National Capital Region Transportation Planning Board

777 North Capitol Street, N.E., Suite 300, Washington, D.C. 20002-4290 (202) 962-3310 Fax: (202) 962-3202

Memorandum

April 24, 2009

To: TPB Technical Committee

From: Daivamani Sivasailam
Principal Transportation Engineer

Subject: Greenhouse Gas Emissions (GHG) Work Activities

Staff has been involved in two GHG work tasks in support of the "What Would It Take" scenario analysis. The first task involves developing new baseline GHG emissions inventories and the second involves estimating the GHG emissions reduction potential of TERM proposals, including those contained in the COG Climate Change Report's Transportation and Land Use Measures.

This memo transmits four attachments, 3 of which were items that were presented and discussed at the April 21, 2009 Travel Management Subcommittee meeting. Attachment A is a memo discussing the development of a baseline GHG inventory; attachment B is a memorandum discussing methodology revisions for estimating the benefits from the Signal Optimization TERM; attachment C (presented at the March 6, TPB Technical Committee meeting), is a table of the measures from the COG Climate Change Report; and attachment D is a detailed analysis of a "Cash For Clunkers" program which is one of the measures in the Climate Change Report.

Staff will brief the Technical Committee on these items at its May 1st meeting and will also present the draft final GHG emissions inventories and the schedule for completing the TERMs analysis.

Attachments A-D

Attachment A

TMS

Memorandum ITEM # 4

April 21, 2009

To: Travel Management Subcommittee

From: Erin Morrow
Daivamani Sivasailam

Subject: Development of Baseline CO_2 and GHG Emissions Inventories

Background

At previous meetings of the Travel Management Subcommittee and at the April 2009 meeting of the TPB Technical Committee, DTP staff discussed the different elements that comprise the baseline CO_2 and GHG emissions inventories. These baseline inventories, to be reflective of available technologies and Department of Energy-developed market trends, will then be used as the starting point for scenario assessment of the 'What Would it Take Scenario' (WWIT) to meet the COG Board Climate Change Steering Committee's greenhouse gas reduction goals. Staff identified three emissions reductions that should be removed from the Mobile 6 emissions inventory to develop the baseline CO_2 and GHG inventories.

Baseline = Mobile 6 emissions - CAFE35 - alternative fuel/technology vehicles - TERM Commitments

Discussion

Staff has applied a consultant spreadsheet to determine the emissions reductions due to the impact of CAFE 35 (Exhibit 1). The calculation of the emissions reductions from TERM commitments is underway.

Staff has been researching how the emissions impact of forecasts for alternative fuel and alternative technology vehicles should be accounted for in the baseline inventory. Initially, staff proposed the approach of determining which of the alternative fuel and

alternative technology vehicles were expected to be accounted for in the CAFE 35 assumptions and then determining the additional CO_2 and GHG impacts of the remainder of the vehicles. Upon further discussion with the consultant, staff is now convinced that all of the tailpipe emissions for alternative fuel and alternative technology vehicles are accounted for in the CAFE 35 reductions spreadsheet. The consultant explained, that "all vehicles that meet the size requirements of CAFE will be accounted for in the program regardless of fuel." Therefore, alternative fuel/technology vehicles do not need further consideration in the baseline.

Recommendation

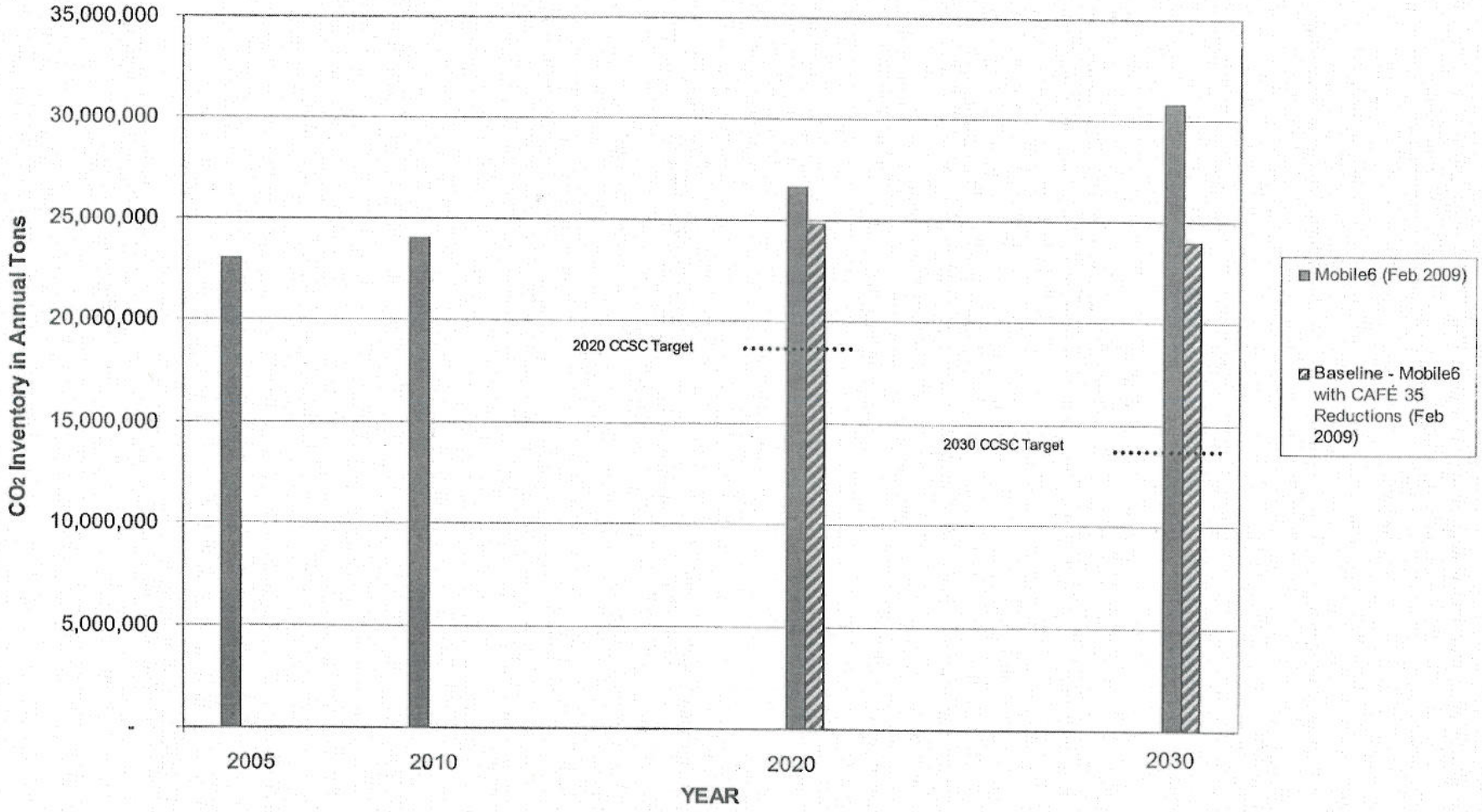
Staff recommends that the baseline for CO_2 and GHG emissions now include the reductions from the impacts of CAFE 35 and the region's TERM commitments as shown in the following equation.

Baseline = Mobile 6 emissions - CAFE35 - TERM Commitments

Upon the completion of the TERMs benefits assessment to finalize the baseline conditions, these inventories for each milestone years will be advanced to the WWIT scenario assessment.

Exhibit 1

CO_2 Emissions Inventories - Baseline
Adjustment of Mobile 6 Inventories to Reflect Impacts of CAFE 35 by 2020



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Memorandum

Date: April 21, 2009

To: Travel Management Subcommittee

From: Anant Choudhary
Transportation Engineer

Subject: Proposed revised methodology for estimating CO_2 emissions benefits from the TERM 'Signal Optimization'

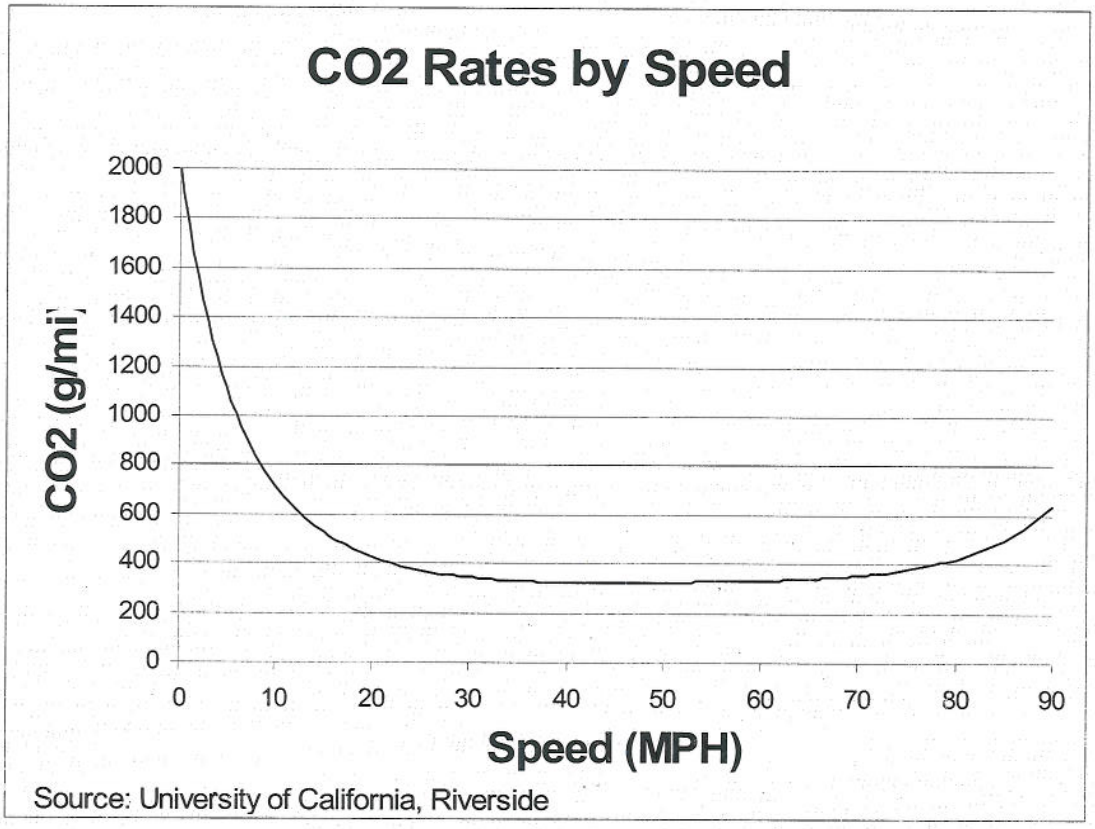
This memorandum provides an update on the proposed revised methodology for the adopted TERM 'Signal Optimization.' The measure was adopted in July 2002 and its accrued emissions benefits (VOC & NOx) are shown in the Tracking Sheet.

The methodology in the year 2002 analysis uses results from studies prepared: (1) by the District of Columbia Department of Transportation for the 16th Street corridor from Eastern Avenue, NW to P Street NW, and (2) by Maryland State Highway Administration for MD 650 (New Hampshire Avenue) from MD 212 to Peabody Street in the District. Delay reductions and operating speed improvements were obtained from the Synchro model and were field verified. Then, emissions benefits were estimated using emission factors from the Mobile6.2 model and VMT information. In the analysis AM speed range 8.3 to 14 mph and PM speed range 13.5 to 18 mph from these routes were considered representative for the entire region.

For the current greenhouse Gas emissions analysis staff uses the CO_2 emissions rates as developed by the University of California, Riverside, which vary by speed. CO_2 emissions rates are much higher at lower speeds, in the range of 1 mph to 15 mph (see Exhibit 1.) Since much of the regional VMT occurs at the higher speeds, estimating CO_2 emissions benefits using the lower speeds from the above two studies and corresponding CO_2 rates is likely to result in overstating the CO2 emissions benefits.

In the revised methodology COG/TPB staff proposes to estimate emissions benefits for each state by facility type. Due to lack of data, estimating benefits for each and every route in the Maryland, District of Columbia and Virginia would be a difficult task. DTP staff proposes to categorize routes having similar road characteristics such as urban, semi-urban roads, arterial or major roads, and use speed profiles for these routes from the annual Arterial Travel Times Studies prepared by COG/TPB staff. The analysis and CO_2 emissions estimates using the revised method will provide a more realistic estimate of emissions benefits than the previous method. DTP staff will report on the revised estimate at the May 26th, 2009 TMS meeting.

Exhibit 1


CO2 Rates by Speed
CO2 (g/mi)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
Speed (MPH)
Source: University of California, Riverside

Analysis Approach for Recommended Measures in the "National Capital Region Climate Report"

Recommendations for Reducing GHG from Transportation and Land Use
Local and Regional Strategies for Government and Business

	Type of Analysis[1]		
A. Increase Fuel Efficiency and Use of Clean Fuel Vehicles	**TERM**	**Scenario**	**Policy**
1. Promote Clean Fuel Vehicles (cars, trucks, buses)			
i. Promote/accelerate adoption of efficient clean-fuel vehicles, including hybrids (cars, trucks, and buses).			X
ii. Evaluate options for promoting CA LEV-II, extending CAFE requirements past 2020 and to cover heavy trucks, and facilitating adoption of high-mileage vehicles through incentives and tax policies	X		
iii. Assess the benefits from a "Cash-for-Clunkers" program and rebates or tax incentives for the purchase of hybrid vehicles	X		
2. Adopt regional green fleet policy			
i. Establish a regional green fleet policy with measurable goals and timetables. Target public and private fleets, transit, taxicabs, rental cars, and refuse haulers. Evaluate the benefits of specific "green fleet" conversion percentages	X		
3. Promote use of clean fuels		X	
B. Reduce Vehicle Miles Traveled (VMT)			
1. Adopt VMT reduction goals			
i. Collaborate with the TPB to develop VMT reduction goals for 2012 and 2020 and associated options for meeting the goals			X
ii. Evaluate the potential greenhouse gas emission reduction benefits and costs of using financial incentives (e.g., pay as you travel insurance, tolling, or congestion pricing) to reduce VMT		X	
iii. Identify the percentage of auto trips under 3, 2, 1, and ½ miles; develop a strategy to shift half of these trips to bike, pedestrian, or transit modes; and evaluate the benefits of such a shift	X		
2. Expand transit use (incentives, exclusive transit lanes)			
i. Examine options to promote the increased use of existing transit capacity		X	X
ii. Evaluate funding requirements for transit incentives and an expanded metrocheck program			X
3. Invest/Expand transit infrastructure			
i. With the Washington Metropolitan Area Transit Authority, MARC, VRE, and the local transit operators, evaluate the greenhouse gas reduction benefits of specific incremental expansion of transit capacity and commuter rail service		X	
ii. Evaluate the greenhouse gas reduction benefits of expanding existing and establishing new exclusive bus transit routes, lanes, on-ramps, corridors, and intercity high-speed rail		X	
4. Expand commuter options (car sharing, bicycle/pedestrian, financial incentives)			
i. Building on the accomplishments of Commuter Connections, develop specific targets for shifting modes from single-occupancy vehicles to transit, walking, and bicycling for commuting and noncommuting trips.	X		
ii. Expand existing and fund new programs to enhance access to transit and alternative modes, commuter connections, guaranteed ride home, telework programs, bike/pedestrian access, and park/ride lots	X		
iii. Fully fund the construction of bicycle/pedestrian paths in the region, as outlined in the regional bicycle/pedestrian plan.	X		
iv. Provide incentives to developments that speed improvements in bicycle/pedestrian access, including improvements in sidewalks, curb ramps, crosswalks, and lighting	X		

v. Address the need for on-road bicycle accommodations and facilities	X		
vi. Promote regional implementation of SmartBike program similar to the Zipcar concept	X		
5. Promote transit-oriented development/Concentrate future growth in Regional Activity Centers			
i. Evaluate the benefits from achieving a range of possible goals (up to 95 percent) for directing new residential and commercial growth to designated regional activity centers, including growth around transit as well mixed-use, higher-density development		X	
ii. Encourage local governments to evaluate opportunities to provide incentives (including zoning changes) to encourage mixed-use development, including workforce housing at transit stations and hubs to reduce sprawl and VMT		X	
iii. Encourage localities to revisit current land-use plans, in light of current shifts in the real estate market, coupled with high energy costs		X	
iv Establish TOD as the region's preferred growth strategy			X
6. Examine parking policies to reduce VMT			
i. Examine parking policies and their relation to VMT, and implement new parking policies to reduce VMT			X
ii. Strengthen financial and other incentives (e.g., tax rebates, higher parking costs, and transit benefits) to encourage residents to drive less			X
iii. Advocate for federal income tax benefits for transit use that equal or exceed the benefits for employer provided/subsidized parking			X
C. Travel Efficiency			
1. Adopt best practices for traffic engineering improvements and road management to reduce VMT and congestion. Identify locations of significant recurrent congestion, and prioritize investments to reduce	X		
2. Implement the Metropolitan Area Transportation Operations Coordination Program to improve coordination among transportation agencies for data sharing and incident management	X		
3. Enforce existing idling regulations	X		
4. Aviation			
D. Land Use			
1. Tree canopy preservation - prepare plan to meet "increase regional canopy"			
2. Evaluate LEED-ND standards for new development			
3. Carefully plan the location and design of new, infill, and redevelopment projects			
i. Promote regional policies that support walkable communities and affordable housing near transit, and that protect green infrastructure.		X	
4. Integrate GHG analyses into comprehensive planning, new capital projects			
i. Quantify projected greenhouse gas emissions from major new transportation and other new capital projects			X
ii. Identify best practices enabling local governments to include greenhouse gas reduction and energy efficiency/conservation as elements in their local comprehensive planning			X
iii. In cooperation with COG's Planning Directors Technical Advisory Committee and local government environmental and energy planners, convene a working group to devise a consistent, standard methodology for evaluating the greenhouse gas emissions from proposed individual development projects		X	
iv. Encourage new commercial construction to include a "travel management plan."		X	
E. Regional Metropolitan Planning Process			
1. Develop regional metropolitan planning process for GHGs			

i. Collaborate with the TPB to evaluate how a regional process modeled after the current regional metropolitan planning process for transportation and air quality planning might be adapted to address greenhouse gas emissions			X
2. Make greenhouse gas reduction a stated goal of regional transportation planning activities, including the newly launched multi-stakeholder Greater Washington 2050 initiative, poised to generate additional growth scenarios, and quality growth scenarios.			X
3. Consult with other regions around the country to broadly evaluate options for regional approaches to greenhouse gas reductions that include cap and trade and other approaches that might be relevant to our region (e.g., California SB 375), or that might be under consideration in upcoming national climate, energy or transportation legislation			X

[1] TERM - Sketch planning analysis methods employed in previous SIP and air quality conformity analysis
Scenario - TPB's Scenario Task Force work activities
Policy - TPB policy/goal, rather than a technical assessment

Climate Change Measure A.1.iii – Provide Incentives for Early Vehicle Retirement

Description

This is an analysis of the potential impact of the "Accelerated Retirement of Inefficient Vehicles Act of 2009" proposed in the US Senate on January 14, 2009 by Senators Feinstein, Collins and Schumer. The bill provides a financial incentive to replace "high fuel consumption automobiles" with a "fuel efficient automobile." Vouchers are awarded over a four year period (beginning January 1, 2009) and are valid for up to two years. The program will last for six years.

Eligibility

A "high fuel consumption automobile" can be a vehicle of any model year before 2008 for which the original certified measured fuel economy level is less than 18 mpg.

A "fuel efficient automobile" achieves a measured fuel economy that exceeds by 25 percent the fuel economy standard prescribed by the Secretary of Transportation.

Voucher Redemption Values

A voucher issued under the program during the 4-year period beginning on January 1, 2009, may be applied to offset the purchase price of a new fuel efficient automobile by

- $ 4,500 if the eligible high fuel consumption automobile was manufactured for a model year that is 7 or fewer years less than the calendar year in which the voucher was issued;
- $ 3,000 if the eligible high fuel consumption automobile was manufactured for a model year that is 8 to 10 years less than the calendar year in which the voucher was issued;
- $ 2,500 if the eligible high fuel consumption automobile was manufactured for a model year that is 11 or more years less than the calendar year in which the voucher was issued;

Analysis Approach

- Use sketch planning analysis to calculate emissions reductions which result from the program implementation by estimating emissions with the old versus the new vehicles.

Assumptions

- This analysis only considers vehicles from a subset of the region using 2008 vehicle registration data for Montgomery County, the District of Columbia, and Fairfax County.
- Vehicles will be purchased with the vouchers over six years (2009 -2014).

- 2% of all eligible vehicles will be replaced each year and 12% of all eligible vehicles will be retired within 6 years.
- While the bill has provisions for purchasing either a new or used vehicle, this analysis only addresses the purchase of a new vehicle.
- The fuel efficiency of vehicle classifications comes from Mobile 6 with adjustments made by a consultant to reflect increasing CAFÉ not reflected in Mobile 6.
- Based on the average fuel efficiency of each vehicle class, it is assumed for this analysis that 50% of LDT2 vehicles and 80% of LDT3&4 vehicles would achieve less than 18 mpg.
- Fuel savings are based on vehicles traveling 10,000 miles per year.
- CO2 estimates are based on 8,788 grams CO2/gallon of gasoline.

Impact

Travel

No travel impacts as the VMT is assumed to be the same

Emissions

The CO2 emissions reductions for all the vehicles are estimated to be 158,586 tons in the first year (2009) of the program. The cumulative CO2 emissions reductions are estimated to be 2,420,825 tons after the sixth year (2014) of the program.

Cost

The cost is estimated to be $ 24,372,062 in the first year (2009) of the program. The cumulative cost is estimated to be $ 128,824,139 after the sixth year (2014) of the program.

Cost Effectiveness

The cost effectiveness for the first year of the program is estimated to be $154 per ton of CO2 in 2009 and the cost effectiveness for the last year of the program is estimated to be $53 per ton of CO2 in 2014.

(See attached tables for details)

Table a. High Fuel Consumption Automobiles in DC, MC, and FFX

	<= 7 years old	8-10 years old	11+ years old	All Vehicles
2009	188,516	64,713	70,457	323,686
2010	160,812	73,898	88,976	323,686
2011	130,281	82,152	111,253	323,686
2012	93,662	94,854	135,170	323,686
2013	61,037	99,775	162,874	323,686
2014	29,646	100,635	193,405	323,686

Table b. Vehicles Participating in the program

	<= 7 years old	8-10 years old	11+ years old	All Vehicles
2009	3,770	1,294	1,409	6,474
2010	3,216	1,478	1,780	6,474
2011	2,606	1,643	2,225	6,474
2012	1,873	1,897	2,703	6,474
2013	1,221	1,996	3,257	6,474
2014	593	2,013	3,868	6,474

Table c. Cumulative Annual Fuel Savings (gallons)

	<= 7 years old	8-10 years old	11+ years old	All Vehicles
2009	9,234,094	3,255,713	3,881,027	16,370,834
2010	26,357,329	10,158,444	12,651,915	49,167,688
2011	46,614,606	19,027,274	24,226,686	89,868,567
2012	68,803,559	29,849,504	38,692,794	137,345,857
2013	92,097,336	42,472,697	56,184,828	190,754,862
2014	115,908,889	56,850,564	77,142,289	249,901,742

Table d. Cumulative Annual CO2 Reduction (tons)

	<= 7 years old	8-10 years old	11+ years old	All Vehicles
2009	89,452	31,538	37,596	158,586
2010	255,326	98,406	122,560	476,293
2011	451,561	184,319	234,687	870,567
2012	666,508	289,155	374,821	1,330,484
2013	892,157	411,438	544,269	1,847,863
2014	1,122,822	550,718	747,286	2,420,825

Table e. Cumulative Cost of the Program

	<= 7 years old	8-10 years old	11+ years old	All Vehicles
2009	$ 16,966,439	$ 3,882,780	$ 3,522,844	$ 24,372,062
2010	$ 31,439,516	$ 8,316,649	$ 7,971,647	$ 47,727,812
2011	$ 43,164,785	$ 13,245,758	$ 13,534,311	$ 69,944,854
2012	$ 51,594,327	$ 18,937,023	$ 20,292,805	$ 90,824,154
2013	$ 57,087,621	$ 24,923,545	$ 28,436,499	$ 110,447,665
2014	$ 59,755,743	$ 30,961,643	$ 38,106,754	$ 128,824,139

Table f. Cumulative Cost Effectiveness ($/ton CO2)

	All Vehicles
2009	$ 154
2010	$ 100
2011	$ 80
2012	$ 68
2013	$ 60
2014	$ 53