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Study on the costs and benefits of the sustainable urban mobility transition in Europe

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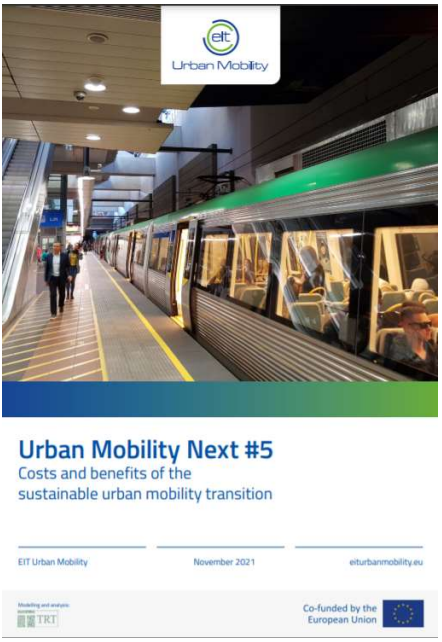
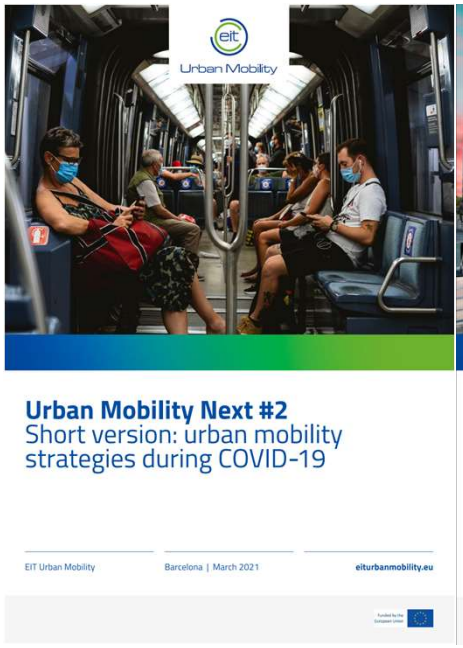
Future mobility foresight





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Transition study: research questions & scope

Research questions:

- How much will the transition to sustainable urban mobility cost to cities?
- What are its costs and benefits, including the monetization of all externalities?
- What range of costs can be identified according to city variables?
- What are the most cost-efficient measures to accelerate sustainable urban mobility?
- For different types of measures, what are the investments needed?

Scope: 779 EU cities with more than 50,000 inhabitants

Main takeaways of the study

€86bn extra investments needed compared to business-as-usual scenario by 2030, **€150bn** by 2050. These lead to net benefits of up to **€177bn by 2030, €698bn by 2050**

Each euro invested in the transition can generate up to **€3,06 by 2030, and up to €5,66 by 2050**

Meeting the 2030 Green Deal target requires **ambitious reduction of private motorised transport** on top of EV uptake

The most ambitious transition scenario (-44% in car ownership between 2019 and 2050) **reduces urban fatalities by 63% in 2050**

By 2030 ***Pricing Schemes*** are the most effective measures in small and medium cities, while ***Innovative Services*** is the better choice for large cities

By 2050**,** ***Innovative Services*** and ***Shared Mobility and Demand Management*** are the most profitable groups in medium and large cities.

Urban Mobility Next #5

Costs and benefits of the sustainable urban mobility transition

EIT Urban Mobility | November 2021 | eiturbanmobility.eu

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https://www.eiturbanmobility.eu/costs-and-benefits-of-the-sustainable-urban-mobility-transition-in-europe/

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How is our study relevant for cities?

- Transition pathways to zero-emission mobility in cities
- Cost-benefit analysis of different urban mobility measures
- Leverage for more investments in sustainable urban mobility
- Differentiated outputs by city size and geographic area

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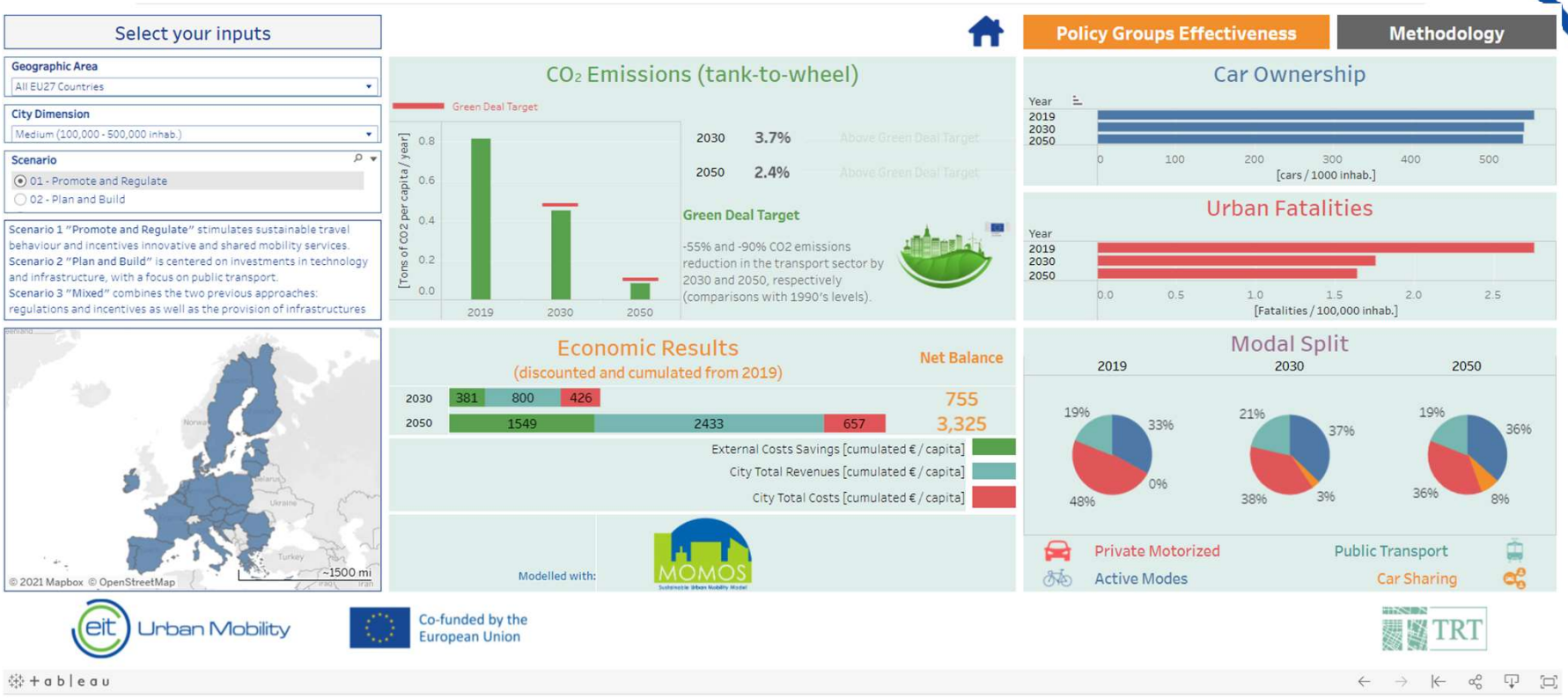
Explore the results with our interactive tool

https://public.tableau.com/views/CostsandBenefitsoftheUrbanMobilityTransitioninEurope/HOME?:language=en-US&:display_count=n&:origin=viz_share_link



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Study methodology and results

Methodology – City prototypes

Three scenarios have been applied to **12 City Prototypes**, to take into account differences among cities in their dimension and geographic area

The model's output (indicators) have been **generalized at the EU27 level** (779 cities)

Characteristics and transport parameters of each City Prototype have been defined using 30 **reference cities**:

	Southern Europe	**Central Europe**	**Northern Europe**	**Eastern Europe**
Small City	Alessandria (IT) Faro (PT) Zadar (HR)	Klagenfurt (AT) La Rochelle (FR) Leuven (BE)	Galway (IR) Lahti (FI)	Daugavpils (LV) Tartu (EE) Zilina (SK)
Medium City	Perugia (IT) Ljubljana (SI)	Bielefeld (DE) Eindhoven (NL)	Uppsala (SE) Oulu (FI)	Gdynia (PL) Klaipeda (LT) Szeged (HU) Timisoara (RO)
Large City	Athens (EL) Barcelona (ES)	Bordeaux (FR) Munich (DE)	Copenhagen (DK) Dublin (IR) Göteborg (SE)	Prague (CZ) Sofia (BG)

Methodology – City Input data

40+ variables collected from the 30 reference cities (direct or estimation)

Group	Input data	Description	Sources
	Average Income	Average income of the city population	National Statistics Database, EUROSTAT
	Economy	Economy city type, representing the relevance of industrial sector for the city in terms of employees working in manufacturing, construction and public utilities	European Commission Report[11]
Urban Mobility Characteristics	**Motorization Rate**	Number of private cars per capita	ACEA Report on Vehicles in use[12]
	Motorization Rate Change	Annual growth of the motorization rate	ACEA Report on Vehicles in use
	Modal Split	Modal split with respect to the urban area only (walk, bike, car, motorbike, bus, tram, metro)	TEMS - The EPOMM modal split tool[13], JRC mobility survey 2018
	Modal Split Change	Modal split trend over time in absence of policy activation	Assumption of business-as-usual trend
	Congestion Level	Qualitative description of road congestion in the city (significant, only during rush hour, negligible)	TOM TOM index, Google Maps Traffic Layer
	Incoming Trips	Share of incoming trips in the urban area, with respect to the total amount of trips within the area	Assumptions based on available city planning documents
	Modal Split of the Incoming Trips	Modal Split of the incoming trips into the urban area (private car, bus, train)	Assumptions based on available city planning documents
	Freight Vehicles Rate	Share of freight vehicles with respect to the total vehicles (freight and cars) travelling in the urban area	Assumptions based on selected traffic counts and available city planning documents
	Freight Vehicles Rate Change	Annual change in the share of freight vehicles with respect to total vehicles travelling in the area	Assumptions based on selected traffic counts in a business-as-usual configuration
Public Transport Characteristics	**Ticket price**	Ticket price for monthly passes and single tickets	Public Transport Operators Reports and Official Websites

Group	Input data	Description	Sources
Urban Characteristics	**Population**	Population of the city	National Statistics Database
	Population Structure	Age distribution of the city population	National Statistics Database
	Population Growth	Expected trend of the population growth	European Commission, JRC projections[10]
	Population Distribution	Population distribution between city centre and outskirts	National Statistics Database
	Urban Growth	Population shifts between city centre and outskirts	National Statistics Database, EUROSTAT

Group	Input data	Description	Sources
	Cost	Implementation and management costs for public transport operators	Public Transport Operators Reports
	Network	Length of the network	Public Transport Operators Reports
	Average Speed	Average speed of the vehicles	Public Transport Operators Reports
	Transport Service Offer	Annual vehicle-kilometre	Public Transport Operators Reports
	Bus Vehicle Fleet	Composition of the fleet, with respect to the fuel type	ACEA Report on Vehicles in use
Park & Ride	**Parking Capacity**	Number of parking lots	Public Transport Operators Reports
	Network Extension	Length of the public transport routes connected with P&R park	
	Public Transport Frequency	Frequency of Park & Ride connection service	
	Tariff	Tariff for single use or subscription related to parking only (the cost of using PT not considered)	
Infrastructure and Traffic Management	**Paid Parking**	Number of paid parking lots in the urban area	City Annual Reports
	Parking Price	Average hourly parking price	Public Transport Operators
	Public Transport Reserved Lane	Length of the public transport reserved lanes	Public Transport Operators
	Bike Lane	Length of the bike lanes in the urban area	City Annual Reports
	Electric Charging Stations	Number of electric charging stations	City Annual Reports
	Hydrogen Charging Station	Number of hydrogen filling stations	City Annual Reports
Car Sharing	**Subscribers**	Number of subscribers	Carsharing Providers Official Websites
	Type	Station Based or Free-Floating service	
	Tariff	Fixed and hourly average tariff	
	Vehicle Fleet	Number of car sharing vehicles	
Bike Sharing	**Vehicle Fleet**	Number of bicycles of the bike Sharing service	Bike Sharing Providers Official Websites
	Electric Fleet	Share of electric bicycles in the fleet	
	Tariff	Fixed and hourly average tariff	
Vehicle Access Regulation	**Limited Traffic Zone**	Qualitative quantification of the share of urban area under Limited Traffic Zone	urbanaccessregulations.eu, City Annual Reports
	Pedestrian Areas	Qualitative quantification of the share of urban area with pedestrian areas	
Traffic Calming Measures	**Traffic Calming Area**	Share of the urban area under 30 km/h speed limit	City Annual Reports
Road vehicle fleet composition	**Vehicle fleet**	Vehicle fleet composition by fuel type and emission standard (for conventional fuels) for private cars, car sharing cars, Light Duty Vehicles and Heavy Goods Vehicles. It is	ACEA Report on Vehicles in use, National Statistics Database

Methodology – Policy measures in the model

29 policy measures, belonging to 6 policy groups, have been implemented within the study:

Policy Group	Policy Measure
Shared Mobility and Demand Management	Sustainable travel information and promotion (behaviour)
	Mobility as a Service (MaaS)
	Bike sharing
	Micro mobility
	Carsharing
	Delivery and servicing plan
	Teleworking
Innovative Services	Autonomous vehicles
	Demand-responsive transport (DRT)
	Intelligent Transport Systems (ITS)
Green Public Transport and Logistics Fleets & Charging Infrastructure	Electric energy refuelling infrastructure
	Hydrogen energy refuelling infrastructure
	Green public fleet
	Green logistics fleet
Pricing Schemes	Congestion and pollution charging
	Parking pricing
	Public transport integrated ticketing and tariff schemes

Policy Group	Policy Measure
Transport Infrastructure	Bus network and facilities
	Tram network and facilities
	Walking and cycling networks and facilities
	Park and ride (multimodal mobility hubs)
	Metro network facilities and light rail
	Urban Delivery Centres and city logistics facilities
Traffic management and control	Legal and regulatory framework of urban freight transport
	Legal and regulatory framework of new mobility services
	Prioritizing Public Transport
	Access regulation and road and parking space reallocation
	Traffic calming measures
	Pedestrian Areas

Methodology – Policy scenarios/pathways

Pathway 1

Promote & Regulate

- More sustainable travel **behaviour** through information, regulations, and promotion
- **Incentivization** of innovative and shared mobility services
- **Short/medium** term

Pathway 2

Plan & Build

- Focused on **investments** in technology and infrastructure
- Change of the **urban environment**, with focus on public transport.
- **Long** term and more ambitious strategy

Pathway 3

Mixed

- **Mix** between the two previous approaches
- Regulations and **behavioural** incentives as well as the provision of **infrastructures** and services
- **Medium** term

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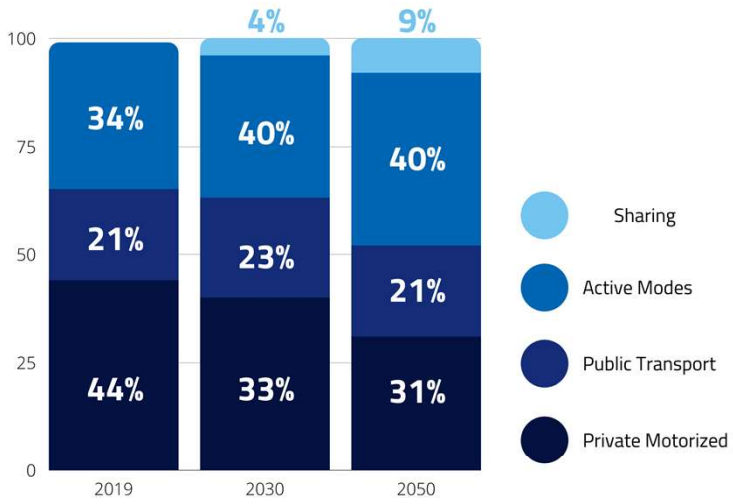
Methodology – Policy measures and pathways

Annex 1: List of policy measures associated to each scenario

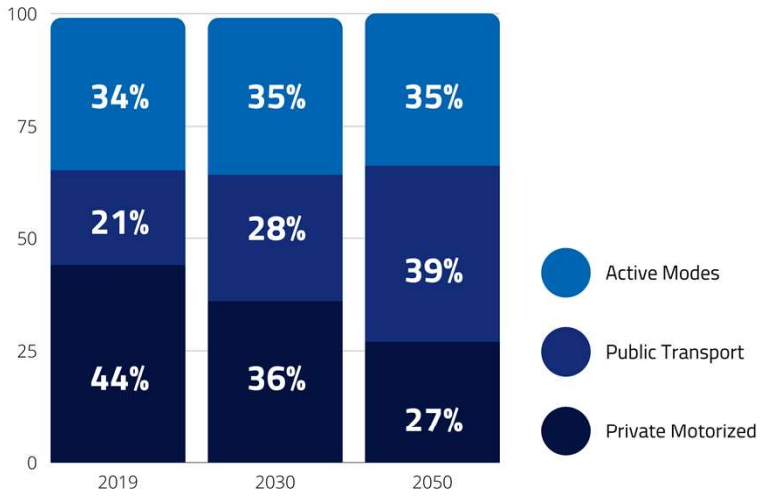
Policy Group	Policy Measure	S01: Promote and Regulate	S02: Plan and Build	S03: Mixed
Shared Mobility and Demand Management	Sustainable travel information and promotion (behaviour)	X		X
	Mobility as a Service (MaaS)	X		X
	Bike sharing	X		X
	Micro mobility	X		X
	Carsharing	X		X
	Delivery and servicing plan	X		X
	Teleworking	X		X
Innovative Services	Autonomous vehicles		X	X
	Demand-responsive transport (DRT)		X	X
	Intelligent Transport Systems (ITS)		X	X
Green Public Transport and Logistics Fleets & Charging Infrastructure	Electric energy refuelling infrastructure	X	X	X
	Hydrogen energy refuelling infrastructure	X	X	X
	Green public fleet	X	X	X
	Green logistics fleet	X	X	X
Pricing Schemes	Congestion and pollution charging	X		X
	Parking pricing	X		X
	Public transport integrated ticketing and tariff schemes	X		X
Transport Infrastructure	Bus network and facilities		X	X
	Tram network and facilities		X	
	Walking and cycling networks and facilities		X	X
	Park and ride (multimodal mobility hubs)		X	X
	Metro network facilities and light rail		X	
	Urban Delivery Centres and city logistics facilities		X	X
Traffic management and control	Legal and regulatory framework of urban freight transport	X		X
	Legal and regulatory framework of new mobility services	X		X
	Prioritizing Public Transport		X	
	Access regulation and street space reallocation	X		X
	Traffic calming measures	X		X
	Pedestrian Areas	X		X

Results - EU27 Context – Aggregated Modal Split

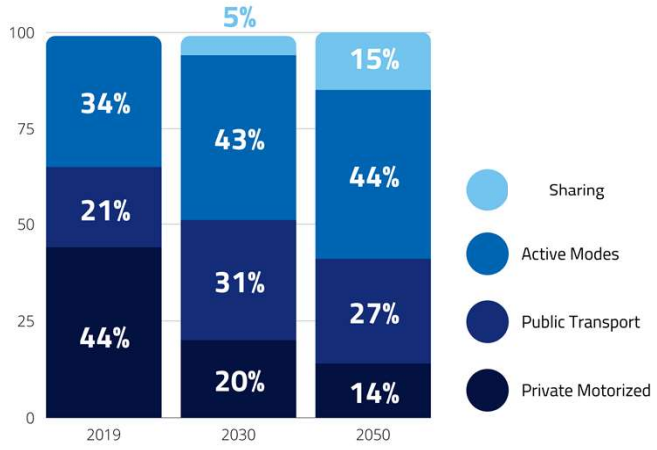
Modal Split: Promote and Regulate (S01)



Modal Split: Plan and Build (S02)



Modal Split: Mixed (S03)



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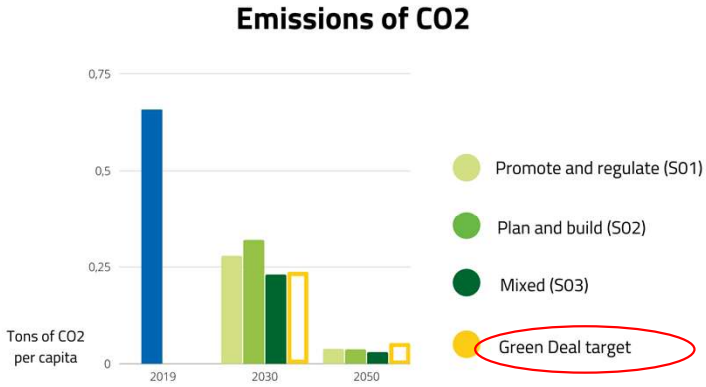
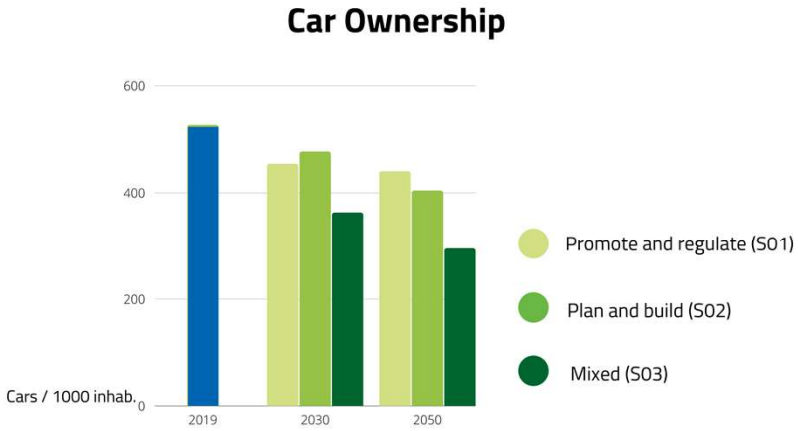
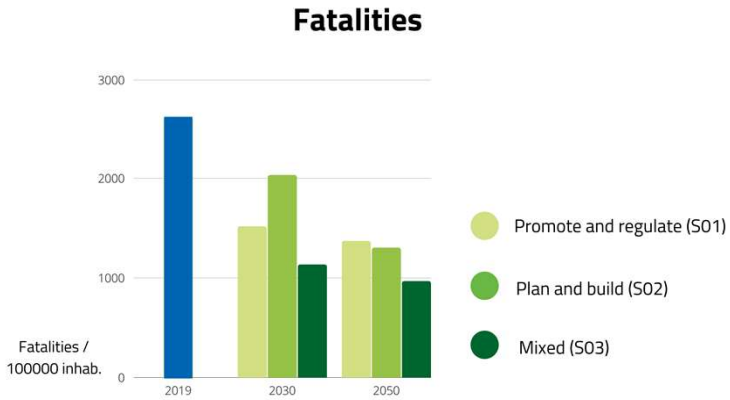
Results - EU27 Context – Car ownership, Fatalities, CO_2 Emissions







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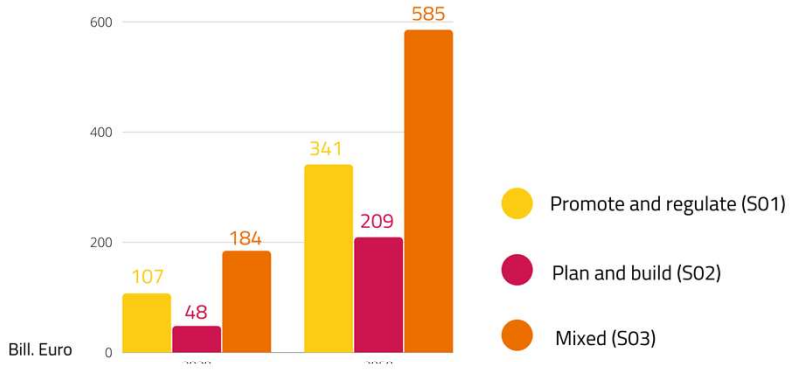
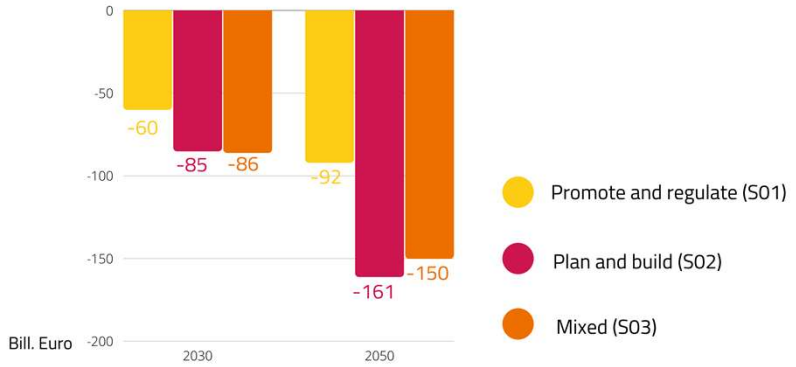
Results - EU27 Context – Economic Outputs

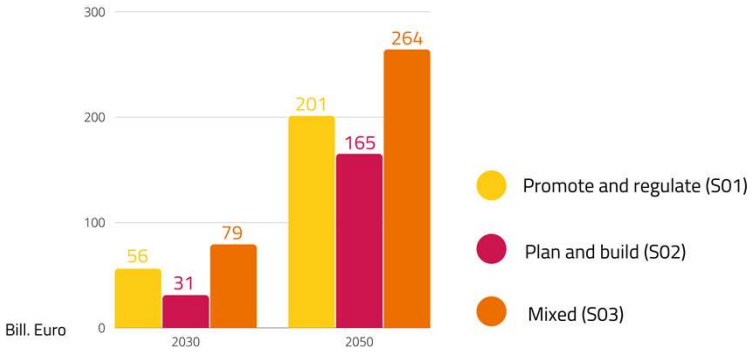
City Total Revenues (discounted, cumulated from 2019)



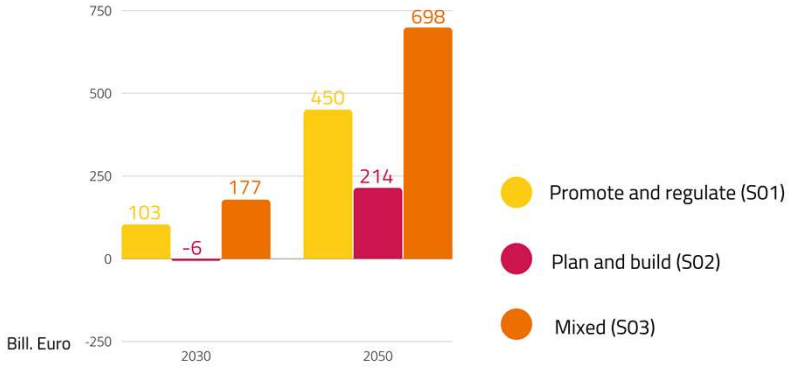
City Total Costs (discounted, cumulated from 2019)



City Total Savings (discounted, cumulated from 2019)

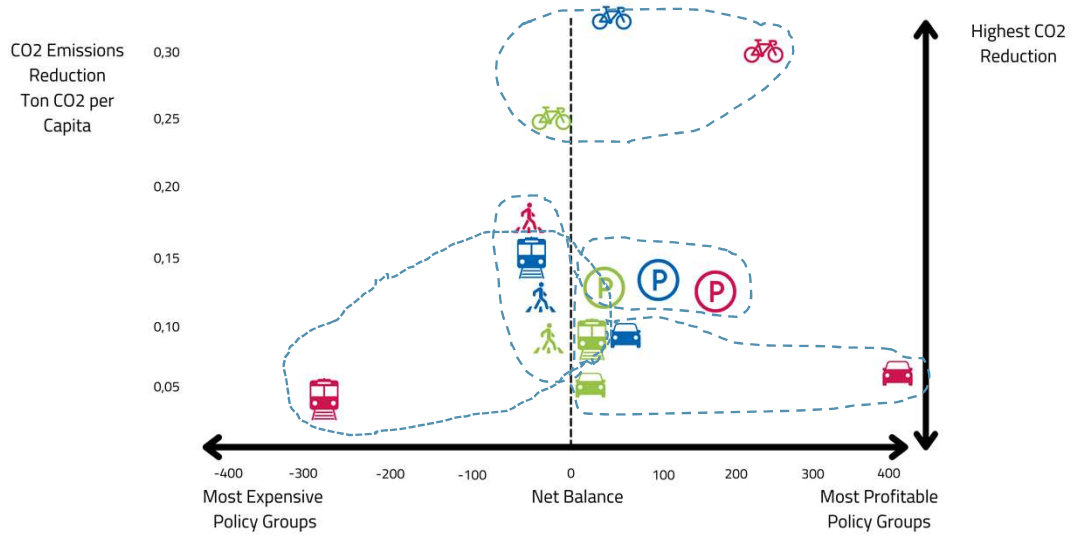


Net Balance (discounted, cumulated from 2019)

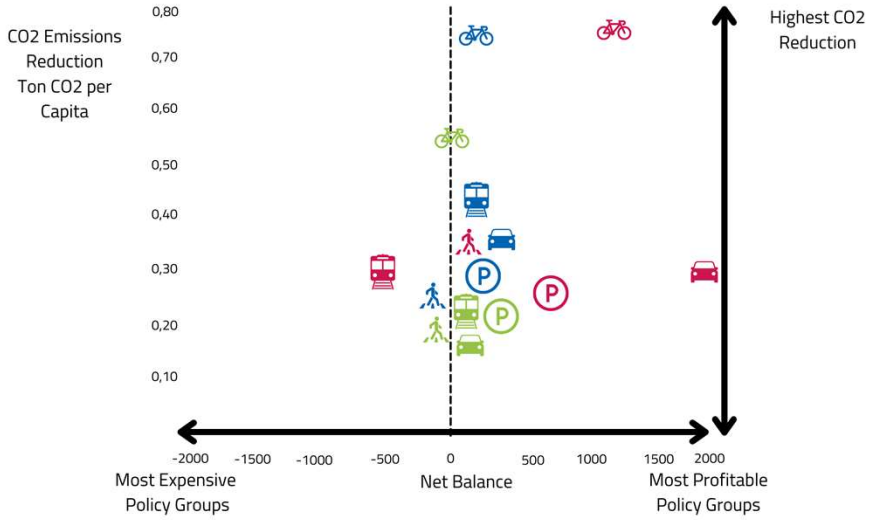


Results - Policy Measures Effectiveness

Policy Groups Effectiveness - 2030



Policy Groups Effectiveness - 2050



Shared Mobility and Demand Management
Pricing Schemes
Traffic Management and Control
Innovative Services
Transport Infrastructures
Small Cities
Medium Cities
Large Cities

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Thank you!

For more information, please contact:

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