NCHRP 23-07: Effective Methods for Setting Transportation Performance Targets

TPM Webinar Series

Congestion Measures, June 16, 2022

ICF

With support from **HIGH STREET** · **applied pavement TECHNOLOGY**

Agenda

- Welcome

- Overview of Methods for Congestion Measures

- Examples of Effective Practices
  - Memphis MPO
  - Metropolitan Washington Council of Governments

- Discussion
  - Share your experiences with each other
  - Technical issues in setting targets
  - Processes, communications, and decision making

Navigating Zoom

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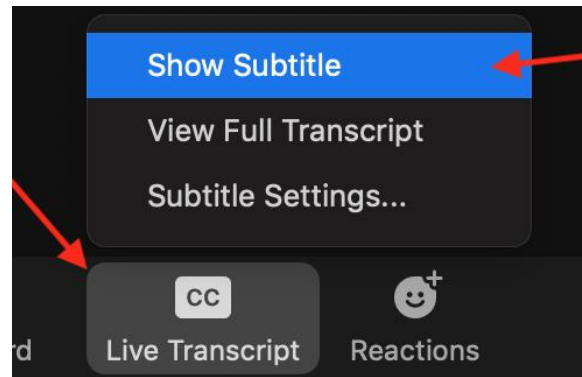
To ask a question, type the question in the chat or click "Raise Hand" to be called on.
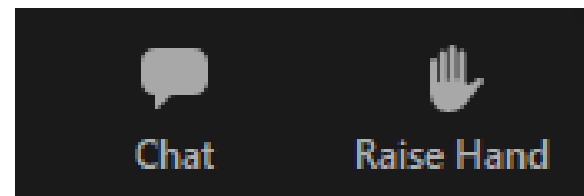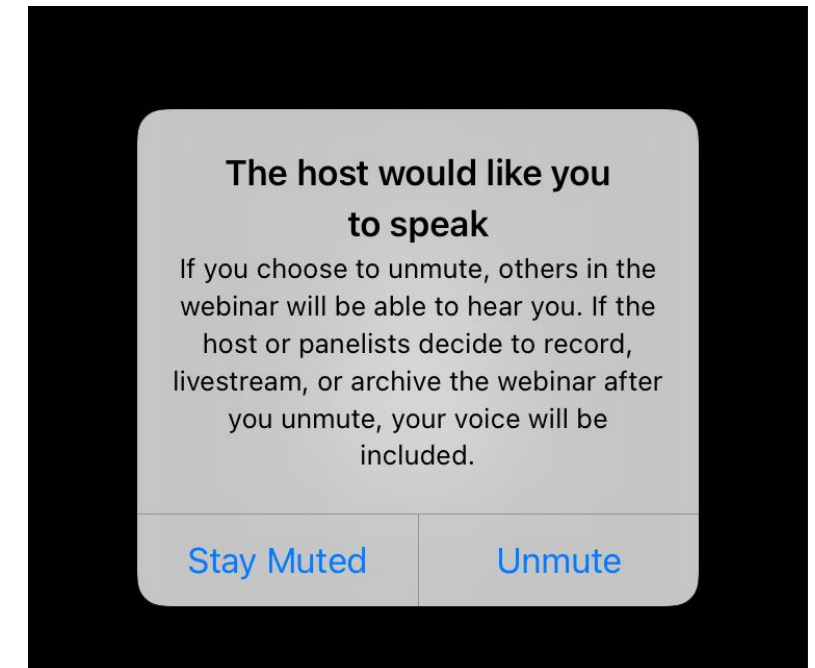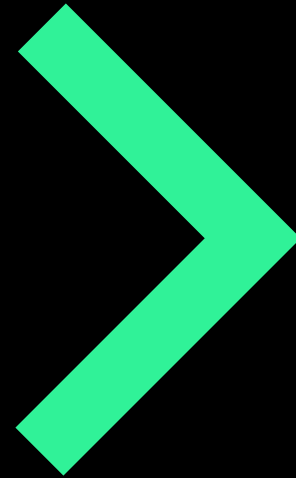

If your hand is raised, we will give you the capability to unmute and ask a question.

Guidebook Purpose

> To help State DOTs and MPOs identify effective methods for setting transportation performance targets.

Guidebook Contents

Part I. Target Setting Overview and Tips

Introduction to Guidebook

Target Setting Foundations

Practical Application Tips

Part II. A Menu of Target Setting Methods

Target Setting Methods for Safety

Target Setting Methods for Infrastructure Condition

Target Setting Methods for Reliability

Target Setting Methods for Traffic Congestion

Part III. Target Setting for Non-Required Measures

Why Use and Set Targets for Other Measures?

Examples of Performance Measures and Targets

Types of Target Setting Methods Used

- ## Policy-Based
  - E.g., annual decrease of 3%

- ## Historical Trends
  - E.g., based on trend over past 5 years

- ## Probabilistic and Risk-based Approaches
  - E.g., considering potential variability in performance

- ## Statistical Models that account for Explanatory Factors
  - E.g., regression model

- ## Other Tools and Models
  - E.g., pavement management systems

Target setting philosophies
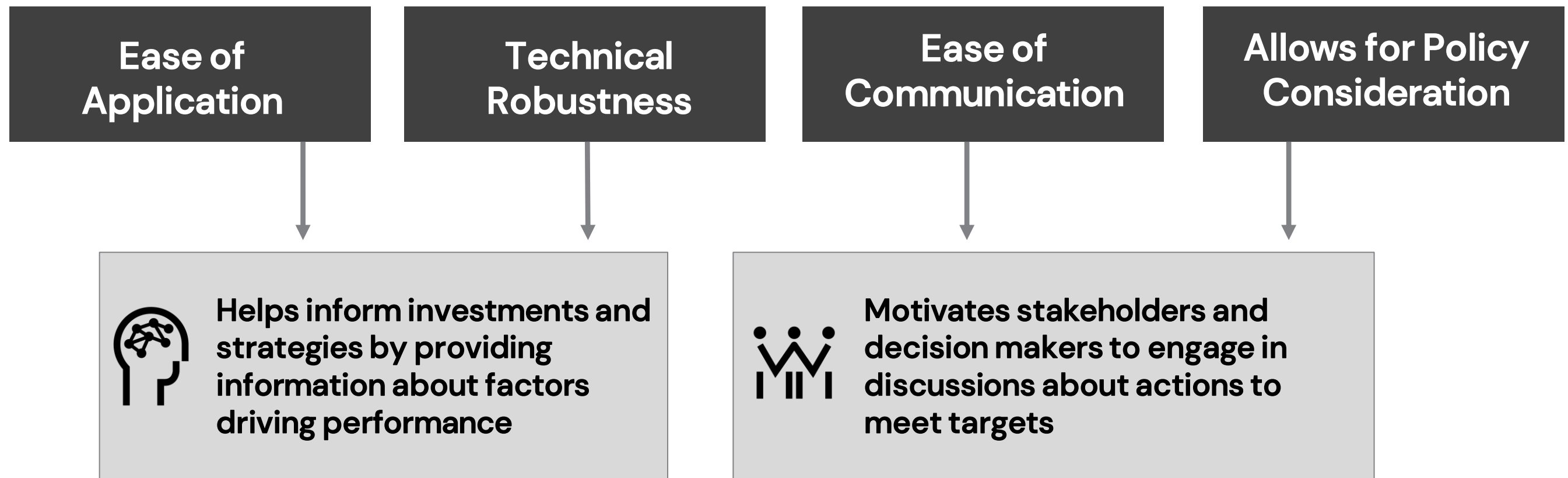
Conservative
Help ensure the agency can attain the target

←→

Realistic/ Predictive
Level most likely to occur

←→

Aspirational
Reflect commitment to improved outcomes
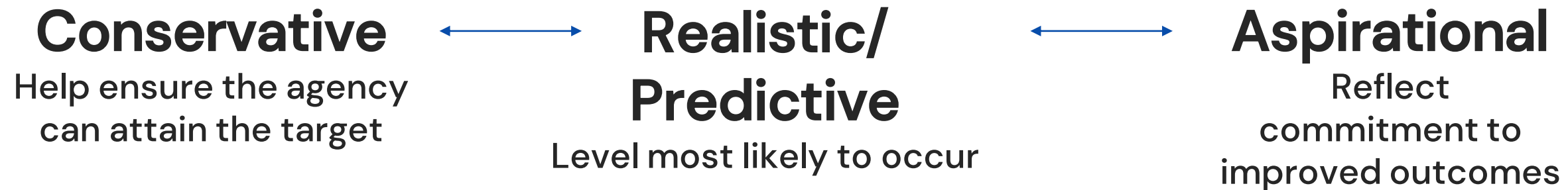
Guidebook Part I: Target Setting Overview and Tips

What Makes a Target Setting Method Effective?

Ease of Application	Technical Robustness	Ease of Communication	Allows for Policy Consideration

Helps inform investments and strategies by providing information about factors driving performance

Motivates stakeholders and decision makers to engage in discussions about actions to meet targets

Congestion Performance Measures

1. Annual Hours of Peak Hour Excessive Delay (PHED) per Capita

2. Percent Non–Single Occupancy Vehicle (non–SOV) Mode Share

Guidebook Part II: Target Setting Methods

Simpler to implement & communicate ↑

More data-heavy ↓

| Method	Strengths	Limitations	Other Considerations
Policy based The target is set based on a policy direction (e.g., to increase non-SOV mode share)	Simple, easy to communicate, and brings in stakeholders; in line with agencies' aspirations.	May not be realistic or align with trends.	–
Building off baseline, with assumptions Maintaining the baseline level as the target or making an adjustment based on judgement	Simple, easy to communicate and often brings in stakeholders.	May be no rigorous methods for the adjustments.	Method for agencies with limited data. Agency will need to decide which exogenous factors are relevant.
Time series trend analysis Forecast based simply on historical performance trend	Simple approach. Does not require special analysis tools. Data-driven.	No insights into causes of outcomes.	May result in a worsening target, which can pose communications challenges or conflict with stated goals.
Trend plus other factors Expands upon trend analysis to account for other factors that may shift future performance	Still relatively simple, data-driven, and brings in additional factors.	There may still be no rigorous methods for the adjustments – sometimes adjustments may not be data-driven.	May result in a worsening target, which can pose communications challenges or conflict with stated goals. Agency will need to decide which exogenous factors are relevant.
Travel forecasting model Uses regional travel model to forecast future congestion, often with anticipated change applied to baseline PHED and non-SOV measures	Fuller understanding of causes of outcomes, fully data-driven, and may support linking the target setting process with decision-making by informing what factors can be influenced	Models often do not account for all factors well, such as bicycle/pedestrian improvements and telework policies.	May result in a worsening target, which can pose communications challenges or conflict with stated goals. Generally requires additional model analysis beyond what is typically conducted for (long-range) planning.

Guidebook Part II: Target Setting Methods

1. Policy-based

Selected to align with long-range plan target (e.g., 2040 target) for non-SOV mode share showing pathway to reach long-range target.
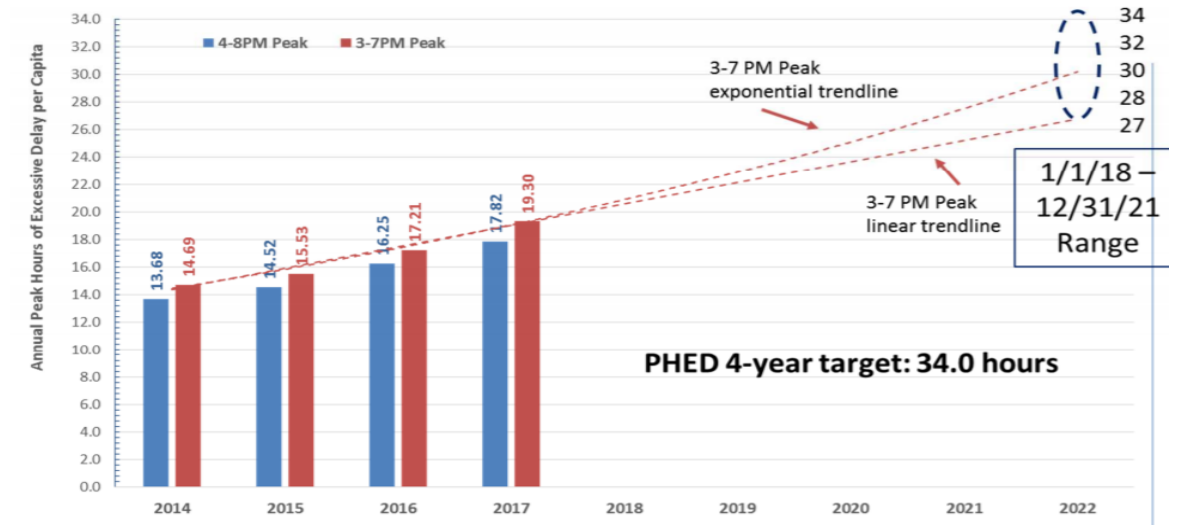
2. Building off Baseline

Set target at baseline level or adjust off baseline based on consideration of factors such as transportation investments.

3. Time-Series Trend
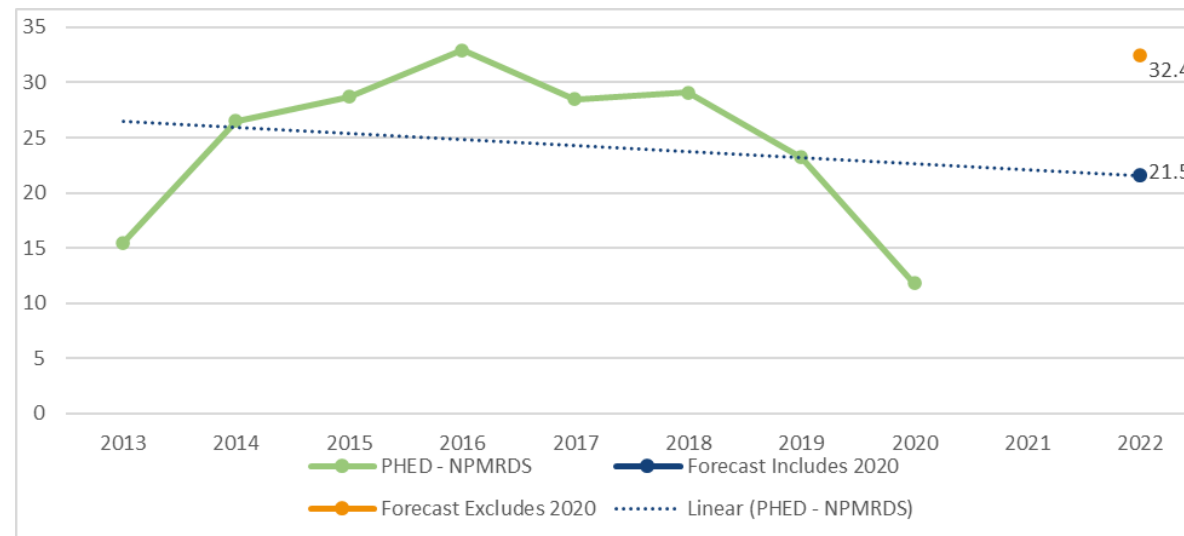
Seattle UZA. Source: Washington State DOT

4. Trend Plus Other Factors

Charlotte, NC–SC UZA. Source: North Carolina DOT

5. Travel Forecasting Model

Use regional model to estimate delay (can use threshold for excessive delay) and/or non-SOV mode share; use results to adjust off baseline.

Presenters

Memphis MPO

Nick Warren

Method:

Trend Plus Other Factors

Metropolitan Washington COG
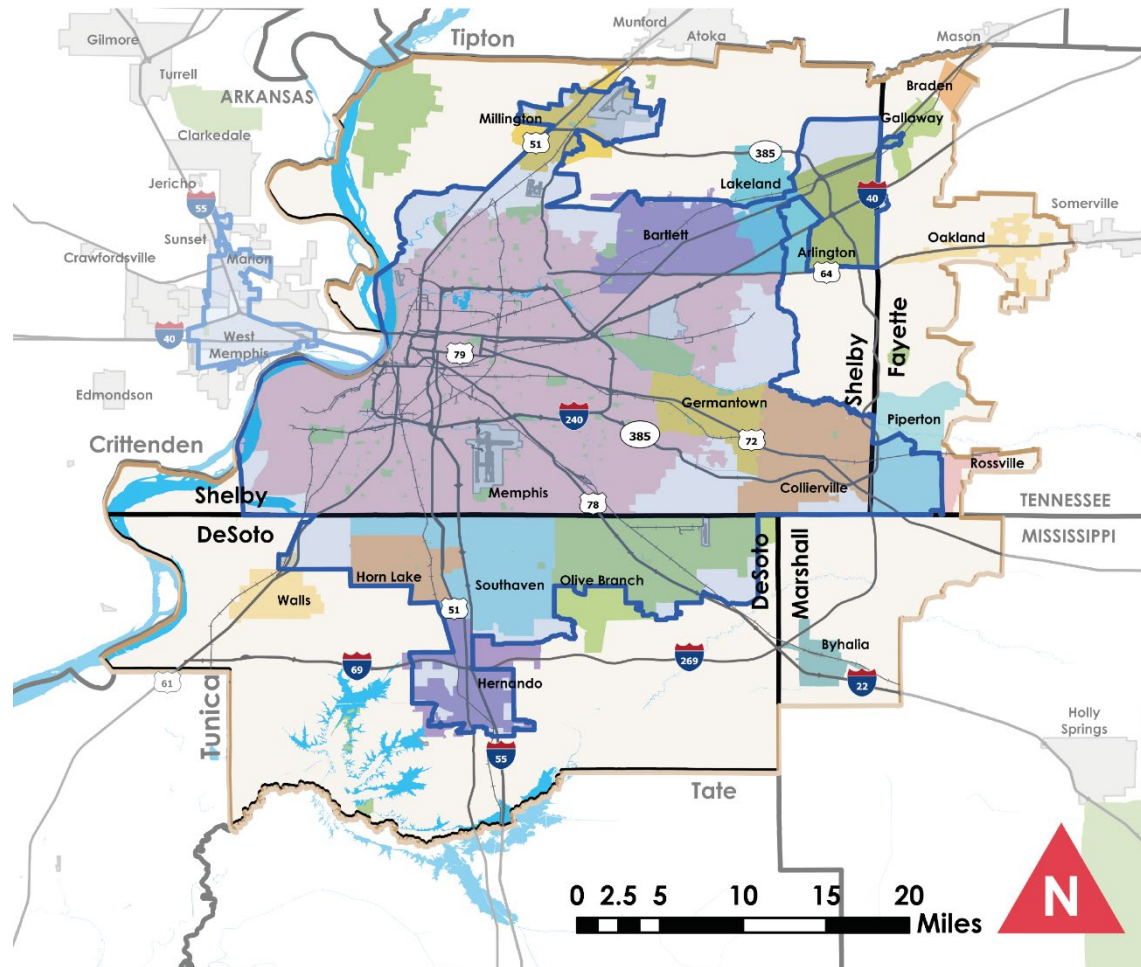
Eric Randall

Method:

Time-Series Trend Analysis

Travel Demand Model

Performance Measure Target Setting
Non-SOV & PHED

Nick Warren
Transportation Planner

Memphis Urban Area MPO
Date: June 16, 2022

Memphis MPO
METROPOLITAN PLANNING ORGANIZATION

Who We Are

- **18 Municipalities**
- **4 Counties**
  - DeSoto
  - Fayette
  - Marshall
  - Shelby
- **2 States**
  - Mississippi
  - Tennessee
- **Tri-State Urbanized Area**
- **Population: 1.15 Million**

LEGEND

	MPO Planning Area		County Line
MPO Municipalities		Major Roadways
Memphis TN-MS-AR Urbanized Area		Railroads
Airports		

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Background/Requirements

- **Area Characteristics**
  - ✓ Designated Urbanized Area
  - ✓ Contains NHS Mileage AND
  - ✓ Population Over 200,000*

- **Nonattainment or Maintenance Area**
  - ✓ **Ozone (O3)** – Currently in Maintenance
  - ✓ **Carbon Monoxide (CO)** – In Maintenance at the Time of Applicability Determination
  - ✗ **Particulate Matter (PM10 or PM 2.5)** – Currently in Attainment

- **Required to Establish One Unified Target for the Memphis TN-MS-AR Urbanized Area**

*Phase In –   For the first performance period, the population criteria applied to urbanized areas with populations over 1 million.

Target Setting: 1st Performance Period (2018-2021)

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2017 2018

Nov	Dec	Jan	Feb	Mar	Apr

Tri-State Working Group Meetings

TN & MS ETC Workshops

Targets Adopted
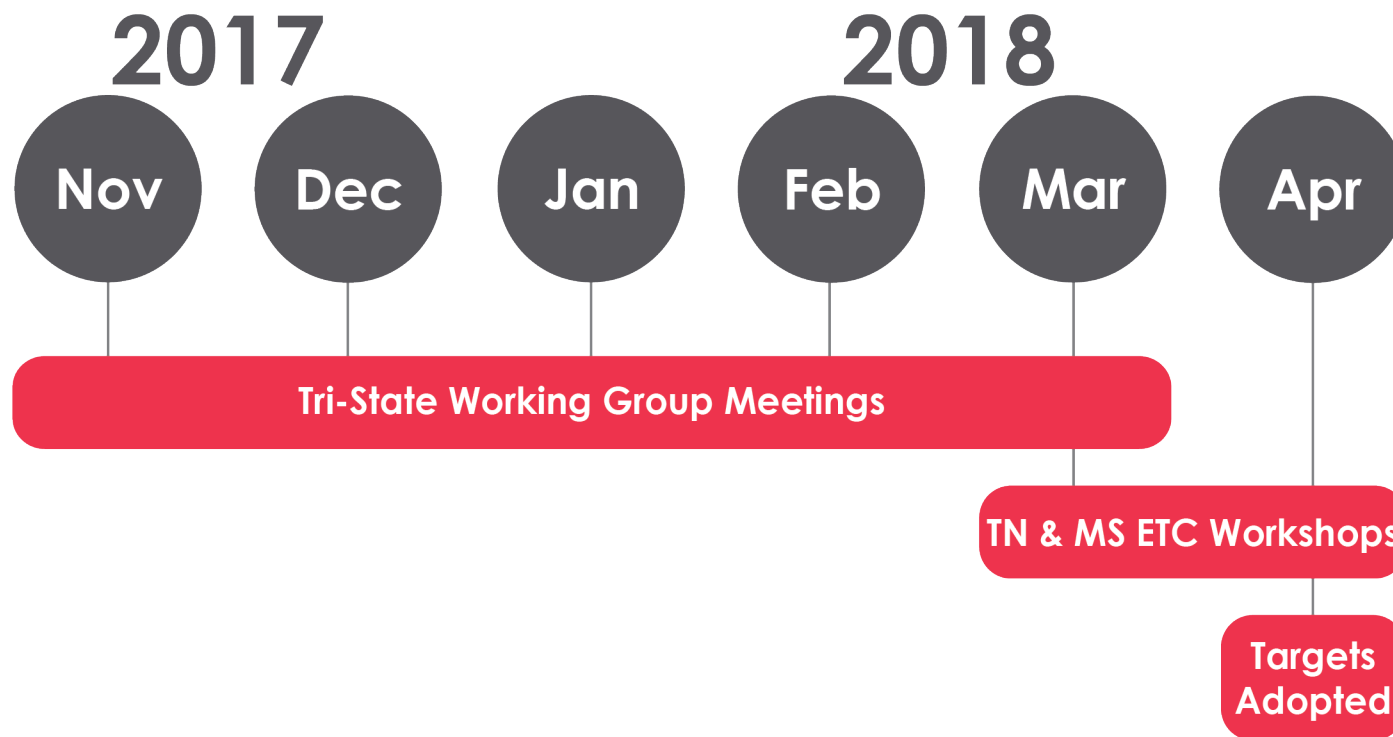
Target Setting Timeline & Factors for Consideration

- **Timeline:**
  - 5 Tri-State Working Group Meetings
  - 2 Engineering & Technical Committee Workshops
- **Factors for Consideration – Non-SOV**
  - Historically, Regional Development Geared Toward Low-Density Development
  - Upcoming Projects
  - Gas Prices
  - Transit Service Cancelled in West Memphis Area
  - Historical Non-SOV Trends
- **Factors for Consideration – PHED**
  - Multiple Datasets
  - Tools to Calculate Metric
  - Population Growth
  - Upcoming Projects
  - Historical PHED Trends

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Memphis, TN-MS-AR Non-SOV
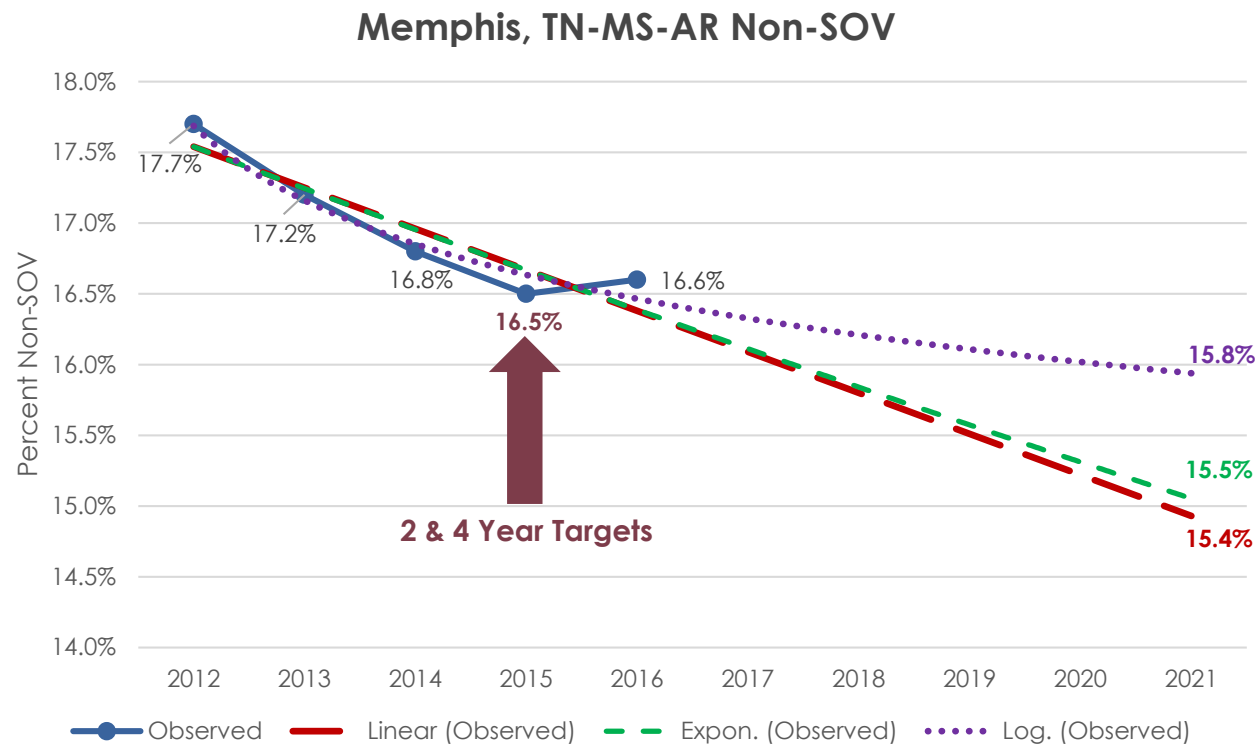
Target Setting Process- Non-SOV

- **Analysis**
  - Focus on Historical Trends & Upcoming Projects
  - 5 Most Recent Years of Available Data from American Community Survey
  - Multiple Projection Types
  - Input from Stakeholders
- **Decision on 2-Year & 4-Year Targets**
 - Conservative & Realistic
  - Data-Driven

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Memphis TN-MS-AR Urbanized Area PHED									
Year	Index Year	Population	PHED (HERE Observed)	PHED/Capita (HERE Observed)	PHED (INRIX Observed)	PHED/Capita (INRIX Observed)	INRIX Trend Projections (HERE 2014-2016 Growth Trend)		
							Linear $y = 2.5984x + 8.42$	Exponential $y = 8.42e^{0.1341x}$	Logarithmic $y = 4.4826\ln(x) + 8.42$
2014	1	1,071,406	18,096,547	16.89					
2015	2	1,075,471	19,976,886	18.58					
2016	3	1,074,615	23,735,244	22.09	12,349,250	11.49	11.49	11.49	11.49
2017	4	1,074,615			9,043,447	8.42	8.42	8.42	8.42
2018	5						11.01	9.62	11.52
2019	6						13.61	11.00	13.34
2020	7						16.21	12.58	14.63
2021	8						18.81	14.39	15.63

Target Setting Process- PHED

- **Analysis**
  - Focus on Historical Trends & Upcoming Projects
  - Input from Stakeholders
  - Analysis Tools
  - 4 Years of Available Data (2014-2016 HERE Data, 2016 & 2017 INRIX Data)
  - Multiple Projection Types
- **Decision on 4-Year Target**
  - Data Driven & Conservative Approach

Memphis, TN-MS-AR PHED
INRIX Trend Projections
(HERE 2014-2016 Growth Trend)

4 Year Target

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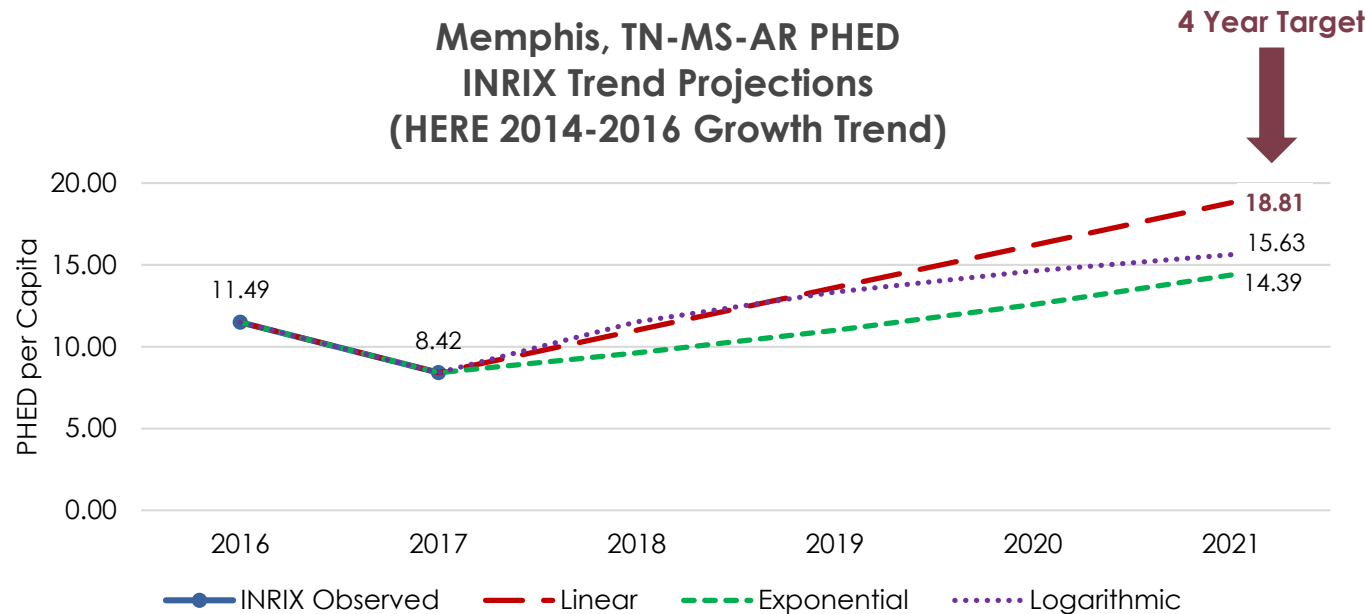
Memphis, TN-MS-AR Non-SOV
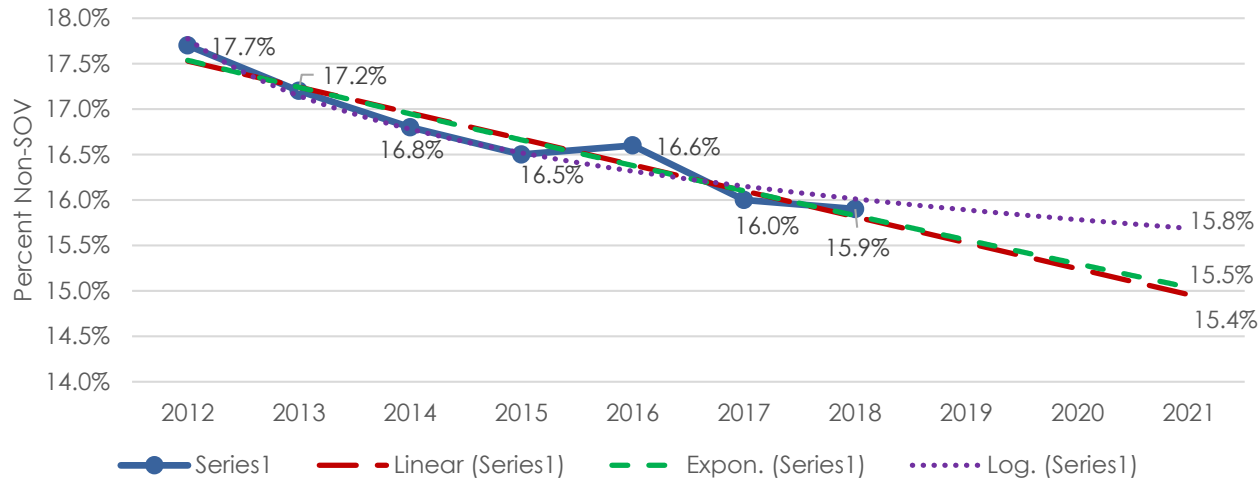
Memphis, TN-MS-AR PHED (INRIX)
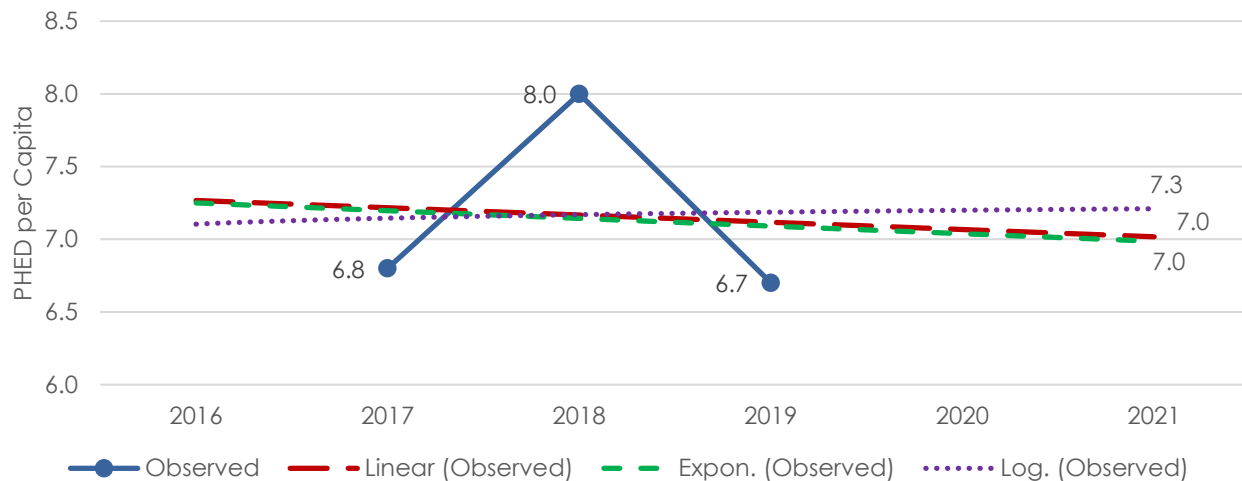
Target Setting Process-Mid-Point Performance Period

- **Timeline**
  - 3 Tri-State Working Group Meetings
- **Updated Non-SOV 4-Year Target**
  - New Data & Continual Decline in Non-SOV Travel
  - Impacts of COVID-19
- **Updated PHED 4-Year Target**
  - New Data & Consistent Dataset
  - UT Tool vs. RITIS Tool
  - Impacts of COVID-19
- **Decision on 4-Year Targets**
  - Non-SOV Target – 14.5%
  - PHED Target- 8.0h

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Hernando-DeSoto (I-40) Bridge Closure

Source: ArDOT

Memphis, TN-MS-AR PHED (RITIS)

Target Setting Process-Results & Lessons Learned from 1st Performance Period

- **Results from 1st Performance Period**
  - Non-SOV- *To Be Determined*
  - PHED – *Target Not Achieved*

- **Lessons Learned**
  - Assessing Historical Data
  - Trend Analysis Helpful in Guiding Discussion, Target Setting Process
  - Difficult to Account for Impacts of Emergency Events & Nonrecurring Congestion

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Target Setting: 2nd Performance Period (2022-2025)

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Memphis, TN-MS-AR Non-SOV

Method of Travel	2015	2016	2017	2018	2019	2020
Drove Alone	83.5%	83.4%	84.0%	84.1%	84.1%	83.2%
Carpooled	9.7%	9.7%	9.3%	9.4%	9.5%	9.8%
Transit	1.4%	1.3%	1.2%	1.1%	0.9%	0.8%
Walked	1.3%	1.3%	1.2%	1.1%	1.1%	1.0%
Bicycle	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%
Taxi	1.3%	1.3%	1.3%	1.3%	1.1%	0.9%
At Home	2.6%	2.8%	3.0%	3.0%	3.2%	4.2%
% Non-SOV	16.5%	16.6%	16.0%	15.9%	15.9%	16.8%

Memphis, TN-MS-AR PHED per Capita
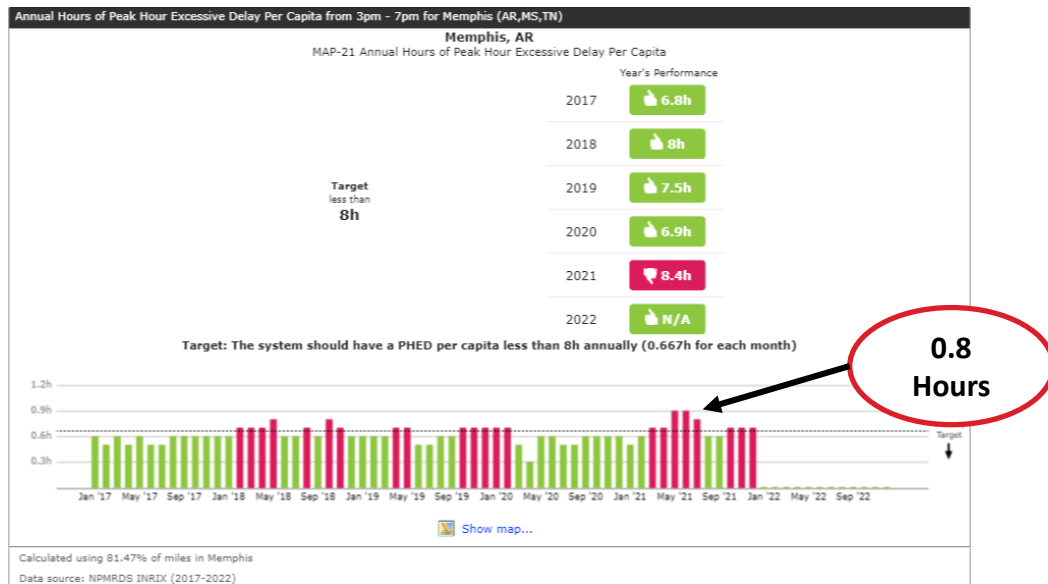
Target Setting Process- 2ⁿᵈ Round

- **Timeline**
  - November 2021 - May 2022
  - 3 Tri-State Working Group Meetings
- **Non-SOV 2-Year & 4-Year Targets**
  - Average of 2015-2019 Data
  - **16.2%**
- **PHED 2-Year & 4-Year Targets**
  - Highest Observed 2021 Monthly Value (0.8) Multiplied by 12
  - **9.6h**

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Integration of Measures & Targets into MPO Planning Products

Integration of Measures & Targets into MPO Planning Products

- **Transportation Improvement Program**
  - TIP Project Prioritization Criteria
  - Linking Investment Priorities
- **Congestion Management Process**
  - Annual Tracking
  - Regionally Accepted Definition for Congestion
- **Annual Performance Measures Report**
  - One Stop Shop

Contact Information

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PERFORMANCE BASED PLANNING & PROGRAMMING

CMAQ Traffic Congestion Presentation

Eric Randall, TPB Transportation Engineer

NCHRP 23-07 Workshop: Effective Congestion Measures Target Setting Methods
June 16, 2022

National Capital Region
Transportation Planning Board

Contents of Presentation

- TPB Overview

- PBPP Coordination

  - TPB Approach

  - Methodology for Data Forecasting

- CMAQ Traffic Congestion measures & targets

  - Performance vs 2018-2021 Targets

  - Adopted 2022-2025 Targets

- Potential PBPP activities

- National Scan of Other MPOs

National Capital Region Transportation Planning Board

- The designated metropolitan planning organization (MPO) for the National Capital Region

- Housed and staffed by the Metropolitan Washington Council of Governments (COG)

- 44 Members include:
  - 3 State transportation agencies
  - 23 local jurisdictions
  - State and DC legislatures
 - WMATA

(mariordo59/flickr)

National Capital Region
Transportation Planning Board

The National Capital Region

- Spans approximately 3,500 square miles
- Home to 5.7 million people and 3.3 million jobs
- 141 Activity Centers

Transportation System:

- More than 17,000 lane miles of highways and major roads
- 118 miles of Metrorail and 91 Metrorail stations
- 167 miles of MARC and VRE commuter rail and 39 commuter rail stations
- Ten miles of bus rapid transit and streetcar
- Over 500 of miles of off-street paved trails and paths for walking and biking and over 200 miles of bike lanes
- Over 15 local and commuter bus systems and over 10 paratransit service providers
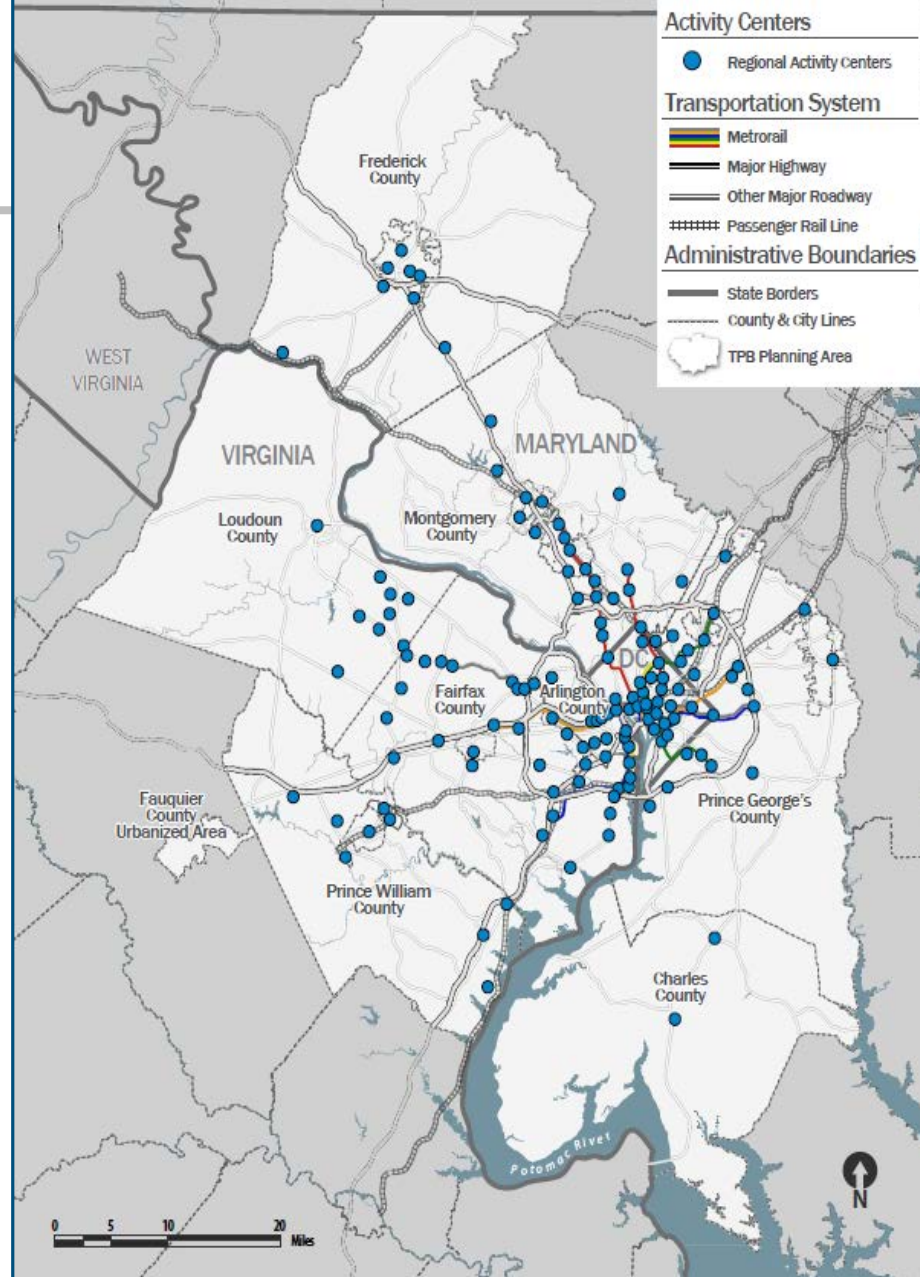
PBPP Coordination – TPB Approach

- Identify and convene working groups comprising designated points of contact and subject matter experts from state DOTs / transit agencies

- Gain understanding of individual state/agency approaches for target setting; discuss similarities and differences among stakeholders

- Discuss potential impacts and conduct QA and sensitivity analyses of state/MPO options

- Compile information as available and circulate drafts for comment and subject matter expert concurrence

- Brief Technical Committee of regional staff on methodology and recommended targets

- Get TPB policy board approval of targets in formal resolutions

National Capital Region
Transportation Planning Board

Methodology for Forecasting for PM2 and PM3

Endeavor to keep methodology simple, understandable, and repeatable. Several basic methods considered for forecasting future performance and setting targets

1. **Extrapolation** of current data
   - Use a trend line (straight or best fit curve) and extend into the future
   - Captures existing trends of actual performance

2. **Aspirational goal** – Use long-term aspirational goal and establish trend line to meet that goal to determine short-term targets

3. **Model Outputs** – Use outputs from a model such as the TPB Travel Demand Model to forecast future performance
   - Use a similar or related indicator to forecast, including effects of population and employment growth and completion of projects and programs

Combination of above – In general, TPB staff uses an average of Extrapolation and Model Outputs for near-term performance forecasts and proposed targets

National Capital Region
Transportation Planning Board

CMAQ Program: Traffic Congestion

The CMAQ Program: Traffic Congestion targets are set regionally for the Washington DC-MD-VA urban area
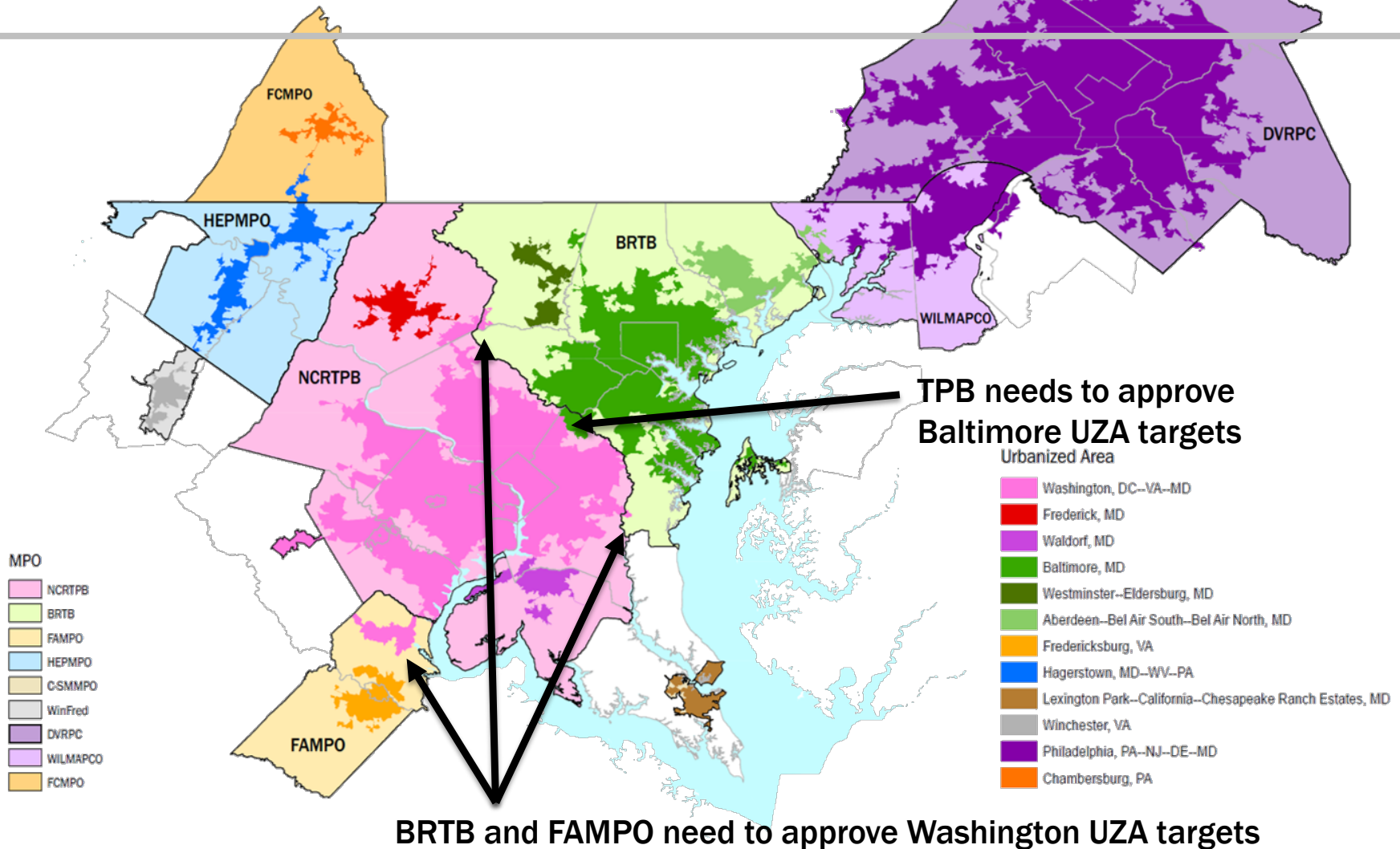
- Peak Hours of Excessive Delay (PHED)
- Mode Share (Non-SOV)

The TPB has taken the lead in developing the targets for these measures in 2018 and 2022

- Identical targets must be adopted by the three State DOTs (District of Columbia, Maryland, Virginia) as well as adjoining MPOs (FAMPO, BRTB)
- TPB must complete the MPO CMAQ Performance Plans (final: 2018-2021; baseline: 2022-2025) with MPO targets and submit to State DOTs by September

PHED and Mode Share: Adjacent MPO Agreement

TPB needs to approve Baltimore UZA targets

BRTB and FAMPO need to approve Washington UZA targets

MPO
- NCRTPB
- BRTB
- FAMPO
- HEPMPO
- C-SMMPO
- WinFred
- DVRPC
- WILMAPCO
- FCMPO

Urbanized Area
- Washington, DC--VA--MD
- Frederick, MD
- Waldorf, MD
- Baltimore, MD
- Westminster--Eldersburg, MD
- Aberdeen--Bel Air South--Bel Air North, MD
- Fredericksburg, VA
- Hagerstown, MD--WV--PA
- Lexington Park--California--Chesapeake Ranch Estates, MD
- Winchester, VA
- Philadelphia, PA--NJ--DE--MD
- Chambersburg, PA

Coordinating Questions for State DOTs

- Do you see what we see?
  - Does our actual data correlate with your own data? Baseline data? Trends / direction?
    - TPB data is usually an aggregate or average of data for the region, from standard sources: HPMS, NBI, NPMRDS, CPAS.
- How are you developing targets for 2022-2025?
  - Methodology / tools used for forecasting future performance and setting targets?
    - Are there data outputs by jurisdiction or geographic area that can be used by TPB? Examples: pavement condition model or bridge model? CMAQ emissions reductions quantitative calculations?
- What is your schedule? When will you set targets?
  - Please transmit to TPB once final / approved

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Transportation Planning Board

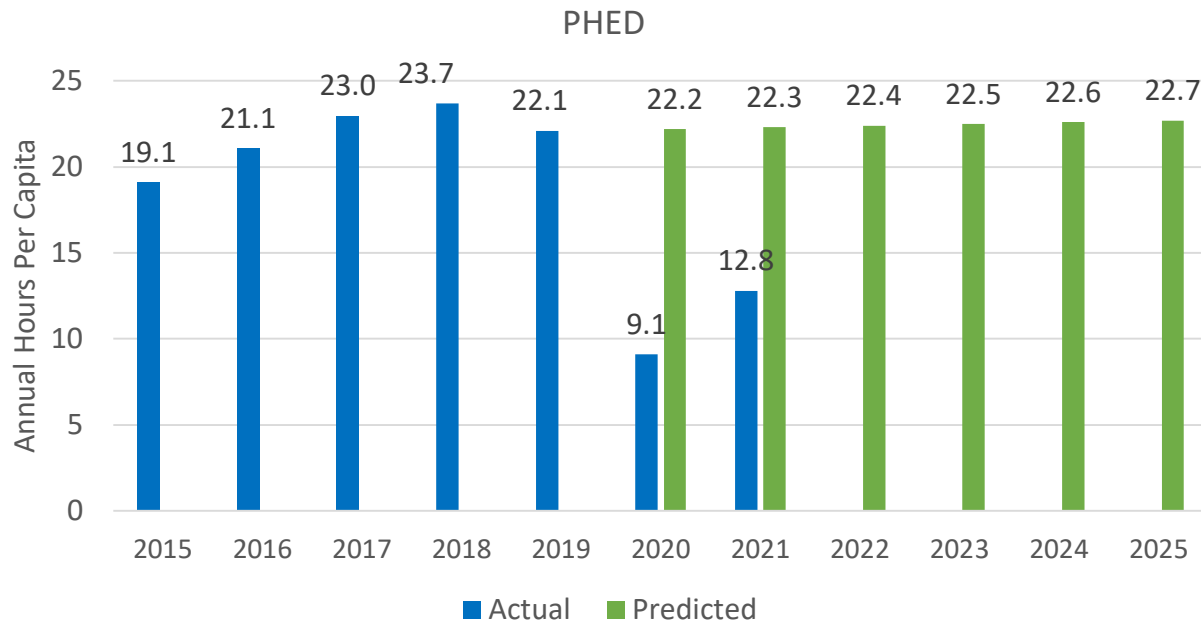# Traffic Congestion: PHED Performance vs. Target
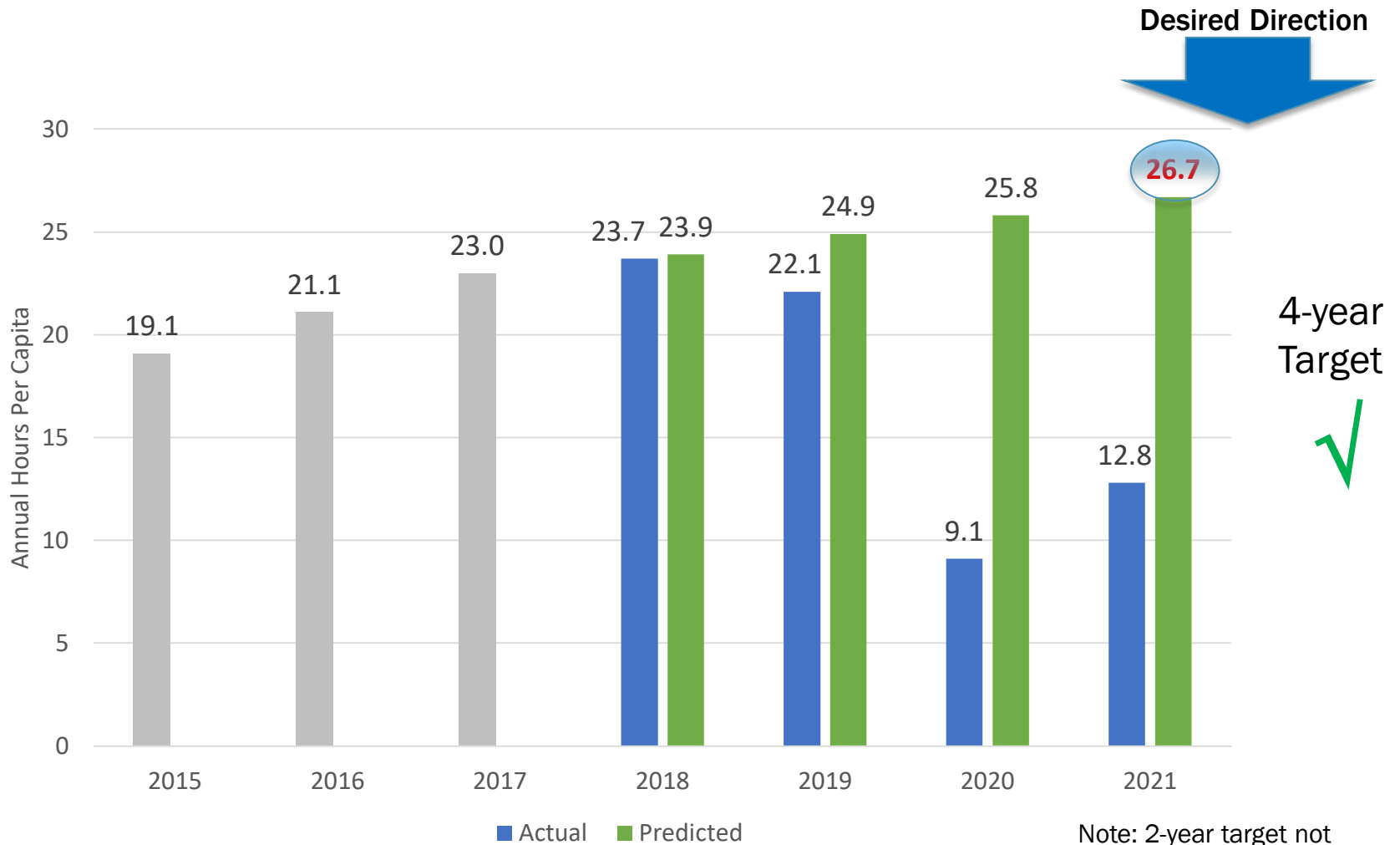
2022-2025 Draft PHED Target Methodology

- Use same general methodology as used in 2018
  - Average of observed trends and short-term predictions of TPB travel demand model (indicator measure)
    - Observed trends captured recent influences
    - Model captures the impacts of increased population and travel demand vs. road and transit changes

- The impact of the pandemic on the PHED performance measure is evident; overall traffic down sharply
  - Exclude data from pandemic years (2020, 2021)
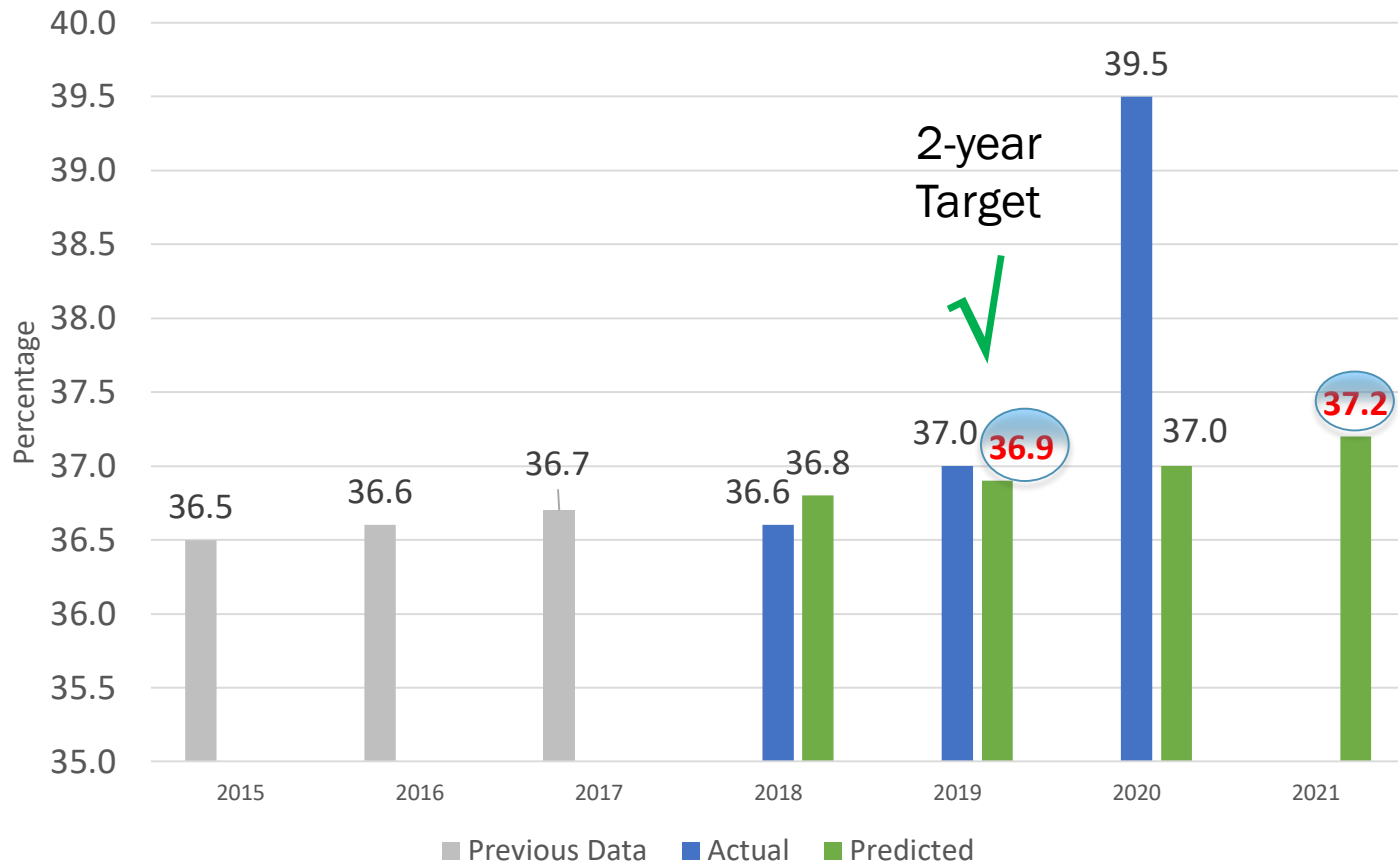 - Use trend data for 2016-2019 (four years) and project from 2019

2022-2025 Draft PHED Graph and Target

PHED

	CY 2022 – 2023 Two Year Target	CY 2022 – 2025 Four Year Target
Peak Hour Excessive Delay (PHED)	**22.5**	**22.7**

# Traffic Congestion: Mode Share (Non-SOV) Performance vs Target

2022-2025 Draft Mode Share Target Methodology

- Recommended methodology:
  - Use only observed trendline to forecast
    - Uncertainty over impacts of telework and other factors affecting transportation mode choice

- The impact of the pandemic on the Mode Share performance measure is evident; huge increase in telework
  - Exclude data from pandemic year (2020)
    - Note 2021 data not available until early CY 2023
  - Use trend data for 2016-2019 (four years) and project from 2019

2022-2025 Draft Mode Share Graph and Target
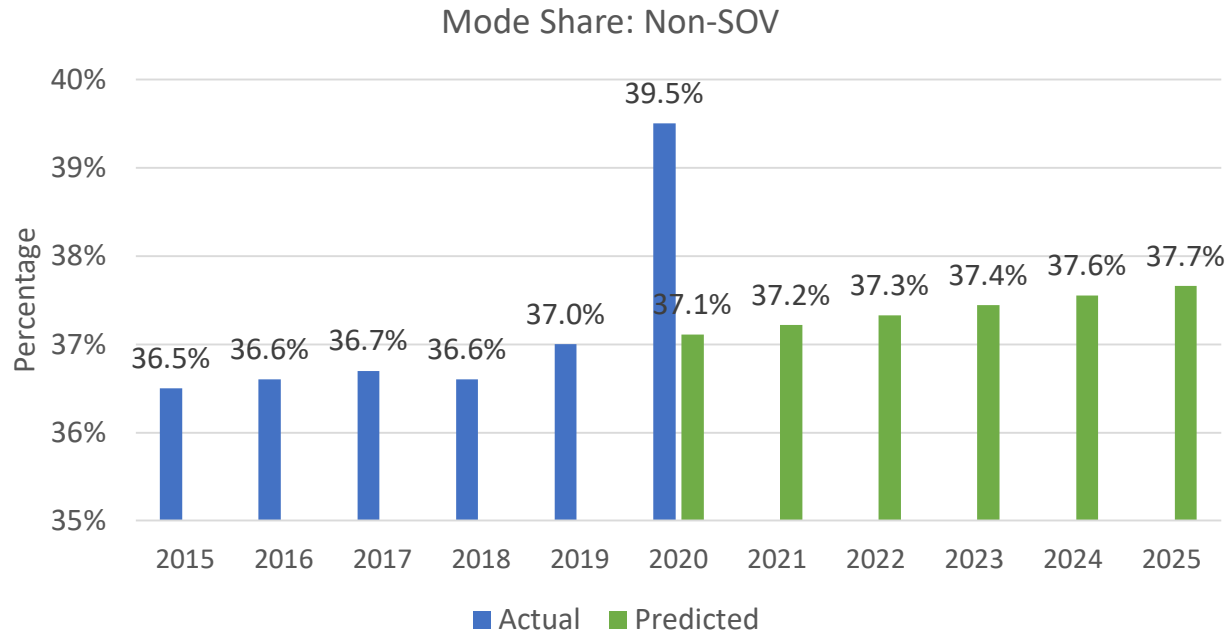
Mode Share: Non-SOV

	CY 2022 – 2023 Two Year Target	CY 2022 – 2025 Four Year Target
Mode Share (Non-SOV)	**37.4%**	**37.7%**

Potential PBPP activities

Potential activities to undertake to better assess the relationship between projects and programs – and external factors – with performance across all areas:

- Analyze obligation data and project completion and the effect of those projects, with a focus on specific funding programs, e.g., HSIP, CMAQ, etc.

- Analyze expected vs actual project outcome from the past TIPs, as well as other influencing factors

- Collect more detailed project data; new TIP & Conformity plan database (EcoInteractive)

- Reconcile with other programming priorities and processes, including state processes

National Scan of Other MPOs

- Board presentation in November 2019 to see how we compare to selected peers:

  Item 9 - Presentation: National Scan of MPO PBPP Targets - Presentation

- When compared to the other MPOs, TPB is an exception, having set our own performance measure targets for all areas
  - The TPB targets are average or above average in performance measures concerning Highway Safety and Highway Assets
  - The TPB targets for Highway System Performance are below average, especially for the travel time reliability measure

- Future analysis could include:
  - Assess influencing factors for those MPOs with more rigourous targets
  - Compare actual performance as data becomes available in the future
    - *Why do other MPOs have better targets (performance)?*
    - *What can we learn from them?*

MPO Comparison – National Scan

National scan – Looked at other major MPOs, as well as neighbors Baltimore Region Transportation Board (BRTB) and Richmond Regional Transportation Planning Organization (RRTPO)
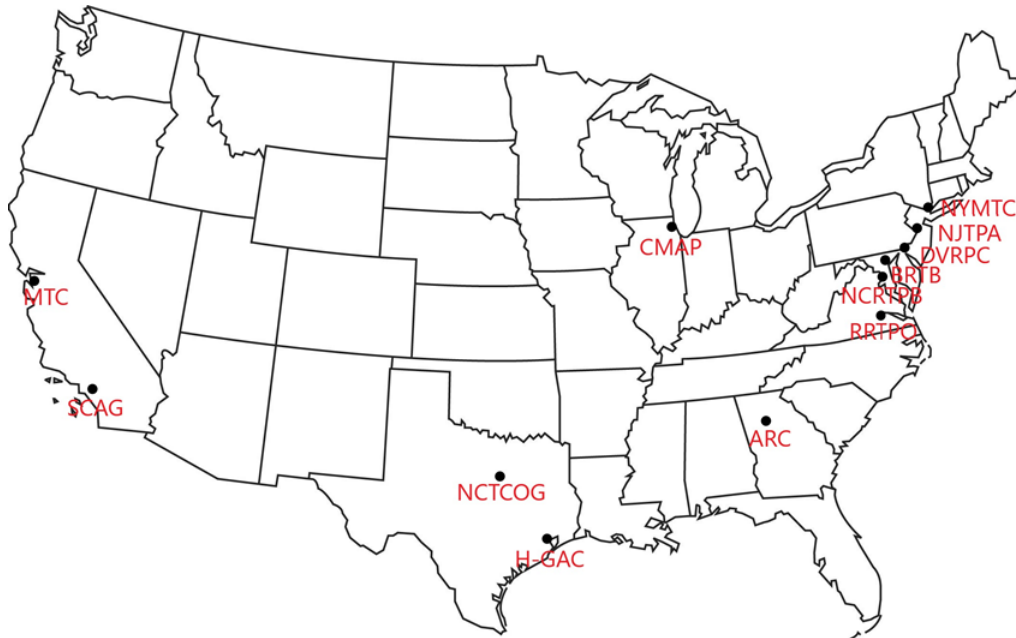
Ranking	Metropolitan Planning Organization	MPO Population 2010
1	Southern California Association of Governments (SCAG)	18,051,203
2	New York Metropolitan Transportation Council (NYMTC)	12,367,508
3	Chicago Metropolitan Agency for Planning (CMAP)	8,444,660
4	Metropolitan Transportation Commission (MTC)	7,150,828
5	North Jersey Transportation Planning Authority (NJTPA)	6,579,801
6	North Central Texas Council of Governments (NCTCOG)	6,417,630
7	Houston-Galveston Area Council (H-GAC)	5,892,002
8	Delaware Valley Regional Planning Commission (DVRPC)	5,626,318
9	National Capital Region Transportation Planning Board (NCRTPB)	5,068,540
10	Atlanta Regional Commission (ARC)	4,819,026
18	Baltimore Region Transportation Board (BRTB)	2,662,204
53	Richmond Regional Transportation Planning Organization (RRTPO)	934,060

System Performance (PHED)

PHED (Four Year Targets)
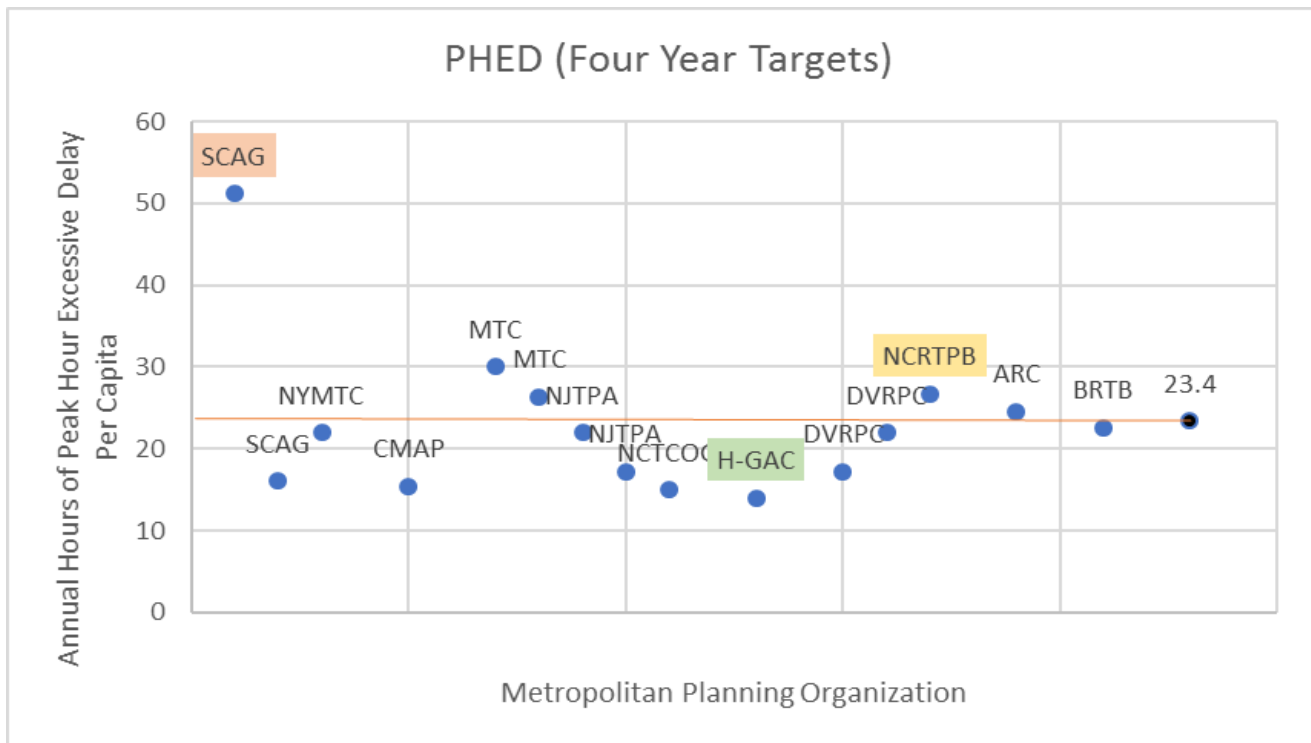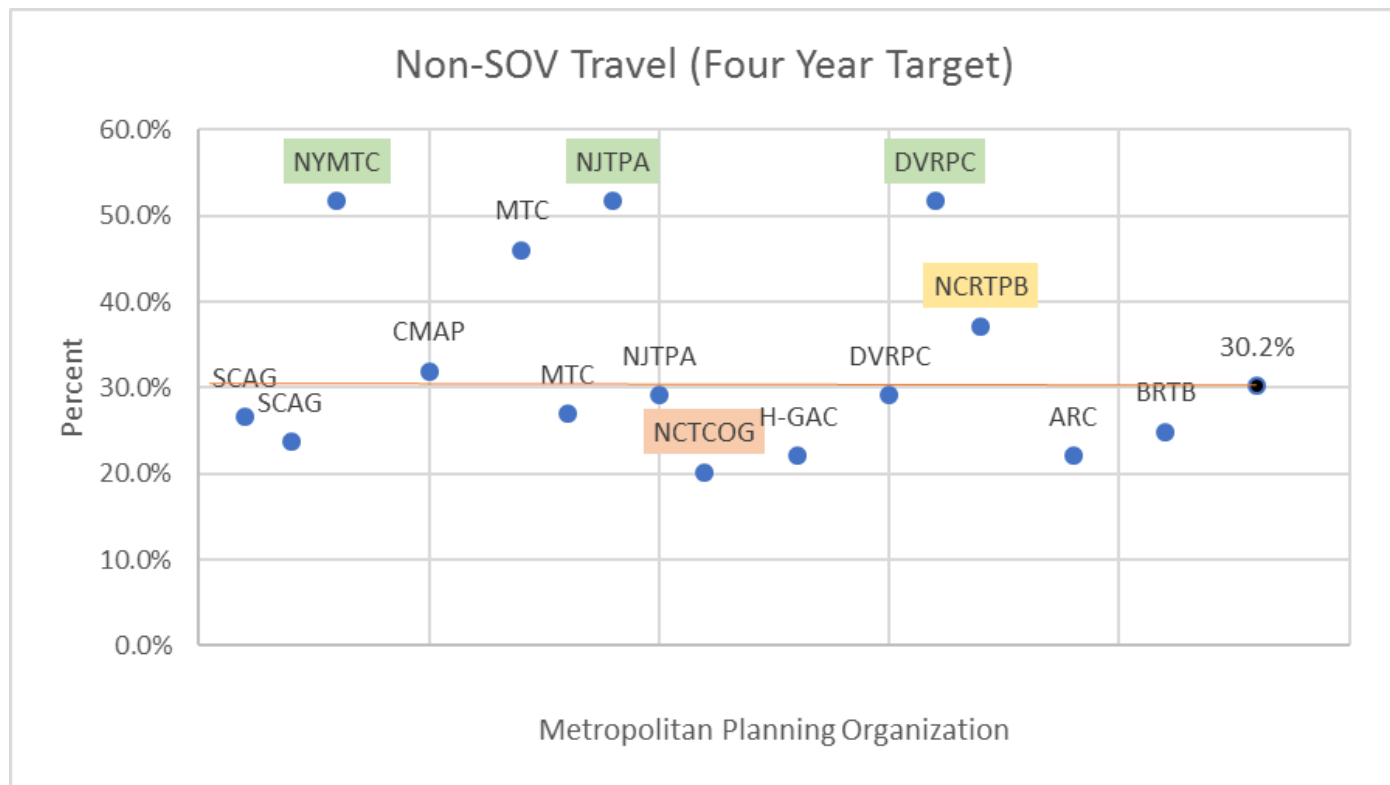
- Roadway congestion is a contributing factor to both the Peak Hours of Excessive Delay (PHED) measure and the Travel Time Reliability measure
- For PHED, TPB's target is above average, meaning on average the region has more hours of excessive delay during the peak than most of the MPOs

System Performance (Non-SOV)

Non-SOV Travel (Four Year Target)

- When comparing the Non-SOV Travel (Mode Share) targets the results were not surprising based on public transportation and bicycle/pedestrian networks

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Discussion: Technical Challenges and Solutions

- What challenges or benefits have you found with your method of target setting?

- Do you or your agency wish to use a different method but face a barrier?

- How to address shifts in travel patterns and mode shares due to COVID-19?

Discussion: Influencing Decision Making

- Have you been able to leverage the target setting or reporting process to bring about new actions or strategies to address performance?

- How have targets been integrated in regional planning?

- Has the process of setting targets strengthened coordination between MPOs and State DOTs? What made the process successful?

- How do you communicate your targets to elected officials? stakeholders? the public? Have you had to communicate worsening performance targets?