



## ISSUE NOTE

Prepared for the Green Growth and  
Sustainable Development Forum 2013

SESSION 3:

**HOW TO UNLOCK LAND  
TRANSPORT INVESTMENT  
TO SUPPORT GREEN GROWTH?**

**ISSUE NOTE**

**“HOW TO UNLOCK LAND TRANSPORT INVESTMENT TO SUPPORT GREEN GROWTH?”**

**SESSION 3, 2013 GREEN GROWTH AND SUSTAINABLE DEVELOPMENT FORUM**

## **OECD GREEN GROWTH AND SUSTAINABLE DEVELOPMENT FORUM**

The Green Growth and Sustainable Development (GG-SD) Forum is an OECD initiative aimed at providing a dedicated space for multi-disciplinary dialogue on green growth and sustainable development. It brings together experts from different policy fields and disciplines and provides them with an interactive platform to encourage discussion, facilitate the exchange of knowledge and ease the exploitation of potential synergies. By specifically addressing the horizontal, multi-disciplinary aspects of green growth and sustainable development, the GG-SD Forum constitutes a valuable supplement to the work undertaken in individual government ministries. The GG-SD Forum also enables knowledge gaps to be detected, to facilitate the design of new works streams to address them.

### **Authorship & Acknowledgements**

This issue note was produced for the 2013 GG-SD Forum to steer discussion around the Forum's theme "encouraging and leveraging private investment for green infrastructure and technologies, including through innovation policies". The authoring team included Stephen Perkins and Philippe Crist from the International Transport Forum, in consultation with the OECD Green Growth Unit headed by Nathalie Girouard. This edition was presented at the annual GG-SD Forum on December 5-6, 2013 in Paris, France. The opinions expressed herein do not necessarily reflect the official views of the ITF and OECD member countries.

## TABLE OF CONTENTS

I. THE CASE FOR GOVERNMENT POLICY ACTION TO UNLOCK PRIVATE INVESTMENT IN SUPPORT OF GREEN GROWTH.....	6
II. INVESTMENT NEEDS .....	7
III. PUBLIC AND PRIVATE INVESTMENT .....	9
Sources of Private Finance for Transport Infrastructure .....	10
Investment in Green Technology .....	12
IV. FISCAL AND REGULATORY FRAMEWORK FOR PRIVATE INVESTMENT .....	13
V. RESEARCH GAPS AND PRIORITIES FOR FUTURE WORK.....	13

## **I. THE CASE FOR GOVERNMENT POLICY ACTION TO UNLOCK PRIVATE INVESTMENT IN SUPPORT OF GREEN GROWTH**

- 1. Transport matters for green growth.** First, transport has major impacts in terms of safety, greenhouse gas emissions, local 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. Second, 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.
- 2. In the transport sector, long-term investment is foremost a public sector issue since long investment cycles and payback periods often discourage private investments.** In times of restricted spending and borrowing, there is also little room in government budgets for transport infrastructure investment. Nevertheless, government support is often needed to mobilise private investment in green growth projects as the risk and uncertainty with non-conventional green infrastructure make private sector investment difficult.
- 3. There is scope for decoupling the environmental impacts of transport from GDP.** Economic development and rising incomes drive demand for transport services. **Decarbonisation can be achieved with a combination of policy options.** Integrated land-use and transport planning/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.
- 4. Regular tightening of fuel economy standards has made the largest contribution to cutting CO2 emissions from the sector to date and tax incentives have been deployed to accelerate progress.** The pace of change set by the regulatory time-table will be a critical part of the policy framework for driving investment in cleaner technologies. With the right policy and regulatory framework, shifting traffic from road and air to rail or waterways can reduce environmental impacts significantly. These circumstances are, however, limited. Rail is only financially viable where traffic density is high; waterways have a geographically limited distribution; and only road transport can reach many points of origin and destination. Thus incremental improvement in performance in relation to GHGs, air pollution and noise will be driven mostly by vehicle regulations.
- 5. Green growth requires coherent cross-sectoral policies to establish transport infrastructure which is suitable for next generation technologies.** An integrated strategy needs to effectively combine economic, environmental and social policy objectives covering demand and supply aspects. An analytically sound measurement framework is also necessary to facilitate the assessment of public investments in support of green growth taking into account long-term economic, environmental and social impacts. A careful assessment is important since many projects with a “green” profile compound investment risks and uncertainties that already characterise more traditional transport sector investments.

## II. INVESTMENT NEEDS

6. **Economic growth, regional economic integration and globalisation drive demand for freight and passenger transport.** Demand generally follows an S curve, saturating eventually. At the global level, the emerging economies will drive the development of transport volumes over the coming century, as they develop through the steepest part of the S curve. Motorised road traffic has 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. Car ownership typically takes-off as average incomes rise through USD 2000 per annum. This is a critical point for policies towards greener growth.

7. **The growth in demand for transport and investment in it will be led by the development of cities.** This trend places a premium on the need to invest in infrastructure for urban transport that creates liveable cities (Box 1)<sup>1</sup>. The International Transport Forum projects that the volume of surface passenger transport in OECD countries (vehicle-kilometres) could rise by about 60% between 2010 and 2050. Outside the OECD, passenger transport volumes could rise four to five times.

8. **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. Everywhere, the priority given to reducing the health impacts and carbon-intensity of transport activity will grow.

9. **There can be competition for financial resources between reinforcement of existing core networks and investment in new infrastructure to shape urban development.** Large cities are the centres of growth in developed countries too and further expansion and/or densification is to be expected, with housing and centres of employment emerging along public transport axes in the periphery. Land use and transport policies have to be coordinated if investment in new capacity in the periphery is not to show substantially lower returns than existing core services. Demographic change, including ageing of the population, can result in major shifts in the location of economic and travel activity in relatively short periods, generating additional investment demands.

### Box 1. Investing in infrastructure for urban transport

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 depends on coordination of bus and para-transit services to provide safe, end-to-end service at affordable prices. Transport hinterlands and administrative boundaries are often very different making coordination difficult. The challenge of ensuring that efficiency determines routes and frequencies, rather than the rents created by uncoordinated allocation of licences, should not be underestimated. 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 to mass transit. They also shape development of the city. Busses remain important throughout the development process. In London, for example, they carry 6 million passengers a day, nearly twice the number carried by the Underground and 6 times the number of commuters arriving and departing from surface rail terminals in the central part of the city.

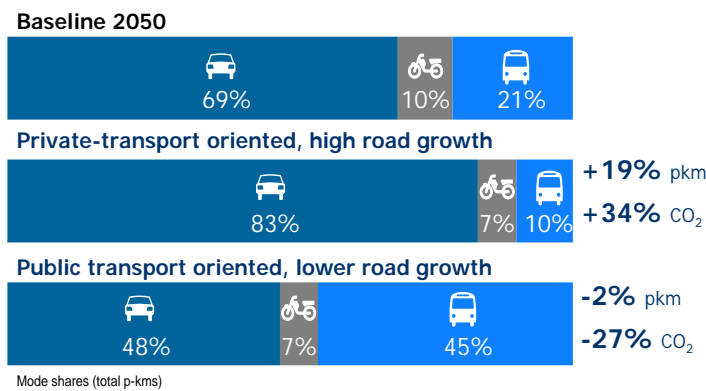
<sup>1</sup> If economic growth falls below the baseline assumed in these projections, the rise in transport volumes will be lower, but not by much in the OECD economies because surface passenger transport demand is less responsive to output growth at high incomes.

The 2013 ITF Transport Outlook examines scenarios for development of urban transport, focusing on middle income countries and 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 CO<sub>2</sub> emissions (Figure 1). Technology for improving fuel efficiency and clean combustion is potentially even more important for cutting CO<sub>2</sub> 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 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 tend to 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 CO<sub>2</sub> emissions in different urban scenarios (2050)**

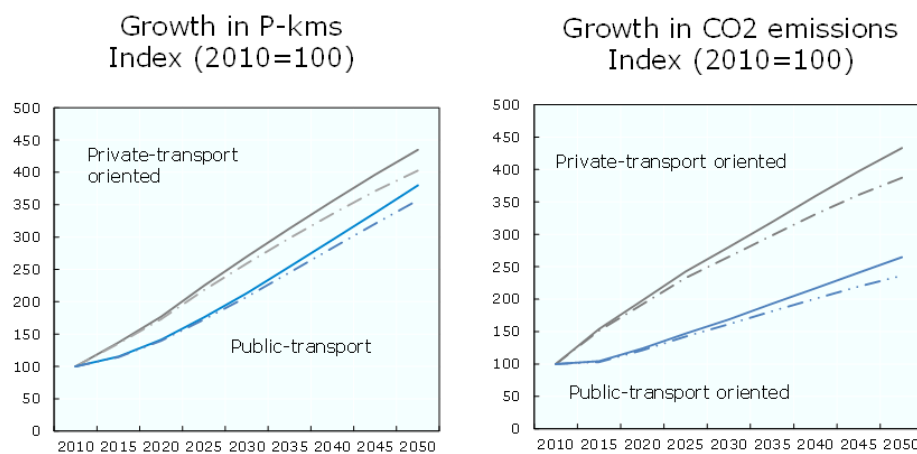
(Mode shares: % of total passenger-kms)



Source: ITF Transport Outlook 2013.

**Figure 2. Evolution of mobility and CO<sub>2</sub> emissions in different urban scenarios (2010-2050)**

(Dotted lines: low road investment variants)



Source: ITF Transport Outlook 2013.

10. **Inter-city public transport concerns mainly buses and rail, whereby rail is only financially viable where traffic density is high.** High speed rail should be viewed primarily as a solution to delivering capacity rather than speed. As energy consumption increases with the square of speed, conventional rail is “greener” than high speed rail. High speed does offer a rail alternative to travel by air over distances up to 800 km. At high load factors high speed rail offers lower emissions of CO<sub>2</sub> per passenger than travel by air or passenger car. At low load factors, rail requires operating as well as capital subsidies and results in more CO<sub>2</sub> emissions per passenger km than transport by air or passenger car, partly because of the relatively large amount of embedded carbon in the infrastructure. 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 (for pure commercial viability twice that number). Investment in high speed rail can thus contribute to green growth where traffic density is particularly high, up to distances of 800 km. This is a significant if relatively small part of the overall passenger transport market.

11. **The private sector has largely carried investment in developing and commercialising plug-in hybrid and pure battery electric vehicles.** 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 to take off. At the same time, the environmental and fuel economy performance of internal combustion vehicles is improving (Crist, 2011). Low-carbon transport strategies in many countries focus on encouraging the uptake of alternative vehicles, and in particular electric cars and charging infrastructure. Passenger cars and powered two wheelers will remain mainstays of passenger transport for the foreseeable future. The vehicle technologies and transport systems for using electricity, hydrogen, ammonia and other energy carriers are being developed ahead of large scale decarbonisation of power/fuel generation and, potentially, to provide storage capacity for intermittent, renewable energy sources.

### III. PUBLIC AND PRIVATE INVESTMENT

12. **Much investment in transport sector infrastructure is funded by the public sector.** Long investment cycles and payback periods with large sunk costs temper private investment. This results, for example, in even commercially profitable high speed rail lines being dependent on partial public funding. 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. Private investment is generally attracted to concessions for transport infrastructure under public private partnerships and similar regulatory frameworks.

13. **Management of revenue risk is central to the financial sustainability of transport infrastructure PPPs.** Risk is priced in private investment, increasing capital costs, but revenue shortfall as a result of over-optimistic demand forecasts is the usual cause of distressed projects. Over and above principal-agent issues, forecasting demand over very long periods is inherently difficult characterised in later periods by uncertainty rather than risk. 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 to initiate a transition to more sustainable transport systems argue for public investment in these areas<sup>2</sup>.

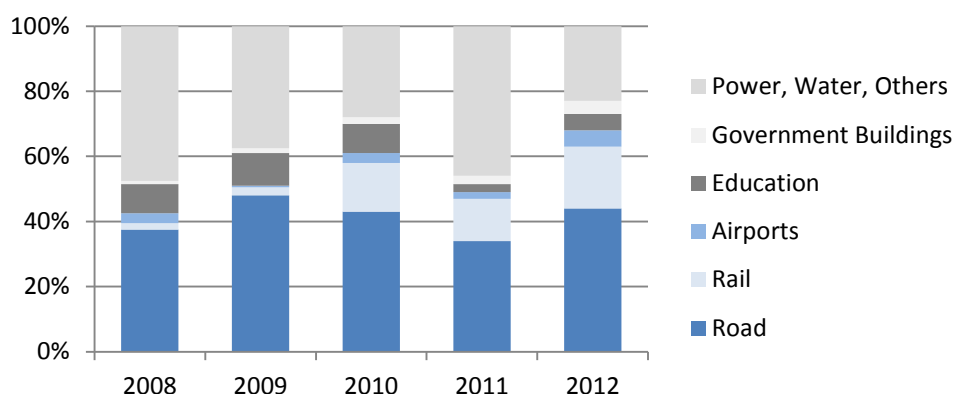
**14. Many governments view investment in green transport infrastructure or in support of electric mobility as a way to stimulate growth.** At the same time, lacklustre growth in many advanced economies limits the ability of authorities to meet their investment ambitions. Recourse to private capital through PPPs has enabled governments to bring forward traditional transport infrastructure projects. Where national accounts have treated PPPs liabilities differently from public spending commitments the effect has sometimes been pronounced. This stimulates interest in using PPPs for funding the transition to more sustainable transport activity.

#### *Sources of Private Finance for Transport Infrastructure*

**15. Accumulation of unsustainable levels of debt is a recurrent problem for most publicly owned railways.** 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. PPPs have accounted for around 20% of overall project finance globally, with half going to transport infrastructure and roads taking the largest share. US freight railways and dedicated mine railways in many parts of the world are financed privately but most rail infrastructure is funded by a mix of operating revenues, public grants and debt backed by government guarantee.

**16. 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. There are different types of equity investor. There are construction companies who make equity investments and are well placed to understand and manage certain types of risk. There are facility management companies that make equity investments and understand long term operating risks but may or may not understand construction 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 risks allocated to it by contract will be passed to the construction or facility management company.

**Figure 3. Breakdown of Global Infrastructure PPP/PFI Investment by Value**



Source: Dealogic Project Finance Review, Full Year 2012.

<sup>2</sup> 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.

**17. 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. Many PPPs involve only “pinpoint equity”, often accounting for less than 1% of finance. This is typical of availability payment based contracts. The use of availability payments rather than tolls reduces revenue risk for lenders and therefore lowers the cost of debt. Tolloed facilities carry potentially more revenue risk, making debt more expensive and requiring a larger equity stake from developers and specialised equity fund investors.

**18. Recapitalisation of banks in the wake of the financial crisis has limited the availability of debt finance, including for PPPs.** Most of the finance in a PPP is extremely risk averse. Only the facility operator and construction companies are willing to take on risk. In the facility operator’s case this is its 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 (ITF 2013).

**19. Securitisation facilitates the access to capital markets.** PPP finance often progresses to a second stage once construction of the infrastructure is complete. At this point the concessionaire issues bonds backed by toll revenues (infrastructure charges in the case of rail). This kind of refinancing is known as “securitisation”. These bonds are often bought by pension funds and insurance funds. The risks at this stage of the project are reduced and securitisation broadens the access of PPPs to capital markets.

**20. The institutional investors still play a relatively minor role.** It is widely held that 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 transportation infrastructure assets. Assessing the risks requires significant resources and only specialised investment funds can 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 then repeated where there is a steady pipeline of projects let as PPPs by the public sector (Sharma 2013).

**Box 2. Who bears the costs of developing urban public transport networks?**

Tolloed PPP contracts create concessions for exclusive exploitation. 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 isolated from existing networks, often politically controversial in urban areas, and the level of charges that can be levied, 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 return consistent profits. These networks 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. The government designates land for transport corridors and development by the MTR which 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. The largest on-going investment of this sort in OECD countries is the £15.9 billion London Crossrail scheme to link western and eastern surface suburban rail networks through a deep tunnel crossing the centre of London. This will link west London to the city centre and the financial centres of the City and Docklands and provide direct access to central destinations for suburban commuters for the first time. It will also significantly expand rail/metro capacity in the central area of London. The Crossrail project is being partly funded through a supplementary tax levied on businesses in London's central business district. 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.

### *Investment in Green Technology*

**21. Investment in electric vehicle markets is risky for both private investors and public authorities.** This is because there is no clear path to an alternative energy future nor on the timing and cost of the transition. There is also competition between technologies and energy carriers (hydrogen, pure electric, plug-in hybrid, biofuels) each supported by government interventions that to some extent exist in isolation. At the same time, improvements in the fuel efficiency of traditional internal combustion vehicles has been robust, accelerated by regulatory requirements and tax incentives, eroding the short to middle-term business case for fossil fuel alternatives.

**22. What are the key policy issues at stake?** Many countries have put in place substantial electric vehicle purchase subsidies (and publicly-backed loans) on the basis of customer interest in electric cars. These are a straight substitute for ICE vehicles in a market that continues to be dominated by privately-owned full size passenger cars. In this regard, will electric vehicles gain market success and if so, what charging network and vehicle technology will prevail? More fundamentally, will the future electric car simply replace its fossil-fuelled equivalent or will the electric vehicle market be largely comprised of small, niche-based two- or three-wheeled, possibly shared-use urban vehicles? These are debatable assumptions given the difficulty electric cars have faced in gaining commercial success and in light of the fact that the current electric vehicle market is dominated by powered two wheelers (Box 3).

#### **Box 3. Private sector financing of the development and deployment of electric vehicles**

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 if and when these technologies meet market success – this was the case with Toyota which bore losses for years before sales of its hybrids took off. 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 motivated Renault-Nissan to invest more than 4 billion euros in developing market-ready electric vehicles. Other car-makers have followed this logic in developing electric vehicles with their own equity. 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.

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 continues 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 attracted over \$ 1.2 billion in private financing but filed for bankruptcy in November 2013. The bankruptcy of Fisker and Better Place underscores the considerable uncertainty regarding electric vehicle business models.

#### IV. FISCAL AND REGULATORY FRAMEWORK FOR PRIVATE INVESTMENT

**23. Government policy action needs to be coherent and properly staged to mobilise private investment without creating market distortions.** As a first step, green growth initiatives in transport could take the form of re-evaluating existing policies to see if they are broadly coherent with government their objectives by, for example, reviewing fossil energy or biofuel subsidies.

**24. 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 need 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.

**25. 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.

**26. 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<sub>2</sub> 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).

**27. Governments will need to ensure a harmonised approach to incorporate these factors into the next generation of energy efficiency/emissions standards.** Such action could help to create certainty for self-financed or equity investments in vehicle markets.

#### V. RESEARCH GAPS AND PRIORITIES FOR FUTURE WORK

**28. Develop a better understanding of the full range of public and private funding models for transport infrastructure investment relevant to green growth** and in particular identify examples of where effective mechanisms have been developed to link private sector funding to infrastructure projects designed to contribute to meeting the goals of sustainable development policy.

**29. Develop a framework for situating public investment and support for private investment in infrastructure among the instruments available to government for establishing efficient conditions for green growth.** The work would identify the market imperfections intervention is intended to address and examine whether fiscal, regulatory or funding instruments are likely to most effective and most cost-effective. It would also take account of the considerations of political economy in assessing which interventions to prefer.

**30. Priorities for investment include investment in infrastructure for urban public transport systems, investment in inter-urban rail in very specific circumstances, investment in alternative vehicle technologies and investment in the infrastructure for alternative vehicles.** The views of panellists and participants will be sought in particular on:

- How can greater priority be given to investment in urban public transport when cost benefit assessment, and financial appraisals generally find higher returns from road investment?
- Under what circumstances can investment in infrastructure to promote modal shift, notably to rail, contribute to greener growth?
- Government support for the development of markets for alternative energy technologies for transport is costly for public budgets and returns on investments are vulnerable to changes in government policy. How durable is support and how long is public support for market development in alternative transport likely to be required?
- Where are the best prospects for investment in alternative vehicles without government support?
- Investment in infrastructure for new transport technologies faces the more traditional issue of managing demand risk over the long periods required to achieve a return on investment in transport infrastructure. Can private finance be attracted to alternative infrastructure or only to alternative vehicles? What kind of government support would help raising capital for investment?
- Where do institutional equity investors see most potential for investment in greener transport and what can governments do to improve the prospects for investment.

## References

EIB (2012) The European PPP Expertise Centre (EPEC) PPP Guide, <http://www.eib.org/epc/g2g/index.htm>, European Investment Bank.

ITF (2013) Better Regulation of Public-Private Partnerships for Transport Infrastructure, International Transport Forum, OECD Publishing.

Crist (2012) Electric Vehicles Revisited – Costs, Subsidies and Prospects, Philippe Crist, International Transport Forum Discussion Paper No 2012-03, April 2012.

Sharma (2013) The Potential of Private Institutional Investors for the Financing of Transport Infrastructure, Rajiv Sharma, International Transport Forum Discussion Paper No 2013-14, May 2013.

Worsley (2011) The evolution of London's Crossrail Scheme and the development of the Department for Transport's economic appraisal methods, Tom Worsley, Institute for Transport Studies (ITS), University of Leeds, United Kingdom, International Transport Forum Discussion Paper No 2011-27, October 2011.

[www.oecd.org/greengrowth](http://www.oecd.org/greengrowth)