MOVES Update: Excerpts from IEIC

October 10, 2019

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MOVES
Motor Vehicle Emission Simulator

EPA Onroad & Nonroad presentations from the International Emission Inventory Conference,

July 29-August 2, 2019

Excerpts from:

- Planned Updates to EPA MOVES Emission Model for Heavy-Duty Onroad Vehicles – *J. Han, U.S. EPA*
- Advancing Nonroad Model Development through Data Partnerships – *S. Roberts, U.S. EPA*
- Developing Updated Activity Inputs for Nonroad Equipment – *J. Warila, U.S. EPA*

MOVES

Motor Vehicle Emission Simulator

Planned Updates to EPA's MOVES Emission Model for Heavy-Duty Onroad Vehicles

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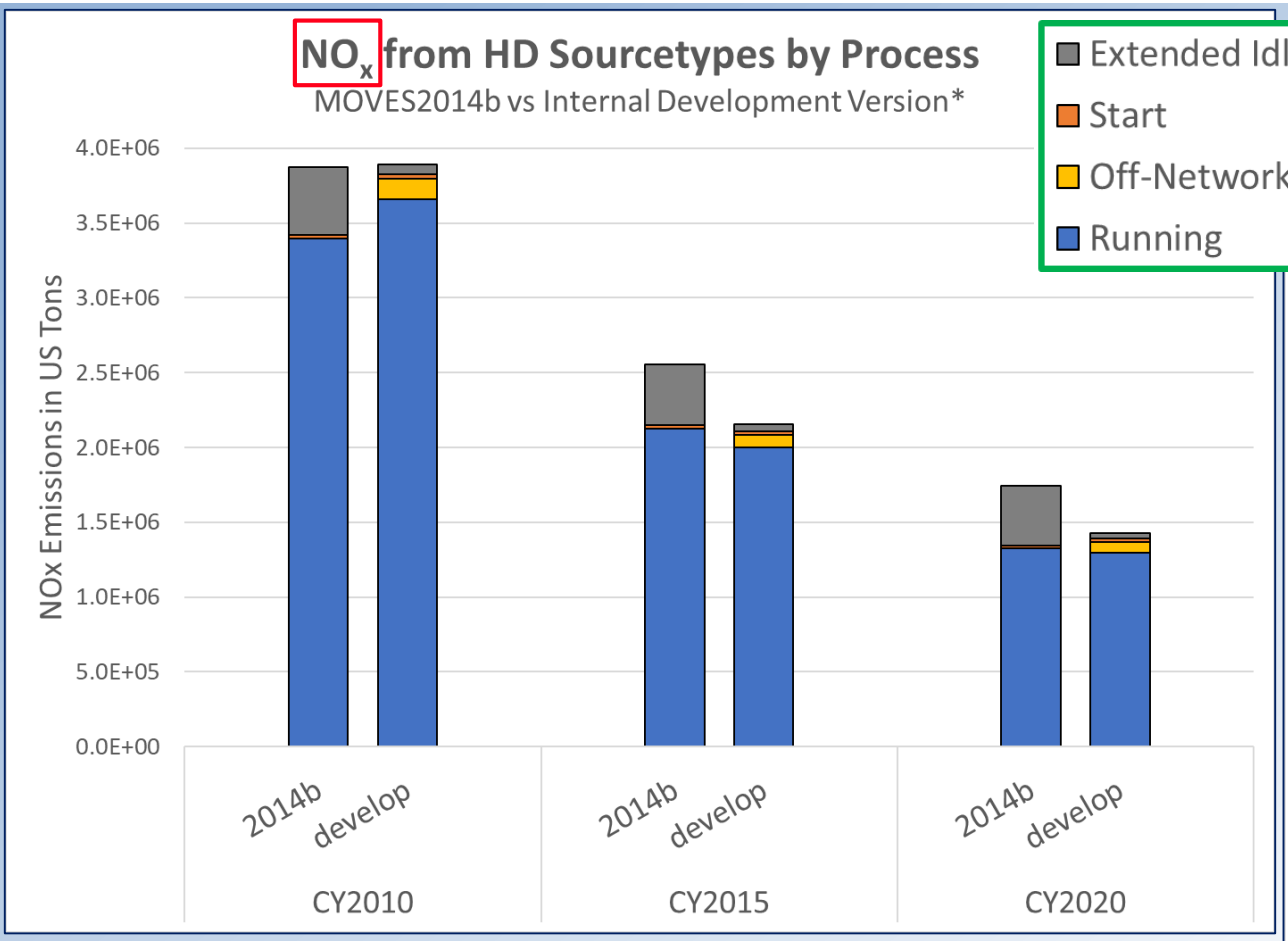
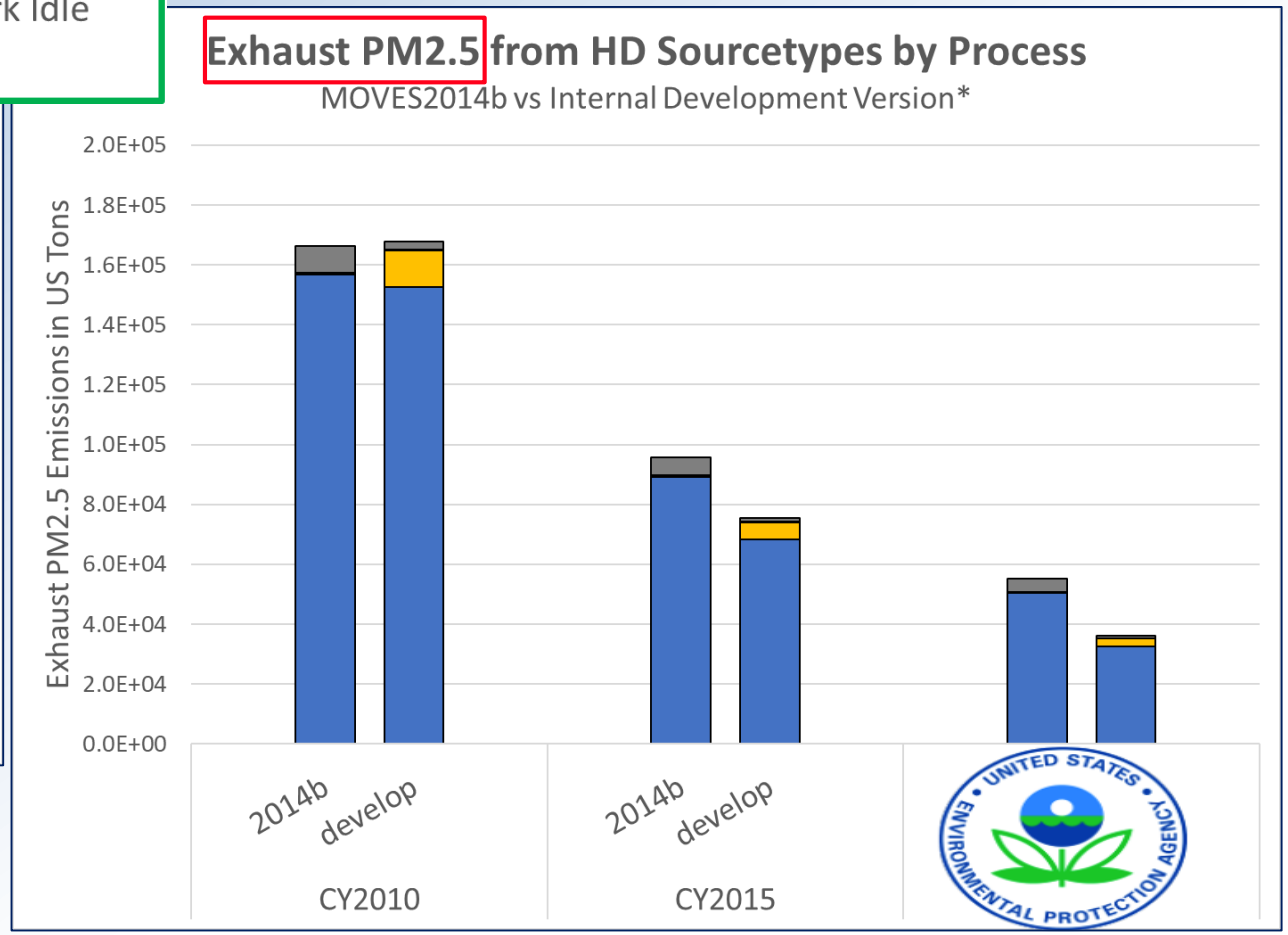
2019 International Emissions Inventory Conference | July 31, 2019 | Dallas, TX

* Office of Transportation and Air Quality, US EPA
^ ORISE participant supported by an interagency agreement between EPA and DOE

Preliminary Estimates: Combined Impact of Planned Updates on HD Emissions





* Preliminary estimates based on EPA's current development version of MOVES

Summary

- The planned heavy-duty updates discussed here are based on latest data and science and will inform future public version of MOVES
- In comparison with MOVES2014b, these updates will likely lead to:
  - Significant NOx increase in HD running emissions from MY 2010+ vehicles
  - Significant NOx decrease in HD extended idle emissions
  - Increase in NOx running emissions due to gliders
  - Addition of new “off-network idle” emissions
  - Decrease in PM in HD running emissions from MY 2010+ vehicles, despite PM increase from gliders
- The results shown in this presentation are still **preliminary**
  - Emission impacts will vary by location and calendar year
  - There are other planned changes that could result in changes in emissions

    (e.g., updates to light-duty presented by Claudia Toro)

Advancing Nonroad Model Development Through Data Partnerships

Sarah Roberts, Carl Fulper, Kathryn Dotzel, and James Warila

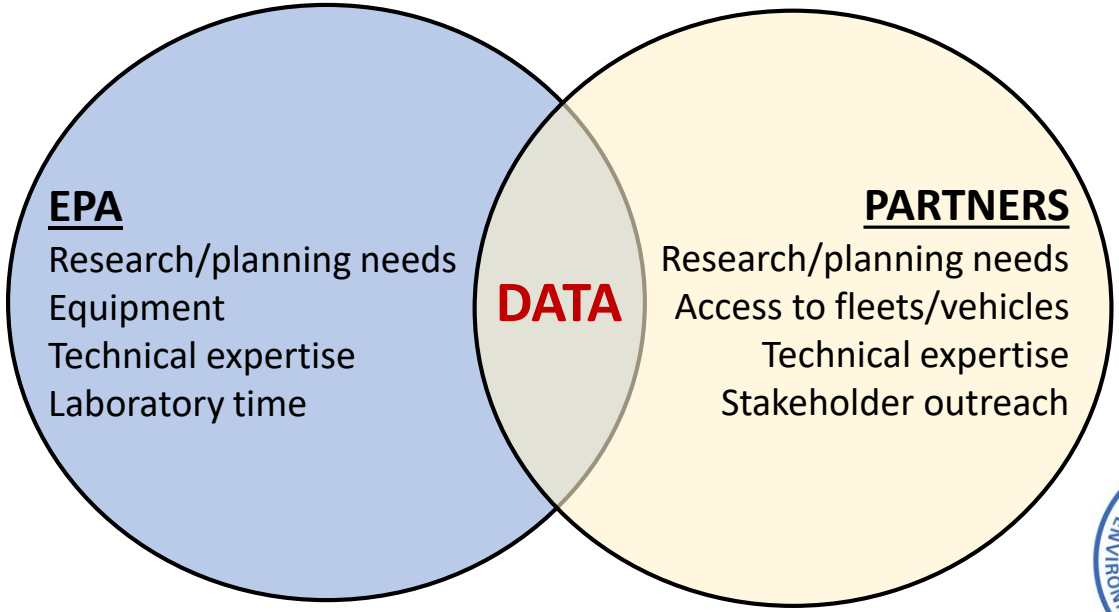
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
Ann Arbor, Michigan

2019 International Emissions Inventory Conference
July 29-August 2, 2019 | Dallas, TX

Leveraging Resources

- Collecting real-world mobile source data requires substantial investment in equipment, data, computing, and staff
- Collaborating with state and local agencies, academic institutions, and private fleets allows EPA and its partners to leverage resources in order to meet respective research needs
- Partners work together to:
  - Develop data and testing procedures and protocols
  - Gather data
  - Develop new sampling methodologies
  - Test/develop measurement equipment
  - Enhance modeling efforts
- Results in a data "win-win"
- EPA's support mechanisms include **Cooperative Research and Development Agreements (CRADAs)**, Interagency Agreements (IAGs), and contractor support

Measurement Method	Equipment Costs (per unit)
PAMS	$600 – $1,000
Mini-PEMS	$20,000 – $30,000
PEMS	$200,000 – $300,000
Laboratory testing: chassis and/or dynamometer	$3,000,000 +



Partnering with EPA

- EPA continues to develop tools and methodologies to further support gathering mobile source activity and emissions data → data partnerships are a cornerstone of this effort

- EPA is actively seeking partnerships to help gather better data to address current and future research needs and improve our data analysis and modeling capabilities

  → Real-world activity data to improve our ability to model emissions from nonroad equipment is a priority

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- Acknowledgements:
  - Texas A&M Transportation Institute: Jeremy Johnson, Phil Lewis, and Joe Zietsman
  - Eastern Research Group: Michael Sabisch
  - University of California, Riverside Center for Environmental Research and Technology: Tom Durbin, Kanok Boriboonsomsin, and Kent Johnson

Developing Updated Activity Inputs for Nonroad Equipment

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Scope

- **Goal: Evaluate equipment activity**
- **For selected diesel equipment types**
  - Wheel loaders
  - Skid-steer loaders
  - Excavators
  - Agricultural Tractors
  - Combines

Conclusions

- **Activity varies by Equipment Type**
  - Wheel Loaders > Excavators > Skid-steer Loaders
  - Ag Tractors > Combines
- **Activity increases by Equipment Size**
  - For types with wide variation in size
  - MOVES-Nonroad tends to:
    - Overestimate activity for smallest diesel equipment
    - Underestimate activity for largest diesel equipment
- **Activity varies by region**
  - To some degree
  - Likely related to climate (e.g., length of working, growing seasons)
  - Has implications for allocation
- **What are implications for inventory?**
  - Depends on changes in total kW-hr
    - Also re-estimating populations
  - Too soon to call

Full Agenda: IEIC Mobile Source Session

https://www.epa.gov/air-emissions-inventories/mobile-session-2019-eic

- Collaboration to Improve the Onroad Sector of the 2017 NEI – *A. DenBleyker, Eastern Research Group, Inc*
- Using Mobile Measurements to Update Onroad Transportation Emission Inventory – *S. Zhang, Cornell University*
- Use of Telematics Data to Update the Heavy-Duty Vehicle Mileage – *A. DenBleyker, Eastern Research Group*
- Planned Updates to EPA MOVES Emission Model for Heavy-Duty Onroad Vehicles – *J. Han, U.S. EPA*
- MOVES Light-Duty Emission Rate Evaluation in the Context of Reconciling Modeled and Ambient NOx – *C. Toro, U.S. EPA*
- Emissions Impacts of Electrifying Passenger Cars in Texas – *C. Kite, Texas Commission on Environmental Quality*
- Estimation of Mobile Source Toxic Emissions and Application in Planning and Policy – *R. Cook, U.S. EPA*
- Environment and Climate Change Canada's Changes to the NONROAD model – *B. Taylor, Environment and Climate Change Canada*
- Towards an AIS Based Marine Emissions Inventory Model –*M. Aldridge, U.S. EPA*
- A Statewide Commercial Marine Vessel AIS-Based Emission Inventory – *S. Cone, Delaware Department of Natural Resources and Environmental Control*
- Methods to Estimate Emissions for Vessels Equipped with Category 1&2 Propulsion Engines Based on AIS Activity Data – *I. Brown, Eastern Research Group*
- Data Quality Tools Applied to AIS Data Enhance Accuracy of Emissions Inventories – *R. Billings, Eastern Research Group*
- Advancing Nonroad Model Development through Data Partnerships – *S. Roberts, U.S. EPA*
- Developing Updated Activity Inputs for Nonroad Equipment – *J. Warila, U.S. EPA*
- Building National High-Resolution Rail Inventories Through Regional Collaboration – *M. Janssen, LADCO*
- Updates to Agricultural Equipment Allocation Data in MOVES Model - *A. Bollman, North Carolina DAQ*