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DECARBONISING PATHWAYS FOR TASHKENT'S URBAN MOBILITY

Synthesis of project results

July 2023

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

IKI INTERNATIONAL CLIMATE INITIATIVE

OECD

MINISTRY OF TRANSPORT
REPUBLIC OF UZBEKISTAN

DECARBONISING PATHWAYS FOR TASHKENT'S URBAN MOBILITY

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.

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OUTLINE

- SIPA-TRANSPORT FOR UZBEKISTAN
- URBAN MOBILITY IMPROVEMENT PLAN
- SCENARIO DESIGN
- SCENARIO RESULTS
- TASHKENT'S URBAN MOBILITY MODEL
- DOWNLOAD STUDY MATERIALS

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SIPA-Transport for Uzbekistan

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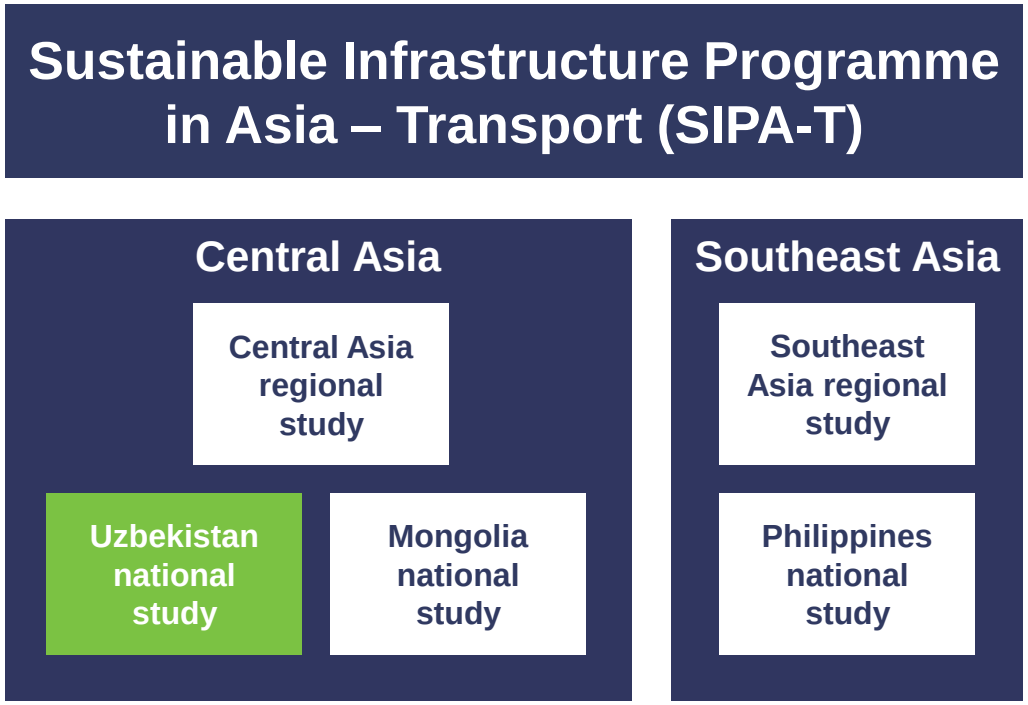
SIPA overview

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



Uzbekistan national study

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

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Urban Mobility Improvement Plan

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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**.

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Scenario Design

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Policy scenarios for CO_2 reduction

The ITF designed **three distinct scenarios** to assess the **CO_2 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

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

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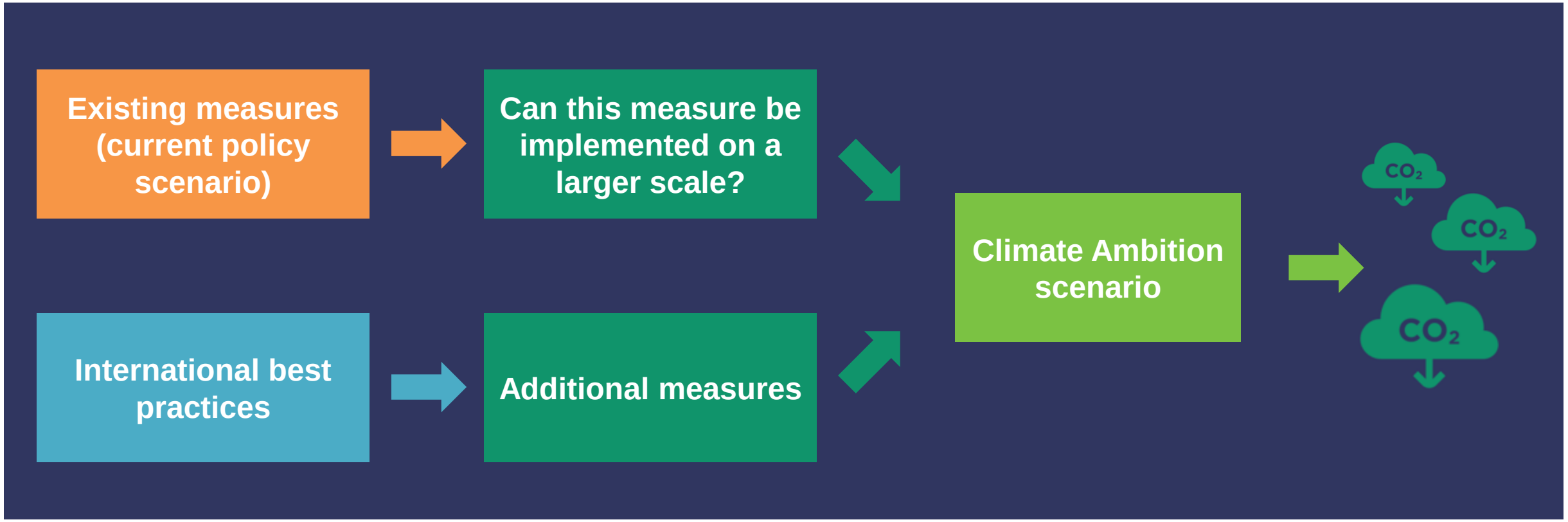
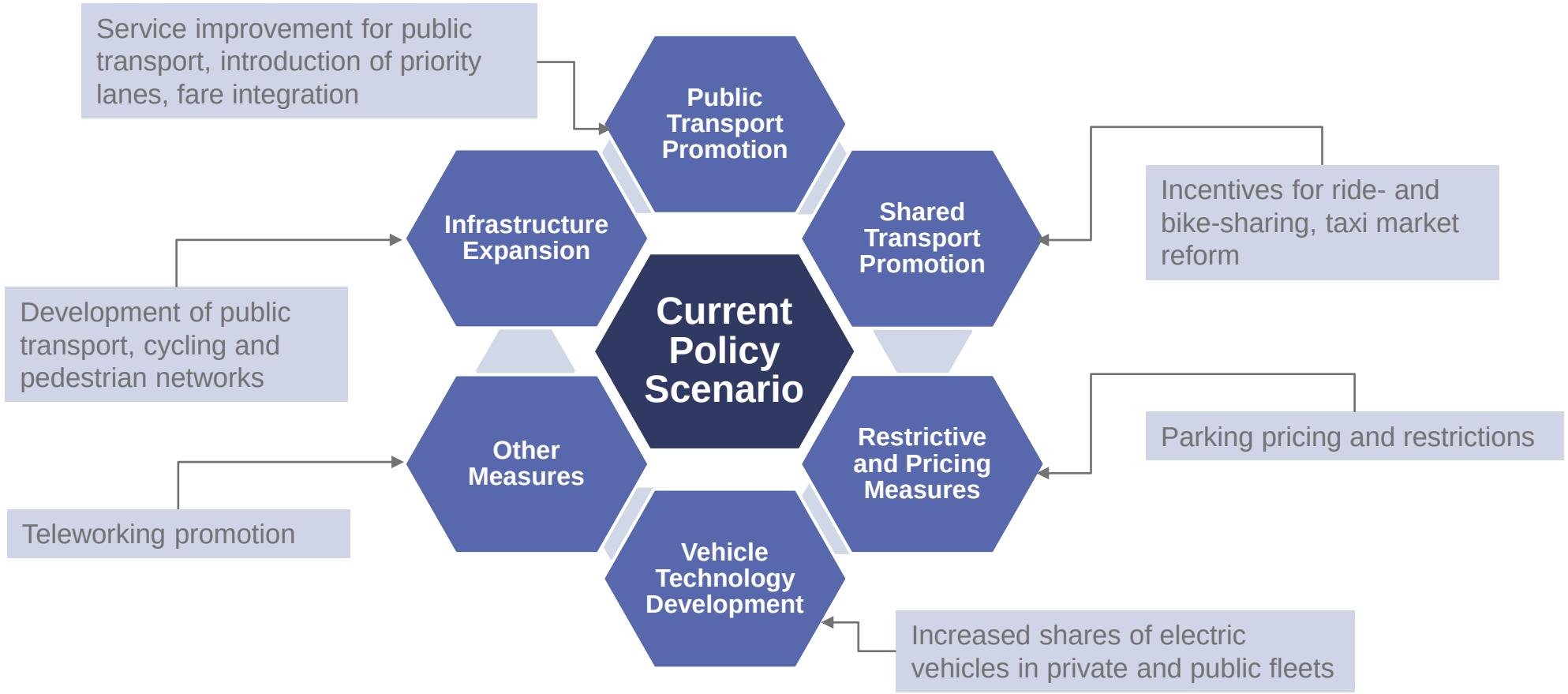
Model handover to the Ministry of Transport for supporting local policy building

How did we build the Climate Ambition scenario?



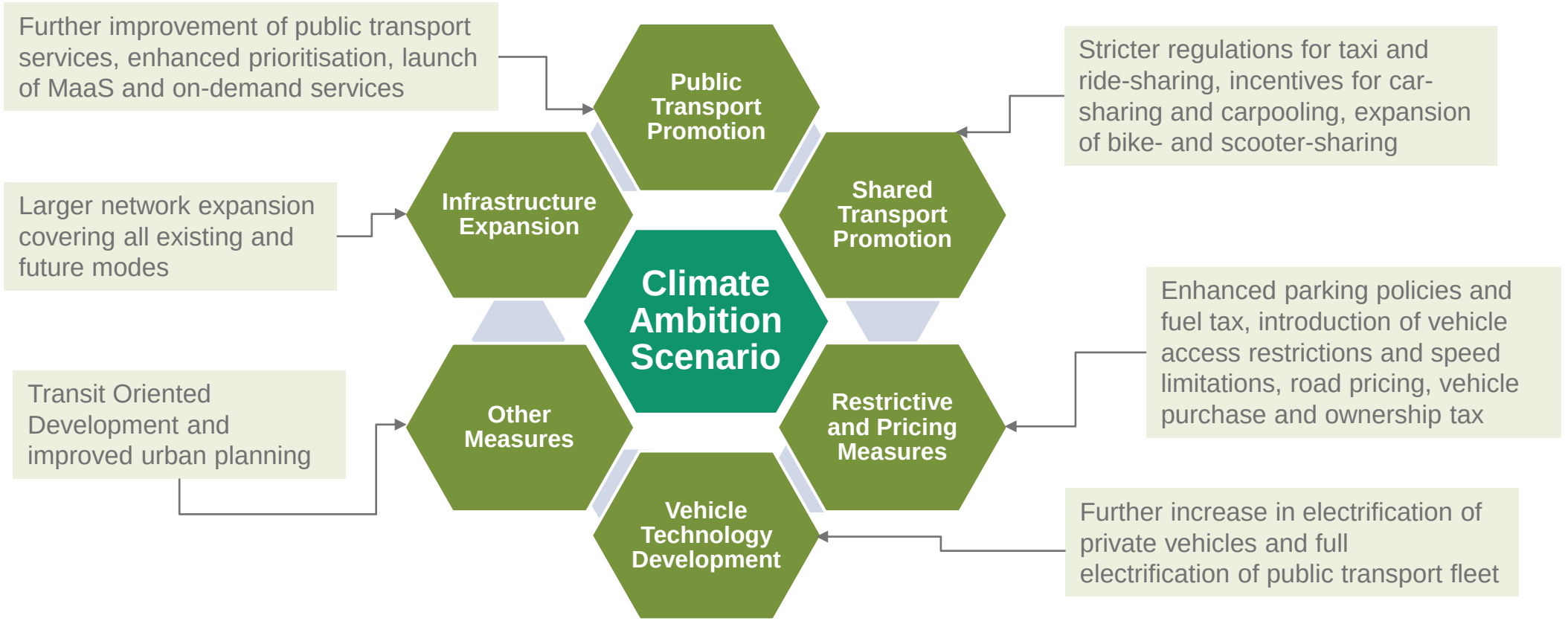
Current Policy scenario

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.



Climate Ambition scenario

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.



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Scenario Results

Impact per policy scenario

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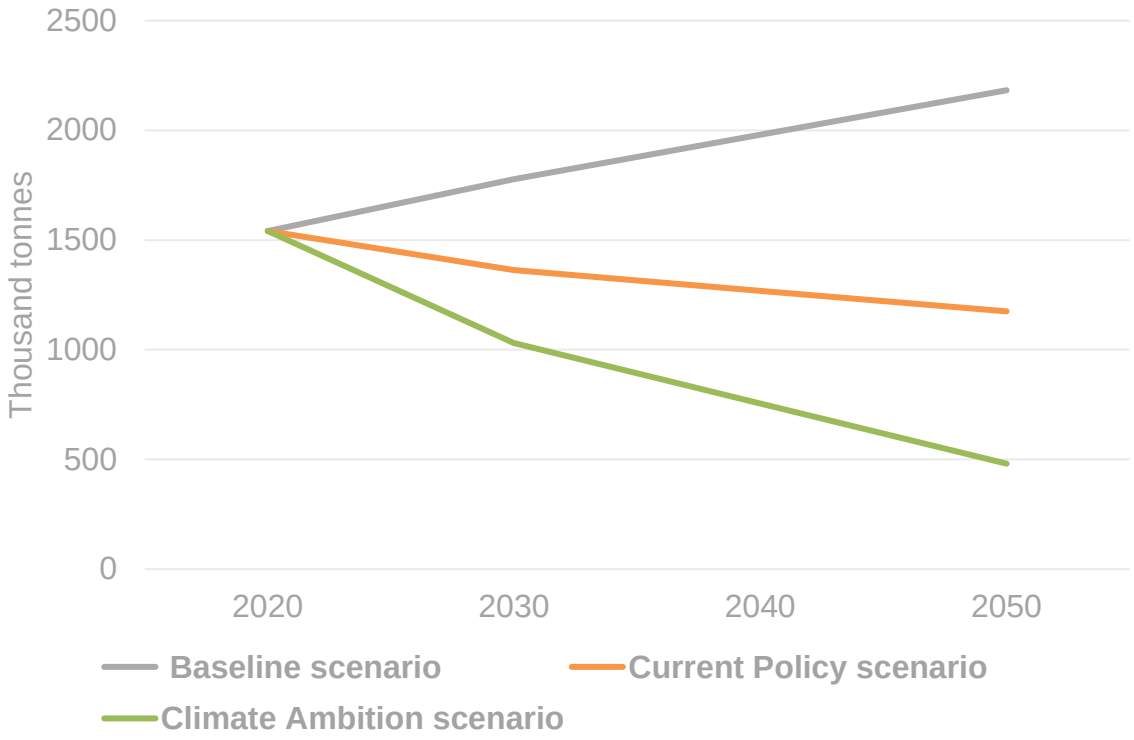
Overall CO_2 emissions

Trajectories of CO_2 emissions until 2050 by scenario



Main findings

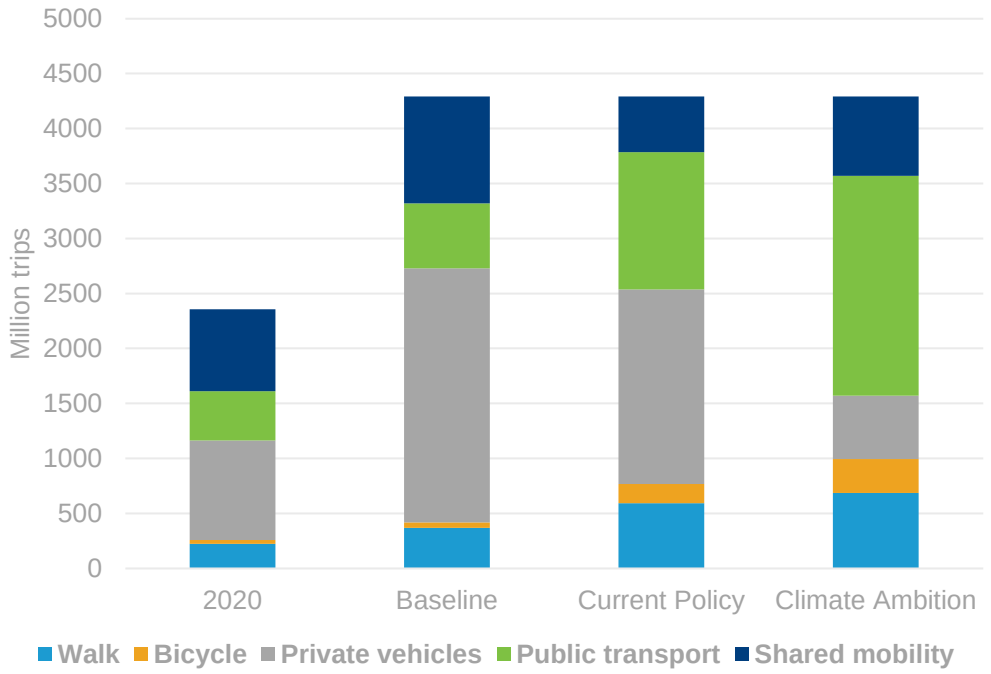
- **Baseline scenario**, strong population and income growth and shift towards private vehicles result in a sharp increase in CO_2 emissions.
- **Current Policy scenario**, planned policy actions reverse the emission trajectory; however, they are not sufficient to achieve Tashkent's climate goals.
- **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

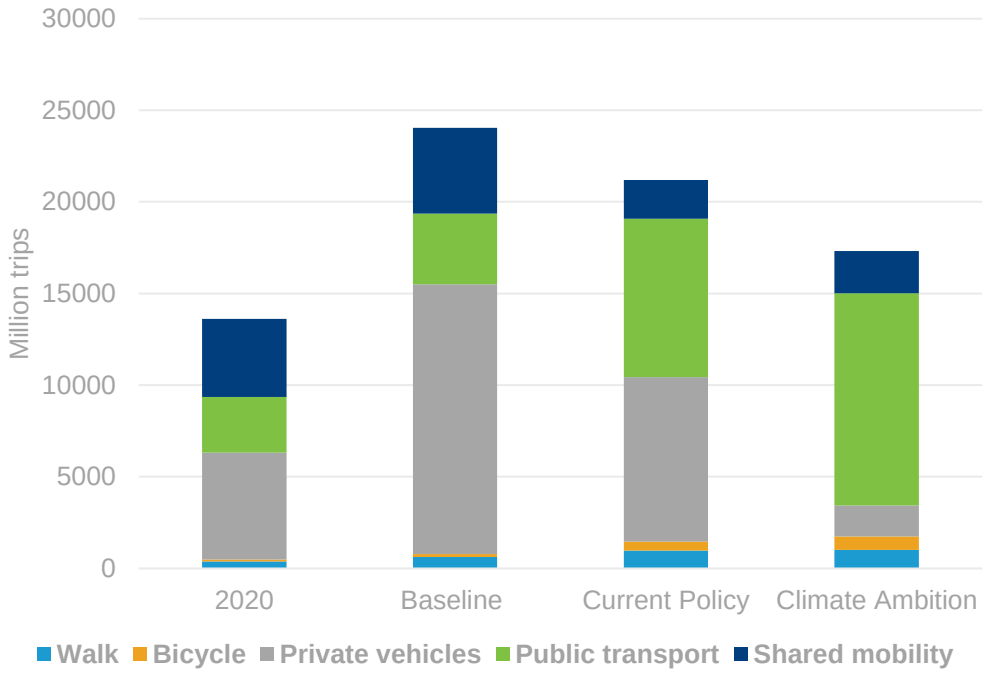
Baseline	Current Policy	Climate Ambition
Business as usual	Where we are heading	How far we must go
+42%	-24%	-68%

Transport demand

Number of trips in 2050 by scenario

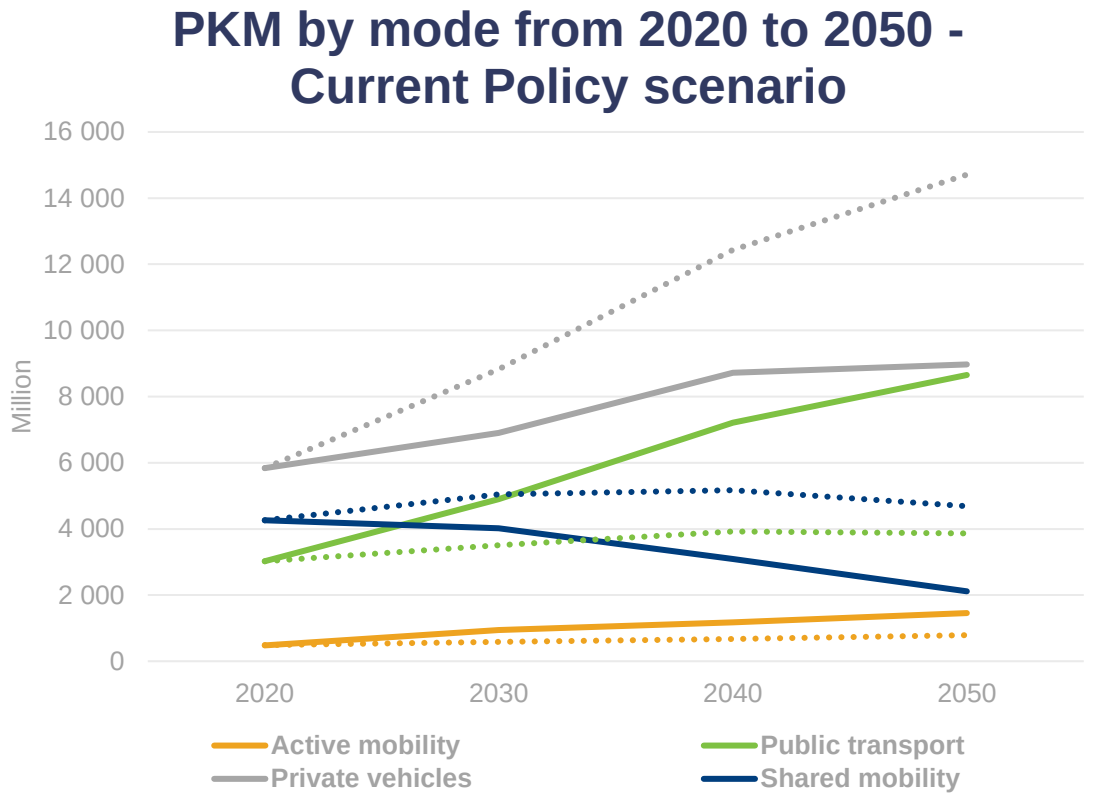


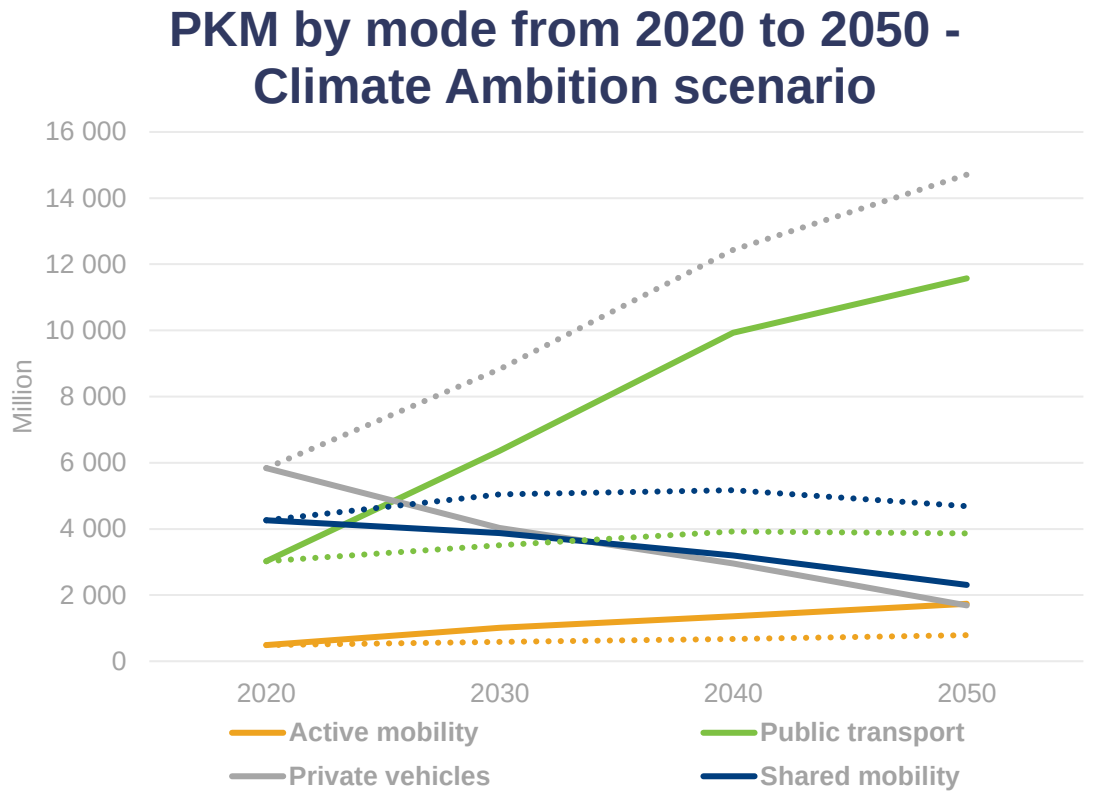
Passenger-Kilometers (PKM) in 2050 by scenario



- 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



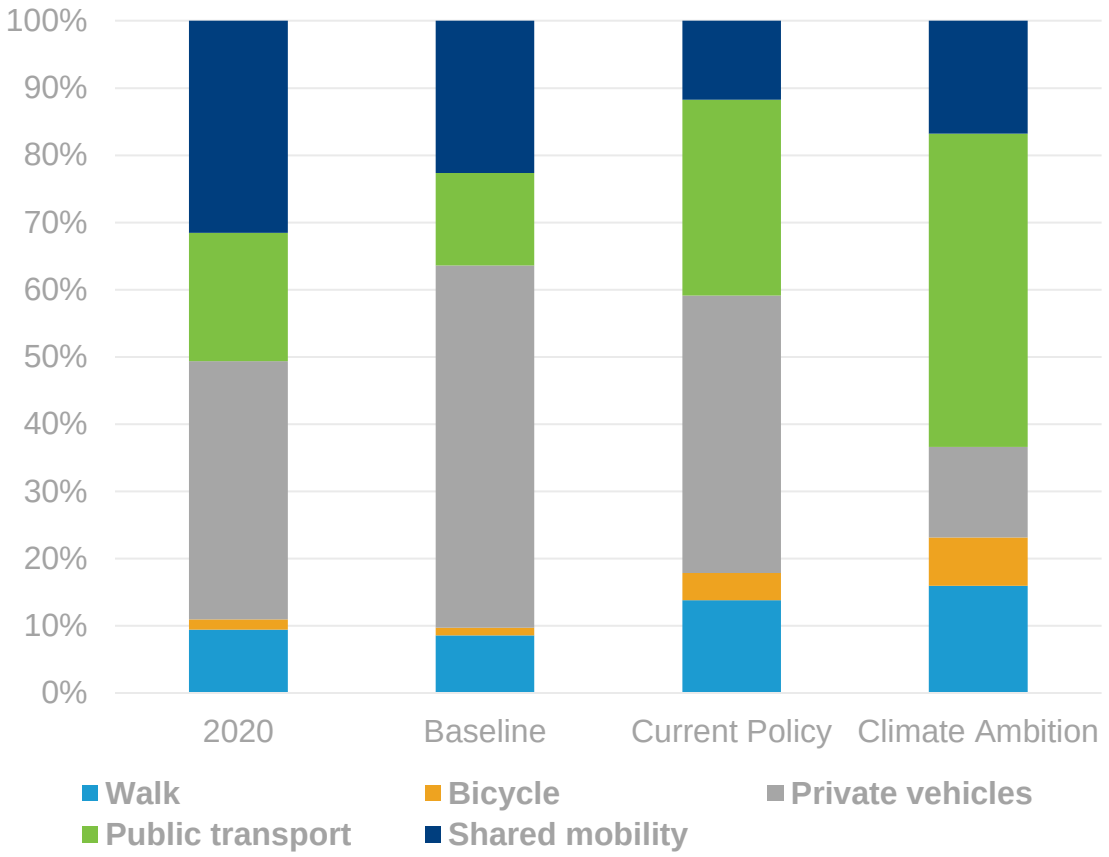


Note: dotted lines represent the Baseline scenario

- **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**

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

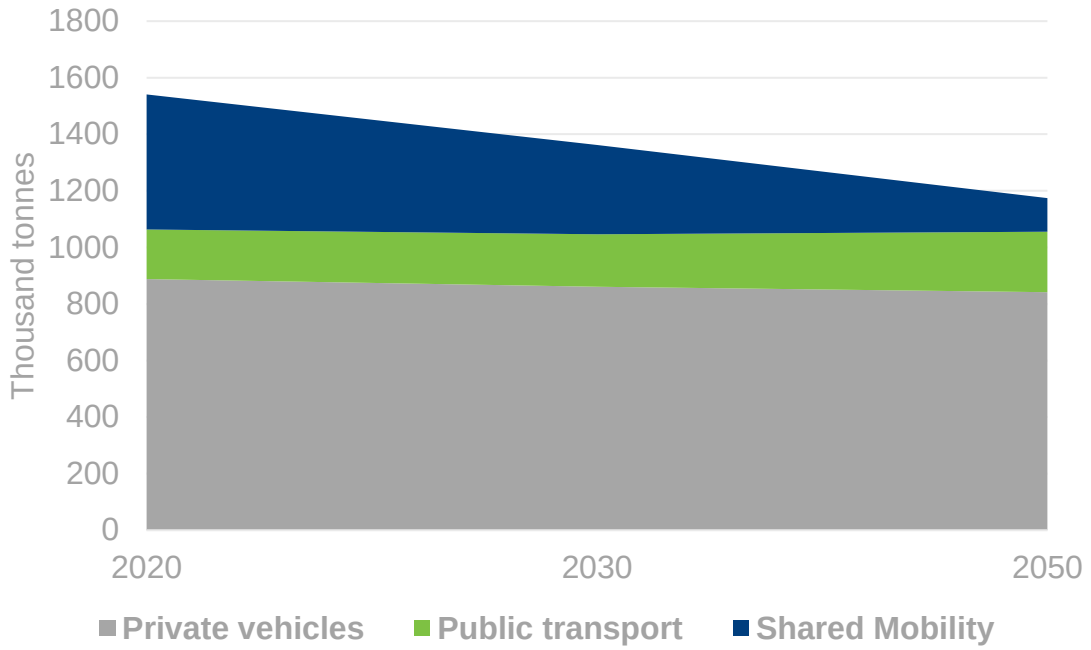
Share of sustainable modes* by 2050

Baseline Business as usual	Current Policy Where we are heading	Climate Ambition How far we must go
46%	59%	87%

* sustainable modes include walk, bicycle, public transport and shared mobility

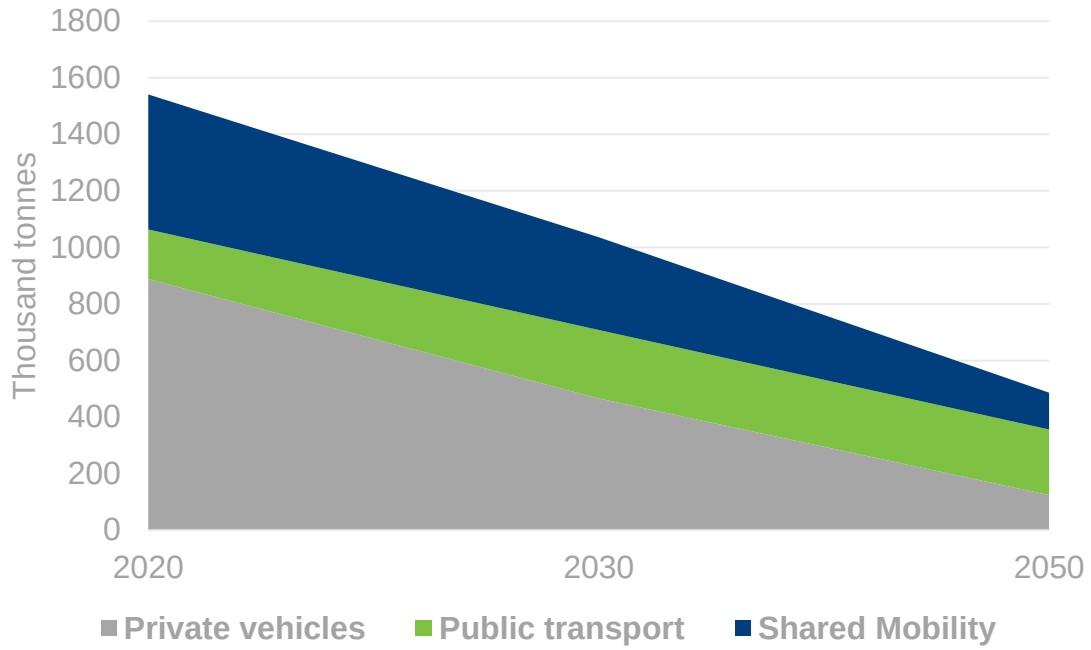
CO_2 emissions by mode

Current Policy scenario



- 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.

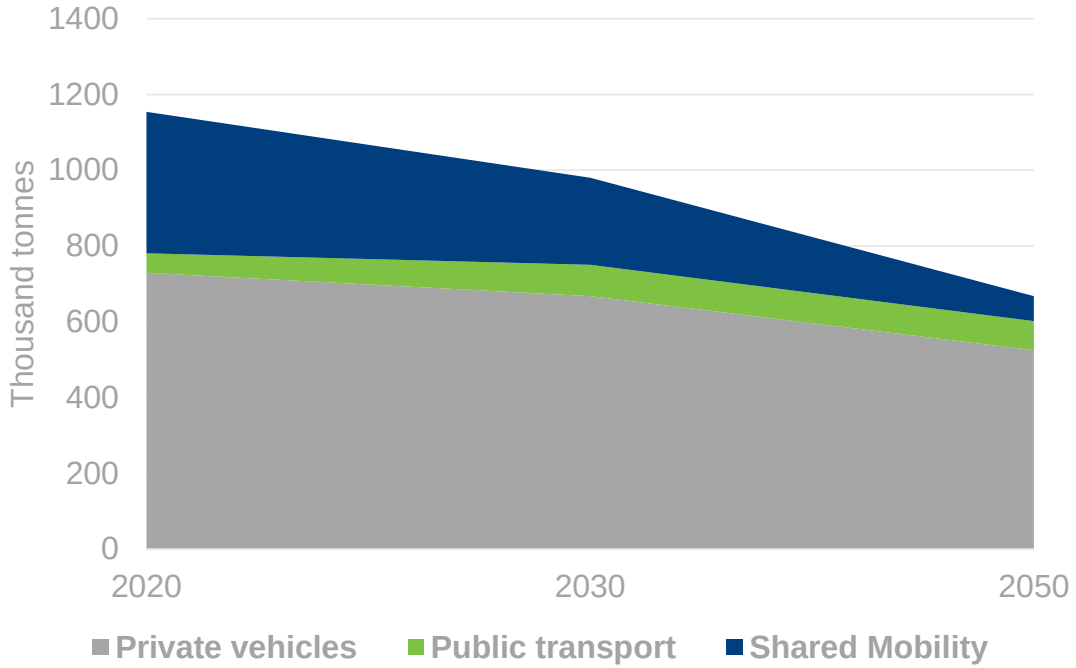
Climate Ambition scenario



- Significant reduction in CO_2 emissions under the Climate Ambition scenario primarily results from a shift towards less emitting transport modes alongside technological advancements.

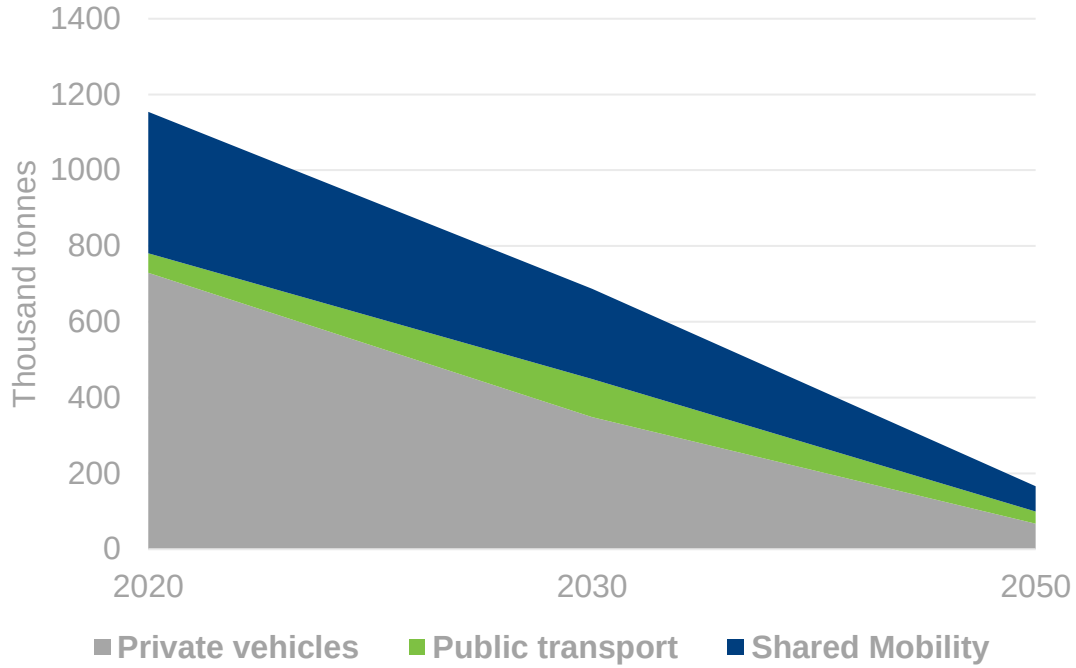
Tank-to-wheel CO_2 emissions

Current Policy scenario



- Considering only the tank-to-wheel component, the current policies cut CO_2 emissions effectively for shared mobility, while private vehicles remain almost unaffected, contributing to approximately 80% of the total emission volume in 2050.

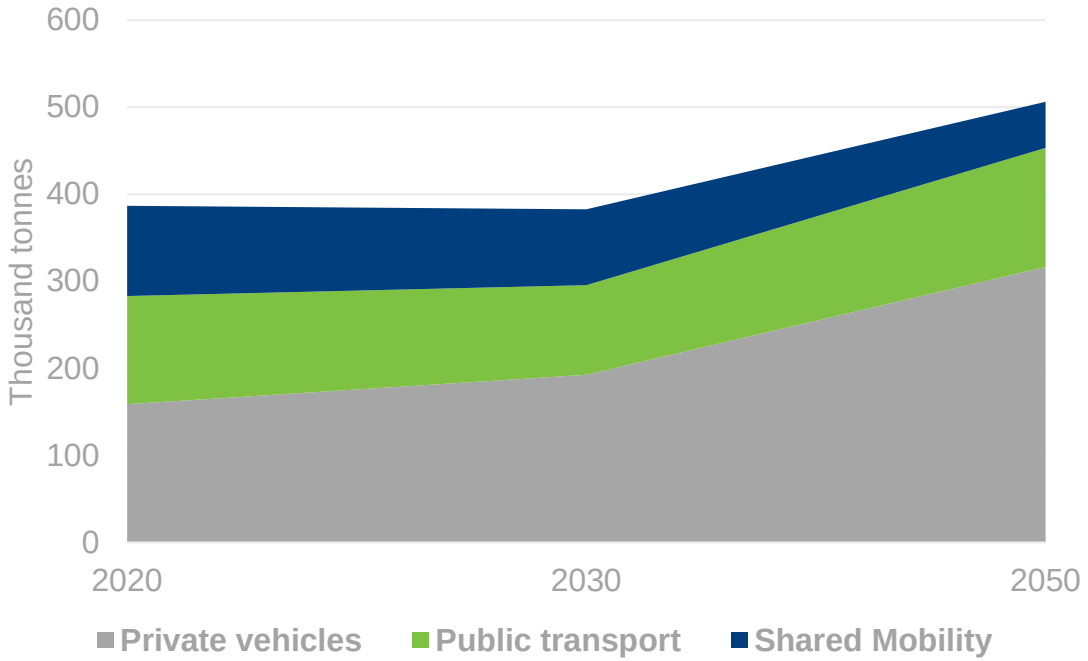
Climate Ambition scenario



- The Climate Ambition scenario effectively reverses tank-to-wheel CO_2 emissions, most noticeably from private vehicles.

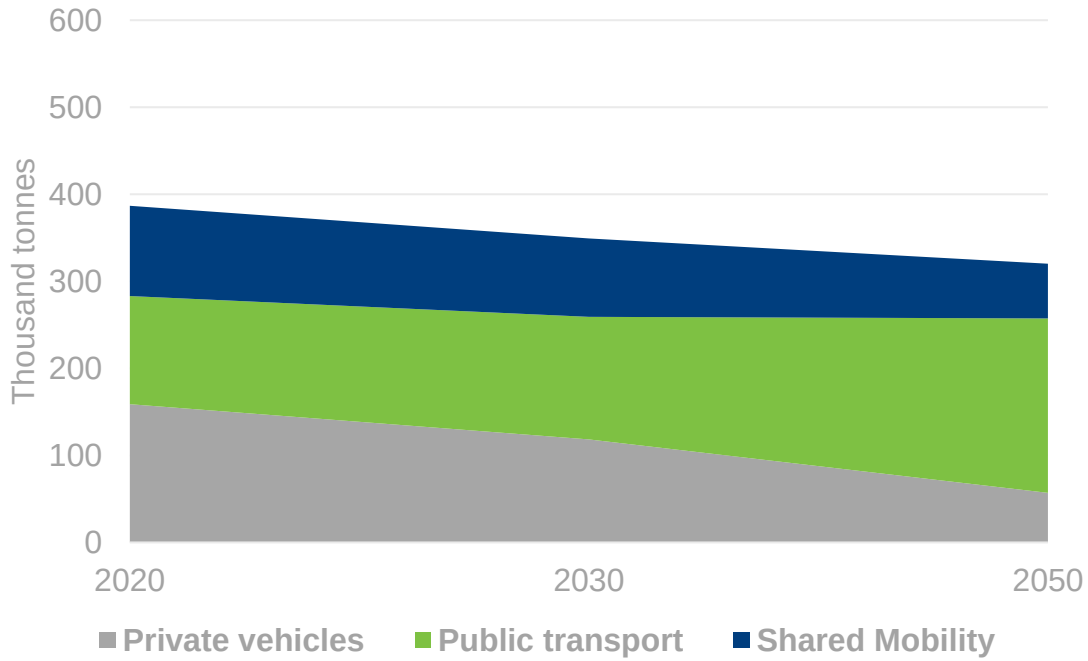
Well-to-tank CO_2 emissions

Current Policy scenario



- 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.

Climate Ambition scenario

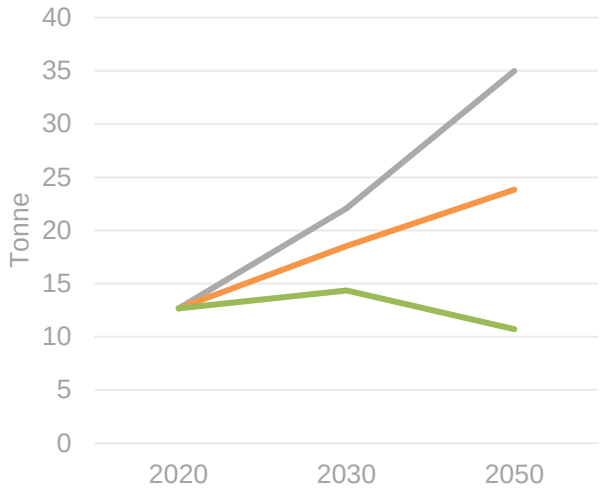


- The Climate Ambition scenario succeeds in reversing the trajectory of CO2 emissions. With greater reliance on public transport, a higher share of cleaner fuels and the greening of electricity sources are essential.

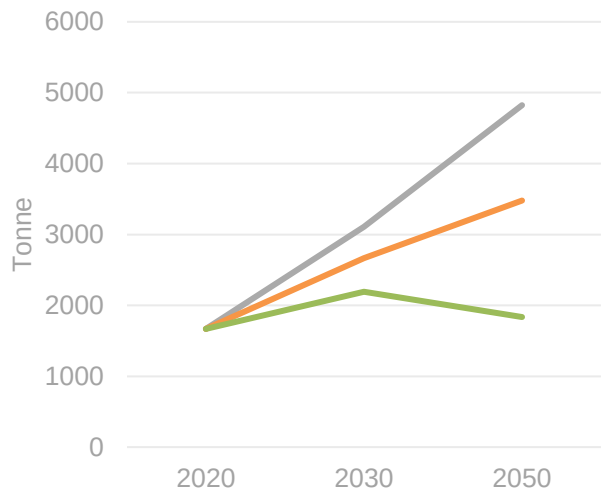
Air quality

Other emissions by scenario from 2020 to 2050

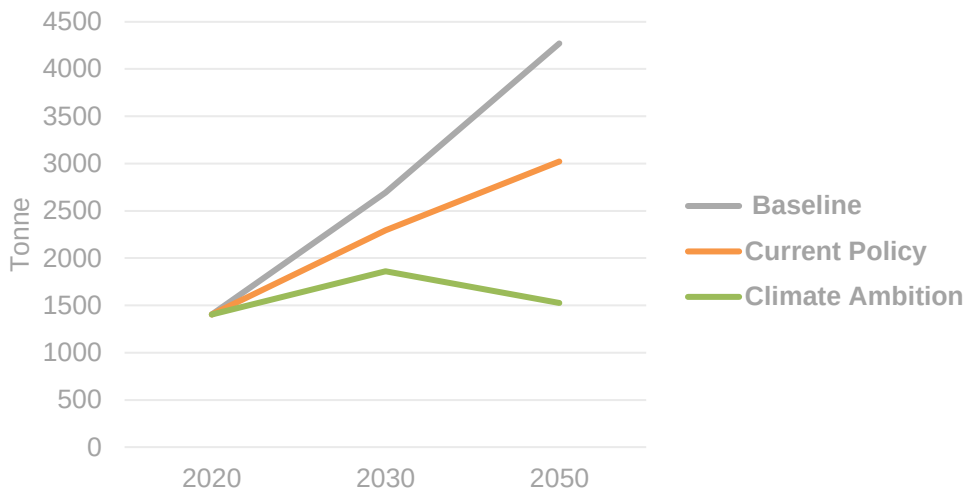
NO_x emissions



PM2.5 emissions



SO_4 emissions



Average annual PM2.5 concentration (µg/m³)

42.8

Tashkent, 2021

5

Limit fixed by the WHO

- **Transport decarbonisation brings co-benefits, helping Tashkent address the challenge of high concentrations of local pollutants.**

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Scenario Results

Impact per policy direction

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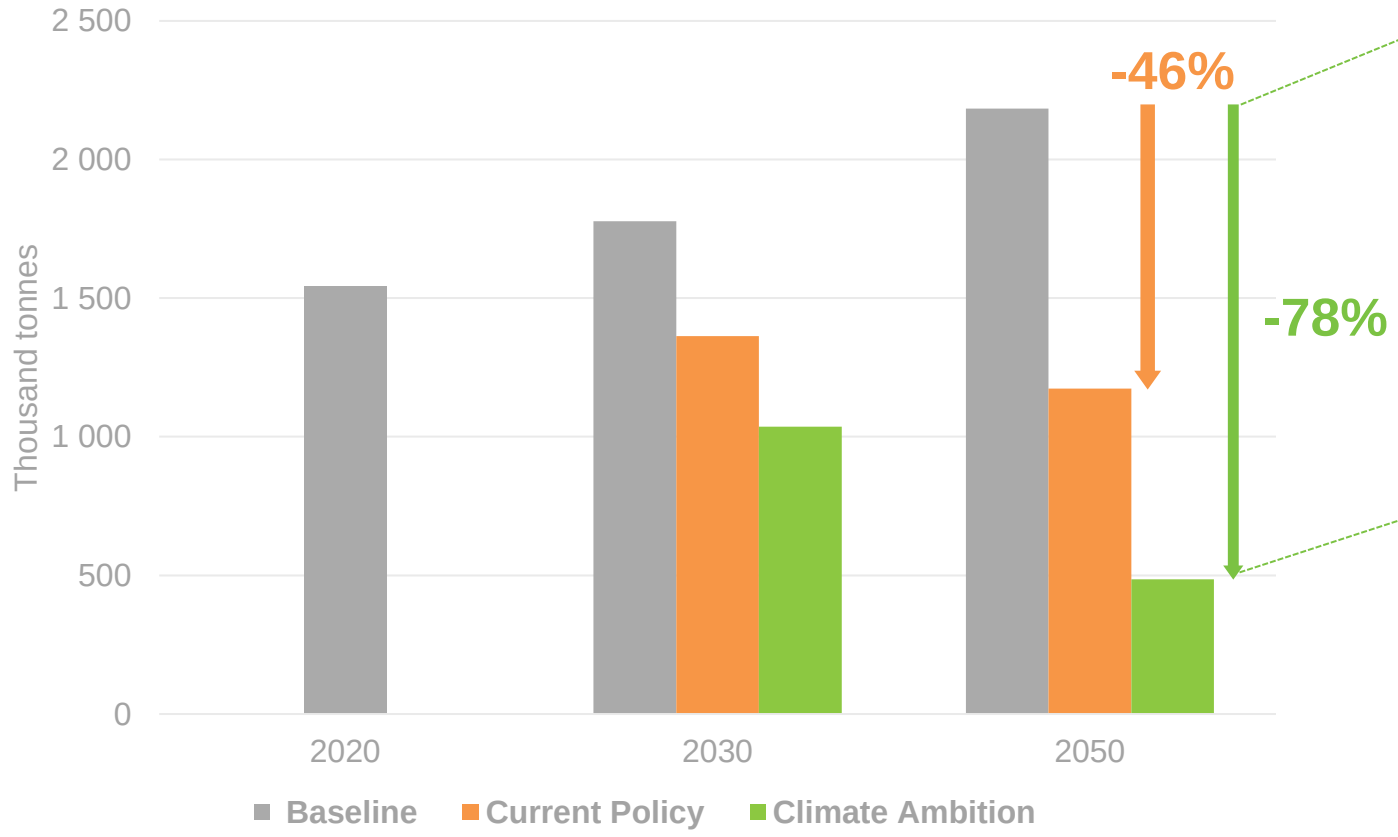
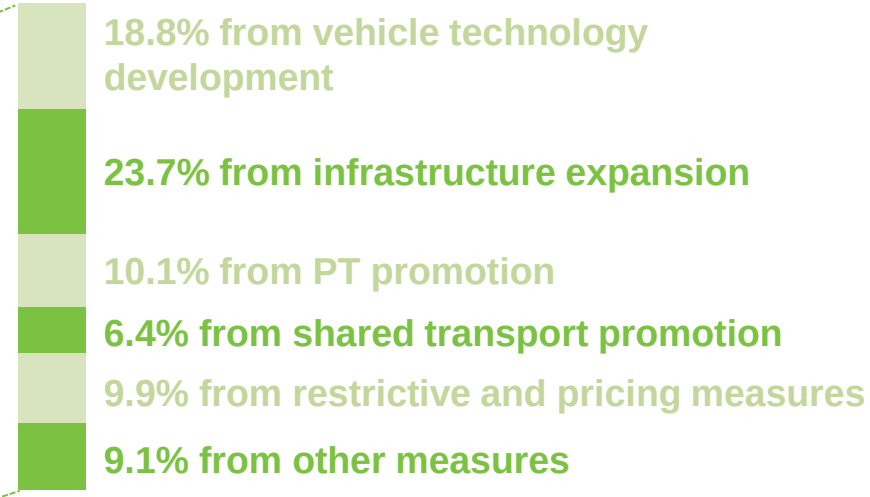
Breakdown by policy direction

Annual urban mobility CO_2 emissions until 2050 by scenario



Breakdown of CO2 reduction by policy direction



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

	By 2030	By 2050
Current Policy	-6%	-19%
Climate Ambition	-10%	-27%

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 CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	-12%	-22%
Climate Ambition	-17%	-34%

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 CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	-3%	-8%
Climate Ambition	-5%	-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 CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	-3%	-0.2%
Climate Ambition	-3%	-9%

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 CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	-0.2%	-4%
Climate Ambition	-0.5%	-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 CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	-1%	-2%
Climate Ambition	-2%	-9%

Other measures

Quantification

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

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

Impact

Reduction in transport-related CO_2 emissions attributed to the measures compared to Baseline in the same year

	By 2030	By 2050
Current Policy	0%	0%
Climate Ambition	-7%	-13%

Comparison and summary

	Vehicle Technology Development	Infrastructure Expansion	Public Transport Promotion	Shared Transport Promotion	Restrictive Measures	Pricing Measures	Other Measures
Current Policy*							
By 2030	-6%	-12%	-3%	-3%	-0.2%	-1%	0%
By 2050	-19%	-22%	-8%	-0.2%	-4%	-2%	0%
Climate Ambition*							
By 2030	-10%	-17%	-5%	-3%	-0.5%	-2%	-7%
By 2050	-27%	-34%	-15%	-9%	-5%	-9%	-13%

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 CO_2 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)

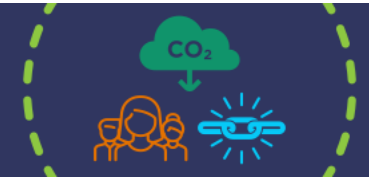
Increased use of active mobility and more walkable city

Decrease of PKM travelled by car

Healthier community

Increased safety

Reduced congestion



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Tashkent's Urban Mobility Model

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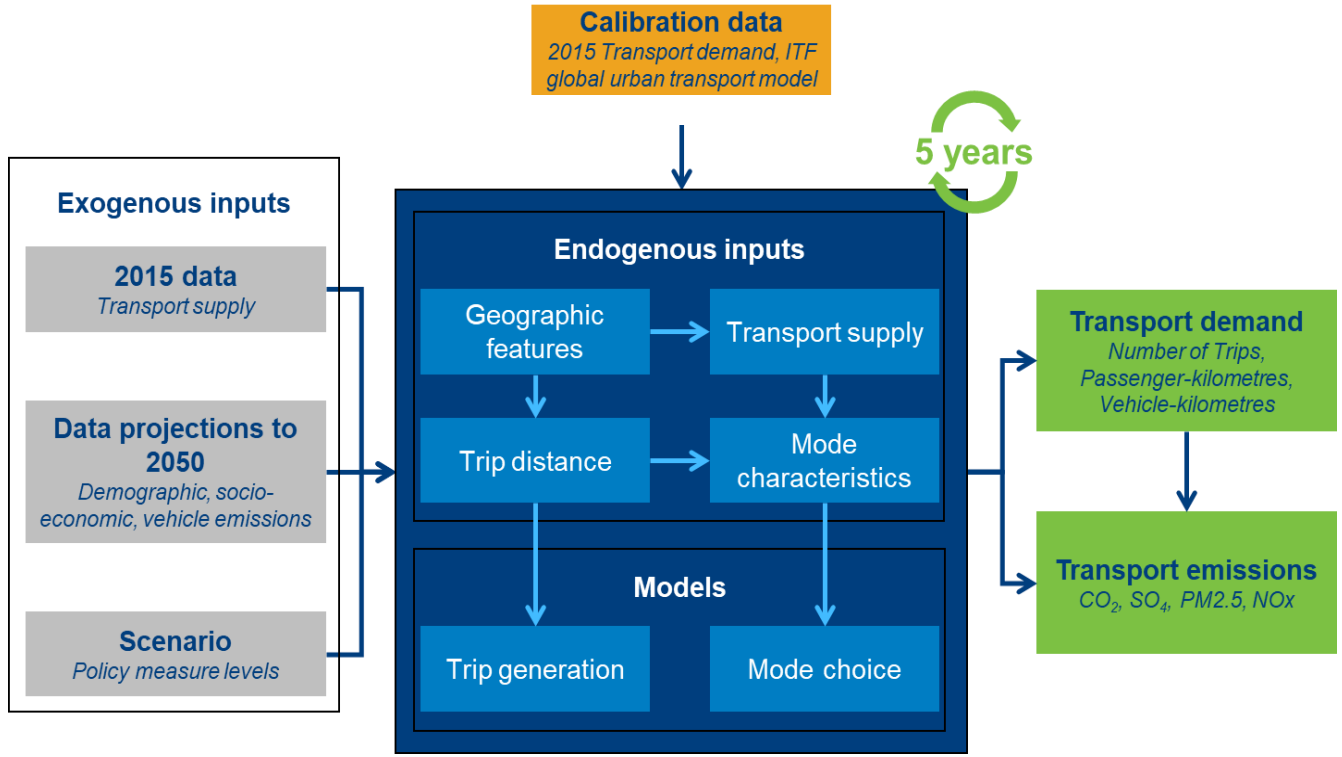
Introduction to the modelling tool

- 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**.

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Download Study Materials

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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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