International Transport Forum

SIPA
Sustainable Infrastructure Programme in Asia

DECARBONISING PATHWAYS FOR TASHKENT'S URBAN MOBILITY

Model Manual for Tashkent's Urban Mobility Model

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IKI INTERNATIONAL CLIMATE INITIATIVE

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MINISTRY OF TRANSPORT
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Disclaimer

- The results presented in the model should be regarded as an estimation derived from the best available data and information collected during the project. Its primary value lies in facilitating scenario comparisons rather than providing precise future values for certain indicators.
- The ITF warrants the outputs of the default scenarios in the model: Baseline, Current Policy and Climate Ambition. These scenarios are validated by the technical team and the Ministry of Transport of the Republic of Uzbekistan. The model allows to manually create alternative scenarios by adjusting input, however, the ITF does not endorse the outcomes of this exercise and should not be quoted as the source of any manual scenario results.
- The use of the model, its default scenarios and any other elements is free.
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- Please cite this work as: ITF (2023), "Tashkent's Urban Mobility Model", *Sustainable Infrastructure Programme in Asia – Transport*, OECD Publishing, Paris.

Table of contents

Project overview

- As part of SIPA, the Sustainable Infrastructure Programme in Asia, a **national roadmap study** was conducted in **Uzbekistan**.
- It focused on **decarbonising urban passenger transport in Tashkent**, emphasising the role of public transport.
- The main deliverables of this study are the **Public Transport Improvement Plan for Tashkent** and the **Tashkent Urban Mobility model**.
- This manual aims to **guide users** in utilising the model to support local policy building.

Access more information and project deliverables.

Data collection in cooperation with stakeholders in Uzbekistan

↓

Development of a tailored strategic urban mobility model for Tashkent based on the ITF methodology and city-specific data

↓

Scenario definition with partners in Uzbekistan: analysis of existing, planned and potential policy measures

↓

Model handover to the Ministry of Transport for supporting local policy building

Introduction

General information about the model

- The model is built in **Microsoft Excel** (macro-enabled workbooks)
- It is based on the **ITF Global Urban Passenger Model**, from which the structure, formulas and initial calibration were extracted
- The model covers the administrative boundaries of the **City of Tashkent** and relies on inputs from local stakeholders and open-source platforms:
  - Ministry of Transport of the Republic of Uzbekistan
  - Agency of Statistics under the President of the Republic of Uzbekistan
  - Ministry of Internal Affairs of the Republic of Uzbekistan
  - JSC “Toshshahartransxizmat” (public transport operator)
  - International Energy Agency (IEA), International Monetary Fund (IMF), OpenStreetMap

Introduction

Model purpose

It is a **strategic modelling tool** allowing to assess the impact of CO_2 mitigation measures:

- **Infrastructure Expansion** (e.g. public transport infrastructure improvement)
- **Public Transport Promotion** (e.g. increased frequencies, lower fares)
- **Shared Transport Promotion** (e.g. car sharing, taxi market reform)
- **Restrictive Measures** (e.g. parking restrictions, speed limitations)
- **Pricing Measures** (e.g. road pricing, parking pricing)
- **Vehicle Technology Development** (e.g. technology stock targets for private and public fleets)
- **Other Measures** (teleworking, land use mixture)

The model develops policy scenarios between 2015 and 2050 and evaluates related transport activity and emissions.

Modelling scope

Level of disaggregation

To enhance the representation of urban mobility for different market segments, the model differentiates:

- 14 modes (current and possible in the future)
- 2 genders and 5 age cohorts
- 6 trip distance bins
- 5 fuel types (gasoline, diesel, electric, LPG/CNG, H2)
- 5-year steps from 2015 to 2050

Modelling scope

Transport modes

Active mobility

walk

bicycle

bike and scooter sharing

Private vehicles

car

motorcycle

Public transport

metro

suburban rail

BRT

bus

minibus

on-demand

Shared mobility

taxi

ride sharing

car sharing

Modelling scope

Population and distance categories

10 population categories × **6 trip distance bins**

5 age cohorts

0-19
20-34
35-54
55-69
70+

×

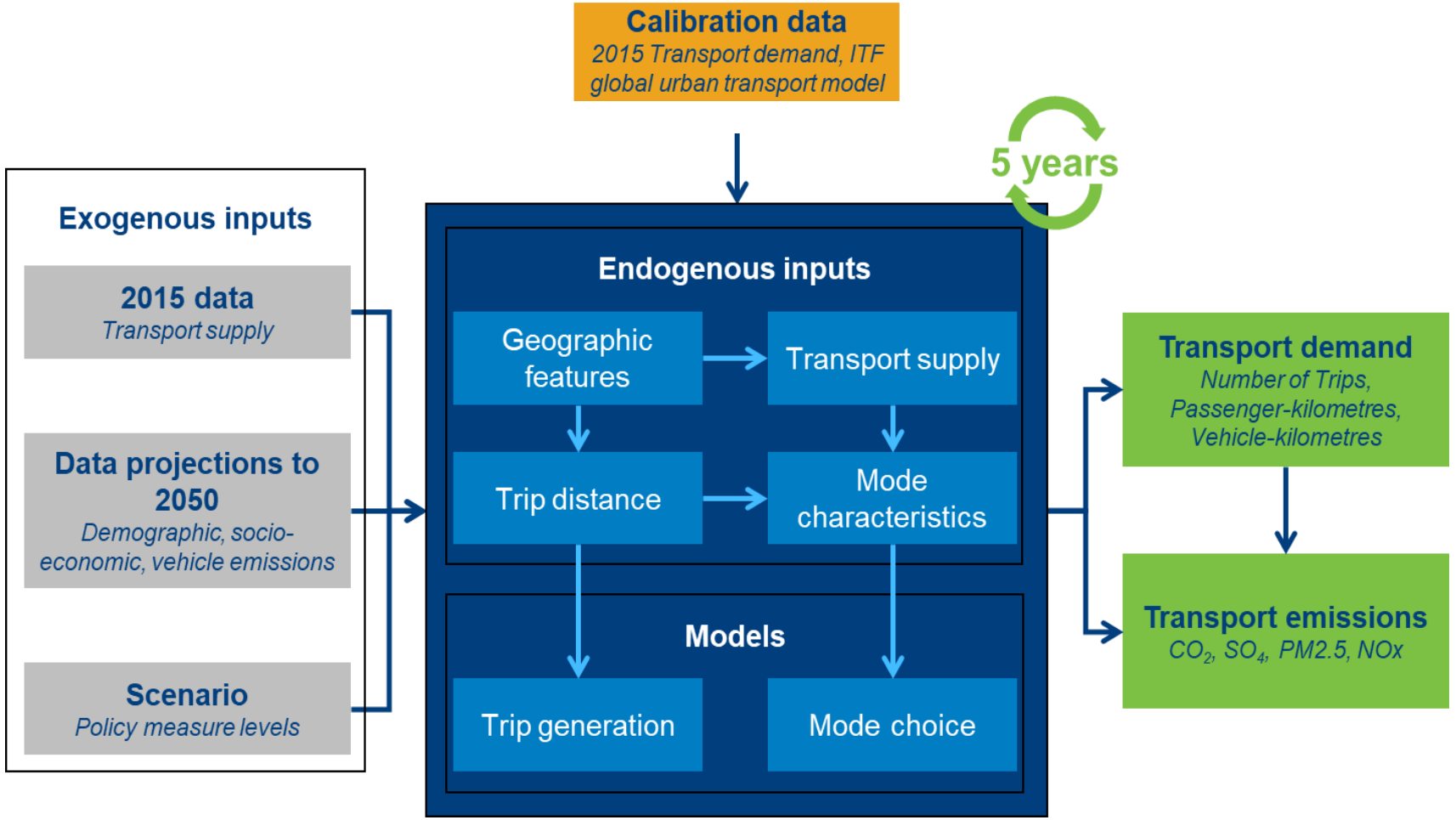
2 genders

Female
Male

0 – 1 km
1 – 2.5 km
2.5 – 5 km
5 – 10 km
10 – 20 km
20+ km

Modelling structure

Modelling framework



Modelling structure

Main model sections

- Cover
- Data explorer
- Scenario & Results
- Model Inputs
- Intermediate Steps
- Model Outputs

Main functions

Where to find them

Scenarios & Results -->

Quick access to scenario setting and main results

Scenario Setting

Enter or correct values for different scenarios

Main Results

Display results and generate additional reports

Main functions

Scenario template

Scenario Setting

Return to Data Explorer

Selected scenario	Baseline			Insert your values into these columns			Suggested value range	
Measure code	Measure name	Description of value to be provided		Implementation year	Anticipated values in implementation year	Anticipated values in 2050	MIN	MAX
Infrastructure Expansion								
MN	Metro network	Total network length (km)		2015	36.2		35	300
				2020	59.5		35	300
				2025	59.5		35	300
				2030	59.5		35	300
				2035	59.5		35	300
				2040	59.5		35	300
				2045	59.5		35	300
				2050	59.5		35	300
BRTN	BRT network	Total network length (km)		2015	0.0		0	300
				2020	0.0		0	300
				2025	0.0		0	300
				2030	0.0		0	300
				2035	0.0		0	300
				2040	0.0		0	300
				2045	0.0		0	300
				2050	0.0		0	300
SRN	Suburban rail network	Total number of stops		2015	8		8	30
				2020	8		8	30
				2025	8		8	30
				2030	8		8	30
				2035	8		8	30
				2040	8		8	30
				2045	8		8	30
				2050	8		8	30
CBN	Conventional bus network	Total network length (km)		2015	3800.0		2500	10000
				2020	3800.0		2500	10000
				2025	3800.0		2500	10000
				2030	3800.0		2500	10000
				2035	3800.0		2500	10000
				2040	3800.0		2500	10000
				2045	3800.0		2500	10000
				2050	3800.0		2500	10000
BN	Bike network	Total network length (km)		2030	100	100	100	1000
PN	Pedestrian network	Additional network length increase (%)		2030	0%	0%	0	100%
Public Transport Promotion								
MTS	Service improvement for mass transit	Increase in operating speed from optimised stop positioning and service improvement, including ICT (%)		2030	0%	0%	0%	100%

Main functions

Scenario template

Scenario Setting

The user selects a policy scenario in *cell C7*

Selected scenario	Baseline

and changes the corresponding values in *columns F, G, and H*

Implementation year	Anticipated values in implementation year	Anticipated values in 2050

- The cells to be filled in are highlighted in orange and green.
- The user can input values for the implementation year, 2050 or each year. Please note that the user inputs for any given scenario will not affect the values for other scenarios.
- Users can select the implementation year of each measure. Note that BN, TI, RSI, and TMR are already being implemented, but users can still select their development milestone in the future.
- For the values of each measure, the suggested range is in *columns I and J*. Users are encouraged to input values within this range. If the user's input falls outside this range, they will still be allowed to enter it, but the corresponding cell will turn red.
- Each policy measure has a measure code for reference (see Measure Code, *column B*)
- In Scenario Parameters Scenario Parameters the values are calculated based on the linear growth rate between the initial value and the 2050 value.

Main functions

Scenario template – Infrastructure expansion

Scenario Setting

- Fill in the total network size for each mode and year (note that the measures are in different units).
- Ensure the following years are non-zero once the value becomes non-zero for a certain mode (see the example below.

Infrastructure Expansion							
MN	Metro network	Total network length (km)	2015	36.2		35	300
			2020	59.5		35	300
			2025	65.9		35	300
			2030	72.3		35	300
			2035	78.8		35	300
			2040	85.2		35	300
			2045	91.6		35	300
			2050	98.0		35	300
BRTN	BRT network	Total network length (km)	2015	0.0		0	300
			2020	0.0		0	300
			2025	15.0		0	300
			2030	30.0		0	300
			2035	47.5		0	300
			2040	65.0		0	300
			2045	82.5		0	300
			2050	100.0		0	300
SRN	Suburban rail network	Total number of stops	2015	8		8	30
			2020	8		8	30
			2025	8		8	30
			2030	8		8	30
			2035	8		8	30
			2040	8		8	30
			2045	8		8	30
			2050	8		8	30
CBN	Conventional bus network	Total network length (km)	2015	3800.0		2500	10000
			2020	3800.0		2500	10000
			2025	2500.0		2500	10000
			2030	2500.0		2500	10000
			2035	2500.0		2500	10000
			2040	2500.0		2500	10000
			2045	2500.0		2500	10000
			2050	2500.0		2500	10000
BN	Bike network	Total network length (km)	2025	220	300	100	1000
PN	Pedestrian network	Additional network length increase (%)	2025	10%	30%	0	100%

Main functions

Scenario template – Vehicle technology

Scenario Setting

- Policy measures: **TECH, CTECH, BTECH**
- Setting values here allows overwriting the pre-defined “default” values for the vehicle technology scenarios (set up in the **TECH** measure, see the IEA NPS/SDS scenarios description in the Methodology Note).
- Provide % shares of vehicle technologies for the private car (**CTECH**) and bus (**BTECH**) fleet
- Make sure the sum of the shares is 100%. Otherwise, the default IEA NPS/SDS shares will be used (the cells will turn red if the sum is not 100%).

Vehicle Technology Development								
TECH	Vehicle fuel technology development and uptake - predefined scenarios	Trigger of two possible technology and vehicle efficiency scenarios: 0 - IEA NPS 1 - IEA SDS **See the methodology note for information on these scenarios.**		0			0	1 (IEA SDS)
CTECH	Technology stock targets for car fleet	Shares of different vehicle technologies in private car fleet (%). **Please note that if you specify the shares, they will substitute the default shares of the IEA scenario. Please make sure the sum of the shares is 100%, otherwise the default IEA shares will be used.**	Gasoline	2025	63%	40%	67%	0%
			Gasoline-hybrid		0%	0%	0%	0%
			Diesel		1%	0%	1%	0%
			Diesel-hybrid		0%	0%	0%	0%
			LPG/CNG		31%	25%	32%	0%
			Hydrogen		0%	0%	0%	0%
			Hydrogen-hybrid		0%	0%	0%	0%
			Electric		5%	35%	0%	100%
			Total		**100%**	**100%**	**100%**	**100%**
BTECH	Technology stock targets for bus fleet	Shares of different vehicle technologies in bus fleet (%). **Please note that if you specify the shares, they will substitute the default shares of the IEA scenario. Please make sure the sum of the shares is 100%, otherwise the default IEA shares will be used.**	Gasoline	2025	0%	0%	0%	0%
			Gasoline-hybrid		0%	0%	0%	0%
			Diesel		63%	20%	80%	0%
			Diesel-hybrid		0%	0%	0%	0%
			LPG/CNG		17%	10%	20%	0%
			Hydrogen		0%	0%	0%	0%
			Hydrogen-hybrid		0%	0%	0%	0%
			Electric		20%	70%	0%	100%
			Total		**100%**	**100%**	**100%**	**100%**

Main functions

Displaying the results

- Aggregated results can be found in the sheet **Main Results**
- Detailed results are in the section **Model Outputs -->**

- To generate the aggregated results, please follow the steps:
  - Select a policy scenario in *cell B7* **Results for scenario: Current** or *cell C7* **Selected scenario** | **Baseline** in **Scenario Setting**
  - Users can also generate additional reports by clicking the two buttons

! The model will be restarted after clicking one of the two buttons.
Please save the file first to ensure that your changes are not lost.

Main functions

Scenario results comparison

Generate Scenario results comparison

- This file consists of two sheets: **Scenario Results** with aggregated results for all scenarios, and **Scenario Comparison** where the user can display absolute and relative differences between two selected scenarios
- Below is an example of **Scenario Comparison**. The scenario selection is in *cells F3 and I3*.

Scenario Comparison

Select two scenarios for comparison: **Ambition** vs **Current**

Ambition-Current (absolute difference)

Mode share of trips

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-0.70%	-0.21%	3.50%	-3.31%	0.72%	0.00%
2030	-0.80%	-0.92%	10.77%	-7.27%	-1.79%	0.00%
2035	-1.20%	-1.53%	17.03%	-10.74%	-3.57%	0.00%
2040	-1.50%	-2.10%	21.36%	-13.35%	-4.40%	0.00%
2045	-1.90%	-2.68%	25.27%	-15.76%	-4.93%	0.00%
2050	-2.30%	-3.20%	28.63%	-17.97%	-5.15%	0.00%

Trips (million per year)

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-19	-6	97	-92	20	0
2030	-24	-28	327	-220	-54	0
2035	-40	-51	570	-359	-120	0
2040	-55	-77	782	-489	-161	0
2045	-75	-106	1 004	-626	-196	0
2050	-99	-138	1 228	-771	-221	0

Ambition-Current (relative difference)

Mode share of trips

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-6.18%	-4.62%	10.83%	-14.20%	2.52%	0.00%
2030	-6.84%	-17.72%	39.89%	-24.64%	-6.72%	0.00%
2035	-9.81%	-27.27%	74.15%	-30.56%	-14.83%	0.00%
2040	-11.15%	-33.95%	109.28%	-33.82%	-20.64%	0.00%
2045	-12.85%	-39.64%	157.43%	-36.27%	-25.99%	0.00%
2050	-14.27%	-44.26%	222.86%	-38.28%	-30.56%	0.00%

Trips (million per year)

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-6.18%	-4.62%	10.83%	-14.20%	2.52%	0.00%
2030	-6.84%	-17.72%	39.89%	-24.64%	-6.72%	0.00%
2035	-9.81%	-27.27%	74.15%	-30.56%	-14.83%	0.00%
2040	-11.15%	-33.95%	109.28%	-33.82%	-20.64%	0.00%
2045	-12.85%	-39.64%	157.43%	-36.27%	-25.99%	0.00%
2050	-14.27%	-44.26%	222.86%	-38.28%	-30.56%	0.00%

Main functions

Analysis per policy direction

Generate Analysis per policy direction

- This file consists of five sheets: detailed scenario results per policy direction (**Baseline, Current, Ambition**), **Scenario Comparison** where the user can display relative differences between two selected scenarios, and **Summary** that brings together the aggregated results and corresponding differences for all scenarios.
- Below is an example of **Scenario Comparison**. The scenario selection is in *cells H3 and K3*.

Scenario Comparison

Select two scenarios for comparison per policy direction: **Ambition** vs **Current**

Infrastructure Expansion

Mode share of trips

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	4.05%	9.36%	-2.66%	5.68%	-1.97%	0.00%
2030	6.14%	19.69%	-4.12%	8.18%	-2.90%	0.00%
2035	8.60%	29.25%	-5.44%	10.27%	-3.57%	0.00%
2040	10.53%	40.92%	-6.83%	12.14%	-4.41%	0.00%
2045	12.36%	53.37%	-8.17%	13.64%	-5.22%	0.00%
2050	14.01%	66.46%	-9.58%	15.13%	-6.09%	0.00%

Trips (million per year)

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	4.05%	9.36%	-2.66%	5.68%	-1.97%	0.00%
2030	6.14%	19.69%	-4.12%	8.18%	-2.90%	0.00%
2035	8.60%	29.25%	-5.44%	10.27%	-3.57%	0.00%
2040	10.53%	40.92%	-6.83%	12.14%	-4.41%	0.00%
2045	12.36%	53.37%	-8.17%	13.64%	-5.22%	0.00%
2050	14.01%	66.46%	-9.58%	15.13%	-6.09%	0.00%

Public Transport Promotion

Mode share of trips

Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-1.81%	-1.96%	-3.02%	10.50%	-2.08%	0.00%
2030	-3.94%	-4.31%	-5.91%	17.71%	-2.24%	0.00%
2035	-5.24%	-5.81%	-8.01%	23.61%	-2.83%	0.00%
2040	-6.42%	-7.13%	-9.63%	27.64%	-3.07%	0.00%
2045	-7.46%	-8.23%	-10.81%	30.28%	-2.93%	0.00%
2050	-8.51%	-9.38%	-12.13%	33.78%	-2.94%	0.00%

Trips (million per year)

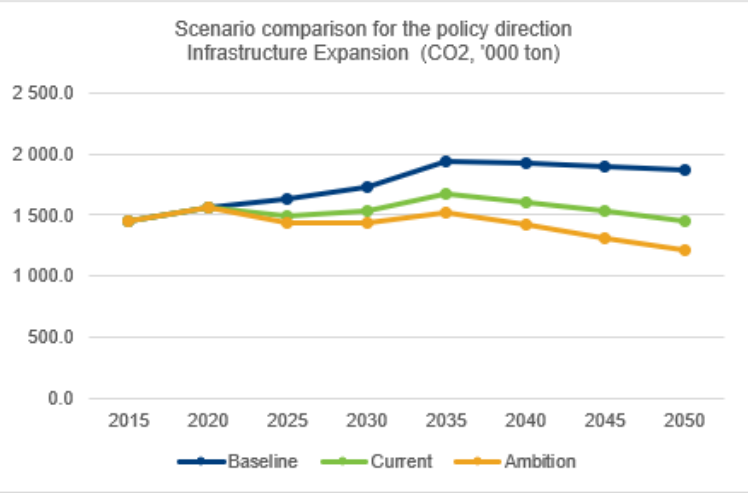
Year	Walk	Bicycle	Private vehicles	Public transport	Shared mobility	Total
2025	-1.81%	-1.96%	-3.02%	10.50%	-2.08%	0.00%
2030	-3.94%	-4.31%	-5.91%	17.71%	-2.24%	0.00%
2035	-5.24%	-5.81%	-8.01%	23.61%	-2.83%	0.00%
2040	-6.42%	-7.13%	-9.63%	27.64%	-3.07%	0.00%
2045	-7.46%	-8.23%	-10.81%	30.28%	-2.93%	0.00%
2050	-8.51%	-9.38%	-12.13%	33.78%	-2.94%	0.00%

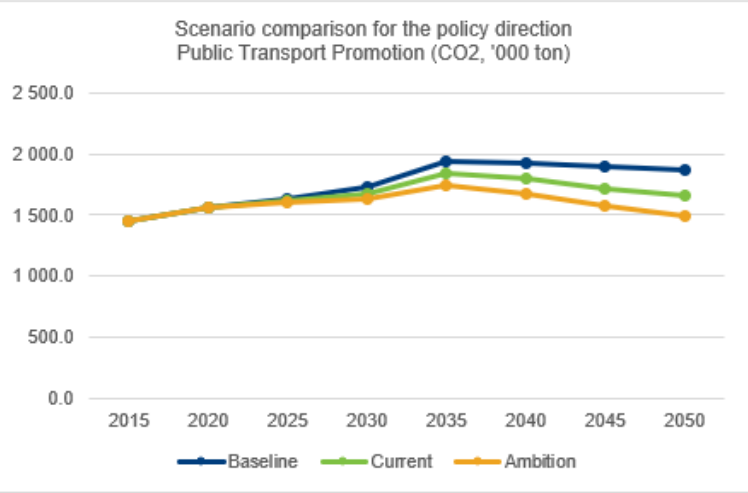
Main functions

Analysis per policy direction – Methodology

Generate Analysis per policy direction

- The impact assessment for each policy direction is done by comparing two scenarios (Current-Baseline and Ambition-Baseline) that only differ in the settings of the specific policy direction that is being discussed.
- Users can also find graphs showing differences per policy direction between the three scenarios in the **Summary** sheet (see examples below).





Input data

Where to find them

Model Inputs --> Update the model with more recent data inputs or revisions

Socio-economic Input	Transport Indicators	Vehicle Technology	Sub-models Calibration
Control and modify input on population, area size, land use, GDP and teleworking	Control and modify input for 2015 on vehicle fleets and technology, transport infrastructure and costs, average speeds and travel times, etc.	Detailed extraction of vehicle technology and performance data from the IEA model corrected with the scenario input	All variables used in intermediary estimations. Values are calibrated based on the ITF Global Model

Input data

Socio-economic data

Socio-economic Input

- Population by age group & gender
- Share of teleworking population
- Area size and land use mixture
- GDP per capita
- Base year (2015) and projections until 2050
- The demographic and geographic characteristics of Tashkent are based on the official statistics of the Republic of Uzbekistan and on a linear regression approach to extend the estimations between 2020 and 2050

Users can modify the data in this section

Input data

Base year (2015) transport indicators

Transport Indicators

- Transport infrastructure supply (road length by category, PT infrastructure size)
- Vehicle fleet (private ownership, shared fleet, share of legally operated vehicles)
- Vehicle technology (share of energy type for car and bus fleets)
- Modal attributes (speed, access and waiting time, average load factor)
- Transport costs (public transport fare, taxi fare, fuel cost, parking cost)
- Travel patterns (share of trips by distance category)

☑ **Users can modify the data in this section**

Input data

Vehicle technology

Vehicle technology

- Vehicle fuel/technology mix, performance, load factors, associated costs and CO2 emissions from the **IEA Mobility Model** (MoMo), including **two IEA scenarios** (NPS/SDS)
- Load factors for private car are updated based on the data from the Ministry of Transport
- Fuel composition for private car and bus comes from Scenario Setting if specified by the user.
- Fuel composition for BRT, minibus, taxi, ride-sharing and car-sharing is adjusted based on the coefficients in Sub-models Calibration
- Local pollutants emissions come from the ICCT Transport Roadmap Model

! To modify the data in this sheet, users should be very well familiar with the model.
It is advised to only modify the table "Aggregated model input".

Input data

Sub-models calibration

Sub-models Calibration

- For more information on each sub-model and its coefficients refer to the Methodology Note
- The sheet includes several sections:
  - **Mode choice module** – modal attributes formula coefficients, COVID impact coefficients, mode choice model coefficients, modes availability assumption by distance bin
  - **Mobility patterns** – trip distance and distance category distribution models, distance detour coefficients, trip rate model
  - **Transport supply** – road length model, reference speed, road space constraints
  - **Modal costs** – elasticities of different costs to GDP per capita
  - **Vehicle stocks/ownership** – private modes ownership model
  - **Other parameters** – carpooling impact and vehicle technology adjustment factors

! To modify the data in this sheet, users should be very well familiar with the model. It is recommended to keep a copy of the initial parameters.

Input data

Sub-models calibration. Example: adjusting the mode share model

Sub-models Calibration

- Mode shares can be changed by modifying the mode choice model coefficients. The results are displayed in Mode Share
- Increasing/decreasing ASC (alternative-specific constant) → increasing/decreasing the mode utility → increasing/decreasing the mode share, independently of the modal attribute values
- Changing other coefficients makes modes more or less "sensitive" to gender as well as changes in modal attributes or policy measures.

! Changes in the model coefficients are not recommended without having data to validate them and a good understanding of discrete choice modelling.

Mode choice model

Coefficients of the calibrated multinomial logit mode choice model, used to compute the utility functions

Mode	Mode ID	Gender	ASC
Walk	M_1	1.00	0.0
Bicycle	M_2	1.30	-2.5
Motorcycle	M_3	1.60	-2.8
Car	M_4	1.40	0.0
Taxi	M_5	0.90	-1.3
PT-Rail	M_6	0.60	-0.3
PT-Metro	M_7	0.60	0.0
PT-Bus	M_8	0.50	-0.5
PT-BRT	M_9	0.60	0.0
PT-Minibus	M_10	0.50	-0.7
Bike and scooter sharing	M_11	1.30	-1.6
Ride-sharing	M_12	0.90	-1.3
Car-sharing	M_13	1.30	-0.5
On-demand Transport	M_14	0.50	-1.0

Input data

Sub-models calibration. Example: adjusting distance bin shares

Sub-models Calibration

- The shares of trips falling into each distance bin can be changed by modifying the distance bin choice model coefficients. The results are shown in Trip Rates & Distances
- Increasing/decreasing ASC (alternative-specific constant) → increasing/decreasing the distance bin utility → increasing/decreasing its share, independently of the attribute values
- Changing other coefficients makes distance bins more or less "sensitive" to attribute changes.

! Changes in the model coefficients are not recommended without having data to validate them and a good understanding of discrete choice modelling.

Distance category distribution model

Coefficients of the multinomial logit model used to compute the utility functions of each distance bin d: $Utility^d = \mu * (\sum_i \boldsymbol{Parameter}^d{}_i * variable^d{}_i)$
The variables are slightly transformed to include threshold effects and the impact of the bike and pedestrian infrastructure scenario measures.

Distance bin	ASC	Area Coeff	Density Coeff	Land use mixture Coeff
0	0.0	-0.033	0.0012	2.70
1	0.5	-0.024	0.0009	2.10
2	2.5	-0.018	0.0007	1.90
3	0.0	0.000	0.0001	-1.80
4	0.0	0.009	-0.0015	-2.20
5	0.0	0.005	-0.0019	-4.50

Input data

Sub-models calibration. Example: adjusting trip rates

Sub-models Calibration

- Trip rates can be changed by modifying the corresponding model coefficients.
- The results are displayed in Trip Rates & Distances
- Increasing/decreasing age and gender coefficients → increasing/decreasing trip rates for certain demographic categories
- Changing other coefficients makes additional factors, such as GDP or policy measures, influence trip rates of all categories to a larger or smaller extent.

! Changes in the model coefficients are not recommended without having data to validate them and a good understanding of regression analysis.

Trip rate model

Teleworking Coeff	30.0
PN Coeff	7.0
BN Coeff	0.01

Variable	Category	Value
Constant	All	0.200
GDPcap	All	0.005
Gender	M	-0.050
Gender	F	0.106
Age_group	0-19	0.136
Age_group	20-34	0.240
Age_group	35-54	0.310
Age_group	55-69	0.184
Age_group	70+	0.000

Sub-models

Where to find them

Intermediate steps -->

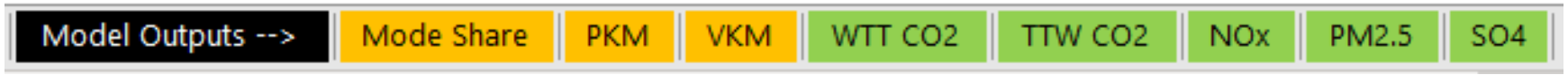
Provide intermediate calculation steps used for updating the overall results

Scenario Parameters	Socio-economic Projection	Urban Area Descriptors	Trip Rates & Distances	Modal Attributes	Mode Share Utilities
Conversion of user scenario input into parameters applied in the model	Population and GDP projections between 2015 and 2050	Projection of transport supply attributes and land use characteristics between 2015 and 2050	Generation of trips by gender, age and distance ranges between 2015 and 2050	Generation of trip attributes for each mode and distance range between 2015 and 2050	Conversion of modal attributes and scenario input into utilities used for mode share calculations (hidden sheet)

! The information in these sheets can be used for control purposes only.
Changes are not recommended. Users should modify corresponding input sheets if necessary

Detailed outputs

Where to find them



Travel demand outputs

Emissions outputs

Number of trips
Average trip distances
Mode shares

→

Passenger kilometres by mode (PKM)

→ Vehicle load factors

Vehicle kilometres by mode (VKM)

→ Fuel/technology mix

CO2 and local pollutants by mode

- By distance bin
- By gender

- By fuel type
- By gender

International Transport Forum

SIPA
Sustainable Infrastructure Programme in Asia

INTERNATIONAL TRANSPORT FORUM

2 RUE ANDRÉ PASCAL
F-75775 PARIS CEDEX 16

PROJECT TEAM

Yaroslav KHOLODOV
Project Manager
Email: yaroslav.kholodov@itf-oecd.org

Mallory TROUVÉ
Urban Mobility Advisor

Xiaotong ZHANG
Data Analyst

Blaise ESTIENNE
Policy Analyst Intern

Guineng CHEN
SIPA Transport Programme Lead
Email: guineng.chen@itf-oecd.org