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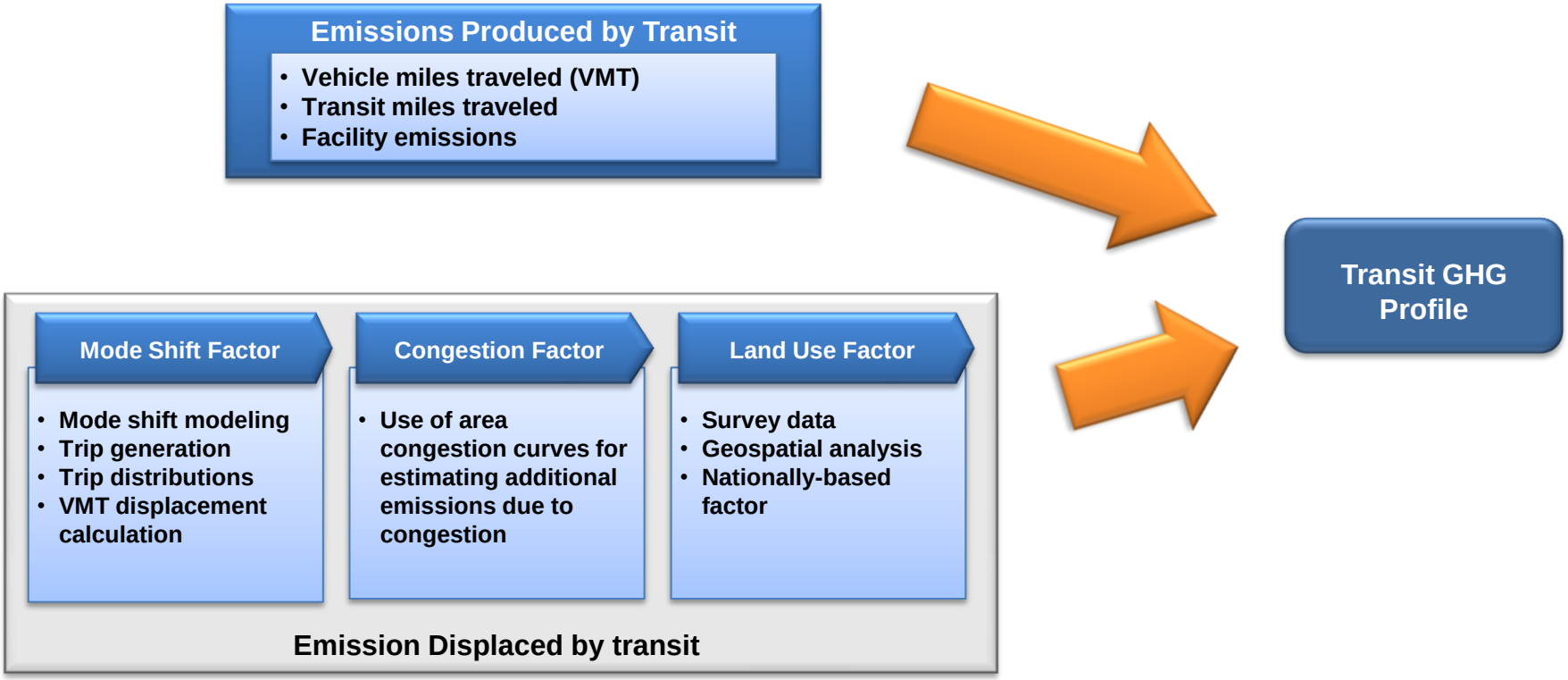
Carbon Displacement Modeling for New York Metropolitan Transportation Authority

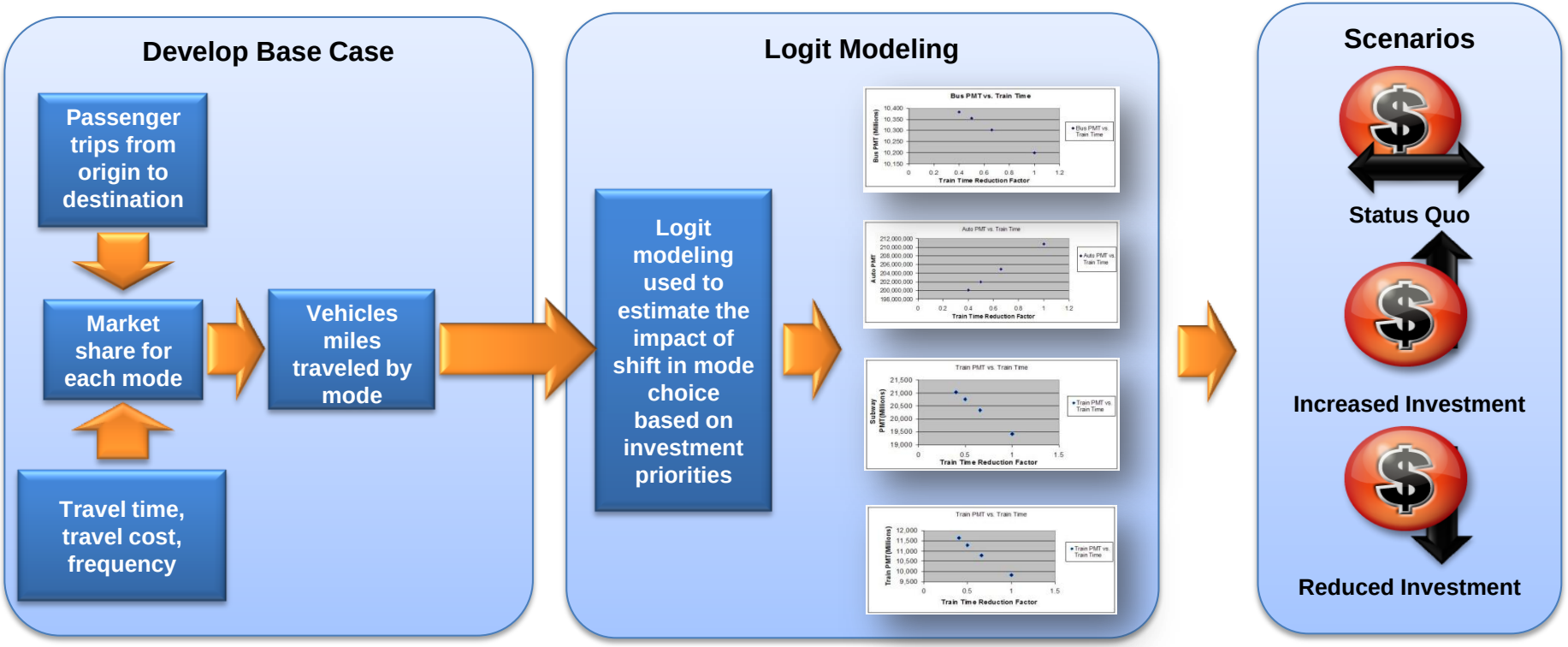
Application of APTA Approach

August 3, 2009

The APTA approach evaluates the GHG emission from transit as well as the emissions not generated as a result of transit



Mode Shift Factor estimates the impact of moving trips from private auto to transit and the resulting reduction in carbon emissions



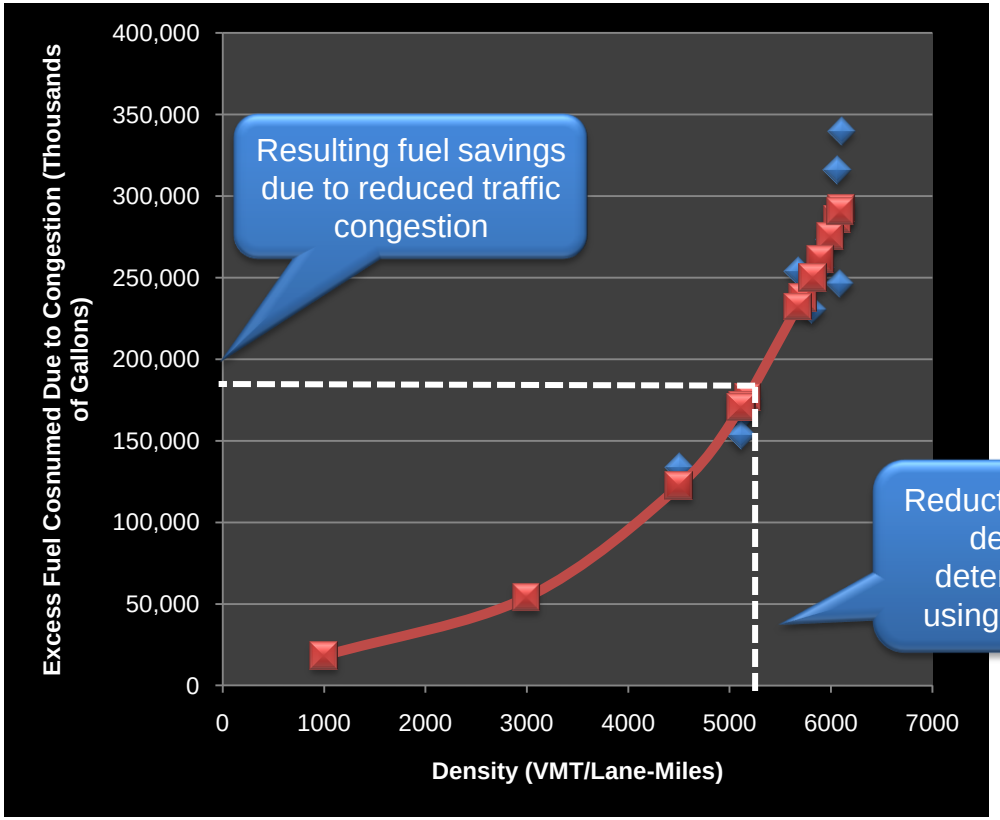
VMT/PMT is calculated using a passenger choice model – the output of the model is VMT/PMT by mode based on changes in demand

Estimates from running the Mode Shift Model show the willingness of automobile travelers to shift to transit. Changes are converted to carbon emission reductions using standard conversion factors.

Mode shift curves can be used to develop different scenarios based on investment priorities

Congestion Factor estimates the impact of transit on reducing overall congestion and associated carbon emissions

Congestion impacts are estimated by using TTI data specific to the region



Land Use Factor estimates the benefits that transit creates by allowing more dense development

APTA guidance includes three approaches for estimating the land use impacts on GHG emissions:

Regional Transportation Models & Studies

Regional GIS Studies

Average Land Use Impact Multiplier

Land Use analysis using regional models and survey data

- VMT reduction from land use
  - VMT saved from driving less because of dense development
  - VMT saved by non-motorized trips
  - VMT saved by transit riders because of dense development
- The land use multiplier is:

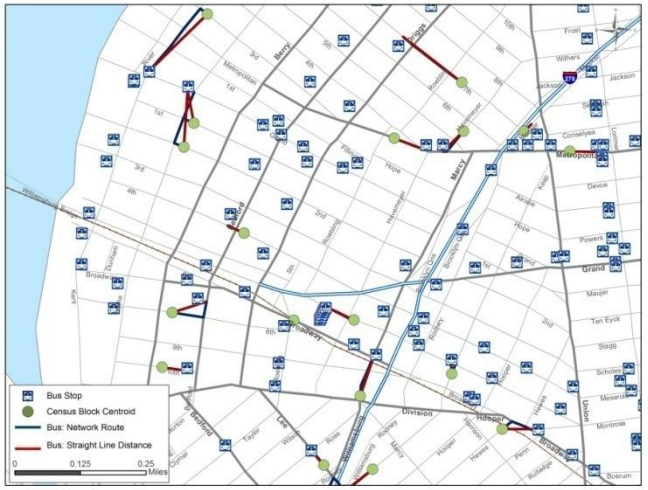
$$\frac{\textit{GHG emissions reduction from land use effects}}{\textit{GHG emissions effects from mode choice}}$$

- Land use multiplier varies depending on your study and reference areas

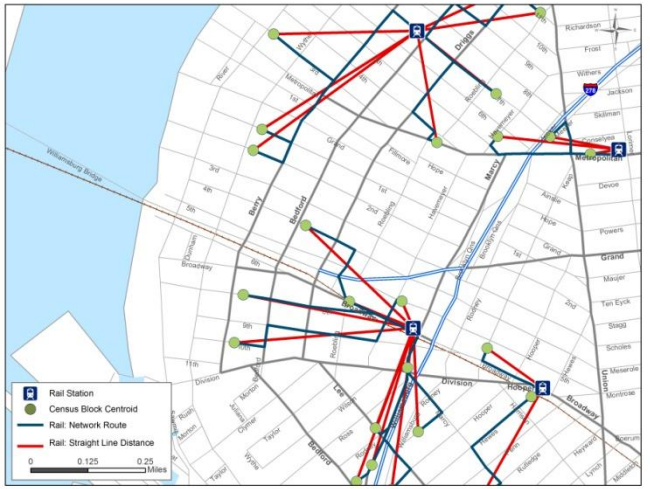
Land use analysis using geospatial analysis

- GIS Spatial Approach:
  - Use a random sample of 1,000 households and 1,000 Census Blocks and evaluate straightline and network distances to transit
  - Apply nonlinear equations from APTA study to calculate a land use multiplier

Based on this analysis, the land use multiplier for the MTA region was around 1.8



Bus



Rail

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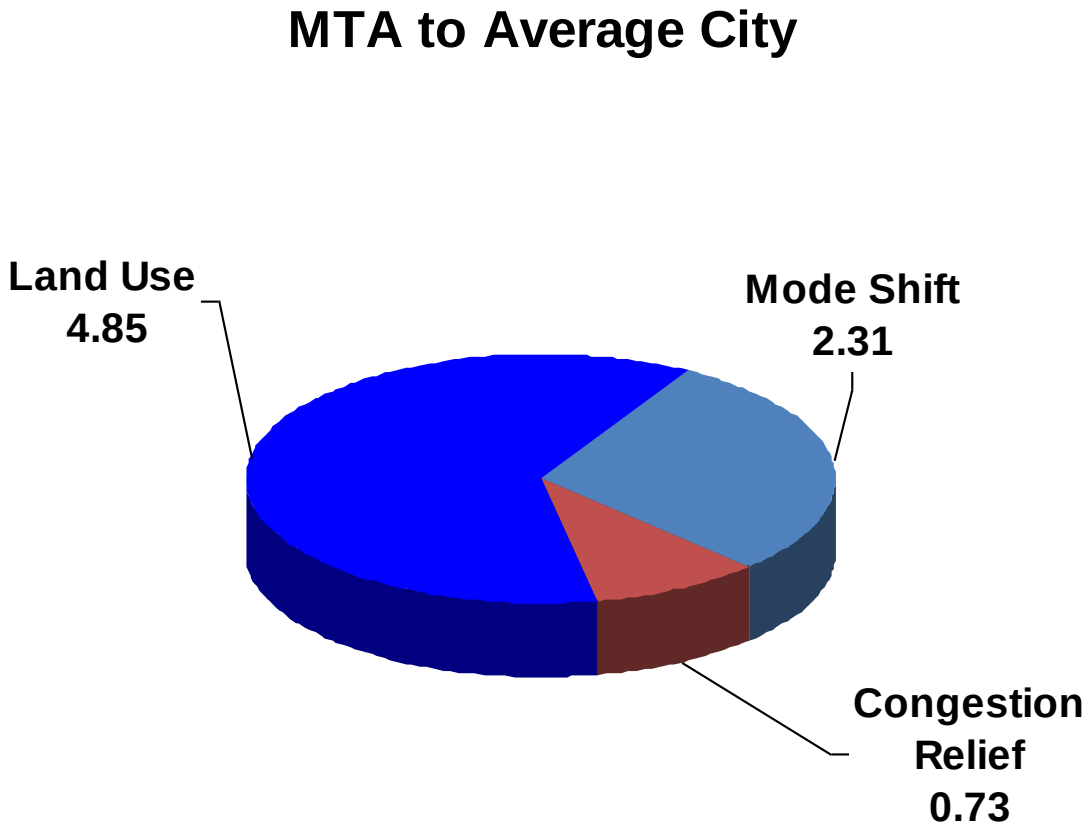
Land Use Multipliers: How do they compare?

Scenario	Approach	Land Use Multiplier
Four dense counties	Resemble suburban NY/NJ	2.88
	Resemble average city*	4.85
NYC	Resemble suburban NY/NJ	3.62
	Resemble average city	4.24
Manhattan	Resemble suburban NY/NJ	10.62
	Resemble average city	12.25
Average Distance	GIS Study	1.8
Default	Multiplier	1.9

What is the impact of MTA on GHG emissions?



MTA Generates ≈ 2.3 M tons/yr

Total Displacement Factor ≈ 8

Without MTA, the Region Would Generate ≈ 18 M tons/yr