Envisioning a Statewide Travel Demand Model for Minnesota

Modeling Mobility Conference 2025

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Setting the stage | Legislation Context

Timeline of Minnesota's Climate Actions

2007 **Next Generation Energy Act** created goal to reduce Minnesota GHG emissions 80% by 2050

2008 Minnesota **Climate Change Advisory group** publishes final report recommending a comprehensive set of state-level climate polocies

2016 **Climate Solutions and Economic Opportunity report** identifies near-term emission reduction opportunities

2019 MnDOT publishes **Pathways to Decarbonizing Transportation in Minnesota,** outlining potential transportation actions to meet GHG goals

2020 **Sustainable Transportation Advisory Committee** established

2021 **Clean Cars Minnesota** rule adopted

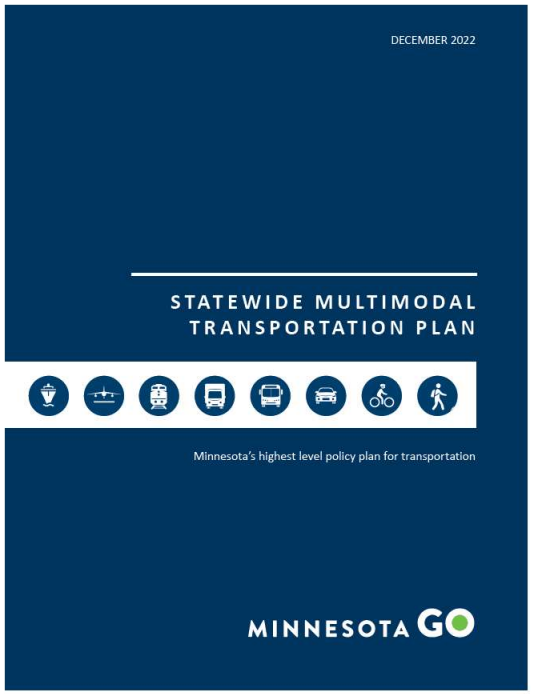
2022 Minnesota's **Climate Action Framework** set goal to reduce GHG emissions by 50% by 2030 and achieve net-zero by 2050

Minnesota **Statewide Multimodal Transportation Plan** establishes transportation GHG reduction targets consistent with the Framework (80% reduction by 2040)

2023 **HF 2887** law creates new transportation funding sources for sustainable transportation, rebates and work groups

Next Generation Energy Act adopts goal to reduce GHG emissions by 30% by 2025, 50% by 2030 and net-zero emissions by 2050

Clean Transportation Fuel Standard Working Group and **GHG Emissions Impact Mitigation Working Group** are established and begin work



GHG emissions reduction performance targets & Impact Assessment + Offset

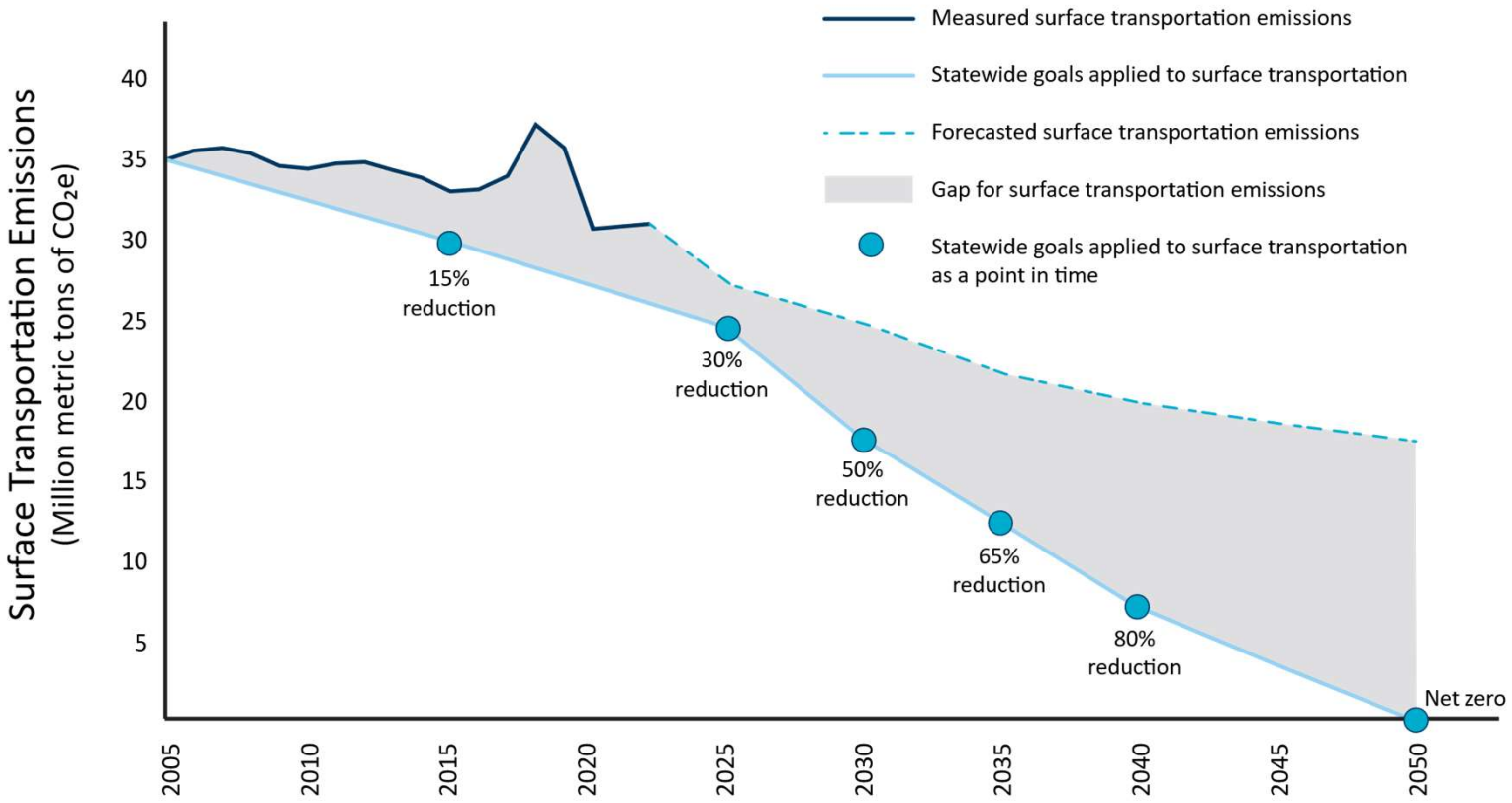
GHG emissions targets and project assessment (2023):

- Chapter 216 (2023): Set greenhouse gas emissions goal for Minnesota across all sectors
- Chapter 174 (2023): requires the commissioner of transportation to establish greenhouse gas emission reduction targets for the transportation sector
- Chapter 161 (2023): Requires MnDOT to assess and mitigate greenhouse gas emissions for highway expansion projects in 2025

Portfolio / Program Assessment (2024):

- Chapter 127 (2024): Amends 161.178 to add a requirement of "assessing a portfolio or program of projects instead of on a project-by-project basis" by 2027

Surface transportation emissions



Note: The 'zero' at the right-hand side of the graph represents a net value of zero GHG emissions from the transportation sector. This means that the GHG emissions created by the transportation sector are 100% offset by mitigation efforts.

Surface transportation geographic regions

Scenario 1

Metropolitan Council's 7-county metro area
(statute defined)

Greater Minnesota
(everywhere outside the metro area)

Scenario 2

Metropolitan Council's 7-county metro area
(statute defined)

Greater Minnesota Metropolitan Planning Organizations
(7 urbanized areas)

Greater Minnesota rural areas
(everywhere outside the metro area and 7 MPO urbanized areas)

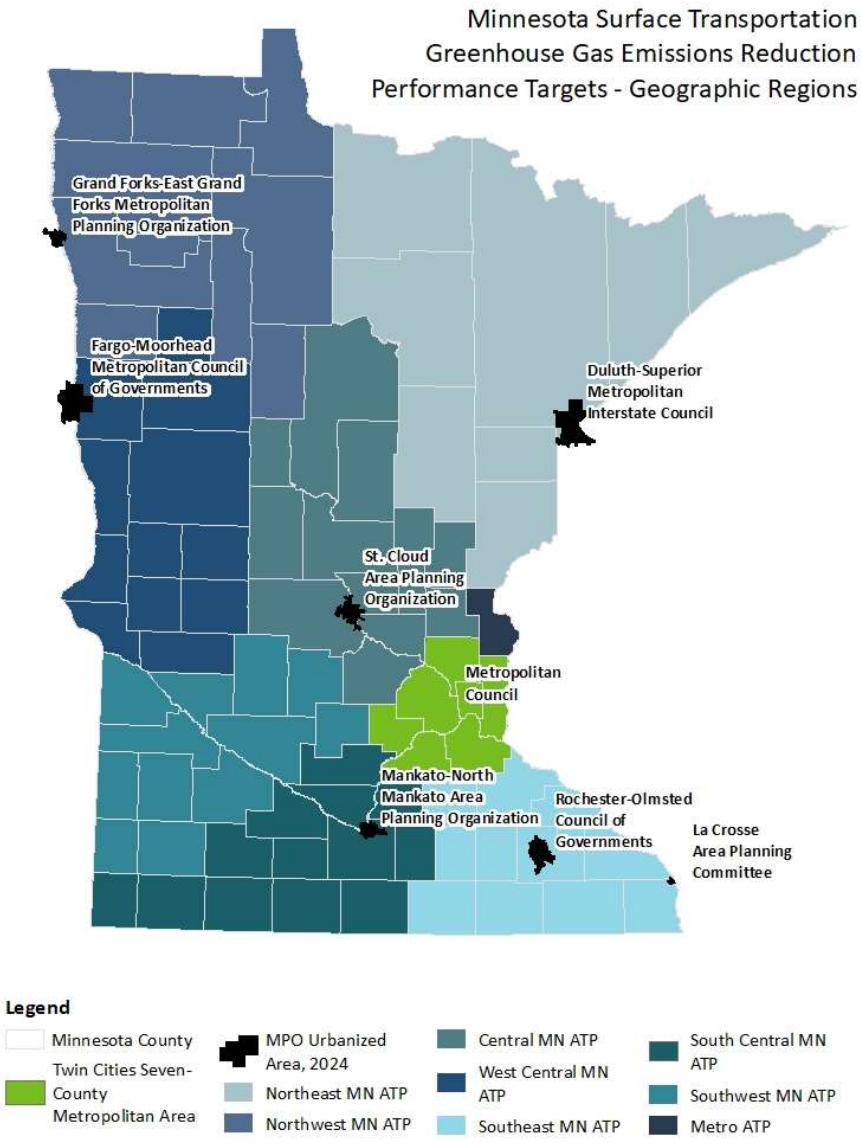
Scenario 3

Metropolitan Council's 7-county metro area
(statute defined)

Greater Minnesota Metropolitan Planning Organizations
(7 urbanized areas)

Greater Minnesota Area Transportation Partnerships
(8)

Surface transportation geographic regions



Scenario 3

- Metropolitan Council's 7-county metro area *(statute defined)*
- Greater Minnesota Metropolitan Planning Organizations *(7 urbanized areas)*
- Greater Minnesota Area Transportation Partnerships *(8)*

Provides more opportunities for accountability.

We can see ourselves in the work because it's more context-sensitive.

So, we need a model…

Now what?

Stakeholder Workshop

Held summer 2024 with approximately 70 participants representing:

MnDOT Groups	Partner Organizations and Agencies
Transportation System Management	DEED
Metro and District representatives	Minnesota Management and Budget
MnIT @MnDOT	Federal Highway Administration
Environmental Stewardship	Metropolitan Council
State Aid	University of Minnesota
Sustainability and Public Health	Metro Transit
Transit and Active Transportation	Grand Forks/East Grand Forks MPO
Traffic Engineering	La Crosse Area Planning Committee
	Mankato/North Mankato APO

Statewide Travel Demand Forecast Models

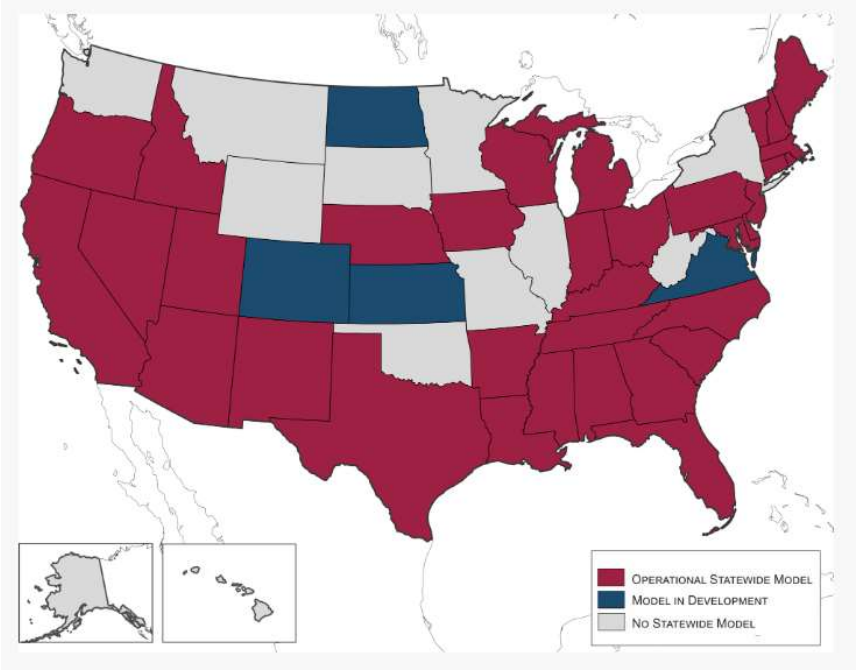
Background

- MN legislation requires assessment of GHG and VMT impacts of transportation investments
- Legislature directed MnDOT to develop STDFM to support GHG and VMT assessments

This investigation:

- Reviewed state of practice for STDFM nationally
- Created scenarios of model approaches for MN
- Evaluate and prioritized those scenarios
- Developed recommendations for MN STDFM implementation

Models are most successful when they are able to address statewide priorities as expressed by legislators and other political leaders.



Source: NCHRP Synthesis 514 – Statewide and Megaregional Travel forecasting Models: Freight and Passenger

Stakeholder Workshop – Travel Demand Model Background

- Basic model structures
- Optional model features
  - Allow for switching between modes
  - Consider different times of day
  - Include intersections and traffic control
  - Include pricing (tolls, transit fares)

S-T-O-R-M Analysis Framework

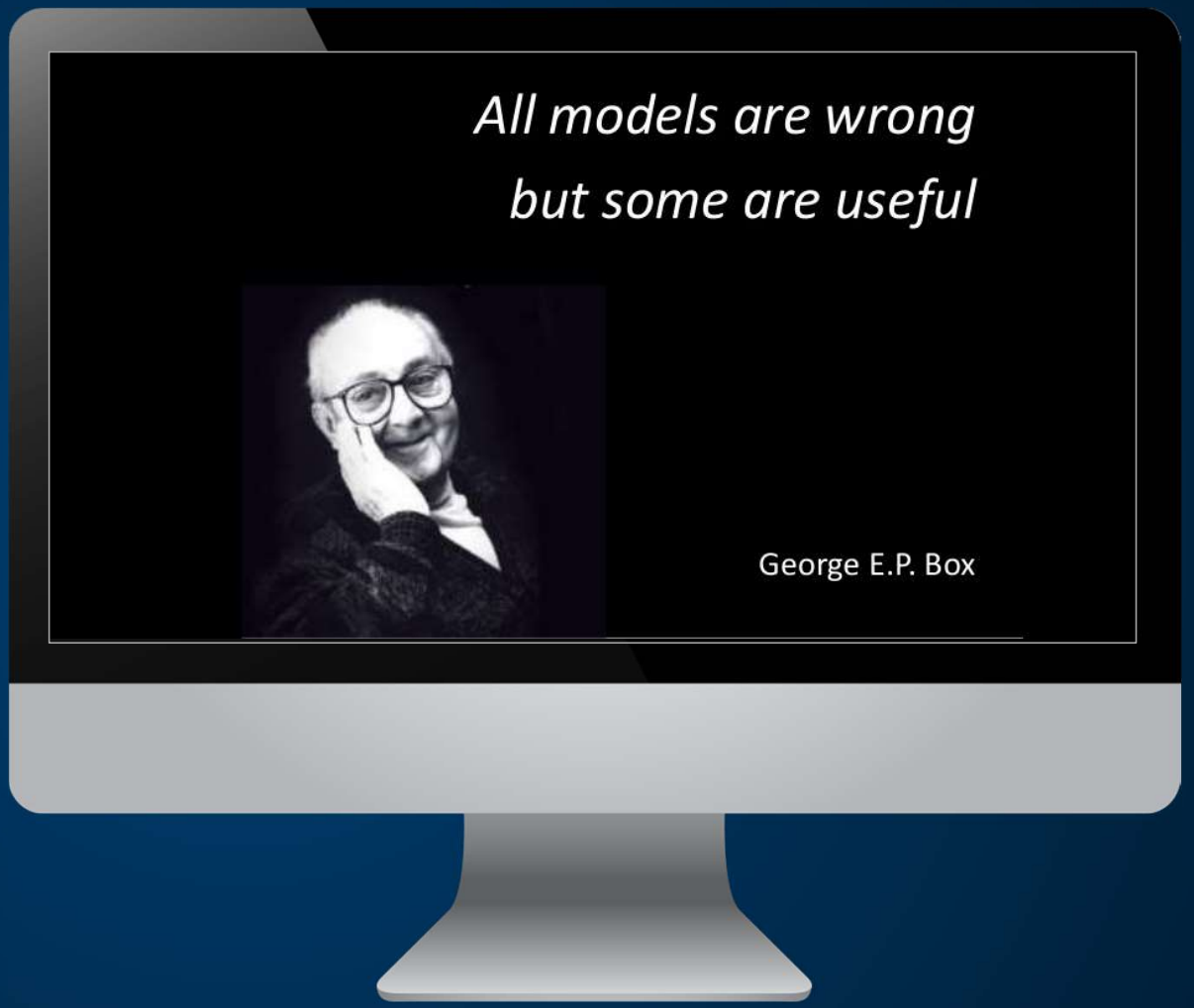
Minnesota Approach

Strategic Planning Model

Travel Demand Model

Traffic Simulation

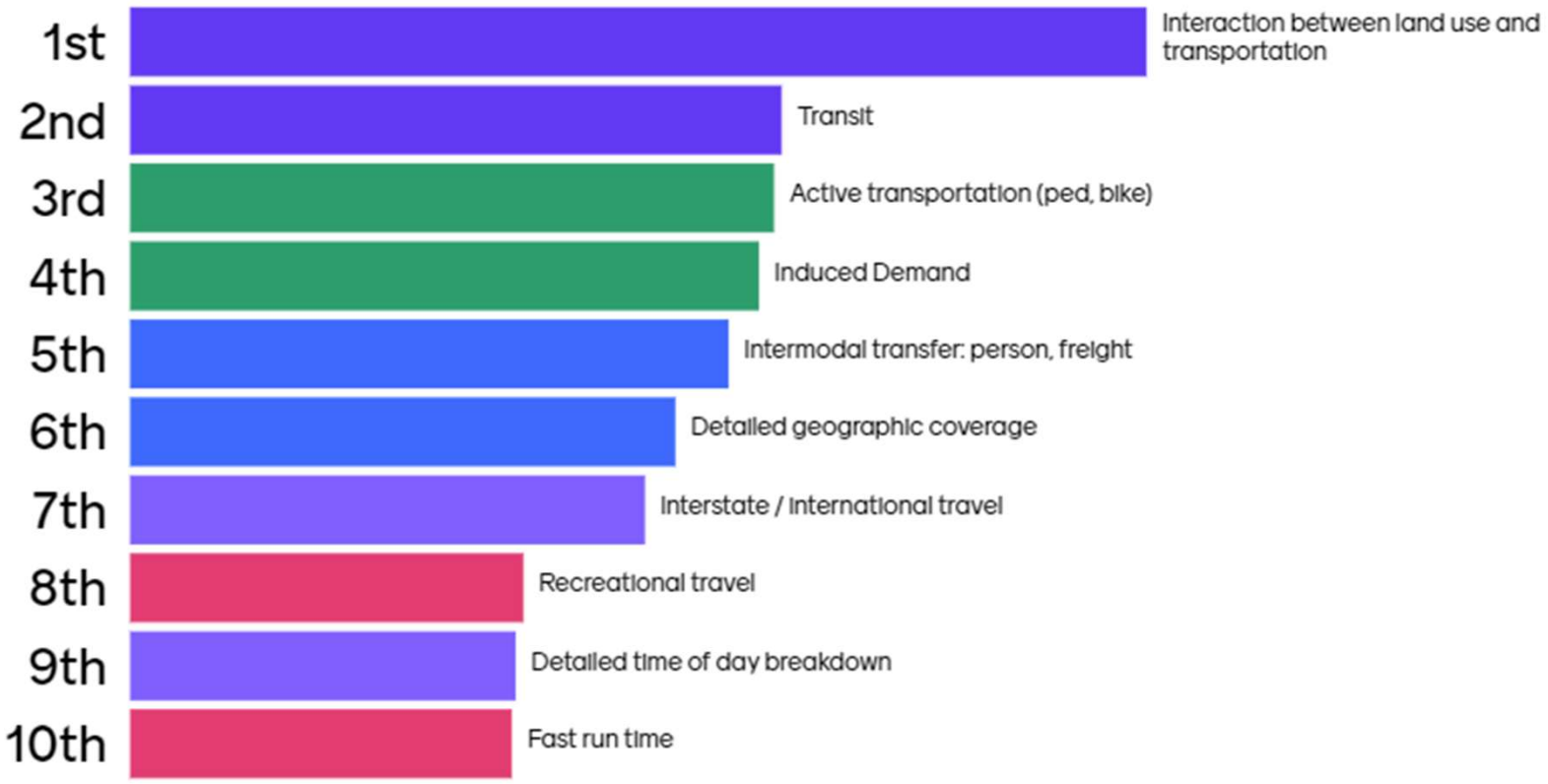
Travel Demand Forecast Models



Stakeholder Input – Potential Model Use Cases

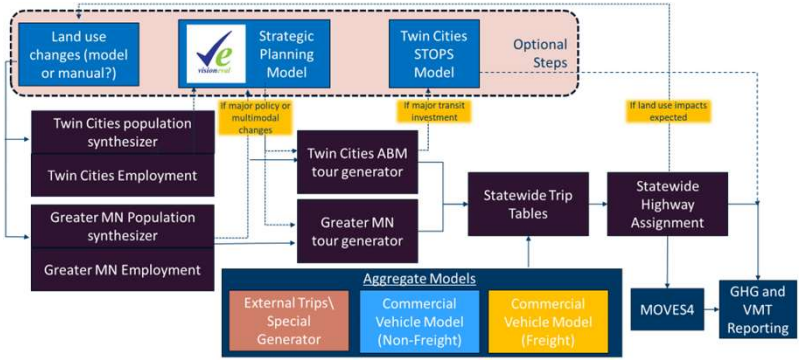
- Freight
- Corridor Planning
- Areas Without Models
- E-Commerce
- Economic Analysis
- Equity/User Analysis
- Grant Applications
- Induced Demand
- Intercity/Interregional Travel
- Land Use
- Local Roadway Projects
- Mode Shift
- Multimodal Operations
- Planning and Programming
- Project Alternatives Analysis
- Recreation
- Regional Model Integration
- Specialty Destinations
- Traffic Data Synthesis
- Travel Time Reliability
- Urban Transit

Stakeholder Input – Priority Model Characteristics

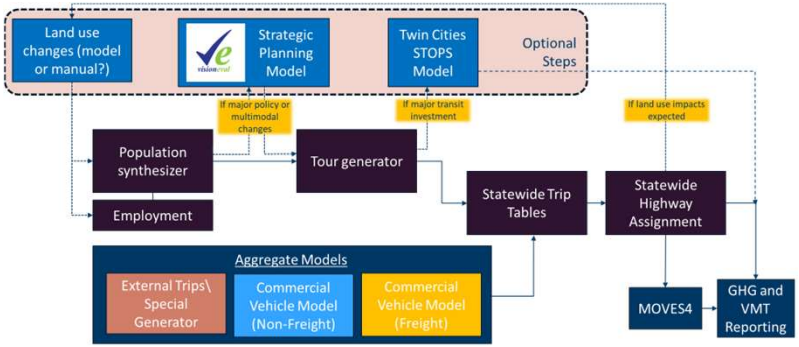


Model Scenarios…

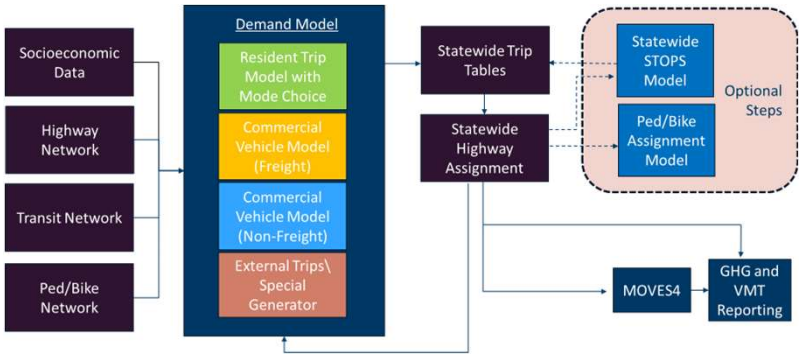
A: Greater MN + Metro ABM Integration



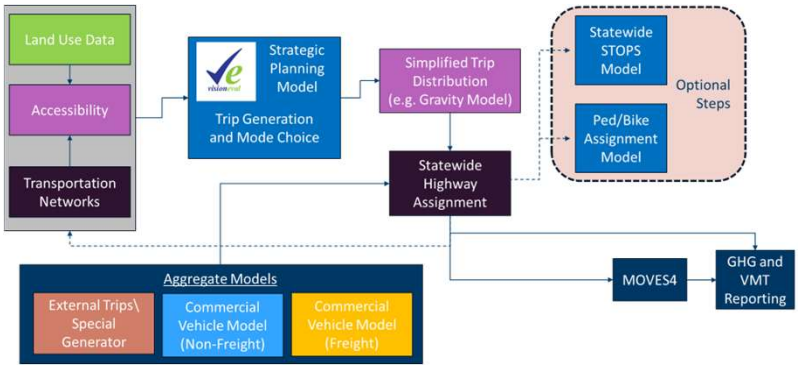
A2: Build Out Twin Cities ABM to Entire State



B/C: Statewide Trip/Tour-Based Model

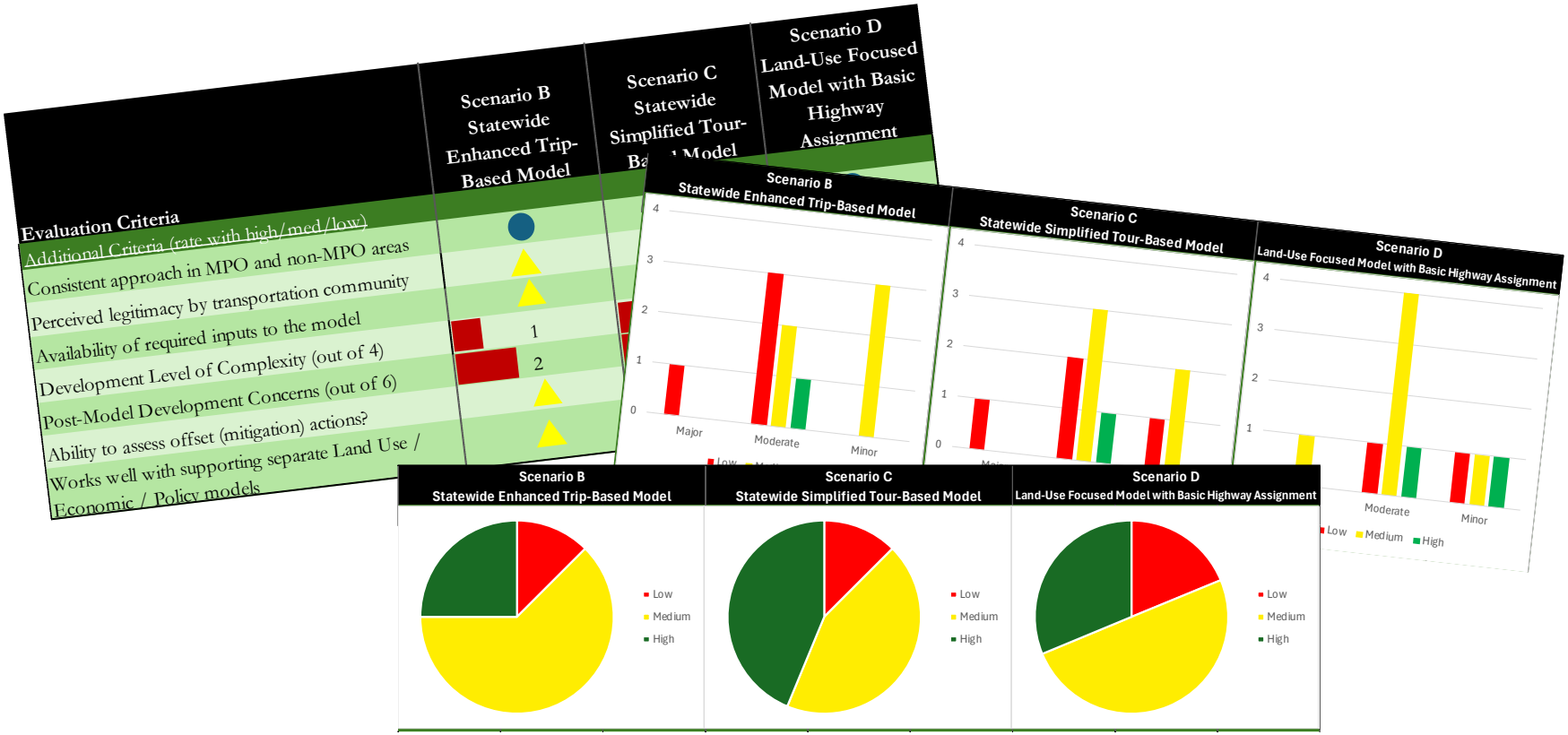


D: Land-Use Focused Model with Basic Highway Assignment



*Potential to pair any of above transportation models with nested Economic / Land Use / Policy models

Scenario Evaluations



Recommendations

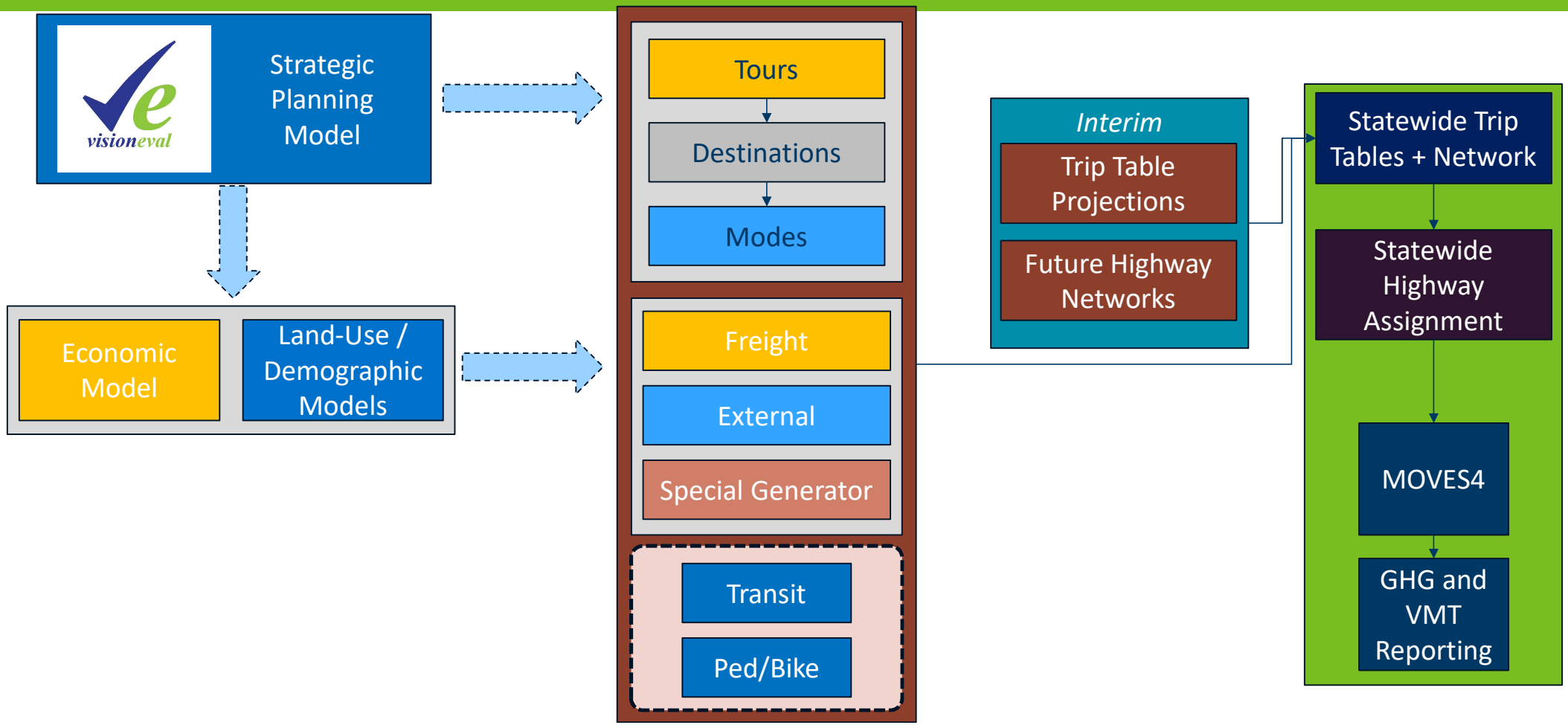
2-Track Model Structure

- Strategic Planning Model
  - Address big-picture questions about approaches to reduce transportation GHG and their costs and benefits
- Travel Demand Forecast Model
  - Emphasis on program-level GHG assessment and less on strategy development (at least initially)

Work Backwards

- Start with highway network, existing trip tables, and assignment routine. Add simple methods to extrapolate 20-year travel demand.
- Build out travel model structure using a tour-based approach
- Incorporate additional features over time (likely beyond 2027) such as freight, land use, etc.

Recommendations



Questions?

Thank you!

Contact

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