TRB Webinar on Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

Presented by
Kevin Black (FHWA, moderator)
Mark Glaze (FHWA)
Michael Baker (PennDOT)
Sean Green (DVRPC)

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- Our webinar today will discuss considering the cost of CMAQ projects and the benefits resulting from those projects as it relates to the reduction of emissions
- Presentations will be made today which provide three perspectives on CMAQ project selections including the views from Federal, State and local representatives
- The CMAQ Program is a Federal program providing funds to assist areas reduces their highway-related emissions and reduce congestion in air quality nonattainment and maintenance areas
- Although the CMAQ Program is a federal program, State's and local agencies are responsible for developing and selecting projects that accomplish the goals of emission and congestion reductions
- Most recently, additional emphasis is being placed on cost effective project selection, or selecting projects that reduce the greatest amount of emission at the lowest cost
- Future project selection may be tracked more carefully in an attempt to encourage State and local agencies that receive CMAQ funding to choose projects that provide the greatest benefit for the least cost

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- The learning objectives for today's webinar will be:
  - To become familiar with the CMAQ Program and the different project types supported by the CMAQ Program
  - to consider and evaluate the cost-effectiveness of CMAQ projects
- Most or many attendees may already be familiar with the CMAQ programs and the projects it supports so some of information may be familiar
- And most or many attendees may be already are aware of cost considerations and their organizations consider this in evaluating the projects selected for CMAQ funding
- But as a result of provisions of the MAP-21 and the FAST Act legislation, additional emphasis is being placed on encouraging and supporting cost-effective CMAQ projects

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- This consideration is often referred to as a project's "cost-effectiveness"
- FHWA has prepared information on CMAQ project cost-effectiveness, some of which will be covered in this webinar
- Additional information can be found on FHWA's CMAQ website at the following web link https://www.fhwa.dot.gov/environment/air_quality/cmaq/reference/cost_effectiveness_tables/

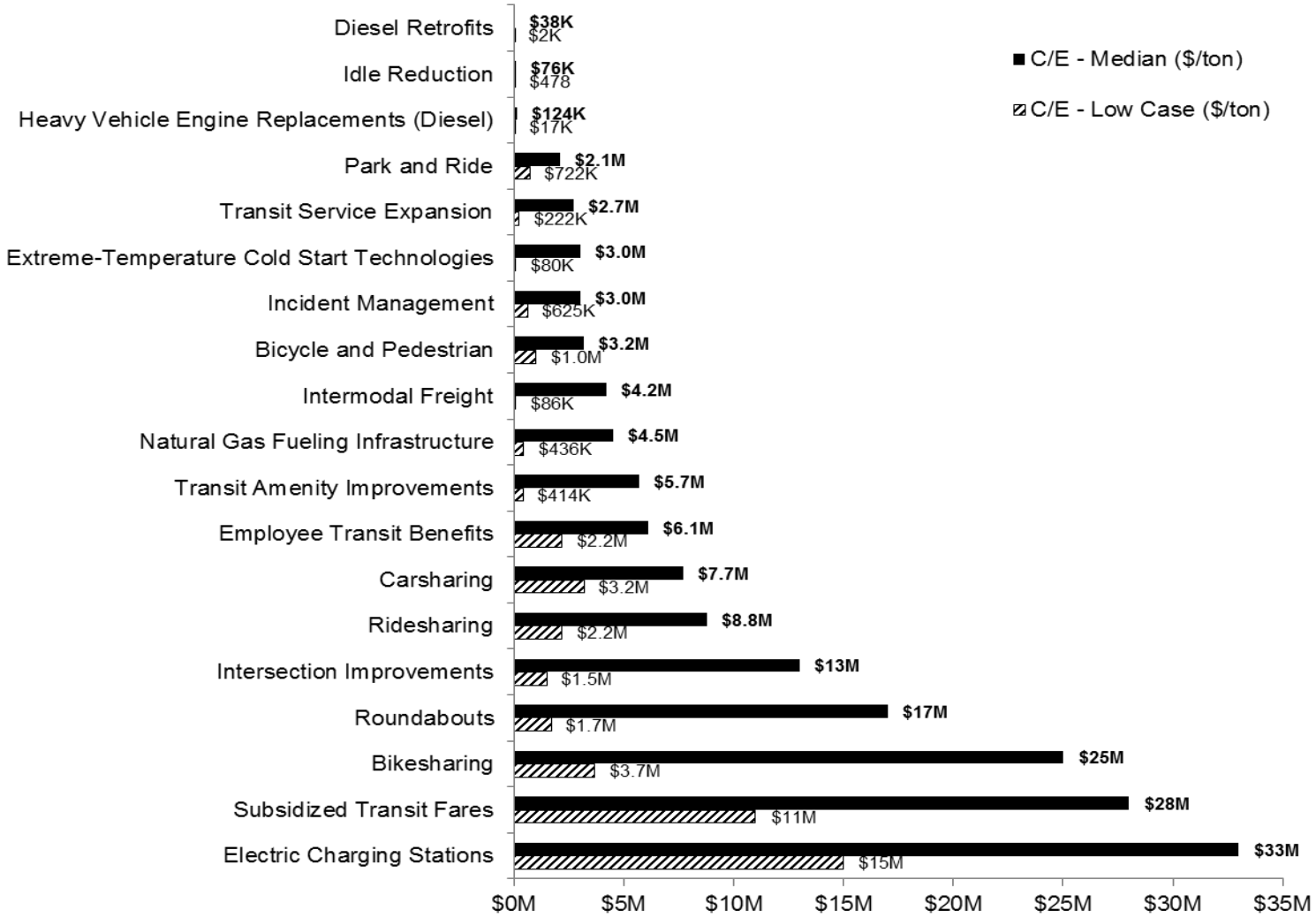
Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- Today's webinar will consist of three presentations providing some considerations on project selections:
  - The Federal perspective will be provided by Mark Glaze with the FHWA
  - The State perspective will be provided by Michael Baker of PennDOT
  - The local perspective will be provided by Sean Greene of the DVRPC, the MPO representing the Philadelphia area
- Today's webinar will be recorded so any questions the viewers have can be sent to today's presenters. Their contact information will be provided at end of the Introduction and at the end of each presentation

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- Today's first presentation will provide the Federal perspective and will be presented by Mr. Mark Glaze from FHWA
- The following slide from Mark's presentation illustrates the concept of the cost effectiveness of CMAQ projects. This bar-type chart illustrating the cost effectiveness of various CMAQ project types based on the costs to implement the project and the resulting emission reduction benefit associated with the project

Median Cost-Effectiveness (Cost per Ton Reduced) of $PM_{2.5}$



Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

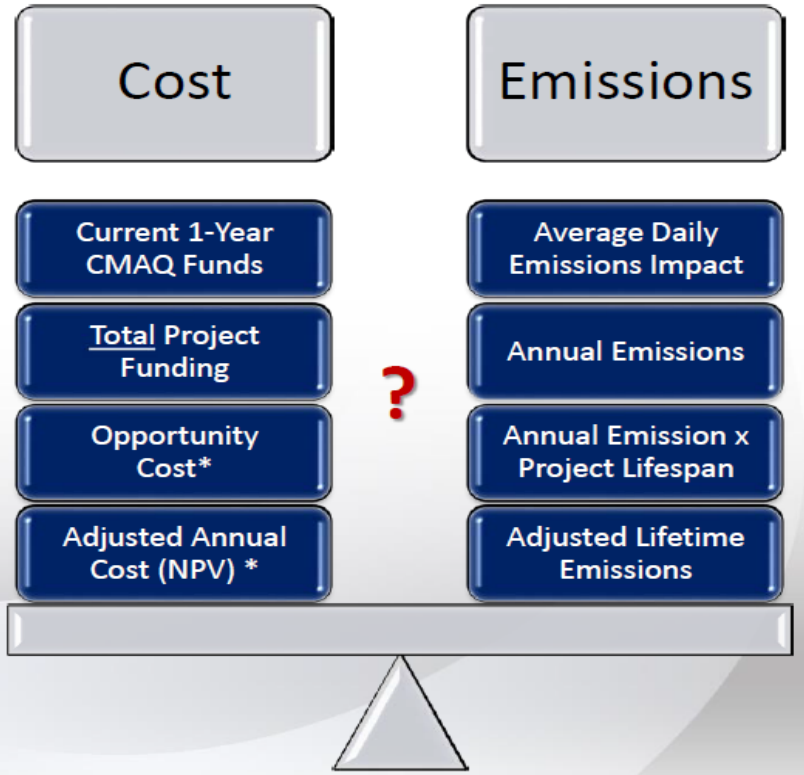
- The second presenter will provide a State perspective and it will be provided by Mr. Michael Baker from PennDOT
- Mike's presentation will describe cost effectiveness "key issues" needed to be considered including funding sources, time and spatial scale considerations and adjustments due to inflation and emission model updates. The following slide from Mike's presentation illustrates some of the points he will cover

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

Cost Effectiveness Calculations

Key Issues:

- Defining costs (CMAQ, all funding sources, capital, operating, etc.)
- Temporal (daily, annual, lifetime)
- Adjustments (inflation, emission rates by year)



Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- Our last presenter, Mr. Sean Greene from DVRPC, will provide a local perspective as represented by the MPO for the Philadelphia area
- On the local scale, from an MPO's viewpoint, Sean's presentation notes the difficulties that can occur when considering the benefits and tradeoffs in balancing CMAQ project alternatives at the regional scale. Factors used in evaluating projects can include time savings, safety, and public health and the fact that "high cost" projects may have less tangible benefits. The following slide from Sean's presentation illustrates some of the points he will cover

Co-Benefits – Challenges to Prioritizing Cost-Effectiveness

- Many eligible project types have co-benefits
  - Travel time savings
  - Safety
  - Public health and accessibility
- The highest cost effective projects for emissions have less tangible benefits for the public
  - Additional perception that equipment owners are responsible for maintenance and replacement

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Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

- Thank you for your interest in today's webinar
- For further information on this topic or other related CMAQ issues, please contact:
  - Mark Glaze, FHWA, 202-366-4093. Mark.Glaze@dot.gov
  - Michael Baker, PennDOT, 717-772-0796, michaelba@pa.gov
  - Sean Greene, DVRPC, 215-238-2860, sgreene@dvrpc.org
  - Kevin Black, FHWA, 410-962-2177, Kevin.Black@dot.gov

Considering Cost-effectiveness in the CMAQ Program Project Selection Process: the FHWA Perspective

Mark Glaze

FHWA Office of Planning, Environment and Realty

October 26, 2017

Presentation Content

CMAQ Cost Effectiveness Tables

- Introduction
- Purpose and Scope
- Analytical Process
- Findings

CMAQ: A Quick Overview

- Congestion Mitigation and Air Quality Improvement (CMAQ) Program
- Established in 1991 under ISTEA (23 U.S.C. Section 149)

  The CMAQ program is established to fund transportation projects that contribute to the attainment or maintenance of the national ambient air quality standards for ozone, carbon monoxide, or particulate matter
- Reauthorized in all subsequent transportation authorization Acts, most recently the FAST Act
  - Annual funding level at about $2.3 - $2.5 billion (FY 2016-2020)
  - Over $33 billion invested in 38,000 projects since 1992

Basic CMAQ Project Eligibility

- Each CMAQ project must
  - be a transportation project
  - generate emission reductions
  - be located in or benefit a nonattainment or maintenance area
- Emission Reduction
  - Must reduce emissions from transportation sources
    - CO
    - Ozone precursors (VOC and NOx)
    - $PM_{2.5}$ and PM_{10} (both direct and applicable precursors)
  - Reductions must contribute to the area's overall clean air strategy and should be demonstrated by the emissions analysis required by FHWA.

Requirements for the Cost Effectiveness Tables as Prescribed under MAP-21

23 USC 149(i):

IN GENERAL - The Secretary in consultation with the Administrator of the Environmental Protection Agency shall evaluate projects on a periodic basis and develop a table or other similar medium that illustrates cost effectiveness of a range of project types for funding under this section as to how the projects mitigate congestion and improve air quality.

USE OF TABLE - States and metropolitan planning organizations shall consider the information in the table when selecting projects or developing performance plans under subsection (l)

Cost- Effectiveness

- Cost-effectiveness analysis enables a like with like comparison of the efficacy of CMAQ projects in reducing on-road mobile source emissions (i.e., across closely related alternatives), normalized to a common denominator (e.g., dollars per ton of pollutant reduced)

FHWA Objectives

- Provide representative cost-effectiveness (C-E) estimates to guide project selection and funding request processes at the State and local level
- Promoting ownership of a role in achieving high environmental impact returns on project funds

Scope of Analysis

- Within scope:
  - C-E estimates of criteria pollutants and precursors (PM2.5, PM10, NOx, CO, VOCs)
    - CMAQ mandate is to reduce emissions of these pollutants
  - All project types either receiving CMAQ funding or that may receive CMAQ funding in the near future
  - Congestion impacts, where applicable

Key Data Sources

- CMAQ assessment studies
- CMAQ project tracking system
- State and local project summaries
- *Multi-Pollutant Emissions Benefits of Transportation Strategies*
- MOVES
- Diesel Emissions Quantifier
- DERA
- Academic and industry literature and contacts

Project Selection

- To generate project cost-effectiveness estimates, we have:
  - Selected specific project categories which could be further divided into project types for use in the cost-effectiveness tables.
  - Identified practical and sufficient project parameters for all cases

Project Selection

- Establishment of project sub-categories
  - Group project types into homogeneous segments (can span groups in the CMAQ Interim Guidance)
  - Align segments with groups in the CMAQ Interim Guidance, where feasible
  - Use related studies as reference points

Project Selection

- With sub-categories defined we selected specific projects based on:
  - Recent or expected prevelance
  - Expected impact
  - Scope of potential new information revealed
  - Availability of required model inputs.

Project Types Selected for Analysis

- Bikesharing
- Bicycle / Pedestrian Projects
- Carsharing
- Dust Mitigation
- Electric Vehicle Charging Stations
- Employee Transit Benefits
- Extreme Cold Temperature Cold-Start Technologies
- Heavy Duty Vehicle Engine Replacements
- Heavy Duty Vehicle Retrofits
- Incident Management
- Intermodal Freight Facilities
- Natural Gas Re-Fueling Infrastructure
- Park and Ride
- Ride Share Programs
- Roundabouts
- Signalization and Intersection Improvements
- Subsidized Transit Fares
- Transit Amenity Improvements
- Transit Service Expansion
- Truck Stop Electrification

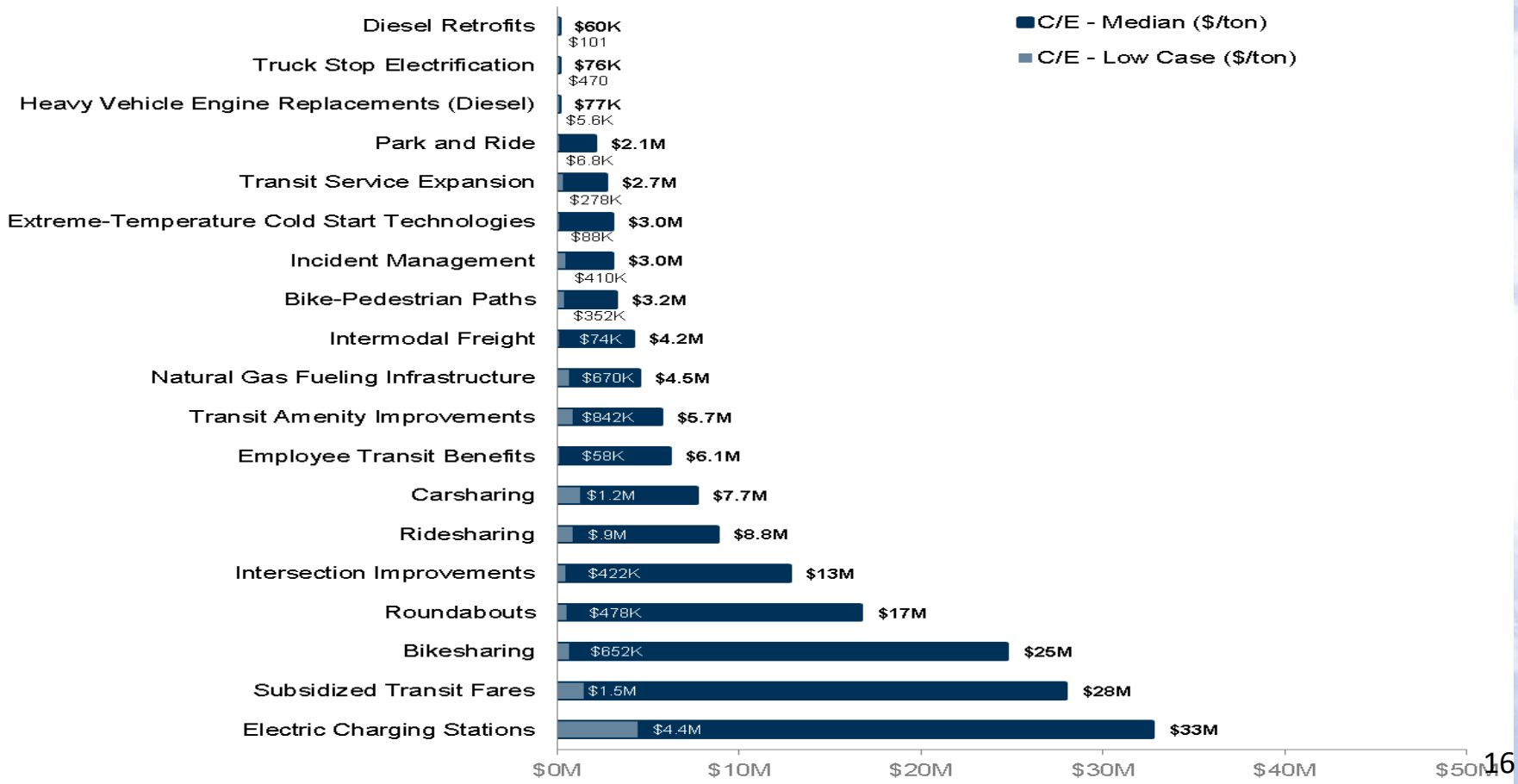
Analytical Scenarios

- C-E estimates represent lifetime emission mitigation for a single pollutant, divided by project cost
- A range of individual cases (scenarios) was analyzed for each project type, in order to generate C-E estimates at the project-type level.
- When required information was not available for an eligible project, representative values from related projects or the literature were substituted
- More complex cases required accounting for increased emissions associated with new, alternative travel behavior (e.g., new bus routes)

Data Reporting

- Median C-E estimates have been reported to represent project C-E because medians are:
  - Not distorted by abnormally-performing outliers;
  - Likely to be more representative within project types than best-case scenarios; and
  - Likely to be more comparable across project types than best-case scenarios.

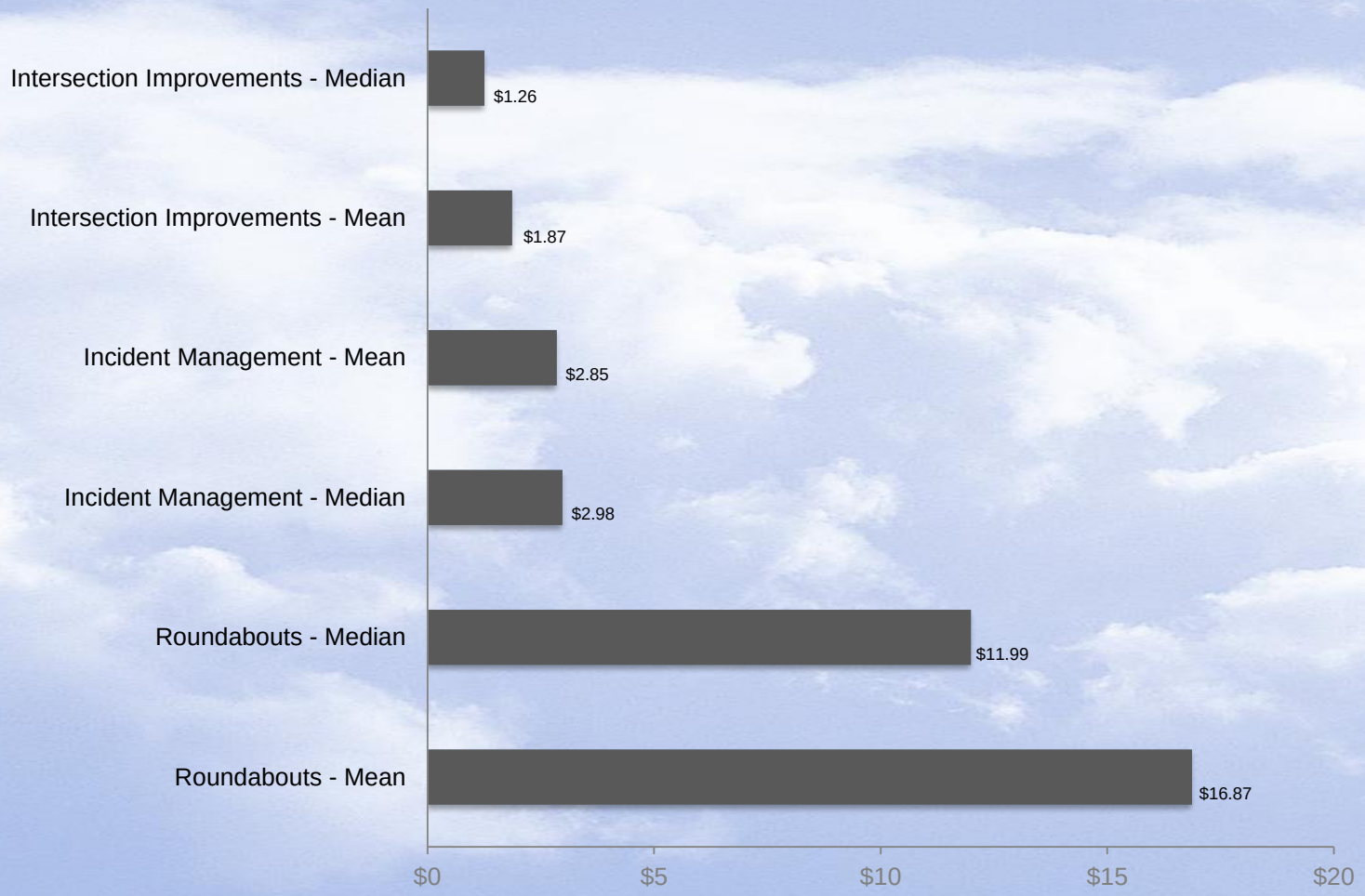
Median Cost-Effectiveness (Cost per Ton Reduced) of $PM_{2.5}$



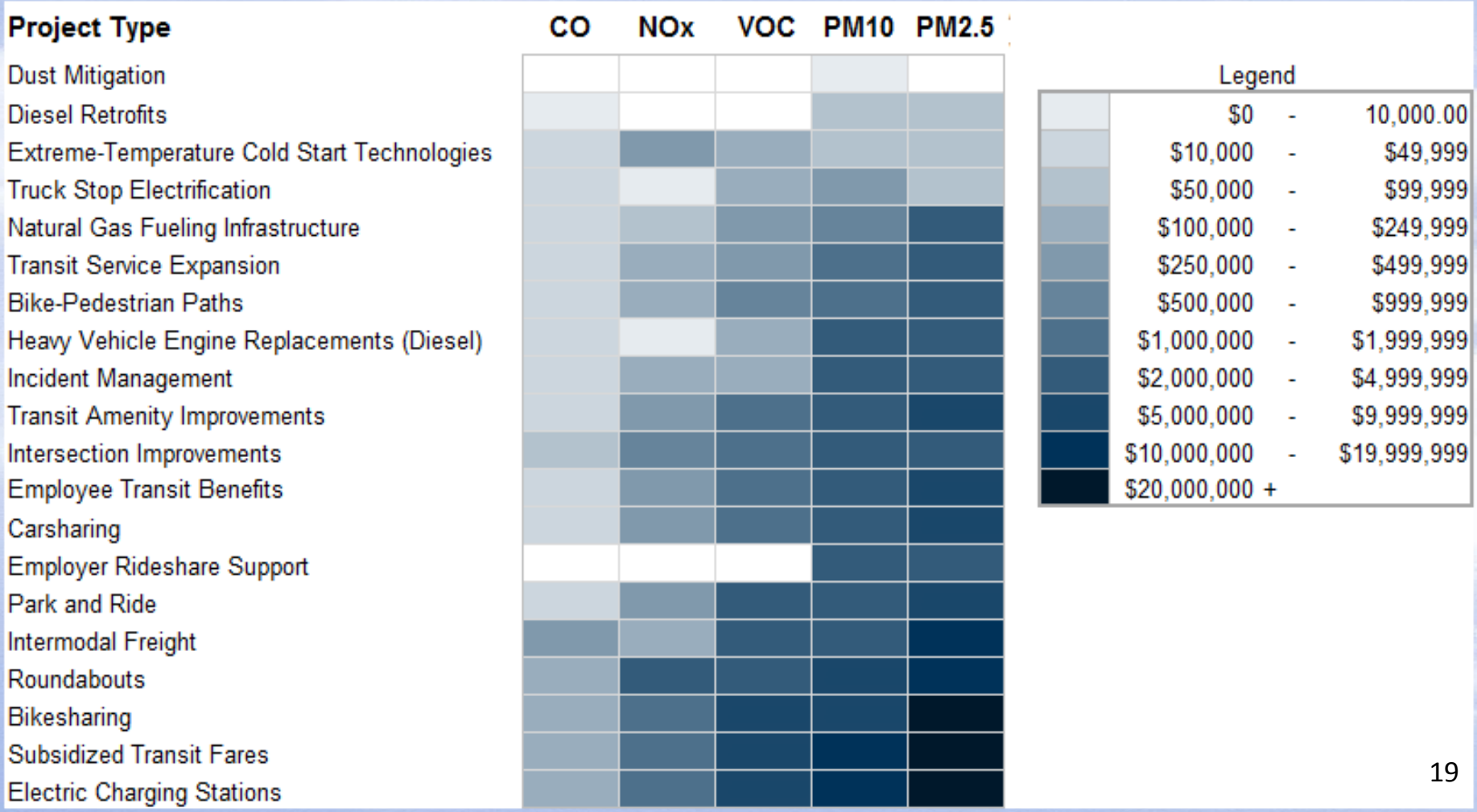
Findings: PM2.5

- Most effective – diesel engine technologies, all under $100,000/ton:
  - Heavy-duty vehicle diesel engine replacements
  - Diesel retrofits
  - Idle reduction
- Least effective, all over $13 million/ton:
  - Electric vehicle charging stations
  - Subsidized transit fares
  - Bikesharing
  - Roundabouts, intersection improvements

Congestion Impacts
(Dollars per Vehicle-Hour of Delay Reduced)



Median C-E for All Pollutants



General Findings

- High general effectiveness:
  - Idle reduction
  - Heavy vehicle diesel engine replacements (except CO)
  - Diesel retrofits (except NOx)
  - Transit service expansion (NOx, VOCs, CO)
  - Park and ride (NOx, VOCs, CO)

Thank you!

- CMAQ Website: https://www.fhwa.dot.gov/environment/air_quality/cmaq/

- Mark Glaze: mark.glaze@dot.gov

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pennsylvania
DEPARTMENT OF TRANSPORTATION

Considering Cost-effectiveness in the Project Selection Process of the CMAQ Program

Michael Baker
Pennsylvania Department of Transportation
Air Quality and Federal Initiatives

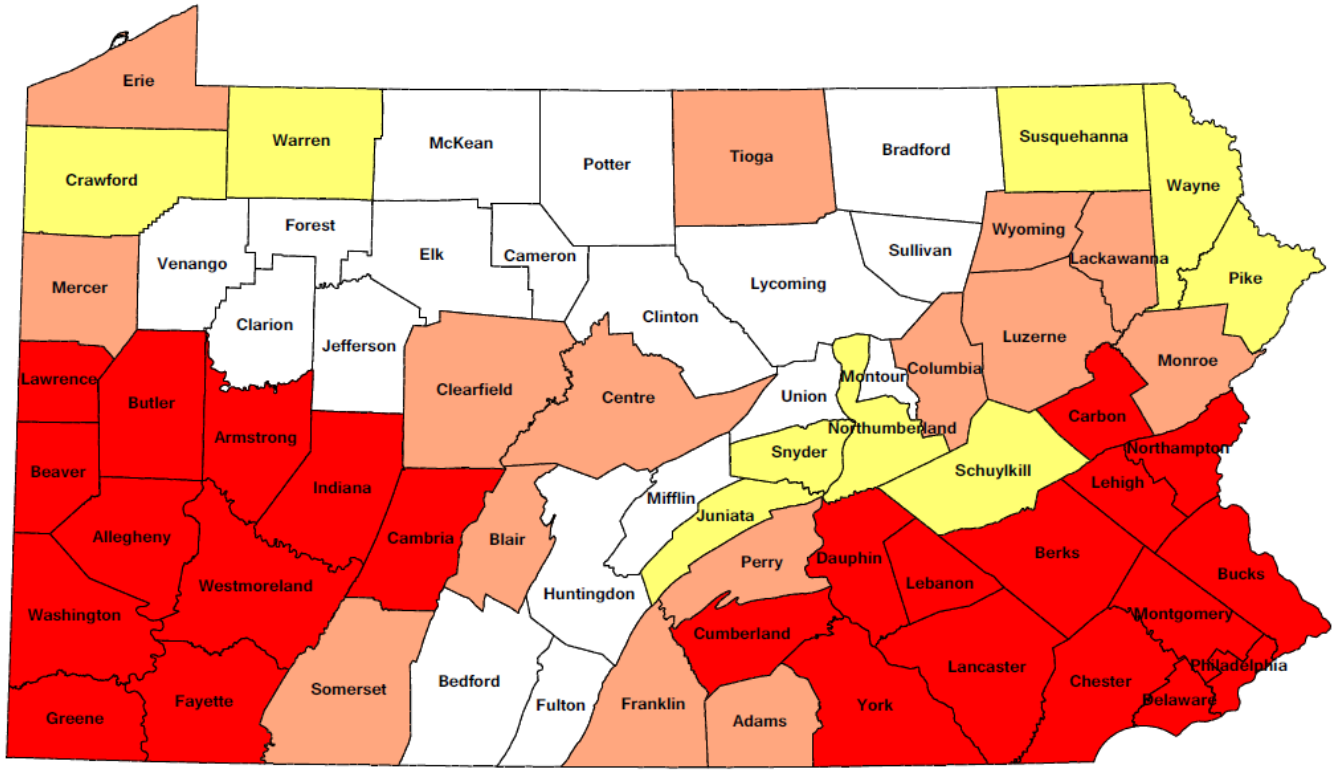
Presentation Topics

- CMAQ in Pennsylvania
- Enhancements to Project Selection
- Tools for Transportation and Emission Impacts
- Evaluation of Methods for Calculating Cost-effectiveness

CMAQ History

- PennDOT has actively participated in the long standing FHWA Congestion Mitigation and Air Quality (CMAQ) program which originated in the 1990 amendments to the CAA
- PennDOT has traditionally provided evaluations primarily to ensure projects selected qualified for funding (e.g. demonstrated an air quality benefit)
- Analysis focus was on providing what was needed for reporting in the CMAQ public access system

Areas Eligible for CMAQ Funding

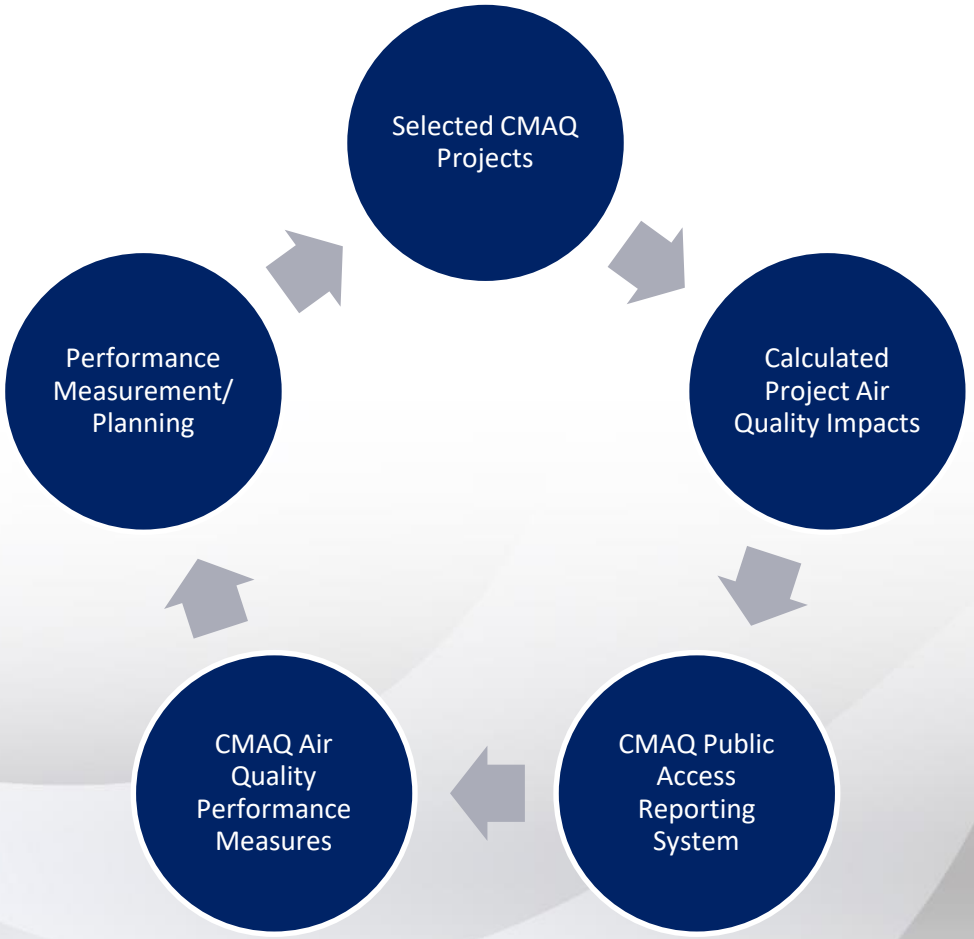


FHWA CMAQ Recommendations

- FHWA has recommended all PA planning partners review their CMAQ process:
  - Ensure **MPO/RPO involvement**
  - Determine **emission benefits** of projects
  - Give high **priority** to the **most cost-effective** projects
  - Process should be **documented** and transparent
  - Process should include **project selection criteria**/factors
  - **Identify roles** and responsibilities
- Philadelphia & Pittsburgh MPOs have robust CMAQ programs

CMAQ Performance Measures

- Performance Planning and reporting metrics are intertwined
- What is reported in the CMAQ Public Access System **must** align with performance planning



Role of Cost Effectiveness in Process

- Cost effectiveness should play role in project scoring and selection
- Cost effectiveness calculations require:
  - Estimates of transportation and emission impacts
  - Project costs

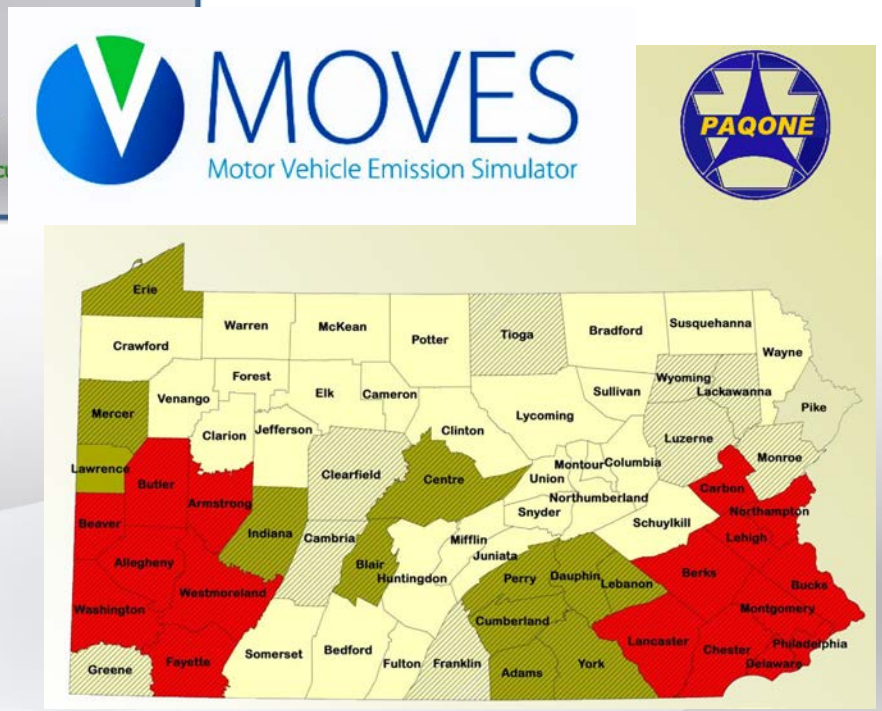
Transportation Impacts

- Transportation benefits can manifest in a number of ways
  - VMT/Trip reductions
  - Reduced delay or idling
  - Impacted VMT (e.g. on-road engine retrofits)
  - Impacted Activity (construction activity)
- Detailed project reviews including impacts may be available
  - Feasibility Study, NEPA, etc.
  - Use these results above all else for consistency
- "Sketch level analysis" is sufficient in most cases
- Tools are available – National and PA specific

Emission Reductions

- Should use MOVES emission rates where possible
  - Both for on and off-road projects
- Should also be compatible with other local air quality planning efforts
  - Conformity, TIP, etc.
  - Imperative if “taking credit” in a planning document
- Should reflect what needs to be reported in the CMAQ Public Access Database
  - Currently daily reductions across pollutants

Project Analysis Tools and Methods



PAQONE

- Pennsylvania Air Quality Off-Network Estimator
- **Consistent process** for estimating transportation and emission impacts
- **Sketch-level** methodologies
- Incorporates EPA's **MOVES emission rates**
- 18+ years of history and continual improvement
- **Easy-to-use**
- Designed to analyze projects that regional models cannot
- Analyze projects in areas without regional models

PAQONE

- Methodologies are based on FHWA guidance & recent research papers
- Contains a large emissions rate database
  - MOVES 2014a based
  - Use defaults from regional analyses
  - Cross Classified
  - Source (vehicle) type/groups of vehicles, analysis year, model year, county, etc.
  - Uses emissions tables rather than running MOVES in real time due to complexity and run times

PAQONE Project Types

TDM

- CPA Areawide Rideshare Programs
- CTC Commuter Tax Credit
- CWW Compressed Work Week
- CPE Employer Rideshare Programs
- GRH Guaranteed Ride Home
- VPN New Vanpool Programs
- INC Parking Incentive Programs
- PKM Parking Management Programs
- TWK Telework Promotion Programs

Transit

- TRR Bus Replacements
- TRF Bus Service Frequency Change
- VPE Existing Vanpool Programs
- TRE Express Bus Conversion
- HSR High Speed Rail
- TRM Modified Bus Service
- TRN New Bus Service
- TRI Transit Amenities Improvements
- TRC Transit Center

Vehicle Technology & PNR

- ATV Advanced Technology Vehicles
- ELV Electric Vehicles Purchase
- EVC EV Charging Facility
- PNR Park & Ride
- TIR Truck Idling Reduction

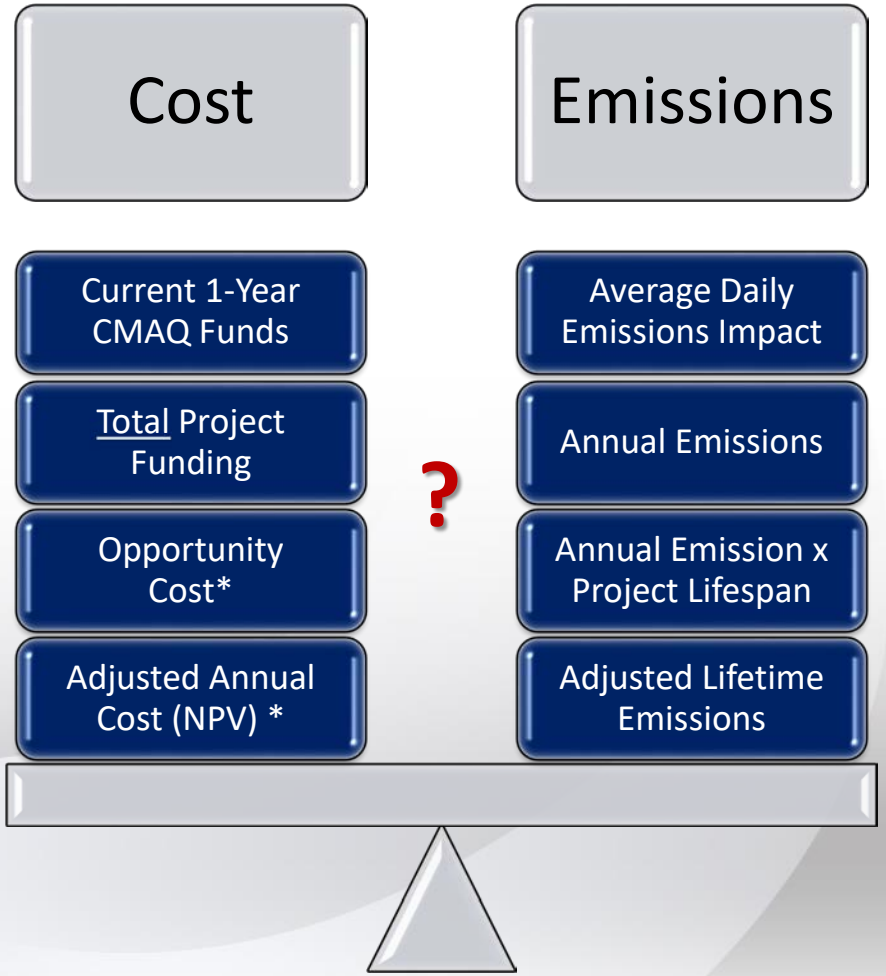
Other

- BPI Bikeway Pedestrian Network Improvements
- EMO Emission Only Analysis
- FER Long Distance Commuter Ferry
- HII Highway Intersections Improvements-Simplified
- HIS Highway Intersections Simulation-Detailed

Cost Effectiveness Calculations

Key Issues:

- Defining costs (CMAQ, all funding sources, capital, operating, etc.)
- Temporal (daily, annual, lifetime)
- Adjustments (inflation, emission rates by year)



FHWA's Recent Method

- The recent FHWA cost effectiveness tables report cost benefit as:

$$\frac{\text{Capital Cost + (opening year operating cost x expected life [yrs])}}{\text{Opening year annual emission reductions x expected life [yrs]}}$$

Additional Considerations

- Cost/benefit approaches attempt to capture the temporal changes on the value of money overtime
- FHWA Cost Recovery Factor or Annualized cost

$$CRF = \frac{(1 + i)^n \times (i)}{(1 + i)^n - 1}$$

Where i = discount rate (as a decimal fraction)
n = project life (in years)

- Attempts to capture the lost opportunity cost
- Discount or sociality value of money (Currently 1.75%)
- Alternately the inflation rate can be used (2016 - 1.9%)
- Other rates are used, as are similar approaches

Evaluating Potential Methods

- PA completed a limited comparative analysis
- Found three recent CMAQ funded projects
  - CNG refuse truck replacement
  - Shuttle Bus (3 year contracted service)
  - 4-signal corridor traffic flow improvement
- Cost information was readily available
- Deliberately selected a diverse set of projects – type, nature, lifespan, cost, etc.

Costs and Updated Emissions Analysis

Project	Lifespan	Costs		Emission Reductions (kg/yr)		
		Total All Sources	CMAQ	VOC	NOX	PM2.5
CNG Refuse Trucks (early Retired)*	4	$40,000	$32,000	-0.8	-14.71	-0.7
CNG Refuse Trucks (Lifetime)*	15	$40,000	$32,000	-0.8	-14.71	-0.7
Shuttle Service	3	$1,481,592	$500,000	-205.39	-297.86	-17.05
Signal Improvements*	10	$1,890,000	$1,512,000	-376.74	-3727.4	-236.08

Aspects not Considered

- "Normalizing" various emissions benefits (VOC, NOx, $PM_{2.5}$) into single metric
  - Instead of multiple rankings by different emissions, pool into a single metric using weighting factors
  - Suggested by FHWA – not generally attempted in practice
  - Much debate on what the factors would be
- Inflation was not considered directly
  - Cost Recovery Factor (CRF) used as a surrogate
  - FHWA recommends a rate of 1.75% for CFR vs. 1.9% for inflation
  - Calculation is similar

Project Cost/Benefit Ratios and Rankings

Project	Cost/Emission Reductions ($/kg)			Cost/Emission Ranking		
	VOC	NOX	PM2.5	VOC	NOX	PM2.5
CMAQ Cost/First Year Emission Reductions						
CNG Refuse Trucks (early Retired)	$40,000	$1,679	$29,326	3/4	3/4	3/4
CNG Refuse Trucks (Lifetime)	$40,000	$2,175	$45,714	3/4	3/4	3/4
Shuttle Service	$2,434	$2,175	$45,714	1	2	3
Signal Improvements	$4,013	$406	$6,405	2	1	1
CMAQ Cost/Lifetime Reductions						
CNG Refuse Trucks (early Retired)	$10,000	$544	$11,429	4	3	4
CNG Refuse Trucks (Lifetime)	$2,667	$145	$3,048	3	2	2
Shuttle Service	$811	$560	$9,775	2	4	3
Signal Improvements	$401	$41	$640	1	1	1
Total Cost/Lifetime Reductions						
CNG Refuse Trucks (early Retired)	$12,500	$680	$14,286	4	3	4
CNG Refuse Trucks (Lifetime)	$3,333	$181	$3,810	3	2	2
Shuttle Service	$2,405	$1,658	$28,966	2	4	3
Signal Improvements	$502	$51	$801	1	1	1
Total Annualize Costs/First Year Emissions Benefits (Considers CFR)						
CNG Refuse Trucks (early Retired)	$13,052	$710	$14,916	4	3	4
CNG Refuse Trucks (Lifetime)	$3,819	$208	$4,364	3	2	2
Shuttle Service	$2,489	$1,716	$29,985	2	4	3
Signal Improvements	$551	$56	$880	1	1	1

Discussion of the Results

- How you adjust/disaggregate the costs and calculate benefits may impact project selection
- There are pros and cons to any $/benefit ratio calculation
- CRF/Inflation is not the issue it once was
  - Discount rates are low (feds recommend 1.75%)
  - Inflation is low (1.9%)
  - In 2007 these rates were 4.5% and 4.1% respectively
  - May be unnecessary precision

Questions PennDOT Working to Answer

- What costs do we use?
  - CMAQ funding – Total Funding
- How to report emissions benefits?
  - Daily – Annual -Lifetime
- How do we go from daily to annual emission benefits?
  - 365 Days? 250 days?
  - Consider emissions seasonality? (e.g. do VOC's only matters in the summer (ozone) season?)
  - What about projects with seasonal/episodic impacts?
  - Regardless of approach it needs to be transparent

Conclusions & Next Steps for PennDOT

- The cost/benefit ratio calculation for CMAQ is anything but definitive
- Consistent methodologies needed for estimating emissions and transportation project costs
- How you calculate costs and emissions impacts project prioritization and selection
- Discussions are ongoing, internally at PennDOT and with our air quality planning partners
- Goal is to develop a consistent and transparent approach

Contact Information

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Considering Cost Effectiveness in the CMAQ Process:

The Local Perspective

Sean Greene
Manager, Air Quality Programs

October 2017
TRB Webinar

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

What is DVRPC?

- Designated MPO for the Greater Philadelphia Region
- Region covers 2 States, 9 Counties, and 352 Municipalities
- NAA for Ozone (region-wide)
- Maintenance for $PM_{2.5}$
- Single county $PM_{2.5}$ NAA

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DVRPC CMAQ Program

- Pennsylvania and New Jersey manage CMAQ program differently
  - Pennsylvania
    - PA portion of Region receives $30M/yr.
    - PennDOT delegates CMAQ project selection to DVRPC
  - New Jersey
    - NJ portion of the Region receives $1.3M/yr.
    - NJDOT “flexes” majority of state CMAQ allocation to transit.

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DVRPC CMAQ Program

- DVRPC Allocates CMAQ funds through two processes
  - Transportation Improvement Program (TIP)
    - Planning partners develop program through regional consensus
    - Eligible projects are considered for CMAQ funding
      - Typical projects include signal, operations, intersection, and bike/ped. improvements
  - Competitive Process
    - Open competitive funding solicitation
      - $20M / 3yrs in PA
      - ~$3.5M / 3yrs in NJ
    - Open to all eligible project types

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MPO CMAQ Program Goals

- Overall
  - Fund projects that reduce congestion and improve air quality
  - Fund a diverse set of multi-modal projects equitably spread across the region
- Competitive Program
  - Chance to fund non-traditional partners
  - Fund projects not typically funded through TIP selection process

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Competitive Program Project Selection

- Cost effectiveness not a direct scoring criteria
- Projects scored on 100 point scale
  - Criteria award 40 points based on emissions reduction and expected lifetime of AQ benefits
  - Additional 5 points for > than required local-cost share
- Criteria are favorable to projects with high emissions reduction and AQ cost effectiveness

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Competitive Program Project Selection

- Project selection committee uses decision management software
  - Maximizes portfolio of projects for the available budget
  - Allows visualization of benefits of projects and helps manage trade-offs
- Typical project selected in competitive program
  - Diesel repowers and replacements
  - Signal coordination and operations improvements
  - Enhancing transit and shuttles
  - Bike and pedestrian improvements

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TIP Project Selection

- CMAQ funded projects
  - must reduce emissions
  - geographic parity across the region
  - benefits for congestion relief
- Typical project selected in TIP
  - Signal coordination and operations improvements
  - Bike and pedestrian improvements
- Roundabouts get additional scrutiny to insure emissions benefit

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Project Implementation – Challenges to Prioritizing Cost-Effectiveness

- **Project implementation** and the **sponsor's capacity** to participate in federal highway aid program is important component to awarding CMAQ funds
- Navigating diesel projects through FHWA design process is **more complex** than funding through other federal or state aid programs (e.g. EPA and state DERA)
  - Buy-America Provisions
  - Purchasing Process
  - Certainty in project delivery

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Project Implementation – Challenges to Prioritizing Cost-Effectiveness

- Difficulties lead to **project delay** and **applicant wariness** of using CMAQ for vehicle replacement (outside of transit)
- Traditional construction projects have **longer history** of successful implementation
- Projects that meet other regional needs and project **co-benefits** outside of narrowly defined “cost-effectiveness”

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Co-Benefits – Challenges to Prioritizing Cost-Effectiveness

- Many eligible project types have co-benefits
  - Travel time savings
  - Safety
  - Public health and accessibility
- The highest cost effective projects for emissions have less tangible benefits for the public
  - Additional perception that equipment owners are responsible for maintenance and replacement

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Program Goals Revisited

Overall

- Fund projects that reduce congestion and improve air quality
  - Eligibility requirement
- Fund a diverse set of multi-modal projects equitably spread across the region
  - Responsible stewardship of public funds
  - Provides project co-benefits
    - safety, access, congestion reduction, AND AQ

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Program Goals Revisited

Competitive Program

- Chance to fund non-traditional partners
  - Opportunities for public health and social justice considerations
  - Brings additional resources to projects
- Fund projects not typically funded through TIP selection process
  - Improves portfolio to include projects with greatest AQ benefits
  - Expands DVRPC project management capacity

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Looking Forward

- Evaluate concept of “cost-effectiveness”
  - Definitions of cost effectiveness?
  - Effective life of project?
  - Where in decision making process does cost effectiveness get evaluated?
- What are the mechanisms for using cost effectiveness as selection criteria?
- Working with project partners to incorporate cost effectiveness into processes

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Thank You!

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For more information please visit,
http://www.dvrpc.org/cmaq

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