# TBILISI SUSTAINABLE URBAN TRANSPORT STRATEGY



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### **EXECUTIVE SUMMARY**

**Timespan.** The updated Tbilisi Sustainable Urban Transport (SUT) Strategy defines policy directions and prioritizes interventions along a multimodal and integrated approach to be gradually implemented between 2015 and 2030, phased over short (2015-2017), medium (2018-2021) and long (2022-2030) terms.

**Focus.** Tbilisi SUT Strategy focusses on environmentally friendly and low emission solutions and realignment of Tbilisi urban mobility system along an efficient, innovative, safe, economically viable, and financially sustainable model. The strategy covers all transport modes including personal motor vehicles, public transport, non-motorized transport as well as institutional and land use aspects to foster better living conditions, city attractiveness and competitiveness, and economic development.

**Vision.** Tbilisi SUT Strategy is also developed around the strategic vision supported by the government of Georgia and Tbilisi City Hall, which revolves around three main areas: (i) ensure a healthy living environment (with focus on sustainable urban transport); (ii) enhance Tbilisi as the Regional economic center; and (iii) develop Tbilisi as cultural, touristic and youth hub. This vision is consistent with recommendations summarized in the Asian Development Bank's (ADB's) Sustainable Transport Initiative Operation Plan.

**Integrated Approach.** Sustainable urban mobility and urban development planning are interconnected and should be approached in an integrated manner.

**Main Urban Mobility Issues.** Shifting to a more sustainable model requires the gradual implementation of a set of combined actions covering all aspects of sustainable urban mobility: (i) comprehensive sustainable urban mobility plan and integrated approach (with urban development); (ii) institutional reforms, creation of a transport authority in charge of planning, implementation and operation, and capacity development; (iii) sustaining current modal split by enhancing quality of service and attractiveness of public transport system; (iv) expansion of backbone transit network and introduction of hierarchy in multimodal public transport network, including restructuring of bus and minibus network and parking strategy; (iv) clean modes and technologies; (v) safety and universal accessibility; (vi) improved traffic conditions and reduced bottlenecks; (vii) economic and financial sustainability, innovative financing mechanisms and increased private sector participation; (viii) transit oriented development (increased density and mixed land-use along mass transit corridors and stations); and (ix) awareness raising, consultations and communication.

**Main Urban Development Issues.** Shifting to a more sustainable urban development model involves a set of actions covering the following main areas: (i) urban master plan and integrated approach (with urban mobility); (ii) quality of life, competitiveness, economic growth and tourism attractiveness; (iii) urban morphology, urban regeneration, mixed land use, and local identity; (iv) topography, natural and artificial barriers; (v) universal accessibility, social and gender equity; (vi) innovative financing mechanisms and increased private sector participation; and (vii) transit oriented development, increased density and mixed land-use along mass transit corridors and stations.







**Short Term Action plan (2015-2017).** The proposed short term action plan revolves around 20 key actions, builds upon on-going initiatives, promotes low-cost-quick-win subprojects, and comprises a series of studies and technical assistance to build foundations for medium (2018-2020) and long term (2012-2030) interventions. Some actions are on-going and the sources of financing are already identified, while further consultations need to be conducted and financing options explored to cover the cost of the yet to be initiated actions. The short term action plan is deliberately ambitious in terms of scope and variety of activities. Its implementation requires reasonable financing resources combined with strong political will, which is a key requirement to create the shift to a more sustainable trajectory and to meaningfully prepare the medium and long term actions. Coordination between all parties and agencies involved in the sector remains critical and should be facilitated under the leadership of Tbilisi City Hall and City Assembly. All technical assistances and consulting services are anticipated to be performed and lead by a team of reputable international consultants teaming up with national consultants to secure reference to recent best practices and standards as well as relevance in Tbilisi context.

**Medium Term Action Plan (2018-2021).** The medium term actions is mainly intended to (i) initiate the implementation of the Sustainable Urban Mobility Plan (SUMP) developed under the Tbilisi SUT Strategy short term action plan – Action 3; (ii) complete outstanding actions of the short term action plan (2015-2017), if any; and (iii) implement institutional reforms. Funding is to be determined.

Long Term Action Plan (2022-2030). The long term action plan is meant to rely on the SUMP recommendations in order to achieve key targets by 2030, with increased focus on actions intended to (i) upgrade the integrated public transport system (coverage, performance, quality of service, financial sustainability); (ii) ensure the institutional reforms are fully implemented and that the Integrated Transport Authority is fully empowered and staffed to enable the continued implementation of the SUMP; and (iii) overall create an urban mobility system which is efficient, universally accessible, safe, environmentally friendly, and financially sustainable.







#### Short Term Action Plan (2015-2017)

- 1. **Planning (Surveys and Model)**. Conduct a new household survey, update the existing multimodal transport demand model and train relevant staff on its use (on-going, government-financed [ADB loan SUTIP]).
- 2. **Planning (Urban Masterplan).** Develop a new urban master plan to define future land use strategies in Tbilisi (on-going, Tbilisi City Hall-financed). Coordinated with sustainable urban mobility plan.
- 3. Planning (Sustainable Urban Mobility Plan). Develop a comprehensive sustainable urban mobility plan (SUMP), based on do-nothing, moderate and transformative scenarios, quantification of benefits, impact and economic viability (for proposed scenario, measures and subprojects), investment plan and financing sources and mechanisms (funding SMUP to be defined). The SUMP would include feasibility study of priority projects. Coordinated with urban master plan.
- 4. Planning (Transit Network). Initiate technical assistance to define a surface transit network, considering main bus routes, bus rapid transit, cable propelled transit and light rail transport options (funding to be defined). Prepare an upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations. Possibly part of SUMP activities.
- 5. Planning (Bus Network Restructuring). Initiate technical assistance (ADB-financed) on and implement (City Hall-financed) bus and minibus network restructuring, introduction of main routes (network hierarchy and possible bus rapid transit corridors), bus lanes and propriety for bus at selected junctions. To be included in and further defined under SUMP.
- 6. Planning (Traffic Management and Missing Links). Initiate technical assistance on traffic management optimisation (making full use of the functionalities of the intelligent transport system [ITS] already in place) and possible missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport (funding to be defined). Possibly part of SUMP activities.
- 7. Planning (NMT). Initiate technical assistance on non-motorized transit (NMT) network, define design standards and prepare a NMT pilot project (funding to be defined). Possibly part of SUMP activities.
- 8. **Planning (Smart Technologies).** Initiate technical assistance on smart technology options, recent best practices and potential for replication and tailoring to Tbilisi (funding to be defined). *Possibly part of SUMP activities*.
- 9. Metro Extension. Complete 2.6-km metro extension (on-going, government-financed [ADB loan SUTIP]).
- Pilot Transit Project Urban Cable Car (between Samgori and Vasis Ubani). Prepare and implement at least one cable
  propelled transit system, between densely populated district(s) and the metro network, to expand the coverage of the
  mass transit backbone (on-going, government-financed [ADB loan SUTIP]).
- 11. Urban Road. Complete upgrade and creation of 17km urban road link between Tbilisi and Rustavi (on-going, government-financed [ADB loan SUTIP]).
- 12. Bus Fleet Renewal. Initiate bus fleet renewal adopting green technology (on-going, government-financed [EBRD loan]).
- 13. **Targeted Interventions.** Implement existing investment plan by Tbilisi City Hall for small scale interventions, including possibly some of the recommendations from actions 5 and 6 (on-going, Tbilisi City Hall-financed).
- 14. **Road Safety.** Create conditions for strict enforcement of rules combined with large scale and continued awareness campaigns (with possible involvement of Non-Governmental Organizations).
- 15. **Institutional Framework and Reforms.** Initiate technical assistance covering the following areas and possibly implement immediate actions when applicable (funding to be defined), covering
- creation of an integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes.
- revised regulatory framework for parking system (combined with a revised parking master plan including park and ride options).
- creation of a regulatory framework for Taxis.
- explore innovative financing mechanisms and introduction of taxes to finance public transport system modernization, expansion and operation (such as fuel tax, employer tax or land value capture).
- create conditions to implement fully integrated e-ticketing system for all public transport modes and parking.
- study options, conditions and feasibility of increased participation of the private sector (management contract, concessions, design build finance operate [DBFO]).
- 16. **Financing**. Conduct consultations to identify and select sources of financing required for the implementation of the short term action plan (grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], private sector).
- 17. Donor Coordination. Hold donor consultation meetings periodically to secure integrated support and sound use of resources.
- 18. **Communication and Awareness Campaign**. Prepare a communication plan and implement an awareness campaign on various sustainable urban mobility related topics (aiming at stimulating the use of public transport). *Possibly part of SUMP activities*.
- 19. Tbilisi Sustainable Urban Mobility Forum 2016. Organize the second edition of Tbilisi Sustainable Urban Mobility Forum in Q4 2016 to take stock of the progress and lessons learned from the various initiatives undertaken, and to refine directions and action plans (government-financed [ADB loan SUTIP]). It is proposed to organize Tbilisi Sustainable Urban Mobility Forum every other year, or at least every 3 years.
- Consultations between Local and Central Governments. Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and prepare investment and financing plans.







#### Medium Term Action Plan (2018-2021)

- 1. Planning (SUMP). Formally endorse Tbilisi SUMP in 2018 (if not achieved earlier) and initiate its implementation.
- 2. Planning (Surveys and Model). Keep the multimodal transport demand model updated and ensure staff are trained to be able to use it and test all initiatives and projects.
- 3. Short Term Action Plan (Continued Completion and Evaluation). Complete all actions of the short term action plan (2015-2017) which might not be fully implemented. Evaluate achievements and learn lessons.
- 4. **Metro (Transit Network).** Implement the first phase of the upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations (detailed design, procurement and implementation).
- Pilot Surface Transit Line (Transit Network). Prepare detailed engineering design and bidding documents for a pilot transit line (most likely Bus Rapid Transit) adopting universal design standards and fully integrated with other public transport modes. Implement the project and secure commissioning by 2020-2021.
- 6. **Bus Network Restructuring (Continued).** Asses the performance of the restructured bus and minibus network. Adapt the routes and operation plan as necessary to continue improving the quality of service and passenger satisfaction rate.
- 7. Traffic Management and Missing Links (Continued). Implement missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport.
- 8. **Pilot NMT Project.** Design and implement pilot NMT project (priority project out of NMT plan and developed around the pilot surface transit project). Secure commissioning by 2020-2021.
- 9. Urban Cable Car Projects (Continued). Complete the pilot urban cable car project (if not yet completed) and implement the urban cable car plan to expand the coverage of the mass transit network (building on the lessons learned by the urban cable car pilot project).
- 10. Bus Fleet Renewal (Continued). Implement subsequent phases of bus fleet renewal (adopting green technology), with consideration of Bus Rapid Transit scheme particularly in view with adoption of full-flex services (BRT usually requires rolling stock with particular specifications, such as floor and doors).
- 11. **Targeted Interventions (Continued).** Implement investment plan by Tbilisi City Hall for small scale interventions. Ensure ITS system is used to continuously improve traffic management.
- 12. **Urban Roads and Road Safety (Continued).** Secure continued enforcement of rules combined with large scale and continued awareness campaigns (with possible involvement of Non-Governmental Organizations) and ensure road safety features are adopted in the design of all projects. Introduce traffic calming zones. Preparation of Tbilisi bypass might be initiated should economic viability be confirmed under the SUMP.
- 13. Institutional Framework and Reforms (Continued).

create an integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes. Ensure the urban transport authority is fully staffed, budgeted and trained.

- introduce regulatory framework for parking system (combined with a revised parking master plan including park and ride options).
- create regulatory framework for Taxis.
- adopt some innovative financing mechanisms and introduction of taxes, to finance public transport system modernization, expansion and operation (such as fuel tax, employer tax or land value capture).
- implement fully integrated e-ticketing system for all public transport modes and parking.
- select pilot projects with private sector participations (possibly management contract, concessions, design build finance operate [DBFO]).
- study options and mechanism to promote Transit Oriented Development.
- 14. **Financing (Continued).** Conduct consultations to identify and select sources of financing required for the implementation of the medium term action plan (grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], private sector).
- 15. **Donor Coordination (Continued).** Hold donor consultation meetings periodically, to secure integrated support and sound use of resources.
- 16. **Communication and Awareness Campaign (Continued).** Implement communication plan and awareness campaign on various sustainable urban mobility related topics.
- 17. Tbilisi Sustainable Urban Mobility Forums (Continued). Organize Tbilisi Sustainable Urban Mobility Forum to take stock of the progress of the implementation of the SUMP and lessons learned from the various initiatives undertaken, and to refine directions and action plans. It is proposed to organize Tbilisi Sustainable Urban Mobility Forum every other year, or at least every 3 years.
- Consultations between Local and Central Governments. Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and refine investment and financing plans.







### Long Term Action Plan (2022-2030)

- 1. **Planning (SUMP).** Review and update the SUMP by 2026-2027 (in-depth review and update of SUMP should happen at least every 10 years).
- 2. Planning (Surveys and Model). Keep the multimodal transport demand model updated and ensure staff are trained to be able to use it and test all initiatives and projects.
- 3. **Medium Term Action Plan (Continued Completion and Evaluation).** Complete all actions of the medium actions plan (2018-2021) which might not be fully implemented. Evaluate achievements and learn lessons.
- 4. **Bus Network Restructuring (Continued).** Asses the performance of the restructured bus and minibus network. Adapt the routes and operation plan as necessary to continue improving the quality of service and passenger satisfaction rate.
- 5. **Metro (Transit Network).** Complete by 2030 the upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations (detailed design, procurement and implementation).
- 6. **Surface Transit Network (Bus Based).** Complete by 2030 the bus based (BRT) surface backbone transit network, adopting universal design standards and fully integrated with other public transport modes (metro, bus, minibuses, NMT, parking, taxi). Implement the project and secure commissioning by 2020-2021.
- 7. Urban Cable Car Projects (Continued). Complete the urban cable car plan to expand the coverage of the mass transit network.
- 8. **Surface Transit Network (Rail Based).** Conduct feasibility studies to assess whether Light Rail Transport should be introduced in Tbilisi on some of the main surface transit corridors after 2030. Study the merits of commuter rail using existing railway tracks for long distance travel within Tbilisi Urban Area.
- 9. **Branding.** Tbilisi public transport system is branded with a unique, visible and attractive identity (possibly segmented by mode).
- 10. Traffic Management and Missing Links (Continued). Implement missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport.
- 11. **NMT Project (Continued).** NMT projects are expanded and NMT features are included in all transport and urban projects.
- 12. Bus Fleet Renewal (Continued). Complete the bus fleet renewal.
- 13. **Targeted Interventions (Continued).** Implement investment plan by Tbilisi City Hall for small scale interventions. Ensure ITS system is used to continuously improve traffic management.
- 14. **Urban Roads and Road Safety (Continued).** Secure continued enforcement of rules combined with large scale and continued awareness campaigns and ensure road safety features are adopted in the design of all projects. Traffic calming zones are widely adopted. Tbilisi bypass might be implemented should economic viability be confirmed.
- 15. **Transit Oriented Development (TOD).** Urban density and mixed land used is promoted along the main transit corridors (metro and surface transit network). Key TOD principles and incentives are institutionalized, promoted and implemented.
- 16. Institutional Framework and Reforms (Continued).
- The integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes, is empowered, fully staffed by experienced sector specialists.
- Reforms on parking and taxi have been implemented.
- Innovative financing mechanisms and introduction of taxes, to finance public transport system modernization, expansion and operation are in place.
- Private sector participation is increased.
- 17. **Financing (Continued).** Conduct consultations to identify and select sources of financing required for the implementation of the long term action plan (grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], private sector).
- 18. **Donor Coordination (Continued).** Hold donor consultation meetings periodically, to secure integrated support and sound use of resources.
- 19. **Communication and Awareness Campaign (Continued).** Implement communication plan and awareness campaign on various sustainable urban mobility related topics.
- 20. **Tbilisi Sustainable Urban Mobility Forums (Continued).** Organize Tbilisi Sustainable Urban Mobility Forum to take stock of the progress of the implementation of the SUMP and lessons learned from the various initiatives undertaken, and to refine directions and action plans (every other year, or at least every 3 years).
- Consultations between Local and Central Governments. Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and refine investment and financing plans.







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## **ABBREVIATIONS**

ADB	Asian Development Bank			
AFD	French Development Agency			
BRT	bus rapid transit			
CEREMA	Centre for Studies and expertise on the risks, the environment, mobility and development			
CPT	cable propelled transit			
EBRD	European Bank for Reconstruction and Development			
EU	European Union			
EWHIP	East West Highway Improvement Project			
GEL	Georgian Lari – country currency			
GPS	global positioning system			
GSM	global system for mobile communication			
HHS	household survey created by Systra			
IC	individual consultant			
LRT	light rail transit			
MDF	Municipal Development Fund of Georgia			
NMT	non-motorized transport			
RATP	French Transport Operator for the Greater Paris (FRANCE)			
SUTIP	Sustainable Urban Transport Investment Program			
SYTRAL	Urban Transport Authority for the Greater Lyon (FRANCE)			
TOD	transit-oriented development			
TRACECA	Transport Corridor Europe-Caucasus-Asia			
TTC	Tbilisi Transport Company			







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## 1. BACKGROUND AND APPROACH

The Tbilisi Sustainable Urban Transport (SUT) Strategy was developed in consultation with key stakeholders and agencies involved in the sector. A Steering Committee composed of Tbilisi's City Hall, Tbilisi Sakrebulo (City Assembly), Municipal Development Fund of Georgia (MDF), Tbilisi Transport Company (TTC), Tbilisi Technology Development Fund (TDF) and transport experts was formed in September 2014 and held periodic meetings to discuss urban mobility issues as well as the findings and recommendations formulated by the Consultant and Specialists from the Asian Development Bank (ADB).

The ADB-financed Sustainable Urban Transport Investment Program (SUTIP), approved in 2010 with a 10-year availability period, intends to foster sustainable urban mobility throughout the country by promoting a holistic and integrated approach along the avoid-shift-improve conceptual framework recommended by ADB under its Sustainable Urban Transport Initiative Operation Plan.<sup>1</sup> This conceptual framework is also recognized by the government of Georgia. In Tbilisi, physical subcomponents financed under SUTIP consist of an extension of the Tbilisi Metro line 2 and the upgrade of the urban road link between Tbilisi and Rustavi, the second largest city within the Tbilisi urban area. Both subprojects are currently under construction. A SUT roadmap was prepared for Georgia in 2010 and five main goals were identified (Box 1).<sup>2</sup> The Government has already invested significantly in the sector during the last decade. Further investments and reforms are required to place Tbilisi on a more sustainable trajectory and create conditions to: (i) provide efficient mobility conditions to all city dwellers (with increased focus on public transport); (ii) improve quality of life and protect the environment; and (iii) boost economic growth.

### Box 1 – Georgia Sustainable Urban Transport Roadmap (2010), Five Main Goals

Five main goals were identified in 2010 for the urban transport sector in Georgia:

**Goal 1. Complete and upgrade the road network in urban areas** to boost the economy and strengthen job creation through a coherent, optimized, efficient time saving road network, decreasing congestion and urban barrier effects, and sustaining economic development in general, and development of tourism in particular.

**Goal 2. Promote a sustainable development of road network operation** to maintain a proper quality of road network, to provide an efficient management of the traffic, an increased quality of service and an optimized organization of its maintenance with strengthened private sector participation.

**Goal 3. Improve public transport network to match demand, and reduce congestion and car usage** through an affordable, environmentally friendly and energy saving strategy to upgrade, renovate, complete public transport infrastructures, and renew vehicle fleet.







<sup>&</sup>lt;sup>1</sup> ADB. 2010. Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to Georgia for the Sustainable Urban Transport Investment Program. Manila.

ADB. 2010. Sustainable Transport Initiative Operational Plan. Manila.

<sup>&</sup>lt;sup>2</sup> ADB. 2010. *SUTIP - Framework Financing Agreement*. Manila. Schedule 1 – Sustainable Urban Transport Roadmap. http://wcm.adb.org/sites/default/files/project-document/63328/42414-01-geo-ffa.pdf



**Goal 4. Improve public transport efficiency, profitability and quality of service** with integrated and sustainable urban transport system with an easy to implement strategy for public transport and tailored solutions to promote intermodality and maximize the benefits of an integrated transport network. **Goal 5. Improve quality of life with specific measures for non-motorized transport** to reduce pollution, noise and traffic accidents through an ambitious strategy to limit the flow of cars inside the dense parts of the cities and to develop exemplary urban renewal promoting universal access and non-motorized transport (pedestrian, two-wheeler, etc.).

Source: Asian Development Bank. 2010. *SUTIP - Framework Financing Agreement*. Manila. (Schedule 1 – Sustainable Urban Transport Roadmap).

The preparation of the Tbilisi SUT Strategy was initiated in September 2014 as part of the midterm activities of the SUTIP and consists of an update of the Tbilisi-fold of the 2010 - Georgia SUT roadmap. The updated Tbilisi SUT Strategy was also developed around the strategic vision supported by the government and the Mayor of Tbilisi, which revolves around 3 main areas: (i) ensure a healthy living environment (with focus on sustainable urban transport); (ii) enhance Tbilisi as the regional economic center; and (iii) develop Tbilisi as cultural, touristic and youth hub.<sup>3</sup> This vision is consistent with the recommendations summarized in ADB's publication entitled 'Changing Course, New Paradigm for Sustainable Urban Transport', which reflects the best knowledge and practices of sustainable urban transport programs around the world.<sup>4</sup> This recommended new paradigm revolves around five core elements which taken together comprise a fundamental change of direction (Box 3).

### Box 2 – A New Paradigm for Sustainable Urban Transport, Five Core Elements

1. **Transport policy is based on what works**. In addition to technical specialists, stakeholders including end users—also participate in the policy-making process to ensure that plans and projects reflect actual needs.

2. Land-use planning is part of the solution. The former link between land use and transport planning is recreated to facilitate the provision of public transport and reduce the need for travel.

3. Transport demand is managed alongside supply, and projects are centered on traffic restraint and the greater use of public transport. No longer is road traffic capacity automatically expanded in response to demand forecasts.

4. **Transport plans and projects reflect a wider city vision or spatial strategy.** They are also affordable, adaptable, and implementable. Furthermore, policy makers recognize that soft measures such as public transport advertising, internet shopping, telecommuting and teleconferencing, and better information are effective ways to influence behavior.

5. Policy effectiveness is demonstrated to a skeptical stakeholder community.

Source: Asian Development Bank. 2010. Changing Course. A New Paradigm for Sustainable Urban Transport. Manila.

<sup>&</sup>lt;sup>4</sup> ADB. 2009. *Changing Course. A New Paradigm for Sustainable Urban Transport*. Manila. This report expands on the need for a new paradigm and identifies its implications for management, financing, transport, and land-use policy.









<sup>&</sup>lt;sup>3</sup> Tbilisi City Hall. 2014. Tbilisi City Hall donor Meeting. Tbilisi.

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The approach also included an awareness and capacity development program. A study tour was organized in Europe in November 2014 for senior government officials and technical staff to learn from demonstration projects and exchange with peers. Subsequently, Tbilisi's first ever Sustainable Urban Mobility Forum was held in December 2014. The 3-day Forum included a discussion on key urban transport issues, a review of the recent best practices and conditions for replication in Tbilisi, and a visioning exercise which enabled Tbilisi's Mayor to translate his vision into a 10-point action plan aiming to accelerating Tbilisi's transformation by shifting to more sustainable urban transportation. The updated Tbilisi SUT Strategy (2015-2030) was finalized from January 2015 to October 2015 and gives directions for short (2017), medium (2021) and long term (2030). Tbilisi's multimodal urban transport model and Household Survey are also being updated to provide an accurate and state-of-the-art tool to test that will help prioritize and refine future SUT projects in Tbilisi.

The Tbilisi SUT Strategy is intended to define policy directions and prioritize interventions along a multimodal and integrated approach to be gradually implemented between 2015-2030.

### Box 3 – Towards updated Tbilisi SUT Strategy, an Iterative and Consultative Approach

Building Foundations (September to December 2015)
Steering committee (periodic meetings)
Tbilisi urban profile and stocktaking
Assessment of current urban mobility conditions, with focus on recent trends (2010-2015)
International best practices and lessons learned
Knowledge development (Study tour and Tbilisi SUT Forum)
Consultations and visioning exercise
Elaborating Tbilisi SUT Strategy (January to October 2015)
Steering committee (periodic meetings)
Consultations on key recommendations and prioritization
Refinement of the Tbilisi SUT Strategy
High level meeting and endorsement









### Box 4 – Tbilisi Mobility Conditions at a Glance

Population	1,118 million (2015) <sup>5</sup>
Tbilisi City area	126 sq. km
Tbilisi Urban area	490 sq. km
Population Density (urban area)	2,998 person/sq.km
GDP per Capita (country)	6,499 GEL (2014)
GDP per Capita (Tbilisi)	7,848 GEL (2014)
Roads Network	2,900 km
<i>Metro</i> <sup>2</sup>	2 lines, 27.5 km / 263 000 daily trips
Bus Network <sup>2</sup>	97 lines, 2344.2 km / 350 000 daily trips
Minibus Network <sup>2</sup>	95 lines, 3852 km / 394 000 daily trips
Public Transport - Daily trips (metro, bus and	1,000,644 daily trips
minibus)°	
Urban Cable Car	2 lines (touristic)
Modal split	Public transport (49%)
(all modes, including non-motorized) <sup>7</sup>	Walk (28%)
	Car (20%)
	Taxi (2%)
Car Ownership <sup>8</sup>	242 per 1,000 inhabitants
Mobility Rate (estimated)	1.69 daily trips per person

Tbilisi Sustainable Urban Transport Strategy 2015-2030







 <sup>&</sup>lt;sup>5</sup> Population in January 2015 – Data from New Census.
 <sup>6</sup> Source TTC (2014).
 <sup>7</sup> Geostat 2014. Registered vehicle in Tbilisi.
 <sup>8</sup> State 2014. Registered vehicle in 2014 modulation.

<sup>8</sup> SYSTRA - Household Survey report - 2011; modal split to be updated once the 2016 household survey is completed.

## 2. SOCIO-ECONOMIC PROFILE

### 2.1. Location

Tbilisi, capital city of the Republic of Georgia, is located in the South Caucasus, in East Georgia on the banks of the Mtkvari River. From the East, South, and partially from the West, Tbilisi is located contiguously along the Gardabani region and from the North and West along the Mtskheta Region.



Figure 1 : Tbilisi Urban Area and Surrounding Cities (Sources: Website and IC)

Tbilisi is located in the Eastern part of Georgia. The city is close to the Azerbaijan and Armenian borders. Relations to other main cities in the country and outside of the frontiers are oriented towards:

- The Western direction, to Gori, Kutaisi, the ports of Poti, Batumi and the Turkish border (M1/M2 to Sarpi and M1/M8 to Vale). The M1, M2 and M8 highways are the main connectors between Georgia and the rest of Europe.
- The South-Eastern direction to Rustavi and Azerbaijan (M4 to Tsiteli Khidi, Krasnyi Most)







- The North-Eastern direction to Telavi and Azerbaijan (M5 to Lagodekhi)
- The Southern direction to Armenia (M7 to Sadakhlo and M6 to Guguti)

Due to the closure of the borders between some of the neighbouring countries, significant traffic runs through Georgia and especially through the Tbilisi Metropolitan area.



(Source: ADB)

### 2.2. Population

According to the preliminary results of the 2014 Population Census, there are about 1.458 million inhabitants in the Tbilisi Metropolitan Area. The Tbilisi Metropolitan Area includes:

- Tbilisi City, composed of 10 districts: Old Tbilisi, Vake; Saburtalo, Didube, Chughureti, Gldani, Nadzaladevi, Isani, Samgori, Didgori, with a population of 1.118 million.
- The city of Rustavi, with a population of 122,900.
- The municipality of Gardabani, with a population of 100,100.
- The municipality of Mtskheta, with a population of 57,400.
- The municipality of Sagarejo, with a population of 60,300.

The Tbilisi City population accounts for 30% of Georgia's total population. The population decreased in the last decade with a minimum of 1,082 million inhabitants in 2002.









Figure 3 : Tbilisi population evolution (Source :Tbilisi Economic Policy Agency, 2015)



Figure 4: Population density in Tbilisi and main road network (Source: Systra 2012)

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SOCIOECONOMIC PROFILE

#### Box 5 – National Census (2014) and Household Survey (2016)

Preliminary Results of 2014 General Population Census of Georgia.

The General Population Census of Georgia was conducted from 5-19 November 2014. The Census covered the whole country, except the occupied territories of Abkhazia and South Ossetia.

Ten thousand surveyors were specially trained for this purpose, and visited all dwellings on their operating territory across the country. By interviewing one or more adult members of the household residing therein, using a special questionnaire, the surveyors received information on the household and its members. Interview timing varied from 40-60 minutes.

The decision to select the 5-19 November period was conditioned by relatively lower mobility of the population during this period, as studies in schools and universities were underway. Wednesday – the middle day of the week – was selected as the reference date also for the reason of lower mobility. The length of the Census period (15 days) was determined while taking into consideration that the population should be able to recall where they were on the Census reference date (5 November).

As of 1 January 2015, the population of Georgia was 3,729.5 thousand persons and the population of Tbilisi 1,118 thousand persons.

The Georgian Statistic Agency indicated that final detailed results of the Census will be published in April 2016.

Census and household survey.

The city of Tbilisi owns a Multimodal Transport Demand Model with socio-economic data and mobility patterns based on the Household Survey done in 2010. There is a program to update both the Household Survey and the model in 2016. The results of the Census will allow checking the relevance of the zoning used for the Household Survey, as the Transport Demand model in 2010, and determine if the zoning needs to be changed in 2016 due to the uneven evolution of populations. The multimodal transport model is a key tool to forecast the impacts of any infrastructure project and assess the performance of the Public Transport Policy.







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### 2.3. Employment

The official figures from Geo Stat indicate that the total active population in Tbilisi amounts to 419,200 persons in 2014. The unemployment rate reaches 29.3% of the labour force.

The occupation of the population by sector is displayed in the following graph. The average wage amounts for 985 GEL in 2014.













## 3. CURRENT URBAN MOBILITY CONDITIONS

### 3.1. Public Transport System in Tbilisi

### 3.1.1. Tbilisi Transport Company (Metro, Bus and Cable Car)

The 100% government-owned Tbilisi Transport Company (TTC, former "Tbilisi Metro") was created in 1966, when the first metro line was opened. In 2009 the municipal buses network and related assets were transferred to the Company's ownership. In 2012, TTC started the operation of the newly constructed Rike-Narikala cable car.

In 2013,<sup>9</sup> the vehicles of the Tbilisi Transport Company carried out 203.2 million trips: (i) Metro - 96.23 million trips; (ii) bus - 105.8 million trips; and (iii) cable car - 1.15 million trips. In 2013, the overall traffic passenger increased by 24.1% compared to 2012, with an increase of 1.8% in metro ridership, 52.8% in bus ridership (introduction of GPS-based operation system and real time passenger information), and 37% in cable car ridership.

### 3.1.2. Metro System

Tbilisi metro system, opened in 1966, comprises two lines totalling 27.6 km and 22 stations.



<sup>9</sup> Source : Annual balance of TTC







The average daily passenger traffic in 2013 was 263,644 passengers (approximately 10,000 daily passenger per km of line) and the annual total passenger traffic was about 96.23 million passengers. The 20.5 km-long Line 1 (Red line, 16 stations) runs North-South from Akhmetelis to Varketeli and the 7.1km-long Line 2 (Green line, 6 stations) runs East-West from Vazha-Pshavela to Vagzlis Moedani where it connects to Line 1. The average distance between stations is 1,300 meters. Headway is 4 minutes at peak hours and about 5-6 minutes during offpeak hours. The commercial speed is 36 km/h and with a maximum speed of 80 km/h. The service provided represents about 15.3 million km in 2013.

The main line 1 stations in terms of daily boarding and alighting are Akhmetelis Teatri, Samgori, Varketili and Vagzlis Moedani (transfer station). The green Metro line currently ends at Vaja Pshavela with degraded operations between Delisi and Vaja Pshavela. The initial plan foresaw an extension of line 2 to University, at the end of the Saburtalo district. The tunnel till University station has already been bored before the collapse of the Soviet Union. The works to complete the extension of line 2 till the university started in the summer of 2015 and are anticipated to be completed by the end of 2017.









Metro ticketing system

Metro station



Rustaveli Metro Station Exit

Figure 8: Pictures of Tbilisi Metro (Source: Tbilisi Transport Company website)

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Figure 9: Metro - Number of Boarding at Morning Peak Hour (Source: Systra 2011)









### Metro – Key findings

(+) The 27.6-km metro network is the backbone of Tbilisi public transport system.

(+) The Metro network is a key asset (not every 1.2 million urban area has one).

(+) Fare integration with the bus network enables easy and affordable transfer between modes.

(-) The Metro system reaches the end of its lifespan and should be upgraded (stations and E&M).

(-) Full passenger capacity of the system is not used.

(-) State-of-the-art universal accessibility and safety standards are not met.

(-) Lack of transfer with other modes (bus lines, park and ride), no proper interchange stations.







### 3.1.3. Bus Network

The average daily passenger traffic in 2013 was 350,000 passengers and the annual total passenger traffic was about 96.23 million passengers. Out of the 95 lines, 8 (lines 2, 23, 24, 33, 39, 51, 140, and 150) carry over 10,000 daily passengers.



Tbilisi Bus - Low Capacity



Tbilisi Bus - Medium Capacity

Figure 11 : Bus Fleet in Tbilisi

The Bus System includes 95 routes and 1,900 stations. A total of 537 low capacity (10 m, 21 seats) and 148 medium capacity (14 m, 31 seats) Bogdan type buses operate in network. The average age of the bus fleet is 10 years but experienced early deterioration due to the poor conditions of part of the road network and lack of maintenance. The current bus fleet consumes diesel fuel which highly contributes to air pollution.

The bus fleet does not meet state-of-the-art standards for passengers comfort and accessibility and passenger occupancy standards are exceeded.

New bus shelters have been introduced throughout the urban area and GPS-based real time passenger information is displayed at most of them.

Acknowledging the low passenger comfort and quality of service as well as environmental concerns, Tbilisi City Hall initiated in 2015 a fleet renewal plan to introduce (EBRD loan to finance 200 clean low-floor busses, for approval in 2015).

Commercial speed is continuously decreasing due to the growing congestion, absence of dedicated bus lanes and priority for busses at junction.

Overall, Tbilisi bus networks lacks hierarchy and high capacity bus lines. On the main bus corridors, the bus frequency reaches over 1,000 services per day with an overall headway between buses of less than one minute. The main bus corridors are the following:

- In the Northern part of the city: Guramishvili Ave. from Zahesi & Avchala to Didube, O. Khizanishvili Str inside Gldani (towards the Akhmeteli Teatri Metro station), -North- South corridors inside the city centre: Robakidze Ave. - Tsereteli St-

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Aghmashenebeli St, Marshal Gelovani Ave.- I. Gagarin St - Pekini St, TS Dadiani St- Chikobava St. Rustaveli Ave.

- East-West corridors inside the city center: Vaja-Pshavela Ave., Nutsubidze St, Kostava St-Kutaisi St, Tamar Mepe Ave., Tamarashvili St-Chavchavadze Ave.
- in the Southern part of the city: Gorgasali St, Cholokashvili St, Gulua St, St Ketevandedopali Ave. and Kalubani St (linking Vazisubani and Varketili).



Figure 12: Bus Network and Traffic Load (Source: Systra 2011)

### **Bus Network – Key findings**

(+) High bus ridership and passenger demand.

(+) GPS based real time passenger information.

(-) Low performance (low commercial speed, mixed traffic, congestion) and comfort (rolling stock).

- (-) Bus network lacks hierarchy and lacks high capacity bus lines on the main corridors.
- (-) Bus lines compete with Metro lines.
- (-) Aging diesel bus fleet, high emissions.
- (-) State-of-the-art universal accessibility and safety standards are not met.

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(-) Lack of transfer with other modes (Metro, park and ride), no proper interchange stations.(-) Lack of updated multimodal transport model (to plan the network and define operation plan).

### 3.1.4. Minibus Network

The average daily minibus passenger traffic in 2013 was 390,000 passengers, which exceed that of bus passenger traffic (350,000) and Metro (263,000). The minibus network is 3,852 kilometers long. It includes 95 bus lines. Microbus Park consists of 2,140 microbuses (8 m), 1,750 of which operate every day. The microbus operator is a privately owned enterprise. The new licenses were granted and the fleet renewed in 2010. The single fare of the Microbus costs GEL 0.8. Socially vulnerable families and veterans of the military forces can use preferential tickets with a 50% discount.

The microbus network covers the whole urban area and offers affordable and door-to-door public transport option. The microbus network competes with the metro and bus networks on the main transport corridors.



**Microbus in Central Railway** 



Microbus in Didube



Microbus in Samgori



N Samgori Microbus in Akhmetelis Teatri Figure 13: Example of Microbus Stations in Tbilisi









Figure 14: Minibus Network and Traffic Load (Source: Systra 2011)

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### Minibus Network – Key findings

(+) High minibus ridership and passenger demand.

(-) Minibus competes with bus network and metro network on main transit corridors, generating excessive congestion and pollution.

(-) No minibus restricted areas within the urban area.

### 3.1.5. Urban Cable Car

Tbilisi currently has 2 cable car lines under operation (Turtle Lake and Rike-Narikala) which are used mainly for leisure and touristic purpose and as such differ from urban transit cable car in terms of passenger capacity and functionality.

Tbilisi has a historical tradition of using cable cars for tourism and passenger transportation purposes. In Soviet times, several urban cable car were in operation, connecting Tbilisi with Mtatsminda, Turtle Lake, and providing passenger transports to Nutsubidze Plato and Vazisubani. With the exception of the Turtle Lake cable car, all other lines were gradually disconnected. The cable car in the historical city center is newly built and was commissioned in 2013.

The cable cars are operated by TTC and are integrated in the fare bus and metro fare system.



Turtle lake Tbilisi



Rike-Narikala

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Figure 15: (Touristic) Cable Car in Tbilisi (Source: Systra and IC)







### Cable Car – Key findings

(+) Two touristic cable cars are under operation.

(+) Some disconnected cable car lines, such as Samgori-Vasis Ubani, are used to cover densely populated areas connecting them to the metro network.

(+) Given the topography and densely populated hilltop districts, which are not served by the metro or any transit system, there is a potential to develop urban transit cable car project(s) in Tbilisi.

### 3.1.6. Fare Policy and Ticketing

Metromani Smart card can be used on metro, bus and cable car, and allows free transfers during 90 minutes. The single fare for the municipal transport (metro, bus) costs 0.5 GEL and the ropeway of Rike-Narikala costs 1.0 GEL.

The single fare of the non-municipal minibus is 0.8 GEL. It is not part of the integrated system and does not allow free transfers.

#### Fare Policy – Key findings

(+) Fare integration between Metro, bus and cable car is already in place, using smart cards.

(+) Fare policy includes free transfers between metro, bus and cable car.

(-) Minibus has a flat rate and is not integrated with other public transport modes.

#### 3.1.7. Taxi

Taxis are widely used by Georgians as well as foreigners. The taxi supply is very high compared to other cities in the world, although no official figure exists regarding the exact number of taxi (some quote a figure as high as 8,000 taxis operating in the city). As the taxi business is not regulated, nothing is legally required to operate a taxi, apart from a car and a driver's licence. The market is largely dominated by self-employed drivers that use their personal cars to generate revenues, competing with the few registered taxi companies that set a monthly fee to their drivers and provide on-call services for hiring taxis.

Quality of taxi services offered by private self-employed taxi drivers is rather questionable due to the poor technical condition of the cabs (normally self-employed taxi drivers use old and deteriorated cars without proper maintenance), absence of appropriate behaviour and lack of knowledge about city and street locations.

Self-employed taxi cabs do not have meters and the price of a ride is negotiated. Some taxi companies use taximeters, while others negotiate the price depending on the considered journey.







Given the oversupply of taxis, fierce competition pushes prices down. Drivers belonging to registered companies also need to offer cheap prices to catch a sufficient market share and cover their monthly fixed cost. Fares usually range from 30 tetri to 70 tetri per kilometer for metered taxis while the price significantly varies for others depending on the client (e.g. local, Georgian from another city, foreigner, etc.), their knowledge about average prices and their negotiating skills. Taxi prices are usually not over 5 GEL for journeys inside the Tbilisi cente and reaches 10 GEL for outer suburbs destinations or to and from the airport. Given their low price, taxis easily compete with public transport on some journeys.

The quality of the taxis also varies significantly from one car to another. Registered companies often set minimum requirements for the state of cars; some taxicabs are seriously damaged thus threatening the safety of passengers.

### Taxi – Key findings

(+) Wide taxi offer and coverage, and affordable price.

(-) Lack of regulation and policy leading to low quality taxi system.

(-) Taxi in poor conditions, bad driving behavior pausing safety problem.

### **3.2.** Non-Motorized Transport

The modal split of non-motorized transport (NMT) in Tbilisi is 28% (mainly walk, bicycle is less than 0.03%), which is rather low. In spite of recent targeted initiatives mainly in the city centre such as the improvement of selected sidewalks, creation of pedestrian zones in the historical city centre and creation of one pedestrian bridge over the river; pedestrian zones in Tbilisi are not considered, organized and prioritized in a way that would promote NMT as a tangible mobility alternative, even for short distance trips.

In a number of locations, space for pedestrian movement is totally ignored and the share of public space as priority is given to private vehicles and parking over pedestrian. In spite of recent prefeasibility studies on NMT options in Tbilisi, NMT has never been considered nor prioritized as a proper transportation mode.

Pedestrian and touristic walking zones are limited to historical parts of the city. The absence of sufficient parking spaces and a weak parking regulatory framework cause unregulated parking in inappropriate places. For instance, Tavisuplebis Moedani is overloaded by vehicles parked in front of the city assembly and taking over half of the square. Another typical example is Tabidze Street, located next to the city assembly building, which is used to be a pedestrian walking zone and where traffic and parking is used to be banned. However, recently, the mechanical barriers were removed and the street became a dense parking area, which reduces the aesthetic appeal for pedestrian and tourists. Meidan remains overloaded with cars despite having a parking lot across the river in Europe Square. This is a missed opportunity to use the space for recreational area.







Sidewalk quality has slightly improved recently on selected streets and avenues with the introduction of dropped kerbs at pedestrian crossing and new sidewalks pavement. However, the same is not spread out throughout the entire city. The quality of sidewalks remain poor as the surfaces are damaged even in the central and touristic districts of Tbilisi. Pedestrian sidewalks are frequently used for parking and obstruct pedestrian movements. Sidewalk quality and geometry are not sufficient to promote walking as a tangible mobility alternative in the city, even for short distance trips.

A survey was performed by NGO Georgian Alliance for Safe Roads (GASR) from June-July 2015 and found that: (i) 54% of respondents when crossing the street breach and ignore safety and traffic rules; (ii) 49% of men and 42% of women cross the streets not using pedestrian crossing (at grade, underground or elevated); and (iii) the main reasons for breaching the safety and traffic rules are: poor infrastructure of undergrounds – 32% (high stair cases difficult to access, poor lightning, poor sanitation conditions, lack of safety), long distance between regulated road crossings and undergrounds – 21%, absence of proper road crossing habit and knowledge of safety rules – 13%.

Tbilisi streets ignore bicycle as a transport mode. In spite of the topography, bike is considered to be in Tbilisi context a tangible and clean alternative to move about and even to commute on short distance which has been largely disregarded. Today, no road space is allocated to bicycle (no bike lanes), and the chaotic traffic and parking conditions stop Tbilisi inhabitant from using bikes, mainly for safety reasons.

### Non-Motorized Transport – Key findings

(+) Recent initiatives to improve sidewalks' geometry, and create pedestrian zones (limited).

(-) Sidewalk quality is not sufficient to promote walking as a safe and tangible mobility alternative in the city, even for short distance trips.

(-) Bicycle is not seen as a transport mode (by decision makers and users) and is disregarded in the sharing of public space and its design.

(-) Lack of NMT strategy or plan, to increase NMT modal share.







### 3.3. Private Motor Vehicles

### 3.3.1. Urban Roads

The number of car registered in Georgia increase regularly.



Figure 16: Evolution of Georgia car registered (Source Geo Stat)\_ 2014)

In 2014, 285,000 (Source: Patrol Police) vehicles are registered in Tbilisi which represents a car ownership level of 242 vehicles for 1,000 people, which is still significantly lower than European countries.

Year	Car	Population	Rate	
2010	206 904	1073345	193	
2011	221 892	1140000	195	
2012	<b>2012</b> 239 508		204	
2013	259 935	1175000	221	
<b>2014</b> 285 000		1180000	242	

Table 1: Motorization Rate in Tbilisi (Source: GEO Stat and IC)

	USA	Japan	France	UE	Brasil
Motorization rate	818	582	598	585	133
Table 2 · Motorization Rate in the World in 2012					

(Source: website and IC)

Opinion survey suggests that car traffic is characterised as chaotic by most of Tbilisi's inhabitants and increasing traffic congestion is a key concern for most of them.

Tbilisi is situated on both sides of the Mtkvari river. The strained topography in Tbilisi includes a stretched-out development along the Mtkvari river, and then a linear shape for the city.

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(Source: Systra 2011)

The urban area is approximately 35 km long and 5 km wide at its narrowest part. The main corridors are located alongside the Mtkvari river.

Highways (with fully grade-separated) do not exist in the city centre of Tbilisi. The M1 freeway from/towards the West and North part of Georgia (Aghmashenebeli Alley) ends at the Didgomi

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## CURRENT URBAN MOBILITY CONDITIONS

Cemetery while the South-East Highway to the Airport (Kakheti Highway) ends at the Petre-Pavel cemetery.



Pekini Street from Pekini & Vaja Pshavela

Chavchavadze Avenue from Vake Park



Traffic jam in Highway In Tbilisi

Traffic jam in Embankment In Tbilisi Figure 19: Road Congestion in Tbilisi (Source: websites and IC)

Major high capacities avenues run North-South inside the city. They include:

- The right and left embankment roads which follow the river from through the city
- Gorgasali street, which connects Rustavi urban road link to the city centre
- Eastern suburbs including the Varketili district connected to the city centre through George Bush Ave.-Kakheti Highway and Ketevan Dedopali Ave.
- Sarajishvili-Guramishvili streets connect the Northern suburbs to the city centre

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- Tsereteli Ave.-Tsinamdzghvrishvili St., Dadiani St. and Aghmashenebeli Ave. run through the left bank districts from the Didube to Avlabari metro stations
- Gamsakhurdia Ave. runs through the right bank from the East of the Saburtalo district to Gmirta Sq. which is connected with the right bank road in the city centre, with the Vake district and with Rustaveli Ave. running through the historical centre

The North-South major roads are connected together by transversal arterials especially:

- Ten bridges across the Mtkvari river
- The district of Vake is connected to the rest of the city by Chavchavdze Ave.
- The district of Saburtalo is connected to the rest of the city by Vaja Pshavela St. and Kazbegi St., both of which end on Pekini St.

Traffic modelling performed in 2011 (Source: Systra) concludes that at least two bridges in the North / East portion facilitate movement between the two banks. The Mtkvari river contains a natural barrier which constrains the connections between both banks. The railway line crossing Tbilisi creates another artificial barrier to connect the left and right banks of the city.

Road projects were recently implemented to improve the Tbilisi road network. In the Saburtalo district, the construction of the Vere River Highway offered direct access to the Vake business district from the city centre and bypassed the bottleneck created by the congested Chavchavadze Avenue.

The transversal routes are less developed. Eastern and Western parts of the city are connected by arterial roads on both sides of the river. These arterial roads are linked to main external roads leading to the city centre, and to an auxiliary arterial road (Rustaveli Avenue - Qetevan Tsamebuli Avenue). Northern and Southern parts of the city are connected with ten bridges. The Southwestern part of the city is situated along a small river, Vere. The districts of Vake and Saburtalo are densely populated and suffer from heavy traffic congestion. Vake is connected with the city centre only by Chavchavadze Avenue, while Saburtalo is connected by Pekini street and Gamsaxudia Avenue and has several connections to the Mtkvari river.

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Figure 20: Counts Roads (Source: SYSTRA 2011)

The South-West suburbs are connected to the centre by the Rustavi urban road link and Gorgasali Street. The Government of Georgia decided to build a new Urban Road link between Tbilisi and Rustavi financed under SUTIP. The construction is on-going and sections 1 and 3 of the road will be commissioned in early 2016. Traffic jams occur at the junctions especially near the city centre at the junction of Gorgasali Street and the Mtkvari river embankment. The Northwestern Suburbs are connected with streets from Sarajishvili-Guramishvili. The Northwestern section is connected by George Bush Avenue and Ketevan Tsamebuli Avenue. The city centre is built on terraces where the narrowest part in width does not exceed 4-5 km. The main arterial road for the Northern central part is Tsereteli Street and David Agmashenebeli Street while the Southern city centre is crossed by Rustaveli Avenue.

Most administrative businesses and cultural and athletic institutions are based in the city centre, Vake and Saburtalo Districts. Consequently, most traffic flow streams towards these areas causing heavy traffic jams during peak hours. The potential capacity of existing arterial streets cannot be fully utilized due to the lack of proper traffic management at critical junctions in the city centre. It is also a hindrance that there are incomplete grade separations for pedestrian







crossings in the districts of Vake and Saburtalo, and the basic streetlights are not interconnected. Densely populated blockhouse suburbs were built in the 1980s but the road infrastructure is not capable of serving current mobility needs. Narrow streets in the city centre cannot accommodate increased traffic flow. The right embankment of the Mtkvari river is heavily loaded at the junctions connected to streets that lead to the city centre. Another critically loaded direction is Saburtalo Street-Kutaisi Street, connecting the Saburtalo district and the North-West arterial Tsereteli Street with one another and embankments of the Mtkvari river at the Vakhushti Bridge.

The 40-km Highway, connecting M1 highway in the North near Mtskheta to M4 outside Rustavi is supposed to be used for transit traffic, but most of the transit flows currently crosses Tbilisi which offers more direct itinerary and supposedly reduced travel times.

Another cause of heavy traffic is rooted in modal choice. Using a car for everyday commuting is the preferred option by inhabitants who can afford one. The lack of special bus lanes causes bus speeds to fall below average, obstructing the general flow of traffic, particularly in congested areas.

## Urban Roads – Key findings

(+) Road network in Tbilisi is already well developed.

- (+) Traffic management system is in place.
- (-) Fast increasing car ownership and increasing road congestions.
- (-) Public transport system is not attractive enough to stimulate the shift from private car to public transport.
- (-) Traffic management system is in place, but functionalities are not fully used.
- (-) Missing road links and one or two bridges are required to better distribute the transversal traffic flows.

(-) A large part of the transit traffic crosses the urban area.







## 3.3.2. Urban Road Safety

A National Georgian Traffic Safety Strategy was published in 2008 followed by a National Road Safety Action Plan in 2010 to implement key multi-sectorial actions. The plan set a national quantitative target to reduce fatal crashes by 20% by 2013 (baseline year was not indicated).

A regional road safety strategy was also developed under the European Union's TRACECA framework<sup>10</sup> and an Injury Prevention Strategy has been drafted by the Ministry of Health.<sup>11</sup>

The National Road Safety Action Plan (2010-2013) specified a range of provisions. A road safety management capacity review carried out during 2013 with the assistance of the senior management of the Georgian governmental agencies and other stakeholders concluded that the plan had been partially implemented.<sup>12</sup>

Reported road fatality rates in Georgia have reduced over the last decade by around 20% against the tripling number of registered motor vehicles over the same period. Between 2010 and 2013, road fatalities reduced by 25% compared with the 2010 level against more than a 30% increase in registered motor vehicles. The reason for these positive developments is unclear due to a lack of monitoring and evaluation, as well as current data quality. However, it is likely that key interventions such as the introduction of compulsory seat belt use in 2010, small-scale road safety road geometry improvements, road improvements with efficient grade separation to eliminate dangerous mixed road use, small decreases in the age of a very old national vehicle fleet and the purchase of newer, safer vehicles from regions such as the EU, further roll out of speed cameras and new penalties for excess alcohol; and annual improvements in emergency medical response will all have played some part. External factors related to the global financial crisis may also have contributed in some way (e.g. actual distances travelled, the impact of youth unemployment rates and any changes in alcohol consumption).<sup>13</sup>

However, 2015 forthcoming road fatalities statistics suggests that the trend is reversing and there is a significant increase in 2015. In addition, the situation in Tbilisi differs from this and the statistics showed a continued increase in the number of road crashes and injuries since 2011.







<sup>&</sup>lt;sup>10</sup> In Land Transport Safety and Security, TRACECA Regional Road Safety Strategy (undated).

<sup>&</sup>lt;sup>11</sup> National Centre for Disease Control of Georgia, Draft Injury Prevention and Control National Strategy and Action Plan, 2014-2018.

<sup>&</sup>lt;sup>12</sup> Breen, J. 2013. Road Safety Management Capacity Review – Georgia. 2013, Global Road Safety Facility and the World Bank

<sup>&</sup>lt;sup>13</sup> Development of the National Road Safety Strategy and Action Plan (2014-2019) – Georgia Under the Fourth East West Highway Improvement Project (EWHIP4).



Figure 21 : Trends in Road Fatalities, Fatality Rates and Registered Vehicles: Georgia 2004-2014 Source: Ministry of Internal Affairs of Georgia, 2015, GEOSTAT 2015)

	2007	2008	2009	2010	2011	2012	2013	2014
Total registered vehicles	508 041	613 116	661 048	713 085	775 522	848 956	933 272	963 805
Total road fatalities	737	867	741	685	526	605	514	511
Fatalities per 10,000 thousand vehicles	14.5	14.1	11.2	9.6	6.8	7.1	5.5	5.3
Fatalities per 100,000 inhabitants	16.7	19.7	16.8	15.3	11.7	13.4	11.5	11.3

 Table 3: Trends in Road Fatalities, Fatality Rates and Registered Vehicles: Georgia 2007-2014

 (Source: Ministry of Internal Affairs of Georgia, 2015, GEOSTAT 2015)

A new national long-term road safety strategy (2015) and a related five year action plan (2015-2020) have been developed in the framework of National Road Safety Strategy and Action Plan (2014-2019) – Georgia under the Fourth East West Highway Improvement Project (EWHIP4), but does not include a clear urban road safety component.

The strategy foresees the establishment of a lead office for the road safety strategy to be set up within an existing agency. In addition, new coordination arrangements involving key agencies at a senior management level and operational levels are also set out. The aim is to ensure the coherent implementation of future road safety activity in Georgia.

Tbilisi, which has the highest motorization rate and the highest population, is the city with the highest level of traffic crashes in the country. Driver's awareness and behaviour is generally inadequate. While the number of fatalities remains almost stable since 2011, the number of road crashes and injuries increased by 20% and 35% between 2011 and 2014. 2015 forthcoming statistics suggests that this trend is continued in 2015.









Figure 22: Trends in Road Crashes, Fatalities and injured: Tbilisi 2008-2014 (Source: Ministry of Internal Affairs of Georgia, 2015, GEOSTAT 2015)

Year	Road accidents	Deaths	Injured					
2008	2943	264	4139					
2009	2595	193	3619					
2010	2427	190	3295					
2011	2072	151	2858					
2012	2213	138	2921					
2013	2329	80	2985					
2014	2744	104	3491					
able 4: Trends in Road Crashes, Fatalities and Injured: Thilisi 2008-2014								

able 4: Trends in Road Crashes, Fatalities and Injured: Tbilisi 2008-2014 (Source: Ministry of Internal Affairs of Georgia, 2015, GEOSTAT 2015)

#### Urban Road Safety – Key findings

(+) Significant decrease in the number of fatalities, injuries and crashes between 2008 and 2011.

(-) However, this trend was not sustained and reversed since 2011.

(+) Automatic radars are in place (should enable enforcement).

(+) Targeted road conditions and geometry improvement projects have been implemented.

(-) Overall poor and decreasing road safety conditions due to increased car ownership, congestion, unregulated traffic, low awareness of drivers and pedestrians, lack of enforcement of traffic rules and speed limit.

(-) Lack of urban road safety policy and leading agency.

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## 3.3.3. Parking

Parking in Tbilisi mainly consists in on-street parking, which in most of the cases is poorly enforced and uncontrolled. Some of newly created pedestrian streets in the city center, such as G. Tabidze Street, originally included access control system (for residents) which was poorly enforced and then abandoned.

Parking management and operation has been outsourced by Tbilisi City Hall to C.T. Park under a concession agreement signed in 2007. C.T. Park is in charge of parking spaces and controlling parking rules in Tbilisi. There are about 33,000 slots today in Tbilisi, including 350 for disabled. Parking signs are installed in dedicated parking places, indicating the C.T. Park logo, and can be used by car users for a fee (GEL 50 for 1 year, GEL 25 for 6 months and GEL 4 for a week). C.T.Park has the right to fine (GEL 10) when fee is not paid, parking method is violated, double parking, vehicle is parked within a 'no parking zone' (with sign), and vehicle is parked on a sidewalk. C.T. Park also has the right of towing. C.T. Park also manages Special Secured Towing Lots (three lots in total).

However, there is no clear parking strategy. Parking is not yet seen as a way of regulating traffic and of encouraging the use of public transport.



Freedom Square



G. Saakadze square



G. Tabidze str



G. Saakadze square









I. Chavchavadze avenue



K. Abkhazi str.

#### Figure 23: Street Parking in Tbilisi (Source: IC)

Car parking has become one of the most important challenges for Tbilisi and its population. The lack of a sufficient parking infrastructure and a weak regulatory framework brought rather negative results i.e. pedestrian areas and sidewalks had been more and more occupied by cars, thus creating additional congestion in town while decreasing the quality of pedestrian zones.

The activities of C.T. Park have only improved the parking situation to a limited extent. Without the development of a sufficient parking infrastructure or parking rules, it remains impossible to solve the problem.

The scarcity of parking lots, especially marked spaces, is affecting Tbilisi. It impacts traffic congestion directly by forcing random parking due to the lack of space. New lots are required in the densest business areas to limit curve parking. Around old Tbilisi, the implementation of secured lots would also enable the creation of a car-free zone downtown, which will help to reinforce its attractiveness.

## Parking – Key findings

(+) Concession for parking management and operation (private sector participation).

(-) Poor enforcement and regulation, unregulated and unenforced parking contributes to road congestion, and impedes quality of life of residents (sidewalks andpedestrian areas are often invaded by cars).

(-) Lack of parking strategy and plan (integrated with urban mobility plan and urban development plan).







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# 4. TBILISI URBAN MOBILITY FORUM 2014



Thematic session during Tbilisi Sustainable Transport Forum, in Tbilisi 9 December 2014) Figure 24: Tbilisi Sustainable Transport Forum (Source: IC)

The Tbilisi Urban Mobility Forum 2014 was held in Tbilisi from 3-5 December 2014. The 3-day event was organized by Tbilisi City Hall and the Municipal Development Fund of Georgia (MDF) with the support of ADB.

The forum was a venue for knowledge sharing and consultations. The purpose of the forum was to discuss options for Tbilisi to shift to more sustainable urban mobility in near future, taking stock of the recent initiatives in Tbilisi as well as learning from international best practices.

This workshop became a milestone event in the on-going process of updating Tbilisi Sustainable Urban Transport Strategy. It was attended by 60 participants, including stakeholders, government agencies, development partners and experts.

Presentations were delivered by Tbilisi City Hall officials, international experts, the Paris urban transport operator company (RATP), urban agencies and research institutions (CEREMA) and development partners (ADB, AFD). Sessions were facilitated by urban development and transport specialists. All participants were invited to actively contribute to debates and visioning exercises.

The first day focused on the current urban mobility conditions and challenges in Tbilisi. The main findings of a study tour in Paris and Lyon, France were discussed. (The study tour was organized from 17-21 November 2014 for the benefit of the Tbilisi City Government and Tbilisi City Hall officials).









The topics of the second day covered three main areas pertaining to transport mode alternatives and the best practices, as well as discussing the experience in South America and other sustainable mobility related issues.

The third day was dedicated to debates based on the results of the discussions from the two first days. Participants were invited to summarize the key lessons and to make suggestions regarding the urban transport solutions and improvements that would be of interest in the context of Tbilisi.

Conclusions were made to prepare strategic options for the development and strengthening of sustainable public transport in Tbilisi and the improvement of urban mobility, involving as many people as possible. A short term actions plan was also discussed an agreed upon (see Box 6), including actions which have been launched in 2015 and recommendations which were further elaborated under the Tbilisi Sustainable Urban Transport Strategy.

## Box 6 – Conclusions of Tbilisi Urban Mobility Forum 2014

#### Main findings

1) Sustainable urban transport: accessible, affordable, efficient, environmentally friendly, financially sustainable, and safe.

- 2) Avoid-shift-improve paradigm and integrated approach.
- 3) Series of convergent measures and actions and strong political will are required.

#### Vision

- 1) Improve quality of life (liveable city) and economic growth (competitive city).
- 2) Reduction of carbon emissions and promotion of clean modes (shift to sustainable urban transport).
- 3) Development of an attractive and high quality public transport system; implementation of measures to control private car use.
- 4) Guarantee mobility and safety for all types of users (universal access).
- 5) Cost effective investments.

#### 10-point Short Term Action Plan (2015-2016) – Tentative

- 1) Household Survey accurate information of current passenger demand, patterns and opinion.
- 2) Finalization of urban transport roadmap.
- 3) Establishment of city twinning (with selected city) for continued knowledge sharing and partnership.

4) Conceptual studies on reorganization of bus network, including main corridor(s) (light rail transit or bus rapid transit and universal access).

- 5) Conceptual studies on parking strategy and NMT.
- 6) Detailed studies of main corridor (BRT).
- 7) Gradual renewal of bus fleet (low floor clean bus), compatible with future BRT.
- 8) Set up of emission monitoring centres.
- 9) Awareness campaigns (safety, pedestrian, public transport).

10) Development of comprehensive multimodal Urban Transport Master Plan (issues: mode NMT /bus/ BRT/ LRT/ CPT/ metro/ parking/ car restriction; environment/emission; investment plan/funding capacity/funding mechanisms; institutional reforms; economic and financial analysis; private sector participation; scenarios low/medium/high).







#### Medium term actions (2016-2018) – Tentative

Planning and implementation of a pilot BRT project, restructured bus network and parking strategy Development of restructured bus network, taking into consideration the possible implementation of a pilot BRT project

Green City strategy development and Action Plan

Parking strategy development

Smart City Strategy development

Implementation of other actions identified from the approved Multimodal Urban Transport Master Plan **Support** 

- 1) City twinning and partnership (knowledge and experience sharing)
- 2) Conceptual and detailed studies (development partners)
- 3) Project financing (Government, development partners, private sector)

A document entitled '*Tbilisi Urban Mobility Forum 2014 – Transforming Tbilisi by Sustainable Urban Mobility*' with all presentations, findings and conclusions of the forum was prepared in January 2015 for dissemination purposes.

It was agreed to organize a new workshop – Urban Mobility Forum 2016 – to follow up on the decisions made during the 2014 forum and to see the achievements and progress reached.

#### Urban Mobility Forum – Key findings

(+) Unique venue for knowledge sharing and conceptualization.

(+) Participation of key stakeholders, agencies, development partners, and civil society is essential.

(+) Participation of international and local specialists is essential, enabling recent best practices to be envisaged and tailored to Tbilisi context.

(+) Forum documents including presentations and findings are essential for dissemination purpose.







# 5. THEMATIC RECOMMENDATIONS

Note: This section should be read together with the Tbilisi Urban Mobility Forum document ('Tbilisi Urban Mobility Forum 2014 – Transforming Tbilisi by Sustainable Urban Mobility') which presents best practices in all sustainable urban mobility related aspects, including case studies on which most of the thematic recommendations are grounded.

# 5.1. Institutional Aspects and Regulatory Framework

Institutional strengthening is a key issue in Tbilisi. The transport sector has only been partially restructured and urban transport is mainly disregarded in national policy and left for local government to manage, without any definition of responsibility and accountability. The main consequence of the lack of empowered entity to plan and manage the urban transport sector is slow decision-making processes due to limited use of economic assessment in defining priorities and absence of long-term planning. As a result, Tbilisi City Hall is not in a position to fully define, finance and implement a coherent local transport development strategy. Due to the lack of integration, single authority taxi, minibus, bus and metro compete with each other, which generate poor quality of services and artificially high operation costs affecting the overall efficiency and attractiveness of the public transport system.

Best practice shows that to implement ambitious sustainable urban mobility plan, an Urban Transport Authority (UTA) should be in place, empowered, funded, and adequately staffed to have and exercise authority for all urban transport aspects, from planning and implementation of project to operation.

The institutional discontinuity between the national (long distance travel) and local (urban transport) levels in the transport sector hinders the coordination and results in poor integration between national and urban transports. Intercity passenger services are not a responsibility of the City Hall and coordination mechanisms are not in place, which generates uncoordinated distribution of services in the city. Quality and safety standards of intercity bus and mini bus services remain poor. The Road Transport Agency of the Ministry of Economic Development of Georgia is in charge of intercity bus and mini bus links. Regulations related to the intercity bus and microbus services exist but are not used. Enforcement of these regulations would improve the safety and quality standards.

## Institutional Framework – Recommendations.

Institutional framework, reforms and creation of Tbilisi UTA should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

UTA (for Tbilisi Urban Area) should be set (decree and status), empowered (decision making, responsibility and accountability), funded, adequately staffed (adequate number of experienced staff) to have and exercise authority for all urban transport aspects (planning, implementation of project, monitoring of operation).







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Authority and decision making mechanism should be clearly defined.

UTA should benefit from capacity building program and twinning (with other urban transport authorities) to familiarize staff and decision makers with recent best practices and technologies.

UTA should organize communication campaigns and events to raise awareness on on-going initiatives among users regarding sustainable urban transport issues.

UTA should establish fare integration for all public transport modes (and park-and-ride).

Create and update transport monitoring tool (multimodal transport model), to be able to test strategies and projects.

Revised regulatory framework for parking system (combined with a revised parking master plan including park-and-ride options).

Create a regulatory framework for taxis.

Explore innovative financing mechanisms and introduction of taxes to finance public transport system modernization, expansion, and operation (such as fuel tax, employer tax or land value capture).

Create conditions to implement fully integrated e-ticketing system for all public transport modes and parking.

Study options, conditions, and feasibility of increased participation of the private sector (management contract, concessions, design build finance operate [DBFO]).

# 5.2. Developing New Transit Corridors

The backbone of Tbilisi transit network is the metro system. With the exception of the extension of line 2 to the university (due for commissioning in 2017), further extension of the underground metro network is not envisaged due to high investment cost required.

To improve the performance of the overall public transport, it is recommended to create atgrade transit corridor(s) to complement the metro system and introduce hierarchy: (i) underground metro system (network); (ii) at grade transit system (network); (iii) bus network; and (iv) minibus network.

At-grade transit options can be bus-based (bus rapid transit) and rail based (light rail transport, e.g. modern tram) and serve similar functions in terms of performance, passenger capacity and quality of service. It is recommended to start a pilot project and have it commissioned at medium term.











Figure 25: BRT systems in Nantes and Mexico City (Source: IC)

## Box 7 – Bus Rapid Transit – Key Features and Lessons

There are various forms of BRT which have been developed over the past decades throughout the world.

A BRT is a metro like-system which includes segregated lanes, stations, modern and clean rolling stock and as such offers high quality of service and performances. This clean and modern system contributed to develop a new image and in most of the cases, a new unique identity for the cities which adopted that mode.

BRT passenger capacity spans from 3,000 passengers per direction and per hour (pphd) to up to 45,000 pphd depending on the type of infrastructure and transport demand. As such, BRT competes with LRT and even MRT in terms of passenger capacity.

BRT (such as in Paris, Nantes, Istanbul, Mexico City, Ahmedabad, Johannesburg) provide passenger capacity similar as modern trams (LRT) meeting the transportation demand, can be inserted in dense urban environment and even in historical city centers (Mexico City, Lyon), and would be suitable in Tbilisi context.

High capacity BRT (such as Bogota and Guangzhou) provide passenger capacity similar to heavy metro systems and uses a larger portion of the road space as they have bigger stations and often require two lanes per direction. High capacity BRT alignment requires wide avenues. High capacity BRT is not required in Tbilisi context.

Compared to rail-based options, BRT proves to be cost effective (CAPEX from \$5.0 to \$12 million per km) and quick to implement (2 to 3 years from decision making to commissioning) alternative.

BRT is also a flexible system as operating plan can be envisaged and adapted during its life cycle to fully match the evolving transport demand. Under the full flex operation scheme for instance, the right of way might be used by bus routes which come for part of the cities other than the BRT corridor only. As such the BRT infrastructure can benefit to main bus routes of a bus network.

BRT projects usually include a NMT component and have positive impact on urban development (which can be regulated using Transit Oriented Development principle).









Figure 26: LRT System in Strasbourg – Before and After Project (Source: IC)

#### Box 8 – Light Rail Transport (at-grade, modern tram) – Key Features and Lessons

Modern tram projects (mainly at-grade) have been developed in Western Europe since the 1980's in medium-sized cities and used to improve the attractiveness of public transport system and to tackle increasing car congestion in city centers.

A modern tram (LRT) is a system which includes segregated right of way (mainly at grade), stations, modern and clean rolling stock and as such offers high quality of service and performances. This clean and modern system contributed to develop a new image and in most of the cases a new unique identity for the cities which adopted that mode.

Modern tram passenger capacity spans from 3,000 to up to 10,000 pphd depending on the type of infrastructure, rolling stock (width, length, single or multiple units), and transport demand.

Modern tram is either used as backbone of the transit network (i.e. Bordeaux, Strasbourg, Barcelona, Rabat) in medium-sized cities or to complement metro network in cities of more than one million inhabitants (Lyon, Marseille, Paris, Berlin, Bruxels), can be in dense urban environment and even in historical city centers (Bordeaux, Strasbourg), can meet the transportation demand, and would be suitable in Tbilisi context.

CAPEX of modern tram ranges from \$20 million (optimized costs, Rabat, Besancon) to \$35 million per km (Bordeaux, including street renewal from face to face). Investment cost of modern tram projects is significantly higher than that of BRT projects but lifespan is longer (30 to 40 years, as opposed to 15 years for BRT systems).

Modern tram projects usually include an NMT component and have positive impact on urban development (which can be regulated using Transit Oriented Development principle).







A corridor analysis was performed in 2011 (Systra) as part of a LRT feasibility study and the keyfindings are summarized below. The analysis will need to be refined under fresh studies, but give an indication of priority transit corridor. As part of the Tbilisi Sustainable Urban Transport Strategy, it should be considered as corridor where both BRT and LRT modes can be envisaged.

The five corridors which had been analyzed are the following:

- Corridor 1: Delisi-Ortachala
- Corridor 2: Vagzlis Moedani Samgori
- Corridor 3: Didi Digomi-Didube
- Corridor 4: Delisi Vagzlis Moedani
- Corridor 5: Pekini Ortachala

The five identified corridors have been compared through a multi-criteria analysis such as:

- Transit system attractiveness: population and employment served, ridership, etc.
- Urban integration: alignment and integration constraints, location of depot, etc.
- Capital Cost
- Operation and Construction issues



Transit corridor 1 (*Recommended*) Delisi – Ortachala Length: 11.18 km

Transit corridor 2 Vagzlis Moedani – Samgori Length: 6.73 km







# THEMATIC RECOMMENDATIONS



Transit corridor 3 Didi Digomi – Didube Length: 8.2 km

**Transit corridor 4** Delisi – Vagzlis Moedani Length: 8.4 km

**Transit corridor 5** Didube – Pekini - Ortachala Length: 12.42km

Figure 27: Presentation of Main Demand Corridor for Public Transport (Source: Systra 2011)







The table below summarizes the findings of the multi-criteria analysis for the five corridors:

	Criteria	Corridor 1 : Delisi – Ortachala	Corridor 2: Vagzlis Moedani – Samgori	Corridor 3: Didi Digomi – Didube	Corridor 4: Delisi - Vagzlis Moedani	Corridor 5: Didube – Pekini – Ortachala
	Length	11.18 km	6.73 km	8.2 km	8.4 km	12.42 km
ctiveness	Population and employments served in the corridor	5	2	1	4	4
stem attra	Attractors and generators served in the corridor	5	1	2	5	5
ınsit sy	Ridership in 2014 (boardings per day)	5	2	2	3	4
Tra	Connection with the existing PT network	5	2	1	5	5
uo	Alignement constraints	2	5	4	3	2
Urban ntegrati	Impacts on technological alternatives	3	5	5	4	3
=.	Depot location	3	2	4	2	4
Operation a issues	and construction	3	2	4	3	3
Total		34	26	28	33	32

Table 5: Comparison of Main Corridors (Source: IC)

The multi-criteria analysis suggests that the most efficient corridor is the Delisi –Ortachala (corridor 1), which might be considered for a BRT pilot project, subject to confirmation and adjustment under a new feasibility study.







#### New Transit Corridor (at-grade) – Main Recommendations

At-grade transit network (bus-based or even rail-based at long term) should be developed to complement the Metro network, and should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

Corridor analysis should be conducted, and transit corridors should be selected based on multicriteria analysis and also using the updated multimodal transport model to test options. Mode analysis should also be conducted as part of this exercise.

Bus Rapid Transit is a cost-effective solution for a pilot project and also future at-grade transit network. There is a range of BRT types implemented around the world with deferent features and passenger capacity. Recent successful projects demonstrate that BRT can be developed in a city like Tbilisi, implemented quickly, and deliver immediate benefits.

Pilot BRT project should be fully accessible (universal design) and include NMT component and would become a tangible demonstration project which would initiate a shift to more sustainable urban transport in the city.

BRT infrastructure can benefit multiple bus lines of the bus network (operation plan), which requires Bus fleet with adequate specifications.

Branding (modern image) and communication campaign are important to secure success of the Pilot BRT project.

BRT project requires adequate institutional setting and fare integration with other public modes.

Quality interchange stations between BRT, Metro, bus, NMT and parking should be included in the pilot BRT project.

LRT (at grade tram) also makes sense in Tbilisi context. However the investment cost, compared to BRT, is significantly higher and would exhaust the financing capacity at a higher pace. LRT might be envisaged at long term, once financing capacity for public transport has increased.

# 5.3. Public Transport (Buses, Metro, Ropeway)

#### 5.3.1. Metro

The 2-line underground metro network is the backbone of Tbilisi public transport network and should be comforted as such. The existing system has the potential to attract more passengers. It is recommended to prepare a sequenced Metro upgrade modernization plan. The plan should include a detailed operation plan and financial evaluation. It is expected that the upgrade of the system would generate a decrease in operation expenses.







It is not envisaged to expand the underground metro network (other than the on-going extension of line 2 to the University) due to too high investment costs. As recommended under Tbilisi SUT Strategy, other cost effective modes such as CPT, BRT (and even LRT at a later stage) can be adopted to efficiently increase coverage of the backbone transit network.

## Metro – Main Recommendations

Metro network should be comforted as actual backbone of Tbilisi public transport system, and a series of measures and investment should be implemented to increase the quality of services and attractiveness of the system.

Improvement of performance and quality of service of the metro network should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

Bus and minibus networks should be restructured in order not to compete with the Metro system, and studied under the sustainable urban mobility plan.

Selected stations should be upgraded to interchange stations (with other public modes) and park-and-ride should be created to encourage transfer from personal motor vehicle.

Modern technologies (mobile apps for passenger information, e-ticketing) to increase the quality of service should be adopted to stimulate the use of metro.

A metro upgrade and rehabilitation plan should be developed, to gradually replace E&M equipment, increase passenger capacity (operation plan), refurbish stations, meet safety standards, and improve accessibility and connectivity with other modes (interchange).

Gradual rolling stock refurbishment should be continued.

New Rolling stock might be purchased to increase the system capacity (headway might be decreased to up to 2 minutes, after modernization/replacement of signaling system).

## 5.3.2. Bus Network

In a city with a metro system, the bus network is a component of the overall public transport system and complements backbone transit system. The bus network system itself should consist of structuring bus lines and secondary bus lines.

An efficient bus network consists of rolling stock, routing and operation scheme matching the passenger traffic demand, adequate road space allocated to busses, and measures to secure high commercial speed. As it currently stands, Tbilisi bus network lacks hierarchy and should be deeply restructured in order to meet the passenger demand, reach acceptable performance and quality of service. Improving the performance of the bus network cannot be achieved just by renewing the bus fleet and takes a series of measures to cover all of the above aspects.







Restructuring the bus network is recommended as an immediate action as it is inexpensive and will deliver immediate benefits. Operation plan and options should be tested on a multimodal traffic forecast model. The bus fleet is already equipped with on-board GPS.

A modern traffic management and control center is already in place and offers the opportunity to fully use the range of functionalities that the system offers, such as prioritization of busses at junctions (bus lanes and priority) and enforcement of bus lanes (automatic radars and fines for personal vehicles which would use the bus lanes).

Creating BRT corridors is an efficient option to improve performance and quality of service on high demand corridors which are common trunk for several bus lines of the network. There are various forms of BRT, and when adopting the 'full flex' system, BRT infrastructure (segregated/dedicated lanes, stations) benefit multiple lines of a bus network provided adequate specifications are adopted for the bus fleet. For instance, doors on both sides of the bus are required to be able to operate in and outside a BRT infrastructure with medium lane and central platforms.

#### **Bus Network – Main Recommendations**

Restructuring, improvement of performance and quality of service of the bus network should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

(Immediate) Restructure the bus network and create main bus lines (integrated with metro network, minibus network, parking plan).

(Immediate) Define adequate share of road space between modes and create dedicated bus lanes with priority at junctions to improve commercial speed (for main bus lines and also at congested junctions for other lines). Pedestrian and bus only zones, traffic calming zones, traffic reorganization (diversion, one-way streets) can also be envisaged.

Bus network should be studied under the Sustainable Urban Mobility plan.

Conduct feasibility study of one or two BRT Corridors (see transit corridor) and implement a pilot BRT project (with potential for replication on other corridors).

Gradually renew the bus fleet (with adequate sizing) and adopt clean technologies; ensure bus capacity/capacities and specifications are consistent with passenger traffic load and envisaged BRT options.

Branding and communication campaign to raise awareness among users and the attractiveness of the bus network (and possibly attract new users).

Ensure roads and bridge projects (rehabilitation or new) take into account bus lines (bus lanes, stop, stations, etc).







#### 5.3.3. Minibus

The current minibus network competes with the bus and metro networks and highly contributes to the road congestions, particularly in the city center.

Minibus is usually used to complement the main public transport network to cover the low density areas (where bus routes are not viable) and also act as feeder to the transit network. Minibus usually operates on short distances and is not recommended to access the city center. Fare integration is required to allow transfer from minibus to bus and transit network.

Clean minibus technology, including electric minibus, is well developed and should be adopted.

#### **Box 9 – Restructuring of Minibus network in Riga**

The Municipality of Riga decided to restructure its minibus network, before restructuring consisted of 100 lines operated by private companies (43).

The process was smoothly and successfully conducted in 2 phases: (i) network restructuring and licenses to 9 operators in 2005; (ii) Minibus network transferred to 'Rigas Satiskmes' (public operator) in 2010.

#### Minibus Network – Main Recommendations

Restructuring of the minibus network – aiming at covering the less densely populated areas of Tbilisi urban area where bus routes are not viable and avoiding the city center – should be conducted under a comprehensive and integrated Sustainable Urban Mobility Plan.

The restructured minibus network should avoid competition with bus, at-grade transit network (future) and metro network, and should mainly act as feeder to the main public transport network.

Minibus network restructuring should be conducted concurrently to the bus network restructuring.

Reconversion plan should be elaborated in order to offer reconversion (or compensation) and include existing minibus operators and personnel in the overall restructured public transport network.

Use of clean minibus (even electric minibus) should be envisaged.

Minibus should be part of the integrated public transport fare system.







## 5.3.4. Urban Cable Car (Cable Propelled Transit)

Several densely populated areas of Tbilisi are not connected to the metro network, and with the exception of the extension of Line 2 to the University (commissioning anticipated in 2017), no extension of metro network is envisaged, due to high CAPEX of underground metro projects.

However, there are densely populated districts in Tbilisi urban area which are not covered by the metro network and where the transport demand is high. Urban Cable Car (Cable Propelled Transit [CPT]) is a mode which is recommended to connect some of them to the metro network.



La Paz (Bolivia) Figure 28: Recent Cable Propelled Transit Projects (Sources: website, Mi Teleferico)

# **Box 10 – Cable Propelled Transit (CPT)**

New concept: from 'cable car' to 'cable propelled systems (CPT)'

Two types of cable car systems: (i) touristic and resorts (as mainly adopted in Georgia so far); and (ii) urban transit system (new trend).

Use of aerial cable cars for carrying low volumes of passengers has existed for many years, particularly in relation to skiing, and the technologies and supply industries for cable cars are well-established. However, urban aerial cable cars for mass transit referred to as CPT, is relatively new. A CPT system was first introduced in Medellin, Colombia in 2004. This was successfully integrated with the other parts of the city's mass transit network, providing passengers with the ability to transfer to local metro lines. Since then, CPT systems have been provided in a various other cities. The world's largest network is the 10 km CPT network recently built in La Paz, Bolivia, which has 3 lines with a capacity of 3,000 passengers per hour per direction (pphpd). Other developing country cities with CPT systems include Caracas, Venezuela; Constantine, Algeria; Rio de Janeiro, Brazil; Hong Kong; Taipei; and Singapore. Further projects are underway or planned in other cities including Kampala, Uganda; and Lagos, Nigeria. CPT systems are also widely adopted in Western Europe.







#### Types of systems

There are three main CPT systems currently available on the market: (i) back-and-forth system; (ii) oneway pulsed system; and (iii) one-way continuous system with detachable gondolas. These systems generally allow for a maximum capacity of 1,000 pphpd (one-way pulsed) to 6,000 pphpd (one-way continuous with 3 cables), which is comparable with trams and low-capacity BRT systems. Construction costs per km are also of a comparable magnitude to BRT systems, typically varying from \$10–25 million (Medellin, Bogota, La Paz), depending on station design. Commercial speed is typically in the range of 21–27 km/hour which is also similar to BRT (speeds can reach 45 km/hour for the "back-and-forth" system). However as CPT follows straight line from station to station irrespective

of the road network, the length of a CPT project is in fact not comparable to that of others at-grade modes (tram or BRT) which would serve the same stations. As a result, a CPT project cost is usually a fraction of that of a tram or BRT serving the same corridor. Also travel time is largely reduced in the case of CPT compared to at-grade modes (tram-BRT) from origin to destination on the corridor.

#### <u>Advantages</u>

- Can effectively connect distant and/or isolated hilltop districts to the city center, particularly when integrated with a pre-existing metro system, with very efficient travel time (compared to without project situation or even other transit modes)
- Can be built relatively easily (including minimal land acquisition) and quickly to serve and cross densely populated hilly (or water laden) areas where other mass transit option such as tram or bus rapid transit are difficult to provide or would be more expensive
- By being elevated they can bypass existing urban congestion
- Construction costs are relatively low compared to other transit systems
- Maintenance and operating costs are relatively low
- They are energy efficient with low greenhouse gas emissions
- Use of proven and safe technology

A Pilot CPT project is recommended to be implemented in Tbilisi. CPT project would be lowcost-high-impact project. Tbilisi hilly topography makes CPT particularly relevant as it would significantly decrease travel time for users (compared to current low quality busses or car in congested roads) and might positively impact road traffic conditions. CPT is efficient, safe, environmentally friendly and an affordable solution to connect distant and hilltop densely populated district with the metro network. The project would be implemented in a short period (2 years) with immediate benefits for the population. Communication and awareness campaigns would be required to help in quick acceptance of this new transit mode. The project will also serve as demonstration project with potential for replication in Tbilisi at short-medium term (connect more districts with the metro system) and adopt an innovative approach.

A tentative CPT plan for Tbilisi has been developed. A feasibility study will be required to confirm and refine the proposed CPT corridors, and confirm the priority corridor.









Figure 29: Proposed Cable Propelled Transit masterplan (Source: IC)

## Cable Car (Cable Propelled Transit) – Main Recommendations

A CPT masterplan should be developed to complement the Metro network, and should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan. CPT would act as feeder to the metro network and expand the coverage of the transit network.

(Immediate) Feasibility study of Pilot CPT project should be conducted, to select priority corridor(s). The pilot BRT project (most likely between Samgori-Vasisubani) should be fully accessible (universal design) and would become a tangible demonstration project which would initiate a shift to more sustainable urban transport in the city.







#### 5.3.5. Taxis

The lack of taxi regulation has led to a chaotic system generating poor quality taxi services. In the taxi market, free competition between drivers without regulation is not considered optimal, especially due to: (i) asymmetry of information: the price a passenger is proposed to pay when negotiating a fare highly depends on the knowledge of the taxi market in the city, which is sometimes limited, for instance with foreigners. This may lead to considerably high prices and unending negotiations in some cases; and (ii) competition on taxi quality: as no requirement is set, some self-employed taxi drivers may offer lower prices because they use a very damaged taxi, endangering the safety of passengers. These two issues are relevant in the case of Tbilisi and significantly worsen the image of the city, especially for foreigners who use taxis extensively without knowing the market.

Based on the experience from cities around the world, the taxi market is usually regulated in the following way: (i) minimum requirements are set for the car's technical condition and driver's behavioural skills; (ii) taximeter and license are required; price is regulated with a formula depending on distance, time and possible surcharges; and (iii) the number of licenses is adjusted to the market size.

Taxi fare is usually computed based on a formula including: (i) a fixed cost; (ii) a variable cost in price per km driven that applies over a certain speed; (iii) variable cost in price per minute that applies under a certain speed (stop and congestion); (iv) a surcharge for night or peak-hour time; (v) additional lump-sum surcharges which may apply for luggage or special journeys – usually between the city and the airport.

#### Box 11 – Taxi Regulation in New York City

Experiences drawn from other countries provide insights for efficient and optimal taxi systems. Regulatory bodies are established in order to set the fare policy and provide safety regulations. Control over the maximum number of taxis is not always used.

New York City provides an interesting example of a regulated and mature taxi market. The regulatory body (New York City Taxi and Limousine Commission) has a jurisdiction over the municipality; it grants licenses and regulates over 13,000 taxis; as other segments of demand appeared, other types for cars have been allowed, such as for-hire vehicles, vans and some luxury limousines. The body set up regulations regarding car quality, and provides licenses to the drivers.

The fare is computed as follows: the fixed cost is \$3.00; \$0.40 is charged for each additional unit; a unit is one-fifth of a mile, when the taxicab is traveling at 6 miles per hour or more; or 60 seconds when not in motion or traveling at less than 12 miles per hour. The taximeter combines fractional measures of distance and time in accruing a unit of fare. Additional charges apply at night (\$0.50 surcharge to the fixed cost – 8PM to 6AM) and at peak hour (\$1.00 surcharge to the fixed cost – Monday-Friday 4PM-8PM). A \$45.5 flat rate applies between JFK International Airport and Manhattan (plus additional tolls). Special rates are designed for trips leaving the boundaries of the city (eg Newark Airport).

The maximum number of licenses is set around 13,000 by the regulatory body. Licenses can be purchased from another license owner (at a very high price, over \$500,000) or are infrequently auctioned by the city.







The analysis clearly states the need for a new regulated environment for the Tbilisi Taxi system in order to improve the quality of service and the image of Tbilisi. The following actions shall be undertaken: (i) identify the proper representatives to discuss new taxi regulations and fares among taxi drivers (companies and self-employed) and users (citizens and businesses, Georgians and foreigners); (ii) launch a dedicated study dealing with socio-economic aspects (number of self-employed taxi drivers and cabs, size of the market, desirable fares, requirements of the technical condition of vehicles, minimum professional skills of drivers to provide quality service...) and with institutional aspects (type of regulating body...); (iii) based on the conclusions of the study, focus groups shall meet to propose the new regulations negotiated between the different representatives. The main objective of the discussion should be to obtain a solution satisfying for the different stakeholders.

The new regulations shall be implemented in phases: (i) phase I should define the total number of taxi cabs, age of taxi cabs, number of self-employed drivers, as well as number and size of taxi companies. Taxi registry should be elaborated; (ii) phase II should require obtaining licenses. Very basic requirements, for the technical condition of the car and the driver, should be elaborated and applied; (iii) phase III should be an elaboration of the overall taxi service regulations and formula to compute the fare with the taximeter. An airport surcharge is desirable, same with other cities, in order to gain the taxi driver's support of the new regulations. In addition, a regulating body and the monitoring/control system should be formed (police, special inspectors, etc). The number of licences shall be defined and monitored.

## Taxi – Main Recommendations

Developing taxi policy and regulation should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

Set up taxi regulation to improve quality of service and safety.







# 5.4. Non-Motorized Transport

The improvement of non-motorized transport revolves around 3 main areas: infrastructure and geometry upgrade, enforcement, and awareness raising.

There is number of recent guidelines and best practices that can be referred to when defining an NMT strategy and including NMT component in transit projects.

The safety of pedestrian and two-wheelers relies on sufficient public space being allocated to them, when sharing it between personal motor vehicles, public transport and NMT modes.

Developing NMT plan (pedestrian and bike) and adopting universal accessibility design in all project components should be a highlight of the comprehensive and integrated Sustainable Urban Mobility Plan. The on-going upgrade of sidewalks should be continued and expanded throughout the city, including street furniture and dropped kerbs at pedestrian crossing. It is also suggested to implement a plan to improve safety condition of all pedestrian crossings (geometry, pedestrian refuges, lights, signage).

Recent plans to create pedestrian zones should be pursued and would be successful by securing proper enforcement to prevent personal motor vehicles from accessing the zones.

Other limited access zones can be developed such as bus (with speed limit) and pedestrian zones. Introducing traffic calming zones, with reduced speed limit for cars (30km/h), also create safe and enjoyable environment for pedestrian.

Introducing bicycle lane on pilot corridors and itineraries and launching a bicycle sharing program should be envisaged.

Communication and awareness raising campaign are essential. Events, such as car-free day can also be organized to serve that purpose.









Figure 30 : Example of pedestrian zone in Tbilisi Old Town





Figure 31: Example of Traffic Calming Zones (Source: IC)









#### Non-Motorized Transport – Main Recommendations

Developing NMT plan (pedestrian and bike) and adopting universal accessibility design in all project components should be a highlight of the comprehensive and integrated Sustainable Urban Mobility Plan.

Continue the upgrade of sidewalks, including street furniture and dropped kerbs at pedestrian crossing.

Implement a plan to improve safety condition of all pedestrian crossings (geometry, pedestrian refuges, lights, signage...).

Expand pedestrian zones and secure proper enforcement.

Introduce bus and pedestrian zones.

Introduce traffic calming zones, with reduced speed limit for cars (30km/h).

Introduce bicycle lane on pilot corridors and itineraries.

Launch bicycle sharing program.

Conduct communication and awareness raising campaign. This might include organization of events like 'car-free day' and open the avenues to pedestrians and leisure activities.

## 5.5. Roads and Private Motor Vehicles

Tbilisi main road network is already fairly developed and advanced. The mobility conditions and road congestion problem would not be resolved only by creating more roads, fly-overs, bridges and tunnels. Experience shows that, in urban areas, congestion would always catch up with the new infrastructure capacity. Developing the road network contributes to encouraging commuters to buy and use cars, as soon as they can afford it.

Rather than continuously expanding the road network, an efficient way of tackling road congestion is to develop an efficient intermodal public transport network with high quality services which will offer a tangible alternative to car users.

In spite of recent and continued investments by City Hall to upgrade and expand the road network, including the creation of overpasses, urban highways (Vare River, and Tbilisi Rustavi Urban Road link), the traffic conditions are still worsening and congestion is increasing. A traffic management system is in place, but its functionalities are not fully used. The public transport system is not attractive enough to stimulate the shift from private car to public transport, particularly in a context of fast increase in car ownership.

Creation of new road infrastructure should be targeted and benefit proven through traffic modeling and economic assessment. Tbilisi urban road network includes bottlenecks and still lacks a few road links and one or two bridges are required to better distribute the transversal traffic flows. A large portion of the transit traffic still crosses the urban area, which creates extra congestion which is not related to urban mobility. The existing ring road (bypassing the Tbilisi centre) is not attractive enough due to its long distance from the city centre. A new inner ring

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road which would connect the main highways arriving in Tbilisi and the surrounding districts of Tbilisi urban area might be envisaged (subject to confirmation of economic viability). A thorough feasibility study should be conducted, including multi-criteria comparison of alignment alternatives.

State-of-the-art road safety standards should be adopted in the design of all new road projects in the city. The design process should include systematic road safety audit (during design, construction, and pre-commissioning).

## Urban Road and Road Safety – Recommendations

Urban road and traffic management should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

Measures to reduce road congestions should not only rely on upgrade and creation of new infrastructure.

Improving the efficiency of the public transport network is part of the solution (stimulate a shift from personal motor vehicle to public transport).

Traffic management should be improved (fully using existing system in place).

Missing links and bridges should be selected and designed based on traffic modeling and economic viability. NMT and public transport features should also be considered in the design.

Feasibility study should be conducted for new city bypass (to release transit traffic in the city center) and implemented if economically viable.

Road safety should be improved for existing roads (geometry, speed limits) and road safety standards should be adopted in new road projects.

Pedestrian areas should be expanded (and enforced), pilot traffic calming zone projects might be launched (coordinated with proper signage and parking plan).







# 5.6. Parking

The Sustainable Urban Mobility Plan which is yet to be developed should include a thorough parking masterplan subcomponent. Parking masterplan with location of on-street and off-street parking lots, articulated with public transport system and car-free zones, improved fare policy and regulations as well as new types of parking services such as Park-and-Ride service.

The Park-and-Ride system is within parking lots located near mass transit system station outside the city center, where the congestions becomes prevalent at peak hours. Park-and-Ride and public transport fare should be integrated to make it attractive to users. Using Park-and-Ride combined with public transport would not cost more than using public transport only. Using this system may also give free access to public transport system, as it is seen in some cities. This is a tangible mechanism to decrease the number of cars entering and moving around Tbilisi on a daily basis. The development of park-and-ride facilities at the entrances of Tbilisi, where one can leave his car and switch to any public transport mode to move inside Tbilisi, will help decrease the congestion on the roads and in parking areas inside the city. Park-and Ride facilities became increasingly developed in European cities to contribute to reducing congestions in city centers.



Figure 32: Proposed Location of Main Parking Lots and Park and Ride (Source: IC)

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The parking master plan would be sequenced along short, medium and long term actions.<sup>14</sup>

## Parking – Main Recommendations

Developing a parking master plan, coordinated with public transport system, traffic plan and possible creation of car restricted zones, should be a main component of the comprehensive and integrated Sustainable Urban Mobility Plan.

(Immediate) Enforcement should be systematic.

Parking is a tool for mobility management. Parking scheme should aim at limiting the personal car traffic in the most congested city areas (combined with traffic calming zones and car free zones) and be integrated with public transport (park-and-ride, with fare integration).

Parking is a tool for urban management and measures should also be included in the urban master plan.

Differentiated fare policy might be envisaged (zoning, duration, combination with public transport).

Private sector participation is highly relevant, including for construction and operation of offstreet parking lots.

Smart technology solutions should be adopted (real time information, mobile apps and e-payment).

Parking generates revenues which should not only benefit the private sector. Part of it might be captured and used to finance the public transport network development.







<sup>&</sup>lt;sup>14</sup> IC consulted with Tbilisi City Hall and provided a draft action plan to prepare and implement a parking strategy in Tbilisi (separate document).

# 6. URBAN TRANSPORT FINANCING

Onersting belonce millions			2009			2010		2011			
GEL		Metro	Bus	Total	Metro	Bus	Total	Metro	Bus	Ropeway	Total
Fare income	26,2	20,7	5,9	26,6	20,8	13,1	33,9	24,1	15,1		39,2
Others income	3,2	2,2	0,1	2,2	3,7	0,3	4	4,8	0,2		5
Subsidies	0	9	4,8	13,8	9,4	10,5	19,9	13,3	13,4		26,7
Total income + subsidies	29,4	31,9	10,8	42,6	33,9	23,9	57,8	42,2	28,7		70,9
Costs without amortization	32,8	34,1	23	57,1	30,4	55,7	86,1	32	41,6	0,08	73,6
Amortization	7,6	8,4	3,4	11,8	8,4	9,8	18,2	9,1	6,1		15,2
Total Cost + amortization	0	42,5	26,4	68,9	38,8	65,5	104,3	41,1	47,7		88,8
Deficit without amortization and subsidies	-3,4	-11,2	-17	-28,3	-5,9	-42,3	-48,2	-3,1	-26,3	-0,08	-29,4
Deficit without amortization	-3,4	-2,2	-12,2	-14,5	3,5	-31,8	-28,3	10,2	-12,9	-0,08	-2,7
Global deficit	29,4	-10,6	-15,6	-26,3	-4,9	-41,6	-46,5	1,1	-19	0	-17,9

Taking into account the operating costs and revenues, the operating balance is the following.

 Table 6: Operating balance of public transport in Tbilisi before 2012

		2	2012		2013				
Operating balance - millions GEL		Bus	Ropeway	Total	Metro	Bus	Ropeway	Total	
Fare income	26,2	16	0,6	42,8	25,2	20,9	0,9	47	
Others incomes	6	0,1	0	6,1	6,2	0,03	0	6,23	
Subsidies	16,5	16,2	0,2	32,9	22	30,9	0,2	53,1	
Total incomes + subsidies	48,7	32,3		81,8	53,4	51,83		106,33	
Costs without amortization	35,9	46,1	0,2	82,2	45,3	61,7	0,4	107,4	
Amortization	9,2	6,4	0,1	15,7	9,2	6,6	0,2	16	
Total Cost + amortization	45,1	52,5		97,9	54,5	68,3		123,4	
Deficit without amortization and subsidies	-3,7	-30	0,4	-33,3	-13,9	-40,77	0,5	-54,17	
Deficit without amortization	12,8	-13,8	-0,2	-0,4	8,1	-9,87	-0,4	-1,07	
Global deficit	3,6	-20,2	0	-16,1	-1,1	-16,47	0	-17,07	

Table 7: Operating balance of public transport in Tbilisi after 2011







The Tbilisi metro company deficit in 2013 reaches 54.17 million GEL (23,7 million USD), without taking into account amortization and subsidies. The operational deficit mainly arises from the bus network.

The global deficit including amortization and subsidies is:

	2011	2012	2013
In millions GEL	Total	Total	Total
Global deficit	-17,9	-16,1	-17,1

Table 8: Presentation of TTC deficit.

	2011	2012	2013
Costs per passengers +			
amortization	0,59	0,60	0,61
Subsidies er passengers	0,18	0,20	0,26
Fares incomes per passengers	0,26	0,26	0,23

Table 9: Operation costs per passengers and subsidies and fares incomes per passengers.

Operational costs per passenger in comparison with the income of subsidies and fares per passenger show that operational costs are not covered. Structurally, the operator (Tbilisi Transport Company) does not have the necessary financial resource to improve the service and finance its modernization.



Figure 33: Operation costs per km (in GEL) (Sources: IC + TTC)

The total of operational costs per km increases overtime due to the aging rolling stock which, in spite of the partial refurbishment of some unit, generates increasing operation and maintenance cost.







#### **Urban Transport financing – Recommendations**

Investment and financing plan will be an essential component of the comprehensive and integrated Sustainable Urban Mobility Plan.

Investment plan (SMUP) should be developed based on CAPEX estimated at least at prefeasibility level.

Financial analysis should be conducted for all new project and financial sustainability ascertained, for any new infrastructure project.

Bus and minibus networks should be restructured to complement each other and articulated with the metro network avoiding completion (as it is currently the case) to optimize the operation cost per passenger.

Explore and pilot innovative financing mechanisms and introduction of taxes (such as fuel tax, employer tax, congestion charging) to finance public transport system modernization, expansion and operation.

Continued consultations should be conducted to identify and select sources of financing required for the implementation of immediate actions and SUMP (IFIs' grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], and private sector).






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## 7. RECOMMENDATIONS AND ACTION PLAN

**Timespan.** The updated Tbilisi SUT Strategy defines policy directions and prioritizes interventions along a multimodal and integrated approach to be gradually implemented between 2015 and 2030, phased over immediate (2015-2017), medium (2018-2021) and long (2022-2030) terms.

**Focus.** Tbilisi SUT Strategy focuses on environmentally friendly and low emission solutions and to realign Tbilisi urban mobility system along an efficient, innovative, safe, economically viable and financially sustainable model. The strategy covers all transport modes including personal motor vehicles, public transport, non-motorized transport as well as institutional and land use aspects to foster better living conditions, city attractiveness and competitiveness and economic development.

**Vision.** Tbilisi SUT Strategy is also developed around the strategic vision supported by the Government of Georgia and Tbilisi City Hall, which revolves around 3 main areas: (i) ensure a healthy living environment (with focus on sustainable urban transport), (ii) enhance Tbilisi as the Regional economic centre, and (iii) develop Tbilisi as cultural, touristic and youth hub. This vision is consistent with recommendations summarized in ADB's Sustainable Transport Initiative Operation Plan.

**Integrated Approach.** Urban mobility and urban development planning are interconnected and should be approached in an integrated manner.

**Main Urban Mobility Issues.** Shifting to a more sustainable model requires the gradual implementation of a set of combined actions covering all aspects of sustainable urban mobility.

- Comprehensive sustainable urban mobility plan and integrated approach (with urban development)
- Institutional reforms, creation of a transport authority in charge of planning, implementation and operation and capacity development
- Sustaining current modal split by enhancing quality of service and attractiveness of public transport system
- Expansion of backbone transit network and introduction of hierarchy in multimodal public transport network, including restructuring of bus and minibus network and parking strategy
- Clean modes and technologies
- Safety and universal accessibility
- Improved traffic conditions and reduced bottlenecks
- Economic and financial sustainability, innovative financing mechanisms and increased private sector participation
- Transit oriented development (increased density and mixed land-use along mass transit corridors and stations)
- Awareness raising, consultations and communication







**Main Urban Development Issues.** Shifting to a more sustainable urban development model involves a set of actions covering the following main areas.

- Urban masterplan and integrated approach (with urban mobility)
- Quality of life, competitiveness, economic growth and tourism attractiveness
- Urban morphology, urban regeneration, mixed land use and local identity
- Topography, natural and artificial barriers
- Universal accessibility, social and gender equity
- Innovative financing mechanisms and increased private sector participation
- Transit oriented development, increased density and mixed land-use along mass transit corridors and stations







#### 7.1. Immediate - 2015-2017

The proposed short term action plan revolves around 20 key actions, builds upon on-going initiatives (Actions 1, 2, 5, 9, 10, 11, 12, 13, 16, 17 and 19), promotes low-cost-quick-win subprojects (Actions 5, 6, 10, 13) and comprises a series of studies and technical assistance (Actions 3, 4, 5, 6, 7, 8, 14 and 15) to build foundations for medium (2018-2020) and long term (2012-2030) interventions. Some actions are on-going and the sources of financing are already identified, while further consultations need to be conducted and financing options explored to cover the cost of the yet to be initiated actions.

The short term action plan is deliberately ambitious in terms of scope and variety of activities. Its implementation requires reasonable financing resources combined with strong political will, which is a key requirement to create the shift to a more sustainable trajectory and to meaningfully prepare the medium and long term actions. Coordination between all parties and agencies involved in the sector remains critical and should be facilitated under the leadership of Tbilisi City Hall and City Assembly. All technical assistances and consulting services are anticipated to be performed and lead by a team of reputable international consultants teaming up with national consultants, to secure reference to recent best practices and standards, as well as relevance in Tbilisi context.

- 1. **Planning (Surveys and Model)**. Conduct a new household survey, update the existing multimodal transport demand model and train relevant staff on its use (on-going, government-financed [ADB loan SUTIP]).
- 2. **Planning (Urban Masterplan).** Develop a new urban master plan to define future land use strategies in Tbilisi (on-going, Tbilisi City Hall-financed). Coordinated with sustainable urban mobility plan.
- 3. **Planning (Sustainable Urban Mobility Plan).** Develop a comprehensive sustainable urban mobility plan (SUMP), based on do-nothing, moderate and transformative scenarios, quantification of benefits, impact and economic viability (for proposed scenario, measures and subprojects), investment plan and financing sources and mechanisms (funding SMUP to be defined). The SUMP would include feasibility study of priority projects. Coordinated with urban master plan.
- 4. **Planning (Transit Network).** Initiate technical assistance to define a surface transit network, considering main bus routes, bus rapid transit, cable propelled transit and light rail transport options (funding to be defined). Prepare an upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations. *Possibly part of SUMP activities*.
- 5. **Planning (Bus Network Restructuring).** Initiate technical assistance (ADB-financed) on and implement (City Hall-financed) bus and minibus network restructuring, introduction of main routes (network hierarchy and possible bus rapid transit corridors), bus lanes and propriety for bus at selected junctions. *To be included in and further defined under SUMP.*
- 6. **Planning (Traffic Management and Missing Links).** Initiate technical assistance on traffic management optimisation (making full use of the functionalities of the intelligent







transport system [ITS] already in place) and possible missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport (funding to be defined). *Possibly part of SUMP activities.* 

- 7. **Planning (NMT).** Initiate technical assistance on non-motorized transit (NMT) network, define design standards and prepare a NMT pilot project (funding to be defined). *Possibly part of SUMP activities.*
- 8. **Planning (Smart Technologies).** Initiate technical assistance on smart technology options, recent best practices and potential for replication and tailoring to Tbilisi (funding to be defined). *Possibly part of SUMP activities*.
- 9. **Metro Extension.** Complete 2.6-km metro extension (on-going, government-financed [ADB loan SUTIP]).
- Pilot Transit Project Urban Cable Car (between Samgori and Vasis Ubani). Prepare and implement at least one cable propelled transit system, between densely populated district(s) and the metro network, to expand the coverage of the mass transit backbone (on-going, government-financed [ADB loan - SUTIP]).
- 11. **Urban Road.** Complete upgrade and creation of 17km urban road link between Tbilisi and Rustavi (on-going, government-financed [ADB loan SUTIP]).
- 12. Bus Fleet Renewal. Initiate bus fleet renewal adopting green technology (on-going, government-financed [EBRD loan]).
- 13. **Targeted Interventions.** Implement existing investment plan by Tbilisi City Hall for small scale interventions, including possibly some of the recommendations from actions 5 and 6 (on-going, Tbilisi City Hall-financed).
- 14. **Road Safety.** Create conditions for strict enforcement of rules combined with large scale and continued awareness campaigns (with possible involvement of Non-Governmental Organizations).
- 15. **Institutional Framework and Reforms.** Initiate technical assistance covering the following areas and possibly implement immediate actions when applicable (funding to be defined), covering
- creation of an integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes.
- revised regulatory framework for parking system (combined with a revised parking master plan including park and ride options).
- creation of a regulatory framework for Taxis.
- explore innovative financing mechanisms and introduction of taxes to finance public transport system modernization, expansion and operation (such as fuel tax, employer tax or land value capture).
- create conditions to implement fully integrated e-ticketing system for all public transport modes and parking.
- study options, conditions and feasibility of increased participation of the private sector (management contract, concessions, design build finance operate [DBFO]).
- 16. **Financing**. Conduct consultations to identify and select sources of financing required for the implementation of the short term action plan (grant for technical assistance, trust



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funds, climate change funds, local and central government budget [including sovereign lending], private sector).

- 17. **Donor Coordination**. Hold donor consultation meetings periodically to secure integrated support and sound use of resources.
- 18. **Communication and Awareness Campaign**. Prepare a communication plan and implement an awareness campaign on various sustainable urban mobility related topics (aiming at stimulating the use of public transport). *Possibly part of SUMP activities*.
- 19. Tbilisi Sustainable Urban Mobility Forum 2016. Organize the second edition of Tbilisi Sustainable Urban Mobility Forum in Q4 2016 to take stock of the progress and lessons learned from the various initiatives undertaken, and to refine directions and action plans (government-financed [ADB loan SUTIP]). It is proposed to organize Tbilisi Sustainable Urban Mobility Forum every other year, or at least every 3 years.
- 20. **Consultations between Local and Central Governments**. Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and prepare investment and financing plans.







#### 7.2. Medium Term - 2018-2021

The Medium term actions plan revolves around 18 key actions and is mainly intended to (i) initiate the implementation of the SUMP (developed under the Tbilisi SUT Strategy short term action plan – Action 3), (ii) complete outstanding actions of the immediate action plan (2015-2017), if any, and (iii) implement institutional reforms. Funding is to be determined.

- 1. **Planning (SUMP).** Formally endorse Tbilisi SUMP in 2018 (if not achieved earlier) and initiate its implementation.
- 2. **Planning (Surveys and Model).** Keep the multimodal transport demand model updated and ensure staff are trained to be able to use it and test all initiatives and projects.
- 3. Short Term Action Plan (Continued Completion and Evaluation). Complete all actions of the short term action plan (2015-2017) which might not be fully implemented. Evaluate achievements and learn lessons.
- 4. **Metro (Transit Network).** Implement the first phase of the upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations (detailed design, procurement and implementation).
- 5. **Pilot Surface Transit Line (Transit Network).** Prepare detailed engineering design and bidding documents for a pilot transit line (most likely Bus Rapid Transit) adopting universal design standards and fully integrated with other public transport modes. Implement the project and secure commissioning by 2020-2021.
- 6. **Bus Network Restructuring (Continued).** Asses the performance of the restructured bus and minibus network. Adapt the routes and operation plan as necessary to continue improving the quality of service and passenger satisfaction rate.
- 7. **Traffic Management and Missing Links (Continued).** Implement missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport.
- 8. **Pilot NMT Project.** Design and implement pilot NMT project (priority project out of NMT plan and developed around the pilot surface transit project). Secure commissioning by 2020-2021.
- Urban Cable Car Projects (Continued). Complete the pilot urban cable car project (if not yet completed) and implement the urban cable car plan to expand the coverage of the mass transit network (building on the lessons learned by the urban cable car pilot project).
- 10. Bus Fleet Renewal (Continued). Implement subsequent phases of bus fleet renewal (adopting green technology), with consideration of Bus Rapid Transit scheme particularly in view with adoption of full-flex services (BRT usually requires rolling stock with particular specifications, such as floor and doors).
- 11. **Targeted Interventions (Continued).** Implement investment plan by Tbilisi City Hall for small scale interventions. Ensure ITS system is used to continuously improve traffic management.
- 12. Urban Roads and Road Safety (Continued). Secure continued enforcement of rules combined with large scale and continued awareness campaigns (with possible involvement of Non-Governmental Organizations) and ensure road safety features are







adopted in the design of all projects. Introduce traffic calming zones. Preparation of Tbilisi bypass might be initiated should economic viability be confirmed under the SUMP.

- 13. Institutional Framework and Reforms (Continued).
- create an integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes. Ensure the urban transport authority is fully staffed, budgeted and trained.
- introduce regulatory framework for parking system (combined with a revised parking master plan including park and ride options).
- create regulatory framework for Taxis.
- adopt some innovative financing mechanisms and introduction of taxes, to finance public transport system modernization, expansion and operation (such as fuel tax, employer tax or land value capture).
- implement fully integrated e-ticketing system for all public transport modes and parking.
- select pilot projects with private sector participations (possibly management contract, concessions, design build finance operate [DBFO]).
- study options and mechanism to promote Transit Oriented Development.
- 14. **Financing (Continued).** Conduct consultations to identify and select sources of financing required for the implementation of the medium term action plan (grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], private sector).
- 15. **Donor Coordination (Continued).** Hold donor consultation meetings periodically, to secure integrated support and sound use of resources.
- 16. **Communication and Awareness Campaign (Continued).** Implement communication plan and awareness campaign on various sustainable urban mobility related topics.
- 17. **Tbilisi Sustainable Urban Mobility Forums (Continued).** Organize Tbilisi Sustainable Urban Mobility Forum to take stock of the progress of the implementation of the SUMP and lessons learned from the various initiatives undertaken, and to refine directions and action plans. It is proposed to organize Tbilisi Sustainable Urban Mobility Forum every other year, or at least every 3 years.
- 18. **Consultations between Local and Central Governments.** Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and refine investment and financing plans.







### 7.3. Long Term 2022-2030

The long term action plan is meant to rely on the SUMP in order to achieve key targets by 2030, with increased focus on actions intended to (i) upgrade the integrated public transport system (coverage, performance, quality of service, financial sustainability), (ii) ensure the institutional reforms are fully implemented and that the Integrated Transport Authority is fully empowered and staffed to enable the continued implementation of the SUMP, and (iii) overall create a urban mobility system which is efficient, universally accessible, safe, environmentally friendly, and financially sustainable.

- 1. **Planning (SUMP).** Review and update the SUMP by 2026-2027 (in-depth review and update of SUMP should happen at least every 10 years).
- 2. **Planning (Surveys and Model).** Keep the multimodal transport demand model updated and ensure staff are trained to be able to use it and test all initiatives and projects.
- 3. **Medium Term Action Plan (Continued Completion and Evaluation).** Complete all actions of the medium actions plan (2018-2021) which might not be fully implemented. Evaluate achievements and learn lessons.
- 4. **Bus Network Restructuring (Continued).** Asses the performance of the restructured bus and minibus network. Adapt the routes and operation plan as necessary to continue improving the quality of service and passenger satisfaction rate.
- 5. **Metro (Transit Network).** Complete by 2030 the upgrade and refurbishment plan for existing metro lines, including E&M, rolling stock and stations (detailed design, procurement and implementation).
- 6. **Surface Transit Network (Bus Based).** Complete by 2030 the bus based (BRT) surface backbone transit network, adopting universal design standards and fully integrated with other public transport modes (metro, bus, minibuses, NMT, parking, taxi). Implement the project and secure commissioning by 2020-2021.
- 7. Urban Cable Car Projects (Continued). Complete the urban cable car plan to expand the coverage of the mass transit network.
- 8. **Surface Transit Network (Rail Based).** Conduct feasibility studies to assess whether Light Rail Transport should be introduced in Tbilisi on some of the main surface transit corridors after 2030. Study the merits of commuter rail using existing railway tracks for long distance travel within Tbilisi Urban Area.
- 9. **Branding.** Tbilisi public transport system is branded with a unique, visible and attractive identity (possibly segmented by mode).
- 10. **Traffic Management and Missing Links (Continued).** Implement missing links and bridge(s) to release traffic bottlenecks, with consideration of surface public transport.
- 11. **NMT Project (Continued).** NMT projects are expanded and NMT features are included in all transport and urban projects.
- 12. Bus Fleet Renewal (Continued). Complete the bus fleet renewal.
- 13. **Targeted Interventions (Continued).** Implement investment plan by Tbilisi City Hall for small scale interventions. Ensure ITS system is used to continuously improve traffic management.







- 14. **Urban Roads and Road Safety (Continued).** Secure continued enforcement of rules combined with large scale and continued awareness campaigns and ensure road safety features are adopted in the design of all projects. Traffic calming zones are widely adopted. Tbilisi bypass might be implemented should economic viability be confirmed.
- 15. **Transit Oriented Development (TOD).** Urban density and mixed land used is promoted along the main transit corridors (metro and surface transit network). Key TOD principles and incentives are institutionalized, promoted and implemented.
- 16. Institutional Framework and Reforms (Continued).
- The integrated urban transport authority (Tbilisi urban area), in charge of planning, implementation and operation of all transport modes, is empowered, fully staffed by experienced sector specialists.
- Reforms on parking and taxi have been implemented.
- Innovative financing mechanisms and introduction of taxes, to finance public transport system modernization, expansion and operation are in place.
- Private sector participation is increased.
- 17. **Financing (Continued).** Conduct consultations to identify and select sources of financing required for the implementation of the long term action plan (grant for technical assistance, trust funds, climate change funds, local and central government budget [including sovereign lending], private sector).
- 18. **Donor Coordination (Continued).** Hold donor consultation meetings periodically, to secure integrated support and sound use of resources.
- 19. **Communication and Awareness Campaign (Continued).** Implement communication plan and awareness campaign on various sustainable urban mobility related topics.
- 20. **Tbilisi Sustainable Urban Mobility Forums (Continued).** Organize Tbilisi Sustainable Urban Mobility Forum to take stock of the progress of the implementation of the SUMP and lessons learned from the various initiatives undertaken, and to refine directions and action plans (every other year, or at least every 3 years).
- 21. **Consultations between Local and Central Governments.** Based on the findings of the set of actions and studies, hold continued consultations between Tbilisi City Hall and the central government to prioritize projects, grounded on cost benefit analysis, and refine investment and financing plans.







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