CIrClE 2019

Challenges for the Islands in the era of the Circular Economy

A Tool for Environmental Assessment of Traffic Mitigation Actions for High Congested Roads in Mediterranean Urban Areas as in REMEDIO Project

Dr. Anastasia Poupkou

Aristotle University of Thessaloniki

Under the auspices of

ENV MOVE

SMile 2019

6th Sustainable Mobility & Intelligent Transport conference

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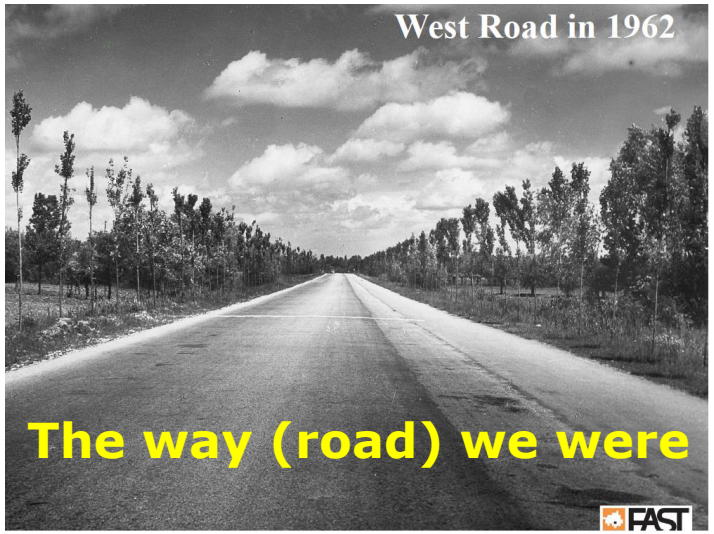
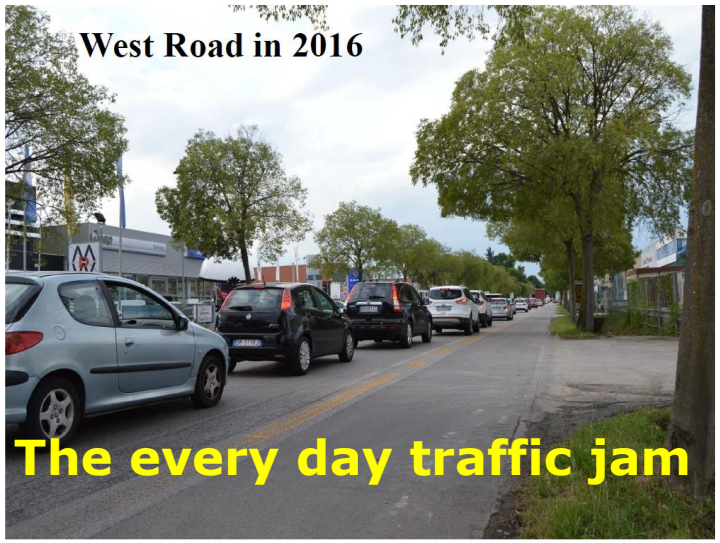
Challenges of REMEDIO





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REMEDIO's Approach in Addressing the Challenges

Soft actions on Low Carbon Mobility Solutions

- SUMPs
- Small scale Investments

Integrated Modelling Tool

- Energy transport efficiency, Noise impact, Air pollutant emissions & Carbon footprint, Air dispersion, Freight streamlining, Cost & Health effects
- Present and Future Scenarios

Horizontal Condominium

- Participatory Governance
- Local Agreements Protocols MoUs

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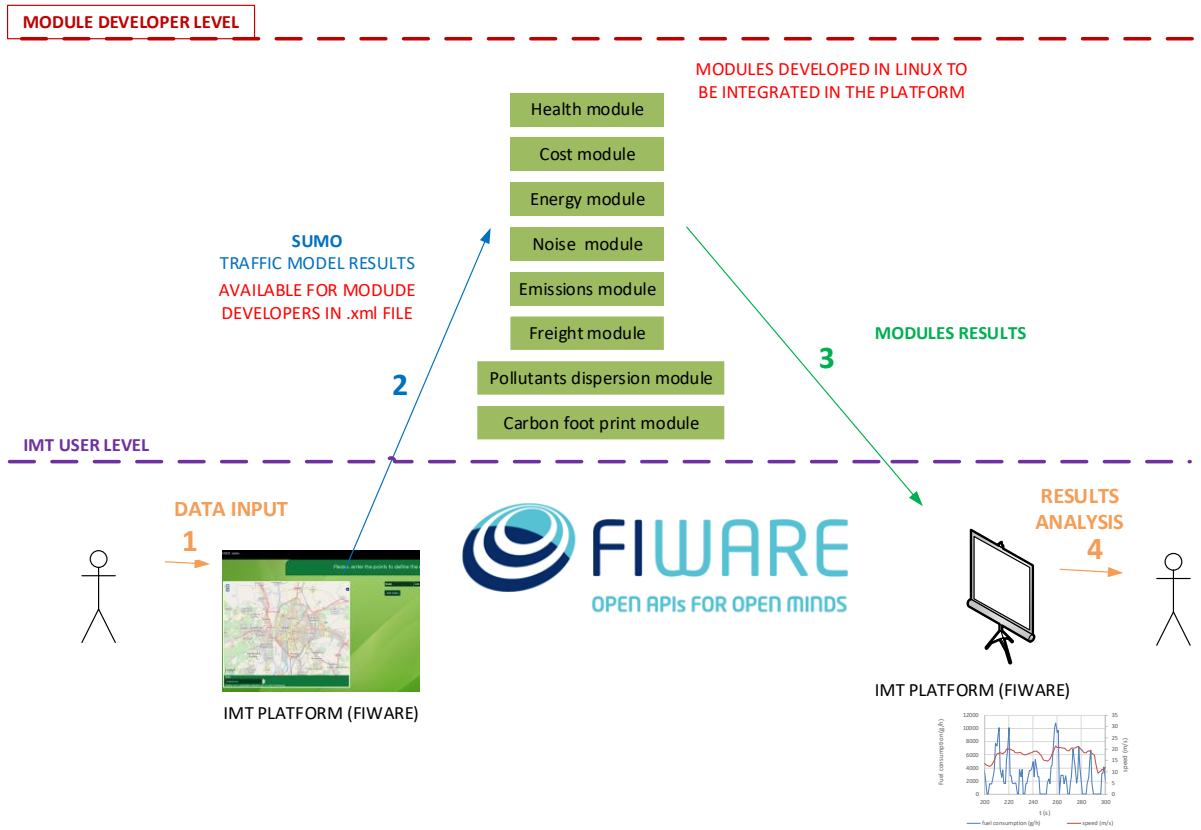
Integrated Modelling Tool (IMT)

- ✓ **Customized modelling tool to evaluate at local street level the environmental-related performance of low-carbon mobility actions.**

- ✓ **Includes modules for estimation of traffic-related:**

  - Pollutant emissions
  - Carbon footprint
  - Atmospheric dispersion
  - Energy consumption
  - Noise
  - Health events and related Costs.

Access through the link http://130.206.115.232:3001/



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IMT Modules

✓Traffic Simulation → SUMO – Simulation of Urban MObility

✓Pollutant Emissions Module
✓Carbon Footprint Module
✓Energy Consumption Module → PHEM LIGHT
Passenger car and Heavy duty Emission Model

✓Air Dispersion Module → VADIS Model

VADIS Model
- Wind Flow Module FLOW
- Dispersion Module DISPER

Pollutants Concentrations

✓Traffic Noise Module → SUMO → CNOSSOS-EU Methodology

✓Health / Cost Module (Statistical Modelling)

Conceptual Modelling Approach

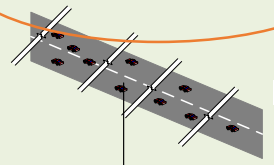
REMEDIO IMT

FIWARE PLATFORM

STEP 1: ZONE DEFINITION

Road data requirements
- Road Definition
- number of trams
- especial lanes
- gradient
- curvature
- Building/spaces indentification

STEP 2: TRAFFIC DEFINITION



For each tram

Traffic data requirements
- Vehicle technologies (fleet)
- Traffic flow characterization
- vehicle loading

STEP 3: MODEL SIMULATION

MODEL IN "C"

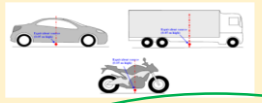
ENERGY AND NOISE TOOLS | FREIGHT TOOL | AIR QUALITY TOOL | COST AND HEALTH TOOL

Calling SUMO+PHEMlight

Models

Energy model

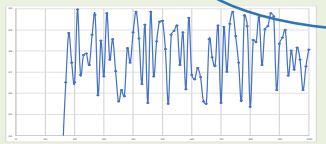
Noise model CNOSSOS-EU



$$P_e = (P_{roll} + P_{air} + P_a + P_{grd})/\eta + P_{aux}$$

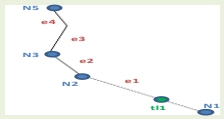
$$P_{air} = C_W \times A_{cross} \times \frac{\rho}{2} \times v^3$$

FIWARE PLATFORM | STEP 4: ANALYSYS OF RESULTS

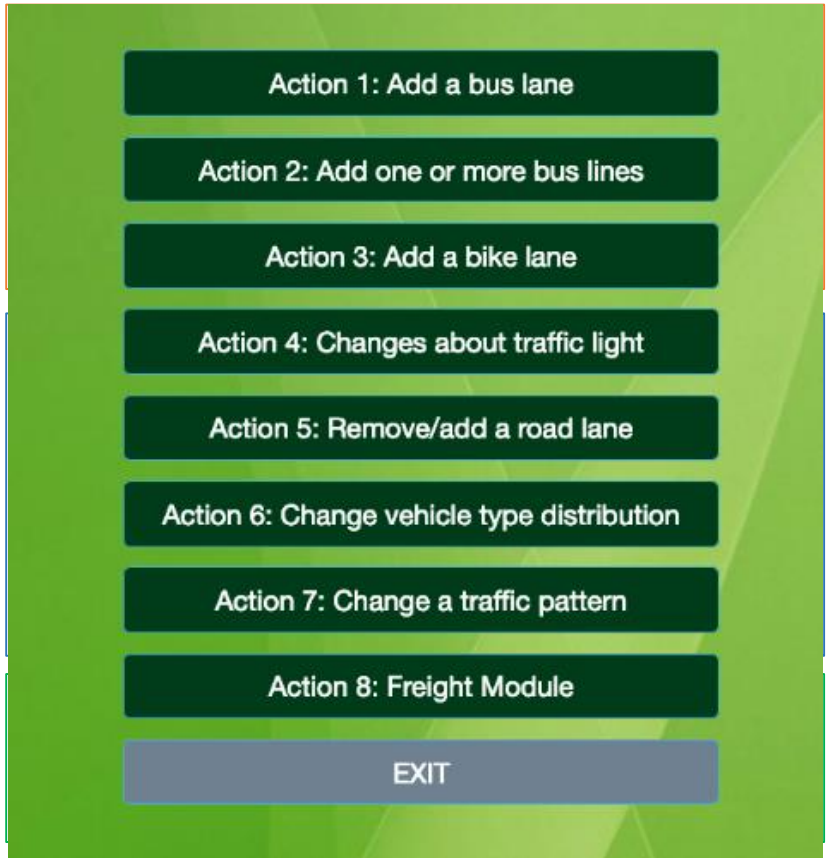


- Total fleet fuel consumption
- Consumption by vehicle type
-Consumption in public transport
- Total CO2 emissions traffic
- Houses exposed to Lden>65db
´-Sensible sites exposed to Lden>65 db.

STEP 5: MODIFICATIONS



-Include one traffic light in the position X
-Increase the bus frequency
-Change tram to pedestrian
-Include bicycle lane
...



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The Case of Thessaloniki: Eastern Horizontal Axis of the City

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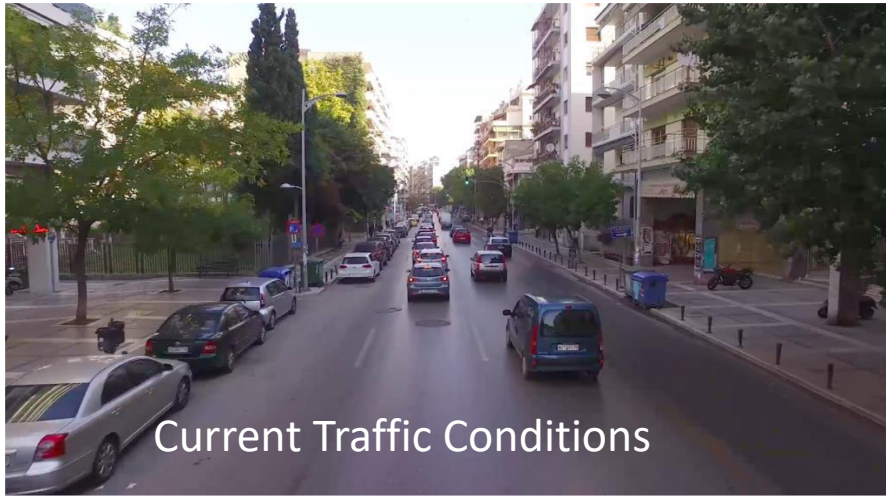
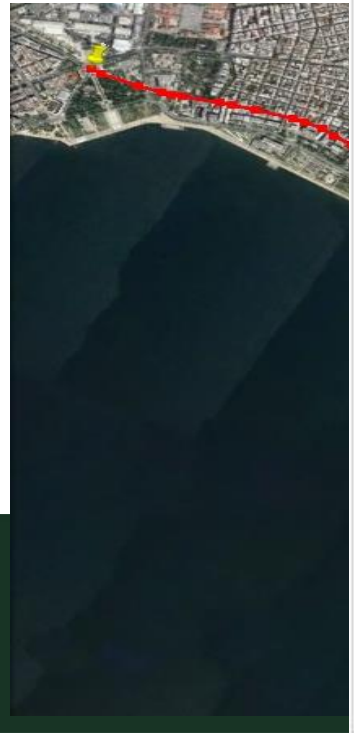
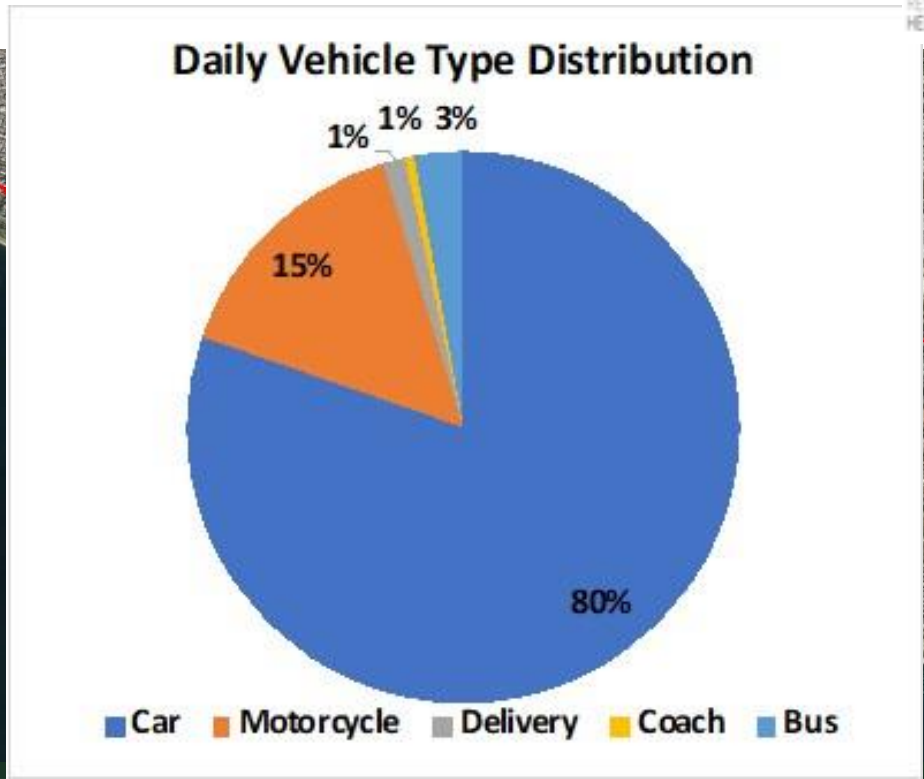
Eastern Horizontal Axis of Thessaloniki

- ✓ **Important road axis** connecting the SE parts of the city with the city center.
- ✓ Mixed-uses road axis with **enhanced commercial activity**.
- ✓ **Dense residential area**.
- ✓ Historical importance with various **historical monuments and point of interest for tourists**.







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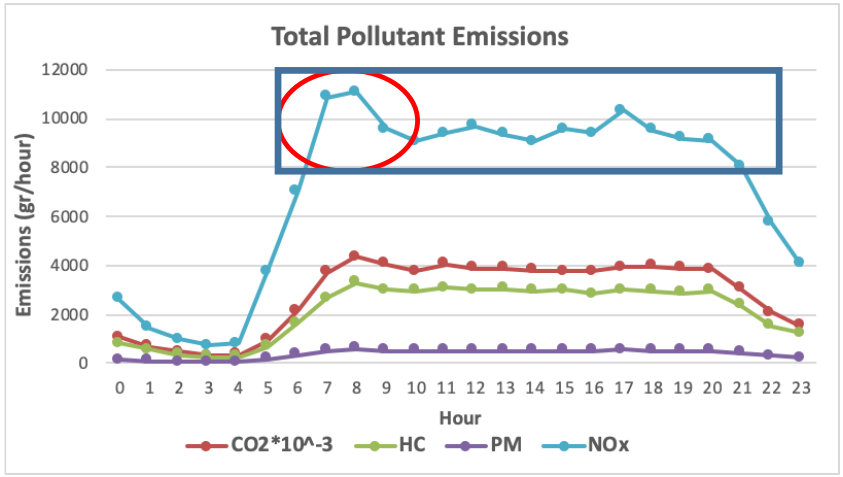
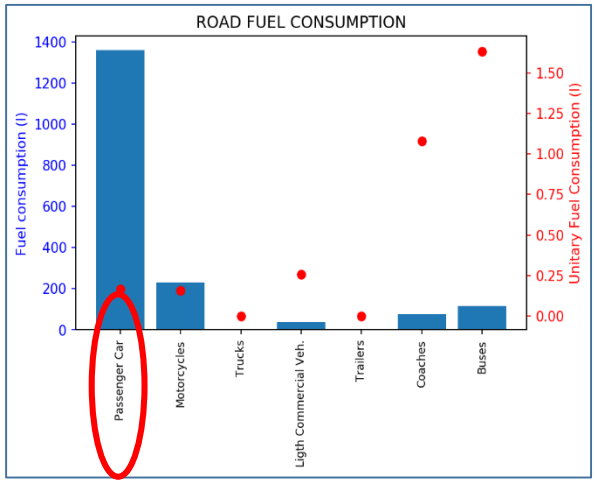
CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
HELLENIC INSTITUTE OF TRANSPORT CERTH / HIT

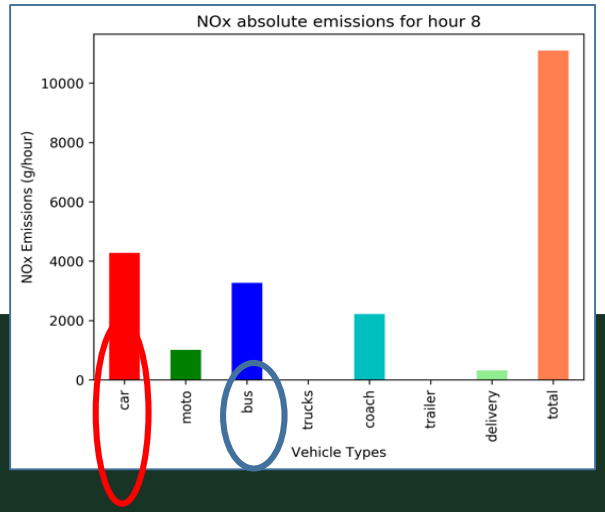
IMT Environmental Simulations: Current Traffic Conditions

When? Which Chemical Species?

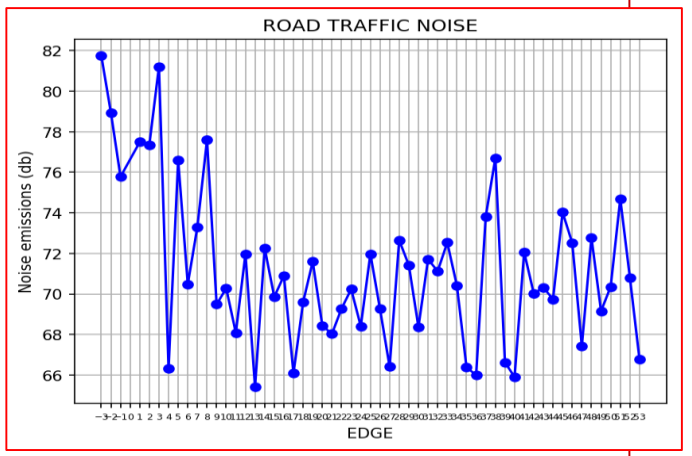


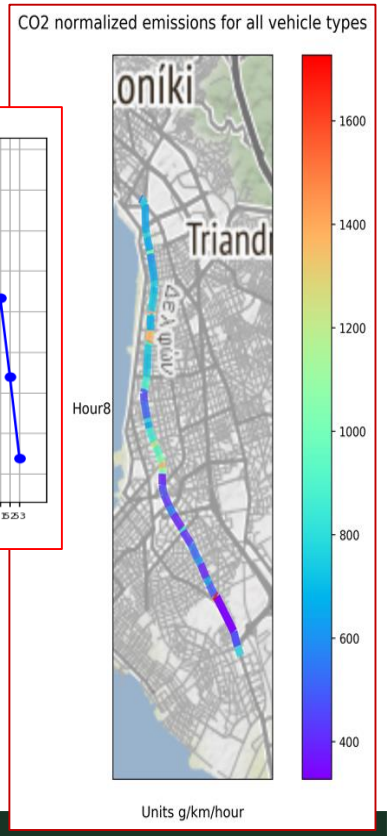
Which Type of Vehicles?





Where?





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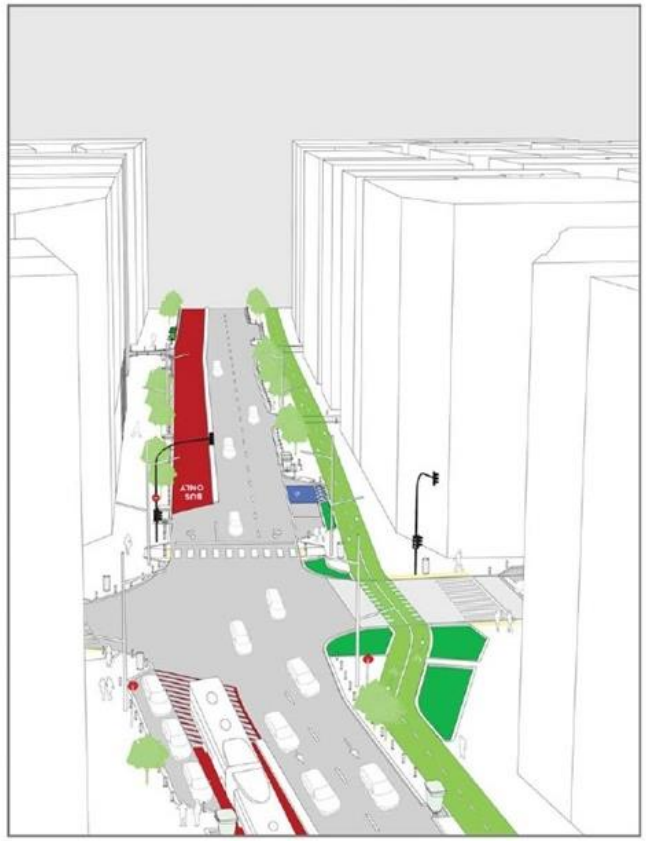
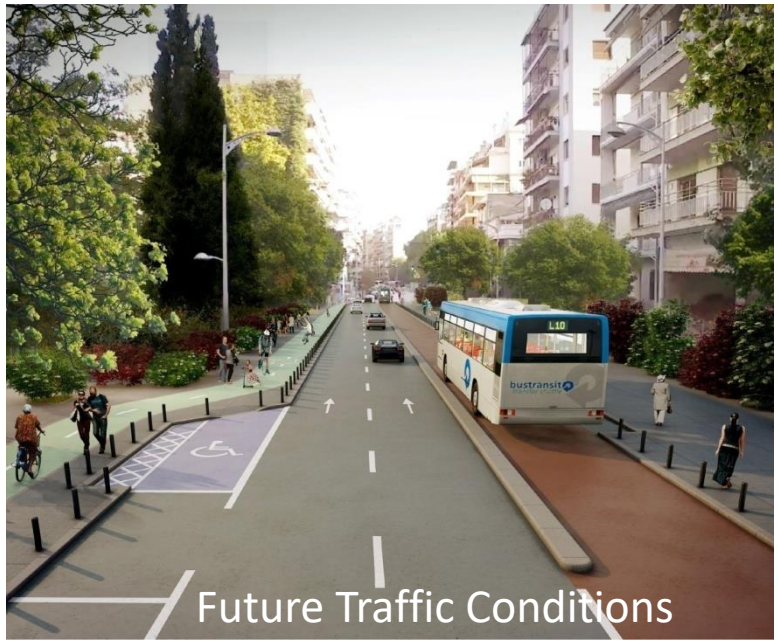
Road Redesign for Improved Urban Mobility





1st Traffic Scenario (SCN10)

- ✓ **10% Reduction of passenger cars and motorcycles traffic load.**

2nd Traffic Scenario (SCN20)

- ✓ **20% Reduction of passenger cars and motorcycles traffic load**

and

- ✓ **Increase by 2 of public buses circulation frequency.**

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Environmental Impacts of Traffic Scenarios

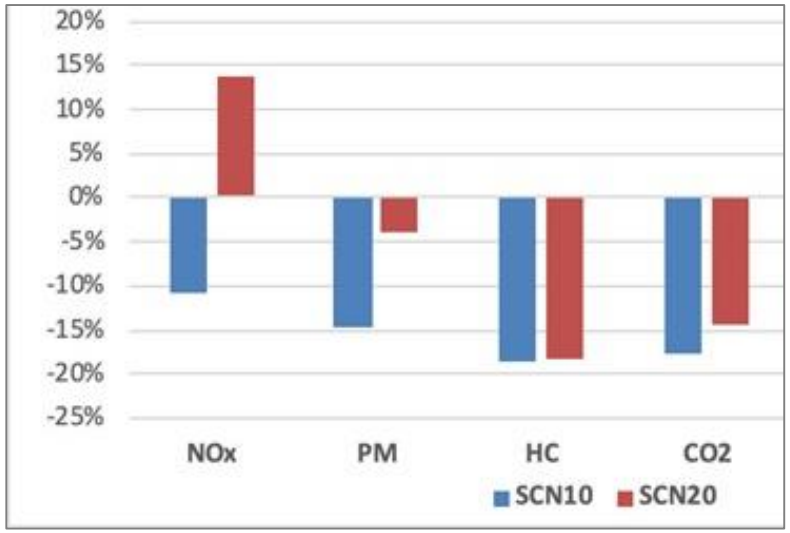
✓ **Differences (%) in values between the future traffic scenarios (SN10, SCN20) and the current traffic conditions (Base Case).**

Fuel Consumption

SCN10 → **-18%**

SCN20 → **-16%**

Pollutant Emissions – Carbon Footprint



Traffic Noise

SCN10 → **-0.5%** (max -2.8%)

SCN20 → **-1%** (max -3.4%)

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Conclusions

- ✓ **REMEDIO IMT = Sound, Customizable, Transferable Tool** to evaluate the environmental-related performance of low-carbon mobility actions.

- ✓ **Technical Developments** can be more useful when **Scientific Knowledge** is associated with **Participatory Governance**:
  - Citizens, Users,
  - Experts,
  - Stakeholders,
  - Organizations, Local authorities, Policy Makers.

Collective Intelligence

Thank you for your attention

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/remediomed

remedio.interreg-med.eu/

remedio-med@ctn.tecnico.ulisboa.pt

Ricardo Chacartegu
Email: ricardoch@us.es

Anastasia Poupkou
Email: poupkou@auth.gr

Francesca Liguori
Email: francesca.liguori@arpa.veneto.it

Susana Marta Almeida
Email: smarta@ctn.ist.utl.pt

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