

Memorandum

February 24, 2009

To: Travel Management Subcommittee

From: Daivamani Sivasailam 
Department of Transportation Planning

Subject: CO₂ and Total CO₂ Emissions Inventories

Department of Transportation Planning Staff has been updating mobile source CO₂ emissions inventories for 2002, 2005, 2010, 2012, 2020, 2030 milestone years. The first set of inventories were developed in June 2007 and were based on 2006 CLRP and FY 2007-2012 TIP. The updated February 2009 inventories were developed based on the 2008 CLRP and FY 2009-2014 TIP.

Map 1 show the 8-hour ozone non-attainment which is the geography used for both sets of inventories. Exhibit 1 is a table comparing the model area VMT for the two inventories. We can observe a 9% difference (decrease) between the June 2007 VMT and February 2009 VMT. Exhibit 2 is a table comparing the CO₂ emissions from the June 2007 inventory and February 2009 inventory. The difference in the emissions inventory is 5% (decrease). Exhibit 3 is a chart showing the June 2007 and February 2009 inventories.

We also proceeded to develop total CO₂e emissions inventories and exhibit 4 is a table showing the components of total CO₂e (Methane, Nitrous Oxide) for 2002 and 2030. The ratio of Total CO₂e and CO₂ is 1.04 in 2002 and changes to 1.004 in 2030. This indicates the amount of Methane and Nitrous Oxide decrease over time in vehicle tail-pipe exhaust. This is also illustrated as exhibit 5 graphically.

Exhibit 6 is a bar chart showing CO₂ inventory and the impact of CAFÉ 35 on the inventory in 2020 and 2030. Similar work will be performed for impact of CAFÉ 35 on total CO₂e.

Map1
Exhibits 1- 6

Map 1 8-Hour Ozone Non-Attainment Area

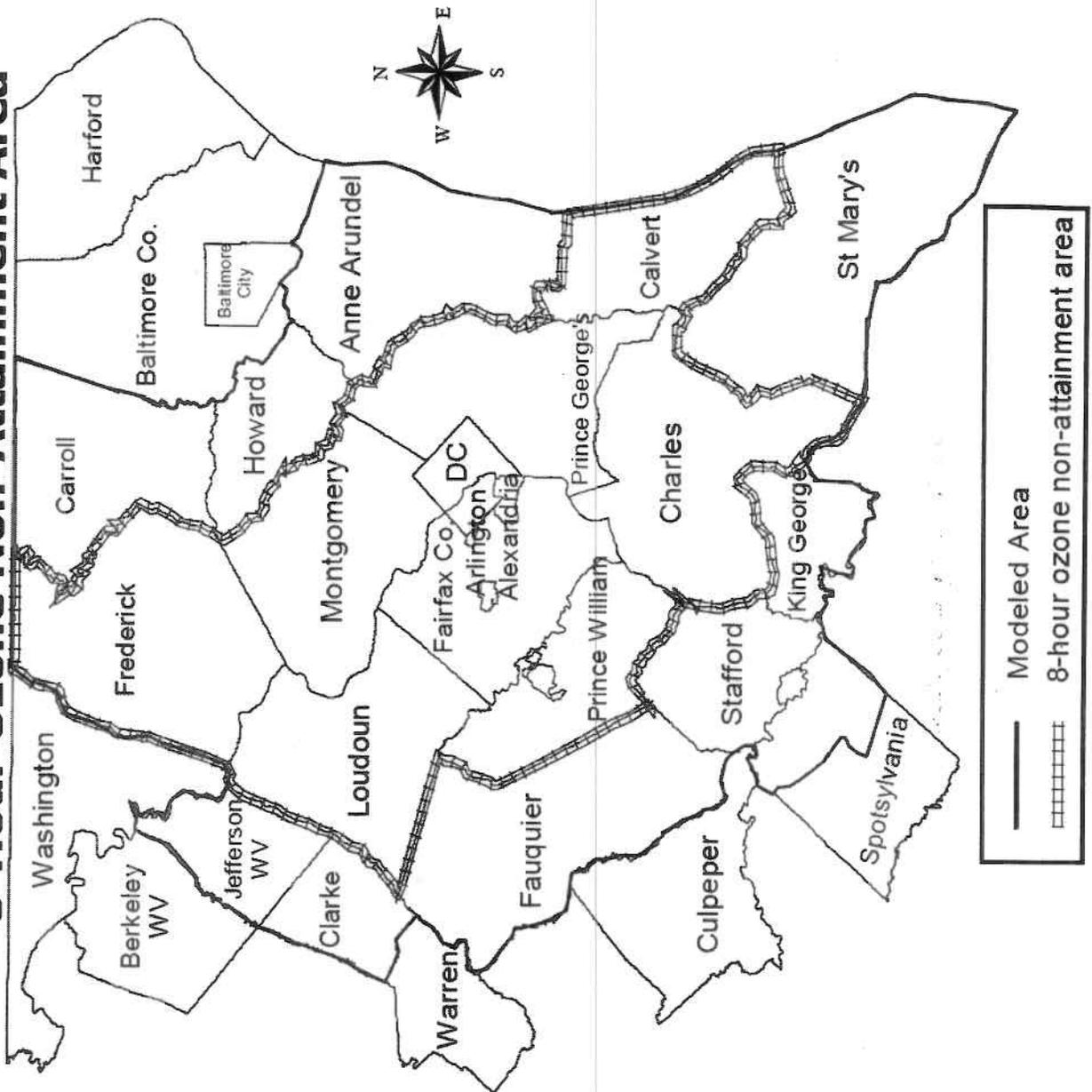


Exhibit 1

COMPARISON OF MODELED AREA TRIPS AND VEHICLE MILES TRAVELED (000'S)
ANNUALIZED AVERAGE WEEKDAY TRAFFIC (AAWDT)
(Based on Final Iteration)

YEAR	REGIONAL VMT (JUNE 2007)	REGIONAL VMT (FEBRUARY 2009)	% DIFFERENCE
2002	149,042,049	146,236,145	1.9%
2010	171,390,904	165,004,265	3.7%
2020	195,384,352	187,128,108	4.2%
2030	216,770,129	199,495,367	8.0%

Comparison of Washington Area CO₂ Emissions Inventories

Draft 02-19-2009

Emissions are in Tons per year

8-Hour Non-Attainment Area	2002			2010		
	Jun-07	Feb-09	% Diff.	Jun-07	Feb-09	% Diff.
Major Roads	21,062,507	20,822,954	1%	24,975,069	24,224,866	3%
Local Roads	1,702,682	1,722,694	1%	2,051,185	1,896,339	8%
School Buses	148,886	151,397	2%	157,151	157,553	0%
Transit Buses	238,937	241,449	1%	259,626	258,566	0%
Auto Access	82,729	81,780	1%	142,750	113,603	20%
Total	23,273,168	23,020,274	1%	27,585,781	26,650,927	3%

8-Hour Non-Attainment Area	2030		
	Jun-07	Feb-09	% Diff.
Major Roads	31,274,167	29,825,933	5%
Local Roads	2,568,474	2,310,466	10%
School Buses	157,557	157,564	0%
Transit Buses	258,072	258,837	0%
Auto Access	132,537	156,749	18%
Total	34,390,808	32,709,549	5%

Notes on Inputs:

Initial Mobile Source Inventory	Updated Mobile Source Inventory
2006 CLRP and the FY2007-2012 TIP Ver 2.1 Travel Demand Model Round 7.0a Cooperative Forecast Interpolated Values for Auto Access to Transit "Post-Processor" Emissions Estimation	2008 CLRP and the FY2009-2014 TIP Ver 2.2 Travel Demand Model Round 7.1 Cooperative Forecast Values Based on Network Analysis "Pechan Software" Emissions Estimation

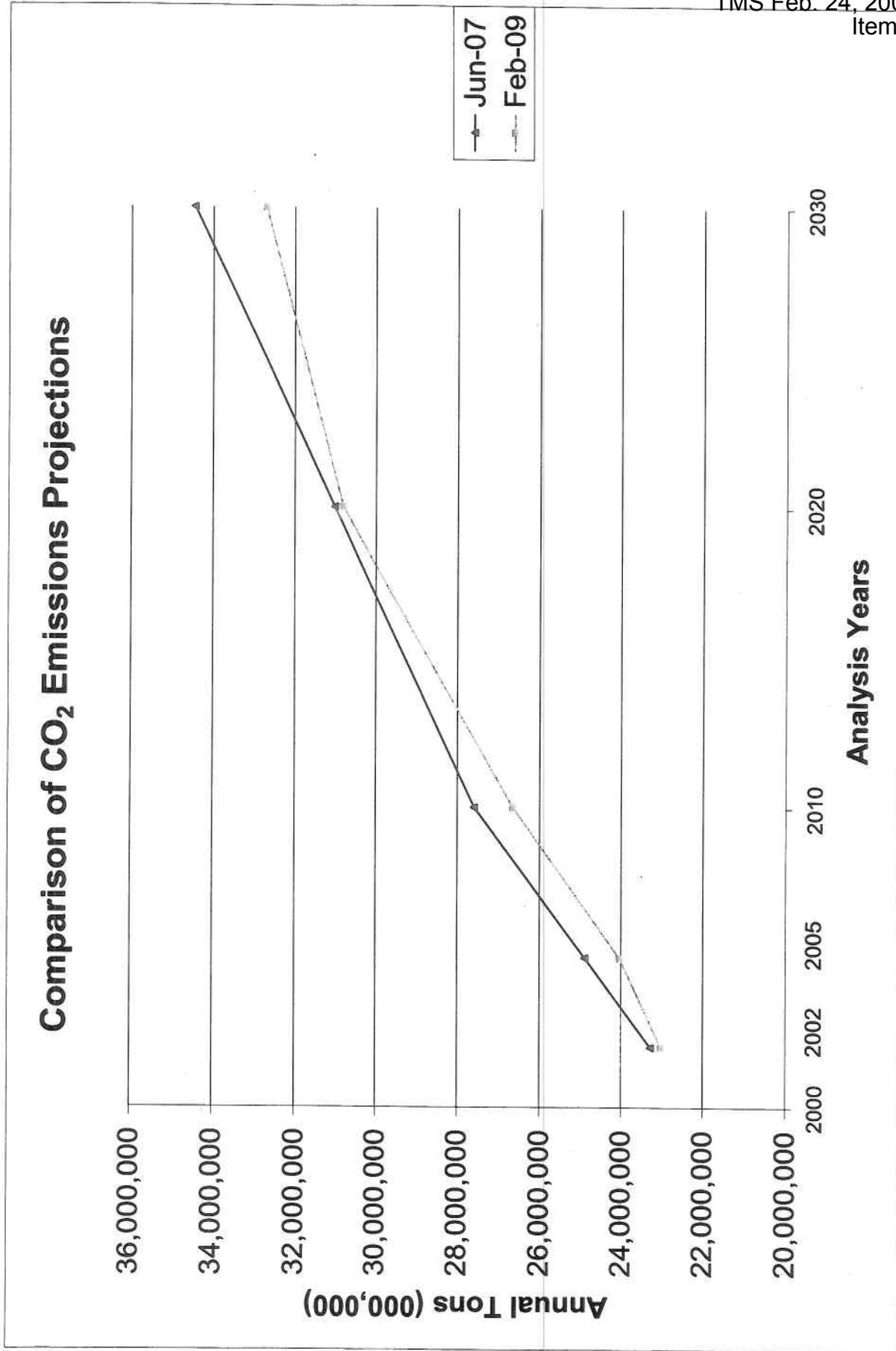


Table 4
2030 CO₂ and CO₂ eq emissions by Jurisdiction and Pollutant

Jurisdiction	Pollutant	Total Emissions	Rate
DC	Carbon Dioxide (CO2)	2021943	
DC	Methane (CH4) as CO2 Eq.	1219	
DC	Nitrous Oxide (N2O) as CO2 Eq.	6233	
DC	Total CO2 Equivalent	2029395	1.004
Calvert	Carbon Dioxide (CO2)	371375	
Calvert	Methane (CH4) as CO2 Eq.	224	
Calvert	Nitrous Oxide (N2O) as CO2 Eq.	1138	
Calvert	Total CO2 Equivalent	372737	1.004
Charles	Carbon Dioxide (CO2)	775781	
Charles	Methane (CH4) as CO2 Eq.	471	
Charles	Nitrous Oxide (N2O) as CO2 Eq.	2399	
Charles	Total CO2 Equivalent	778652	1.004
Frederick	Carbon Dioxide (CO2)	2605209	
Frederick	Methane (CH4) as CO2 Eq.	1561	
Frederick	Nitrous Oxide (N2O) as CO2 Eq.	7992	
Frederick	Total CO2 Equivalent	2614762	1.004
Montgomery	Carbon Dioxide (CO2)	5259720	
Montgomery	Methane (CH4) as CO2 Eq.	3159	
Montgomery	Nitrous Oxide (N2O) as CO2 Eq.	16185	
Montgomery	Total CO2 Equivalent	5279065	1.004
Prince George	Carbon Dioxide (CO2)	5507831	
Prince George	Methane (CH4) as CO2 Eq.	3309	
Prince George	Nitrous Oxide (N2O) as CO2 Eq.	16874	
Prince George	Total CO2 Equivalent	5528014	1.004
Arlington	Carbon Dioxide (CO2)	1020908	
Arlington	Methane (CH4) as CO2 Eq.	621	
Arlington	Nitrous Oxide (N2O) as CO2 Eq.	3176	
Arlington	Total CO2 Equivalent	1024704	1.004
Fairfax	Carbon Dioxide (CO2)	7004025	
Fairfax	Methane (CH4) as CO2 Eq.	4183	
Fairfax	Nitrous Oxide (N2O) as CO2 Eq.	21410	
Fairfax	Total CO2 Equivalent	7029618	1.004
Loudoun	Carbon Dioxide (CO2)	2099390	
Loudoun	Methane (CH4) as CO2 Eq.	1258	
Loudoun	Nitrous Oxide (N2O) as CO2 Eq.	6444	
Loudoun	Total CO2 Equivalent	2107092	1.004
Prince William	Carbon Dioxide (CO2)	2610805	
Prince William	Methane (CH4) as CO2 Eq.	1564	
Prince William	Nitrous Oxide (N2O) as CO2 Eq.	7985	
Prince William	Total CO2 Equivalent	2620355	1.004
Alexandria	Carbon Dioxide (CO2)	548946	
Alexandria	Methane (CH4) as CO2 Eq.	331	
Alexandria	Nitrous Oxide (N2O) as CO2 Eq.	1694	
Alexandria	Total CO2 Equivalent	550971	1.004
Washington Area	Carbon Dioxide (CO2)	29825933	
Washington Area	Methane (CH4) as CO2 Eq.	17899	
Washington Area	Nitrous Oxide (N2O) as CO2 Eq.	91532	
Washington Area	Total CO2 Equivalent	29935364	1.004

Table
2002 CO₂ and CO₂ eq Network Emissions by Jurisdiction and Pollutant

Jurisdiction	Pollutant	Total Emissions	Rate CO₂e to CO₂
DC	Carbon Dioxide (CO ₂)	1700256	
DC	Methane (CH ₄) as CO ₂ Eq.	3167	
DC	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	58788	
DC	Total CO ₂ Equivalent	1762211	1.04
Calvert	Carbon Dioxide (CO ₂)	249095	
Calvert	Methane (CH ₄) as CO ₂ Eq.	461	
Calvert	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	8452	
Calvert	Total CO ₂ Equivalent	258008	1.04
Charles	Carbon Dioxide (CO ₂)	484498	
Charles	Methane (CH ₄) as CO ₂ Eq.	880	
Charles	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	16262	
Charles	Total CO ₂ Equivalent	501640	1.04
Frederick	Carbon Dioxide (CO ₂)	1641923	
Frederick	Methane (CH ₄) as CO ₂ Eq.	2906	
Frederick	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	54874	
Frederick	Total CO ₂ Equivalent	1699704	1.04
Montgomery	Carbon Dioxide (CO ₂)	3979595	
Montgomery	Methane (CH ₄) as CO ₂ Eq.	6667	
Montgomery	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	129208	
Montgomery	Total CO ₂ Equivalent	4115470	1.03
Prince George	Carbon Dioxide (CO ₂)	4068746	
Prince George	Methane (CH ₄) as CO ₂ Eq.	7506	
Prince George	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	140433	
Prince George	Total CO ₂ Equivalent	4216684	1.04
Arlington	Carbon Dioxide (CO ₂)	869716	
Arlington	Methane (CH ₄) as CO ₂ Eq.	1484	
Arlington	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	28705	
Arlington	Total CO ₂ Equivalent	899905	1.03
Fairfax	Carbon Dioxide (CO ₂)	4944938	
Fairfax	Methane (CH ₄) as CO ₂ Eq.	8252	
Fairfax	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	163034	
Fairfax	Total CO ₂ Equivalent	5116225	1.03
Loudoun	Carbon Dioxide (CO ₂)	952947	
Loudoun	Methane (CH ₄) as CO ₂ Eq.	1539	
Loudoun	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	30472	
Loudoun	Total CO ₂ Equivalent	984958	1.03
Prince William	Carbon Dioxide (CO ₂)	1525995	
Prince William	Methane (CH ₄) as CO ₂ Eq.	2655	
Prince William	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	51285	
Prince William	Total CO ₂ Equivalent	1579936	1.04
Alexandria	Carbon Dioxide (CO ₂)	405245	
Alexandria	Methane (CH ₄) as CO ₂ Eq.	646	
Alexandria	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	12591	
Alexandria	Total CO ₂ Equivalent	418482	1.03
Washington Area	Carbon Dioxide (CO ₂)	20822954	
Washington Area	Methane (CH ₄) as CO ₂ Eq.	36164	
Washington Area	Nitrous Oxide (N ₂ O) as CO ₂ Eq.	694106	
Washington Area	Total CO ₂ Equivalent	21553224	1.04

Exhibit 5

Comparison of CO₂ with Total CO₂e Emissions

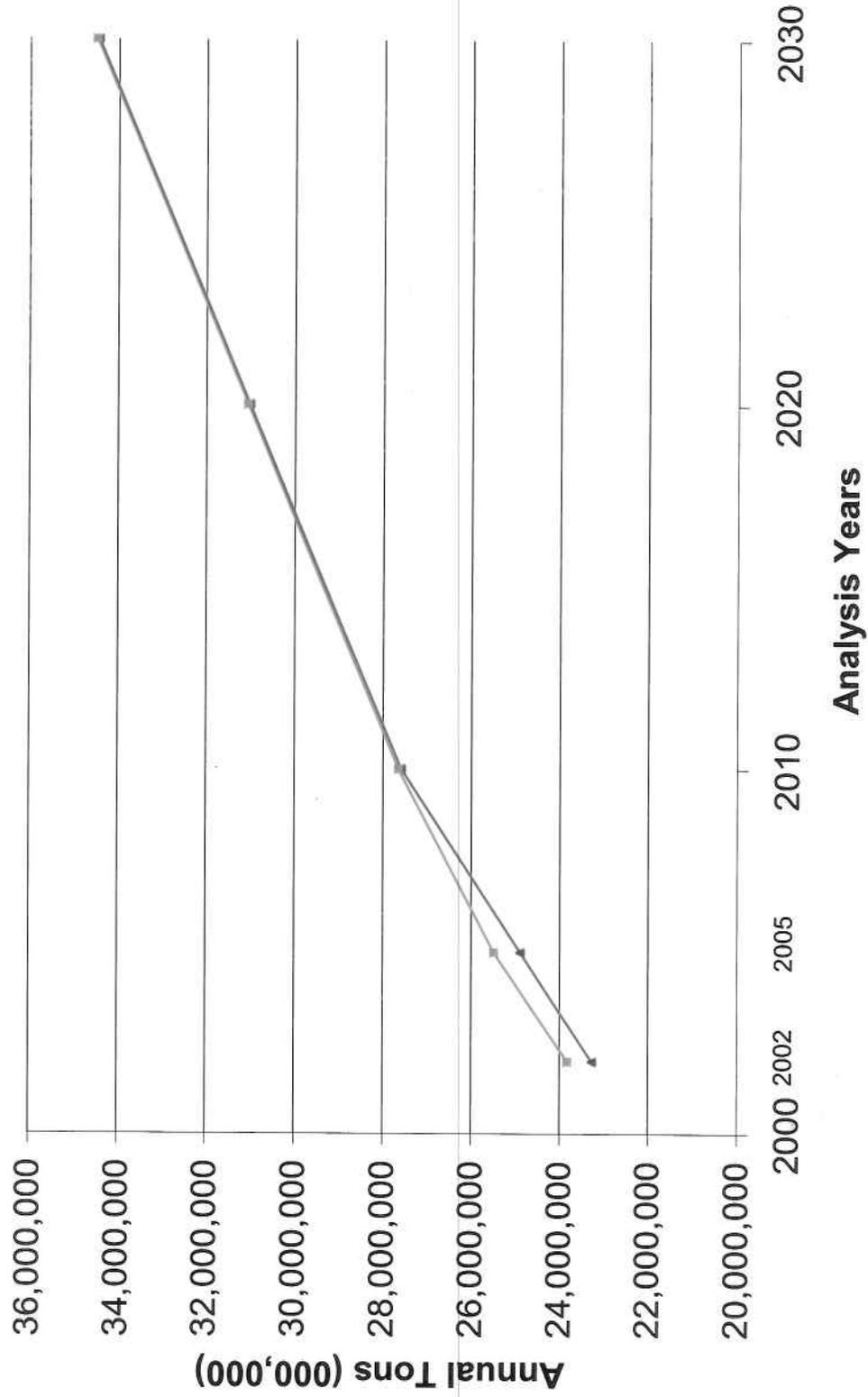


Exhibit 6

CO₂ Emissions Reductions with CAFE 35

