DECARBONISING PATHWAYS FOR TASHKENT’S URBAN MOBILITY

Synthesis of project results

July 2023
This publication presents the results of the national study for Uzbekistan under the Sustainable Infrastructure Programme in Asia (SIPA).

It features the impacts of three policy scenarios on passenger transport demand and emissions in the capital city of Tashkent between 2015 and 2050. In light of these results, the ITF developed a list of policy recommendations to promote and facilitate the implementation of more ambitious decarbonising policies for Tashkent’s urban mobility sector.

For more information, please refer to the project web page.
OUTLINE

- SIPA-TRANSPORT FOR UZBEKISTAN
- URBAN MOBILITY IMPROVEMENT PLAN
- SCENARIO DESIGN
- SCENARIO RESULTS
- TASHKENT’S URBAN MOBILITY MODEL
- DOWNLOAD STUDY MATERIALS
SIPA-Transport for Uzbekistan
SIPA overview

What is the Sustainable Infrastructure Programme in Asia (SIPA)?

- A four-year program supporting the development of cleaner infrastructure in Central and Southeast Asia
- Led by the OECD and funded by the International Climate Initiative (IKI) of Germany’s Ministry for the Environment
- The ITF leads transport-related studies. It aims to provide transport policy guidance with a focus on decarbonisation and enhanced connectivity by:
  - Producing an assessment of transport infrastructure at both regional and national levels
  - Providing policymakers with simulation tools to assess the impact of policy options and identify effective decarbonising measures

Sustainable Infrastructure Programme in Asia – Transport (SIPA-T)

Central Asia
- Central Asia regional study
  - Uzbekistan national study

Southeast Asia
- Southeast Asia regional study
  - Mongolia national study
  - Philippines national study
Understanding the urban transport context in Tashkent: data collection, analysis of policy priorities

Developing a public transport improvement plan for Tashkent: strategies to meet Uzbekistan’s goals regarding sustainable mobility

Quantitatively assessing decarbonising pathways for Tashkent: tailor the ITF modelling tool to estimate carbon emissions under three different scenarios (Baseline, Current Policy, Climate Ambition)

Disseminating best practices for low-carbon transport systems

What is the national roadmap study for Uzbekistan?

The national roadmap study for Uzbekistan developed **decarbonising pathways for urban passenger transport** in the capital city, Tashkent. It emphasised the role of public transport and its development. It comprises four parts:

1. Understanding the urban transport context in Tashkent: data collection, analysis of policy priorities
2. Developing a public transport improvement plan for Tashkent: strategies to meet Uzbekistan’s goals regarding sustainable mobility
3. Quantitatively assessing decarbonising pathways for Tashkent: tailor the ITF modelling tool to estimate carbon emissions under three different scenarios (Baseline, Current Policy, Climate Ambition)
4. Disseminating best practices for low-carbon transport systems

Study timeline

- Pre-kickoff (virtual)
- Kickoff and mission in Tashkent
- Improvement plan handover
- Scenario workshop (virtual)
- Model training session (virtual)
- Final dissemination event
Urban Mobility Improvement Plan
Key policy recommendations

Planning and Financing

✓ Restructure governance and establish a Metropolitan Transport Authority (MTA)
✓ Adopt a Sustainable Urban Mobility Plan (SUMP)
✓ Integrate land-use and transport development

Public Transport Service

✓ Create a hierarchical and intermodal public transport network to increase ridership and meet future demand
✓ Transform informal public transport services to strengthen transport supply and improve connectivity
✓ Implement a new fare structure with a single ticket for seamless trips

Supporting Mobility

✓ Formalise the taxi market and reduce its competitiveness
✓ Leverage micromobility, shared mobility and digitalisation for convenient multimodal integration
✓ Regulate private transport to maximise the benefits of sustainable urban mobility
Tashkent’s urban mobility improvement plan

For more information related to the Urban Mobility Improvement Plan, please consult/download it from the ITF repository.
Scenario Design
Policy scenarios for CO₂ reduction

The ITF designed three distinct scenarios to assess the CO₂ reduction potential of different policy pathways. The scenarios explore alternative futures, their impacts on the transport system and their externalities.

1. **Baseline scenario**: no measures are implemented for sustainable mobility
2. **Current Policy scenario**: expected and planned measures are implemented
3. **Climate Ambition scenario**: planned measures are enhanced, and new measures are introduced

- **Data collection** in cooperation with stakeholders in Uzbekistan
- **Development** of a tailored strategic urban mobility model for Tashkent based on city-specific data and methodology from the ITF
- **Scenario definition** with partners in Uzbekistan: analysis of existing, planned and potential measures
- **Model handover** to the Ministry of Transport for supporting local policy building
How did we build the Climate Ambition scenario?

Existing measures (current policy scenario) → Can this measure be implemented on a larger scale? → Additional measures → Climate Ambition scenario → CO₂
Current Policy scenario

The **Current Policy scenario** refers to the existing and committed strategies, regulations, and initiatives in the city to transition its mobility system towards low-carbon and environmentally sustainable.

- **Public Transport Promotion**
  - Service improvement for public transport, introduction of priority lanes, fare integration

- **Shared Transport Promotion**
  - Incentives for ride- and bike-sharing, taxi market reform

- **Restrictive and Pricing Measures**
  - Parking pricing and restrictions

- **Vehicle Technology Development**
  - Increased shares of electric vehicles in private and public fleets

- **Other Measures**
  - Teleworking promotion

- **Infrastructure Expansion**
  - Development of public transport, cycling and pedestrian networks

- **Other Measures**
  - Service improvement for public transport, introduction of priority lanes, fare integration
The **Climate Ambition** scenario builds upon the planned policies of the Current Policy scenario but with further enhancements aimed at achieving significant reductions in CO$_2$ emissions to reach the climate goals.
Scenario Results

Impact per policy scenario
Overall CO$_2$ emissions

Trajectories of CO$_2$ emissions until 2050 by scenario

Main findings

- **Baseline scenario**, strong population and income growth and shift towards private vehicles result in a sharp increase in CO$_2$ emissions.

- **Current Policy scenario**, planned policy actions reverse the emission trajectory; however, they are not sufficient to achieve Tashkent’s climate goals.

- **Climate Ambition scenario**, effective policy measures allow for cutting CO$_2$ emissions further and achieving decarbonisation goals.

Evolution of CO$_2$ emissions from 2020 to 2050

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Baseline</th>
<th>Current Policy</th>
<th>Climate Ambition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business as usual</td>
<td>+42%</td>
<td>-24%</td>
<td>-68%</td>
</tr>
<tr>
<td>Where we are heading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How far we must go</td>
<td></td>
<td></td>
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</tbody>
</table>
Population and income growth leads to almost a doubling number of trips by 2050

Shorter travel distances by transport users in the alternative scenarios result in reduced PKM

Public transport serves around 47% of all trips, but 67% of all PKM in the Climate Ambition scenario
Passenger-Kilometers (PKM) by mode

- The Current Policy scenario measures already flatten the growth of PKM from private vehicles.
- Public transport becomes a dominant mode in terms of PKM only in the Climate Ambition scenario.
- Active modes represent an important share of trips but not PKM, serving relatively short distances.

Note: dotted lines represent the Baseline scenario.
Mode share

Mode share in 2050 by scenario

Main findings

- **Baseline scenario**, income and area growth leads to a noticeable increase in private vehicle ownership
- **Current Policy scenario**, investments in active mobility, public transport infrastructure and service improvement favour a shift to sustainable modes
- **Climate Ambition scenario**, additional measures boost modal integration as well as target private vehicles allowing for a further decrease in the usage of carbon-intensive modes

Share of sustainable modes* by 2050

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline (Business as usual)</td>
<td>46%</td>
</tr>
<tr>
<td>Current Policy (Where we are heading)</td>
<td>59%</td>
</tr>
<tr>
<td>Climate Ambition (How far we must go)</td>
<td>87%</td>
</tr>
</tbody>
</table>

* sustainable modes include walk, bicycle, public transport and shared mobility
**CO₂ emissions by mode**

- Current policies have a limited ability to reverse the upward trend of private vehicle emissions, indicating the need for more effective measures specifically targeting this mode group.

- Significant reduction in CO₂ emissions under the Climate Ambition scenario primarily results from a shift towards less emitting transport modes alongside technological advancements.
Considering only the tank-to-wheel component, the current policies cut CO₂ emissions effectively for shared mobility, while private vehicles remain almost unaffected, contributing to approximately 80% of the total emission volume in 2050.

The Climate Ambition scenario effectively reverses tank-to-wheel CO₂ emissions, most noticeably from private vehicles.
Considering the well-to-tank component, overall CO$_2$ emissions are expected to increase, especially for private vehicles. Stricter upstream measures are needed to reduce the carbon intensity of fuel production and distribution.

The Climate Ambition scenario succeeds in reversing the trajectory of CO2 emissions. With greater reliance on public transport, a higher share of cleaner fuels and the greening of electricity sources are essential.
Transport decarbonisation brings co-benefits, helping Tashkent address the challenge of high concentrations of local pollutants.

Average annual PM2.5 concentration (µg/m³)

Tashkent, 2021

Limit fixed by the WHO

42.8

5
Scenario Results

Impact per policy direction
Breakdown by policy direction

Annual urban mobility CO$_2$ emissions until 2050 by scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Baseline</th>
<th>Current Policy</th>
<th>Climate Ambition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>2030</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>2050</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

Breakdown of CO$_2$ reduction by policy direction

- 18.8% from vehicle technology development
- 23.7% from infrastructure expansion
- 10.1% from PT promotion
- 6.4% from shared transport promotion
- 9.9% from restrictive and pricing measures
- 9.1% from other measures

CO$_2$ emissions in 2050

-46% Current Policy scenario vs Baseline scenario

-78% Climate Ambition scenario vs Baseline scenario
### Vehicle technology development

#### Quantification
- Percentage of various vehicle technologies in the private vehicle and bus fleet

#### Current Policy
- Delivery of 230 electric buses by 2023
- Production of electric buses in Uzbekistan
- **Target:** 35% of electric cars and 70% of electric buses by 2050

#### Climate Ambition
- 50% of private vehicles are electric in 2050
- Full electrification of the bus fleet by 2050

#### Impact
- Reduction in transport-related CO$_2$ emissions attributed to the measures compared to Baseline in the same year

<table>
<thead>
<tr>
<th></th>
<th>By 2030</th>
<th>By 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Policy</strong></td>
<td>-6%</td>
<td>-19%</td>
</tr>
<tr>
<td><strong>Climate Ambition</strong></td>
<td>-10%</td>
<td>-27%</td>
</tr>
</tbody>
</table>
Infrastructure expansion

Quantification

- Network length of metro, BRT, suburban rail, conventional bus, minibus, bike and pedestrian infrastructure

Current Policy

- Extension of the existing metro network with over 40 stations
- Development of a BRT system of approx. 100 km in 2050
- Development of cycling (250 km) and pedestrian networks

Climate Ambition (2050 values)

- Metro network: +20% length
- BRT network: +50% length
- Suburban rail network: double the number of stations
- Conventional bus network: +40% length
- Bike network: 200 km longer
- Pedestrian network: +10% length

Impact

Reduction in transport-related CO₂ emissions attributed to the measures compared to Baseline in the same year

<table>
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<tr>
<th>Current Policy</th>
<th>By 2030</th>
<th>By 2050</th>
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<tr>
<td>-12%</td>
<td>-22%</td>
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<table>
<thead>
<tr>
<th>Climate Ambition</th>
<th>By 2030</th>
<th>By 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>-17%</td>
<td>-34%</td>
<td></td>
</tr>
</tbody>
</table>
Public transport promotion

Quantification

- Increase of operating speed, share of dedicated bus lanes, average trip cost, MaaS subscriptions, on-demand fleet

Current Policy

- Application of a multi-level structure (trunk, ring, connecting, feeding) to 159 bus routes
- **Target**: double the average frequency of bus services by 2035
- Development of priority lanes on 11 trunk bus routes
- Introduction of a new fare system with a single ticket

Climate Ambition

- +10% to the operating speed of mass transit and buses
- +10% to the dedicated bus network
- Launch of MaaS with 30% of users subscribed by 2050
- Launch of an on-demand service (350 vehicles in 2050)

Impact

Reduction in transport-related CO₂ emissions attributed to the measures compared to Baseline in the same year:

- **Current Policy**
  - By 2030: -3%
  - By 2050: -8%

- **Climate Ambition**
  - By 2030: -5%
  - By 2050: -15%
## Shared transport promotion

### Quantification
- Size of taxi, ride-, car-, bike and scooter sharing fleets; share of legal operators in the taxi fleet, load factor for private vehicles

### Current Policy
- Taxi market reform, including legalisation (approx. 60%)
- **Target:** 7000 taxis, 18000 ride-sharing vehicles, 1400 shared bikes and scooters in 2050

### Climate Ambition
- Stricter regulation of the taxi and ride-sharing services
- Only legal vehicles in operation
- Launch of car-sharing (2000 vehicles by 2050)
- Double the size of shared micromobility
- Incentives for carpooling

### Impact
Reduction in transport-related CO₂ emissions attributed to the measures compared to Baseline in the same year

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<tr>
<td><strong>Current Policy</strong></td>
<td>-3%</td>
<td>-0.2%</td>
</tr>
<tr>
<td><strong>Climate Ambition</strong></td>
<td>-3%</td>
<td>-9%</td>
</tr>
</tbody>
</table>
Restrictive measures

Quantification

- Share of the city core under parking restrictions, share of vehicles restricted from circulating within the city, speed limit reduction

Current Policy

- **Target:** 10% of the city core receives restricted parking by 2025

Climate Ambition

- Extend the parking restriction share to 25%
- Introduce vehicle access restrictions resulting in 10% less traffic
- Reduce the speed limit on urban roads to 60 km/h by 2025

Impact

Reduction in transport-related CO₂ emissions attributed to the measures compared to Baseline in the same year

- **Current Policy**
  - By 2030: -0.2%
  - By 2050: -4%

- **Climate Ambition**
  - By 2030: -0.5%
  - By 2050: -5%
Pricing measures

Quantification

- Increase in vehicle purchase, ownership and usage cost; road and parking charges

Current Policy

- Paid parking on 12 streets with further expansion
- **Target:** parking fare of 2000 UZS per hour in 2025

Climate Ambition

- Implement congestion charging (approx. 12000 UZS for entry in 2030)
- Gradually increase fuel tax towards 10% in 2050
- Introduce additional vehicle ownership or purchase tax that would increase expenses by 5% in 2050

Impact

Reduction in transport-related CO₂ emissions attributed to the measures compared to Baseline in the same year

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<tbody>
<tr>
<td><strong>Current Policy</strong></td>
<td>-1%</td>
<td>-2%</td>
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<td><strong>Climate Ambition</strong></td>
<td>-2%</td>
<td>-9%</td>
</tr>
</tbody>
</table>
Other measures

Quantification

▪ Share of population regularly teleworking, increase in diversity of land use and density around the public transport network

Impact

Reduction in transport-related CO$_2$ emissions attributed to the measures compared to Baseline in the same year

By 2030

Current Policy: 0%

Climate Ambition: -7%

By 2050

Current Policy: 0%

Climate Ambition: -13%

Current Policy

▪ Land-use elements are not incorporated into transport planning
▪ No incentives for promoting teleworking are in place

Climate Ambition

▪ Promotion of teleworking to attain a 10% level
▪ Implementation of Transit Oriented Development practices for better accessibility
Comparison and summary

<table>
<thead>
<tr>
<th></th>
<th>Vehicle Technology Development</th>
<th>Infrastructure Expansion</th>
<th>Public Transport Promotion</th>
<th>Shared Transport Promotion</th>
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<td>0%</td>
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<tr>
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<td>-0.2%</td>
<td>-4%</td>
<td>-2%</td>
<td>0%</td>
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<td>-2%</td>
<td>-7%</td>
</tr>
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<td>-15%</td>
<td>-9%</td>
<td>-5%</td>
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**Policy priorities**

- Begin with “soft” measures requiring less time and resources to implement while planning for “hard” structural changes
- Develop a hierarchical and integrated public transport network that will become the backbone of urban mobility
- In parallel, introduce and enhance shared and micromobility to further support public transport
- Following the establishment of sustainable modes as a feasible alternative, target the use of private vehicles

*The sum does not equal to total CO₂ emissions reductions as the analysis by individual policy direction does not account for combined effects*
Other non-measured benefits

- Decrease of local air pollutants (NOx, PM$_{2.5}$, SO4)
- Increased use of active mobility and more walkable city
- Decrease of PKM travelled by car

- Healthier community
- Increased safety
- Reduced congestion
Tashkent’s Urban Mobility Model
Introduction to the modelling tool

- The ITF Urban Mobility Model is a tool that allows users to test various policy packages by building scenarios and evaluating the efficiency of different transport decarbonisation measures in Tashkent.

- The model covers the official administrative boundaries of Tashkent. It captures relationships at the city level by the population category and distance bin. The model analyses 14 modes, covering the existing and potential future modes.

- It simulates the overall long-term evolution of socio-economic, land use and transport characteristics of Tashkent between 2015 and 2050, presenting the results with a five-year step.

- Relationships between different inputs and sub-models are shown on the diagram.
Tashkent’s urban mobility model

For more information related to the Urban Mobility Model, please consult/download the model and supporting materials from the ITF repository.
Download Study Materials
Download study materials

- Tashkent’s Urban Mobility Improvement Plan
- Tashkent’s Urban Mobility Model
  - Modelling tool
  - Model manual
  - Methodology note
- Brochure with project summary
- Project web page with relevant information and events
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