



## **Methodology Brief: Greenhouse Gas Emissions Estimates and Target Reduction in Vehicle Miles Traveled for Mercer County, Part 1 April 2006**

### **Goal:**

The goal of this exercise was to calculate the necessary decrease of Vehicle Miles Traveled (VMT) in Mercer County to reach 2005 NJ Sustainability Greenhouse Gas Action Plan air quality standards. Using the VMT statistics, we will later calculate the amount of car and truck trips that need to be shifted to alternate modes of transportation or reduced to reach the air quality standard goal.

### **Data:**

We used the New Jersey Sustainability Greenhouse Gas Action Plan goal of reducing greenhouse gas emissions to 3.5% below 1990 levels by 2005 as our air quality target. Michael Aucott of the Division of Science, Research and Technology, New Jersey Department of Environmental Protection, supplied RPP with data on CO<sub>2</sub> emissions from 1960 to 2001 from all sources as well as a breakdown for motor vehicle emissions from diesel and motor gasoline, by millions of tons of CO<sub>2</sub>. (See Table 1) This data was gathered from US Department of Energy, the Energy Information Administration, and the New Jersey State Energy Data Report. The statewide VMT statistics and a breakdown of VMT statistics by county are available for download from the NJ Department of Transportation website. (See Table 2) Bill Buff, of the Diesel Technology Forum, supplied data representing the proportions of diesel, gasoline, and alternative fuel vehicles by type. (See Table 3)

### **Methodology:**

The proportion of statewide to Mercer County daily VMT was calculated from Department of Transportation data and converted to annual VMT. We used this percentage, 4.48%, as the percentage of statewide VMT attributed to Mercer County. (See Table 2)

According to the NJDEP data, the motor-vehicle CO<sub>2</sub> emissions are 33.2% of total estimated CO<sub>2</sub> emissions in New Jersey. (See Table 4) By calculating the difference between the latest (2001) motor-vehicle emissions and the Greenhouse Gas Action Plan target (3.5% below the 1990 emissions level), the amount of motor-vehicle emissions that must be reduced to reach the target by 2005 was calculated as 8.21% of CO<sub>2</sub> emissions in Mercer County. (See Table 4)

As the motor-vehicle portion of the CO<sub>2</sub> emissions are broken into diesel and non-diesel classifications, the Diesel Technology Forum provided the national average breakdown of diesel, gasoline, and alternate fuel vehicles by vehicle class. (See Table 3) These proportions were assumed for Mercer County to calculate the amount of diesel and gasoline VMT and the associated proportion necessary to reach the Greenhouse Gas Action Plan target in Mercer County.

We then used the statewide to Mercer County VMT comparison to calculate the approximate amount of motor-vehicle emissions from Mercer County, 2.2 million tons of CO<sub>2</sub> in 2001. By comparing this value to the Mercer County proportion of the target, the necessary decrease in VMT to reach the 2005 Greenhouse Gas Action Plan was calculated. (See Table 5)

Future analysis will include converting the necessary VMT reduction to a reduction in trips using updated values for average annual trips per dwelling unit for several development types.

### **Results:**

Assuming similar future fleet ratios, in order to reach the Mercer County proportion of the motor-vehicle emissions of the State Greenhouse Gas Action Plan target, CO<sub>2</sub> emissions for diesel and motor gasoline vehicles must decrease by 8.21% percent by 2005, or 1.99 million tons of CO<sub>2</sub>. The decrease translates to approximately 12 million diesel-vehicle miles and 262 million gasoline-vehicle miles per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
from diesel ***	6.1	6.1	6.7	6.7	8.0	7.2	7.4	8.6	9.2	9.3	9.6	10.3
from motor gasoline	31.8	32.4	31.2	28.8	33.2	33.4	34.9	36.1	37.3	37.4	38.6	38.1
total from motor vehicles, on- and off-road	37.9	38.5	37.8	35.5	41.2	40.6	42.3	44.6	46.4	46.7	48.2	48.4
<b>Total estimated CO<sub>2</sub> equivalent emissions from all sources *****</b>	<b>138.8</b>	<b>139.0</b>	<b>144.3</b>	<b>137.9</b>	<b>147.9</b>	<b>149.8</b>	<b>156.2</b>	<b>156.1</b>	<b>145.8</b>	<b>149.5</b>	<b>148.2</b>	<b>145.9</b>
Annual VMTs, NJ, millions of miles**	58923	59288	59249	59726	60466	61013	62164	63280	64616	65920	67172	68497
Annual VMTs per lb CO <sub>2</sub> (average)*	0.778	0.771	0.783	0.841	0.735	0.751	0.734	0.709	0.696	0.706	0.696	0.708
lbs CO <sub>2</sub> per annual VMT (average)*	1.286	1.298	1.278	1.189	1.361	1.331	1.362	1.410	1.437	1.417	1.436	1.413

\* NOTE: these are calculated averages and should be treated as approximations only and not used for extrapolations.

\*\* from NJDOT web site

\*\*\* assumed to be equivalent to transportation distillate

\*\*\*\* as used by NJDEP

\*\*\*\*\* includes CH<sub>4</sub>, halogenated gas, etc. emissions as estimated by NJDEP based on various sources, weighted by global warming potential

Source: Mike Aucott, NJDEP 9/13/05

		Urban	Rural	Total
<b>Mercer</b>	Miles	1,238	252	1,491
	Daily VMT	6,770,735	1,476,619	8,247,354
<b>Statewide</b>	Miles	24,182	11,837	36,019
	Daily VMT	146,629,533	37,403,725	184,033,258
<b>Mercer % of Total</b>	Miles	5.1%	2.1%	4.1%
	Daily VMT	4.6%	3.9%	4.48%

Source: NJDOT 2000 NJ VMT by County

CLASS	DIESEL	%	GASOLINE	%	ALT FUEL	%	TOTAL
1 - CAR	374,769	0.3%	123,923,700	99.2%	624,615	0.5%	124,923,085
1 - TRK/VAN/SUV	51,506	0.1%	49,600,296	96.3%	1,854,217	3.6%	51,506,019
2	3,022,078	9.9%	27,313,595	89.3%	265,915	0.9%	30,601,588
3	957,860	44.1%	1,211,889	55.8%	205	0.0%	2,169,954
4	415,352	43.7%	534,735	56.2%	745	0.1%	950,832
5	181,077	40.0%	271,249	59.9%	509	0.1%	452,835
6	683,703	48.1%	732,181	51.5%	5,350	0.4%	1,421,234
7	1,298,934	87.8%	168,738	11.4%	10,974	0.7%	1,478,646
8	2,965,043	98.5%	39,858	1.3%	6,045	0.2%	3,010,946
<b>TOTAL</b>	10,003,753	4.6%	203,780,574	94.1%	2,730,812	1.3%	216,515,139

Source: Bill Buff, Diesel Technology Forum

<b>Table 4: Motor-Vehicle Proportion of Statewide CO2 Emissions (33.2% of total)</b>	
Statewide CO2 Target	44.4
2001 Statewide CO2 Emissions	48.4
Mercer Proportion of 2001 CO2 Emissions	2.17
Mercer CO2 Target	1.99
Percentage Decrease to Reach Target	8.21%
Source: NJDEP Greenhouse Gas Action Plan, NJDOT VMT by County, RPP Analysis	

<b>Table 5: Motor Vehicle Emissions Analysis for Mercer County</b>		
	<b>Diesel</b>	<b>Gas</b>
Percent of All Vehicles	4.38%	94.70%
Mercer 2000 VMT	147,890,730	3,196,421,533
Decrease in CO2 to meet Target	<b>8.21%</b>	<b>8.21%</b>
Decrease in VMT to meet Target	12,139,939	262,385,367
Average VMT/Trip	9	9
Decrease in Trips to meet Action Plan Target	1,348,882	29,153,930
Sources: NJDEP Greenhouse Gas Action Plan, NJDOT Mercer County and Statewide estimates, Diesel Technology Forum, RPP GOZ preliminary multiplier estimates		

**Sources:**

*NJ Vehicle Miles Traveled by County, 2000*, NJDOT Bureau of Transportation Data Development, Roadway System Section

*NJDEP Greenhouse Gas Action Plan*, NJDEP Division of Science, Research & Technology

*Estimate of Vehicles in Operation in the U.S. by Fuel Type*, Diesel Technology Forum

RPP GOZ preliminary multiplier estimates

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