SMTC 2050 Long Range Transportation Plan

Appendix D: MOVES results for SMTC model

MEMO

TO: SMTC MPO
FROM: RSG
CC:
DATE: June 15, 2015
SUBJECT: MOVES results for SMTC model runs

RSG used MOVES2014 to estimate emissions inventories the SMTC travel demand model. RSG ran MOVES once for each of three scenarios: 2014, 2050 no build, and 2050 build.

Table 1 presents the 2014 and 2050 socio-economic (SE) data that were used as inputs for VHT and VMT calculations needed to run MOVES.

TABLE 1: HOUSEHOLDS AND EMPLOYMENT BY MUNICIPALITY IN 2014 AND 2050

		Households*				Employment			
		2014	2050	Change	% Change	2014	2050	Change	% Change
Town	Camillus	9,918	10,988	1,070	11%	7,542	8,729	1,187	16%
/City	Cicero	12,348	13,566	1,218	10%	12,671	14,149	1,478	12%
	Clay	23,387	26,317	2,930	13%	23,494	26,584	3,090	13%
	Dewitt	11,690	12,039	349	3%	43,085	48,326	5,241	12%
	Elbridge	2,354	2,497	143	6%	2,704	3,594	890	33%
	Fabius	728	778	50	7%	438	453	15	3%
	Geddes	7,485	7,467	-18	0%	7,238	8,110	872	12%
	Granby	44	47	3	7%	9	10	1	11%
	Hastings	3,883	4,253	370	10%	2,232	2,543	311	14%
	Lafayette	2,000	2,240	240	12%	1228	1248	20	2%
	Lysander	8,551	10,472	1,921	22%	5,918	8,198	2280	39%
	Manlius	13,442	14,642	1,200	9%	10,390	11,096	706	7%
	Marcellus	2,474	2,835	361	15%	1,743	1,867	124	7%
	Onondaga	9,230	10,527	1,297	14%	7,399	8,212	813	11%
	Onondaga Nation	306	306	0	0%	129	129	0	0%
	Otisco	963	1,013	50	5%	315	322	7	2%
	Pompey	2,527	2,831	304	12%	703	733	30	4%
	Salina	15,179	15,346	167	1%	21,105	22,385	1,280	6%
	Schroeppel	3,351	3,570	219	7%	1661	1773	112	7%
	Skaneateles	2,946	3,128	182	6%	3,982	4,481	499	13%
	Spafford	669	738	69	10%	192	199	7	4%
	Sullivan	6,160	6,713	553	9%	2823	3330	507	18%
	Syracuse	69,486	71,622	2,136	3%	100,807	114,802	13,995	14%
	Tully	1,073	1,173	100	9%	904	1,015	111	12%
	Van Buren	5,812	6,498	686	12%	3,682	4,210	528	14%
	West Monroe	1,425	1,516	91	6%	439	480	41	9%
County	Onondaga	202,568	217,023	14,455	7%	255,669	288,842	33,173	13%
	Madison	6,160	6,713	553	9%	2,823	3,330	507	18%
	Oswego	8,703	9,386	683	8%	4,341	4,806	465	11%
Total		217,431	233,122	15,691	7%	262,833	296,978	34,145	13%

*Household numbers include group quarters residents, with one group quarters resident equivalent to one household

The 2050 no build scenario was run using the base year network (2014) and future year (2050) SE data. Several changes were made to the network in order to prepare the 2050 build network and are listed in Table 2 below along with the year in which the projects are expected to be completed.

TABLE 2: FUTURE YEAR NETWORK PROJECTS

PROJECT	PROJECT YEAR
Onondaga Lake Parkway speed reduction	2020
Old Liverpool Rd/Electronics Pkwy Safety Project	2020
James, Salina, Seneca Turnpike, E. Genesee and South Ave, traffic signal improvements	2020
Geddes, W. Genesee, Lodi, and North Salina Street Traffic Signal Improvements	2020
Third lane of Frontage Road	2020
Soule Road & Route 31/Route 481 interchange improvement	2020
Comstock Ave Lane Reduction	2020
Waverly Ave Lane Reduction	2020
Route 11/Route 20 intersection Improvements	2020
Electronics Pkwy/Henry Clay Blvd Signal Improvements	2020
Township 5 intersection improvements	2020
South Salina Street improvements	2020
Water street partial closure	2020
West Street lane reductions	2020
White Pines intersection and road improvements	2030
James Street improvements	2030
Taylor Street partial closure	2030
Conversion of downtown streets to two-way operation	2030
Roundabout at James / Shotwell / Grant	2030
NY 31 widening	2030
Routes 31/81 interchange improvements	2030
Seventh North/Buckley intersection upgrade	2030
Buckley Rd/Bear Rd intersection expansion	2030

The MOVES inputs files were constructed using two data sources. The first data source was the files that were constructed by NYSDEC and provided by the NYSDOT Environmental Services Bureau.:

- 36067_2011_moves2014_input.xlsx
- 36067im2015.csv

- 36067im2050.csv
- moves2014_nylev.zip

The following input tables were based completely on the first three input files:

- tables copied with no changes
    - fuelFormulation
    - AVFT
    - zoneMonthHour
    - monthVMTFraction
    - dayVMTFraction
    - hourVMTFraction
    - hotellingActivityDistribution
- tables copied with no changes except for replacing the year ID with the scenario's year
    - sourceTypeAgeDistribution
    - fuelSupply
    - fuelUsageFraction
    - IM

The fourth input file was used as a custom emissions rates table which reflects the presence of low emission vehicles in the fleet.

The second data source was the outputs from the scenario runs of the TDM. The following MOVES input tables were modified or created based on the TDM outputs:

- tables copied with no changes in base year (2014) but with expanded numbers in future year (2050) (expansion accomplished by multiplying by ratio of 2050 total VMT to 2014 total VMT)
    - hotellingHours
    - sourceTypePopulation
- tables based on TDM model outputs
    - speed distribution (speed distribution varies by road type but is identical across source types and hours of day)
    - ramp fraction
    - road type distribution (distribution is identical across source types)
    - total vmt by hpms vehicle type (Total VMT is from TDM; distribution between HPMS vehicle types copied from original table)

The TDM outputs were for one typical weekday 24 hour period. To expand to an annual number, the TDM outputs were multiplied by 365. This likely overestimates the annual VMT since volumes are typically lower on weekends. However, the overall trends in terms of percentage differences between scenarios remain unaffected.

Table 3 presents the emissions inventory results. Total emissions are substantially lower in 2050 compared to 2014. The main driver behind this trend is that MOVES models increasing vehicle efficiencies in future years. The increasing vehicle efficiencies in MOVES are defined mainly by the federal CAFE standards, which started increasing rapidly for model year 2012 and newer vehicles

(Figure 1). For example, the standard in 2012 for small passenger vehicles was 36 mpg, and in 2025 the standard will be 60 mpg, which is an increase of nearly 70%. As older vehicles leave the fleet and are replaced by newer vehicles with the higher standards, the average fleet efficiency will increase dramatically, especially beyond the year 2025, as the standard for new cars has reached a maximum, and many pre-2012 cars have left the fleet. By the time the future year of 2050 is reached, almost the entire vehicle fleet will be comprised of vehicles that meet the 2025 standards.

TABLE 3. MOVES EMISSIONS INVENTORY RESULTS

	Total Annual Emissions		
Pollutant Name	Scenario 2014	Scenario 2050 No Build	Scenario 2050 Build
Total Gaseous Hydrocarbons	1.30E+06	4.20E+05	4.15E+05
Carbon Monoxide (CO)	2.11E+07	7.86E+06	7.94E+06
Oxides of Nitrogen (NOx)	4.01E+06	8.76E+05	8.76E+05
Non-Methane Hydrocarbons	1.21E+06	3.64E+05	3.60E+05
Volatile Organic Compounds	1.26E+06	3.75E+05	3.70E+05
Atmospheric CO2	2.45E+09	1.83E+09	1.79E+09
Total Energy Consumption	3.39E+13	2.53E+13	2.48E+13
Petroleum Energy Consumption	3.23E+13	2.42E+13	2.37E+13
Fossil Fuel Energy Consumption	3.23E+13	2.42E+13	2.37E+13
CO2 Equivalent	2.45E+09	1.83E+09	1.79E+09
Units are Kilograms or KiloJoules			

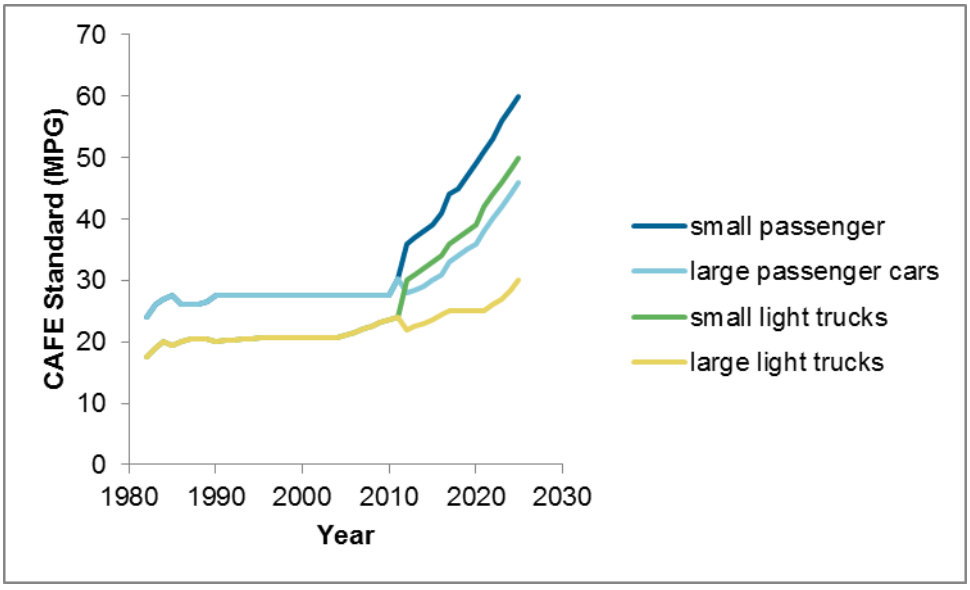

FIGURE 1. VEHICLE EFFICIENCY STANDARDS