CMAQ Program
(Congestion Mitigation and Air Quality)

Emissions Benefit Estimation Tools

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 for 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 reauthorization Acts, most recently the FAST Act

  Annual funding level at about $2.3 -$2.5 billion (FY 2016-2020)

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 or formerly designated as such.
- 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.

Range of Eligible Projects

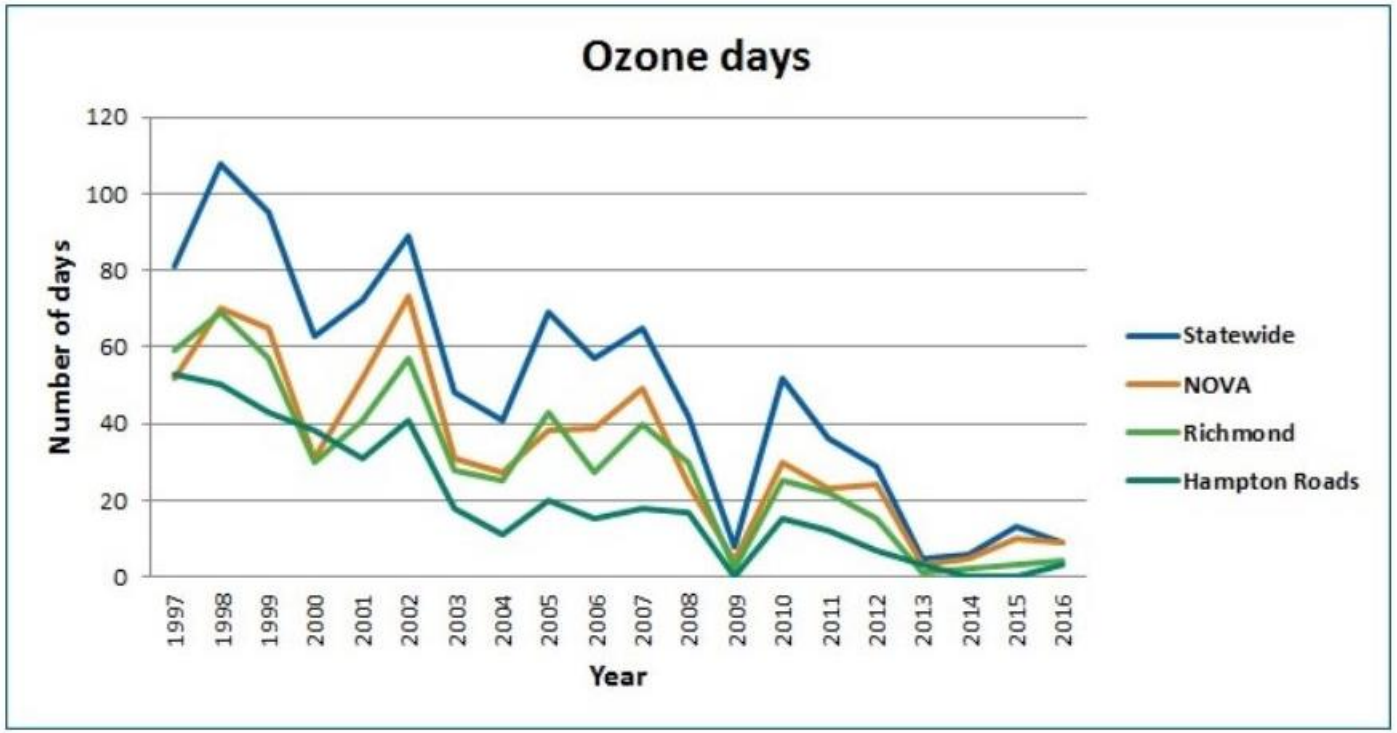
Diesel Retrofits & Advanced Truck Technologies*
Idle reduction technology
Traffic flow improvements
Demand management
Bicycle/Pedestrian
Freight services
Anti-idling facilities
Transit improvements
Shared ride services
Alternative fuels*
Inspection & maintenance programs
Experimental pilot projects
Public Outreach

Ineligible Activities

- Maintenance /Reconstruction projects
- Construction of SOV capacity
- Stand alone fuel purchases
- Salary/Benefits/Overhead

Air Quality Improving

Ozone pollution, as measured by the number of days where the standard was exceeded, has dropped significantly in all areas of the state since 1997.



Source :http://www.deq.virginia.gov/AboutUs/DEQDashboard/Air.aspx#Ozone

FHWA
CMAQ Emissions Calculator Toolkit

http://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/

CMAQ Emissions Calculator: Purpose

- Develop tools to assist the estimation of emission benefits of CMAQ projects, and to support reporting activities:
  - FHWA Review of CMAQ Program
  - Annual CMAQ report –CMAQ Public Access System*
  - CMAQ on-road mobile source performance measure (Subpart H)
- Respond to request from project sponsors who may have limited technical and analytical capabilities to estimate emission benefits
- Provide analysis methodologies for most encountered CMAQ projects
- Provide a common set of methodologies using consistent assumptions, available data sources
- Serve as a resource only; areas are not required to replace methodologies already in practice

*https://fhwaapps.fhwa.dot.gov/cmaq_pub/

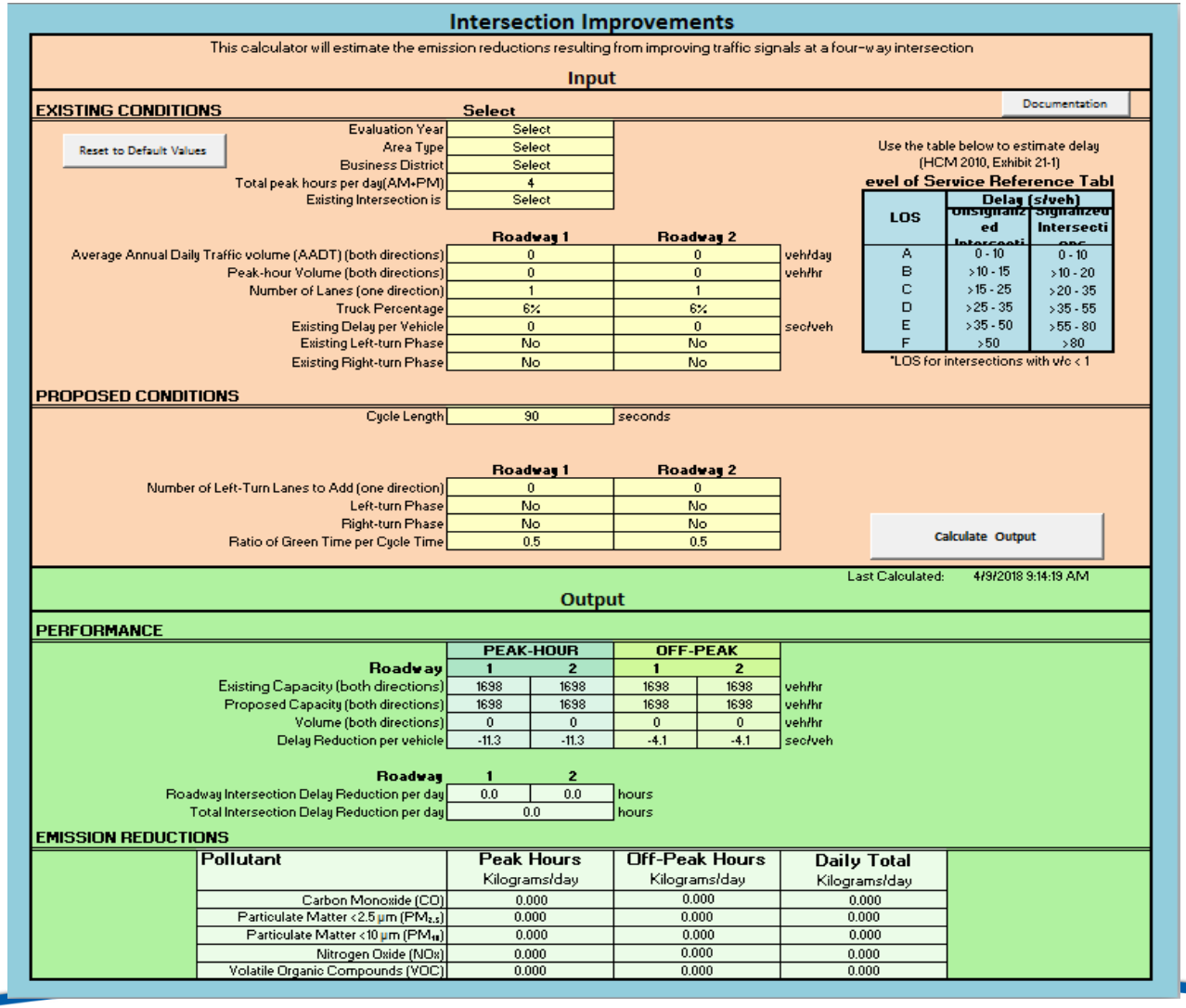
Project Tools Now Available

Tool	Documentation
Congestion Reduction and Traffic Flow Improvements	• Intersection Improvements • Traffic Signal Synchronization • Roundabouts • MOVES Documentation
Advanced Diesel Truck/Engine Technologies	• On-Road Activity Calculator • On-Road Diesel Repower or Replacement • On-Road Diesel Retrofits • MOVES Documentation for the On-Road Diesel Technologies Spreadsheet Tool
Alternative Fuels and Vehicles	• On-Road Alternative Fuel Vehicle Fleet Purchase • Restricted Access Alternative Fuel Infrastructure • Unrestricted Access Alternative Fuel Infrastructure • MOVES Documentation of Emissions Data for the Alternative Fuels and Vehicles Tool
Carpooling and Vanpooling	• Carpool Module • Vanpool Module • MOVES Documentation of Emissions Data for the Carpooling and Vanpooling Tool
Transit Bus Retrofits and Replacement	• Transit Bus Replacement Module • Transit Bus Retrofit Module • MOVES Documentation of Emissions Data for the Transit Bus Retrofit and Replacement Tool

Tool Methodology

- Years: 2016-2021
- MOVES National default data
- Inputs readily-available
- Outputs by pollutant in kg/day

Intersection Improvements Module



Intersection Improvements

This calculator will estimate the emission reductions resulting from improving traffic signals at a four-way intersection

Input

EXISTING CONDITIONS — Select — Documentation

Reset to Default Values

Evaluation Year	Select
Area Type	Select
Business District	Select
Total peak hours per day(AM+PM)	4
Existing Intersection is	Select

	Roadway 1	Roadway 2	
Average Annual Daily Traffic volume (AADT) (both directions)	0	0	veh/day
Peak-hour Volume (both directions)	0	0	veh/hr
Number of Lanes (one direction)	1	1	
Truck Percentage	6%	6%	
Existing Delay per Vehicle	0	0	sec/veh
Existing Left-turn Phase	No	No	
Existing Right-turn Phase	No	No	

Use the table below to estimate delay (HCM 2010, Exhibit 21-1)

evel of Service Reference Tabl

LOS	Delay (s/veh) Unsignalized Intersecti	Signalized Intersecti
A	0 - 10	0 - 10
B	>10 - 15	>10 - 20
C	>15 - 25	>20 - 35
D	>25 - 35	>35 - 55
E	>35 - 50	>55 - 80
F	>50	>80

*LOS for intersections with v/c < 1

PROPOSED CONDITIONS

Cycle Length: 90 seconds

	Roadway 1	Roadway 2
Number of Left-Turn Lanes to Add (one direction)	0	0
Left-turn Phase	No	No
Right-turn Phase	No	No
Ratio of Green Time per Cycle Time	0.5	0.5

Calculate Output

Last Calculated: 4/9/2018 9:14:19 AM

Output

PERFORMANCE

	PEAK-HOUR		OFF-PEAK		
Roadway	1	2	1	2	
Existing Capacity (both directions)	1698	1698	1698	1698	veh/hr
Proposed Capacity (both directions)	1698	1698	1698	1698	veh/hr
Volume (both directions)	0	0	0	0	veh/hr
Delay Reduction per vehicle	-11.3	-11.3	-4.1	-4.1	sec/veh

Roadway	1	2	
Roadway Intersection Delay Reduction per day	0.0	0.0	hours
Total Intersection Delay Reduction per day	0.0		hours

EMISSION REDUCTIONS

Pollutant	Peak Hours Kilograms/day	Off-Peak Hours Kilograms/day	Daily Total Kilograms/day
Carbon Monoxide (CO)	0.000	0.000	0.000
Particulate Matter <2.5 µm ($PM_{2.5}$)	0.000	0.000	0.000
Particulate Matter <10 µm (PM_{10})	0.000	0.000	0.000
Nitrogen Oxide (NOx)	0.000	0.000	0.000
Volatile Organic Compounds (VOC)	0.000	0.000	0.000

Summary

- ✓Easy to use –
  - Excel-based
  - Readily available inputs
- ✓Consistent methods
- ✓Customizable with local data
- ✓Supported by FHWA

Atlanta Regional Commission (ARC) CMAQ Calculator

- In an effort to standardize best practices in evaluating CMAQ projects, the ARC developed a modular CMAQ emissions calculator.
- The calculator was developed by Cambridge Systematics, Inc. using data and input parameters specifically tailored to the Atlanta Region for use by the ARC.
- Calculates benefits for 16 types of strategies for Years 2010-20
- Preparation of MOVES Emissions Rates and Methodology inputs can be customized for other regions throughout the country
- Customizing Inputs and MOVES emissions rates complex and data intensive.

Website- https://atlantaregional.org/transportation-mobility/air-quality/congestion-mitigation-and-air-quality-program-cmaq/