

MOVES2004

Fleet & Activity Inputs

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The word "MOVES" is displayed in a stylized, metallic, three-dimensional font with a brushed metal texture and a slight shadow effect, set against a dark rectangular background.

Acknowledgements

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- Sujan Srivistava

Background Documents

- **“MOVES2004 Highway Vehicle Population and Activity Data,” Draft, December 2004**

What is “Fleet & Activity Data?”

Vehicle Populations & Characteristics
Vehicle Activity Descriptions

- **Essential to any emissions inventory model**
- **Often based on projections and allocations**
- **Important source of uncertainty in emission inventory estimates**

Characterizing the Fleet

- **Current difference in how activity and emission data sources characterize vehicles**
 - e.g. HPMS VMT Classes & EPA Certification Classes
 - MOBILE guidance includes external HPMS/EPA mapping
- **MOVES integrates activity and emission data:**
 - Source Types
 - defined by unique activity patterns, based on HPMS classes
 - Source Bins
 - defined by unique emission characteristics
 - MOVES maps between the two classification schemes by model year.

MOVES Source Types

HPMS Vehicle Type	MOVES2004 SourceType	MOVES2006 SourceType ?
Motorcycle	Motorcycle	Motorcycles
Passenger Car	Passenger Car	Passenger Cars
Other 4-tire, 2 axle	Passenger Truck Light Commercial Truck	Light Trucks
Bus	Intercity Bus Transit Bus School Bus	Buses
Single Unit Truck	Refuse Trucks Short-haul Single Unit Long-haul Single Unit Motorhomes	Single Unit Trucks
Combination Truck	Short-haul Combination Long-haul Combination	Combination Trucks

Source Bins

- **Discriminators by “Pollutant”**

- **Energy:**

- Fuel Type, Engine Technology, Model Year Group, Loaded Weight, Engine Size

- **CH₄ & N₂O:**

- Fuel Type, Engine Technology, Model Year Group, Regulatory Class

Characterizing Activity

- **Total Activity**

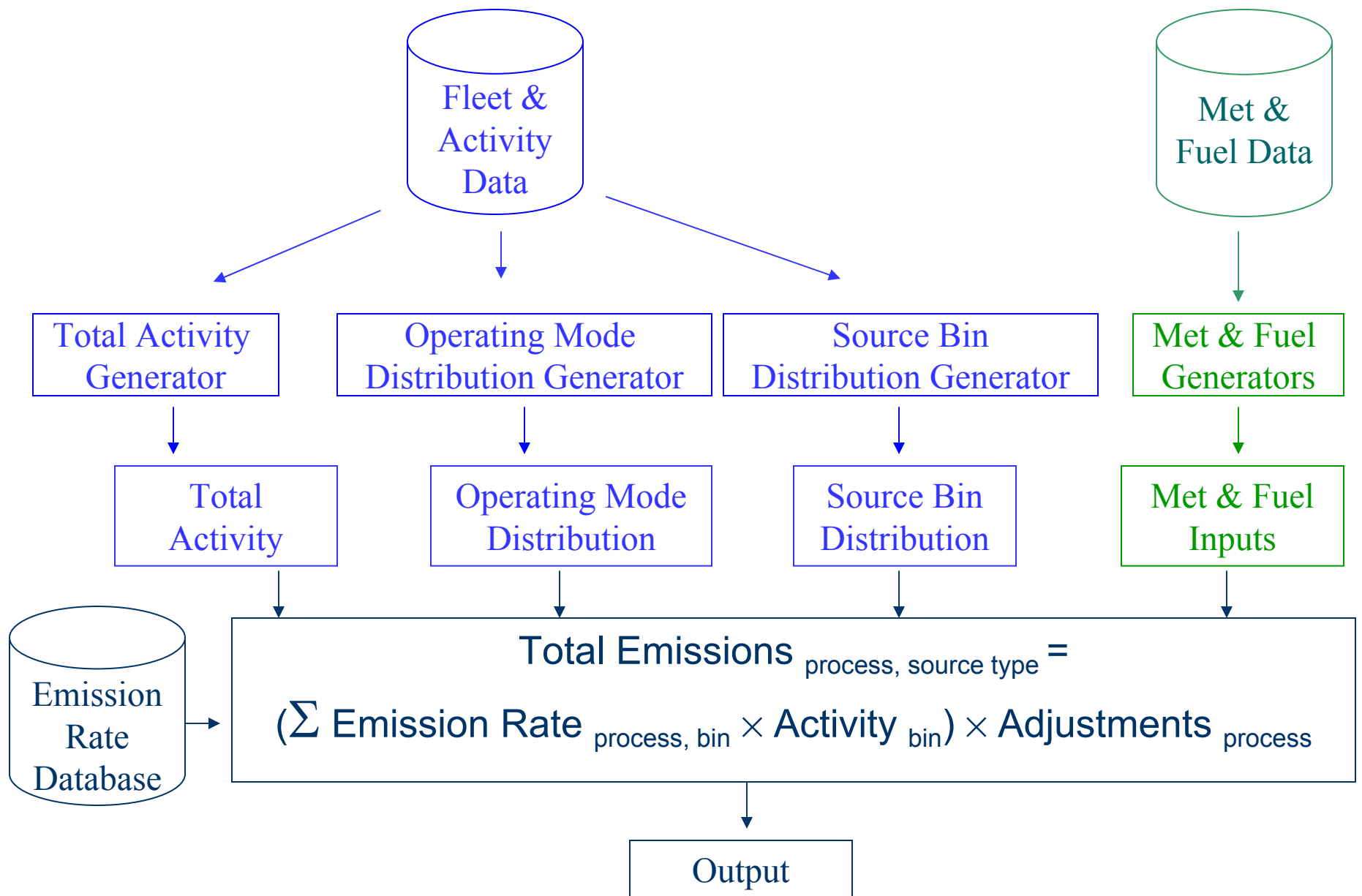
- Population * per-vehicle activity
- Defined on time basis (activity per hour)

- **Operating Mode**

- Division of total activity into sub-categories that differentiate emissions
- Defined for Energy by Speed and Vehicle Specific Power

Structure of Fleet & Activity Data in MOVES

- **Default database stores implementation-specific data**
 - In this case -- national macroscale data for MOVES2004
 - Format similar to data sources so relatively easy to obtain & update.
- **Generators convert default data into Core Model Inputs**
 - Highly detailed data in MOVES-specific format
 - Format consistent across implementations



Structure of Fleet & Activity Inputs in MOVES

Total Activity Generator Inputs

- **Generating Analysis Year Populations by Source Type & Age**
 - Base year vehicle populations
 - Scrappage rates
 - Sales growth rates
 - Age distributions

Total Activity Generator Inputs

- **Estimating Travel by Source Type, Age, & Road Type**
 - Base Year VMT by Vehicle Type
 - VMT Growth Rates by Vehicle Type
 - Relative Mileage Accumulation Rates
 - Road type VMT fractions by Source Type

Total Activity Generator Inputs

- **Converting to time basis & allocating activity in time & space**
 - Temporal VMT distributions (Month, Day, Hour)
 - Distribution of Roadway VMT by county
 - Allocations of starts in time & space
 - Allocation of HD extended idle in time & space
 - Average speed distributions

Source Bin Generator Inputs

- **Allocating Source Types to Source Bins by Source Type and Model Year**
 - Fuel/Engine Technology Distributions
 - Regulatory Class Distributions
 - Size/Weight Distributions
 - Model Year Groups

Operating Mode Distribution Generator Inputs

- **Allocating Source Hours Operating to Operating Modes**
 - Average Speed Distributions
 - Driving Schedules
 - VSP coefficients by Source Type
 - average weight
 - rolling, rotating & drag coefficients

Speed & Drive Schedules

- **Average Speed Distributions**
 - By hour, day & roadway type
 - Currently based on MOBILE6
- **Driving Schedules**
 - By source types, roadway type & average speeds
 - Defaults
 - New MHDV and HHDV schedules developed by ERG based on heavy-duty driving surveys
 - MOBILE6 facility cycles used for LD, with new high-speed schedules
 - WVU cycles for urban bus, refuse truck

National Default Data Sources

- **Polk**-- Registration data, especially used for light duty
- **VIUS97** -- Census survey of truck data
- **FHWA**-- VMT data and registration data
- **Specialized sources:**
 - Federal Transit Administration
 - Recreational Vehicle Industry Assoc.
 - Motorcycle Industry Council
 - School Bus Fleet Magazine
 - etc.



Projections

- **DOE Annual Energy Outlook (AEO) forecasts future energy consumption.**
 - The National Energy Modeling System (NEMS) is used to generate these projections based on economic and demographic projections.
- **We used AEO2004 to project default:**
 - VMT growth
 - Vehicle sales growth
 - Future distributions of vehicle fuels & technologies

Modeling “What If?” Scenarios

- **Alternative Vehicle Fuels & Technology tool allows GUI input of future vehicle mix**
- **User Input Database allows other changes, for example:**
 - VMT Growth
 - Sales Growth

User Input Database

- All fleet & activity data can be customized using the User Input database.
- Default fleet & activity data are provided for all values.
- Defaults are appropriate in many cases.
 - For MOVES2006, we will provide draft guidance on when inputs should be modified and when they should remain default.

Plans for MOVES2006

- Consolidate source types, road types, days
- Update base year 1999 data
- Add base year 1990 data
- Add source bin distributions for new pollutant characteristics

Final Notes

- **Fleet & activity data are critical inputs to total emission inventory**
- **Like MOBILE6, most data compiled from non-EPA sources**
- **Unlike MOBILE, MOVES is designed to take available data and transform into needed core model inputs**
- **Report provides details**