National Capital Region Transportation Planning Board

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Item #8

MEMORANDUM

To: Technical Committee
From: Elena Constantine, Director System Planning Applications
Date: January 7, 2011
Re: MOVES Task Force Progress Report

A. BACKGROUND:

Since the EPA announcement that the MOBILE6.2 model used for SIPs and air quality analyses will be phased out and it will be replaced by the Motor Vehicle Emission Simulator (MOVES) model after a two-year grace period, the MOVES2010 Task Force was formed to provide guidance during the transition period. Since its first meeting in August 2009, its objective has been interagency consultation and coordination as required for the development of SIPs and conformity determination analyses. The Task Force has also been a forum to discuss input data development methodologies, technical issues pertaining to model execution and issues left unanswered by the technical guidance that EPA periodically provided.

Contrary to the MOBILE6.2 model, which only generates emissions factors thus requiring emissions inventories to be calculated in a post-model-processing setting, MOVES is a complete emissions estimation package (i.e., it estimates total emissions). It also allows greater customization of its outputs for diverse applications at county level as well as project level. Due to its complexity the model has been under development for at least two years, a fact that resulted in various versions, which are known among practitioners as MOVES2009, MOVES2010 and MOVES2010a. The Task Force devoted a considerable amount of time and effort in ten data input categories, which are used for model execution. They are as follows:

1. Age Distribution of vehicles registered by jurisdiction
2. Average Speed Distribution of vehicles by vehicle type, road type, time and day
3. Market Share of existing fuels (Fuel Supply) by state, county, month and year
4. Fuel Formulation by state
5. Inspection/Maintenance (I/M) Programs by state
6. Meteorology Data (i.e., hourly temperature and relative humidity readings)
7. Fraction of time driven on ramps (Ramp Fraction) by road type
8. Fraction of the annual VMT (Road Type Distribution) across five road types and by vehicle type
9. Source Type Population (number of vehicles registered by jurisdiction and vehicle type)
10. Vehicle Type VMT (annual VMT by HPMS vehicle type)

EPA has developed national default values for all of the above ten data input categories, which are to be used when local data is not available. In addition, EPA encourages use of local data in select categories while it discourages their use in other categories. Such a selective use of local versus national default data has been among the key issues addressed by the MOVES Task Force.

B. MOVES TASK FORCE ACCOMPLISHMENTS:

In light of the multijurisdictional environment of the Washington region, the variety of Fuel Supply/Formulation and I/M Programs, the abundance of public transportation options and the existing emissions budgets for the region set using MOBILE6.2, the Task Force devoted time and effort in the development of methodologies for seven out of the ten input data categories as the remaining three (i.e., fuel supply, formulation and I/M programs) were provided by the state air agencies and they did not require Task Force approval. Specifically, it assessed the availability of local data, the feasibility of using local data instead of default values, and the format of existing MOBILE6.2 databases for transitioning to MOVES environment. The Task Force also reviewed and approved the technical integrity of methodologies that were developed especially for MOVES when new data categories were introduced, which did not exist in MOBILE6.2. Finally, the Task Force addressed model operational issues (e.g., Batch Processing versus Distributive Processing, MySQL programming, Windows operating systems compatibility etc.).

The most important decision of the MOVES Task Force was the adoption of the Emissions Inventory approach for air quality conformity determination instead of the Emissions Rate approach since EPA allows use of either approach for conformity analyses. The decision was reached on June 22, 2010.

Upon addressing input data, methodologies and model operational issues the Task Force requested a series of sensitivity tests using the approved input data development methodologies based on the recently adopted 2010 CLRP and FY2011-2016 (November 2010). The testing aimed to assess the pollutant level differentials for milestone years 2011, 2020, 2030 and 2040 calculated by MOBILE6.2 and MOVES. The preliminary findings of these analyses are illustrated in the charts that follow.

C. ISSUES RAISED FROM THE SENSITIVITY TESTS:

- MOVES calculated higher pollution levels for all types of pollutants analyzed except Winter CO for all analysis years. The increased emissions levels were attributed to the inherent differences of the two models' structures.

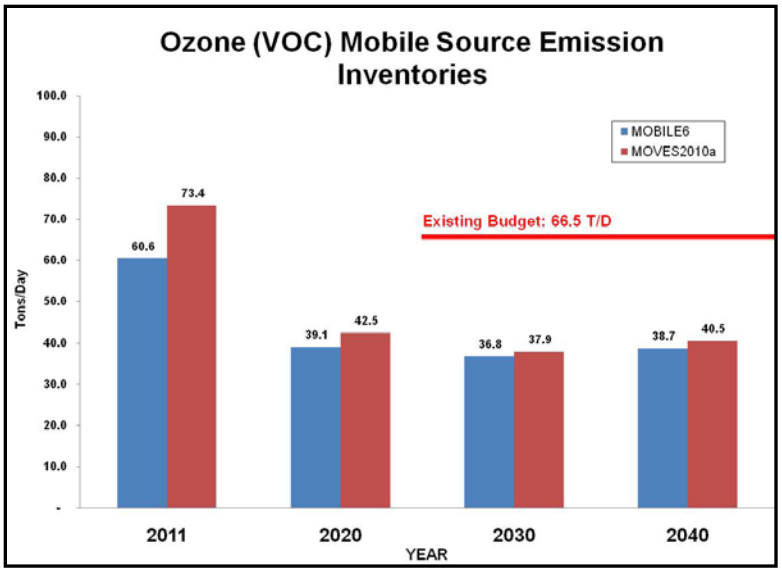
- The emissions levels calculated by MOVES are within existing budgets (set using MOBILE6.2) for the outer years (i.e., 2020, 2030 and 2040). For the near future, year 2011, the daily and annual pollutant levels were estimated to be over the budgeted amounts.

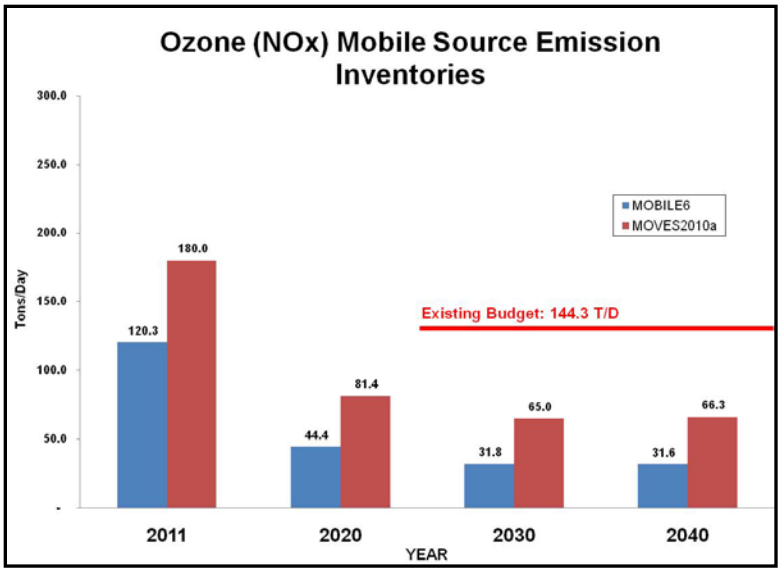
- Use of the MOVES model would become mandatory for SIPs and Air Quality Conformity analyses after March 2012 if the current two-year grace period granted by EPA is not extended.

- The calculated emissions levels across all categories of pollutants are calculated to be at their lowest points around year 2030 while they marginally increase afterwards. This pattern was attributed to an aging vehicle fleet, the maturity of the emissions control technologies of vehicles and increases in VMT, which could not be offset by emissions control technologies.

D. PRELIMINARY FINDINGS:

Ozone Daily (VOC and NOx) Mobile Source Emissions Inventories:



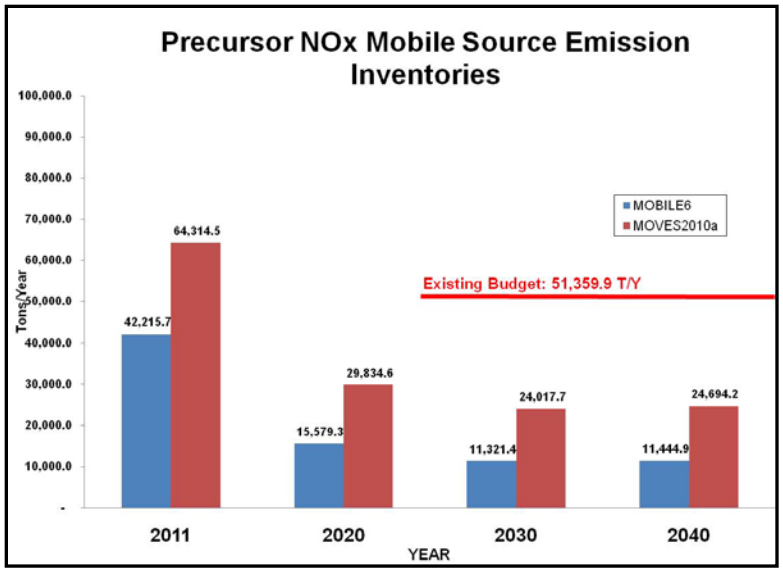


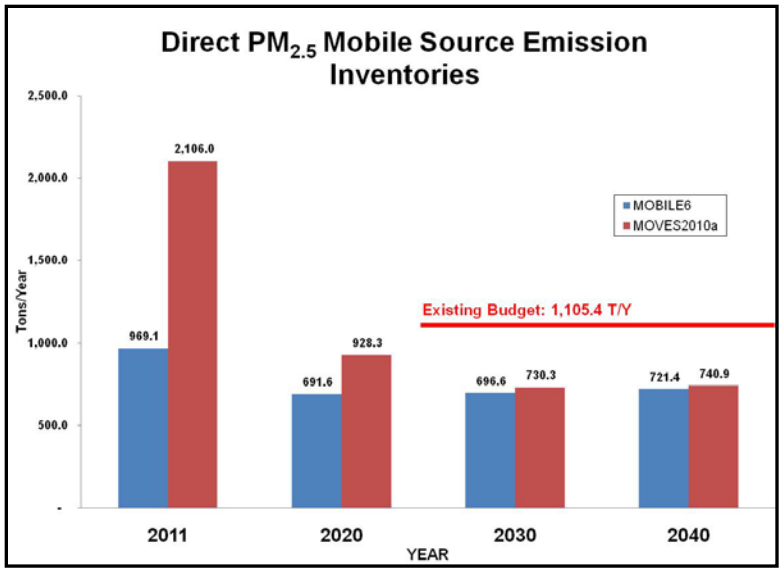
- The region will be within existing budgets for Ozone daily VOC and NOx for years 2020, 2030 and 2040 (based on the 2010 CLRP and the FY2011-2016 TIP) according to both MOVES and MOBILE6.2;

- The region will exceed existing daily budgets for VOC and NOx for year 2011 by 6.9 and 35.7 tons/day respectively according to MOVES. It is noteworthy that the region is expected to be within existing budgets according to MOBILE6.2 in year 2011;

- Conformity in year 2011 (or lack of it) depends on the 13 and 60 tons/day of VOC and NOx respectively that are calculated by MOVES as compared to MOBILE6.2. These differentials represent pollutant increases of 21% and 50% for VOC and NOx respectively.

Annual Mobile Source Emissions Inventories:

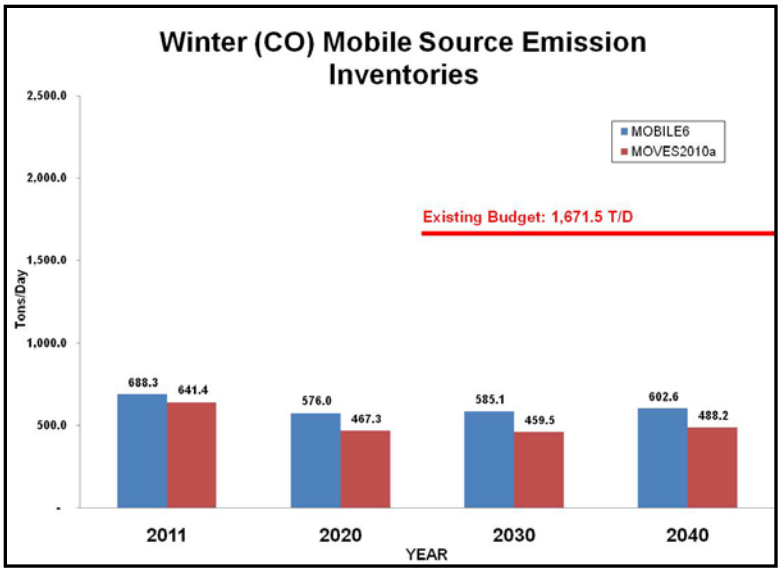




- The region will be within existing budgets for Precursor NOx and Particulate Matter (PM2.5) years 2020, 2030 and 2040 (based on the 2010 CLRP and the FY2011-2016 TIP) according to both MOVES and MOBILE6.2;

- The region will exceed budgeted amounts for year 2011 by 13,000 tons/year for precursor NOx and by 1,000 tons/year for particulate matter (PM2.5) according to MOVES. It is noteworthy that the MOVES calculates exceptionally higher PM2.5 values for year 2011 as compared to MOBILE6.2 (i.e., at 2,106 tons/year it represents an increase over the MOBILE6.2 calculated value of 117 percent.

Winter CO Mobile Source Emissions Inventories:



- The region is currently in maintenance status for Winter CO;

- Winter CO inventories calculated by MOVES are lower than the corresponding values calculated by MOBILE6.2 for all analysis years. These Winter CO inventories are within the existing daily budget.