Future Mobility Lab

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Shaping Environmental-Friendly Mobility Policies using State-of-the-Art Tools

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Outline

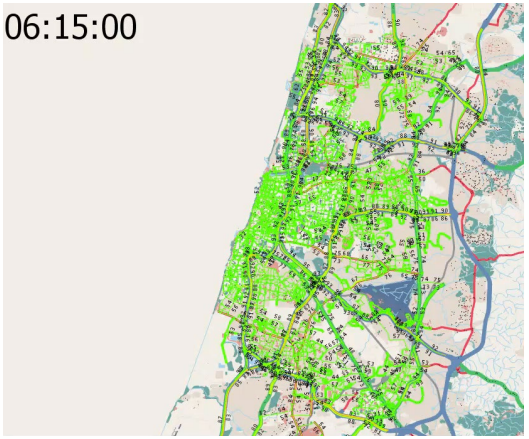
- Future Mobility Lab: Focus Areas
- Digital-Twin Lab Functional Design
- Recent Studies:
  - Environmental-Friendly Mobility Policies in Israel
  - Environmental Study of AMoD

Future Mobility Lab: Focus Areas

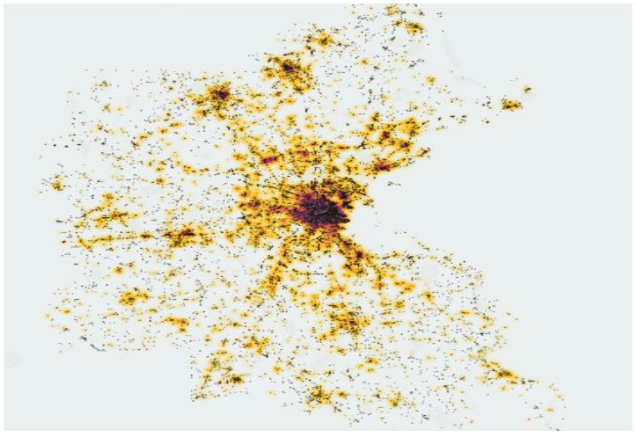
Environmental Impacts of new Technology

Big Data Sources Analysis for Mobility Studies

State-of-the-art Evaluation Tools



Activity-Based Epidemic Propagation Model



Automated Mobility on-Demand Systems

Social and Environmental Justice in Transportation

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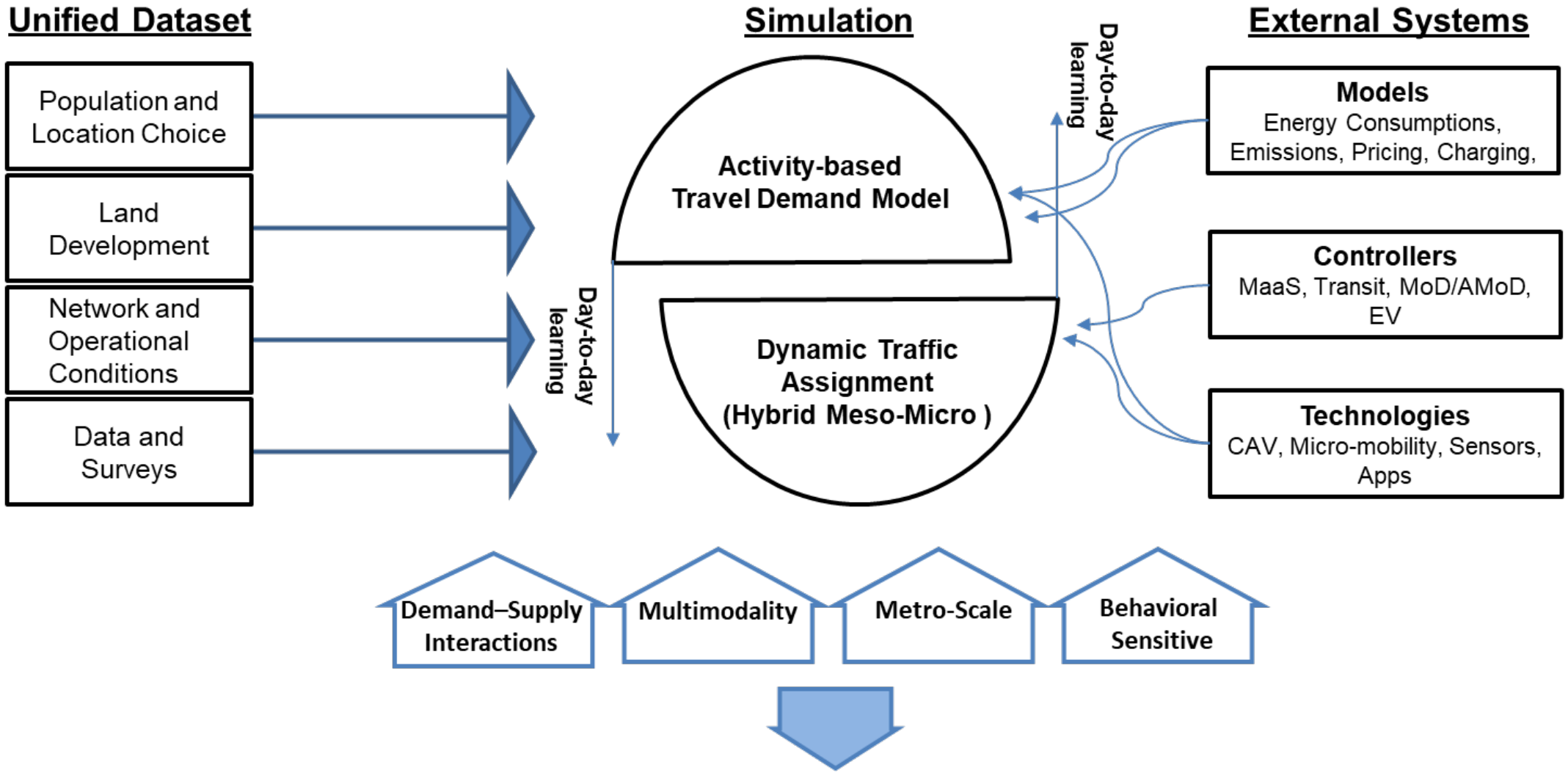
Digital-Twin Lab Functional Design



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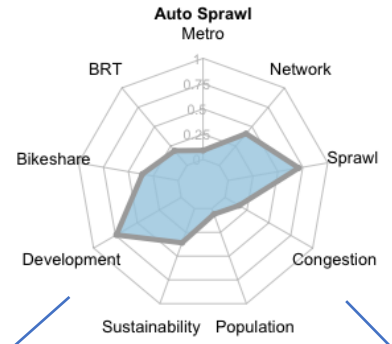
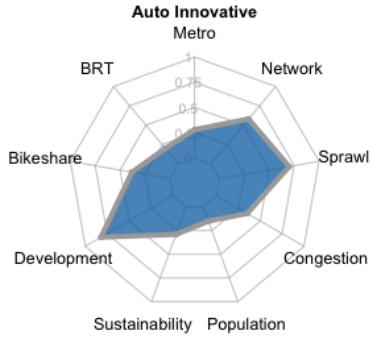
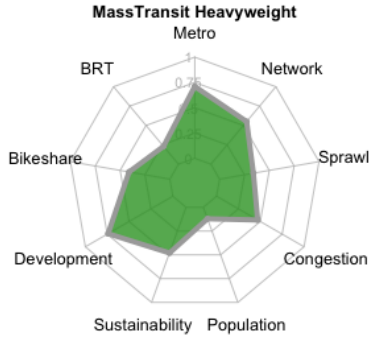
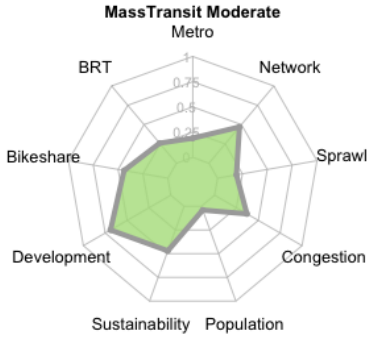
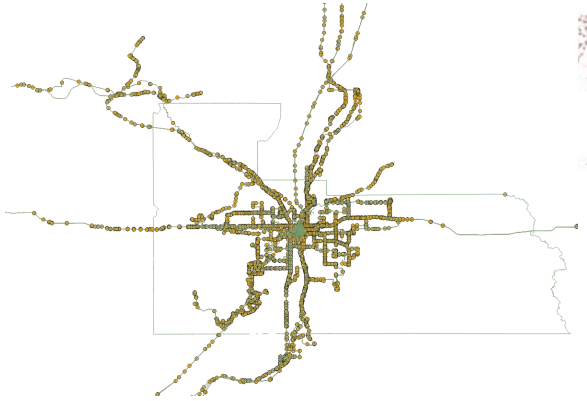
State-of-the-Art Evaluation Tool



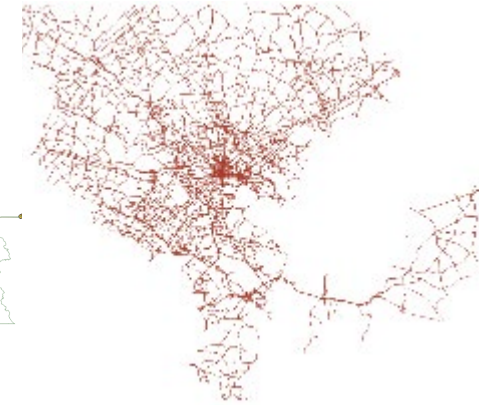




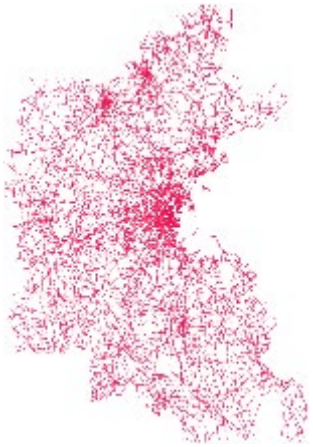




Orlando



Baltimore, Tampa, Raleigh, Orlando

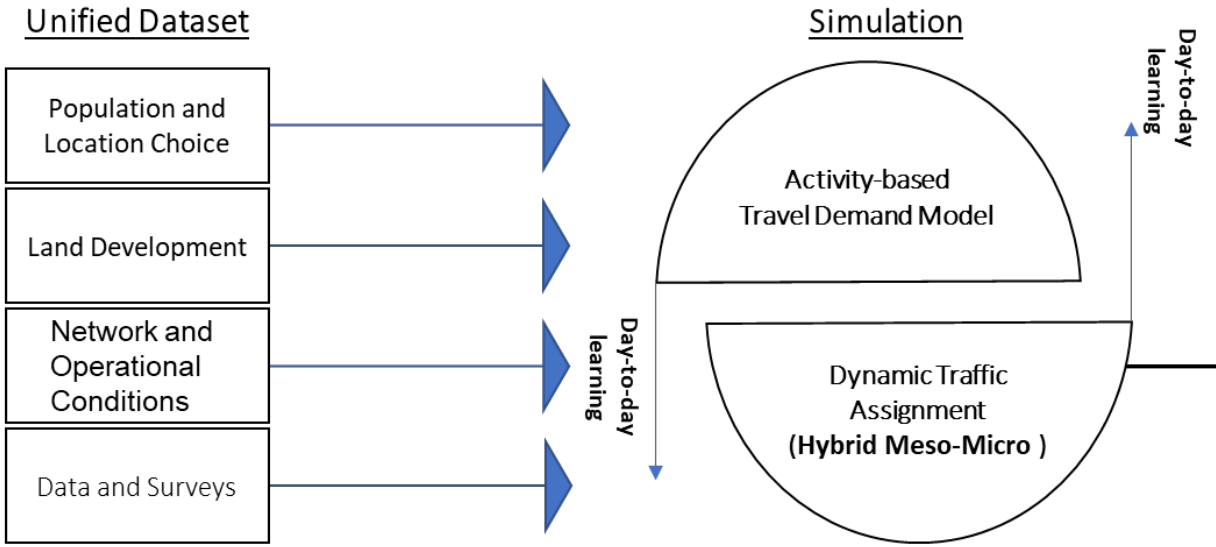


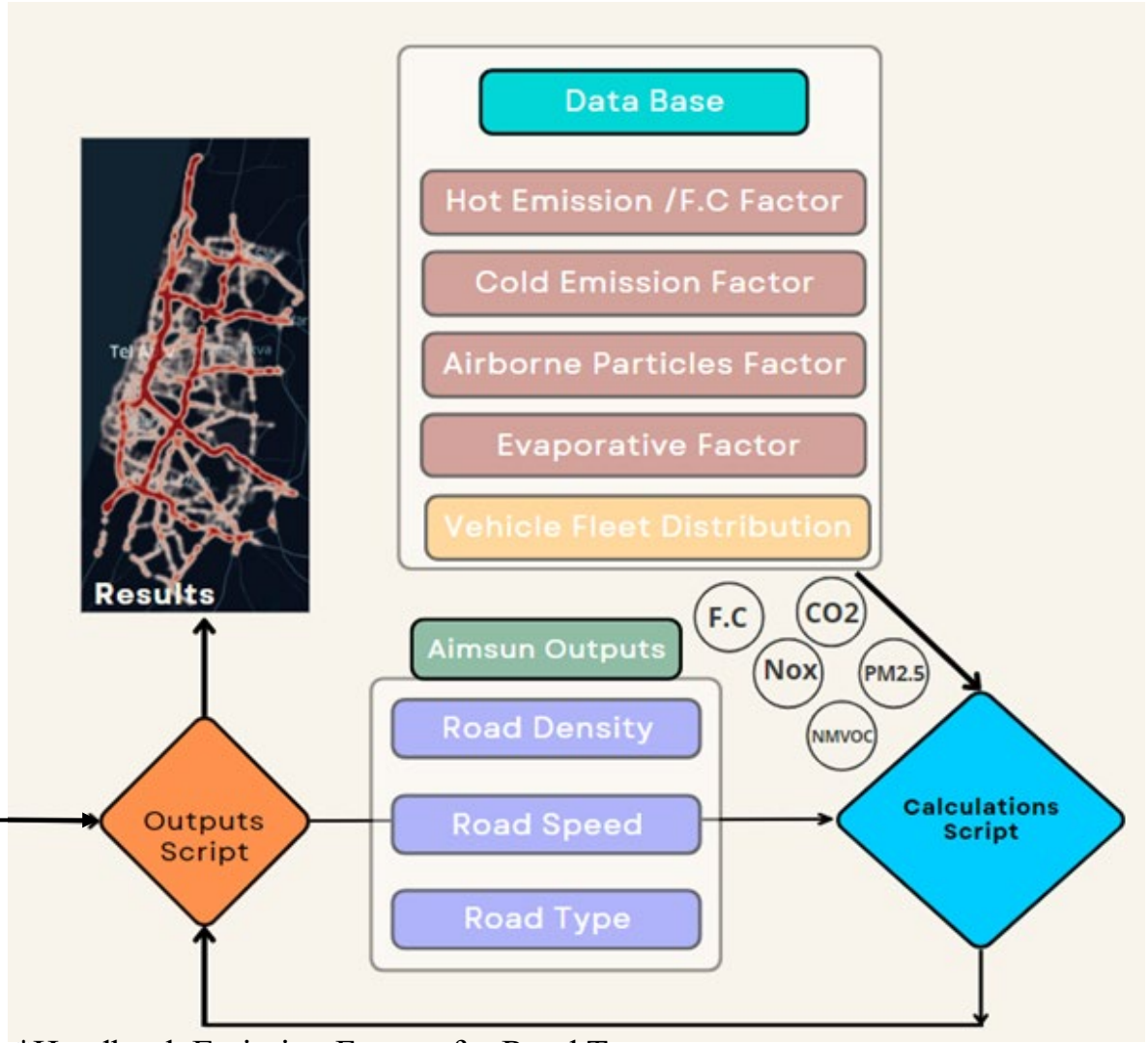
Washington DC, Boston, Chicago, San Francisco, Toronto

Singapore, Madrid, Seoul, Berlin, London

Antwerp, Tel Aviv, Turin, Liverpool

Energy Consumption and Emission Model





*Handbook Emission Factors for Road Transport

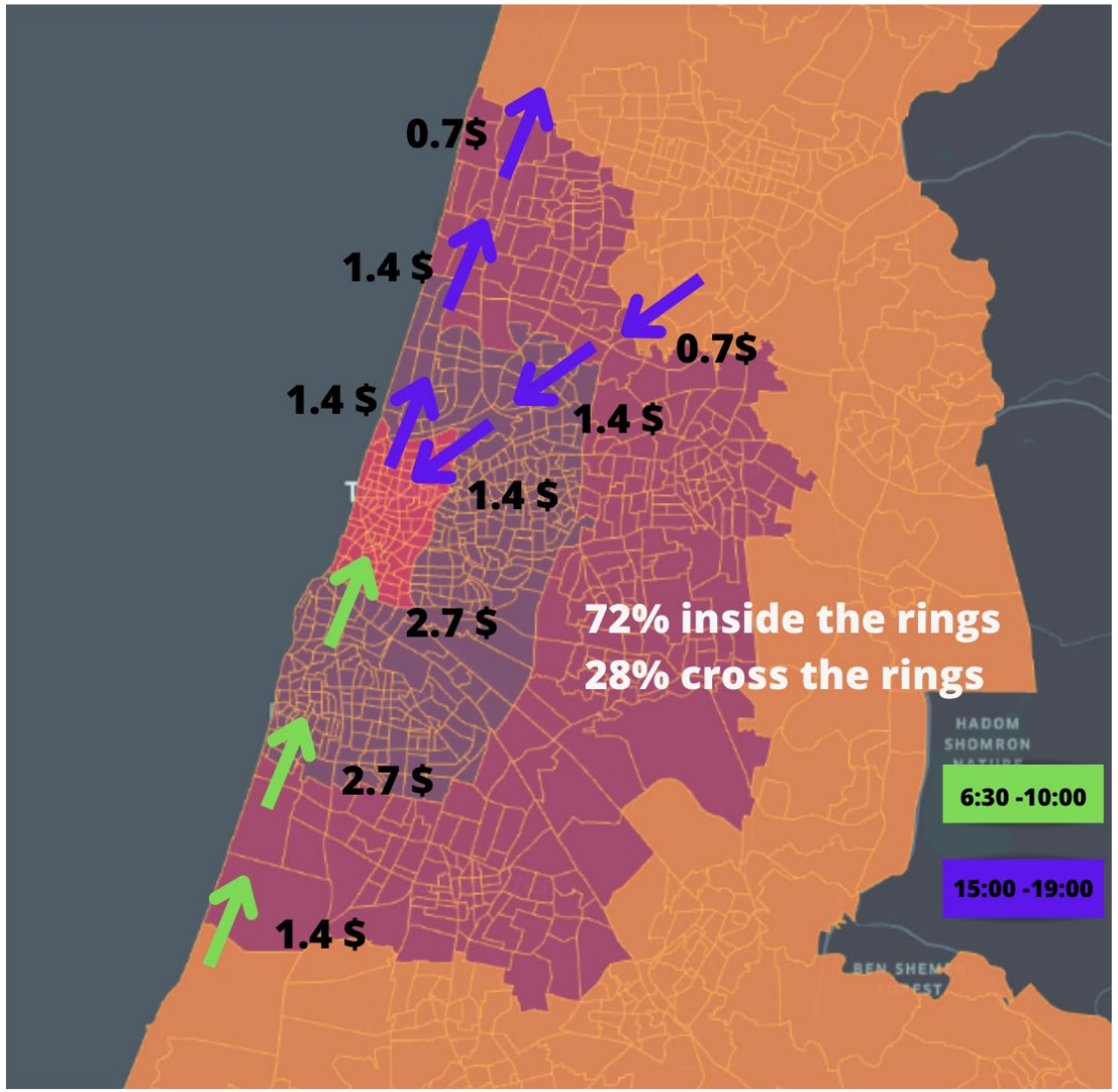
Environmental-Friendly Mobility Policies

Scenario Design

Base Case: Represents current conditions for the Tel-Aviv metropolitan area in terms of demand, supply and fleet composition.

Scenario 1: Applying geographical pricing policy following Israel's government plan.

Scenario 2: Reducing car ownership by 25% that is created by taxing private vehicle.



Results - Simulated Mode Choice

- **1% reduction in car travel (100k trips) in favor of Bus, Walk and Bike as a result of congestion pricing scenario.**

  72% inside the rings
  28% cross the rings

  ↓

  75% inside the rings
  25% cross the rings

- **10% reduction in car travel in favor of Bus, Taxi, Walk and Bike as a result of car ownership reduction scenario.**

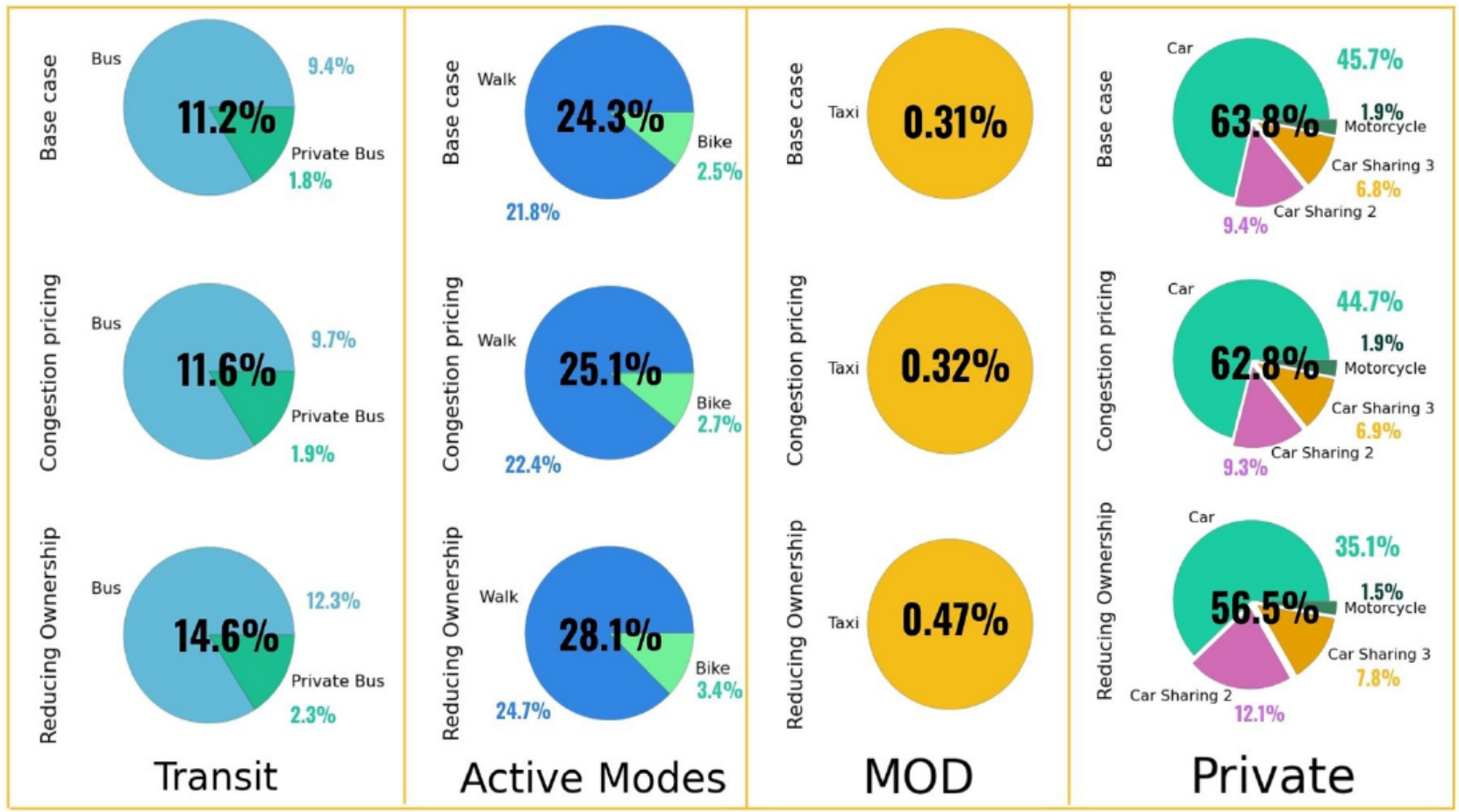


Fig.6 : Simulated Mode Choice by scenario

Results - Simulated Demand by Activity

- Every 5 percent reduction in car ownership is equivalent to a 2.32 to 2.5 percent reduction in carbon dioxide.
- Only 0.11-0.3 percent reduction in carbon dioxide is expected for every 10% reduction in congestion charge.

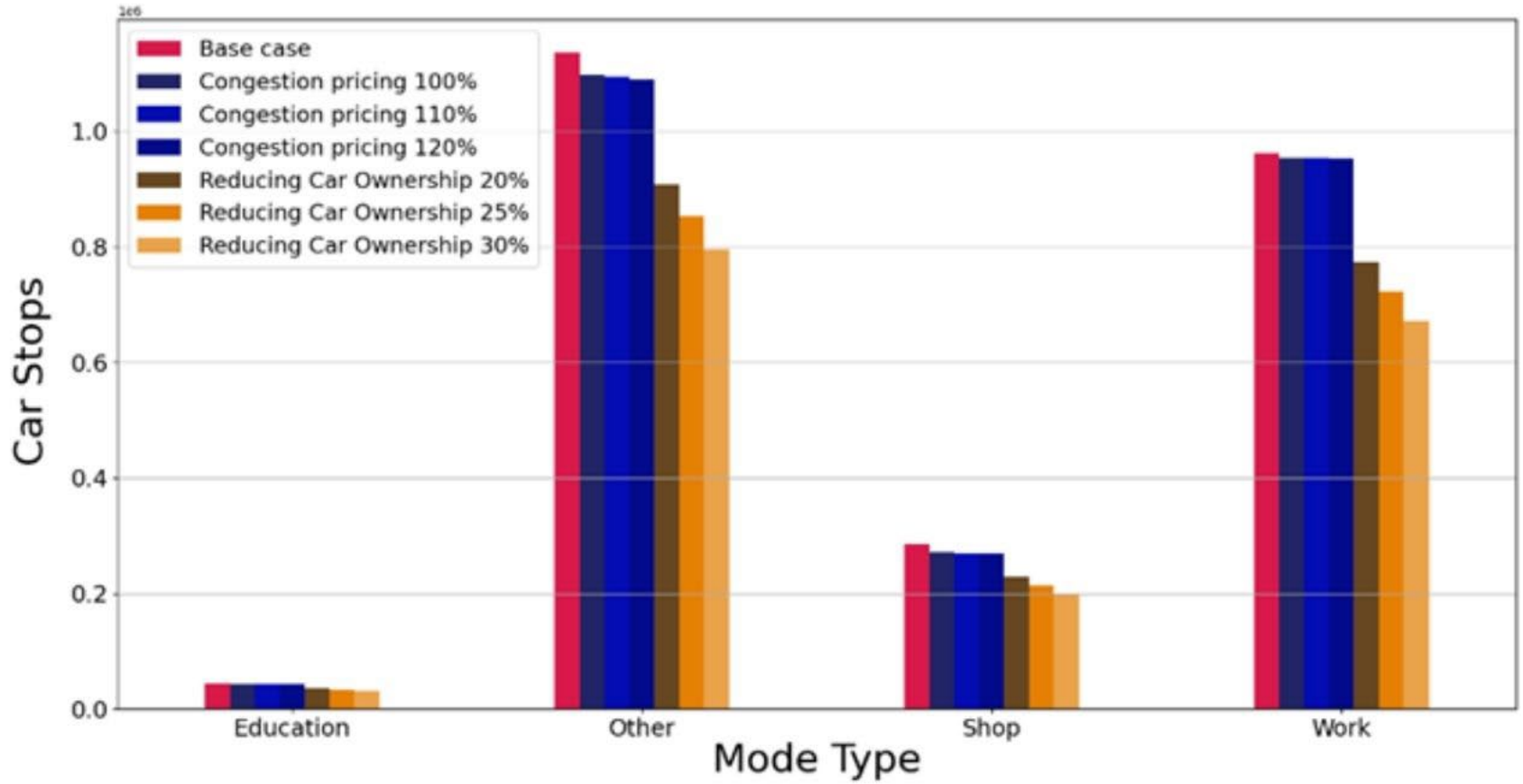
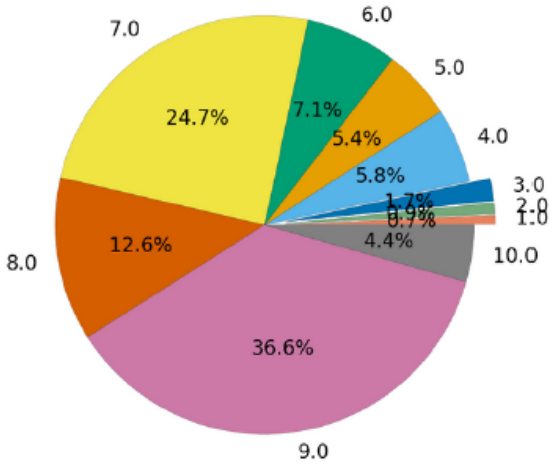


Fig.2: Sensitivity analysis: Change in congestion pricing and car ownership rate

Results - Simulated Emission by Scenario

- Although most CBD is populated by the "rich", most pollution is still concentrated in the "poor" areas.
- As cluster go up, pollution becomes smaller in both policies.
- Clustered 2-4 areas are extremely polluted relative to the rest.
- Cluster 2 is most affected by the policies – 5%less exposure to carbon dioxide in congestion charging scenario and 25% less in car ownership reduction scenario.



Socio Economic cluster Area %

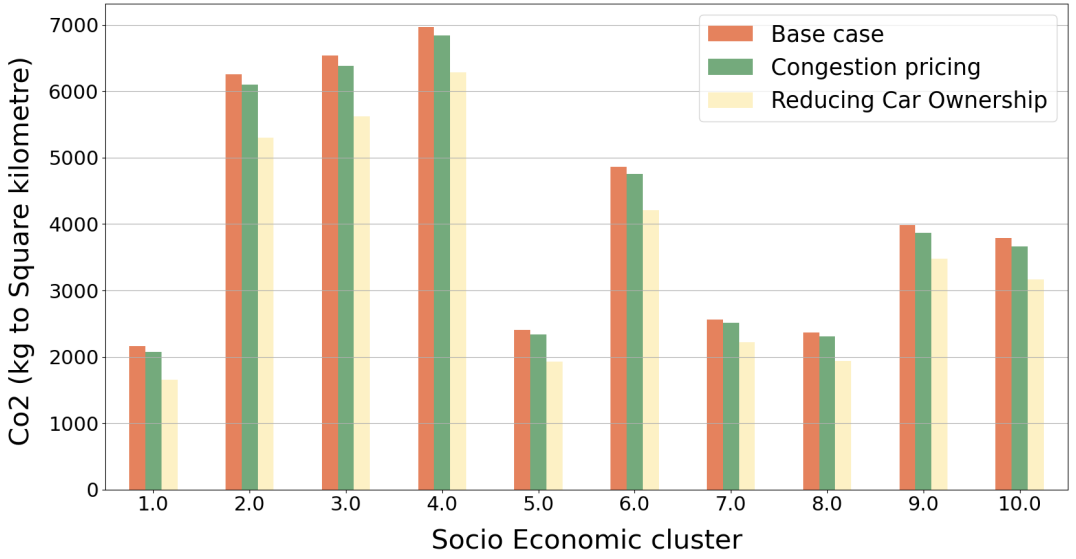


Fig.9: Simulated Carbon Dioxide by Road Type

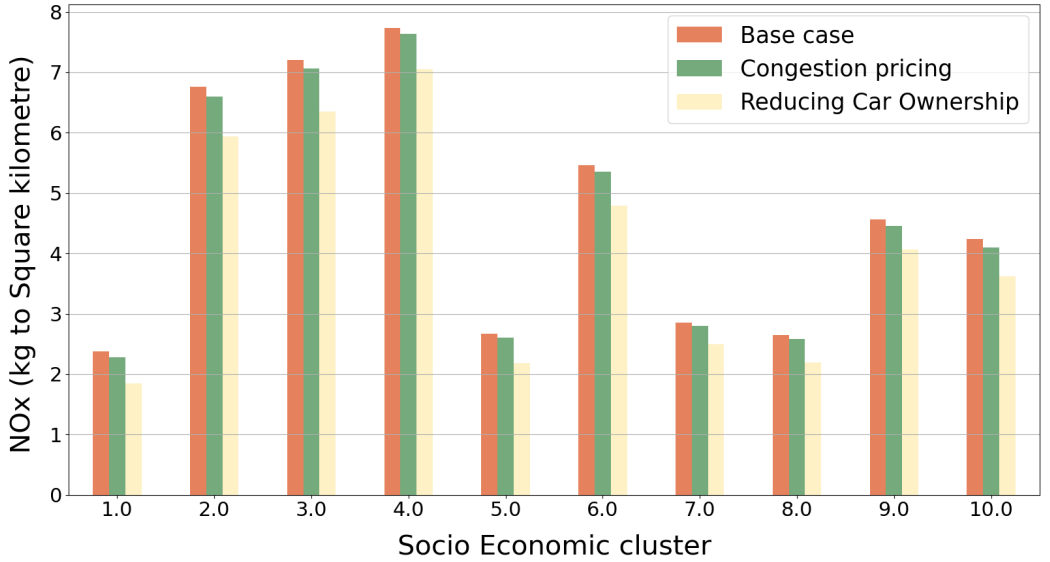


Fig.10: Simulated Nox by Road Type

Results -Childs Exposed to high pollution

- 1% reduction in car travel in the Pricing policy scenario, make 10 % reduction in the number of children's exposure to high Co2 emissions (higher than 3000 kg/km^2) and 25% reduction in-car ownership scenario make 22%.
- In the base case, most of the children are exposed to 0.2 kg to km2 of PM2.5, a significant impact on children health.
- In the car ownership scenario most of the children are exposed to 0.1 kg of km2 PM2.5.

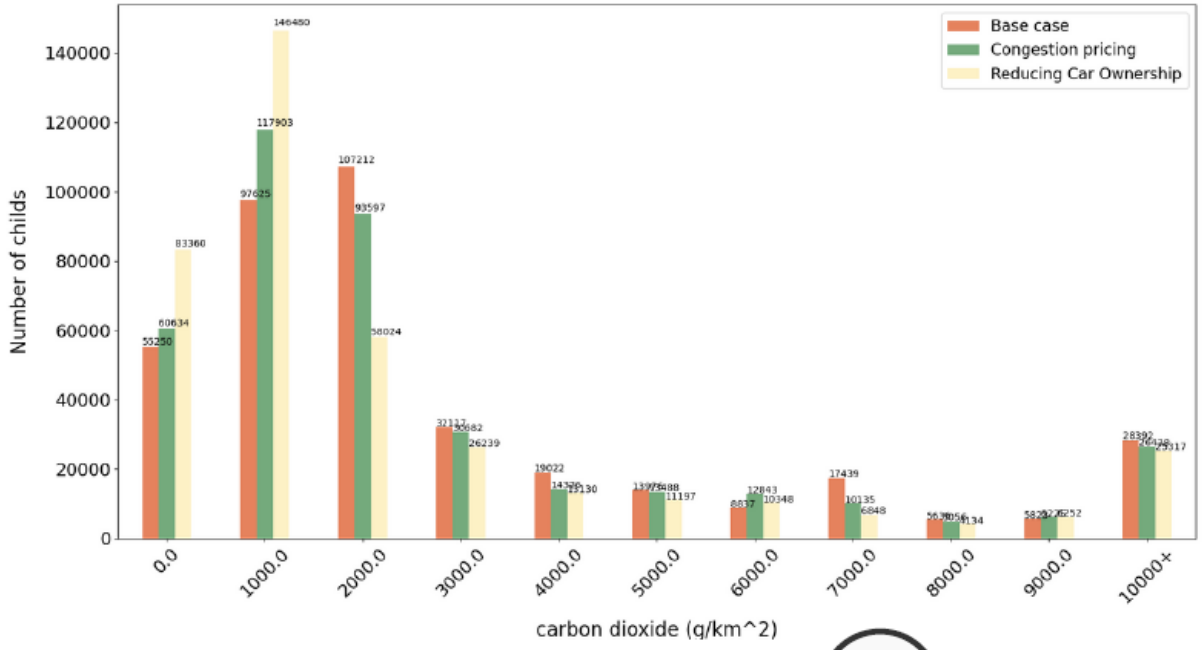


Fig.13: Simulated Carbon Dioxide by Road Type

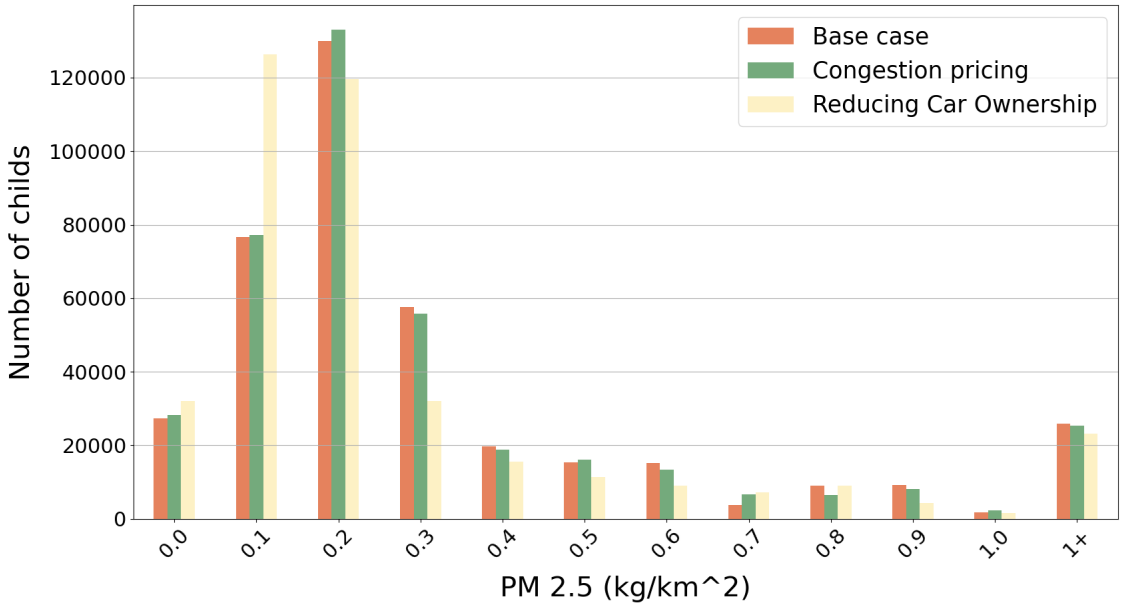


Fig.14: Simulated Nox by Road Type

Results - Simulated GHG on All Roads

- A reduction in GHG emissions on most Roads.
- "Poor" areas get more pollution compared to the other areas.
- Employment areas in Tel Aviv separate main roads and "rich" areas.
- There is no such separation between poor neighborhoods and main roads.

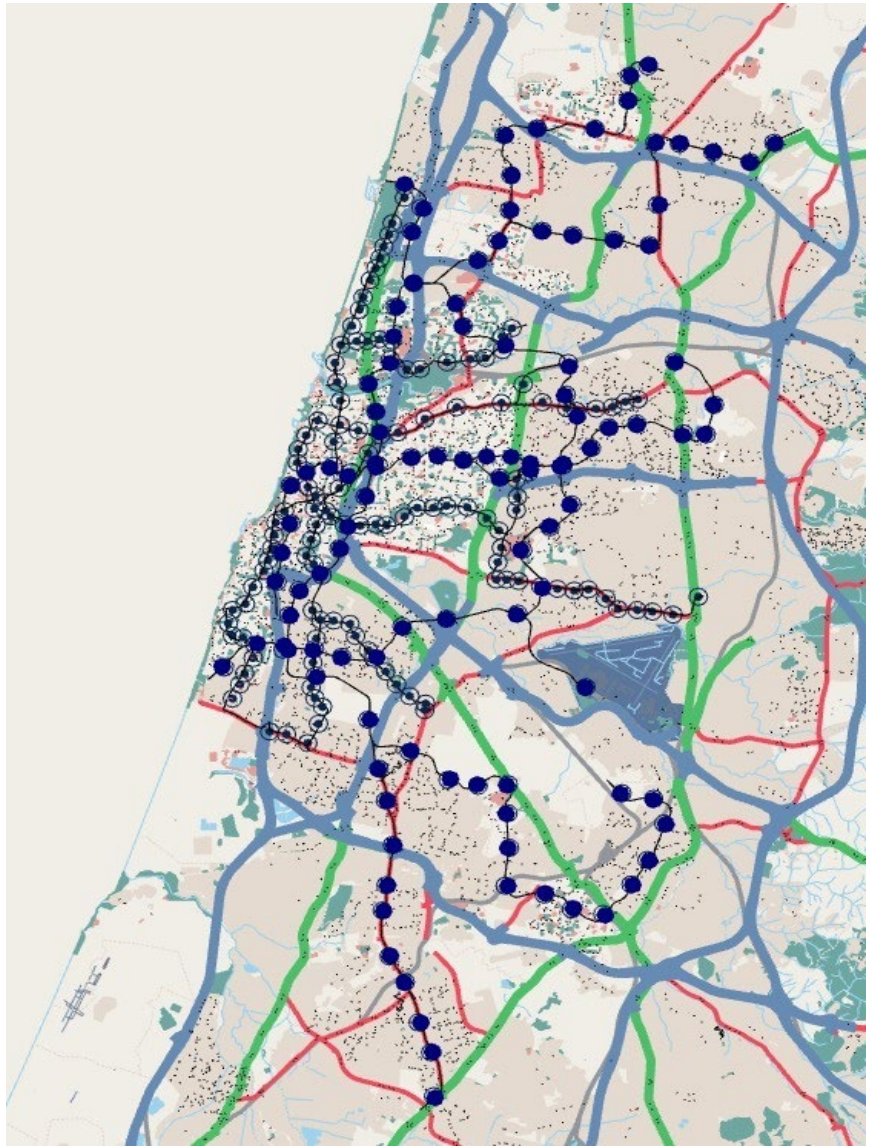
Environmental-Friendly Mobility Policies for 2040

Scenario Design

Base Case: Representing future conditions for the Tel-Aviv metropolitan area in 2040 in terms of demand, supply and fleet composition.

Scenario 1: Applying geographical pricing policy following Israel's government plan.

Scenario 2: AV's as an additional mode and as a first/last mile solution.



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Questions and Comments?

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