

AQRN Workshop

MOVES Breakout Group

Tuesday Afternoon

2/9/2016

Process

- 20 minutes to review all ideas was too short
- Successful in generating a lot of ideas
- Connecting different ideas and trying to determine overlap took a long time
- Scribes did a great job!
- Good variation of disciplines, backgrounds, opinions

Big Picture Issues

- Nonroad came up a lot
- Temporal and Spatial Allocation
- Off-network activity (includes starts, idling, evap)
- Very pragmatic list – ideas are approachable
- A number of ideas generated for improving the model are not necessarily research-focused
- A lot of information out there is available that could be accessed

1. Improved Spatial Allocation of emissions and activity

- Need to allocate activity down to a scale of less than 1 to 4 km and irregular grid cells (make consistent with AQ models)
- Includes both heavy duty and light duty cars and trucks and nonroad (things in MOVES)
- Emissions while running, starting, idling and parked (evap)
- Develop appropriate data and surrogates.
 - Data and methods
 - Link level inventories exist for South Coast, could this be expanded to larger scales?
 - ? Start with interstates?

2. Better National Temporal Data for highway vehicles

“My cell phone knows it, why can't we?”

- Need data for heavy and light duty vehicles
- Need temporal distributions at the link and grid cell level
- Need hourly (or finer) activity that differs by day of the week.
- Need to distinguish temporal patterns for different vehicles types

3. Big (and Small) Data for Nonroad Activity

- We need information on how nonroad equipment (construction, agriculture, etc.) is used.
 - Research would include instrumenting equipment to measure activity such as fuel use per day.
 - Research would also include survey data on equipment usage patterns
 - Top down & bottom up
 - Emission rates later.

4. Better distinguish Onroad Source Types

When modeling, it is important to know what emission standards a vehicle is subject to, for example, distinguishing “cars” from “trucks.” The distinctions also matter for predicting activity.

- Research would include VIN decoding for light duty vehicles.
- Would also need to develop effective strategies for heavy duty
- Also include age distributions
- Need flexible approaches and frequent updates.

5. Improve Future Projections

Much of our work involves predicting future inventories. This requires predicting future activity including:

- Total activity
- Mix of activity among vehicle types and ages
- Mix of activity among fuel types (diesel, gasoline, E85, biodiesel, etc.)
- Age distributions, vehicle technologies, etc.
- Nonroad too
- County-by county variability too

DOE already does much of this prediction in the Annual Energy Outlook (AEO). Research can improve, automate or better communicate ways to convert DOE projections into MOVES inputs and to evaluate other prediction approaches to allow frequent updates and possible evaluation of alternative scenarios.

6. Better use of Measurements to evaluate the Model

- Evaluation can help improve confidence in the model and identify areas for improvement.
- Research should include a variety of approaches including detailed comparisons between roadside measurements, satellite measurements, and model estimates.
- Needs to include off-network emissions
- NO_x should be one focus of this work. Also hazardous air pollutants (HAPs).

7. Better drive cycles

- Develop database of prototype drive cycles, not just intersections and ramps.
- The accelerations and braking at intersections and on ramps can cause relatively high emissions.
- Research should develop
 - second-by-second drive cycles and
 - algorithms for applying these driving cycles at various scales.

8. Instrumented onroad activity data

- There is a large amount of data from instrumented vehicles (and people via their phones).
- Focus on information on where and when vehicles drive, start, stop, idle.
- Techniques need to be developed to efficiently process this data and apply it in the model at various scales.

9. Better GIS Location based inputs for Rail & Marine

- Rail, Marine and other emissions need to be properly located at a fine scale.
- Activity data often exists, but needs to be efficiently collected and applied.
- Variation in time should be captured.

10. Improve Starts

- Emissions at vehicle start are a large contributor to emissions since they are difficult to control.
- We need better data on HD and LD start emission rates.
- Including how rates differ depending on time parked (soak time) before starting
- Includes variation with age & technology
- Includes speciation of emissions
- We also need better data on when and where vehicles start and how that varies by vehicle type.

Conclusions

- There are lots of research opportunities for improving MOVES and inventories.
- Our biggest challenges are getting fine-scale data over large areas and time periods.
- In many cases, data doesn't exist and needs research (surveys, instrumentation, etc.) to create.
- In other cases, data does exist and we need effective strategies to get it and analyze it.