FLEET P2 REDUCTION
Change Driving Patterns

March 12, 2014

Thomas Westergaard

Fleet Management Division Chief
Department of Public Works
Prince William County, Virginia

Member of Professional Organizations
» NAFA
» APWA
» WAFA

Environmental Management System Council
Safety and Health Committee
Fleet facility is rated E3 by the VDEQ (since 2009)

PRINCE WILIAM COUNTY, VIRGINIA
FLEET MANAGEMENT DIVISION

100 BEST FLEETS™

2013

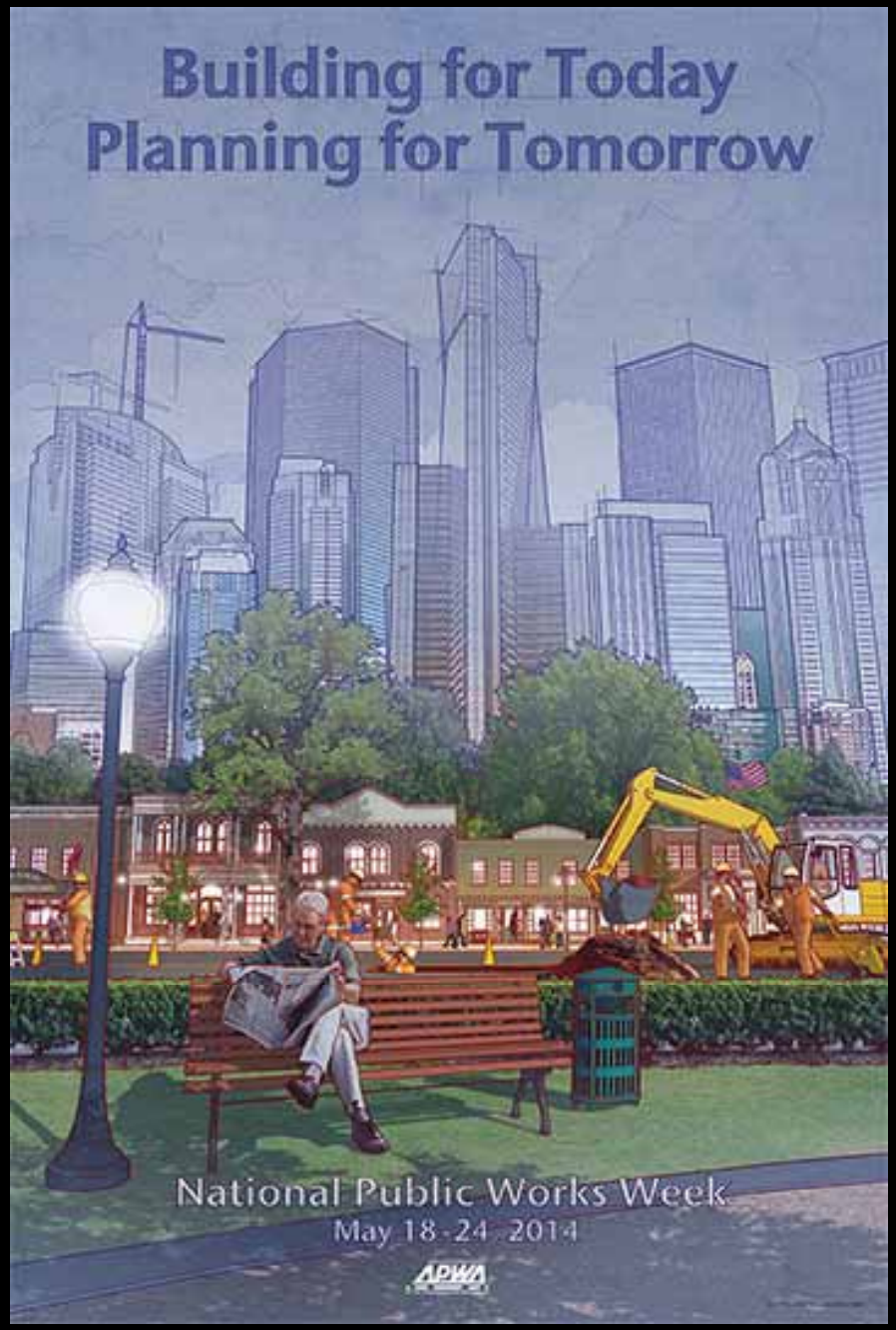
2012

2011

2010

2009

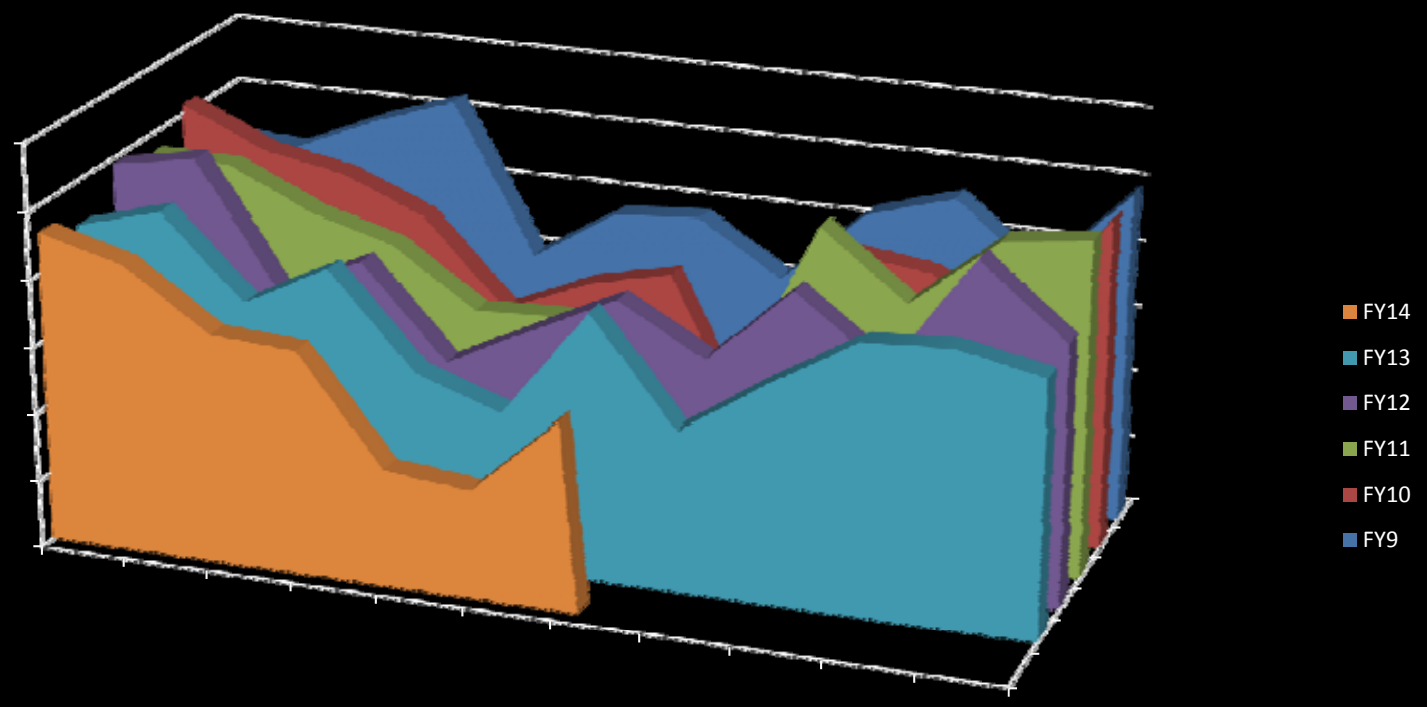
2008


Building for Today
Planning for Tomorrow
National Public Works Week
May 18 - 24 2014
APWA

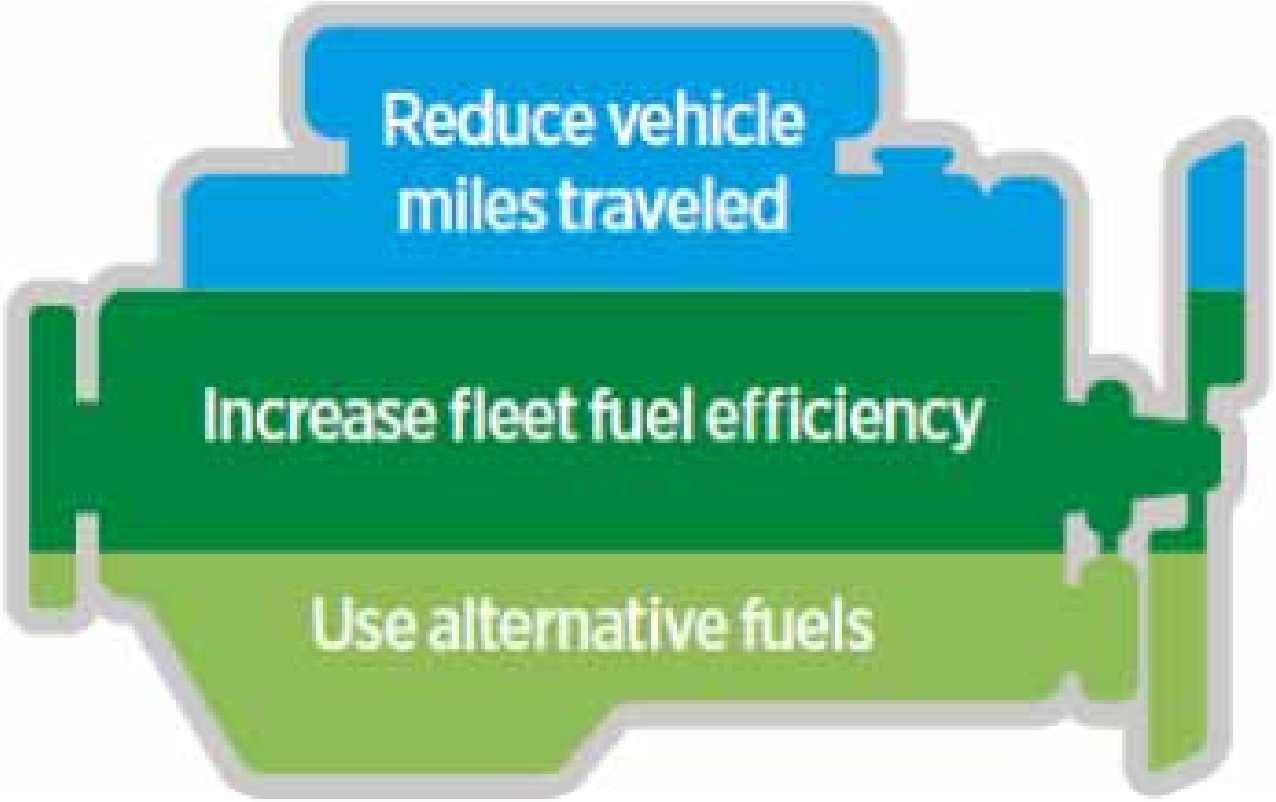
Focus Topics

- General Principals of GHG Reduction
  - Vehicle Miles Traveled
  - Increase Fuel Efficiency
  - Increase Alternative Fuel Vehicles
- GPS Use
- Eco Driving
- AFV Adaptation

Fuel Consumption History of Prince William County



The Driving Principles of GHG and Petroleum Use Reduction



Reduce Miles Traveled

Strategy to reduce VMT applies to all fleet vehicles, regardless of kind of vehicle

Consolidate trips. Eliminate duplication of vehicle trips and car pool
Co-locate associated offices to reduce automobile travel
Stop at the store or the gym on the way to or from work
Delay an errand until several can be done in a single trip

Eliminate trips. Install and Use Video/Web tools for meetings and documents Have simple directions to use the technology in the conference rooms Digital signing is now available that prevents document tampering

Using mass transportation. Eliminate fleet vehicle transportation needs along transit corridors. Post common destination transit schedules for employees

Use agency shuttles. Provide a shuttle service for high-use routes to consolidate trips. Trips from divisions to department headquarters are common

Avoid Inefficient Idling

Idling vehicles typically burn from a quarter to 1 gallon of fuel per hour. Unnecessary idling pollutes the air, wastes fuel, and causes excess engine wear. Reducing idle time is a simple policy to implement but hard to patrol. GPS monitoring can produce alerts to control waste.

Idle reduction is typically used to describe technologies and practices that reduce the amount of time operators idle their engines

Turn off your engine when you are parked or stopped (except in traffic) for more than 1 minute

Avoid using a remote vehicle starter, which causes unnecessary idling

Avoid drive-through windows; choose to walk inside instead

Allow traffic to clear before heading onto the roadway by staying 15 minutes longer after an event or work

Virginia Idle Restriction Law

9VAC5-40-5670. Motor vehicles...

C. In commercial or residential urban areas, propulsion engines of motor vehicles licensed for commercial or public service use shall not be left running for more than **three minutes** when the vehicle is parked, unless the propulsion engine is providing auxiliary power for other than heating or air conditioning; except that:

1. Tour buses may idle for up to **ten minutes** during hot weather in order to maintain power to the air conditioning system; and

2. Diesel powered vehicles may idle for up to **ten minutes** to minimize restart problems

Statutory Authority
§§ 10.1-1307 and 10.1-1308 of the Code of Virginia.
Historical Notes
Derived from VR120-04-4103, eff. January 1, 1985

Idle Reduction Technologies

- Automatic vehicle charging system into Crown Victoria police cruiser to eliminate car engine idling to power onboard equipment
  - Took 3 Mechanics about two days to complete
  - Data dumped weekly to vendor
  - Test in 2nd year
  - No discernable improvement to MPG in test
  - Assigned officer not happy with operation or slight gas smell

- Solar Roof Array charging system installed on Fire and Rescue response vehicle
  - Produces trickle charge to offset parasitic drain from radios
  - Eliminated dead battery road calls
  - Allows engine shutdown on scene of emergency while maintaining operational capability

The Cost of Idle Operation

How Much Could You Save by Idling Less?

Instructions: Fill in the blue cells with information about your costs.

You may change any of the items in blue cells or use the defaults entered.

Calculate Costs for Idling that Can Be Avoided

													Tons GHG Reduction	
	How much fuel is used for idling? You may consult the table below.			How many hours each year might you use an IR device?			What is the price of fuel?				Avoidable Idling Fuel Costs		Diesel	Gasoline
1	0.48	gallons/hour	X	250	hours/year	X	$3.25	/gallon		=	$390.00	per year	1.332	1.164
							What is your average fuel economy?				"Miles" of idling			
2	0.48	gallons/hour	X	250	hours/year	X	25	miles/gallon		=	3000	miles		
	How much does an oil change cost?			How many miles between oil changes?							Preventive Maintenance Costs			
3	$60	/oil change	÷	5,000	miles =	$0.012	/mile	X	"miles"	=	$36.00	/year		
	How much does an engine overhaul cost?			How many miles between overhauls?							Overhaul Costs			
4	$10,000	/overhaul	÷	100,000	miles =	$0.10	/mile	X	"miles"	=	$300.00	/year		
											Total Avoidable Idling Costs			
5									Sum	=	$726	/year		

GPS – Networkfleet.com

- $275.40/year per unit
- $30 transfer GPS from one vehicle to another
- $180 new service plus monthly subscription
- Reports can be configured to report
  - Monthly, Weekly, Daily, Alert (immediate)
  - Email to different/multiple addresses
  - Criticality level of management response

Reports PWC using

- Idle Alert > minimum for various work types
  - Exclude vehicles doing PTO operations
- Speed Violation
  - Exceeds Posted Speed
  - Exceeding 65, 70, 80 with incr levels of mgt notice
- Geo-fence for shopping centers, etc.
- After hours operations of equipment
  - Possible personal use issues
- Utilization by days and hours, dead units

IDLE ALERT

Idle Time Alert has been triggered — **Eastern Standard Time**

Alert Details

Alert name:	NS Litter Crew Idle ALert
Vehicle:	NS3129
Duration:	10 Minutes
Violation Date/Time:	Wednesday, February 26, 2014 8:15:52 AM EST
Start Location:	County Center, VA 22192 US
Start Lat/Lon:	38.681742,-77.352747
Start Map:	

IDLE Time Report Response

From: Alhaj, Hafez
To: Westergaard, Thomas E.; Flory, Polly M.; Smith, Thomas J.
Cc:
Subject: RE: Idle Time Alert - SW 3117

Driver had to run a regeneration.

Hafez Al-Haj
Prince William County Public Works Department
Solid Waste Division
Office: 703-792-6468
Cell: 703-675-2934
Fax: 703-792-5753

From: Networkfleet [mailto:NOREPLY@networkfleet.com]
Sent: Friday, August 23, 2013 2:32 PM
To: Westergaard, Thomas E.; Alhaj, Hafez; Flory, Polly M.; Smith, Thomas J.
Subject: Idle Time Alert - SW 3117

Idle Time Alert has been triggered — Eastern Daylight Time

Alert Details

Alert name:	Solid Waste Diesel Idle ALert
Vehicle:	SW 3117
Duration:	16 Minutes
Violation Date/Time:	Friday, August 23, 2013 2:30:28 PM EDT
Start Location:	13572 Dumfries Rd, Coles, VA 20112 US
End Location:	13572 Dumfries Rd, Coles, VA 20112 US **violation is ongoing
Priority:	Critical

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Monthly Idle Report

Prince William County-Public Works Scheduled Report

Report: Idle Time

Selected Group(s):	All Groups	Average Idle Pct:	25.61%
Selected Attribute(s):	All Attributes	Average Idle Time(hh:mm):	6:18
Report Run Date/Time:	3/2/14 6:22 AM EST	Total Idle Time(hh:mm):	359:13:00
Report Time Period:	2/1/14 12:00 AM - 3/1/14 12:00 AM	Total Operating Time(hh:mm):	1402:53:00
Total Vehicles in Report:	57 of 167		
Idle Percentage Threshold:	>= 15%		
Idle Hours Threshold:	>= 0.75		

Vehicle Label	Driver	Total Operating Time(hh:mm)	Drive Time(hh:mm)	Total Idle Time(hh:mm)	Total Idle Percentage
BG 1476	Unassigned	10:32	8:27	2:04	19.68%
BG 1614	Unassigned	12:35	10:17	2:17	18.19%
BG 1842	Unassigned	4:37	1:24	3:13	69.68%
BG 210	Unassigned	10:58	8:51	2:07	19.30%
BG 2406	Unassigned	19:01	16:09	2:51	15.05%
BG 2782	Unassigned	15:37	11:09	4:28	28.61%
BG 2944	Unassigned	8:20	5:24	2:56	35.18%
BG 3466	Unassigned	32:02:00	24:33:00	7:28	23.33%
BG 936	Unassigned	19:21	15:55	3:26	17.78%
ES 031	Unassigned	2:51	1:13	1:38	57.26%
ES 1560	Unassigned	2:57	0:57	1:59	67.42%
ES 1849	Unassigned	14:54	10:51	4:03	27.24%

Electrical Boom

Weekly Speed GPS Report

Fleet Weekly 10mph Over Posted Speed - Message (HTML)

File | Message | Adobe PDF

Ignore | Junk | Delete | Reply | Reply All | Forward | Meeting | More | Overnite TakeHo... | To Manager | Team E-mail | Move | Rules | Actions | Mark Unread | Categorize | Follow Up | Translate | Find | Related | Select | Zoom

If there are problems with how this message is displayed, click here to view it in a web browser.

From: Networkfleet Reports <NOREPLY@networkfleet.com> Sent: Mon 3/3/2014 8:24

To: Westergaard, Thomas E.; Westergaard, Thomas E.; Lambert, James L.; O'Keefe, Gregory L.; Childers, Timothy R.; Whetsell, Clifton E.

Cc:

Subject: Fleet Weekly 10mph Over Posted Speed

Message | Fleet Weekly 10mph Over Posted Speed 2014-03-03.xls (15 KB)

Prince William County-Public Works Scheduled Report Eastern Standard Time

Report: Safety(Speed Violations)

Selected Group(s): FLEET MANAGEMENT
Selected Attribute(s): All Attributes
Total Vehicles in Report:: 1
Report Run Date/Time: 3/3/14 8:24 AM EST
Report Time Period: 2/24/14 12:00 AM - 3/3/14 12:00 AM
Report Data: Speed Violations
Speed violation threshold: 10 mph
Violation Type: Posted Speed

Vehicle Label	License Plate	Driver	Violations	Violation Time	Duration	Vehicle Speed (mph)	Posted Speed (mph)	Violation Distance (mi)	Start Location	End Location
FM 2791	135074L	Unassigned	1							
		Unassigned	Speed	02/24/2014 08:17:49 AM	2m 2s	46	35	0.6	14815 Minnieville Rd, Independent Hill, VA 22193 US	--

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After Hours Use GPS Report

Report: Odd Hours/Movement

Report Run Date/Time	9/2/13 5:20 PM EDT
Start Time	8/1/13 10:00 PM
End Time	9/1/13 5:00 AM
Selected Vehicle(s)	All Vehicles
Driver:	All Drivers
Violation Time	10:00 PM - 5:00 AM

* Vehicle was still operating at this time/location

Vehicle	License Plate	Driver	Violation Start Time	Violation Stop Time	Start Lat Stop Lat	Start Lon Stop Lon	Start Location End Location
ES 2926	139 428L	Unassigned	8/26/13 10:00:43 PM	8/26/13 10:11:27 PM	38.591218 38.631822	-77.334187 -77.417458	16615 Dumfries Rd Dumfries, VA 22025 US Independent Hill, VA 20112 US (Landmarks: GMMC)
MP3481	174-482L	Unassigned	8/29/13 10:01:17 PM	8/29/13 11:30:01 PM	38.157298 38.787982	-77.507129 -77.520071	I-95 North/USA1 Berkeley, VA 22408 US Bull Run, VA 20109 US
NS2393	34787L	Unassigned	8/9/13 10:00:16 PM	8/9/13 10:17:08 PM	38.717796 38.681458	-77.481742 -77.35232	Prince William Py Buckhall, VA 20112 US County Center, VA 22192 US (Landmarks: County_Complex)
ES3127	149192L	Unassigned	8/27/13 10:01:04 PM	8/27/13 10:17:44 PM	38.746809 38.631822	-77.450027 -77.417458	9736 Liberia Ave Manassas, VA 20110 US (Landmarks: Seefeldt1) Independent Hill, VA 20112 US (Landmarks: GMMC)
ES3127	149192L	Unassigned	8/29/13 10:00:57 PM	8/29/13 10:11:45 PM	38.657991 38.63168	-77.46944 -77.417387	13422 Bristow Rd Brentsville, VA 20181 US Independent Hill, VA 20112 US (Landmarks: GMMC)

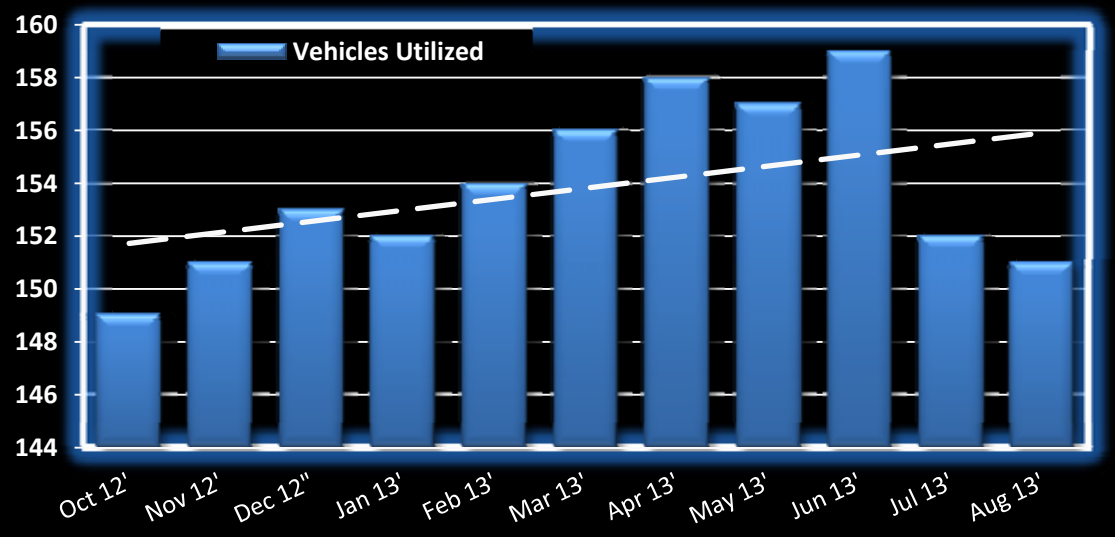
Utilization GPS Report

Utilization Summary Report

Report Run Date/Time	9/2/13 6:12 AM EDT
Report Time Period	8/1/13 12:00 AM - 9/1/13 12:00 AM
Selected Vehicle(s)	All Vehicles in the BUILDINGS & GROUNDS Group
Number of Vehicles Included in Report	33
Fleet Utilization Filter	N/A
Include Vehicles with No Utilization	Yes

Vehicle Label	License Plate	VIN	Year Make Model	Distance Traveled (mi)	Vehicle Engine Hours	Days Utilized	Trips	Last Key Off Time
BG 1530	29652L	1GKDT1	1997 GMC JIMMY	65.2	2h 43m 43s	4	17	8/30/13 3:34:55 PM
BG 3296	157 482L	1GCZGF	2010 CHEVROLET EXPRESS CARGO	285.3	11h 4m 35s	4	54	8/22/13 3:45:04 PM
BG 2049	94578L	3GBKC3	2001 CHEVROLET SILVERADO	147.9	6h 4m 11s	5	55	8/28/13 2:36:04 PM
BG 210	67 739L	1B7FE06	1989 DODGE RAM	132.0	5h 39m 19s	6	26	8/27/13 11:32:18 AM
BG 2897	139347L	1GNDT1	2007 CHEVROLET BLAZER	147.1	5h 38m 17s	7	33	8/19/13 11:05:24 AM
BG 3314	162788L	1GC0KV	2011 CHEVROLET SILVERADO 2500HD	488.5	20h 49m 8s	7	104	8/27/13 3:46:57 PM
BG 849	72878L	2B7HB21	1990 DODGE VAN	28.6	2h 10m 29s	7	26	8/30/13 10:19:27 AM
BG 2535	114656L	1GCHK2	2005 CHEVROLET 2500	651.3	25h 22m 22s	8	123	8/30/13 3:39:01 PM
BG 2783	135079L	1GCGG2	2006 CHEVROLET EXPRESS	121.4	6h 21m 54s	9	52	8/28/13 4:04:03 PM
BG 216	94687L	2B7KB3	1987 DODGE VAN	111.5	6h 46m 57s	10	63	8/30/13 3:39:05 PM
BG 2722	130 541L	1GNDT1	2006 CHEVROLET TRAILBLAZER	226.7	8h 16m 9s	10	26	8/28/13 3:34:53 PM
BG 936	85245	1GBHC3	1991 CHEVROLET 3500 STEAK	399.5	17h 52m 48s	10	91	8/31/13 1:34:39 PM
BG 2406	94585L	1GCHK2	2004 CHEVROLET 2500	45.2	4h 17m 40s	13	59	8/29/13 10:38:23 AM

Utilization



What is ECO Driving?

- A set of simple driving habits that
  - Use Less Fuel
  - Generate Fewer Emissions
  - Increase Safety
- Typical Saving of 15-30% in Fuel Efficiency
- Good for the Ecosystem and the Economy

Eco Driving Informational

- Handouts used at meetings
  - APWA Open House
  - Earth Day celebration in the plaza
  - On the Fleet service desk counter
- Avoid Idle and Warm-Up Operation
  - Input Map Info, Entertainment, before starting engine
- Avoid Jack Rabbit Starts
- Drive at Constant Speed
- Look Ahead and Plan for Slowing Down Easy
- Shut Down Engine Promptly

EcoDriving™ Practices

Subtle changes in driving habits can produce significant benefits, such as saving money at the gas pump and reducing CO_2 emissions.

1 Believe You Can Reduce Fuel Use and Emissions

Typically, practicing moderate levels of EcoDriving can reduce fuel use by an average of 15%.

2 Avoid Rapid Starts and Stops

Rapid acceleration and braking, often called "jack rabbit" starts and stops, use fuel and cost money at the gas pump.

3 Keep on Rolling in Traffic

Maintaining a constant speed in your commute increases fuel economy, because it takes much more energy to move a stopped vehicle than to keep a vehicle moving.

4 Ride the "Green Wave"

A steady speed often can help drivers avoid red lights and keep the car moving more efficiently.

5 Use Air Conditioning at Higher Speeds

When driving at slower speeds (less than 40 mph), such as driving in urban areas, open windows are better. At higher speeds (over 40 mph), open windows use more fuel than the air conditioner.

6 Maintain an Optimum Highway Speed for Good Mileage

Observing the speed limit and not exceeding 60 mph (where legally allowed) can improve mileage by 7-23%.

7 Use Cruise Control

According to a test conducted by Edmunds.com, cruise control can provide a 7% average fuel savings, compared to driving without the device operating.

8 Navigate to Reduce Carbon Dioxide

Planning driving trips, even Saturday shopping, can help reduce fuel use and CO_2 emissions.

9 Avoid Idling

Idling uses gas and because the car is going nowhere, it translates into 0 mpg.

10 Buy an Automated Pass for Toll Roads

By purchasing an "EZ Pass" for a toll road or bridge, a driver avoids stopping and starting the vehicle and idling in lines.

11 Use the Highest Gear Possible

By using overdrive gearing where possible, such as on the highway, your vehicle's engine speed goes down, saving fuel and engine wear while reducing CO_2 emissions.

12 Drive Your Vehicle to Warm It Up

Your vehicle will reach its optimum operating temperature much faster when you are driving, rather than idling.

13 Keep Your Cool

Always roll down the windows when getting into a hot car to blow out the hot air. Try to park in the shade. And consider investing in a heat reflector or window shades.

14 Obey Your Check Engine Light

When the onboard diagnostics alert light comes on, there is the possibility that your emissions are increased and your fuel economy is going down.

Alternative Fuel Vehicles

- Reduce Dependence on Imported Fuel
- Improve Air Quality

When Congress passed The Energy Policy Act (EPAct) in 1992, one of the goals was to encourage the use of alternative transportation fuels (not derived from petroleum) that could help reduce dependence on imported oil and improve air quality. EPAct, as amended, defines alternative fuels to include: methanol, ethanol, and other alcohols; blends of 85% or more of alcohol with gasoline; natural gas and liquid fuels domestically produced from natural gas; liquefied petroleum gas (propane); coal-derived liquid fuels; hydrogen; electricity; biodiesel (B100); and P-Series.

The alternative fuels that are commercially available in Virginia or surrounding states include:

Biodiesel	Natural Gas
Electric	Ethanol
Hydrogen	Propane

CO_2 Emissions by Fuel Type

Fuel	kg/GGE CO2 emission factors	Biogenic[a] kg/GGE CO2 emissions factors
B20	7.396 kg/GGE	1.85 kg/GGE
B100	0 kg/GGE	9.23 kg/GGE
CNG	6.628 kg/GGE	n/a
Diesel	9.245 kg/GGE	n/a
E85[a]	1.317 kg/GGE	7.27 kg/GGE
Gasoline	8.778 kg/GGE	n/a
LNG	6.628 kg/GGE	n/a
LPG	7.873 kg/GGE	n/a

[a] CO_2 emissions from the biofuels portion of the fuel are known as biogenic emissions, and must be reported within the appropriate scope in which they occur and must be categorized as biogenic. Agencies are not required to include these emissions in their reduction targets under E.O. 13514 at this time

Vehicles Exempt from EPAct 1992 AFV Acquisition Req.

Law enforcement and emergency vehicles*
792
Military tactical vehicles**
0
Non-road vehicles, including farm and construction vehicles
39
Motor vehicles held for lease or rental to the general public
0
Motor vehicles held for sale by motor vehicle dealers, including demonstration motor vehicles
0
Motor vehicles used for motor vehicle manufacturer product evaluations or tests
0
Motor vehicles that, under normal operations, are garaged at personal residences at night
0
Vehicles operated outside of the U.S.
0

Current Vehicles Defined as AFVs in the Federal Fleet

E85 flexible fuel vehicles (FFV)
512
Compressed natural gas (CNG) vehicles
0
Liquefied natural gas (LNG) vehicles
0
Liquefied petroleum gas (LPG) or propane vehicles
1
Battery electric vehicles (BEV)*
Plug-in hybrid electric vehicles (PHEV)
0
Hybrid electric vehicles (HEV)
12
Hydrogen vehicles
0
Fuel cell vehicles
0
Lean burn technology vehicles
1

Greater Washington Regional Clean Cities Coalition Survey

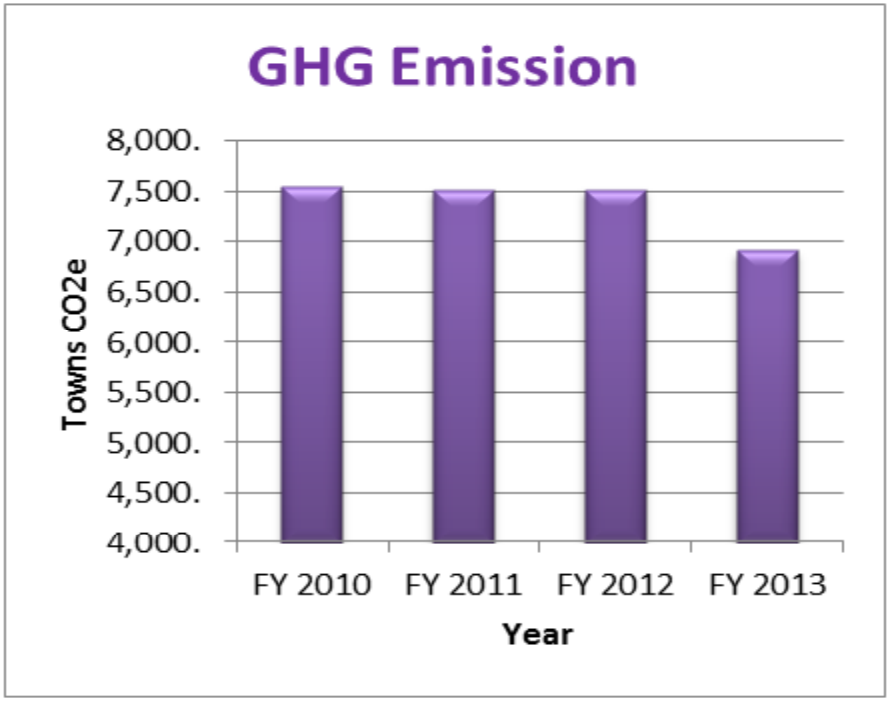
What is the **total number of alternative and clean fuel vehicles in your fleet?** *(Ex: CNG, all electric, hybrid, plug-in electric hybrid, E85, propane, LNG, ULSD, diesel and biodiesel*.)* *If using biodiesel, please indicate blend, e.g. B5, B20, etc.	QUANTITY	DUTY TYPE Light	DUTY TYPE Medium	DUTY TYPE Heavy	**How often is the fuel used?** (100%, 75%, 50%, 25% of the time)
CNG					
All Electric					
Hybrid	12	12			100
Plug-in electric hybrid					
E85	512				
Propane					
LNG					
ULSD	47		47		100
Diesel					
Biodiesel					

Input Data for GHG Computation

Source Description	Region	Mode of Transport	Type of Activity Data	Activity Data						GHG Emissions			
				Vehicle Type	Distance Travelled	Unit of Distance	Fuel Used	Fuel Amount	Unit of Fuel Amount	Fossil Fuel CO2 (metric tonnes)	CH4 (kilograms)	N2O (kilograms)	Total GHG Emissions, exclude Biofuel CO2 (metric tonnes CO2e)
PWC Year 2013 GHG	US	Road	Fuel Use	Motorbike - Control Unknown	217514	Mile	Gasoline/F	7047	US Gallon	62.08407	24.6645	2.46645	63.4356846
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1984-1993	1335	Mile	Gasoline/F	90	US Gallon	0.7929	0.14256	0.131018	0.835507215
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1994	2318	Mile	Gasoline/F	151	US Gallon	1.33031	0.180407	0.19026	1.391517661
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1995	19712	Mile	Gasoline/F	1328	US Gallon	11.69968	1.069704	1.413324	12.14759315
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1996	8371	Mile	Gasoline/F	461	US Gallon	4.06141	0.282132	0.441869	4.200140113
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1997	27528	Mile	Gasoline/F	1632	US Gallon	14.37792	0.984096	1.549584	14.86429843
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1998	91974	Mile	Gasoline/F	5539	US Gallon	48.79859	3.103225	4.897861	50.33573312
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 1999	84473	Mile	Gasoline/F	4854	US Gallon	42.76374	2.359044	3.680546	43.91951866
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2000	117579	Mile	Gasoline/F	9611	US Gallon	84.67291	3.849206	5.903557	86.52840005
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2001	184594	Mile	Gasoline/F	13188	US Gallon	116.1863	3.26403	4.688334	117.6650043
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2002	187540	Mile	Gasoline/F	13733	US Gallon	120.9877	3.30622	4.727585	122.4792059
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2003	314167	Mile	Gasoline/F	20643	US Gallon	181.8648	5.29493	6.270311	183.865756
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2004	234095	Mile	Gasoline/F	17958	US Gallon	158.21	5.858798	3.353657	159.3558396
PWC Year 2013 GHG	US	Road	Fuel Use	Passenger Car - Gasoline - Year 2005-present	7275563	Mile	Gasoline/F	566105	US Gallon	4987.385	187.2392	100.6252	5022.05233
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1987-1993	15477	Mile	Gasoline/F	1391	US Gallon	12.25471	1.83203	2.33229	12.99553309
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1994	0	Mile	Gasoline/F	0	US Gallon	0	0	0	0
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1995	6815	Mile	Gasoline/F	601	US Gallon	5.29481	0.503362	0.884047	5.570840033
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1996	2874	Mile	Gasoline/F	297	US Gallon	2.61657	0.217475	0.419073	2.746890618
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1997	3638	Mile	Gasoline/F	334	US Gallon	2.94254	0.244568	0.471281	3.089095847
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1998	1150	Mile	Gasoline/F	85	US Gallon	0.74885	0.053841	0.100246	0.780069206
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 1999	32568	Mile	Gasoline/F	2739	US Gallon	24.13059	1.424335	2.50257	24.91196409
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2000	35133	Mile	Gasoline/F	2882	US Gallon	25.39042	1.615419	2.89935	26.29481166
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2001	31688	Mile	Gasoline/F	3322	US Gallon	29.26682	0.812628	0.882589	29.5501472
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2002	48009	Mile	Gasoline/F	2815	US Gallon	24.80015	0.811733	1.039748	25.13028836
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2003	77091	Mile	Gasoline/F	6726	US Gallon	59.25606	1.688899	1.242158	59.66844545
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2004	56938	Mile	Gasoline/F	4689	US Gallon	41.31009	1.154619	1.002696	41.63775882
PWC Year 2013 GHG	US	Road	Fuel Use	Light Goods Vehicle - Gasoline - Year 2005-present	501033	Mile	Gasoline/F	37474	US Gallon	330.1459	9.531137	6.131496	332.2114042
PWC Year 2013 GHG	US	Road	Fuel Use	Heavy Duty Vehicle - Diesel - Year 1960-present	416492	Mile	On-Road D	41792	US Gallon	424.1888	1.875625	1.765294	424.7617483
PWC Year 2013 GHG	US	Road	Fuel Use	Bus - Gasoline	62633	Mile	On-Road D	9831	US Gallon	99.78465	1.032255	0.835635	100.0594756

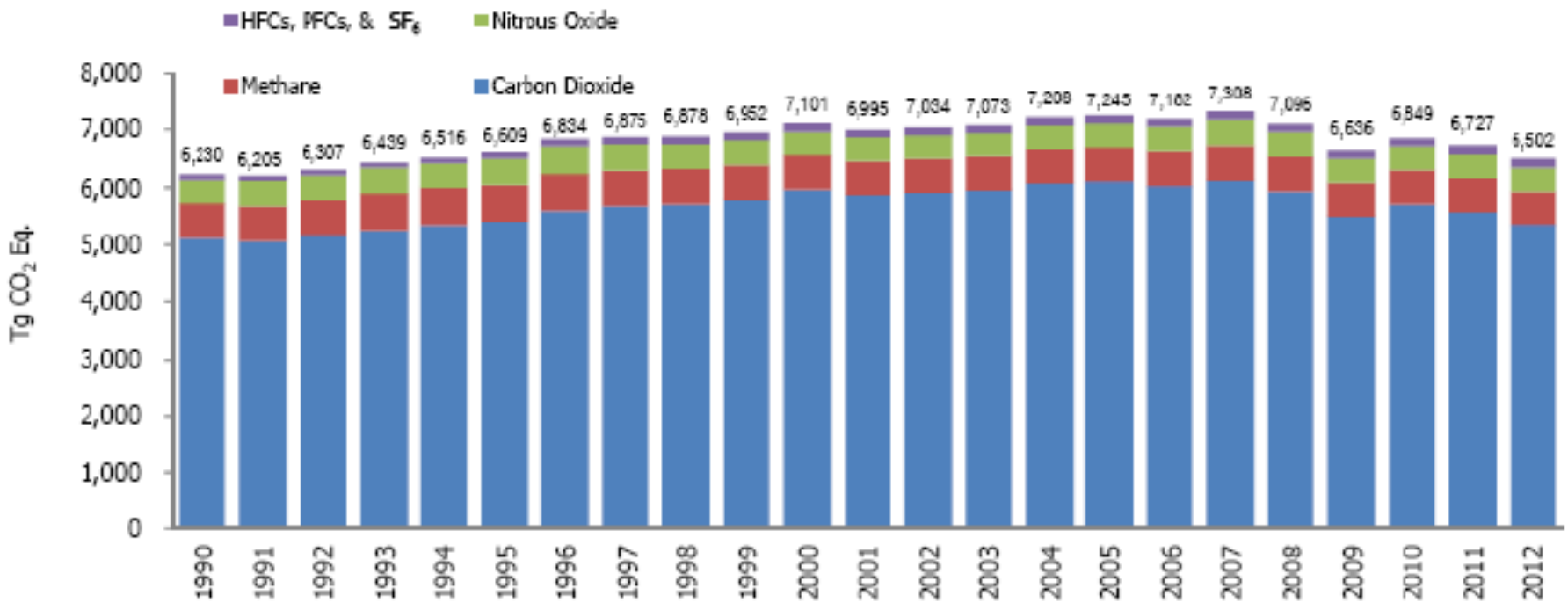
World Resource Institute
Green House Gas Protocol Tool (Version 2.0)

Scope	Fossil Fuel CO2 (metric tonnes)	CH4 (kilograms)	N2O (kilograms)	TOTAL GHG Emissions
	Fossil Fuel Emissions			
2010	7472	295	222	7546
2011	7453	291	207	7522
2012	7515	284	194	7580
2013	6917	264	163	6972



US EPA Greenhouse Gas 2/21/2014 DRAFT

Figure ES-1: U.S. Greenhouse Gas Emissions by Gas



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