Scaling up sustainable transport systems in Rwanda

REPORT

MININFRA

In partnership with

International Growth Centre

Venue: Kigali Marriott

Date: Tuesday 25th February 2020

Contents

Background

Electric mobility is rapidly gaining attraction around the world as an energy efficient solution for transportation of goods and people allowing for the use of renewable energy whilst avoiding tailpipe emissions. Aware of that, the Government of Rwanda (GoR) through its ambitious targets of achieving seamless, green and sustainable transportation, it strives to ensure that safe and environmentally sound transport for goods and people is provided in the country to enable further development, green growth and innovation work and continuous reduction of dependency on fossil fuels in the transport sector.

In the Cabinet meeting on 28th November 2019, MININFRA briefed the Cabinet on an electric mobility project in Rwanda aimed at reducing air pollution. The Government of Rwanda is keen to proceed as rapidly as possible with a transition to electric mobility, and thus the time

is ripe to learn from international experiences of electric mobility about the challenges and opportunities that lie ahead.

Moreover, it will be necessary to finance the infrastructure that underpins sustainable urban mobility, which is especially challenging in neighbourhoods. Rwanda is urbanising rapidly from one of the lowest urbanisation rates on the continent; as a result, there is a need for infrastructure, including roads, to keep up with population growth as urban neighbourhoods expand. Research shows that this urban infrastructure is necessary to underpin economic growth, but it also comes at a high cost. There is a need for greater discussion about options for sustainable financing of local urban roads, that learns from international experience and applies it to Rwanda's context.

Objectives

This workshop aims to bring together a mix of the most relevant stakeholders from the Government of Rwanda, private sector and development partners, to learn and exchange about scaling up transport systems in an environmentally and financially sustainable way. In the morning, this event will explore the findings of the study on introduction of electric mobility in Rwanda, challenges, opportunities, environmental and economic impacts that the Government vision for scaling up electric mobility will encounter as it begins implementation in partnership with the private sector. The afternoon will focus on financial sustainability of local urban roads by exploring options that have worked in other countries and comparing these with the unique challenges faced in Rwanda. Specific objectives may include the following:

- Understand the unique regulatory, institutional and financial challenges for implementation of electric mobility in Rwanda, and discuss a potential road map for implementation
- Understand the likely economic and environmental impacts of a transition to electric mobility in Kigali
- Learn from international experiences of scaling up electric mobility solutions
- Discuss the unique challenges in Rwanda related to local urban road financing
- Learn about various options for financing local urban roads that have worked internationally
- Discuss how these financing options may be applied to Rwanda
- Catalyse unanticipated valuable discussions and collaborations between stakeholders

Agenda

Part 1: Scaling up electric mobility solutions: challenges and opportunities

Electric mobility: vision, challenges and opportunities *Moderated by Liliane Mupende, Independent Consultant*		
Time	**Activity**	**Session Lead**
8:00 – 8.30	Arrival and registration of participants	MININFRA/IGC
8:30 - 8:40	Opening remarks	Senior official/MININFRA
8:40 – 8:50	Welcome remarks	Richard Newfarmer, Country Director, IGC Rwanda & Uganda
8:50 – 9:10	Government of Rwanda: policy and vision for electric mobility	Alfred Byiringiro, Transport Division Manager, MININFRA
9.10 – 9:35	Transition to e-mobility solutions: a road map	Jit Bajpai, Adjunct Professor, Columbia University & Consultant, IGC
9:35 – 9:45	Electric mobility services for complete streets in Addis Ababa	Phillip Rode - Executive Director of London School of Economics Cities and of the Urban Age Programme
9:45 – 9:55	Transport system design and urban e-mobility solutions for City of Kigali	Christopher Kost, Africa Program Director, Institute for Transportation and Development Policy
10:00 – 10.30	Discussion	All participants
10:30 – 10:50	**Coffee break**	
Scaling up electric vehicles *Moderated by Inhee Chung, Country Representative, Global Green Growth Institute*		
10:50 – 11:00	Introduction to Ampersand electric motos	Josh Whale, Founder & CEO, Ampersand
11:00 – 11:10	Introduction to Safi electric motos and Gura electric bicycles	Tony Adesina, Founder & CEO, Safi and Gura
11:10 – 11:20	Introduction to Rwanda Electric Mobility	Donald Kabanda, CEO, Electric Mobility
11:20 – 11:40	The economic impact of mass introduction of electric motorbikes in Kigali: preliminary results	Andrew Sudmant, Research Fellow, School of Earth and Environment, University of Leeds; Centre for Urban Transitions & Consultant, IGC
11:40 – 11:55	Electric Vehicle Value Chain Development – an ecosystem approach to accelerate adoption of e-mobility and financing to support solutions to scale	Emma Stephenson, Business Development Advisor, Shell Foundation

11:55– 12:40	Panel Discussion	Speakers
12.40 – 1.00	Discussion	All
1.00 – 2.00	**Lunch break**	

Part 2: Financing Neighbourhood Roads in Rwanda's Cities

Financing urban roads *Moderated by Liliane Mupende, Independent Consultant*		
2.00 – 2:20	Government initiatives to finance neighbourhood roads and associated challenges	Alfred Byiringiro, Transport Division Manager, MININFRA
2.20 – 2:50	Urban road funding options	Jit Bajpai, Adjunct Professor, Columbia University & Consultant, International Growth Centre
2:50 – 3:05	The role of PPPs in road financing	Koen van Baekel, Financial & Strategy Advisor for Infrastructure and Transport Sectors, Rebel Group
3:05 – 3:25	Street designs for neighbourhood roads	Alphonse Nkurunziza, Transport Planning Consultant, Institute for Transportation and Development Policy
3:25 – 3:55	Group discussions	Facilitated by Dan Smit, Team Leader, Rebel Group Kigali Master Plan project
3:55 – 4:05	**Coffee break**	
4:05 – 4:40	Groups report back to plenary; final comments from speakers	Facilitated by Dan Smit and Liliane Mupende
4:40 – 5:00	Closing remarks	MININFRA

Recommendations

1. **Start an e-mobility task force and consider including high capacity transport and NMT**: MININFRA should establish an Electric-Mobility task force or thematic working group, as a consultative mechanism that can help solve problems related to scaling up electric mobility and monitor ongoing progress. Some considerations for the task force are as follows:
    a. To address sustainability and transport emissions in a more holistic way, the task force might include a focus on complete streets, high capacity transport such as bus and bus rapid transit (which can transport 15 times more passengers than roads for cars), and non-motorised transport including walking and cycling.
    b. To implement joined up governance, the task force should include central and local government especially City of Kigali, NGOs and the private sector as a core player, and should incorporate transport, energy, health and urban planning stakeholders.
    c. To be responsive to markets and communities, which is an essential element of eventual success, the task force should incorporate market research and community consultation.
    d. The task force might consider working through these workshop recommendations and incorporating in some way the Shell Foundation themes of innovation and fast iteration, incentives and financing, collaboration, and customer focus.
2. **Design and implement complete streets alongside the e-mobility scale-up**: E-mobility should be incorporated into a city-wide mobility plan that deals with licensing, parking, charging locations, regulations, mobility oriented development and transport nodes. Relatedly, the introduction of electric mobility needs to be coupled with building complete streets that host mass transport, BRT and mass-transport, especially buses and Bus Rapid Transit, to better achieve green transportation – for instance bus rapid transit and dedicated bus lanes, and complete streets.
3. **Test e-mobility regulations and learn with the private sector:** Government of Rwanda (GoR) should work with the task force to develop policy and technical and environmental standards for e-vehicles and charging infrastructure, and pilot them in a regulatory "sandbox" to test them with companies before implementation, as a learning process – this would help agree common standards to enable interoperability and sharing of data.
4. **Design and implement demand and supply side fiscal and non-fiscal incentives**: Adopt & monitor a long-term policy framework covering fiscal & non-fiscal incentives to move more people using clean modes. On the demand side this might include subsidies & lowering or exemption of taxes, provision of parking, provision of a EV driving lane on complete streets, low off-peak energy tariff, dense land development, demand management pricing and fuel efficiency standards. On the supply side this might include investments and standards for assembly & localization of components, reuse of batteries, R&D, standardization of charging, protocol for data sharing, reduced taxes for EV industry actors, and power grid adequacy. Carefully consider private sector requests for incentives

including lowering import duties to zero, including reducing the VAT reimbursement period from over 9 months to under 30 days, assistance with work permits to allow in-country employment of skilled foreign staff, and research.

5. **Have a special electricity tariff for e-mobility**: The current electricity tariff, at 0.277 USD/kWh, is higher than the global average of 0.15 USD/kWh. Participants recommended the provision of a special electric tariff dedicated to electric vehicles to assist in the financial viability and impact of the sector; in the longer term GoR should work towards a reduction in the national electricity tariff.
6. **Design charging infrastructure, battery swapping stations and bike share infrastructure in a coordinated way**: GoR should work in a joined up way across transport, energy and land use planning at national and local government levels, and with electric mobility companies and investors, to plan, allocate land for, and standardize charging infrastructures, bike share infrastructure and battery swapping stations so that they are efficient, harmonized, and interoperable, and so that their roll-out is data-driven and in line with the number of users. Charging infrastructure should be provided in strategic and high demand areas and should plan for parking. Consider approaching the UK's Charge Infrastructure Investment Fund or other grant funding.
7. **Seek and take full advantage of internationally available funding - grants and concessionary loans –- to assist with scale up of e-mobility and NMT**. To scale up e-buses, financing support for vehicle purchase will be needed because their unit cost is higher, but their operating costs are lower. Loans for sustainable leasing programmes for e-bike share schemes may also be needed. Various international green funds exist that may be able to assist with scale up of e-mobility and NMT, and the task force should search for, engage and utilize these funds. E-moto companies need asset financing for moto drivers, debt finance for Capex, letters of credit/revolvers for inventory, grants and technical assistance.
8. **Recycle the batteries**: GoR and the task force should work out a strategy for recycling electric vehicle components, that engages investors and the private sector.
9. **Build skills necessary for e-mobility jobs**: Electric mobility firms should continue to work with TVET and other government initiatives to build capacity to do the various jobs that e-mobility will create– riders, technicians, mechanics, manufacturers, charging station attendants and others.
10. **Consider a vehicle-km tax for e-vehicles**: Introduction of e-motos would decrease tax revenue from fuel levies, that are currently used for road maintenance. The Government should explore options including the benefit-cost ratio of a vehicle-kilometre tax for e-vehicles, which uses GPS to track distance travelled and calculates tax accordingly, as well as parking fees.
11. **Work to capture the value created by infrastructure investments**: When the government invests in infrastructure, it should capture the value that its investments create in private properties. Value capture is an attractive idea but difficult to implement; so its implementation in Rwanda needs to be given due commitment, thought and resources.

Land readjustment should be piloted and scaled up on greenfield land outside urban areas. The property tax, should be carefully and strongly implemented, to create a virtuous circle of revenues followed by value creation through infrastructure, followed by increased revenues, as Rwanda's cities urbanise.

12. **Frontage fees should be explored for neighbourhoods that want to upgrade their roads**: Frontage fees, filtered through some market segmentation based on ability to pay, along with social pressure to pay or a compulsory element, should be explored in cases in which neighbourhoods want their roads to be upgraded and these roads directly pass property owners' plots. Neighbourhoods can contribute money, labour, land or materials that can help with road building.
13. **Public Private Partnerships are costly and not generally appropriate for neighbourhood roads.** PPPs may work for roads with a high volume of "captive" traffic such as airport roads, but any toll charges should be kept down through cheap or absent land expropriation and must have the consent of the population. PPPs result in deferred payments by government or citizens, at a cost which gives the private sector sufficiently high return at sufficiently low risk, so where they are employed, great care must be taken to ensure value for money for the public.
14. **Consider establishing a neighbourhood development revolving fund**: GoR should consider establishing a "neighborhood development revolving fund" to fund the upgrading of neighborhood roads in Rwandan cities. Funds can be collected/gathered from:
    - Property tax revenue, possibly a defined portion
    - Real estate developers
    - Community contributions e.g. from frontage fees
    - Grants, for instance green funding for NMT
    - Central government transfers

Photos from the workshop. Top photo left to right: Panel, green bike from Safi, and red bike from Ampersand. Bottom photo: swiveling left from the top photo. Attendees totaled around 48.

Session 1: Electric mobility: vision, challenges and opportunities

Moderated by Liliane Mupende, Independent Consultant

Government of Rwanda: policy and vision for electric mobility
Alfred Byiringiro, Transport Division Manager, MININFRA

Alfred Byiringiro described electric mobility as a hot topic and noted that the President had stated publicly that moto-taxis should be fully electric. As of April 2019 there were 221,000 motor vehicles excluding those owned by security organs; of which, 52% are motorcycles. Vehicle registration is growing by 12% annually. Transport is a huge contributor to GHG emissions in Rwanda. SWECO conducted a study on the introduction of electric vehicles in 2019, finding – as demonstrated in Figure 1, that electric buses are more expensive than diesel buses and the capex required is four times more expensive.

Figure 1: Cost (Euros per year) of electric bus types vs diesel buses (SWECO 2019)

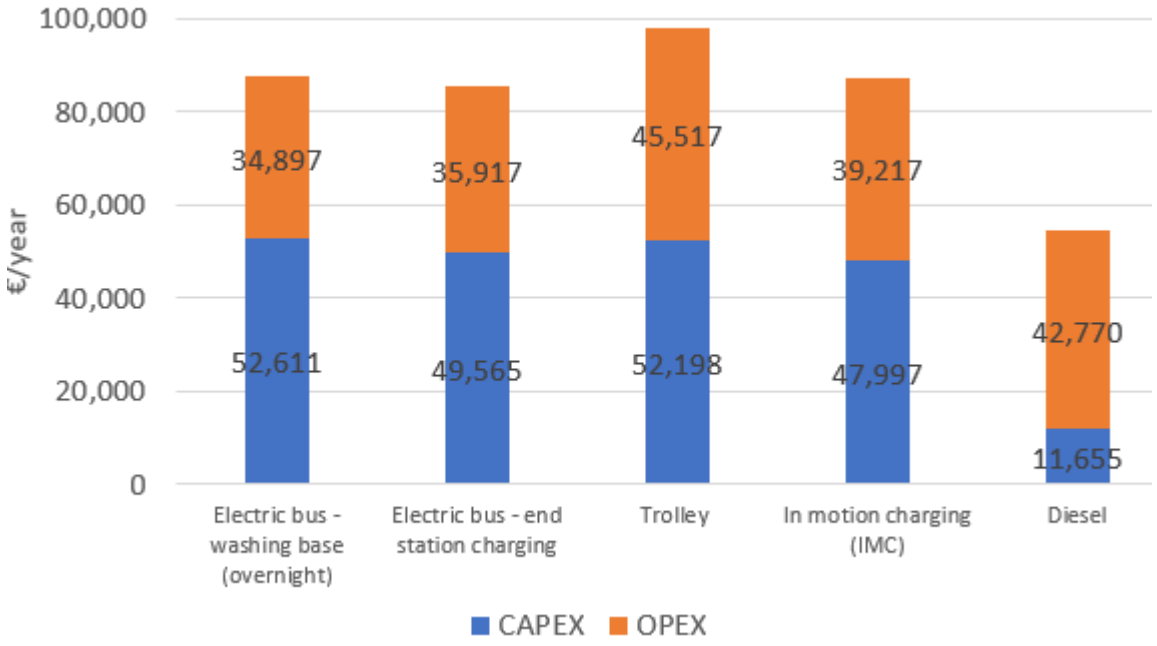


Figure 2 shows that the cost of electric car needs to decrease by around 15% to reach the same life cycle cost level as the fuel taxi. Figure 3 shows that the overall cost of electric motorcycles is slightly higher than the fuel ICE motorcycle.

Figure 2: Cost of electric taxi vs Internal Combustion Engine cars (SWECO 2019)

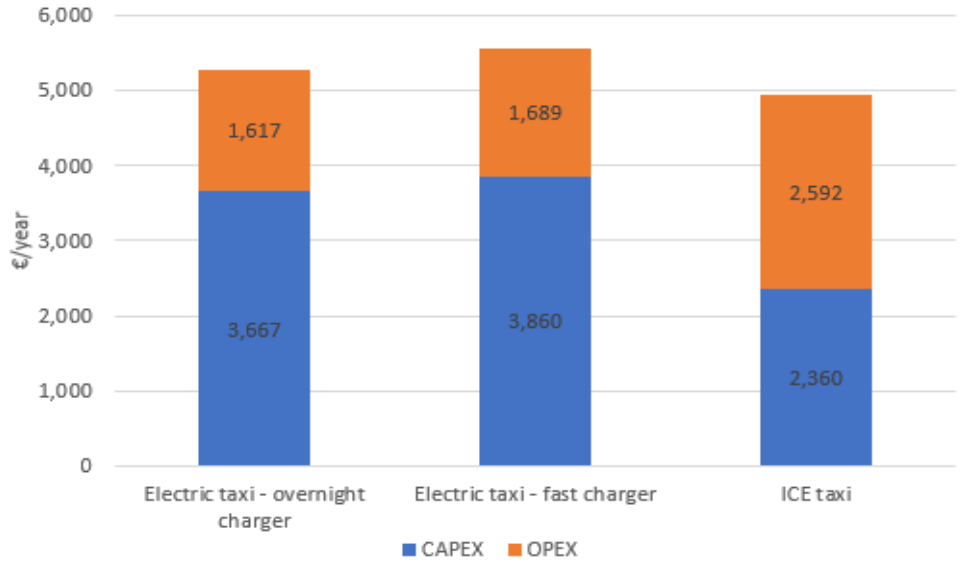
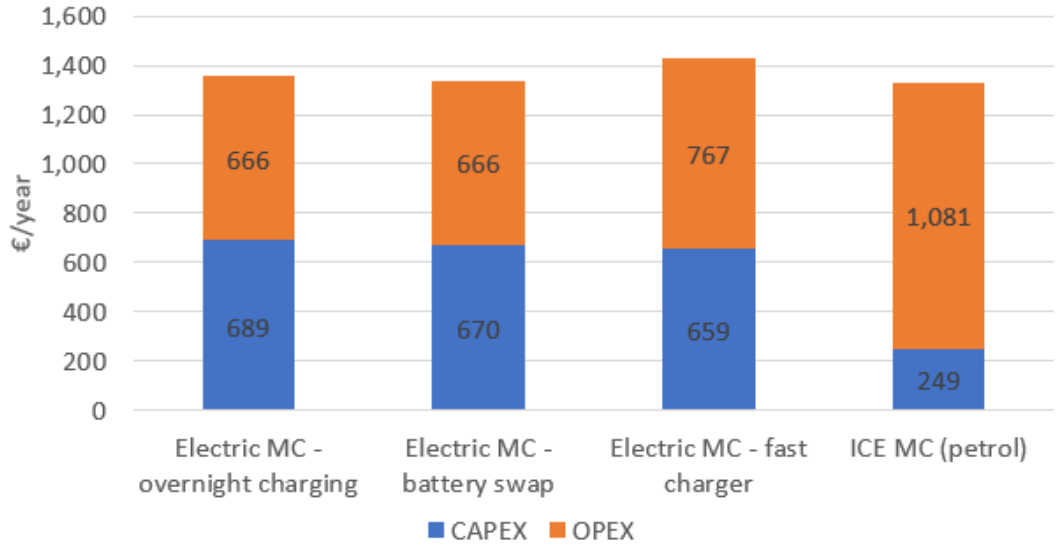


Figure 3: Cost of electric motorcycle vs petrol motorcycle (SWECO 2019)



The SWECO study recommends that Rwanda aims to have 30% of motorcycles as electric by 2030; 8% of cars (including jeeps), 20% of buses, and 25% of electric taxi and mini/microbuses. The study recommends that the government reduces import tax and exempts VAT, and applies an industrial electricity tariff to charging stations, in order to incentivise uptake of electric vehicles. The study recommends an action plan with short term elements (2019-2024) – establishing the right conditions; medium term elements (2024-2030) - scaling up, and the long term element from 2030 onwards, of having electric mobility an integrated part of the transport system. Byiringiro's recommended policy actions are:

- Develop technical standards for e-vehicles, including environmental standards and regulations for the recycling of batteries and electronic waste.
- Provide incentives for electric mobility users and early adopters.
- Document experiences from demonstration projects on electric mobility.

- Develop sound business models for charging infrastructure and vehicles.
- Develop plans for the efficient placement of charging infrastructure.
- Improve the reliability of the electric grid.
- Establish a protocol of cooperation with countries and companies to facilitate technology transfer related to electric vehicles.

Transition to e-mobility solutions: a road map
Jit Bajpai, Adjunct Professor, Columbia University & Consultant, IGC

Professor Jit Bajpai asked two questions: What are drivers of e-mobility transition in countries? And how are countries nurturing this transition? He noted that the following factors shape the future of e-mobility: environment & economy, technology, regulations, consumers and businesses. Emissions targets are falling for vehicles between 2015 and 2025 and are stricter in Europe than in China and the US. In the US, car e-technologies are responding to emission targets, and manufacturers are making cars with lower emissions that meet the ever-lowering target. Examples of electric vehicle use include Nissan Leaf Club in Jordan, extensive use of electric three-wheelers in India, and Safa taxis in Nepal. People are currently struggling with range: the Deloitte Global Automotive Consumer Survey (2018) found that range was the biggest concern in four out of ten countries, but range will increase in future. Forty or fifty percent of the cost of a car is in the battery, but prices are declining fast.

India has EV targets of 70% of commercial cars, 30% of private cars, 40% of buses and 80% of two and three wheelers by 2030. It is offering incentives worth 1.4 billion USD over three years: goods and service tax on EVs are being reduced from 12% to 5%, and chargers from 18% to 5%; subsidies are also on offer. There is potential for a 64% cut in passenger mobility-linked energy demand and related oil imports, and a 37% reduction in CO_2 emissions.

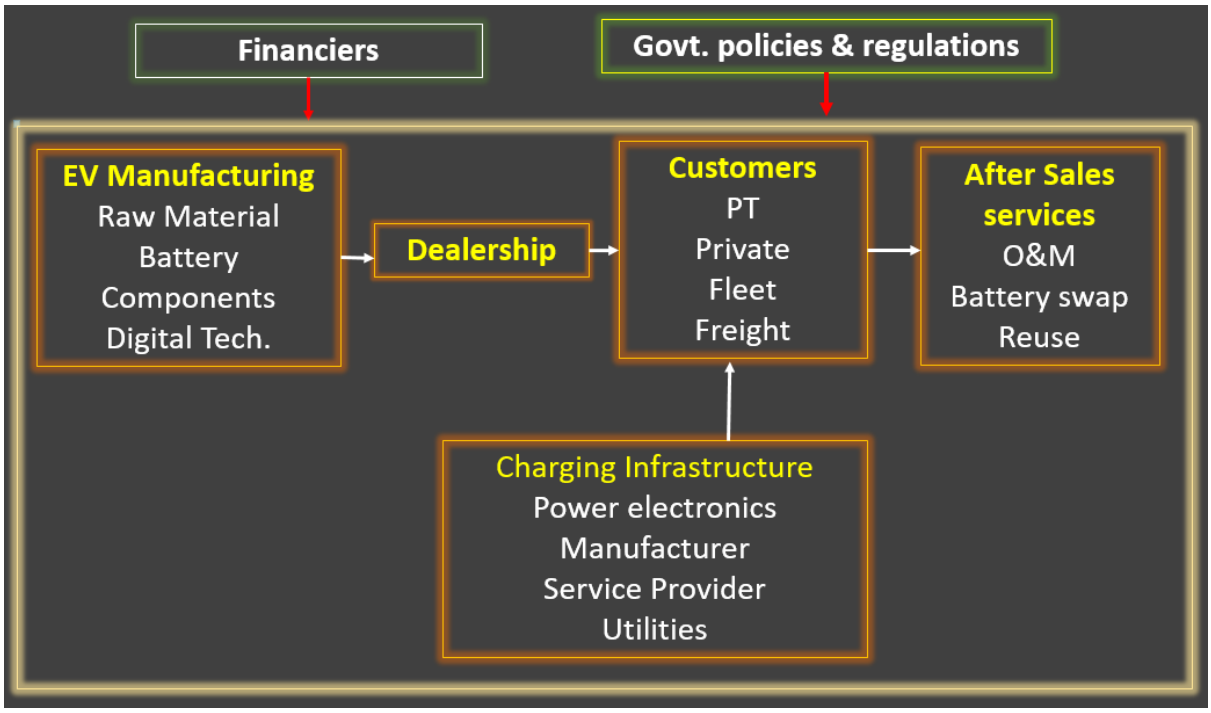
The total cost of owning a private e-car in India is 37% higher than the cost of a private diesel car. However, for commercial vehicles, the cost increase is lower at 12%. BS-VI is a new standard that will be implemented that will make commercial e-cars cheaper than diesel cars. Total cost of commercial two-wheelers is cheaper than for Internal Combustion Engine (ICE) scooters. There is a big push for 3 wheelers in India. By 2030 battery price will come down to 83$/kwh from a much higher current level; assuming this level, over a five year life cycle, a private electric car will represent a 4.1-fold reduction in terms of the import burden, compared to an ICE car, and a commercial car will represent a 5.7-fold reduction. However, EV in India is not very clean because of the way electricity is generated: the reduction in CO_2 emissions is low at 12% given current trends, but could rise to a 16% reduction if renewables form a higher percentage of electricity generation.

Charging infrastructure is a challenge but the Dutch have done a good job with installing charging stations according to data-based planning. The increase in the number of charging stations has kept the ratio of users to charging stations fairly constant between 2014 and 2019.

The ecosystem of EV, shown in Figure 4, is the most important thing, because the pace of E-mobility transition will depend upon the way a country nurtures its supporting eco-system.

Collaboration across national and sub-national agencies is needed to nurture a healthy ecosystem and policies

Figure 4: Major Components of EV Ecosystem



The business models for EV are evolving very fast. New partnerships are emerging – between auto manufacturers, battery manufacturers and original equipment manufacturers; battery manufacturers and original equipment manufacturers; government agencies, private services and property owners; auto industry and sharing companies; charging companies, gas stations and property owners. Various small battery swapping options are merging for e-scooters and three-wheelers.

Bajpai finished by outlining policy recommendations and actions to build a connected EV and shared mobility future:

- Identify market segments ready for adoption
- Provide charging infrastructure at strategic & high demand areas (smart charging, building & zoning codes, parking mgmt., battery swapping.)
- Undertake demonstration projects to internalize lessons
- Integrate commercial services in city-wide mobility plan (licensing, parking, charging locations, regulations, mobility oriented development, transport hubs/nodes)
- Adopt & monitor long-term policy framework covering fiscal & non-fiscal incentives to move more people using clean modes
    - **Demand side:** subsidies & lowering or exemption of taxes, provision of parking, EV driving lane, low off-peak energy tariff, dense land development, demand management pricing, fuel efficiency std. etc.
    - **Supply side**: assembly & localization of components, reuse of batteries, R&D, standardization of charging, protocol for data sharing, reduced taxes for EV industry actors, power grid adequacy, skill development

Electric mobility services for complete streets in Addis Ababa
Phillip Rode - Executive Director of London School of Economics Cities and of the Urban Age Programme

Dr Phillip Rode described the accessibility nexus between transport policy, urban planning and social policy, referencing issues that connect them including facilitation of movement, physical connectivity, physical proximity, inclusive land use, social inclusion and equitable travel. He showed a graphic that illustrated that cars take up road space whether they are conventional, electric or autonomous, and one important challenge is to change from cars to other more space-efficient modes of transport, given that urban densities are high and increasing in a city such as Addis Ababa.

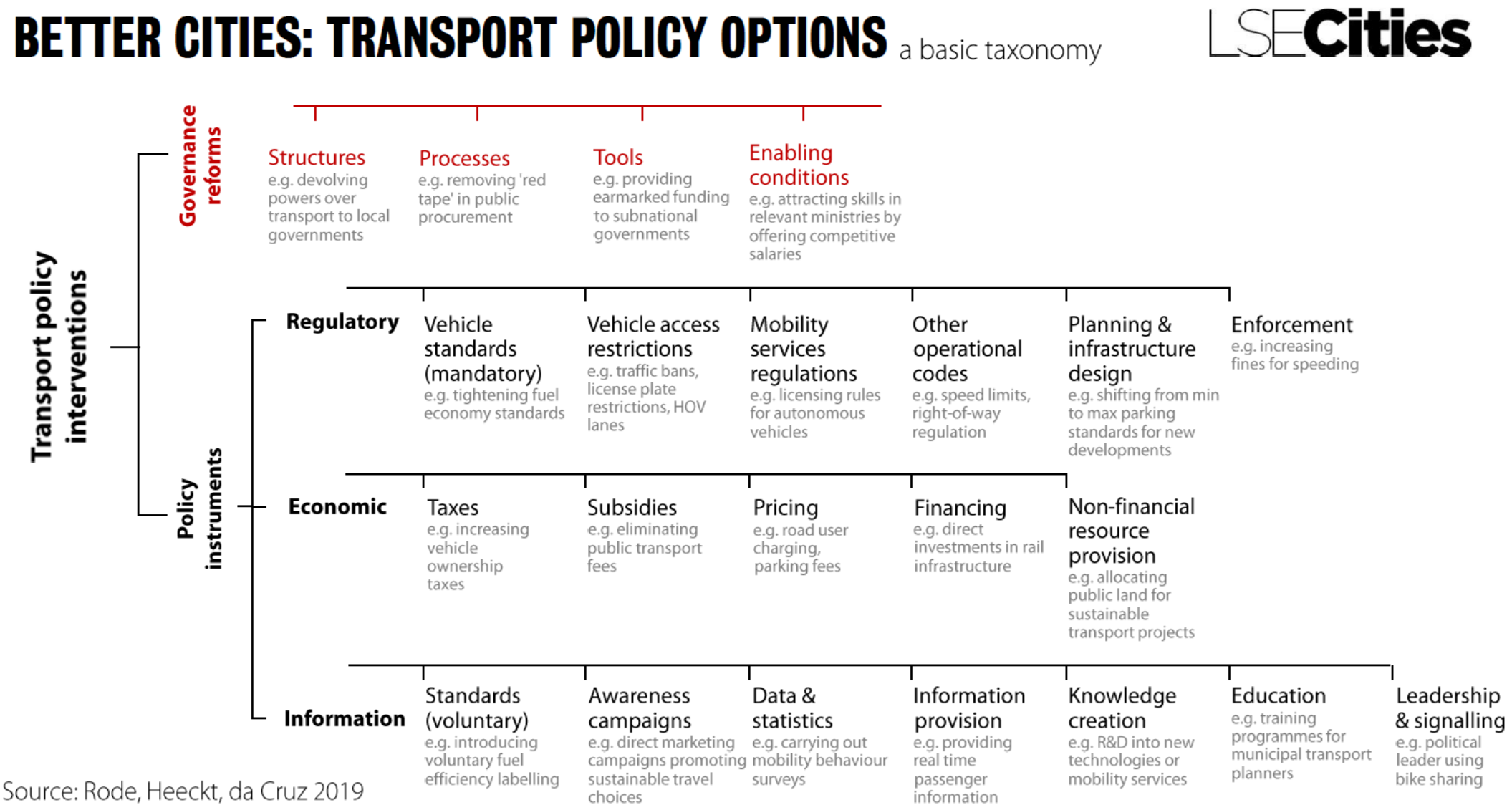
Rode showed a graphic of bus routes in Addis Ababa that illustrated that a great number of housing units do not have access to bus routes. There is a need for higher capacity mobility given the current reality in parts of Addis Ababa of congested, inefficiently laid out streets and means of mobility. Digitalisation is spreading throughout the African continent; one example of an opportunity digitalization could offer to increase capacity of low-emissions mobility is an electric digital van service, for which routes and seats can be booked and paid online, flexible routing is possible and the passenger who has booked would have a guaranteed seat. The Addis Ababa Mobility Survey showed that 65% of affluent people or people who own private cars would consider testing the digital van service for their daily journeys, although 57% of the same group said they were not open to selling their cars.

The Addis Ababa Mobility Survey showed that on the positive side, the digital van service can reduce urban mobility stress, it is an enjoyable service, easy to use, enables the user to work or read on the go, it is safe and has a positive image; on the negative side its perceived service coverage is low and it is difficult to move with children or luggage. Relevant considerations for scaling this up include the fact that the existing digital taxi service is very attractive; waiting times for public transport push people towards car use; and there are significant levels of walking even among car users.

Rode finished by presenting the following graphic in Figure 5 overleaf, which shows a useful taxonomy of transport policy options including governance reforms of structures, processes, tools and enabling conditions; as well as policy instruments including regulatory, economic and information instruments.

In the plenary questions, Rode stated that scaling up mobility requires joined up governance. In addition to the technical side, experience across various countries has shown that it is necessary to work with civil society, develop a clear sense of local residents and do market research. Early feedback is important so that the EV strategy is aligned with what the market wants.

Figure 5: Taxonomy of transport policy options (Rode, Heeckt & da Cruz 2019)



Transport system design and urban e-mobility solutions for City of Kigali
Christopher Kost, Africa Program Director, Institute for Transportation and Development Policy

Christopher Kost made a case for designing roads around public transport and non-motorised transport rather than cars; car-oriented transport involves time wasted, buses stuck in traffic, and cars competing with public transport, resulting in congestion. Kost showed the following picture of a complete street in Dar es Salaam, showing a pedestrian lane, a cycle lane, a lane for cars and a lane for buses.

Figure 6: Complete street in Dar es Salaam

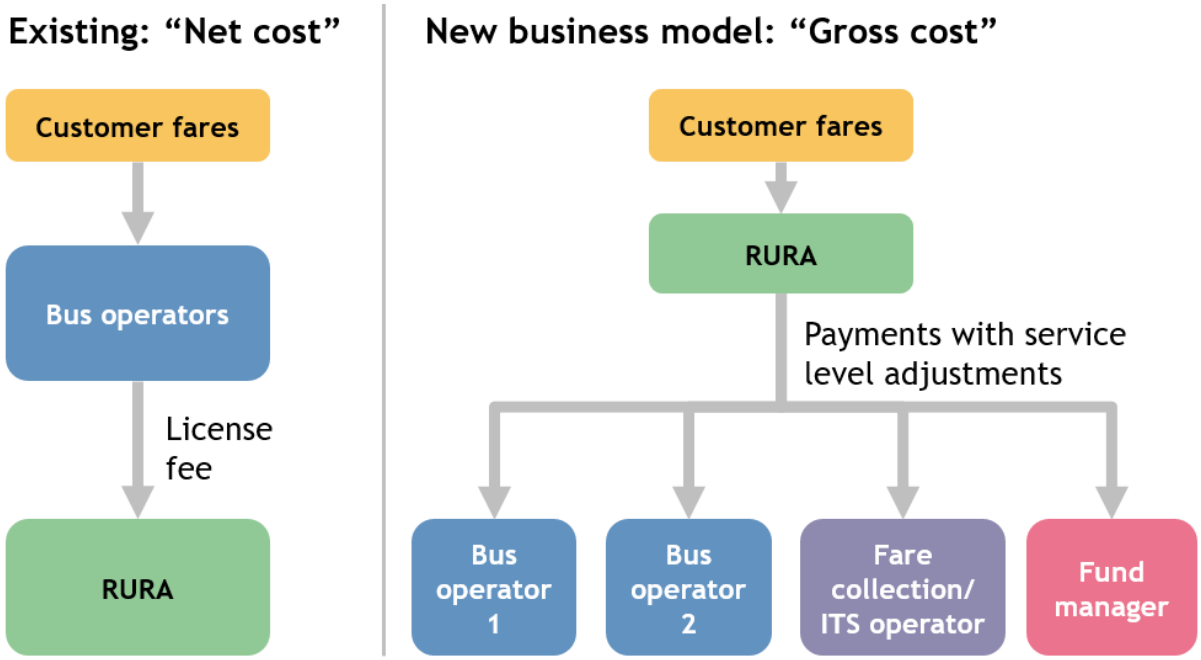
Kost laid out a vision for Kigali of 200 kilometres of complete streets, 4000 shared cycles, 500 high-capacity, high quality buses and 20-30km of rapid transit. He gave images illustrating that many of Rwanda's urban streets do not include dedicated space for the many pedestrians who walk them. Electric bikes and bike share would be especially suited to provide last-mile access to public transport given Rwanda's topography. Bike share has improved access for short trips and provided an expanded user base in Marrakech. The only other point we might add is that electric bikes could improve access in the bikeshare system given Kigali's hilly topography.

The Kigali bus reform process has some achievements: consolidating into operating companies, an improved fleet and automatic fare collection; however, buses tend to wait

until they are full to leave, leading to irregular journeys; there are queues due to lack of peak-hour service, there is overcrowding on some routes, and this results in a loss of customers to moto-taxis and cars.

A new business model is possible in which bus operators are paid per km and there is regular monitoring of service quality by the government. Kost proposed a gross cost model, in contrast to the current "net cost" model in which customer fares go to the bus operators who then pay a license fee to Rwanda Utilities Regulatory Authority (RURA) The gross cost model would involve customer fares being paid directly to RURA, who would then pay the service providers according to service levels.

Figure 7: Flow of payments in the net cost vs gross cost model



Advantages of the gross cost model include: improved road safety and customer service because of change in operator incentives; the bidding process yields a revealed cost of bus operations; the government can make decisions on fare levels and service planning without the need for lengthy negotiations with operators; and the government can facilitate adoption of e-buses more easily.

Electric buses are more expensive to buy than diesel buses but have a lower operating cost; their lifecycle cost is only slightly higher as a result. E-buses also have a lower cost than compressed natural gas buses. There is thus a need for financing support for vehicle purchase.

Kost finished by making a strong case for the higher capacity of dedicated lanes for bus rapid transit, which can transport 12,000 to 45,000+ people per hour per direction compared to a three-lane carriageway which can transport just 3000 people per hour per direction. This demonstrates that wider roads are not a long-term solution to congestion. He advocated for compact development along public transport corridors – transport-oriented development. He concluded by stating that cities built with bus rapid transit, for people, are denser, cleaner, less polluted, safer, quicker and offer better quality of life, than cities built for cars.

Session 2: Scaling up electric vehicles

Moderated by Inhee Chung, Country Representative, Global Green Growth Institute

Ampersand: sparking mass market electric transport in Africa

Josh Whale, Founder & CEO, Ampersand

Josh Whale stated that boda bodas are the backbone of mobility in Rwanda but are dirty and expensive to buy and operate. Sixty percent of vehicles in Rwanda are boda bodas and there is a high density of vehicles with 30,000 in a 12 km radius in Kigali. Rukondo is Africa's first e-moto driver and rides 170-190km per day, for 12 hours a day, 6 days per week. He rides 60,000 km per week. Fuel would normally cost him 5.10 USD per day, and the net margin for the day's work would be 1.60 USD. The Ampersand bike is more powerful, durable and can save drivers billions, and "it just happens to be electric". Whale gave the numbers presented in Figure 7, showing that the take home pay can increase from 1.74 USD per day to 3.61 USD per day.

Figure 8: Ampersand bike value proposition compared to petrol bike

PETROL		AMPERSAND	
Daily Trip Revenue	$13.50	Daily Trip Revenue	$13.50
Cost of Lease per day	$5.84	Cost of Lease per day	$5.56
Daily Fuel Spend ($1.16/litre)*	$4.24	Swap Expenses (188km @ $1.84/charge)*	$3.18
Daily Cost of Maint. (incl. Oil change)	$1.49	Daily Cost of Maint. (with Service contract)	$0.95
Co-op Fees	$0.20	Co-op Fees	$0.20
Daily Total Expenses	$11.76	Daily Total Expenses	$9.89
Take-Home - Daily	$1.74	Take-Home - Daily	$3.61
Take Home Annual	$586.55	Take Home Annual	$1 220.77
		Net Value Proposition per annum	$634.22
		Percentage net benefit to Drivers	108%

*Assumes 157 km per day (43km/litre for petrol, 91km range per battery swap)

Most of the savings (56%) come from lower energy costs, some (29%) come from lower cost of maintenance and 15% comes from a cheaper bike lease.

Replacing gas bodas with Ampersand has major environmental advantages: Per passenger km, bodas create 16x more pollution than cars. Transportation accounts for nearly 50% of pollution in cities like Kigali. Rwanda will have a 20% power surplus by 2024, giving us plenty of electricity to use. Power surplus hurts grid profitability, so Ampersand helps solve an infrastructure problem while capitalizing on available resources.

Ampersand has operated in Rwanda since 2016 and has a 7000 driver waiting list growing daily. Its e-motos have clocked up 400,000 km on the road. The company has performed 10,000 battery swaps. It is ready to scale. Money is one factor needed for growth:

Figure 9: Ampersand graphic

Ampersand needs 60 million USD. It needs working capital for asset financing for drivers, debt finance for CAPEX, letters of credit and revolvers for inventory. It needs grants, and it needs technical assistance and research.

Another factor that may help or hinder growth is policy: the electricity tariff is high at 0.277 USD/KWh compared to the global average of 0.15. Whale proposed to reduce the VAT reimbursement period which is currently greater than 9 months down to less than 30 days, lowering import duties to zero, exempting VAT on EV charging stations, assistance on work permits and clean power through carbon offsets.

Whale finished by arguing that removing fiscal barriers would increase the number of motos on the road by 2025 by 80%, resulting in 95,000 e-motos on the road by then. The largest impact is from the electricity tariff.

Ensuring the success & sustainability of e-mobility in Rwanda
Tony Adesina, Founder & CEO, Safi and Gura

Tony Adesina said that ensuring the success of e-mobility in Rwanda will require a collaborative effort from the Rwandan government, the private sector, Rwandan citizens,

NGOs and other agencies, and development partners. He outlined some challenges that need to be overcome, including difficulty accepting and adopting e-mobility, lack of public awareness, the high cost of electricity tariffs, inadequate infrastructure, inadequate support from relevant agencies, inadequate support from the financial sector, a high accident rate of motorbikes, and a lack of technical skills among staff in Rwanda.

Adesina then sketched some potential solutions to achieve long and sustainable market penetration. He has been working with Rwanda Development Board, MININFRA, RURA and Rwanda Energy Group on a special tariff for e-mobility to mitigate the high cost of charging as an incentive to allow the project take off smoothly. Safi/Gura have also partnered with TVET and drawn up curricula to gradually transfer this amazing and transformative technology to Rwandans. Another solution will be the improvement of infrastructure and increase in electricity generation. Loans for sustainable leasing programmes will be needed from the financial sector. Safi/Gura are pioneering two service centres. They are also proposing a green license plate for electric vehicles.

The e-mobility sector, and Safi/Gura in particular, can create green jobs – including riders, mechanics, technicians, charge station attendants, and others; a recent MOU signed with Kigali Employment Service Center (KESC) through the City of Kigali will help provide readily skilled and trained workers for the industry.

Figure 10: Safi and Gura Graphic

SAFI UNIVERSAL LINK LTD

GURA UNIVERSAL LINK LTD

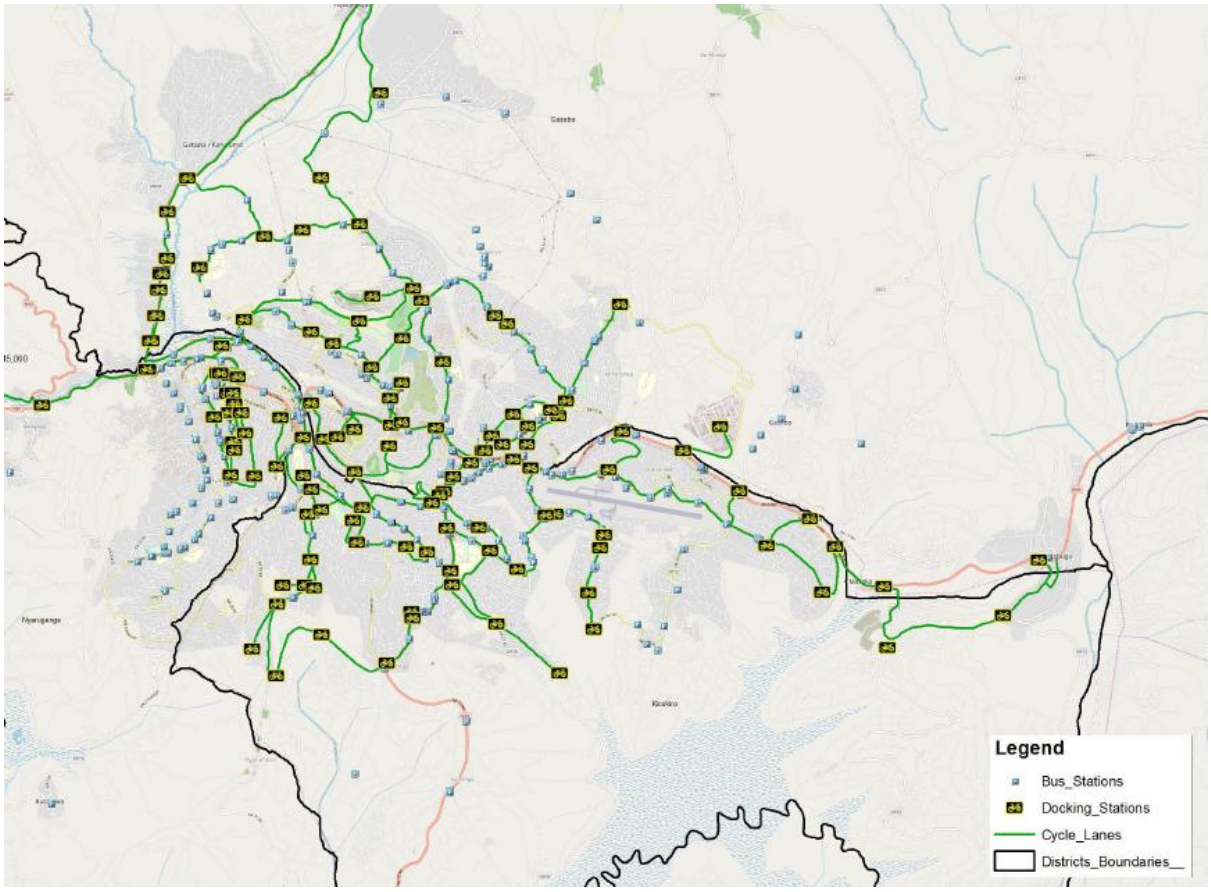
Safi's products and services include deploying EV charging infrastructure, repair and services, a training academy for e-mobility (SUL Academy) to train riders, technicians and mechanics, ride share, retail electric motorcycles, and parts and accessories.

Guraride public bikeshare includes a smart bike, electric bike, electric scooter, scan lock, phone application and helmet. Public bike sharing is affordable, accessible, eases congestion, is environmentally friendly, has health benefits and creates jobs. This has been implemented successfully in various cities across the world – Washington DC in USA, Paris in France, Hangzhou in China, Milan in Italy, and Montreal in Canada.

Gura is piloting a corridor between Gisimenti and Simba Supermarket Kimironko, but has a plan for where the docking stations would eventually go as illustrated in Figure 11.

Adesina finished by stating "Even if 7-10% share of the population of Rwanda adopts the use of bikeshare as their daily means of transportation this will have an enormous positive impact on the ecosystem."

Figure 11: Potential docking stations for Gura electric bikes



Introduction to Rwanda Electric Mobility
Donald Kabanda, CEO, Electric Mobility

Awaiting powerpoint slides

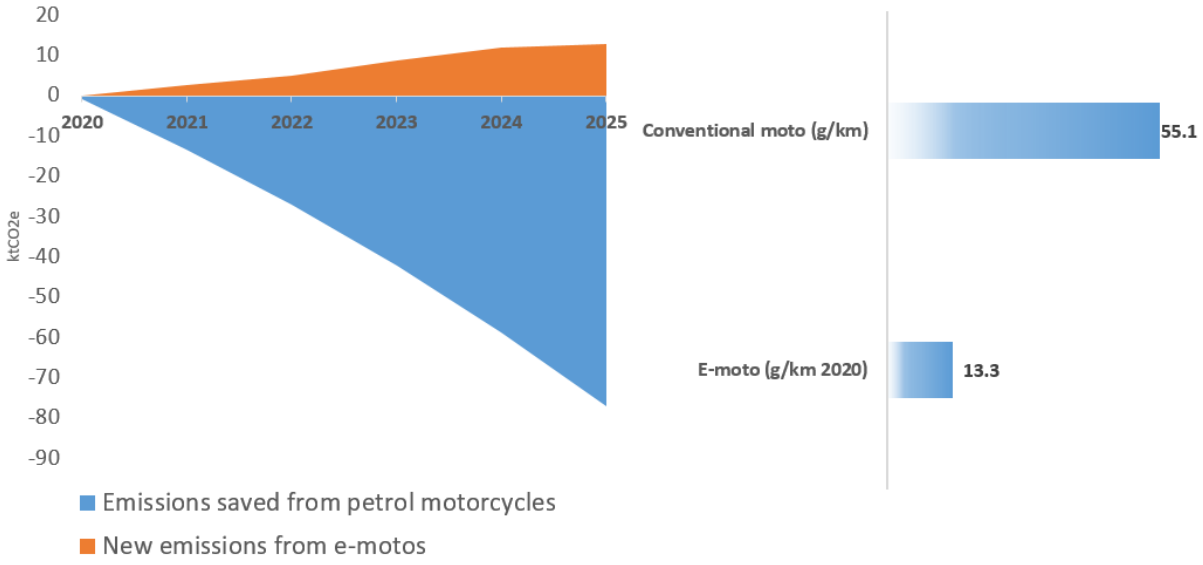
The social, environmental and economic impacts of e-motos in Kigali: preliminary findings
Andrew Sudmant, Research Fellow, School of Earth and Environment, University of Leeds; Centre for Urban Transitions & Consultant, IGC

This study is commissioned by IGC and jointly being authored with Professor Andy Gouldson. Andrew Sudmant introduced the Climate Smart Cities Program at University of Leeds of which he is a part. The program aims to understand the conflicts and complementarities between development needs and climate actions; assess the economic and financial benefits of low carbon action in cities; and measure the scale of 'co-benefits' from climate action, including job creation, benefits to pubic health, and improvements in mobility.

Sudmant presented a graphic showing that with a population of 2.8 million compared to Atlanta's 2.5 million, Barcelona is far more compact and its public and private transport has a far smaller carbon footprint at 0.7 tonnes of CO_2 per person compared to 7.5 for Atlanta. This demonstrates the principle that well designed compact transport-oriented development has a significant impact on emissions and pollution. Rwanda had an estimated 247,000 Disability Adjusted Life Years lost to poor air quality in 2017. Kigali's air quality has an average AQI rating of 62, which is classed as "unhealthy for sensitive groups" and 55 days per year in the city have an AQI rating of over 155 which is classed as "very unhealthy".

Therefore the introduction of e-motos, by reducing emissions and pollution, can have a significant impact on public health – adding 1565 DALYs in 2030. Figure 12 shows that if 100% e-motos is achieved by 2025, the emissions saved by eliminating petrol motorcycles far exceeds the new emissions from e-motos. Conventional motos emit over four times as much CO_2 as e-motos.

Figure 12: 100% e-motos by 2025: Implications for GHG emissions



The financial implications of "100% e-motos by 2025" are 27 billion RWF of increased wages for moto drivers due to lower costs (which could be passed on to consumers as cost savings or retained as wages), but combined with 6 billion RWF of reduced tax revenue.

Sudmant estimates that 100% e-motos will require around 150 mwh daily in 2025. This will also require that a supply chain is developed with employment to build, maintain, service and drive a growing fleet.

In conclusion, the potential for health benefits from a transition to electric motos is large, but further research is needed to provide certainty around the scale and distribution of these impacts. Wider benefits may include:

- increases in earnings for moto drivers (>3500 RWF per day):
- reduced cost of mobility in Kigali helping to better connect people with jobs, services and amenities
- new employment opportunities in e-moto supply and service
- reduced GHG emissions

Challenges include:

- a reduction in fuel tax earnings of the government (6 billon RWF in 2025)
- the need for development of the electric mobility supply chain in Rwanda to build and service a growing demand for vehicles

REVV'D – Regional EV Value Chain Development For East Africa project
Emma Stephenson, Business Development Advisor, Shell Foundation

Emma Stephenson introduced the Shell Foundation and its focus area of Access to Energy and Sustainable Mobility. Shell Foundation (SF) catalyses sustainable and scalable solutions to global development challenges. It is a UK registered charity established in 2000, with a mixed board of trustees. It aims to advance sustainable mobility to achieve more affordable, inclusive and safer movement of people and goods, with a reduced impact on the climate.

The Regional EV Value Chain Development For East Africa (REVV'D) project works in Uganda and Ethiopia and has started work in Rwanda. It is worth 3 million USD over three years and will fund 2-5 companies from SF and DfID co-funding collaboration. The stated outcomes are:

- 500 e-motorcycles (2 or 3 wheelers) on the road across Kampala, Kigali and Addis
- Government and public sector support for electric motorcycle ecosystem
- Raise $10m to grow the sector further

Through these outcomes the project aims to increase earnings for drivers, increase driver happiness through calmer, quieter bikes, bring benefit to wider urban citizens through lower levels of noise and pollution, and through lower electricity costs as the grid is developed.

The companies the project funds are infrastructure and energy providers, motorcycle manufacturers and importers, innovative payment solution providers, and asset finance and service providers. The project aims to create a strong enabling environment by supporting governments and start-ups to work together, foster collaboration and policies to enable the sector.

Shell Foundation sees four opportunities to strengthen the EV ecosystem: **customer focus**, **innovation and fast iteration**, **incentives & financing**, and **collaboration**. On **customer focus**, the goals are to align EV transition with the best outcome for the consumer "EV driver", create

a customer feedback loop, harness asset financing to unlock fast adoption of EVs, and build local capacity. On **innovation and fast iteration**, the goals are to support start-ups with business model testing/ piloting; learn fast and iterate on standards, tech, incentives and pricing; and develop grants to encourage innovation and RnD.

On **incentives and financing**, the goal is ensure connected and effective national and local approaches to enable efficient investment; help foster a strong regulatory framework across key themes; foster economic incentives that increase the value proposition of EVs – lower parking fees and zero emission incentives; and unlock access to finance – for instance the UK £400m match-funded Charge Infrastructure Investment Fund. On **collaboration** there is a need to combine automotive and energy industries, startups, government and NGOs to meet, discuss and find solutions to challenges.

Stephenson finished by making two recommendations: a Kigali Electric Vehicle Task Force that combines the multiple stakeholders, and that the government creates a regulatory "sandbox" to test policy with companies before implementation, as a learning process – this would help agree common standards to enable interoperability and sharing of data.

Session 3: Financing urban roads

Moderated by Liliane Mupende, Independent Consultant

Government initiatives to finance neighbourhood roads and associated challenges
Alfred Byiringiro, Transport Division Manager, MININFRA

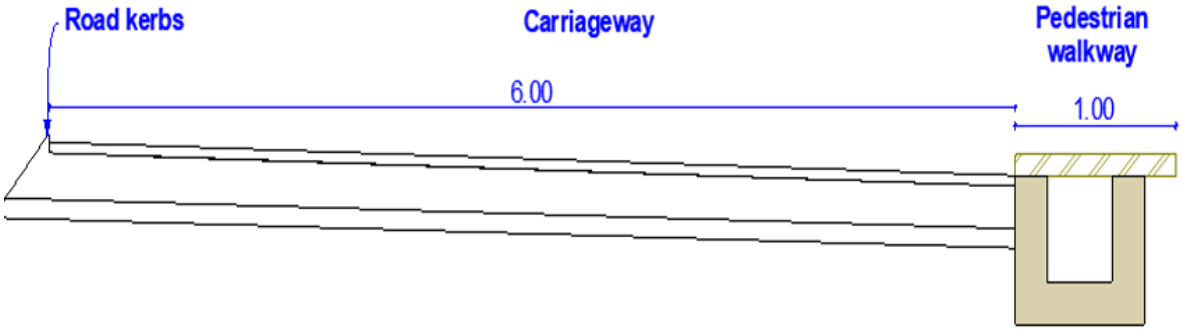
Alfred Byiringiro set out the benefits of upgrading of neighbourhood roads - it aims to: provide urban residents or communities with a safe and reliable all-weather access; avoid rapid deterioration of unsealed earth and gravel neighbourhood roads due to non-traffic-related factors such as climate, terrain, soil conditions and ineffective maintenance practices; reduce adverse environmental degradation and health hazards created by dust pollution; reduce vehicle operating costs and maintenance costs.

Most neighbourhood roads in Kigali are still earthen roads. Currently urban roads including neighbourhood roads are funded by the public treasury. There are three types: asphalt concrete paved roads, double layer surfacing paved roads, and cobble stone roads. Most upgrades are done with asphalt which entails high cost. A number of expressions of interests have been received from residents to contribute to neighborhood upgrading.

A strategy for upgrading low volume roads (i.e. urban, feeder, and neighborhood roads with traffic < 200 Vehicle/day) was approved by the Cabinet on 3rd April 2019. Figure 13 shows the proposed cross section model for neighbourhood roads.

Figure 13: Proposed cross section model for neighbourhood roads

Road Elements	Two ways	One way
Design speed (km/h)	40	40
Vehicle width (m)	2.44	2.44
Carriageway (m)	6.0	4.5
Number of lanes	2.0	1
Lane width (m)	3.0	4.5
Walkway(m)	1.0	1.0
Drainage	One side covered/Walkway	One side covered/Walkway



To finance these neighbourhood roads, the current financing strategy is taxes (VAT 18%), quarry and borrow pit materials and their transportation, relocation of utilities and expropriations if any, studies and supervision, other structures such as bridges and retaining walls. The community contribution would currently be for road construction work. The Government contribution is comprised between 18% and 72% depending on dwelling unit patterns. It is cheaper to upgrade neighbourhood roads in planned, rather than unplanned settlements. Neighbourhood roads will be upgraded through Framework Contracts to be signed between CoK and road construction firms (preferably local firms).

The main challenge is the predominance of earth neighbourhood roads in the City combined with lack of sufficient funds for upgrading; land is also expensive to acquire especially in unplanned settlements. There is also insufficient contributions from residents. The demand hugely outstrips the need.

Urban road funding options

Jit Bajpai, Adjunct Professor, Columbia University & Consultant, International Growth Centre

Professor Jit Bajpai stated that we seek funding for transport to recover cost including capital cost, operations and maintenance cost and the cost of dis-benefits such as emissions, congestion, accidents and noise; we also fund transport to provide direct benefits such as reduced travel time and reduced cost as well as driving comfort; and indirect benefits such as the rise in labour and business productivity and wider important agglomeration benefits that roads enable.

Bajpai then asked who should pay for transport access. He answered that government budget and transport users should pay for the capital cost of roads, that operations and maintenance should be paid for by users depending on the level of use and damage caused. Users should also pay for congestion and health impacts, to internalize the social costs.

Figure14 shows different types of user fees that can pay for roads and their advantages and disadvantages. In Africa there is common use of license fees, fuel tax, heavy vehicle fees, tolls, parking charges, traffic violation fees & international transit fees. One interesting opportunity is the vehicle-km tax which is a distance-based fee on vehicles registered in the region. It can replace the fuel-based tax, but requires GPS devices and tracking systems to implement. This may be a good alternative for electric vehicle users who do not, of course, pay fuel tax.

Figure 14: User taxes & fees

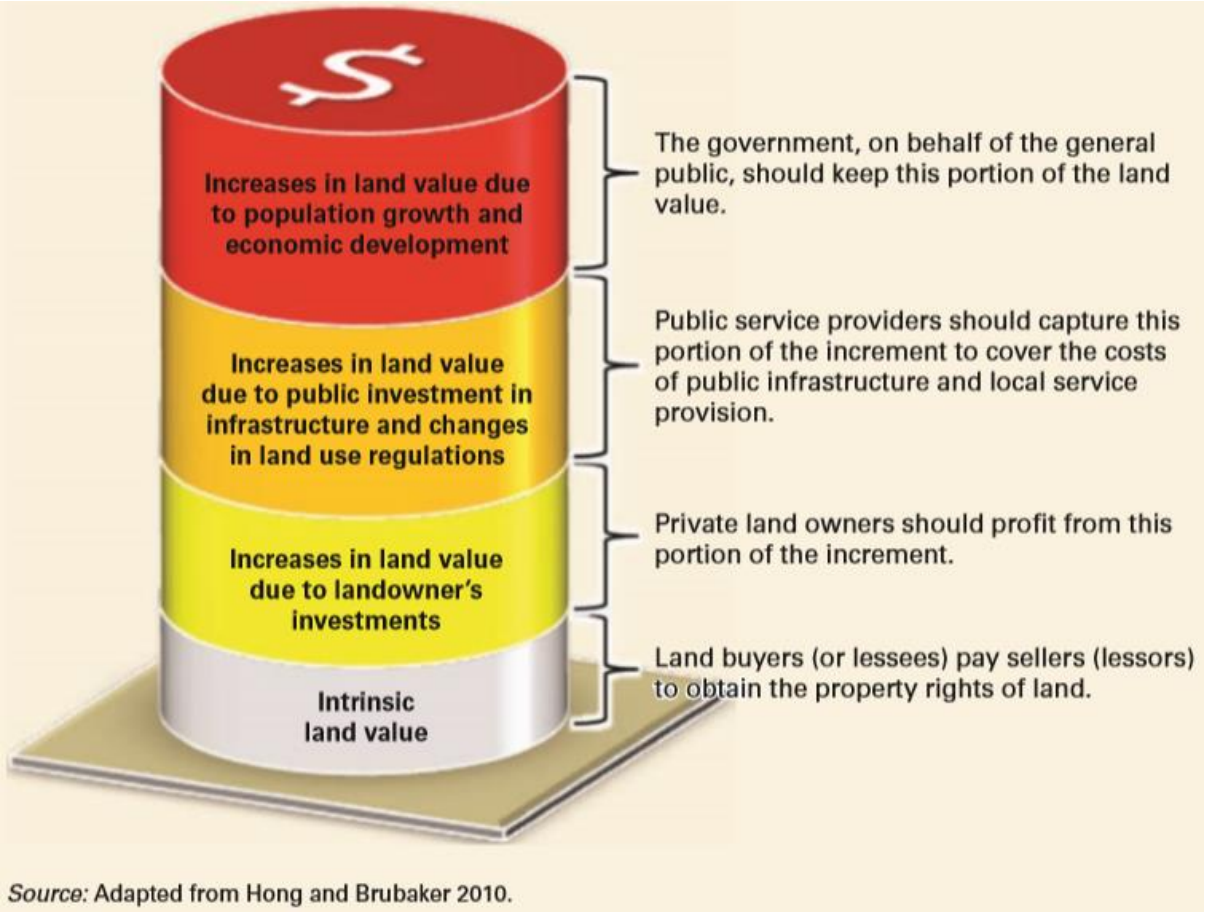
	Description	Advantages	Disadvantages
Fuel taxes	An additional fuel tax in the region.	Widely applied. Reduces vehicle traffic and fuel use.	Is considered regressive.
Vehicle fees	An additional fee for vehicles registered in the region.	Applied in some jurisdictions. Charges motorists for costs.	Does not affect vehicle use.
Utility levy	A levy to all utility accounts in the region.	Easy to apply. Distributes burden widely.	Is small, regressive and support no other objectives.
Employee levy	A levy on employees in a designated area or jurisdiction.	Charges for commuters.	Requires administration. Encourage sprawl if in city centers.
Road tolls	Tolls on some roads or bridges.	Reduces traffic congestion.	Costly to implement. Can encourage sprawl if only applied in city centers.
Vehicle-Km tax	Distance-based fees on vehicles registered in the region.	Replaces fuel based tax Reduces vehicle traffic.	Costly to implement.
Parking taxes	Special tax on commercial parking transactions.	Is applied in other cities.	Discourages parking pricing and downtown development.
Parking levy	Special property tax on parking spaces throughout the region.	Large potential. Distributes burden widely. Supports strategic goals.	Costly to implement. Opposed by suburban property owners.

Other sources of transport funding include Inter-governmental transfers (restricted or unrestricted), debt financing (loans, general or revenue bonds), grants & subsidies, revolving funds (loan to selected projects), general benefit sources such as climate related financing instruments (Green tax, bonds for clean transportation), Carbon Reduction Funding (CDM, GEF, etc. for energy efficiency), and other sources including PPPs (these work best for toll road/bridge, terminal, housing projects, maintenance contracts), advertisements, land sales or lease or rental payments, other business taxes (ride sharing, utility, shops, occupancy, tourism), and citizen contributions (land, labor, material, money/share of investment).

In relation to funding urban and neighbourhood roads, value capture will be important. Figure 15 shows how different components of the value of land come from different sources and should thus accrue to these different sources. Intrinsic land value is owned by the buyer; if the buyer then invests to improve land, they should certainly own this portion of the land. However, when the government invests in infrastructure and changes land use regulations, public service providers should capture this portion of the value to cover the costs of provision

of the infrastructure. When the economy and the city are growing and land values are increasing for this reason, Bajpai argues, the government should also capture this portion of the land value.

Figure 15: Creators of land value



Source: Adapted from Hong and Brubaker 2010.

Value capture is normally done using property taxes, development or transport impact fees. Development-based land capture instruments include land sales or lease fees – in which developers or parastatal seek public investment or regulatory change or make upfront investment, in return for payment, lease charges or land rent; the inclusion of low income housing/site & services and road frontage fees are an option in this case. Landowners can also pool their land and cover the infrastructure cost through partial land contribution or sale. In areas with pressure to build above the height permitted by building regulations, air rights or additional permitted floor area ratio may be sold to finance roads. In the case of urban redevelopment, a cooperative of landowners may seek government support through modified zoning and floor area ratios, to consolidate land parcels and develop them with access roads and public spaces.

In Ahmedabad in India, between 2001 and 2015, Figure 16 shows visible land readjustment from greenfield land to serviced plots. Land readjustment does not require expropriation and can hugely increase the value of the plots involved, even though they are smaller.

Figure 16: Visible large scale land readjustment in Ahmedabad, India from 2001 to 2015

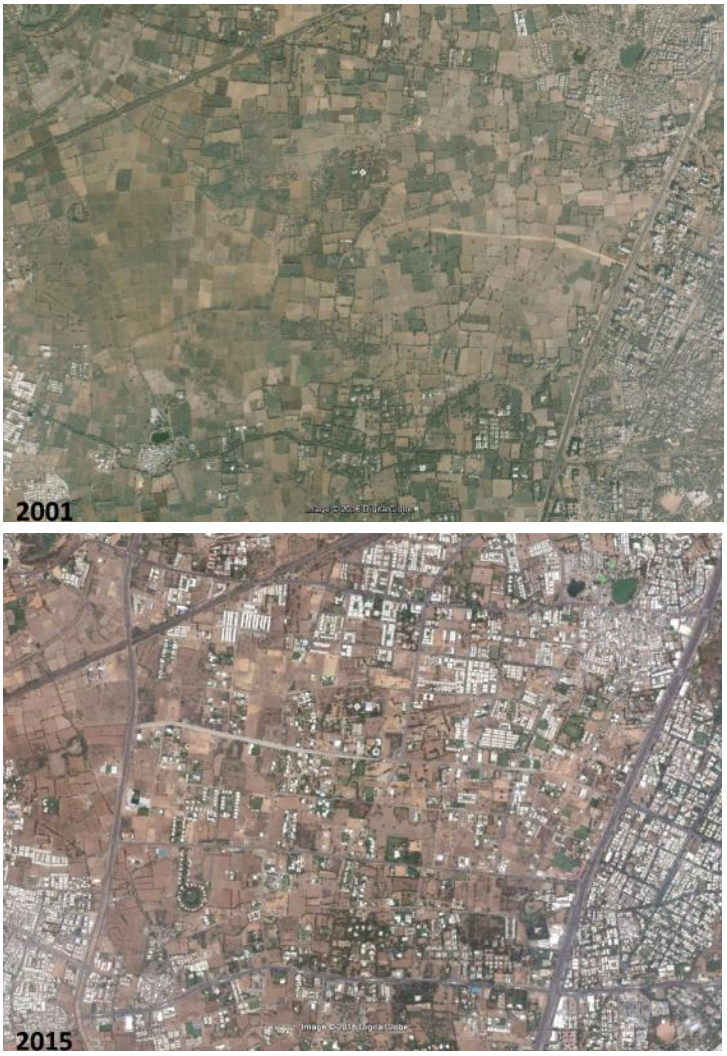
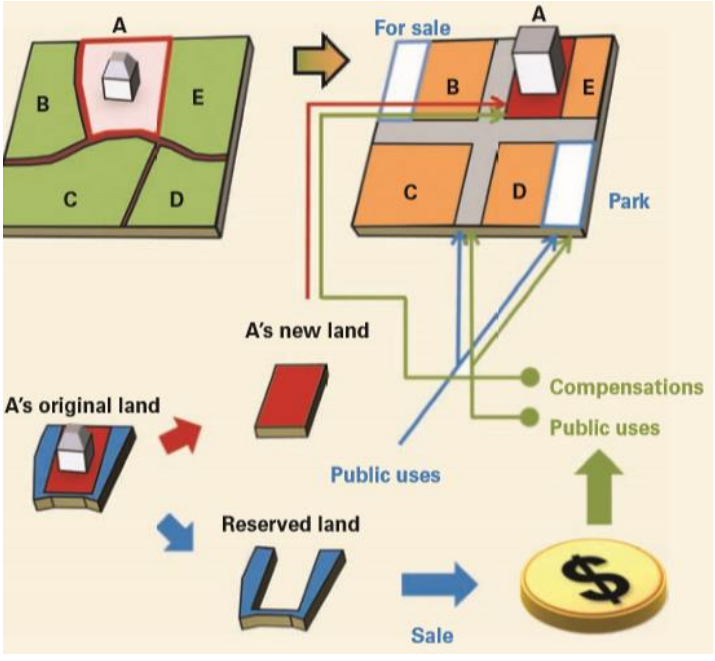


Figure 17 shows the process of land readjustment that has happened in Japan.

Figure 17: Land readjustment mechanism in Japan



Frontage fees or development charges may be appropriate for local roads. Local or neighbourhood roads provide access to plots or development unlike arterial or sub-arterial roads that serve a catchment area of a city. One issue is how to apportion infrastructure costs to a community, and whether to pay an upfront charge for infrastructure on a development that could be value or area based. One option is that if a road has multiple plots along it, each plot owner pays for half of the road that immediately adjoins their house. If a park or other public land adjoins the road, the government pays.

Bajpai referred to the example of the New York road grid that originated in 1811, and which designated a seven-fold increase in the land area and took sixty years to implement. Until 1820 the city city collected rent, fees and lease payments prior to selling common land (23-90th street) to reduce debt. Street opening costs were recovered with a frontage fee and land auctions were held in a Real Estate Exchange. The property tax base expanded considerably, as did real estate values which rose from 25 million USD in 1807 to 1.25 billion in 1887.

Figure 18 shows a schematic of the infrastructure funding system. Bajpai used Figure 19 and Figure 20 to illustrate how India's Urban Transport Fund works.

Figure 18: Diagram of infrastructure funding system

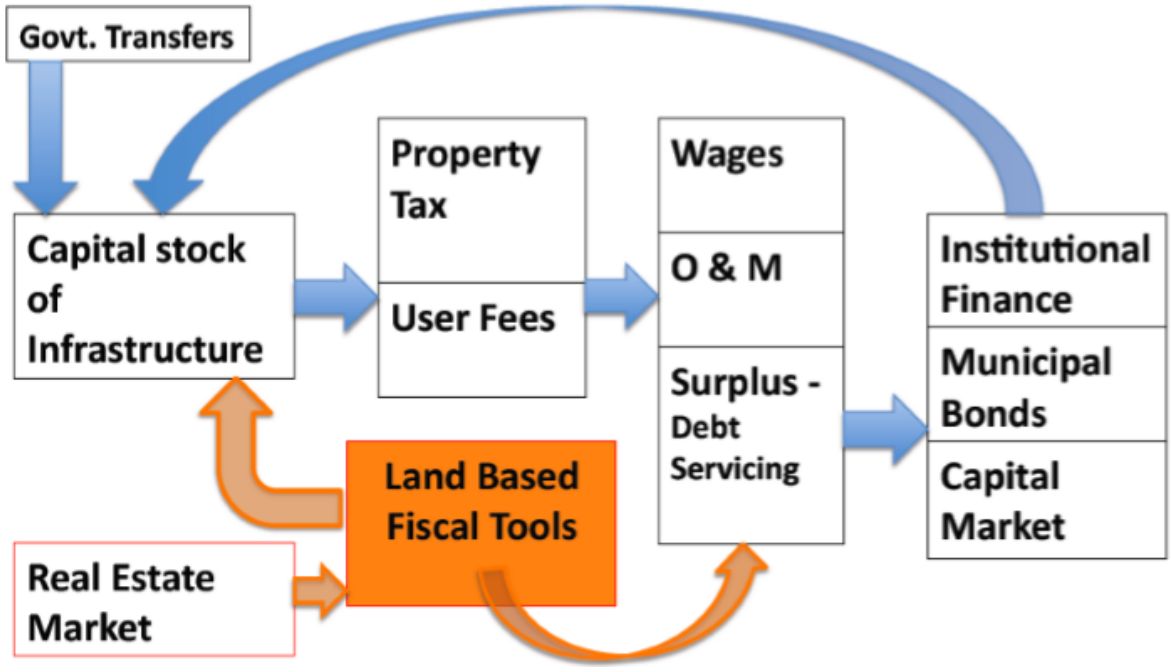


Figure 19: India's Urban Transport Fund (UTF) a dedicated source of financing

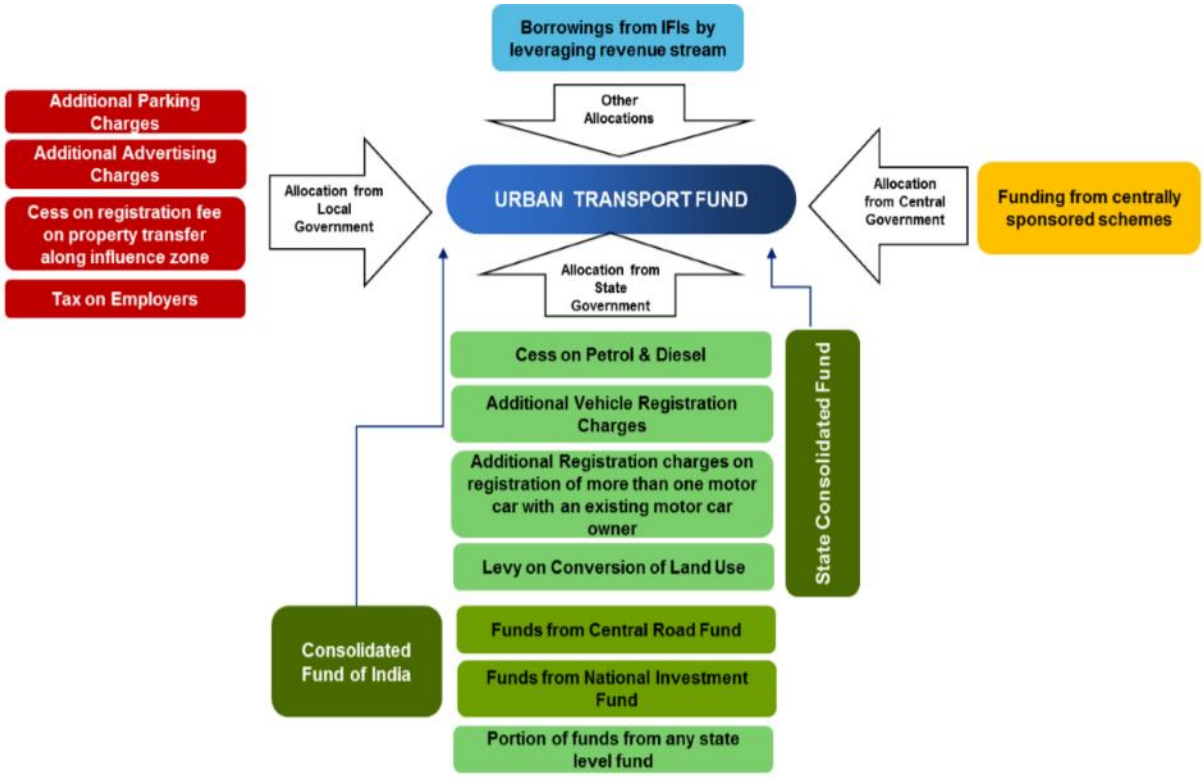
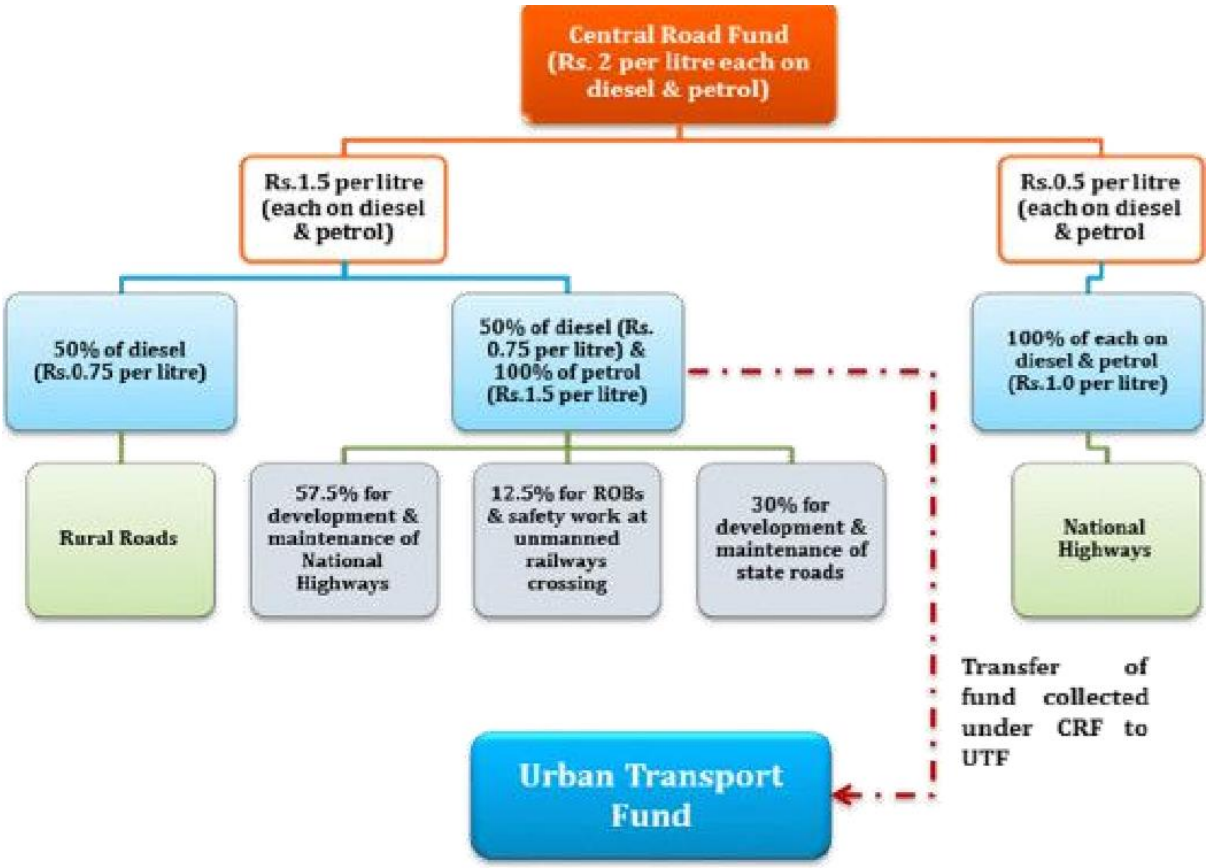


Figure 20: Transfer from Central Road fund to UTF in India



Bajpai concluded by stating that value capture is an appealing method but is full of challenges. It will be important to do the following:

- Ensure clarity & availability of data on land tenure rights & owners
- Develop transparent & efficient land market
- Define geography of beneficiaries
- Ensure effectiveness & flexibility in land use regulations & enforcement
- Build capacity to assess base & future property values
- Develop assessment framework for transport linked benefits
- Ensure stable & predictable revenue potential
- Address inequities & potential gentrification
- Raise public awareness & acceptability
- Ascertain legislative support & inter-governmental collaboration
- Maintain macro conditions supportive of demand

Urban Road Public-Private Partnerships and Financing: case studies in and strategies for Sub-Saharan Africa

Koen van Baekel, Financial & Strategy Advisor for Infrastructure and Transport Sectors, Rebel Group

Koen van Baekel spoke first on PPP & finance cases in urban highways/ arterial and connector roads, second on PPP & finance strategies in projects 'down' the road network hierarchy, and finally put some questions forward for discussion. Baekel stated that financing does not generate free money, it moves available funds forward in time – while actually costing money. Public Private Partnerships involve a "lifecycle integration" including long-term private financing, into a single tender and contract between public and private partners. There is a source of revenue involved over a period of time, from ten to 25+ years; this is from user chargers or government payments, and must be sufficient to recover all costs including capital costs. The risks and uncertainties are manageable overall and are supposed to be balanced appropriately between the public and private sector partners. Value for money is important, and must be achieved along with the complexity of the PPP.

Baekel described three case studies of PPPs in Africa. The Dakar-Diamniadio Toll Highway, Senegal had a 20.4km section that is structured and tendered out as a 30 year "Build-Operate-Transfer" (BOT) PPP contract with project cost ~USD 125 Million. This highway is an airport city connector with substantial captive traffic. Revenue risk is borne by the private sector whose revenues come from the toll. This is a fairly successful example of a PPP.

The Nairobi-Nakuru-Mau Summit Toll Road, Kenya, is a 30-year Design-Build-Finance-Maintain-Operate PPP contract with project cost of USD 550 Million, and the road will be tolled by the contracting authority, which pays availability payments to concessionaire. The government carries the revenue risk in this case. However, a National Toll Fund will collect the toll revenues and pay the availability payments. Deficits from the national toll fund will be funded by government. The PPP arrangements contains substantial additional 'enhancements' from the perspective of the private sector including availability payments' 'political' guarantee and adjustments for currency-inflation-KHS interest rate risk.

The third, less successful example, is Lekki-Epe Expressway Toll Road, Nigeria, which involves Rehabilitation and upgrade of 49 km of existing two-lane dual carriageway to a three-lane highway connecting Lagos areas Lekki and Epe. It is the first PPP in Nigeria, done as a 30-Year BOT concession for project cost of USD 450 Million. The revenues are a combination of a direct toll and a shadow toll. Delays in right of way acquisition and resettlement led to increased construction cost, which led to high toll fee charges. Local opposition to tolling led to cancellation of the PPP contract and buyback by Lagos State Government.

For neighbourhood roads, it is difficult to raise private finance on the basis of direct road user charges as the road network is granular, therefore difficult to collect toll or similar revenue from road users based on amount (time/distance) of road use. There are no direct revenues to enable private financing. A PPP may be possible for urban neighbourhood roads ***if*** the party committed to pay – whether local or central government – has sufficient funding, creditworthiness and experience. Potential exceptions in terms of revenues for private finance may be parking revenues or city congestion charges.

Alternatively, public sector borrowing can be an ingredient to fund road PPPs for instance using intergovernmental transfers, municipal bond issuance, or contractor-facilitated financing. South Africa uses Municipal Infrastructure Grant Funds which are central government funds for basic infrastructure provision for the poor. South Africa has also used a municipal bond to help fund infrastructure.

Various value capture approaches can be identified, including property/land value improvement tax, community/group/district funding initiatives, specific beneficiary funding (e.g. developer impact fees paid by newly established shopping mall), city improvement districts, community contributions and zonal development concessions. Mexico used a property value improvement tax, which is a land value tax determined based on proximity to pre-specified “high-value” locations. The increase in revenue was used to fund infrastructure. This is similar to the US practice of tax increment financing. Santiago in Chile used developer impact fees to fund 21km radial highways connecting the wider metropolitan region to central Santiago including 41km of byways and interchanges. These roads were funded 39% by government and 61% from developer impact fees.

Sometimes the private partner even becomes the community itself. Revolving loan funds (RLF’s) most common for Community-Based Financial Organizations (community structures, savings associations, cooperatives) and would need to be capitalized by community savings , grants from government or donors or via concessionary loans (possibly via a national or city revolving fund). CBFOs are more sustainable when the grant element is smaller. Where CBFOs are tried, they should be set up with focus on standardized and best practice approaches to governance, professional management and should focus on long-term development of communities not one-off interventions.

In the Philippines in 1995, the Bases Conversion and Development Authority (BCDA), a state enterprise launched a concession for the development of Bonifacio Global City. The joint venture between BCDA and the developer company, funded the construction and ongoing maintenance of the urban road network of the area from the proceeds of commercial property development & management.

Fund structures (for example, a "Kigali Neighbourhood Road Improvement Fund") can be a useful tool to raise money from various sources. They could be 100% revolving or partially revolving, if the fund is used for loans. Another decision is whether the fund is capitalized by private investors wishing to fully recover their investment as well as a return, by the public sector, or by less profit-oriented capital providers who would tolerate lower or no returns on capital invested. The fund could be linked to a specific programme of well-defined and viable projects of road network improvement, and/or a standard to develop and fund such projects.

Van Baekel left the conference with the following questions:

- Public/private finance do not generate money → only solve timing problems, at a cost
- PPP raising substantial amounts of private finance → complex and expensive (and, often, close to impossible), always consider the alternatives on their merits
- Project involving government payments can still be PPP – the key to value for money from PPP is risk transfer of revenue risk, performance / availability / quality / etc. risk
- 'Real' privately financed PPPs work best for major connector / ring / arterial roads → for smaller roads and neighbourhood roads, consider concessions that create or use a revenue base from such sources as community contributions, parking or access/congestion charging, property or developer levies, etc.
- Funds can be useful structures: (finance/grant) fundraising, standardization, scaling – both at the city level (Kigali Road Improvement Fund) and at the community level (CBFO).

Street designs for neighbourhood roads

Alphonse Nkurunziza, Transport Planning Consultant, Institute for Transportation and Development Policy

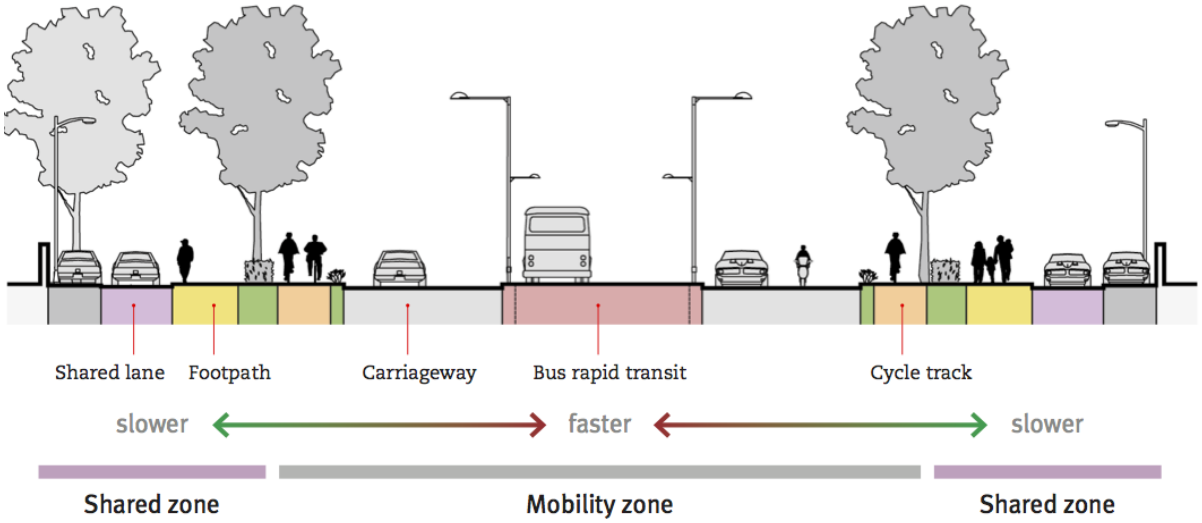
Alphonse Nkurunziza remarked that the most common means of travel is walking. In Rwanda, pavement provision is sometimes excellent and sometimes non-existent as in Figure 21. Sometimes there are no cycle lanes on highways with high volumes of bicycles.

Figure 21: High volume of pedestrians with no pavement in Musanze

Whilst space for cars is considered sacred, space for pedestrians is cut off by uneven pavement, utility poles, or private businesses. Open drains are common in urban streets. Speed limits need to be better coordinated with design of infrastructure.

Street design currently enables vehicle movement and parking, but there is mostly no provision for walking, cycling, spaces to meet friends, or organized street vending. There needs to be more equitable allocation of street space, and more complete streets, to cater for the different types of users as shown in Figure 22. Speed management is a critical element to ensure public safety and health. On some streets, priority may be established for non-motorised users.

Figure 22: Diagram of a complete street



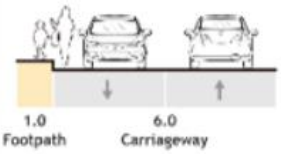
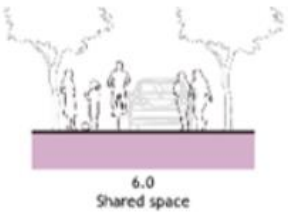
Road expansion only temporarily reduces congestion and emissions. Figure 23 shows that non-motorised transport improvements and use of buses and BRT beat road expansion in terms of emissions reduction potential and cost.

Figure 23: Greenhouse gas reduction strategies

Activity	Emissions reduction potential	Cost
Non-motorised transport improvements	High	$
Bus fleet expansion	High	$
Trip reduction from land use policy change	High	$
Rapid transit	Low-High*	$ - $$$*
Vehicle technology	Moderate	$$
Road expansion, elevated corridors	Only temporary	$$$$

Figure 24 shows that the road width and road surface makes a big difference to the cost. Chip seal is cheaper than asphalt.

Figure 24: Estimated cost of urban street construction

Cross section	Width	Cost	
Typical cross section: Carriageway + footpath	6 m + 1 m	$ 568k	
Shared street (traffic calming) With chip seal	4 m 4 m	$ 320k $ 100k	
Shared street (traffic calming)	6 m	$ 530k	

Nkurunziza gave the following potential sources of finance for neighbourhood roads:

- Municipal governments:
  - TDM measures e.g., parking fees
  - Land value capture along transit corridors
  - Issuance of municipal bonds
- Central governments:
  - Allocate budget for NMT & PT for every urban road project
- Development partners:
  - Inclusion of NMT & PT should be a pre-condition for funding of mega city road infra projects (e.g., WB, AFDB, JICA, etc.)
- Multilateral carbon funds:
  - Green Climate Fund, Clean Technology Fund, GEF, NAMAs

He concluded by urging the government to prioritise pedestrian infrastructure where volumes are already high.

Group discussions
Facilitated by Dan Smit, Team Leader, Rebel Group Kigali Master Plan project

With the presentations and plenary discussions finished, Dan Smit split the participants into three groups – one to represent communities living in neighbourhoods, one to represent government and one to represent the private sector. They were set five questions.

1. What does this group want from neighbourhood roads and what are its incentives ?
2. What does this group have to contribute?
3. How can this group work with the other stakeholders (the other groups) and what does it need from them?
4. What ideas presented by the speakers are most appealing in thinking about the interests and role of this group (and which should perhaps be considered in policy guidelines).
5. Formulate one (Max 2) question(s) related to the group's perspective to be put to the panel of speakers.

Communities want quality, inclusive, cheap roads with street lights for safety. They can contribute money, materials and labour according to their needs. They can be organised by the umudugudu leader. They need guidelines from the government and resources to contribute to the roads. One idea that was appealing from the workshop was frontage fees – this could work to raise funding for roads.

Governments want to achieve development goals relevant to transport (growth, equity, safety, convivial neighbourhoods according to the National Urban Policy) at least cost. They can contribute money, long term planning, coordination of the other partners and community education and awareness. They need to be transparent about how the relevant taxes are spent that others pay. One question this group had was how to prioritise which roads to build, because the need is massive.

When building any road, the private sector wants to make money and create jobs. It can contribute expertise, investment and building of the roads. The private sector needs a framework to ensure its investment is derisked or safe. One interesting idea from discussions was a road development fund along with contributions and grants (although there is already a Road Maintenance Fund). The group asked how investors in PPPs for neighbourhood roads could recover their funds; to which the answer was they were not viable.

Institutions invited

The following institutions were invited.

MININFRA	**KfW**	**GGGI**
MINECOFIN	**PSF**	**JICA**
MINALOC	**Carnegie Mellon University**	**REG**
MoE	**LODA**	**RMF**
MINICT	**REMA**	**ITDP**
FONERWA	**RISA**	**RRA**
NIRDA	**RNP**	**VW**
RTDA	**Rwanda Polytechnic**	**Ampersand**
CoK	**WDA**	**Safi and Gura**
RURA	**University of Rwanda**	**RDB**
RSB	**World Bank**	**AfDB**
UNDP	**EU**	**Shell Foundation**
IGC	**World Bank**	**DFID**
University of Leeds	**Rebel Group**	**GIZ**
Surbana Jurong	**Carbon Trust**	