Connecticut Department of Energy and Environmental Protection

EPA comparison of MOVES light-duty gas NOx emissions to real-world data

December 14, 2017
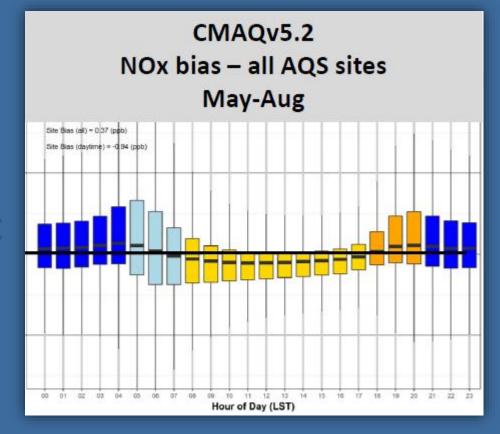Presented by Louis Corsino
SIPRAC, DEEP Headquarters

Connecticut Department of Energy and Environmental Protection

What's the Issue?

- Recent studies have suggested that AQ models over predict NOx compared to monitored concentrations

- Staff across EPA investigating various aspects of issue

- MOVES is just one part of the complex AQ modeling system

CMAQv5.2
NOx bias – all AQS sites
May-Aug

Site Bias (all) = 0.37 (ppb)
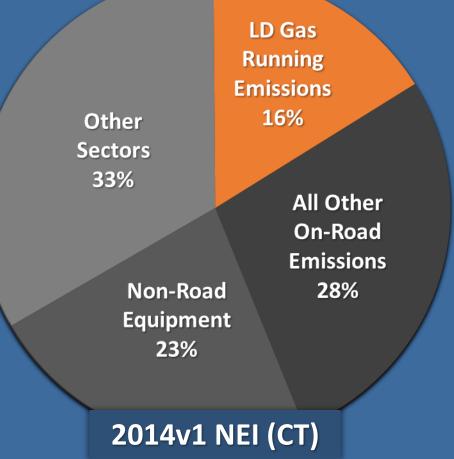Site Bias (daytime) = -0.94 (ppb)

Hour of Day (LST)

Why Focus on Light Duty Gas Vehicles?

- Researchers have suggested mobile emissions may be over estimated – specifically LD NOx emissions

- MOVES2014 model is being re-evaluated for next version release

- Focused on running emissions because little independent data exists for start emissions which are also significant

LD Gas Running Emissions 16%

All Other On-Road Emissions 28%

Non-Road Equipment 23%

Other Sectors 33%

2014v1 NEI (CT)

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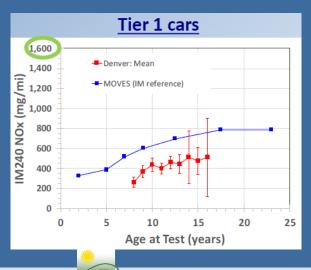
Compare MOVES to External Data

- Denver I/M Program
  - Running Emissions for
    - 1,360 Tier 1 cars ('96-'00)
    - 20,400 Tier 2 cars and trucks ('10-'16)

- Caldecott Tunnel Studies in CA
  - Fleet wide emission rates measured in '01, '06 and '10
  - 600K+ measurements

- Remote Sensing Data (RSD)
  - 14 Different Cities
  - 670K+ individual vehicle measurements
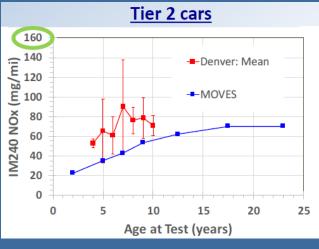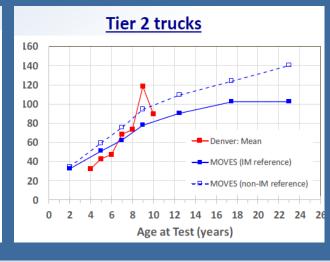
Denver I/M Results

- Simulated IM240 test cycle in MOVES base rates
- MOVES:
  - over estimates for Tier 1 cars
  - under estimates for Tier 2 cars
  - estimates well Tier 2 light trucks
  - deterioration trends compare well
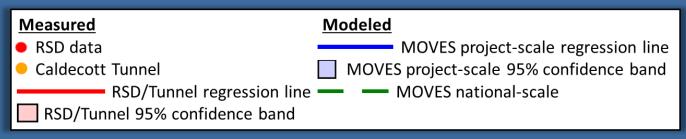
Tunnel Studies and RSD Results

- MOVES run in project scale with inputs customized to RSD and tunnel sites
  - Local temp/humidity, I&M, vehicle fleet properties, etc.

- National-scale runs also completed
  - Default inputs
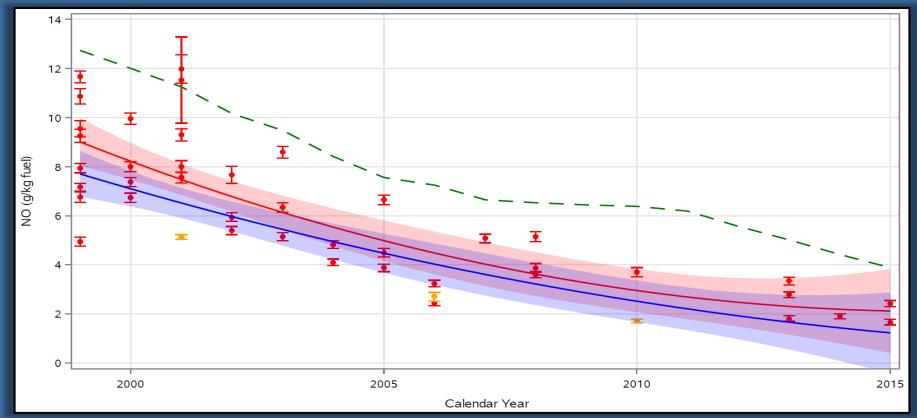 - Does not account for measurement conditions

Caldecott Tunnel

RSD Site
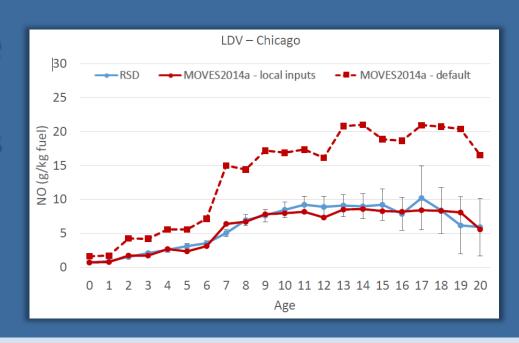
Tunnel Studies and RSD Results

Tunnel Studies and RSD Results

- MOVES project scale
  - Under estimates on-road RSD measurements
  - Generally MOVES results are within data variability
  - Demonstrates importance of accounting for measurement conditions when evaluating MOVES

- MOVES national scale
  - Clear over estimation of RSD measurements
  - NOT a proper way to compare MOVES to independent data

LDV – Chicago

NEI and MOVES

- **National level** – NEI comparable to MOVES national default emissions

- **State/County level** – emissions vary considerably between the NEI and MOVES national default
  - States submit local inputs that differ from MOVES national defaults
  - When local inputs not provided by states, EPA develops default inputs for NEI that may differ from MOVES national defaults

- EPA working to understand the NEI inputs that lead to these differences

Summary

- Denver I/M suggest that MOVES NOx emission rates are too high for Tier 1 cars and too low for Tier 2 cars

- RSD and Tunnel studies show:
  - MOVES rates higher when using national defaults
  - MOVES rates lower when inputs are appropriately adjusted to reflect roadside conditions and trends are within data variability

- EPA **has not concluded** that MOVES LD gas NOx rates are too high and **does not support** adjustments to the mobile source inventory

- EPA will continue to evaluate why AQ models over predict NOx and DEEP will follow their progress