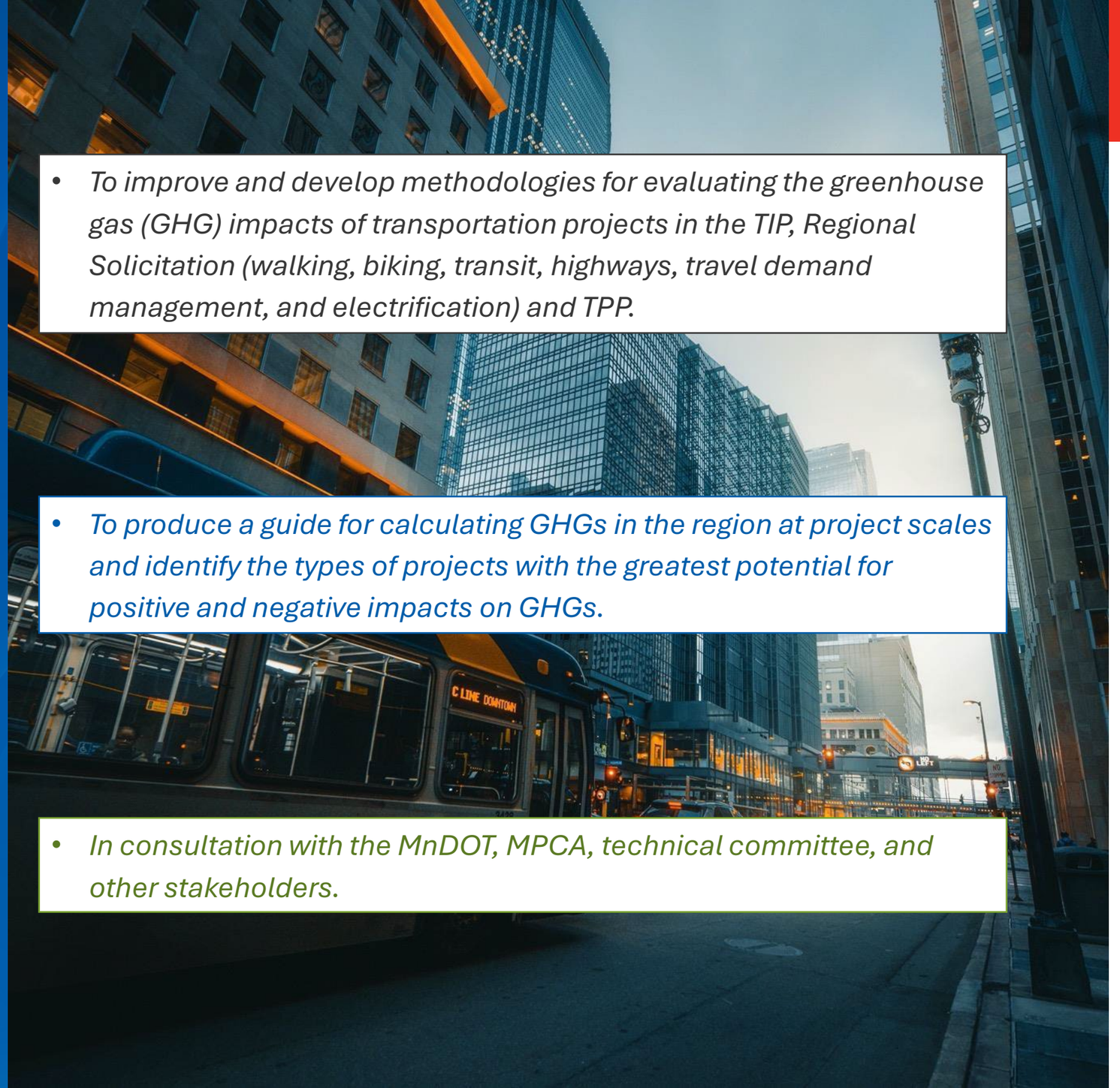
Regional Transportation and Climate Change Multimodal Measures

TAC Planning

METROPOLITAN COUNCIL

Feb 2025 |Tony Fischer

Project Overview



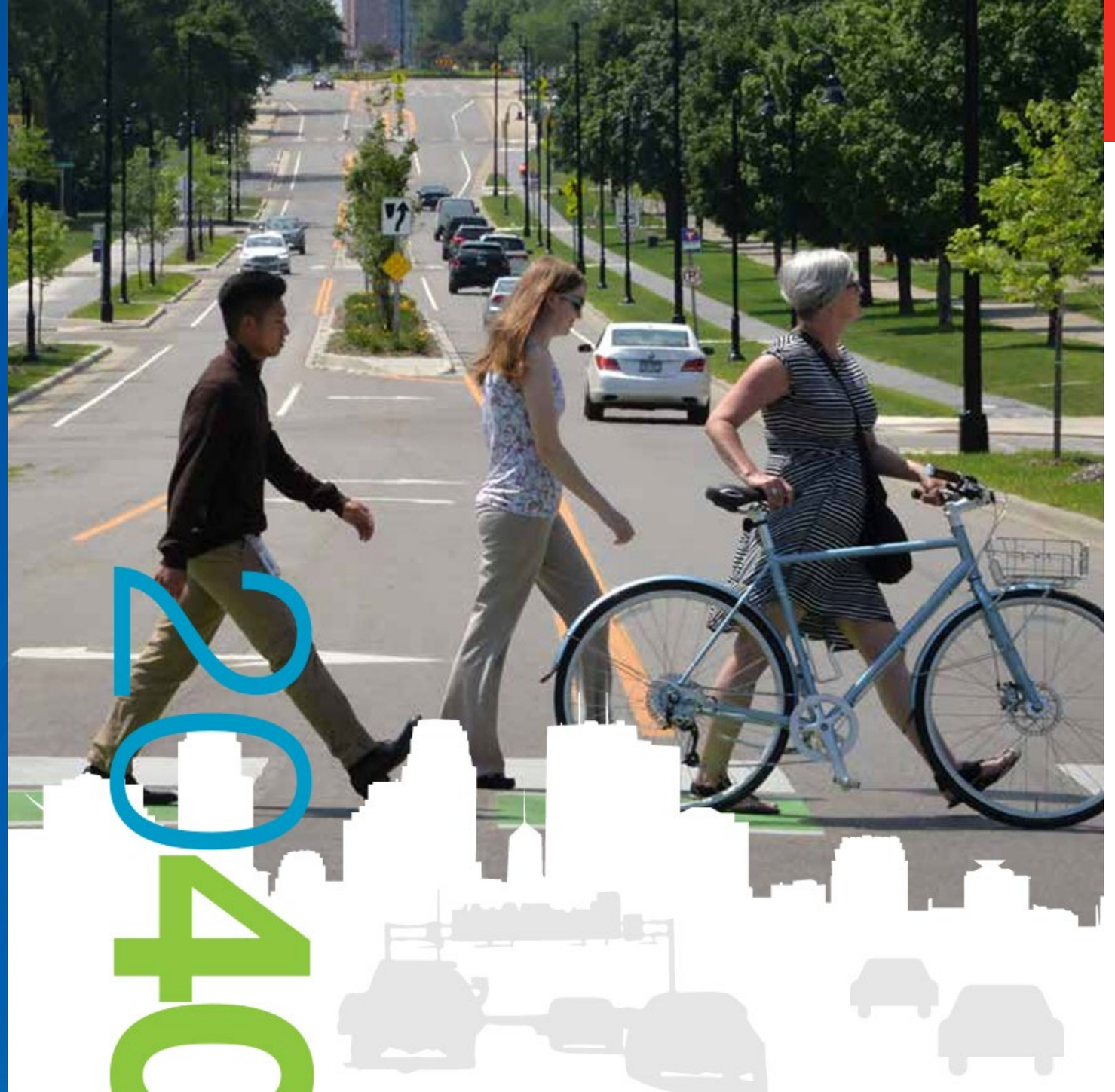
- *To improve and develop methodologies for evaluating the greenhouse gas (GHG) impacts of transportation projects in the TIP, Regional Solicitation (walking, biking, transit, highways, travel demand management, and electrification) and TPP.*

- *To produce a guide for calculating GHGs in the region at project scales and identify the types of projects with the greatest potential for positive and negative impacts on GHGs.*

- *In consultation with the MnDOT, MPCA, technical committee, and other stakeholders.*

Project Schedule and Progress

Inventory
Current Methods



Regional Solicitation

Existing Methodologies

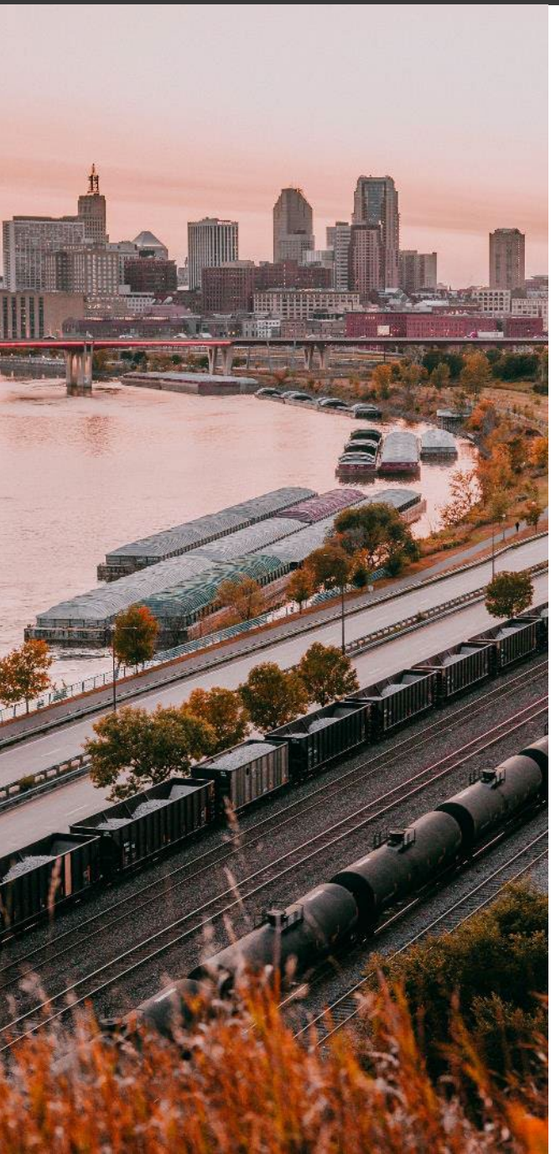
- The existing methodologies require a low to moderate level of effort.
- No direct GHG estimates.
- For certain projects, GHG impacts are indirectly assessed with vehicle miles travelled (VMT) reduction estimates:
  - Distance from terminal to terminal and ridership data for transit services
  - Commute trip distances for travel demand management (TDM) projects
- Synchro can provide fuel consumption for roadways projects, an indirect estimate of GHG impacts.
- Traffic speed/congestion effects is an indirect proxy for induced demand but considered in reverse.

Transportation Improvement Program (TIP)

Project Examples

Project Type		Description of Project Type	Grand Total
Appurtenance	Education and Safety	Travel behavior inventory and regional model development	$3,166,000
	Historic Preservation	Study for Rondo Area Street Improvements in St Paul	$1,400,000
	Median Barrier	Cable median barrier installation and resurfacing/repair projects	$12,342,000
Bike/Ped	Bridge Pedestrian	Construction and replacement of pedestrian bridges	$9,746,640
	Coop Const Agreement	Construction of bike facility	$2,670,000
	New Trail	Construct bike/ped trail or bridge	$37,147,057
	Pedestrian Ramps (ADA Improvements)	Construct ped safety improvements, protected bikeways and multiuse trails	$52,945,442
Bridge Replacement or Construction	Bridge New	Construction of bridge	$6,050,000
	Bridge Removal	Removal of bridge	$2,574,064
	Bridge Replacement	Rehabilitation or replacement of bridges, interchanges	$53,755,895

Transportation Policy Plan (TPP)



Existing Methodologies

- The 2040 forecast model was reviewed.
- The regional model takes in the future transportation network, land uses, population and jobs, and is used to forecast future travel demand and estimate performance measures.
- GHG emissions projections come from the regional travel demand model and Motor Vehicle Emission Simulator (MOVES), high level of effort.
- The travel demand model estimates some induced demand; results in approximately half of the effect of online calculators and suggested by research literature
- Construction is not considered when estimating GHG emissions associated with the TPP.

Review Best Practices

Best Practices Review

- California Air Resources Board (CARB): California Climate Investments Calculator Tools
- California Air Pollution Control Officers Association (CAPCOA): Handbook for Analyzing Greenhouse Gas Emission Reductions
- Federal Highway Administration (FHWA): CMAQ Emissions Calculator Toolkit
- San Diego Association of Governments (SANDAG): Mobility Management Toolbox – VMT Reduction Calculator Tool
- Puget Sound Regional Council (PSRC): Project Level Emissions Estimation Tool
- Minnesota Department of Transportation (MnDOT): Carbon Reduction Strategy

Key Differences in Methodologies

• Tailpipe emissions only	**vs.**	Tailpipe + upstream (well-to-wheels)
• Before/after activity (ridership, bicyclists, etc.)	**vs.**	Change in activity calculated using elasticity
• Considers changes in transit vehicle emissions	**vs.**	Ignores changes in transit vehicle emissions
• Applies mode shift factor (fraction previously SOV)	**vs.**	Assumes all new riders/cyclists were previously SOV
• Result expressed in tons of GHG emissions	**vs.**	Result expressed in percent change in GHG emissions

Recommended Methodologies

GHG Quantification Recommendations Key Considerations

- Incorporate key feedback and input from technical meetings:
  - TIP discussions with MnDOT
  - A total of three meetings dedicated to TPP
  - Work groups for Regional Solicitation project categories: Electrification, Transit, Bicycle and Pedestrian, TDM, and Roadways
- Balance effort against precisions and completeness
- Account for vehicle well-to-wheel emissions
- Capture emission benefits and disbenefits throughout the entire project lifetimes
- Apply national best practices with regional-specific input parameters (updated regularly)
- Provide recommendations to collect project-related information for future methodology refinement

Summary of Methodology - Transit

- Begins with ridership forecasts
- Considers the percentage of new transit users who would have driven if transit options were unavailable.
- New emissions from added transit are reflected.
- Rather than relying on terminal-to-terminal distances, it utilizes the average distance of transit trips to calculate the reduction in VMT for each trip.
- Opportunity to better estimate ridership, including the secondary impact on ridership due to improved connectivity to transit stations.

Summary of Methodology - TDM

- Commuter trip reduction projects:
  - Depends on project sponsors to assess the reduction in the number of commute trips.
  - Considers the differences in average commute distances throughout the region.
- Shared mobility projects:
  - Evaluates the potential of reducing VMT based on the type of vehicle/equipment used and population within 3 miles.
    - Elasticity differs for micromobility trips vs. vehicle trips
  - Accounts for deadhead miles for ridesharing or carsharing services.

Summary of Methodology – Bike/Ped

Method relies on elasticity models.

- The approach requires an annual average daily traffic (AADT) estimate on the road next to or parallel to the new facilities.
- Facilities built close to key destinations earn additional credits. Met Council staff will need to develop map layers that inventory key destinations.
    - Eligible key destinations encompass banks, post offices, childcare facilities, grocery stores, medical centers, office parks, pharmacies, places of worship, public libraries, public parks, schools, universities, and colleges.

Summary of Methodology - Electrification

Involves comparing estimates of internal combustion engine vehicles with electric vehicles (EVs) and VMT.

- The approach considers emissions from the upstream generation of electricity, recognizing that EVs are not entirely "zero-emission".
- It is recommended to gather information on:
  - Current and upcoming charging infrastructure projects to understand regional charger usage, with a particular emphasis on the active in-use hours for different types of charging stations (Level 2 vs. Direct Current Fast Charging).
  - Outcomes from outreach events to understand how effectively these events encourage drivers to transition to EVs.
- Future methodological enhancements could directly address medium- to heavy-duty EVs.

Summary of Methodology – Roadways

The quantification of roadway projects primarily follows the existing methodology using Synchro.

- The emission factors related to idling and speed-dependent running have been revised.
- Project sponsors are highly encouraged to document both build and no-build scenarios.
- A new component has been added to evaluate the induced demand associated with improved corridor speeds.

TPP and TIP

- TPP
  - Induced demand comparison
  - Update EV forecast integrated into baseline
  - Upstream and lifecycle emissions across all vehicle types/fuels (consistency)
  - Consider construction emissions
- TIP
  - TIP does not include sufficient information for independent GHG estimates.
  - Project sponsors could either submit GHG estimates in line with established guidelines or propose their own methods.
  - More discussion needed.

Review and Update Inventory

Inventory Update

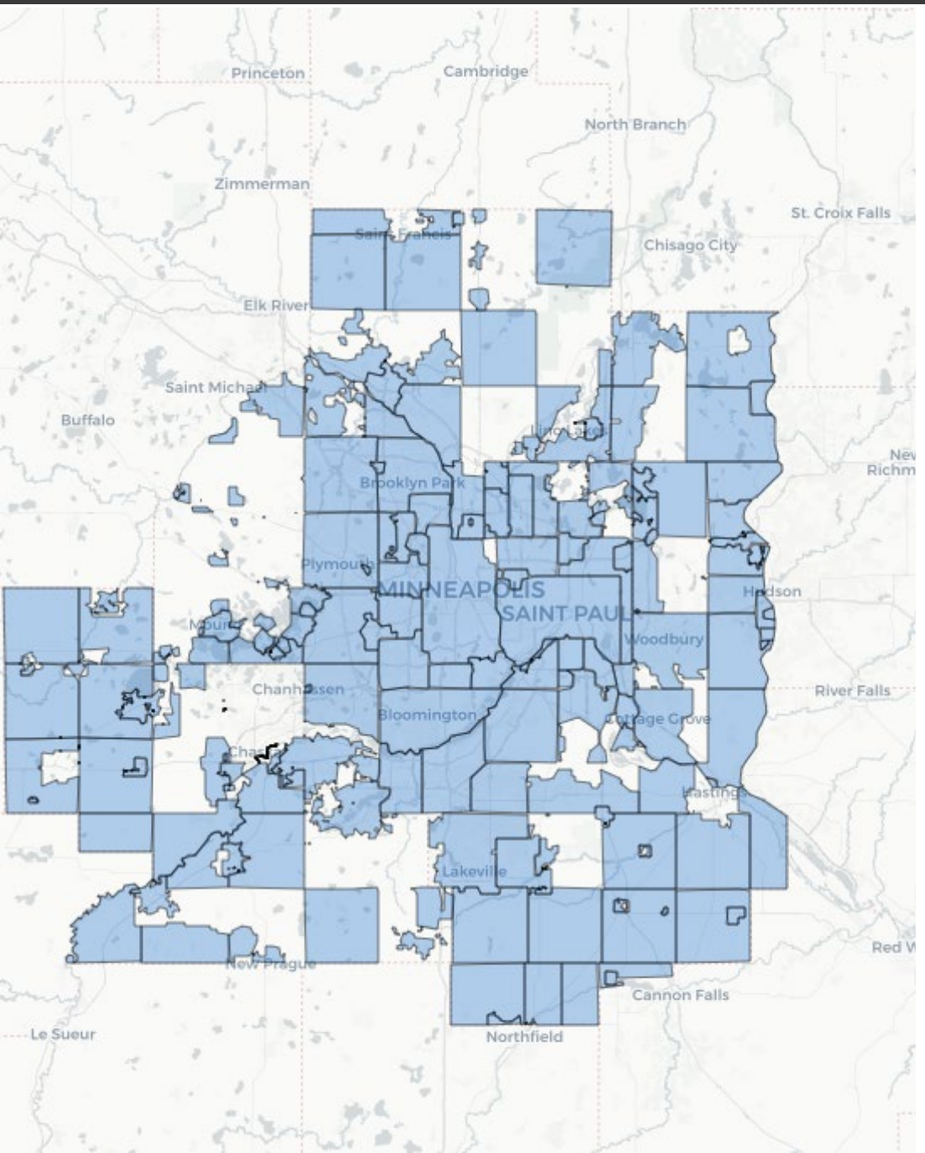
Evaluated GHG Strategy Planning Tool and Priority Climate Action Plan done as part of our Climate Pollution Reduction Grant (CPRG)

Recommendations

- Update baseline data to more closely resemble CPRG miles travelled
- Account for well-to-pump (e.g., fuel production, distribution, and delivery) of combustion fuels for more direct comparison to EV emissions
- Update GHG emission factors used in transportation embodied emissions calculation from 2014 EPA GHG Emission Factor Hub to 2024 EPA GHG Emission Factor Update
- Consider GREET model lifecycle GHG emissions in place of elasticity-based approach to estimate embodied emissions
- Consider including the latest federal and state EV sales forecasts in future scenarios

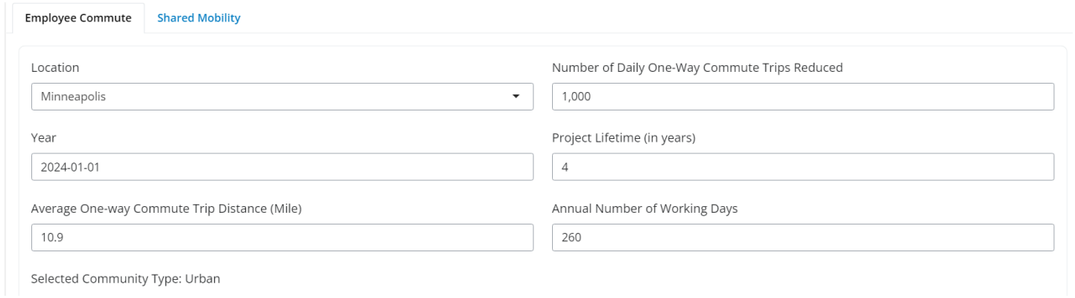
Implementation

R-Based Transportation GHG Tool



Map-Based Tool Features

- An easy map-based tool to input and extract necessary information for project evaluations
- Calculates the residential population within a specified radius
- Enables mapping to community type which assigns the commute distances and other trip attributes
- Incorporates the defined fleet data for each city into our displaced vehicle miles traveled calculations



Currently in the beta testing phase:

https://metcouncilicf.shinyapps.io/transport-emission-shiny/

Roadways Methodology Comparison

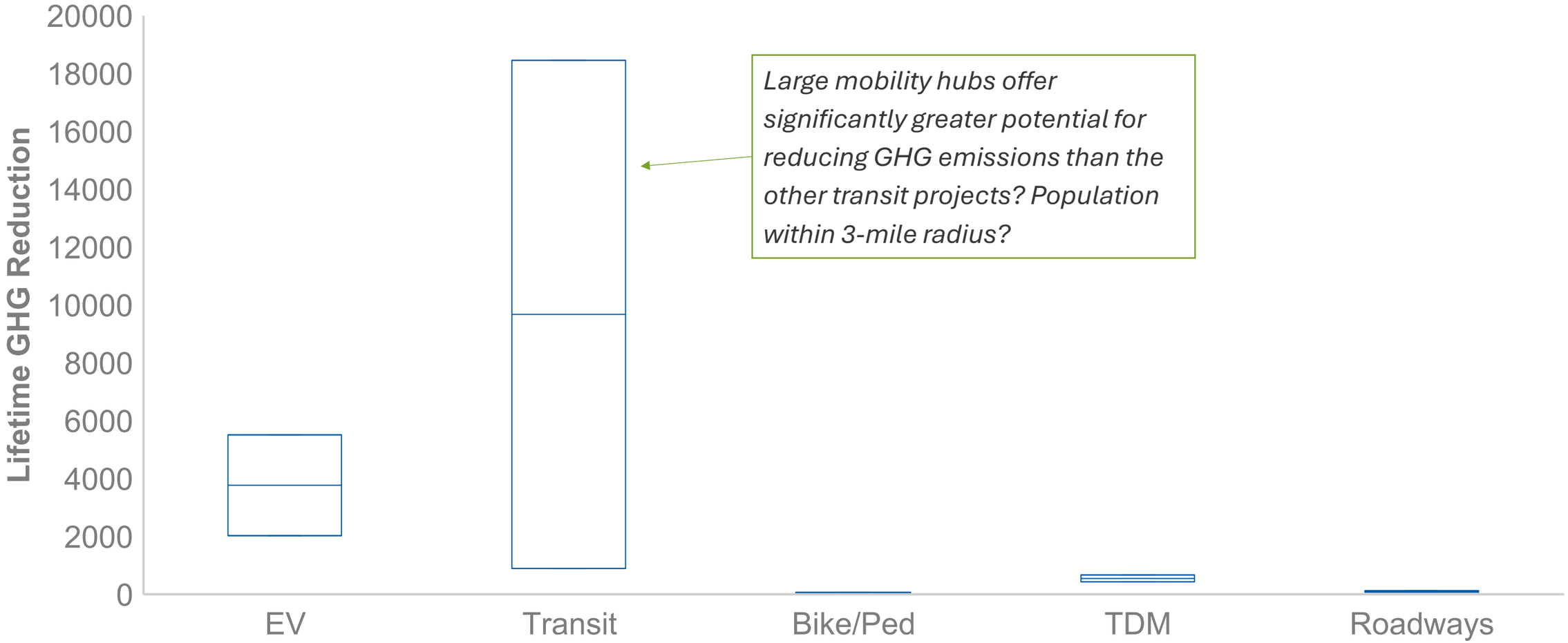
- Applications:
  - Synchro: High-level planning, traffic signal optimization.
  - SimTraffic: Detailed operational analysis, scenarios with significant vehicle dynamics.

- Key Takeaway:
  - Choice depends on detail level, effort required, and specific analysis objectives.

Comparison from a Corridor Study

	Synchro	SimTraffic
Fuel Used (Gallon)	625	193.8
Total Delay (s/veh)	76	59.1
Stop/Veh	0.29	1.59

GHG Emission Impact – Sample Projects



Next Steps

Regional Solicitation – What's Next?

- Beginning in spring a Regional Solicitation Special Issue Working Group for Climate will be established to dig into this topic area further.
- R-based transportation GHG tool should be utilized and incorporated into the ongoing application process to evaluate projects.
- Some projects lack region-specific data and may require data reporting from funded initiatives to better understand how the current elasticity or methodology applies to local projects:
  - Mobility hubs, EV education and outreach, and the installation of public EV charging infrastructure.
- For roadway projects, considerable discrepancies among Synchro, SimTraffic, and FHWA's CMAQ results. Consider lookup table by project type (e.g., interchange, lane expansion) and scaling parameters (e.g., AADT, level of congestion reduction)
- Construction emissions can be quantified using the Minnesota Infrastructure Carbon Estimator (MICE) tool.

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