An Integrated Tools-Based Approach to Transportation and Land Use GHG Mitigation Policy Analysis

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Purpose of the Integrated Tool-Based Analysis Approach

- A comprehensive family of integrated analysis tools allows for 'stand alone' and 'integrated' analysis of many transportation and land use policies
- The integrated tool-set provides a consistent and validated method for analyzing different GHG reduction strategies for the transportation and land use sector
- The integrated tool-set can estimate the aggregate effects of multiple policies and also measure overlap and synergistic effects of policies

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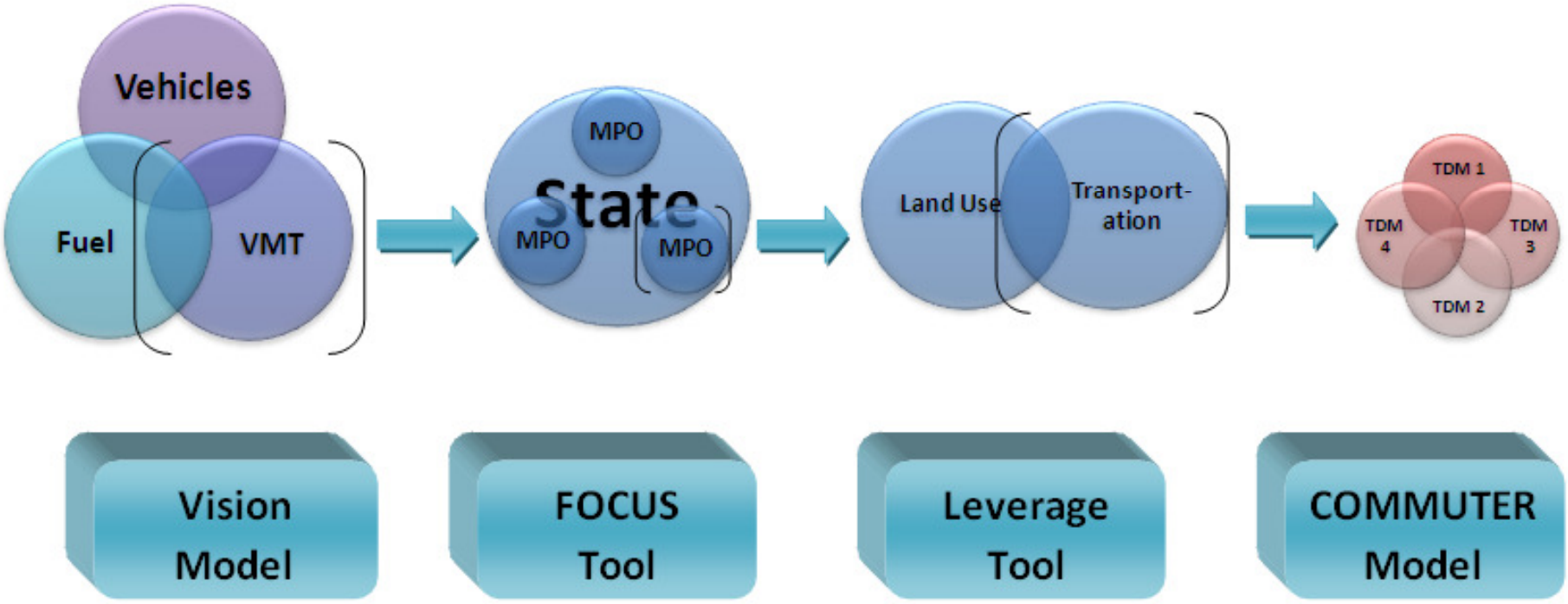
Comprehensive Integrated Tool-Based Analysis Approach



Example of Using EPA COMMUTER Model for Travel Demand Management Strategies

- The EPA COMMUTER Model analyzes Transportation Demand Management (TDM) strategies and provides travel and emission impacts in its results

Draft Example: Travel Demand Management

	Separate Analysis of Strategy Bundles								
	2020			2030			2011-2030		
NYS I&F (Millions VMT)	139,696	24,396	12,059	160,688	28,062	13,871	2,814,919	491,581	242,992
	Passenger	Lt Trks	HDV	Passenger	Lt Trks	HDV	Passenger	Lt Trks	HDV
Bundle 2: TLU 6A-6D (TDM/TSM)									
Sum of standalone Impacts	7,145	*N/A*	0	8,222	*N/A*	0	135,159	*N/A*	0
Integrated Impact	6,715	*N/A*	0	7,727	*N/A*	0	127,024	*N/A*	0
Integration Effect (*Overlap*)	-6.0%	*N/A*	0.0%	-6.0%	*N/A*	0.0%	-6.0%	*N/A*	0.0%
Percent Change from Baseline I&F	4.8%	*N/A*	0.0%	4.8%	*N/A*	0.0%	4.5%	*N/A*	0.0%

Example of Using TARGGET Tool for Transit and Land Use Strategies

- Transit reduces (displaces) Scope 3 GHG emissions in three ways:

1. Mode shift(transit riders take less private vehicle trips)
2. Congestion relief
3. Land use changes (i.e. land use multiplier)

- APTA provides guidance on how to estimate each of these GHG reduction mechanisms at the transit agency level

Draft Example: Transit and Land Use

	Separate Analysis of Strategy Bundles								
	2020			2030			2011-2030		
NYS I&F (Millions VMT)	139,696	24,396	12,059	160,688	28,062	13,871	2,814,919	491,581	242,992
	Passenger	Lt Trks	HDV	Passenger	Lt Trks	HDV	Passenger	Lt Trks	HDV
Bundle 3b: TLU 9, 10, 11 and 7 (Transit added)									
Sum of standalone Impacts (Transit affects LDV VMT only)	14,950	*N/A*	225	24,422	*N/A*	514	278,434	*N/A*	4,931
Integrated Impact	24,065	*N/A*	225	36,493	*N/A*	514	434,333	*N/A*	4,931
Integration Effect (*Synergy*)	61.0%	*N/A*	0.0%	49.4%	*N/A*	0.0%	56.0%	*N/A*	0.0%
Percent Change from Baseline I&F	-17.2%	*N/A*	-1.9%	-22.7%	*N/A*	-3.7%	-15.4%	*N/A*	-2.0%

VMT Efficiency Strategy Expansion Analysis Tools

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"Top Down" versus "Bottoms Up" Analysis

- Other Tools and Methods of Analysis rely upon "Top Down" Analysis
- "Top Down" Analysis tools are limited by shortcomings of Aggregate Baseline Scenario Data

A Suite of Tools based upon "Bottoms Up" Analysis

- "Bottoms Up" Tools do not rely upon Aggregate Baseline Scenario Data
- Instead "Bottoms Up" Tools rely upon Scientific Knowledge Base for Unit Effectiveness Factors
- Unit Effectiveness Factors are "Scaled Up" through Strategy Expansion Scenario

Bottoms Up Analysis Provides Improved Ramp Up Scenario Analysis

- Top Down Analysis is helpful for regulatory programs (eg. Vehicle standards, fuel standards)
- VMT Efficiency is generally not implemented through regulation.

Bottoms Up Analysis Provides Improved Ramp Up Scenario Analysis

- Instead VMT Efficiency is achieved through expanded funding and program implementation
- Bottoms Up Analysis Allows for multiple, iterative scenarios of ramp up and program implementation

A Growing Suite of VMT Efficiency Analysis Tools for Strategy Expansion

- Scientifically Based Analytical Capabilities
- Multiple and Iterative Scenario Analysis
- Not Dependent upon Quality of Aggregate Inventory and Forecast

Example: Bike-Sharing Strategy Expansion Analysis Tool

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Benefit-Cost Analysis

EXAMPLE

Bike-sharing

Modest CO_2 benefits are a contributing factor to large overall benefits.

Costs	**$231,000,000**
Capital	$16,000,000
Operating	$75,000,000
Increased Accidents	$145,000,000
Benefits	**$625,500,000**
User Cost Savings	$197,000,000
Travel Time Savings	$378,000,000
Reduced Accidents (from reduced VMT)	$1,300,000
Public Health	$2,000,000
Increased Access	$38,000,000
Congestion Reduction	$3,500,000
Environmental Benefits	$5,700,000
CO_2	**66,000 tons**

All numbers over 20 year horizon from 2010-2030

Introduction

- This Tool uses a combination of national data and local data
  - National data are assumptions for the analysis
  - Local data are inputs provided by the user
- This Tool was developed based on the bike share analysis example provided by Metropolitan Washington Council of Governments (MWCOG)

Key Components

- Costs
  - Capital Cost
  - Operating Cost
  - Bike Replacement Cost
- Revenues
  - Advertising Revenue
  - User Fee Revenue

Key Components

- Major Benefit
  - Energy Savings
- Co-benefits
  - User Cost Savings
  - Travel Time Savings
  - Congestion Reduction
  - Environmental Benefits
  - Health Care Savings
  - Reduced Accidents

Costs

- Capital Cost
  - Annual capital cost = $500 X number of new bikes purchased each year
  - Capital cost in first year = $3500 X number of bikes
- Operating Cost
  - Annual operating cost = $1400 X number of bikes
- Bike Replacement Cost:
  - Assuming a lifetime of 6 years for all bikes

Revenues

- Advertising Revenue
  - Based on advertising revenue per bike
- User Fee Revenue (per bike)
  - Revenue from members = Yearly membership cost X 10 members per bike
  - Revenue from day pass riders = Day pass cost X 84 riders per bike per year

Example: Change Mode Shift Data

- Suppose more riders used to drive and fewer riders used to take public transportation

	Default Data	User Designated Data
From transit to bike	50.0%	45.0%
From walking to bike	26.0%	16.0%
From car/motorcycle to bike	7.8%	12.8%
From personal bike to sharing bike	5.0%	5.0%
From taxi to bike	2.5%	2.5%
From not traveling to bike	8.3%	8.3%
Total	100%	100%

Example: Change Mode Shift Data

- With new mode share assumptions, the bike share program shows a higher benefit-to-cost ratio.
- This makes sense since the bike share program now has a greater impact on fuel savings

	B/C Ratio with Default Data	B/C Ratio with User Designated Data
3% discount rate	1.99	2.12
7% discount rate	0.85	0.97

Thank you for your interest:

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