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Alternative Fueled Fleet Vehicle Analysis

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Abstract

This report documents the results of an analysis conducted to evaluate options available to utilities to "green" their vehicle fleet. The New York Power Authority (NYPA) fleet was used as our test case. In accordance with corporate sustainability goals. NYPA vehicle purchasing decisions are constrained by internal requirements, including operational considerations and funding availability, and external constraints, including, most significantly, the alternative fuel vehicle (AFV) purchasing requirements of the Energy Policy Act (EPAct). For this study the continued purchase of new light-duty "flex fuel" vehicles FFVs and the continued use of gasoline in the entire FFV fleet is considered the business as usual baseline; alternative fueled fleet strategies were evaluated against this baseline. The costs evaluated for each fueled fleet strategy include annual vehicle purchase costs, capital costs for any new fueling infrastructure required, and annual fuel purchase costs.

The study recommended that NYPA stick with EPAct Standard compliance since the alterative compliance path is not a viable option granted the NYPA's current fleet mix and practical limitations in the total amount of E85 and B20 biodiesel that could be used by the fleet. NYPA can and should maximize its annual AFV credits under EPAct Standard Compliance by using more B20 biodiesel in its medium/heavy-duty fleet. NYPA should begin to purchase electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs). While more expensive than conventional and hybrid vehicles, EVs and PHEVs can significantly reduce petroleum use and CO_2-e emissions per mile and per year and can therefore play an important role in helping NYPA achieve its Sustainability Plan targets and other corporate goals. Additional reductions in gasoline use can be achieved by further emphasis on vehicle right sizing in NYPA's light-duty vehicle fleet and by developing a regional travel policy that encourages travel by train and increased use of video conferencing.

Keywords
Electric vehicles
Emissions
Energy Policy Act
Plug-in hybrid electric vehicles (PHEVs)
Alternative fueled vehicles (AFVs)

Executive Summary

Background

This report documents the results of an analysis conducted to evaluate options available to the New York Power Authority (NYPA) to "green" their vehicle fleet, in accordance with corporate sustainability goals.

NYPA is a public/private authority organized under the New York State Public Authorities law. It is the country's largest state public power organization, operating 17 generating facilities and over 1,400 circuit-miles of transmission lines throughout New York. NYPA's power customers include over 700 businesses and industrial customers, 115 government entities in New York City and Westchester County, and 47 municipal and four rural cooperative electric systems, as well as municipal and utility service agencies in New York City and Nassau, Suffolk and Westchester Counties.

Approximately 80 percent of NYPA's electricity is produced from hydropower, with the rest generated by thermal plants burning natural gas or low sulfur fuel oil.

NYPA operates 267 light duty and 199 medium- and heavy-duty fleet vehicles in support of their power generation, transmission, and sales operations. These vehicles operate from twelve different NYPA facilities located throughout New York State.

As an electric utility company NYPA has a strong interest in vehicle electrification, and in recent years an increasing number of electric, hybrid-electric, and plug-in hybrid vehicles have come on the market, which could be incorporated into the NYPA fleet. This study did not focus exclusively on these vehicles, but also analyzed opportunities to incorporate into the NYPA fleet a range of "alternative fuel" vehicles, including vehicles that operate on an E85 blend of ethanol and gasoline or biodiesel.

NYPA vehicle purchasing decisions are constrained by internal requirements, including operational considerations and funding availability. They are also constrained by external forces, including federal and state laws, the commercial availability of different fuels in different operating locations, and commercial availability of different vehicle technologies. This study took all of these constraints into consideration to delineate a range of practical alternatives available to NYPA for alternative fueled "green" fleet strategies. For each

alternative, the study calculated incremental costs and environmental benefits relative to a "business as usual" baseline.

The most significant external constraints imposed upon NYPA's fleet purchasing decisions are the alternative fuel vehicle (AFV) purchasing requirements of the Energy Policy Act (EPAct). In order to comply with the requirements of EPAct, over the last few years the majority of vehicles that NYPA has purchased for the light duty fleet have been "flex fuel" vehicles (FFV) capable of operating on either gasoline or E85. However, due to limited commercial availability of E85 fuel in NYPA's service area NYPA currently operates its flex-fuel vehicles exclusively on gasoline.

EPAct does allow fleets to generate AFV "credits" by using B20 biodiesel rather than standard petroleum diesel, and NYPA has begun in recent years to take advantage of this opportunity to gain increased flexibility for vehicle purchasing under EPAct. EPAct also offers an "alternative compliance" path which would allow NYPA even greater flexibility to purchase HEV and PHEV vehicles, but it would require NYPA to utilize E85 in a large percentage of its existing FFV fleet.

For this study the continued purchase of new light-duty FFVs, and the continued use of gasoline in the entire FFV fleet, is considered the business as usual baseline; alternative fueled fleet strategies were evaluated against this baseline. These alternative strategies include an analysis of what would be required for NYPA to qualify for EPAct alternative compliance, greater use of biodiesel in the medium/heavy-duty fleet to generate additional AFV credits under standard compliance, and operational changes such as vehicle "right-sizing", and implementation of a regional employee travel policy to reduce total fleet mileage.

For this study the costs evaluated for each fueled fleet strategy include annual vehicle purchase costs, capital costs for any new fueling infrastructure required, and annual fuel purchase costs. Environmental effects include changes in petroleum use (gasoline-gallon equivalents), as well as changes in net air emissions of nitrogen oxides (NOx), particulate matter (PM), volatile organic carbon (VOC), sulfur dioxide (SO_2) and greenhouse gases (GHG). For NOx, PM, VOC, and SO_2 only "tail pipe" (and for electric vehicles power plant) emissions were included. For GHGs the study includes "wells-to-wheels" emissions, comprised of tail pipe emissions plus upstream emissions from extraction or production, and transportation, of fuel, as well as indirect land use effects for bio-based fuels (ethanol, biodiesel). GHG emissions are expressed as CO_2-equivalent emissions (CO_2-e).

Results and Recommendations

The results of this analysis indicate that EPAct alternative compliance is not a practical option for NYPA to pursue. The current fleet mix, limited central fueling capability, and limited availability of E85 fuel at public fueling stations in the vicinity of NYPA fleet locations severely limits the amount of E85 fuel that NYPA could use. As such it would be virtually impossible for NYPA to meet the required minimum target for petroleum displacement under EPAct alternative compliance using other alternative fueled fleet strategies. A major recommendation of this analysis is therefore that NYPA should use additional B20 biodiesel fuel in their medium/heavy-duty fleet to generate AFV credits under EPAct standard compliance, in order to gain additional flexibility to purchase light-duty HEVs and PHEVs.

By converting only part of their current usage of #2 diesel and B5 biodiesel fuel to B20 biodiesel (44,000 gallons per year) NYPA could generate 19 AFV credits per year, which would allow them to purchase up to 19 additional HEVs and/or PHEVs. If NYPA did this they could reduce their annual petroleum use by 10,186 gasoline gallon equivalents, and reduce annual CO_2-e emissions by 45.7 tons compared to the business as usual scenario. There would also be small reductions in annual emissions of other pollutants: a 0.002 ton reduction in NOx, a 0.041 ton reduction in VOC, a 0.002 ton reduction in PM, and a 0.001 ton reduction in SO_2. Approximately one third of the reduction in petroleum use would result from reduced gasoline use because of the additional hybrid vehicles purchased; the remainder would result from lower petroleum content of B20 biodiesel compared to #2 diesel and B5 biodiesel.

This approach would increase annual fuel costs by $4,910; increased annual costs for diesel fuel purchases due to the higher cost of B20 biodiesel compared to #2 diesel and B5 biodiesel would be only partially offset by savings from reduced gasoline usage due to having more HEVs in the fleet. Annual costs for vehicle purchases would also increase - by $225,000 (+19%) - due to the higher cost of HEVs compared to FFVs. Over-all, annual costs for vehicle and fuel purchases would increase by 12% compared to business as usual.

Other recommendations include:

- Purchase modest numbers of EVs and PHEVs annually, to further reduce petroleum use and CO_2-e emissions, and to support corporate strategic goals to promote electric-drive transportation,

- Provide management level support for fleet "right-sizing" efforts, with a goal to minimize the number of full-sized sedans and SUVs in the light-duty fleet, in favor of more compact sedans and SUVs, and

- Develop regional employee travel and video conferencing policies that emphasize the use of video meetings instead of face-to-face meetings, and the use of trains for necessary regional travel rather than cars whenever possible, to support a goal of reducing total annual mileage from the light-duty fleet by 5% or more.

If implemented fully, all of the recommended strategies could reduce NYPA's annual petroleum use by up to 22,199 gasoline gallon equivalents (-8.9%) compared to the business as usual case, and could reduce annual CO_2-e emissions by up to 177.3 tons (-5.7%). Annual emissions of other pollutants would also be reduced slightly.

This would also reduce NYPA's annual fuel costs by up to $27,432 (-3.4%), but would increase annual costs for vehicle purchases by up to $192,300 (+16.3%) due to higher purchase costs for electric-drive vehicles (HEV, PHEV, EV).

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Section 1: Overview

While potentially constrained by operational needs, NYPA's fleet purchasing decisions should be in line with over-all corporate sustainability goals, which emphasize energy efficiency, a reduction in net emissions of carbon dioxide, and promotion of electric drive vehicles. In addition, NYPA is subject to the AFV purchasing requirements of the 1992 Energy Policy Act (EPAct), as amended, as well as several New York State Executive Orders related to efficiency and alternative fuel use. Each of these requirements is discussed below.

1.1 NYPA Sustainability Goals

The following specific goals are included in NYPA's over-all commitment to continuously improve the sustainability of their operations:

- Reduce carbon dioxide and other greenhouse gas emissions
- Reduce petroleum consumption
- Increase energy efficiency
- Maintain or improve operational efficiency and reliability
- Minimize air quality impacts of vehicle operation, fueling, and maintenance
- Support the market development of electric-drive vehicles
- Lead by example for our customers

1.2 EPAct AFV Fleet Purchasing Requirements

The Energy Policy Act of 1992 (EPAct), which has been amended several times – most recently in 2005, is primarily intended to reduce petroleum use from the U.S. transportation sector, to enhance U.S. energy security by reducing imports of foreign oil. In 2008 ninety four percent of the energy used by the U.S. transportation sector was derived from petroleum, and the transportation sector consumed 72% of all petroleum used in the wider economy[1]. More than half of the oil and refined petroleum products used were imported from abroad.

Among other provisions, EPAct requires federal and state government agencies, as well as certain private companies, to purchase "alternative fuel vehicles" (AFV) for their light-duty vehicle fleets. Light-duty vehicles (LDV) are those with gross

[1] U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2009*, August 19, 2010, http://www.eia.doe.gov/emeu/aer/contents.html

vehicle weight rating (GVWR) under 8,500 pounds; this vehicle category includes all cars and mini-vans, and most light trucks (pickups, vans, SUVs).

Covered private fleets subject to EPAct AFV purchase requirements are fleets operated by businesses whose principle activity is based on the production or sale of EPAct-authorized alternative fuels[2]. As an alternative fuel provider (electricity), NYPA is a covered fleet, subject to EPAct AFV purchase requirements.

EPAct defines an AFV as any dedicated or dual-fuel vehicle designed to operate solely on an alternative fuel, or on at least one alternative fuel. The following fuels qualify as alternative fuels[3]:

- Methanol, ethanol, and other alcohols
- Blends of 85% or more alcohol with gasoline (E85)
- Natural gas and liquid fuels domestically produced from natural gas
- Liquefied petroleum gas (LPG)
- Coal-derived liquid fuels
- Hydrogen
- Electricity
- Fuels, other than alcohol, derived from biologic materials

Under EPAct "Standard Compliance" 90% of the LDVs purchased each year by covered alternative fuel provider fleets must be AFVs. Also, covered fleets must "use alternative fuels in their AFVs, unless they operate in an area where the fuel is not available". Fleets that buy more AFVs than required in a particular year can earn credits that can be carried forward and used in later years.

Since 2001 covered fleets have also been able to earn compliance credit under EPAct standard compliance for up to 50% of required annual AFV purchases, by using biodiesel fuel in their medium- and heavy-duty onroad vehicle fleets. To earn biodiesel credits the biodiesel fuel must be used in onroad vehicles with GVWR greater than 8,500 lb[4], and it must have biodiesel content of at least 20% (B20 or higher). In addition, the fleet can only get credit for biodiesel content in excess of that required by federal or state law.

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[2] Fleets with less than 50 total vehicles are exempt. To be covered, more than 20 of the 50 vehicles must also be used primarily within a single Metropolitan Statistical Area with a population of more than 250,000 per the 1980 census, and must be centrally fueled or capable of being centrally fueled.

[3] U.S. Department of Energy, Energy Efficiency & Renewable Energy, Vehicle Technologies Program, *Alternative Compliance, Guidelines for Preparing and Submitting a Waiver Request Application and Other Documentation Requirements, 10 CFR Part 490 Subpart 1,* DOE/GO-102010-3117, Nov 2010

[4] The fuel cannot be used in light duty vehicles, and cannot be used in nonroad equipment such as construction or lawn and garden equipment.

Fleets can earn one AFV credit for each 450 gallons of qualifying B100 used. For example, if state law required use of B2 (2% biodiesel), but the fleet burns 50,000 gallons of B20, they can earn 20 AFV credits[5]. If they would otherwise need to purchase 40 AFVs, they could purchase only 20 AFVs and apply the 20 biodiesel credits to satisfy the remainder of their compliance obligation.

In 2007 the Department of Energy issued rules which allow covered fleets to meet their EPAct compliance obligations in other ways than just buying AFVs. Under this "alternative compliance" method, fleets must achieve the same reduction in petroleum use as they would by buying AFVs and using alternative fuel in them, but they can use additional methods to achieve the reduction, including efficiency measures.

In order to utilize alternative compliance fleets must apply for a waiver from standard compliance. The waiver application must include a detailed plan as to how the fleet will achieve the required reduction in petroleum use. If DOE approves the waiver the fleet must then implement the plan and track its success. At the end of the year the fleet must submit an annual report, with supporting documentation, to show that they have achieved the required level of petroleum reduction.

The ways in which a fleet can demonstrate petroleum reduction under alternative compliance include:

- The purchase and use of alternative fuels in AFVs within the fleet
- The purchase and use of hybrid-electric and other more efficient vehicles in lieu of standard vehicles
- The use of biodiesel blends
- Idle reduction for vehicles in their fleet
- Reduction in the number of miles traveled annually by their fleet

While AFV purchase requirements under standard compliance apply only to light duty vehicles, under alternative compliance fleets can get credit for petroleum reduction measures applied to their medium- and heavy-duty onroad fleets as well.

The amount of petroleum reduction required under alternative compliance is equivalent to the amount of petroleum that would have been reduced in that year if all AFVs in the fleet that had previously been purchased under standard compliance were operated exclusively on an alternative fuel. To account for differences in the energy content of different fuels, the petroleum reduction requirement is denoted in "gasoline gallon equivalents" (GGE)[6].

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[5] (20% - 2%) x 50,000 gal ÷ 450 gal/credit = 20 credits

[6] One gallon of conventional diesel fuel is equivalent to 1.11 GGE, one gallon of B100 biodiesel fuel is equivalent to 1.017 GGE, one gallon of E85 gasoline-ethanol blend is equivalent to 0.72 GGE, and one kilowatt-hour of electricity is equivalent to 0.03 GGE

For example, if the fleet already has 50 AFVs that can operate on E85 fuel, and under standard compliance they would need to purchase an additional 10 AFVs this year, then the number of qualifying AFVs for calculation of the petroleum reduction requirement under alternative compliance would be 60. If each AFV in their fleet burns, on average, 800 gallons of E85 per year then the petroleum reduction requirement under alternative compliance would be 34,560 GGE[7].

See table 1-1 for a hypothetical example of how a fleet might achieve this level of petroleum reduction under alternative compliance, using a number of different strategies.

Table 1-1
Hypothetical Petroleum Reduction Plan under EPAct Alternative Compliance

Approach	Calculation	Petroleum Reduction
Use E85 in 30 LDV flex-fuel vehicles	800 gal/veh x 30 veh x 0.72 GGE/gal	17,280 GGE
Use 50,000 gal B20 in heavy-duty diesel fleet	50,000 gal x 0.2 x 1.017 GGE/gal	10,170 GGE
Operate 4 electric vehicles (0.25 kWh/mi x 18,000 mi per vehicle)	4 x 0.25 kWh/mi x 18,000 mi x 0.03 GGE/kWh	540 GGE
Purchase 10 hybrid-electric vehicles (45 MPG) instead of conventional vehicles (22 MPG)	((18,000 mi÷ 22 MPG) – (18,000 mi÷ 45 MPG)) x 10	4,180 GGE
Reduce idling of heavy-duty diesel fleet by 2,000 hours	2,000 hr x 0.75 gal/hr x 1.11GGE/gal	1,665 GGE
Reduce total light-duty fleet mileage by 36,000 mi (fleet average MPG = 25)	36,000 mi ÷ 25 MPG	1,440 GGE
TOTAL		**35,275 GGE**

1.3 Other "Clean Fuel" and Efficiency Mandates

As a New York State Authority, NYPA is subject to the requirements of Executive Orders issued by the office of the Governor of the State of New York. There are two Executive Orders which may impact vehicle fleet purchasing decisions, EO 111 and EO142.

EO 111 – Alternative Fueled Vehicles and Buildings

This executive order specifies that, beginning in 2010, 100% of light-duty vehicles purchased by subject agencies must be either alternative fuel vehicles (as defined by EPAct) or hybrid-electric vehicles. In addition, for medium- and heavy-duty vehicles agencies shall implement "strategies to reduce petroleum consumption and emissions by using alternative fuels and improving vehicle fleet fuel efficiency".

[7] 60 AFV x 800 gal E85/year x 0.72 GGE/gal E85 = 34,560 GGE

EO 142 – Use of Bio Fuels

Originally issued in 2005, EO 142 mandated that state agencies and authorities with central fueling capability "ensure that vehicles capable of operating on E85 ethanol fuel shall do so whenever it is feasible to do so." The order also created a Governor's Clean Vehicle Council, charged with developing a plan and identifying and implementing measures that would allow state agencies to do so.

EO 142 also mandated that state agencies and authorities use an increasing amount of biodiesel fuel in their diesel fleets between 2007 and 2012. The exact blend(s) to be used was left to the discretion of the agencies, but needed to be equivalent to B100 use for 2% of over-all diesel consumption in 2007, rising to 7% in 2010 and 10% in 2012.

In 2011 the new Governor rescinded the requirements of EO 142 that relate to E85 ethanol and biodiesel use by state agencies and authorities.

Section 2: NYPA Vehicle Fleet

To support their operations, NYPA operates a diverse fleet of 466 vehicles that includes light-duty vehicles as well as medium- and heavy-duty vehicles. As shown in Figure 2-1 the fleet operates from twelve different locations throughout the state. The NYPA service territory is quite large – the distance between the corporate headquarters in White Plains and either the Niagara Power Project or the St Lawrence Power Plant is over 360 miles. The distance between the corporate headquarters and down-state operations in the New York City area is approximately 30 miles.

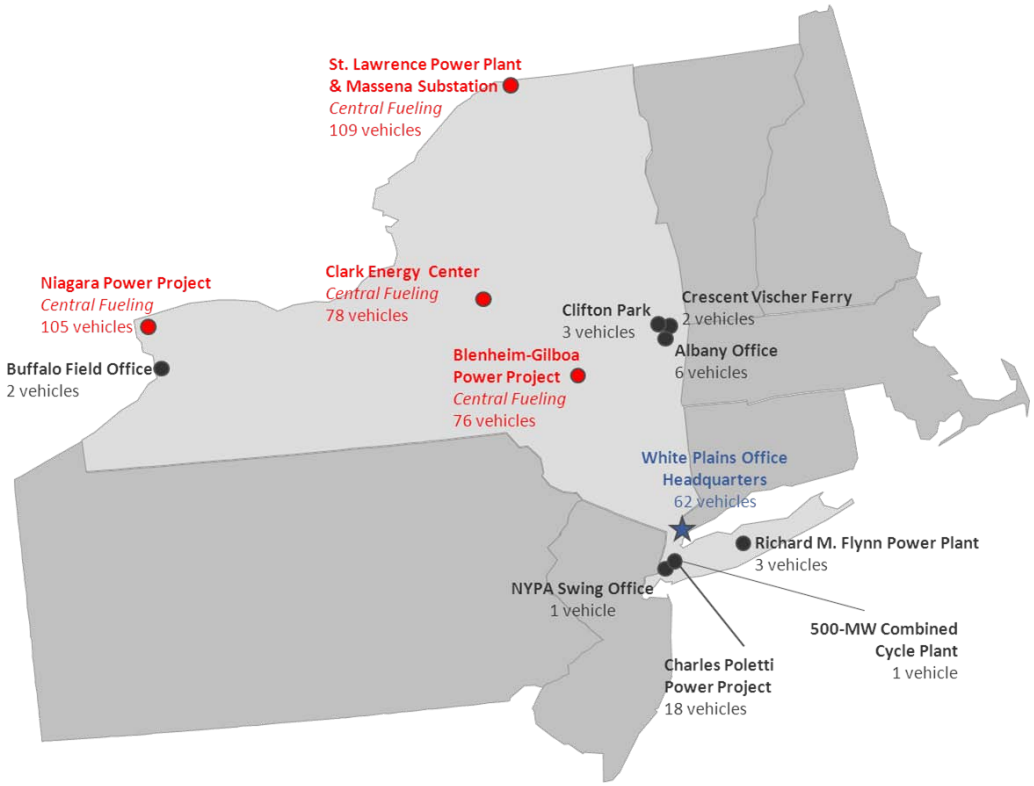

Figure 2-1
NYPA Fleet Locations

The vast majority of vehicles (94%) operate from only five locations – four upstate electric generating projects, and the White Plains headquarters. The motor pool at the White Plains office includes only light-duty vehicles, and does not have central fueling capability. The other four upstate locations that house

the majority of NYPA's vehicles have central fueling capability and their fleets include light-duty, medium-duty, and heavy-duty vehicles.

2.1 Vehicle Inventory

NYPA currently operates 267 light-duty[8] vehicles. See Table 2-1 for a summary of this fleet, by location and vehicle type. As shown, 63% of the vehicles are SUVs (compact and full-sized), 28% are sedans (compact and full-sized) and 9% are pick-ups and vans. Thirty four percent of the vehicles are hybrid-electric vehicles (HEV) that operate exclusively on gasoline and 66% are flex-fuel vehicles (FFV) that can operate either on gasoline or an E85 blend of ethanol and gasoline.

Table 2-1
Current NYPA Light Duty Fleet

Location	Number of Vehicles							
	Compact Sedan	Sedan	Compact SUV	SUV	Mini-Van	Pick-up	Van	TOTAL
NIAGARA POWER PROJECT	0	8	24	17	3	5	0	57
ST LAWRENCE & MESSENA	2	1	18	15	1	6	0	43
BLENHEIM-GILBOA POWER PROJECT	1	6	12	20	0	0	0	39
CLARK ENERGY CENTER	0	2	15	18	1	5	0	41
BUFFALO FIELD OFFICE	0	0	1	1	0	0	0	2
CHARLES POLETTI POWER PROJECT	1	4	2	3	0	0	1	11
RICHARD M. FLYNN POWER PLANT	0	0	2	0	0	0	0	2
500-MW COMBINED-CYCLE PLANT	0	0	0	1	0	0	0	1
WHITE PLAINS OFFICE	17	26	13	4	0	0	1	61
NYPA SWING OFFICE	0	1	0	0	0	0	0	1
ALBANY OFFICE	2	1	2	1	0	0	0	6
CLIFTON PARK	0	3	0	0	0	0	0	3
TOTAL	**23**	**52**	**89**	**80**	**5**	**16**	**2**	**267**
Typical Vehicle	**Toyota Prius**	**Chevy Impala**	**Ford Escape**	**Chevy Tahoe**	**Dodge Caravan**	**Ford F150**	**Chevy 1500**	
% HEV/EV	**70%**	**10%**	**80%**	**0%**	**0%**	**0%**	**0%**	

Typical vehicles in the fleet are the Toyota Prius HEV (compact sedan), Chevy Impala FFV (sedan), Ford Escape FFV and Ford Escape HEV (compact SUV), Chevy Tahoe FFV (SUV) and Ford F150 FFV (pick-up). The HEVs in the fleet are almost exclusively Toyota Prius and Ford Escape Hybrid vehicles.

The majority of the compact sedans and sedans are assigned to the motor pool at the White Plains headquarters. LDV fleets at the other operating locations are more heavily weighted toward compact SUVs and full-sized SUVs.

[8] Light-duty vehicles have GVWR less than 8,500 lb.; under Department of Transportation weight class designations they are considered Class 1 and Class 2 vehicles.

Based on EPA combined city/highway fuel economy ratings for various vehicle models, the vehicle-weighted average fuel economy of the NYPA light-duty vehicle fleet is 24.7 miles per gallon (MPG)[9]. LDV fleets at the White Plains and Albany offices have the highest average fuel economy (29.7 MPG and 30.9 MPG, respectively) while the LDV fleet at the Clark Energy Center has the lowest (21.9 MPG).

NYPA currently operates 161 medium-duty[10] vehicles. See Table 2-2 for a summary of this vehicle fleet, by location and vehicle type. Fifty six percent of NYPA's medium-duty vehicles are heavy-duty pickups, such as the Ford F250 and Ford F350; many of these are equipped with four wheel drive, and many also have an extended crew cab that can seat five adults. The second most numerous medium-duty vehicle type (22%) is utility trucks. These are typically Ford F350 or Ford F550 chassis, with an extended crew cab and an enclosed, lockable utility body for housing equipment and supplies for work crews.

Ninety three percent of NYPA's medium-duty trucks are assigned to the four up-state locations with central fueling capability. All of NYPA's medium duty trucks operate on diesel fuel.

NYPA currently operates 38 heavy-duty[11] vehicles. See Table 2-3 for a summary this fleet, by location and vehicle type. This is a diverse fleet that includes chassis with utility, stake, and dump bodies, as well as trucks equipped with aerial lifts, tow trucks, and combination truck-tractors. All of these heavy-duty vehicles operate on diesel fuel, and all are assigned to the four up-state locations with central fueling capability.

In 2011, NYPA began a program to retrofit their heavy-duty diesel vehicles older than model year 2007 with diesel particulate filters (DPF), to reduce particulate (PM) emissions. To date eleven vehicles have been retrofit, and another three vehicles will be retrofit by the end of the year. The vehicles are being retrofit with devices manufactured by Engine Control Systems, Inc. which have been verified by U.S. EPA and the California Air Resources Board to reduce PM emissions by greater than 90%.

This program will reduce PM emission from the NYPA heavy-duty fleet by 22.5 pounds per year; when the retrofit program is complete the entire NYPA heavy duty fleet will be equipped with DPF (either from the factory or retrofit).

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[9] Fueling and trip records for motor pool vehicles assigned to the White Plains office indicate that NYPA vehicles generally achieve in-use fuel economy equivalent to the EPA combined City/Highway rating.

[10] Medium-duty vehicles have GVWR between 8,500 lb and 26,000 lb.; under Department of Transportation weight class designations they are considered Class 2b (8,500 – 10,000 lb) and Class 3 through Class 6 vehicles.

[11] Heavy-duty vehicles have GVWR greater than 26,000 lb.; under Department of Transportation weight class designations they are considered Class 7 and Class 8 vehicles.

Table 2-2
Current NYPA Medium-Duty Fleet

Location	Number of Vehicles								
	Van	Pickup	SUV	Utility	Stake	Dump	Aerial	Other	TOTAL
NIAGARA POWER PROJECT	7	22	1	7	2	1	0	0	40
ST LAWRENCE & MESSENA	4	32	0	12	0	3	2	2	55
BLENHEIM-GILBOA POWER PROJECT	1	13	2	7	3	1	1	0	28
CLARK ENERGY CENTER	0	15	1	9	1	1	0	0	27
CRESCENT VISCHER FERRY	0	2	0	0	0	0	0	0	2
CHARLES POLETTI POWER PROJECT	1	5	0	0	1	0	0	0	7
RICHARD M. FLYNN POWER PLANT	0	1	0	0	0	0	0	0	1
WHITE PLAINS OFFICE	1	0	0	0	0	0	0	0	1
TOTAL	**14**	**90**	**4**	**35**	**7**	**6**	**3**	**2**	**161**

Table 2-3
Current NYPA Heavy-Duty Fleet

Location	Number of Vehicles						
	Utility	Stake	Dump	Aerial	Tractor	Other	TOTAL
NIAGARA POWER PROJECT	0	0	3	1	3	1	8
ST LAWRENCE & MESSENA	2	0	3	0	5	1	11
BLENHEIM-GILBOA POWER PROJECT	2	1	2	2	2	0	9
CLARK ENERGY CENTER	0	0	4	1	2	3	10
TOTAL	**4**	**1**	**12**	**4**	**12**	**5**	**38**

2.2 Typical Vehicle Duty Cycle & Fuel Use

Most of the vehicles assigned to the White Plains office are in a common motor pool, and individuals that use them must sign them in and out for every trip. An electronic database of motor pool trip records for these vehicles was available for analysis. This database covered all trips for the 2010 calendar year – a total of 3,713 trips in 67 different vehicles, covering a total of 685,000 miles.

See Table 2-4 for a summary of these trip records. As shown, in 2010 the average trip by a White Plains LDV lasted more than one day (40 hours) and covered 185 miles. Only 25% of trips were less than 40 miles, and these trips accounted for less than one percent of all accumulated mileage. Slightly more than half of all trips were less than 100 miles, and accounted for just over 10% of accumulated mileage. Nine percent of trips were over 500 miles; these long trips accounted for almost 37% of accumulated mileage. This pattern of vehicle activity is likely driven by NYPA's large service territory, and may not be typical of other utility companies with a more compact service area.

On average, each White Plains motor pool vehicle was used for 55 trips, and traveled 15,093 miles in 2010[12].

Trip records are not available for other NYPA vehicle locations. However, based on estimated annual mileage accumulation and fuel purchase patterns, as discussed below, it is clear that the motor pool cars at White Plains accumulate on average about 30% more miles annually than the cars assigned to other locations. LDVs assigned to these other locations may therefore have a smaller percentage of their total mileage accounted for by very long trips.

[12] This is an estimate based on full-year records for 35 vehicles, and part-year records for 15 vehicles that entered service mid-year. Sixteen vehicles were retired from the fleet mid-year but the actual retirement date was not known, so records for these vehicles were not included in the calculation of average annual mileage per vehicle.

Table 2-4
Summary of White Plains Motor Pool Trip records, Calendar Year 2010

Vehicle Type	Number of Vehicles	Number of Trips	Trip Duration [hour]	Trip Length [mi]	% of Trips							
			AVG	AVG	< 10 mi	< 20 mi	< 30 mi	< 40 mi	< 50 mi	< 60 mi	< 100 mi	> 500 mi
COM SEDAN	22	1,474	34	139	22%	23%	25%	27%	31%	39%	56%	4%
SEDAN	29	1,754	44	209	15%	17%	19%	20%	25%	32%	46%	11%
COM SUV	11	218	59	283	15%	15%	18%	20%	23%	28%	38%	19%
SUV	5	267	34	200	36%	39%	42%	45%	47%	51%	63%	15%
TOTAL	**67**	**3,713**	**40**	**185**	**19%**	**21%**	**23%**	**25%**	**29%**	**36%**	**51%**	**9%**
			% of Total Miles →		**0.2%**	**0.3%**	**0.5%**	**0.9%**	**1.8%**	**4.1%**	**10.1%**	**36.6%**

See Table 2-5 for a summary of NYPA's gasoline usage by location in 2010. As shown, in 2010 NYPA purchased 195,239 gallons of gasoline; 57% of this gasoline was purchased centrally, and used at the four locations with central fueling capability. The remainder of gasoline used in 2010 was purchased off-site at various public fuel stations. For the four locations with central fueling, between 67% and 91% of total gasoline purchased for the location was purchased centrally. Please note that the amount of gasoline purchased centrally in one year may not equal the amount used in that year due to timing differences between bulk purchase and individual vehicle fueling.

Table 2-5
Summary of NYPA Gasoline Usage by Fleet Location, 2010

Location	Annual Gas/E85 Use (gallons)				% Central Fueling
	Central Fueling		Off-site	TOTAL	
	Gas	E85	Gas		
NIAGARA POWER PROJECT	32,624	0	3,283	**35,907**	91%
ST LAWRENCE & MASSENA	37,966	0	9,925	**47,891**	79%
BLENHEIM-GILBOA POWER	15,713	0	7,753	**23,466**	67%
CLARK ENERGY CENTER	24,024	0	11,739	**35,763**	67%
All other locations	0	0	52,211	**52,211**	0%
TOTAL	**110,327**	**0**	**84,912**	**195,239**	**57%**

To determine typical mileage and gasoline usage by NYPA light duty vehicles at locations other than White Plains the authors analyzed fueling records from NYPA's fleet management system. On average, each NYPA gasoline-powered vehicle used approximately 460 gallons of gasoline in 2010. The fleet management system does not track vehicle mileage or fuel economy, but a comparison of fleet management fuel records to the White Plains motor pool trip records indicates that most of the White Plains vehicles achieve in-use fuel economy similar to the EPA combined city/highway rating for the vehicle model.

Using these EPA fuel economy ratings, the weighted average fuel economy of the NYPA light duty fleet is approximately 24.7 MPG. Based on this weighted average fuel economy and average annual fuel use of 460 gallons, the average annual mileage of the entire NYPA light-duty fleet is approximately 11,500 miles per vehicle.

Assuming 250 work days per year, mileage accumulation for all NYPA light-duty gasoline vehicles averages 46 miles per day, though there is significant variability from vehicle to vehicle. As discussed above, the White Plains motor pool fleet averaged 15,000 miles per year per vehicle in 2010 (average of 60 miles per day), and approximately 7% of all NYPA light duty vehicles used more than 1,000 gallons of gasoline in 2010, implying daily average mileage of 100 miles or more.

See Table 2-6 for a summary of NYPA's diesel fuel purchases by location in 2010. This fuel is used for both onroad medium- and heavy-duty vehicles and nonroad equipment. NYPA's fleet management fueling records indicate that approximately 13% of NYPA's diesel fuel is used in nonroad equipment and 87% is used in onroad trucks. As shown, in 2010 NYPA purchased 129,260 gallons of diesel fuel for its medium- and heavy-duty onroad and nonroad fleet; 77% of this diesel fuel was purchased centrally and used at the four locations with central fueling capability. At three of these locations more than 95% of total diesel fuel used was purchased centrally; the exception is the Clark Energy Center, where only 46% of the diesel fuel used was purchased centrally. Diesel fuel not purchased centrally was purchased at various public fuel stations.

Table 2-6
Summary of NYPA Diesel Fuel Usage by Location, 2010

Location	Annual Diesel Fuel Use (gallons)					% Central Fueling	% Biodiesel	
	Centralized Fueling			Off-site	TOTAL			
	B5	B20	#2	#2			B5	B20
NIAGARA POWER PROJECT	19,836	0	0	345	**20,181**	98%	98%	0%
ST LAWRENCE & MASSENA	26,315	0	22,235	2,045	**50,595**	96%	52%	0%
BLENHEIM-GILBOA POWER	7,470	0	3,252	614	**11,336**	95%	66%	0%
CLARK ENERGY CENTER	13,628	6,809	0	24,062	**44,499**	46%	31%	15%
All other Locations	0	0	0	2,648	**2,648**	0%	0%	0%
TOTAL	**67,248**	**6,809**	**25,488**	**29,715**	**129,260**	**77%**	**52%**	**5%**

In 2010, 52% of the diesel fuel used by NYPA was a B5 blend of 5% biodiesel and 95% petroleum diesel, 5% was a B20 biodiesel blend, and 43% was standard #2 ultra-low sulfur onroad diesel.

Based on fleet management fueling records, on average, each NYPA diesel onroad vehicle used approximately 580 gallons of fuel in 2010.

Based on this average fuel use, and estimated weighted average fleet fuel economy of 9.2 MPG[13], the estimated annual mileage per onroad diesel vehicle was 5,336 miles in 2010.

Assuming 250 work days per year, mileage accumulation per day for these medium- and heavy-duty diesel vehicles averaged 21 miles per day for the entire fleet.

[13] This weighted average fleet fuel economy was calculated using U.S. average heavy-truck fuel economy by weight class, per the Department of Energy's Transportation Energy Data Book, edition 26, table 5.4

2.3 Recent Fleet Purchasing Policies

NYPA's fleet purchasing policies are responsive to operational needs as well as outside mandates, primarily the AFV purchase requirements of EPAct.

Light duty vehicles are generally replaced at the end of five years or after accumulating 75,000 miles. Medium-duty trucks are replaced at seven years/100,000 miles, and heavy-duty trucks are replaced at 10 years/100,000 miles. NYPA's 5-year fleet replacement plan calls for the purchase of approximately 53 LDVs, 29 MDVs, and one HDV per year over the next five years.

For the light duty fleet there is a general policy to purchase the smallest, most fuel-efficient vehicles available; requests for full-sized SUVs and pick-ups must be justified based on operational needs. The medium-duty fleet primarily supports NYPA work crews and is heavily weighted toward crew-cab pickups and utility body trucks, in accordance with the need to carry people, supplies, and tools to various work sites.

For the past six years an average of 63% of light-duty vehicles purchased by NYPA have been alternative fuel vehicles (AFV), in order to comply with EPAct AFV purchase requirements (standard compliance). Virtually all of these AFVs have been flex-fuel vehicles (FFV) capable of operating on an E85 blend of ethanol and gasoline. Other than FFVs there are currently only two other light-duty alternative fuel vehicles in the NYPA fleet – both are electric vehicles.

Since 2005, all light-duty vehicles purchased by NYPA that were not FFVs or EVs have been hybrid-electric vehicles (HEV). Most of these HEVs are compact sedans (Toyota Prius) and compact SUVs (Ford Escape HEV).

Section 3: Alternative Fueled Fleet Options

NYPA already has a very "green" light duty fleet – it is dominated by flex-fuel and hybrid electric vehicles. Options available to NYPA to further reduce the environmental impact of their fleet operations include greater use of alternative fuels (E85, biodiesel) for both their light-duty and medium/heavy duty vehicles, purchase of greater numbers of fuel efficient hybrid and plug-in hybrid vehicles, purchase of electric vehicles, and reductions in total annual miles driven by the fleet.

This section discusses the availability, cost, and emissions performance of various "green vehicles" and alternative fuels in New York State. This discussion focuses on flex-fuel, electric, and hybrid electric vehicles, and on E85 and biodiesel fuels. While NYPA could also pursue the use of natural gas and LPG in their light and medium/heavy-duty fleets they have chosen not to analyze these options in detail at this time due to a lack of current fueling infrastructure, and the fact that as an electric utility they are more interested in promotion and use of electricity for transportation.

3.1 Alternative Fueled Vehicles Available for Purchase

See Appendix A for a list of "alternative fuel" and other "green" vehicles currently available for purchase by NYPA. The vehicle types shown in Appendix A include flex-fuel vehicles (FFV), natural gas vehicles (NGV), vehicles that operate on liquid petroleum gas (LPG), electric vehicles (EV), hybrid-electric vehicles (HEV) and plug-in hybrid electric vehicles (PHEV). The focus of the list in Appendix A is on light-duty vehicles, but it also includes a partial list of available medium and heavy-duty vehicles, focusing on NGVs, EVs and HEVs that would be specific to utility fleets[14].

The list in Appendix A was compiled from publicly available sources, including:

- U.S. Environmental Protection Agency, Green Vehicle Guide (www.epa.gov/greenvehicles)

[14] Many medium- and heavy-duty vehicles are available from the manufacturer with an optional natural gas engine and fuel system. This project did not attempt to compile a comprehensive list of these vehicles.

- U.S. Department of Energy, Alternative Fuels and Advanced Vehicle Data Center (www.afdc.energy.gov/afdc/vehicles/search/)
- New York State Office of General Services (www.ogs.state.ny.us/purchase/spg/awards/404VehicleList.htm)
- CalStart NGV Coop (www.calstart.org/projects/Natural-Gas-Vehicle-Cooperative/NGV-Co-Op-Bid-List.aspx)
- CalStart, Hybrid truck Users Forum, HTUF Vehicle Directory (www.calstart.org/htuf-vehicle-directory.aspx)
- Plug-In America (http://www.pluginamerica.org/vehicles)

In some cases the data available from these sources was supplemented by data from manufacturer websites or other manufacturer literature. This list is intended to be extensive, but may not be comprehensive; the data is current as of March 2011.

For each available vehicle Appendix A lists the vehicle type (i.e. sedan, SUV, pickup), manufacturer name, vehicle model name, fuel economy (MPG), price, and distance-specific emissions (grams per mile, g/mi) of carbon dioxide-equivalent greenhouse gases (CO_2-e), nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM), and volatile organic carbon (VOC).

Availability

See Table 3-1 for a summary of the available vehicles. As shown, the vehicle types with the greatest number of available models are FFVs and HEVs. Fifty two different models of light-duty FFV are available from major auto manufacturers, in virtually any body style (compact sedan, sedan, compact SUV, SUV, pickup, van).

Similarly, 28 different light-duty HEV models are available, in a similar range of body styles. All light-duty HEVs are gasoline-electric. In addition, there are ten medium- and heavy-duty HEV models available; virtually all of these are diesel-electric.

There is only one model of light-duty NGV available directly from the original manufacturer – the Honda Civic NGV. The other light-duty NGVs listed are pickups and vans that are sold as new by a third-party conversion company, sometimes under license to the original manufacturer. The same is true of the two listed LPG vehicle models.

There are currently only two light-duty EV models for sale to the general public by major auto manufacturers – the Nissan Leaf and Smart ForTwo – both of which are compact sedans. Several other manufacturers have recently fielded small volume demonstration fleets of other EV models. In addition there are seven light- and medium-duty EV vans, two EV utility trucks, and one EV truck-tractor available commercially. Some of these are sold by the original equipment manufacturer and some are conversions sold as new vehicles by a third party.

Of the ten PHEV models shown in Table 3-1 only two are currently commercially available, in limited numbers; these are the Chevy Volt and Toyota Prius PHEV. Six other PHEV models have announced release dates in 2012 or 2013. The listed PHEVs have advertised all-electric range between 12 and 40 miles.

Table 3-1
Summary of Available Alternative Fuel and other Green Vehicles

Vehicle Type		Available Styles	Number of Available Models		
			LDV	MDV	HDV
Alternative Fuel Vehicles	FFV	compact sedan, sedan, compact SUV, SUV, pickup, van	52	0	0
	NGV	compact sedan, pickup, van, stake/utility truck, truck-tractor	14	2	4
	LPG	pickup	1	1	0
	EV	compact sedan, light-duty van, medium-duty van, utility truck, truck-tractor	3	7	2
Other Green Vehicles	HEV	compact sedan, sedan, compact SUV, SUV, pickup, medium-duty van, utility truck, truck-tractor	28	3	7
	PHEV	compact sedan, sedan, compact SUV, medium-duty van	9	1	0

Purchase Cost

For all vehicles included in Appendix A the manufacturer's suggested retail price (MSRP) is listed, if published. For some vehicles prices available under New York State or California centralized purchase contracts are also listed; these prices are generally lower than the listed MSRP.

In general, FFVs are the lowest cost alternative fuel vehicles available for purchase by any fleet. NGV, LPG, HEV, PHEV, and EVs are all more expensive than the same, or comparable, model of FFV. See Table 3-2, which compares purchase costs for various types of select vehicle models. The vehicle models included in Table 3-2 were chosen because they are offered in a range of fuel types and/or because they are most numerous in the current NYPA fleet. The prices shown in Table 3-2 are the lowest available; if the vehicle is available from the New York State Office of General Service central vehicle purchase contract that price is shown in red – if not the MSRP is shown in black.

Direct comparisons are not always possible because all vehicle models are not offered in each configuration. However, as shown in Table 3-2 NGV and LPG vehicles can cost between $9,000 and $22,000 more than the same or comparable FFV model, a cost premium of between 60% and 200%. Similarly, HEVs typically cost between $4,000 and $18,000 more than the same or comparable FFV model, a cost premium of between 20% and 75%.

The comparative data for PHEVs and EVs is more limited, but based on the available comparisons it appears that PHEVs and EVs cost $17,000 - $20,000 more than comparable HEVs, and may cost as much as $25,000 more than comparable FFVs, a premium of 140% or more.

Table 3-2
Comparison of Green Vehicle Prices

Model		Purchase Price					
		FFV	NGV	LPG	HEV	PHEV	EV
Compact Sedan	Toyota Prius				$19,812	$36,000	
	Ford Fusion	$15,488			$24,711		
	Honda Civic		$24,833		$22,015		
	Chevy Volt					$40,280	
	Nissan Leaf						$32,780
Sedan	Chevy Impala	$16,782					
	Nissan Altima				$21,498		
Compact SUV	Ford Escape	$19,054			$28,564	Avail 2012	
	Mazda Tribute	$20,555			$29,500		
SUV	Chevy Tahoe	$28,350			$46,551		
	GMC Yukon	$38,535			$46,414		
Pickup	Ford F150	$15,260	$36,415				
	Ford F250		$37,088	$35,185			
	GMC Sierra	$21,240			$37,300		
Van	Chevy 1500	$18,294					
	Chevy 2500	$18,854	$41,050				

Emissions

For light-duty vehicles the fuel economy shown in Appendix A is the EPA combined city/highway rating, which for all vehicles is based on standardized testing. Listed tail-pipe emissions factors (g/mi) for NOx, PM, and VOC are based on the EPA engine certification level of the vehicle. Listed emissions of SO_2 are based on listed fuel economy and typical fuel sulfur levels, assuming that all fuel-borne sulfur is converted to SO_2 during combustion in the engine. Listed emissions of CO_2-e are "wells-to-wheels" emissions, which include vehicle tail-pipe emissions as well as emissions from production and transport of the fuel.

Listed CO_2-e emissions for each vehicle (g/mi) are based on the listed fuel economy, and the typical carbon content and "well-to-tank" emission factors for the fuel used. Well-to-tank emission factors are taken from the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET)

model produced by Argonne National Laboratory. In developing the emission factors, New York-specific values were used for various input assumptions in GREET, instead of U.S-default values[15].

The well-to-tank emission factors for bio-fuels (ethanol, biodiesel) also include the indirect emissions from land use changes when growing bio-fuel crops. These indirect emissions are not included in GREET; the values used here were taken from current assumptions used by California Air Resources Board when assessing the net carbon emissions from different fuels under the California Low Carbon Fuel Standard[16]. See Figure 3-1 for the values used in this report for well-to-wheels emissions from various fuels; these values are shown as grams CO_2-e per gallon of fuel[17]. Note that in Figure 3-1 "tail pipe" emissions are shown as zero for pure bio-fuels (E100 and B100). While actual tail-pipe CO_2 emissions from vehicles burning these fuels are not zero, it is the convention to show them as zero because the CO_2 released is re-cycled back into the feed crops grown to produce the fuel.

Listed emissions for electric vehicles (EVs, and PHEVs when operated on electric-only mode) are based on the listed energy use (kilowatt-hours per mile, kWh/mi) per EPA testing and/or manufacturer literature, and average emissions factors for production of the electricity used in New York State.

The listed EV/PHEV emission factors are specific to New York, and they are based on the following mix of electric power generation: 28% from thermal plants burning natural gas, 13% from thermal plants burning coal, 4% from thermal plants burning oil or biomass, 27% from nuclear plants, 27% from hydro-electric plants, and 1% from wind turbines. This generation mix includes electricity generated in New York (86%) as well as electricity imported from Canada (9%) and electricity imported from surrounding states (5%). The PM emission factors also assume that coal-fired electric generating plants in New York State are equipped with a high level of PM control (bag-house filtration).

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[15] See: New York Energy Research & Development Authority, NYSERDA Report 9576, *Assessing the Total Fuel Cycle Energy and Environmental Impacts of Alternative Transportation Fuels, Development and Use of NY-GREET*, Final Report, Sept. 2007.

[16] Well-to-tank emission factors for ethanol and biodiesel vary significantly based on the feed stock crop and the production process used. For this analysis the authors used average values for production of ethanol from mid-west corn, and for production of biodiesel from mid-west soy beans. Emissions factors are significantly lower for production of ethanol from sugar cane or cellulosic feed stocks. However, ethanol produced from these crops is currently a very small percentage of total U.S. production.

[17] The values in Figure 3-1 are based on the use of New York-specific assumptions in GREET for well-to-tank emissions. See Appendix A for well-to-tank emission factors using US-default and California-specific assumptions. Both US-default and California-specific values for well-to-wheels emissions are within +/-5% of New York-specific values for all fuels.

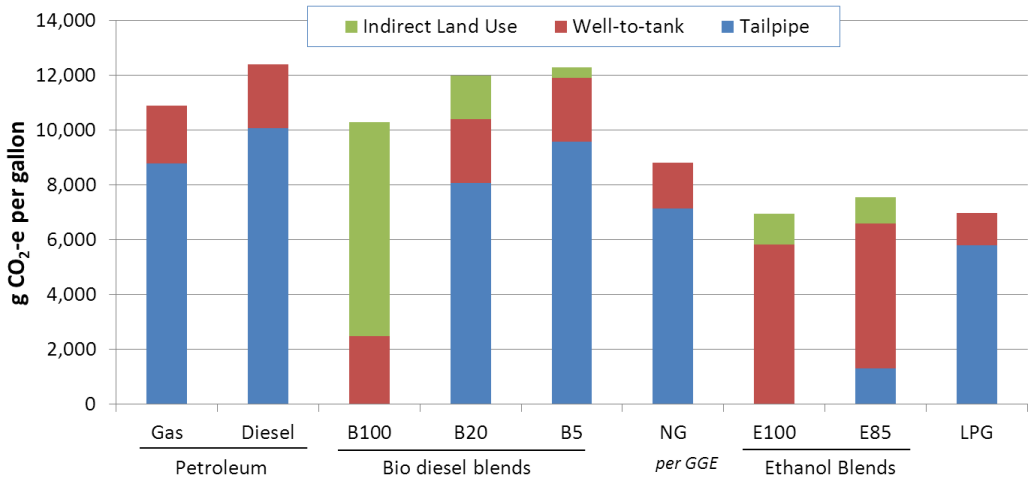

Figure 3-1
Wells-to-Wheels GHG Emissions from Various Fuels (g/gal CO2-e)

EV/PHEV emission factors will vary by location, based on both the generation mix and the level of emission controls installed on thermal generating plants (natural gas, coal, oil, bio-mass).

See Figure 3-2 for the distance-specific emission rates (g/mi) from various typical vehicles included in Appendix A.

All of the vehicles compared in Figure 3-2 (Buick Regal, Toyota Prius, Chevy Volt, Nissan Leaf) are compact sedans. In figure 3-2 the Chevy Volt PHEV is assumed to operate for 50% of the time in electric-only mode and 50% in hybrid-mode (i.e. with 35 miles all-electric range a typical trip would be 70 miles between plug-ins). In this chart the Nissan Leaf is assumed to use 0.34 kWh/mile electricity and the Chevy Volt is assumed to use 0.36 kWh/mi in electric-only mode, in accordance with data published by EPA.

In Figure 3-2 emission rates for NOx, SO_2, PM, and VOC have all been multiplied by 1,000 to allow them to be shown on the same scale as CO_2-e emissions.

As shown, when an FFV such as the Buick Regal is operated on E85 fuel it has marginally lower g/mi CO_2-e and SO_2 emissions than when it is operated on gasoline, but NOx, PM, and VOC emissions are identical.

HEVs can have significantly lower CO_2-e emissions than conventional gasoline vehicles and FFVs, due to their improved fuel economy; SO_2 emissions will also be marginally lower. NOx, PM, and VOC emissions from light-duty vehicles are dependent primarily on EPA engine certification level, not in-use fuel economy. As such HEVs can have higher or lower g/mi emissions of these pollutants than gasoline vehicles and FFVs, depending on the certification level of their engines. The Buick Regal FFV is certified to EPA Tier 2/Bin 4 emission levels, while the Toyota Prius is certified to more stringent California SULEV

standards – that is why g/mi NOx and VOC emissions shown in Figure 3-2 are lower for the Prius than for the Regal.

As shown in Figure 3-2, in New York EVs will have significantly lower g/mi emissions of CO_2-e, PM, and VOC than any other vehicle type, but NOx and SO_2 emissions will be higher, based on average emissions factors from electricity production.

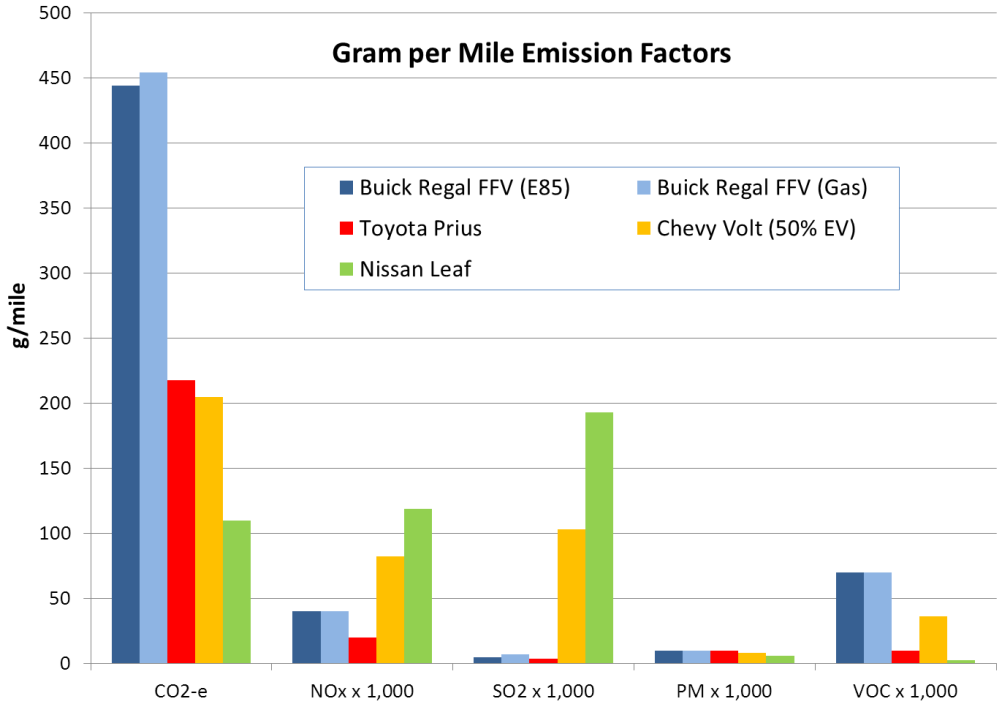

Figure 3-2
Emission Rates from Typical Vehicles (g/mi)

3.2 Availability & Cost of Alternative Fuels

This section focuses on availability and cost, within New York State, of E85 and B20. These are the alternative fuels that NYPA is considering using for its light duty fleet.

Availability

As discussed in section 2.2, NYPA currently purchases 57% of the gasoline it uses and 77% of the diesel fuel it uses centrally, for use at four different up-state locations with central fueling capability. NYPA buys this fuel using a centralized state fuel purchase contract controlled by the Office of General Service (OGS).

Forty three percent of the gasoline and 23% of the diesel that NYPA uses is purchased at public fuel stations by various vehicle users; in some cases this fuel is purchased when vehicles are on long trips away from their assigned fleet location and in some cases it is purchased for vehicles assigned to the eight NYPA fleet locations that do not have central fueling capability.

The OGS centralized fuel contract includes gasoline and #2 diesel fuel, as well as alternative fuels E85, B5 biodiesel, B10 biodiesel, and B20 biodiesel. However, all of the alternative fuels are not available everywhere in the state. In August 2011, the OGS database listed pricing for E85 in only six out of 62 New York counties, and listed pricing for B20 biodiesel in only 20 counties.

Pricing for E85 was not listed in any of the counties where NYPA has fleet locations with central fueling (Niagara, Saint Lawrence, Schoharie, and Oneida counties) and pricing for B20 biodiesel was listed in only one of these counties (Oneida county). The lack of pricing may be due to difficulties in obtaining supply in these counties, or may be due to a lack of demand from contract users.

E85 is also in very limited supply at public fuel stations in New York. See Table 3-3 for the locations of the nearest public fuel stations selling E85 in the vicinity of NYPA fleet locations. The data in Table 3-3 is based on a database maintained by OGS, which was updated in November 2010.

As shown there are no public E85 fuel stations in the vicinity of six of NYPA's fleet locations; these six locations house 55% of NYPAs flex-fuel vehicles. At the other fleet locations the nearest E85 station is typically more than five miles away. The location with the closest E85 station, at only 2.7 miles away, is the Albany office; this office currently only has two flex-fuel vehicles assigned.

Table 3-3
Public E85 Fuel Stations in the Vicinity of NYPA Fleet Locations

Name	City	County	Flex-fuel Vehicles Assigned	Nearest E85 Stations in County [1]					
				Public?	Distance [mi]	Public?	Distance [mi]	Public?	Distance [mi]
NIAGARA POWER PROJECT	Lewiston	Niagara	35	Public	13.2	Public	19.8		
ST LAWRENCE PP & MASSENA	Massena	St. Lawrence	26	None					
BLENHEIM-GILBOA	N. Blenheim	Schoharie	27	None					
CLARK ENERGY CENTER	Marcy	Oneida	31	None					
BUFFALO FIELD OFFICE	Buffalo	Erie	1	Public	5.2	NYSTA ONLY	7.7		
CRESCENT VISCHER FERRY	Cohoes	Albany	0	Public	8.8	Public	11.5	Public	11.7
CHARLES POLETTI PP	Astoria	Queens	8	None					
RICHARD M. FLYNN PP	Holtsville	Suffolk	0	Public	4.9	Public	6.3	Public	8.8
500-MW COMBINED-CYCLE	Astoria	Queens	1	None					
WHITE PLAINS OFFICE	White Plains	Westchester	36	Public	6.0	Public	7.6	Public	16.0
NYPA SWING OFFICE	New York	New York	1	None					
ALBANY OFFICE	Albany	Albany	2	State	2.7	State	4.5	Public	5.1
CLIFTON PARK	Clifton Park	Saratoga	0	Public	5.0	Public	14.5	Public	21.8

[1] New York State Office of General Service, *State/Public Ethanol (E-85) Fueling Sites,* Nov 2010, (www.ogs.state.ny.us/bu/ss/afv/default.asp)

Fuel Cost

See Table 3-4 for a summary of recent (August 2011) fuel pricing under the OGS central fuel contract. As shown in Table 3-4, NYPA currently pays an average of $3.13/gallon for gasoline and $3.31/gallon for #2 diesel fuel.

As shown in Table 3-4 the price of E85 in New York ranges from $0.19/gallon more than gasoline to $0.07/gallon less. The average differential cost of E85 across the state is currently $0.05/gallon less than the cost of gasoline.

However, E85 has 29% less energy per gallon than gasoline, which results in lower fuel economy when flex-fuel vehicles are operated on E85 compared to when they are operated on gasoline. For example, the EPA combined fuel economy rating for the Chevy Impala FFV is 15 MPG on E85 and 21 MPG on gasoline.

Based on the current average price differential between E85 and gasoline in New York, NYPA's annual fuel costs would increase by approximately 38% if they switched to E85 for their flex-fuel fleet. With the most favorable E85 pricing currently available (Fulton County, E85 $0.07/gallon less than gasoline) fuel costs would increase by 37%.

As shown in Table 3-4 the price of B20 biodiesel in New York ranges from $0.22/gallon to $0.88/gallon more than standard #2 diesel. The current average price differential is $0.48/gallon. Based on this current average price differential NYPA's annual fuel costs would increase by approximately 15% if they switched from #2 diesel to B20 biodiesel for their medium- and heavy-duty diesel fleet. With the most favorable B20 pricing currently available (Queens County, $0.22/gallon more than diesel) fuel costs would increase by 7%.

Table 3-4
NYS OGS Fuel Contract Pricing (8/8/11)

County	Price per Gallon					
	Gas	E85	*Diff*	Diesel	B20	*Diff*
Albany	$3.10	$3.14	*$0.04*	$3.27	$3.87	*$0.60*
Allegany	$3.09	NA		$3.30	NA	
Bronx	$3.15	NA		$3.31	NA	
Broome	$3.20	NA		$3.36	NA	
Cattaraugus	$3.06	NA		$3.29	NA	
Cayuga	NA	NA		$3.38	NA	
Chautauqua	$3.06	NA		$3.29	$3.69	*$0.40*
Chemung	$3.15	NA		$3.49	NA	
Chenango	$3.25	NA		$3.35	$4.00	*$0.65*
Clinton	$3.16	NA		$3.32	NA	
Columbia	$3.15	NA		$3.30	$3.95	*$0.65*
Cortland	$3.28	NA		$3.57	NA	
Delaware	$3.27	NA		$3.41	$4.02	*$0.61*
Dutchess	$3.27	NA		$3.28	$3.62	*$0.34*
Erie	$3.02	NA		$3.21	$3.51	*$0.30*
Essex	$3.28	NA		$3.41	NA	
Franklin	NA	NA		$3.37	NA	
Fulton	$3.23	$3.16	*($0.07)*	$3.31	NA	
Genesee	$3.05	NA		$3.27	NA	
Greene	$3.14	NA		$3.30	$3.95	*$0.65*
Hamilton	NA	NA		$3.51	NA	
Herkimer	$3.23	NA		$3.33	$4.21	*$0.88*
Jefferson	$3.17	NA		$3.33	NA	
Kings	$3.12	NA		$3.28	NA	
Lewis	$3.18	NA		$3.35	NA	
Livingston	$3.07	NA		$3.30	NA	
Madison	$3.25	NA		$3.36	NA	
Monroe	$3.04	NA		$3.24	$3.72	*$0.48*
Montgomery	$3.23	NA		$3.33	NA	
Nassau	$3.10	NA		$3.19	$3.47	*$0.28*

County	Price per Gallon					
	Gas	E85	*Diff*	Diesel	B20	*Diff*
New York	$3.12	NA		$3.31	NA	
Niagara	$3.02	NA		$3.21	NA	
Oneida	$3.11	NA		$3.31	$3.91	*$0.60*
Onondaga	$3.11	$3.30	*$0.19*	$3.29	$3.96	*$0.67*
Ontario	$3.05	NA		$3.28	NA	
Orange	$3.26	$3.36	*$0.10*	$3.28	NA	
Orleans	$3.02	NA		$3.25	$3.56	*$0.31*
Oswego	$3.13	NA		$3.34	NA	
Otsego	$3.20	NA		$3.40	NA	
Putnam	$3.18	NA		$3.26	NA	
Queens	$3.11	NA		$3.27	$3.49	*$0.22*
Rensselaer	$3.12	NA		$3.29	$3.88	*$0.59*
Richmond	$3.23	NA		$3.43	NA	
Rockland	$3.17	$3.21	*$0.04*	$3.24	$3.53	*$0.29*
Saratoga	$3.08	NA		$3.29	NA	
Schenectady	$3.14	NA		$3.29	NA	
Schoharie	$3.23	NA		$3.30	NA	
Schuyler	$3.17	NA		$3.38	NA	
Seneca	$3.08	NA		$3.33	NA	
St Lawrence	$3.14	NA		$3.42	NA	
Steuben	$3.14	NA		$3.39	NA	
Suffolk	$3.11	NA		$3.21	$3.48	*$0.27*
Sullivan	$3.17	NA		$3.32	NA	
Tioga	$3.21	NA		$3.38	NA	
Tompkins	$3.12	NA		$3.36	NA	
Ulster	$3.23	NA		$3.30	NA	
Warren	$3.18	NA		$3.30	NA	
Washington	$3.15	NA		$3.43	$4.00	*$0.57*
Wayne	$3.06	NA		$3.24	NA	
Westchester	$3.12	$3.11	*($0.01)*	$3.22	$3.49	*$0.27*
Wyoming	$3.03	NA		NA	NA	
Yates	$3.16	NA		$3.36	NA	
NYS AVG	**$3.16**	**$3.15**	***$0.05***	**$3.33**	**$3.82**	***$0.48***
NYPA AVG	**$3.13**	**NA**	***NA***	**$3.31**	**$3.91**	***$0.60***
Counties where NYPA has centralized fueling capability						

New York State OGS pricing, as discussed above, is less favorable for both E85 and B20 biodiesel than pricing available at public fuel stations in much of the U.S. According to the most recent Clean Cities Alternative Fuel Price Report[18] national average pricing for E85 is $0.49 per gallon less than gasoline, and it ranges from $0.65/gallon less (West Coast region) to $0.14/gallon less (New England). Based on this national average pricing, fuel costs would increase by approximately 21% if switching from gasoline to E85 for a flex-fuel fleet.

National average pricing for B20 biodiesel is $0.01 per gallon more than diesel, and it ranges from $0.14/gallon more (Gulf Coast region) to $0.14/gallon less (New England). Based on this national average pricing, fuel costs would be approximately the same for a fleet operating on B20 biodiesel as for operating with standard petroleum diesel.

Infrastructure Cost

Given the lack of public gas stations selling E85 fuel in the vicinity of NYPA fleet locations, if NYPA wanted to use a significant amount of E85 fuel in their fleet they would need to develop their own E85 fueling capability. Currently only four of their twelve fleet locations have central fueling; each of these locations has capacity to dispense two different fuels, currently diesel and unleaded gasoline. With the possible exception of the White Plain Office, none of the other locations has enough assigned vehicles to make central fueling cost effective. While the White Plains office has a large number of assigned vehicles it is located in a downtown office building with no available space for installation of fuel tanks and dispensers.

In order to provide E85 fueling at one of the four locations with central fueling capability NYPA could either convert an existing unleaded gasoline tank to E85 to provide E85 instead of gasoline, or could install a new tank and dispensers so that they could provide E85 in addition to unleaded gasoline. Given the current fleet mix, which includes significant numbers of flex-fuel and gasoline-only vehicles the first option would not be practical.

As shown in Table 3-5, virtually all NYPA fleet locations have a mix of flex-fuel and gasoline-only vehicles assigned. Of the four locations with central fueling capability, only about 60% of assigned LDVs are flex-fuel vehicles at three of them, and 76% are flex-fuel vehicles at the fourth. It would be difficult, if not impossible, for NYPA to concentrate their flex-fuel vehicles to create one or more locations with 100% flex-fuel vehicles assigned.

[18] U.S. Department of Energy, Energy Efficiency & Renewable Energy, *Clean Cities Alternative Fuel Price Report,* April 2011

Table 3-5
NYPA Light Duty Vehicle Fuel Type, by Location

Assigned PM Location			Number of Vehicles				% of Vehicles			
			HEV Gas Only	Flex-Fuel E85 Capable	EV Electric	TOTAL	HEV Gas Only	Flex-Fuel E85 Capable	EV Elec	TOTAL
Central Fueling Available	1100	NIAGARA POWER PROJECT	22	35	0	57	39%	61%	0%	100%
	1200/1250	ST LAWRENCE & MASSENA	17	26	0	43	40%	60%	0%	100%
	1300	BLENHEIM-GILBOA POWER PROJECT	12	27	0	39	31%	69%	0%	100%
	2100	CLARK ENERGY CENTER	10	31	0	41	24%	76%	0%	100%
	Sub-total		*61*	*119*	*0*	*180*	*34%*	*66%*	*0%*	*100%*
No central Fueling	1101	BUFFALO FIELD OFFICE	1	1	0	2	50%	50%	0%	100%
	3100	CHARLES POLETTI POWER PROJECT	3	8	0	11	27%	73%	0%	100%
	3200	RICHARD M. FLYNN POWER PLANT	2	0	0	2	100%	0%	0%	100%
	3300	500-MW COMBINED-CYCLE PLANT	0	1	0	1	0%	100%	0%	100%
	5100	WHITE PLAINS OFFICE	23	36	2	61	38%	59%	3%	100%
	5200	NYPA SWING OFFICE	0	1	0	1	0%	100%	0%	100%
	5300	ALBANY OFFICE	4	2	0	6	67%	33%	0%	100%
	5350	CLIFTON PARK	0	3	0	3	0%	100%	0%	100%
	Sub-total		*33*	*52*	*2*	*87*	*38%*	*60%*	*2%*	*100%*
TOTAL			**94**	**171**	**2**	**267**	**35%**	**64%**	**1%**	**100%**

Given this reality, the only practical option available to NYPA to increase E85 use would be to install new infrastructure. Based on past projects, NYPA facility managers estimate the cost of installing tankage and dispensers to handle E85 fuel to be $200,000 per location.

NYPA does not face the same practical constraints to increased use of biodiesel fuel. Most diesel vehicles can operate equally well on 100% petroleum diesel and biodiesel blends with up to 20% biodiesel (B20). NYPA already purchases a significant amount of B5 fuel annually, and a smaller amount of B20. NYPA could increase their use of B20 fuel to as much as 130,000 gallons per year (total annual centralized diesel purchases) without the need to add or upgrade existing fueling infrastructure.

Section 4: Analysis of Alternative Fueled Fleet Strategies

This section summarizes an analysis of the effect of different fleet and fuel purchase strategies available to NYPA. The alternative strategies are evaluated against a "business as usual" baseline which would maintain the current practice of purchasing primarily FFVs to satisfy EPAct requirements under the "standard compliance" option.

Various other options available under EPAct standard compliance are explored, along with an EPAct "alternative compliance" option.

For each strategy the analysis calculates total annual costs for vehicle and fuel purchase, as well as total annual petroleum and non-petroleum fuel use, and fleet-wide annual emissions of NOx, PM, VOC, CO, SO_2, and CO_2-e.

4.1 NYPA "Business as Usual" Base Case

The business as usual base case and all alternative scenarios assume that NYPA will purchase, on average, 53 light-duty vehicles per year to maintain a 5-year/75,000 mile replacement cycle[19]. Under EPAct standard compliance 90% of these vehicles would need to be AFVs. The base case assumes that NYPA will be able to generate three AFV credits per year by continuing to burn a small amount of B20 biodiesel in their medium/heavy-duty fleet, for a net requirement to buy 45 AFVs per year. This is shown in Figure 4-1.

Total Light Duty Fleet	**267**	
Annual Light Duty Fleet Purchases	53	*per 5 year replacement cycle*
Annual AFV Prchases Required Under EPAct	48	*90% requirement*
Less Biodiesel AFV Credits	*-3*	*Based on 6,800 gallons/year B20*
Net Annual AFV Purchases Required	**45**	

Figure 4-1
Base Case AFV Purchase Requirements under EPAct Standard Compliance

[19] Based on fleet needs, budget constraints and vehicle mileage accumulation actual purchases in any particular year may vary from this average by +/- 10 vehicles.

The base case assumes that per current practice NYPA will purchase only FFVs to satisfy the EPAct AFV purchase requirements, and that the remaining light duty vehicles purchased (8 vehicles) will all be HEVs. The base case assumes that annual vehicle purchases will continue to reflect the current fleet mix of 9% compact sedans, 19% sedans, 34% compact SUVs, 30% SUVs, and 4% pickups/vans. For the base case and all other scenarios compact sedan purchases are assumed to be either the Chevy HHR FFV or Toyota Prius HEV, sedan purchases are assumed to be either the Chevy Impala FFV or Nissan Altima HEV, compact SUV purchases are assumed to be either the Ford Escape FFV or Ford Escape HEV, SUV purchases are assumed to be either the Chevy Tahoe FFV or Chevy Tahoe HEV, pickup purchases are assumed to be either the Ford F150 FFV or Chevy Silverado HEV, and van purchases are assumed to be the Chevy Express 1500 FFV. These vehicle models are all available for purchase under the NYOGS central purchase contract and are typical of recent purchases by NYPA. For all vehicles, assumed pricing is as per the NYSOGS contract, as shown in Appendix B.

The base case assumes that NYPA will continue to burn gasoline in all FFVs in the fleet and that diesel fuel use by the medium/heavy-duty fleet will continue to be 43% #2 petroleum diesel, 52% B5 biodiesel, and 5% B20 biodiesel. Assumed fuel prices for the base case and all alternative scenarios are current NYPA average costs per the NYSOGS contract, as discussed in section 3.2.

The base case and all alternative scenarios assume that every NYPA light duty vehicle will accumulate 11,500 miles per year; for each vehicle model, assumed fuel economy and exhaust emissions are per EPA published data, as discussed in section 3.1 and shown in Appendix A.

4.2 EPAct Alternative Compliance Option

As discussed in Section 1.2, under EPAct "alternative compliance" instead of buying AFVs, NYPA could instead demonstrate that they had achieved an equivalent reduction in petroleum use using different approaches, including efficiency measures such as purchasing HEV/PHEVs, or reducing total vehicle miles traveled.

The amount of petroleum reduction required under alternative compliance is equivalent to the amount of petroleum that would have been reduced in that year if all AFVs in the fleet that had previously been purchased, and all new AFVs that would need to be purchased this year, under standard compliance were operated exclusively on an alternative fuel.

As shown in Figure 4-2, NYPA would need to demonstrate an annual displacement of 85,560 gasoline gallon equivalents of petroleum to comply with their EPAct obligations using the alternative compliance path.

Realistically, NYPA could not achieve this level of petroleum displacement by purchasing only EVs, HEVs and PHEVs for their new light-duty fleet purchases. To achieve this level of annual petroleum displacement, in addition to

maximizing their purchase of electric drive vehicles NYPA would need to maximize their use of E85 in existing light-duty FFVs, would need to maximize their use of B20 biodiesel in medium/heavy-duty vehicles, and would need to reduce total fleet miles driven.

Annual AFV Purchases Required Under EPAct	48		
Current AFVs in the Fleet	172	*per fleet list*	
Less current AFVs to be retired this year	-34	*20%*	*fleet turn-over annually*
NET VEHICLES SUBJECT TO ALT COMPLIANCE	186		
Annual Fuel Use per Vehicle (gge)	460	*per fuel records, 2010*	
ANNUAL PETROLEUM DISPLACEMENT REQD	**85,560**	**gasoline gallon equivalents**	

Figure 4-2
Annual Petroleum Displacement Required Under EPAct Alternative Compliance

To achieve these ends, the alternative compliance option analyzed here starts with the assumption that NYPA will use E85 in all FFVs currently assigned to the four fleet locations that have central fueling capability - which means that 50% of current gasoline usage would be converted to E85. In practical terms this is the maximum amount of E85 that NYPA could use in their fleet because there are no public fuel stations selling E85 easily accessible to FFVs assigned to NYPA locations without central fueling, and because not all vehicles assigned to the locations with central fueling can use E85. In order to achieve this level of E85 use, NYPA would need to install new fueling infrastructure at all four fleet locations with central fueling, at a projected one-time capital cost of $800,000. As discussed in section 3.2, NYPA could not convert the existing gasoline tanks at these locations to E85 because all of these locations have both E85-capable FFVs and gasoline-only vehicles assigned.

The alternative compliance option also assumes that for all centrally purchased diesel fuel used by their onroad fleet NYPA will buy B20 biodiesel instead of petroleum diesel or B5 biodiesel – this equates to 77% of the diesel fuel used by the NYPA onroad medium/heavy-duty fleet. In practical terms this is the maximum amount of B20 biodiesel that NYPA can use because 23% of diesel fuel is purchased at public fuel stations which do not sell biodiesel.

The alternative compliance option also assumes that all new vehicles purchased by NYPA will be hybrid vehicles, if this is an option, and that NYPA will buy very few new FFVs[20].

All together, the three above approaches (maximize E85 use, maximize B20 use, maximize HEV purchases) yield a 60,000 gasoline gallon equivalent annual reduction in petroleum use from the NYPA light-duty fleet. As noted in Figure

[20] The only light-duty vehicle type for which there are no hybrid models available from the NYSOGS central contract is vans.

4-2, this is not enough to comply with NYPA's EPAct obligations under alternative compliance.

In order to be able to use EPAct alternative compliance NYPA would need to do more to reduce petroleum use. While there are a number of potential options open to them, the option modeled here is a reduction in total miles driven by the light duty fleet. This could be accomplished by, for example, requiring all employee trips between White Plains and Manhattan and between Albany and Manhattan to be taken by train instead of car; by developing a regional travel policy that mandates all trips to Boston and Washington DC be taken by train, and by making greater use of video conferencing technologies for employee meetings.

The analysis shows that in order to achieve the required annual petroleum reduction under alternative compliance, total light-duty fleet miles would need to be reduced by 35%. This level of reduction is not likely to be achievable without significant changes to NYPA's business practices.

4.3 EPAct Standard Compliance Options

Under EPAct standard compliance NYPA must purchase 45 AFVs per year. Under EPAct, FFVs and EVs count as AFVs, by HEVs and PHEVs do not. Under standard compliance NYPA can also earn AFV credits for use of B20 biodiesel; they can earn one AFV credit for every 2,250 gallons of B20 they use, and up to half of their annual AFV purchase requirement (22 vehicles) can be satisfied using AFV credits.

The potential fleet strategy options available to NYPA under EPAct standard compliance were analyzed incrementally. The starting point is increased use of B20 biodiesel in the medium/heavy-duty diesel fleet to maximize annual AFV credits, and increased purchases of HEVs using the credits, instead of purchasing FFVs (the baseline business as usual strategy). To maximize allowable AFV credits (up to half of annual AFV purchases) NYPA must use 49,500 gallons of B20 biodiesel annually – approximately 43% of all diesel fuel used by the onroad fleet. Note that NYPA currently uses over 60,000 gallons of B5 biodiesel annually[21].

Based on past experiences with fuel-filter plugging during cold-weather use of B20 biodiesel, NYPA fleet managers are not comfortable with using this fuel year round. As noted previously, 23% of NYPA diesel is purchased at public fuel stations and 77% is purchased centrally. If NYPA was to maximize the use of B20 during only the warmer parts of the year (6 months) approximately 38.5% of annual usage could be B20 (one half of centralized purchases) - a total of approximately 44,000 gallons. Using this much biodiesel would generate 19 AFV credits under EPAct standard compliance, allowing NYPA to purchase 19

[21] Use of B5 biodiesel is not eligible for AFV credits under EPAct. To receive AFV credits the biodiesel used must have minimum biodiesel content of 20% (B20).

fewer FFVs and 19 more HEVs annually; this is the scenario included in the analysis.

The other options analyzed were incremental to this strategy, and they include 1) purchase of a modest number of EVs and PHEVs instead of FFVs and HEVs, 2) a change in the fleet mix to purchase compact SUVs instead of full-sized SUVs, and 3) a modest (5%) reduction in light-duty fleet VMT based on changes in employee travel policies.

4.4 Summary of Alternative Fleet Strategy Results

See Table 4-1 for a summary of the results of the analysis of alternative fueled fleet strategies available to NYPA. The full analysis for each strategy is shown in Appendix B.

As shown in Table 4-1, the modeled EPAct alternative compliance strategy, compared to the business as usual case, would result in significant reductions in petroleum use and CO_2-e emissions from the NYPA fleet. Annual petroleum use would fall by 85,603 gasoline gallon equivalents (the minimum required under EPAct alternative compliance), and annual CO_2-e emissions would fall by 622 tons. There would also be small reductions in annual emissions of other pollutants: a 0.2 ton reduction in NOx, a 0.23 ton reduction in VOC, a 0.035 ton reduction in PM, and a 0.012 ton reduction in SO_2.

Compared to the business as usual case the alternative compliance strategy would increase annual costs for vehicle and fuel purchases by $427,394 (+21%). In addition NYPA would incur a one-time capital cost of $800,000 for installation of E85 fuel infrastructure at four fleet locations.

Under this scenario net annual fuel costs would actually be reduced by approximately 12%, but annual vehicle purchase costs would increase significantly due to the increased cost of HEVs compared to FFVs. The net reduction in annual fuel costs under the alternative compliance scenario is almost entirely the result of the significant reduction in light duty VMT required to achieve the minimum level of petroleum displacement necessary to qualify for alternative compliance.

While the alternative compliance option was included in the analysis it is not a realistic option for NYPA. In order to achieve the minimum required level of petroleum reduction, NYPA would need to reduce the number of miles traveled by their light duty fleet by 35%. This would not be possible without significant changes to NYPA's business practices. This analysis indicates that EPAct alternative compliance is not a realistic option for NYPA. Realistically, any changes to NYPA's current fleet purchase and deployment practices to make them more "green" must be done in the context of the constraints imposed by EPAct standard compliance.

Table 4-1
Summary of Analysis of Alternative Green Fleet Strategies

	SCENARIO		Unit	BUSINESS AS USUAL FFV Purchase Scenario	ALTERNATIVE COMPLIANCE Maximize E85, B20 use; maximise HEV purchases; 35% VMT reduction Scenario	Δ from BAU	STANDARD COMPLIANCE OPTIONS OPTION 1: Maximize AFV credits; 50% FFV/50% HEV purchases Scenario	Δ from BAU	OPTION 1a: Option 1 + Purchase 5 EV and 5 PHEV Scenario	Δ from Option 1	OPTION 1b: Option 1 + Purchase compact SUVs instead of SUVs Scenario	Δ from Option 1	OPTION 1c: Option 1 + 5% VMT Reduction Scenario	Δ from Option 1	OPTION 1a-1c COMBINED Scenario	Δ from BAU
COST	Annual Fuel		$	$802,920	$701,313	*($101,606)*	$807,829	*$4,910*	$802,202	*($5,628)*	$800,337	*($7,493)*	$788,608	*($19,221)*	$775,488	*($27,432)*
	Annual Veh Purchase		$	$1,179,000	$1,708,000	*$529,000*	$1,404,000	*$225,000*	$1,583,800	*$179,800*	$1,191,500	*($212,500)*	$1,404,000	*$0*	$1,371,300	*$192,300*
	TOTAL ANNUAL		$	$1,981,920	$2,409,313	*$427,394*	$2,211,829	*$229,910*	$2,386,002	*$174,172*	$1,991,837	*($219,993)*	$2,192,608	*($19,221)*	$2,146,788	*$164,868*
FUEL USE	Annual Fuel Use	Gas	GAL	126,323	49,977	*(76,346)*	123,854	*(2,468)*	120,376	*(3,479)*	121,461	*(2,394)*	117,713	*(6,141)*	111,841	*(14,482)*
		E85	GAL	0	39,051	*39,051*	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
		#2 D	GAL	49,620	26,541	*(23,079)*	26,541	*(23,079)*	26,541	*0*	26,541	*0*	26,541	*0*	26,541	*(23,079)*
		B5	GAL	60,005	0	*(60,005)*	44,427	*(15,578)*	44,427	*0*	44,427	*0*	44,427	*0*	44,427	*(15,578)*
		B20	GAL	5,770	88,854	*83,084*	44,427	*38,657*	44,427	*0*	44,427	*0*	44,427	*0*	44,427	*38,657*
		Elec	kWh	0	0	*0*	0	*0*	35,075	*35,075*	0	*0*	0	*0*	35,075	*35,075*
	Annual Petroleum Use		GGE	249,800	164,197	*(85,603)*	239,614	*(10,186)*	236,136	*(3,479)*	237,221	*(2,394)*	233,473	*(6,141)*	227,601	*(22,199)*
EMISSION	Annual Emissions	CO_2-e	ton	3,083.1	2,460.5	*(622.58)*	3,037.4	*(45.67)*	3,008.0	*(29.39)*	3,008.9	*(28.51)*	2,963.7	*(73.69)*	2,905.8	*(177.25)*
		NOx	ton	6.19	6.00	*(0.191)*	6.19	*(0.002)*	6.20	*0.010*	6.18	*(0.008)*	6.16	*(0.027)*	6.166	*(0.027)*
		SO_2	ton	0.04	0.02	*(0.012)*	0.03	*(0.001)*	0.06	*0.021*	0.03	*(0.000)*	0.03	*(0.001)*	0.054	*0.018*
		PM	ton	0.15	0.12	*(0.035)*	0.15	*(0.002)*	0.15	*(0.000)*	0.15	*0.000*	0.15	*(0.004)*	0.148	*(0.007)*
		VOC	ton	0.89	0.66	*(0.233)*	0.85	*(0.041)*	0.85	*(0.004)*	0.84	*(0.009)*	0.83	*(0.021)*	0.816	*(0.076)*
ANNUAL FLEET MILES			mi	4,145,100	3,070,425	*(1,074,675)*	4,145,100	*0*	4,145,100	*0*	4,145,100	*0*	3,991,575	*(153,525)*	3,991,575	*(153,525)*

Fortunately, EPAct standard compliance does allow NYPA some flexibility to purchase additional electric-drive vehicles that do not qualify as AFVs (HEV, PHEV) by accruing AFV credits for using biodiesel fuel. The maximum effect of such a strategy is shown in Table 4-1 under standard compliance Option 1. This scenario assumes that NYPA will use approximately 44,000 gallons of B20 biodiesel annually (B20 for all centralized diesel purchases during warm months, with all centralized diesel purchases during colder months B5), and will therefore accrue 19 AFV credits, which will be used to purchase new HEVs instead of FFVs.

Under standard compliance Option 1 annual petroleum use would fall by 10,186 gasoline gallon equivalents, and annual CO_2-e emissions would fall by 45.7 tons compared to the business as usual strategy. There would also be small reductions in annual emissions of other pollutants: a 0.002 ton reduction in NOx, a 0.041 ton reduction in VOC, a 0.002 ton reduction in PM, and a 0.001 ton reduction in SO_2. Approximately one third of the reduction in petroleum use would result from reduced gasoline use because of the hybrid vehicles purchased; the remainder would result from lower petroleum content of B20 biodiesel compared to #2 diesel and B5 biodiesel.

Compared to the business as usual case standard compliance Option 1 would increase annual fuel costs by $4,910. Annual costs for diesel fuel purchases would increase due to the higher cost of B20 biodiesel compared to #2 diesel and B5 biodiesel; these increased costs would be only partially offset by savings from reduced gasoline usage due to more HEVs in the fleet. Annual costs for vehicle purchases would also increase - by $225,000 (+19%) due to the higher cost of HEVs compared to FFVs. Over-all, annual costs for vehicle and fuel purchases would increase by 12% under Option 1 compared to business as usual.

The next three alternatively fueled fleet options summarized in Table 4-1 (Option 1a, option 1b, and Option 1c) are all incremental to Option 1 – each one analyzes a different strategy that NYPA could pursue under EPAct standard compliance to further "green" their fleet, in addition to the basic strategy of Option 1 (use B20 biodiesel and purchase HEVs instead of FFVs). Option 1a shows the effect of buying a modest number of EVs (five) instead of FFVs (both qualify as AFVs) and a modest number of PHEVs (five) instead of HEVs. Option 1b shows the effect of changing the fleet mix and buying only more fuel efficient compact SUVs instead of full-sized SUVs. Option 1c shows the effect of a modest (5%) reduction in total light-duty VMT, which could be achieved by changes to employee travel policies.

As shown in Table 4-1, the purchase of five EVs and five PHEVs[22] under Option 1a could further reduce annual gasoline use from the NYPA light-duty fleet by 3,479 gallons, and reduce annual CO_2-e emissions by 29.4 tons. The net

[22] Option 1a assumes that PHEVs would operate 75% of their miles in EV mode and 25% in hybrid gasoline-electric mode. To achieve this level of electric-only operation NYPA would likely need to monitor and control how the vehicles were assigned, to ensure they are assigned for mostly short trips.

effect on emissions of other pollutants would be minor: annual PM emissions would stay virtually the same, annual VOC emissions would be reduced by 0.004 tons, annual NOx emissions would increase by 0.01 tons, and annual SO_2 emissions would increase by 0.021 tons. Annual NOx and SO_2 emissions would increase marginally under Option 1a due to the grid mix for electricity production in New York (see Section 3.1, Emissions).

Under Option 1a total annual fuel costs (including the cost of electricity) would be reduced by $5,628 compared to Option 1, but annual costs for vehicle purchase would be increased by $179,800 due to the increased costs of EVs and PHEVs compared to comparable FFVs and HEVs.

Option 1b shows the potential effect of changing NYPA's light duty fleet mix – specifically purchasing only compact SUVs instead of full-sized SUVs. Due to significantly better fuel economy for compact SUVs (22.6 MPG versus 18.3 MPG for FFVs and 32 MPG versus 21 MPG for HEVs) Option 1b would reduce annual gasoline use by 2,394 gallons and would reduce annual fuel costs by $7,493 compared to Option 1. Annual emissions of CO_2-e would be reduced by 28.5 tons, and both NOx and VOC emissions would be reduced slightly as well. Because compact SUVs are also less expensive than full-sized SUVs, annual costs for vehicle purchases would also be reduced by $212,500.

Option 1c shows the effect of reducing total annual light-duty VMT by 5%. If NYPA were able to achieve this level of VMT reduction based on changes to employee travel policies they could reduce total annual fuel use by 6,141 gallons, reduce annual CO_2-e emissions by 73.7 tons, and reduce annual fuel costs by $19,221.

The final column in Table 4-1 shows the potential effect of implementing all of the policies that were individually analyzed in Options 1, 1a, 1b, and 1c. This scenario represents the maximum annual reductions in fuel use and emissions that NYPA could realistically achieve by implementing a range of practical alternatively fuel fleet strategies. As shown, with the full range of strategies in place NYPA could reduce annual petroleum use by up to 22,199 gasoline gallon equivalents (-8.9%) compared to the business as usual case, and could reduce annual CO_2-e emissions by up to 177.3 tons (-5.7%). Annual emissions of other pollutants would also be reduced slightly.

The full range of alternatively fueled fleet strategies included would reduce annual fuel costs by up to $27,432 (-3.4%), but would increase annual costs for vehicle purchases by up to $192,300 (+16.3%). Under this maximum scenario, NYPA's investment in more expensive, but more fuel efficient, vehicles would not be paid back over the typical 5-year life of the vehicles (pay back based on annual fuel cost savings compared to the business as usual case is approximately 7 years).

Note, however, that not all of the net fuel cost savings results directly from the purchase of EVs, HEVs, and PHEVs – much of the savings in annual fuel use results from operational changes that have nothing to do with vehicle technology (i.e. reductions in total VMT); in addition, fuel savings from EVs, HEVs, and PHEVs are balanced against increased fuel purchase costs for B20 biodiesel compared to #2 diesel and B5 biodiesel. Also, the costs summarized in Table 4-1 do not account for increases in NYPA-reimbursed employee train fares, or investments in information technology, that might be required to achieve a 5% VMT reduction.

Section 5: Recommended NYPA Fleet Strategy

Based on the analysis described in section 4, the following recommendations are made with respect to opportunities to further "green" NYPA's vehicle fleet:

1) Stick with EPAct Standard Compliance

The use of the "alternative compliance" path to satisfy NYPA's alternative fuel vehicle purchase requirements under EPAct is not a viable option for NYPA. Given NYPA's current fleet mix, and practical limitations on the total amount of E85 and B20 biodiesel that could be used by the fleet, NYPA would need to achieve unrealistic levels of fleet VMT reduction to meet the minimum requirements for petroleum reduction under alternative compliance.

2) Under EPAct Standard Compliance maximize annual AFV credits by using more B20 biodiesel in the medium/heavy-duty Fleet

By centrally purchasing only B20 biodiesel for half the year (warm months) and B5 biodiesel for half the year (cold months) NYPA can use approximately 44,000 gallons of B20 biodiesel annually, and can earn 19 AFV credits annually under EPAct standard compliance. These credits will allow NYPA to purchase 19 more vehicles annually which do not qualify as AFVs, but which have reduced fuel use and emissions (HEVs, PHEVs).

3) Begin to purchase EVs and PHEVs

Electric-drive EV and PHEV models are now available in limited quantities from major auto manufacturers; over the next two years up to ten additional models are supposed to be introduced. While more expensive than conventional and hybrid vehicles, EVs and PHEVs can significantly reduce petroleum use and CO_2-e emissions per mile and per year and can therefore play an important role in helping NYPA achieve its Sustainability Plan targets and other corporate goals.

Given NYPA's strategic interest in promoting electric-drive transportation options it is important for NYPA to begin to include these vehicles in its own fleet. EVs and PHEVs can serve as an effective tool in communicating corporate priorities to customers and stakeholders and are used frequently by

Public Affairs and Renewable Energy Resources and Technology staff for outreach and education activities. When deploying EVs and PHEVs, however, NYPA must be careful to match vehicle assignments to trips (by expected length) in order to maximize actual benefits. Given current range limitations EVs must be used for daily trips of less than 100 miles. To maximize the benefit of a PHEV trip distances should generally be less than 35 miles.

NYPA motor pool records indicate that 75% of all vehicle trips from the White Plains headquarters are longer than 40 miles. In order to maximize the benefits from PHEVs (and EVs) assigned to the White Plains motor pool, NYPA will need to actively manage vehicle assignment by expected trip length, to ensure that PHEVs generally get assigned to short trips whenever possible.

Trip records from other NYPA operating locations were not available for this study, but total annual fuel use for most NYPA vehicles indicates that typical trip lengths from these locations might be significantly shorter than those from White Plains. NYPA should further investigate trip length distributions at these locations to determine if there are opportunities to assign EV and PHEV vehicles to these other locations.

To help evaluate the effectiveness of EVs and PHEVs in their fleet, and to help gather information about trips and trip distributions for vehicles assigned to various operating locations, NYPA should consider equipping some or all of their vehicles with GPS-based telematics systems. Such systems can track vehicle location and activity, and provide automated web-based reports to fleet managers about daily usage (trip time, distance, and location).

Additional benefits of such systems include the ability to transmit real-time engine diagnostic information that can be used to improve fleet maintenance, and the ability to identify excess engine idling, high speed driving, and risky driving behavior. GPS data from such systems could also help NYPA to evaluate whether some trips could be combined, avoided, or taken by public transportation (i.e. train) in an effort to reduce total fleet mileage.

These systems can be installed for approximately $400 per vehicle. On-going operating costs are typically about $30 per month per vehicle for wireless data service.

Also note that the Department of Energy is in the process of evaluating revisions to EPAct AFV eligibility rules for HEVs and PHEVs; in the future HEVs and/or PHEVs might fully or partially quality as AFVs under EPAct standard compliance. If DOE changes eligibility rules the impact of the new rules on NYPA fleet purchasing options will need to be further evaluated.

4) Further emphasize vehicle right-sizing

NYPA's light-duty vehicle fleet is currently composed of 9% compact sedans, 19% sedans, 34% compact SUVs, 30% SUVs, and 4% pickups/vans. In recent years NYPA fleet managers have made efforts to "right size" the fleet by requiring justification for requests to purchase full-sized SUVs. These efforts have been complemented by the purchase of a significant number of hybrid vehicles when replacing compact SUVs in the fleet.

These past efforts should be strengthened at the management level, with a goal of having as few full-sized SUVs and full-sized sedans in the fleet as possible, in favor or greater numbers of compact sedans and compact SUVs. This will improve the environmental performance of the fleet, while reducing annual expenses for both vehicle purchases and fuel.

Note that this recommendation is targeted to the light-duty fleet which is used primarily by management and supervisory personnel. This recommendation is not intended to address medium-duty pick-ups, vans, and utility body trucks used by NYPA work crews.

5) Develop a Regional Travel and Video Conferencing Policy

To support a goal of reducing total VMT from its light-duty fleet by 5% or more, NYPA should develop a regional travel policy which emphasizes employee travel by train, rather than by car, when reasonably feasible. Specific trips which might be appropriate for train travel include trips from White Plains to Albany or Manhattan, as well as trips between other major cities such as Rochester and Syracuse. It might also be appropriate for NYPA to encourage trips by train to other regional destinations (for example to Boston or Washington, DC), rather than by car or plane.

In addition, NYPA should investigate whether more employee meetings could be held by teleconference rather than face-to-face (for example between employees assigned to White Plains and employees assigned to the major up-state operating locations), supported by appropriate policy and potentially by investments to install or upgrade information technology at each operating location.

With respect to the potential purchase of EVs and PHEVs to support NYPA's corporate goals, it is recommended that NYPA undertake the following investigations:

- *White Plains Motor Pool Case Study*: Evaluate the costs and benefits of making the White Plains Motor Pool fleet as "green" as possible (lowest fuel use and CO_2 emissions, highest electricity use) through purchases of EVs and PHEVs in 2013 and through the reassignment of HEVs from other sites. To do this NYPA will need to further investigate White Plains trip profiles and assess what would be required (procedures, hardware and software, etc.) to consistently assign vehicles by expected trip length. Based on that analysis the maximum number of vehicles that could realistically be EVs and PHEVs could be determined.
- *Evaluation of Upstate trip profiles:* Gather data on typical vehicle trip profiles at St Lawrence, Massena, Blenheim, and Clark fleet locations to determine whether these locations could host EVs and PHEVs without disrupting normal business activities, and if so how many. If vehicle dispatch records are not available the analysis can use qualitative information based on interviews with assigned personnel. Based on this analysis evaluate costs and benefits of replacing conventional vehicles with EVs and PHEVs at these locations. Also evaluate costs and benefits of replacing conventional medium and heavy duty vehicles with hybrid vehicles.

Appendix A: Alternative Fueled Vehicles Available for Purchase

Data Sources

1 - EPA Green Vehicle Guide (www.epa.gov/greenvehicles)

2 - DOE Alternative Fuels and Advanced Vehicle Data Center (www.afdc.energy.gov/afdc/vehicles/search/)

3 - New York State Office of General Services (www.ogs.state.ny.us/purchase/spg/awards/404VehicleList.htm;www.ogs.state.ny.us/purchase/spg/awards/4045021910Can.htm; www.ogs.sta

4 - CalStart NGV Coop (www.calstart.org/projects/Natural-Gas-Vehicle-Cooperative/NGV-Co-Op-Bid-List.aspx)

5 - HTUF Vehicle Directory (www.calstart.org/htuf-vehicle-directory.aspx)

6 - Plug-In America (http://www.pluginamerica.org/vehicles)

7 - USA Today Inverview with Toyota Motor Executive Vice President Takeshi Uchiyamada (http://www.usatoday.com/money/autos/2010-11-18-toyota-plug-in-hybrid_N.htm)

FFV: FLEX FUEL VEHICLES (Emissions Based on E85 operation)																
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	COMPACT SEDAN	Buick	Regal	E85/Gas	17.0	24.0	EPA T2/B4	444.0	0.04	0.005	0.01	0.070	$26,245			1,2
	COMPACT SEDAN	Chevrolet	Malibu	E85/Gas	18.0	25.4	EPA T2/B4	419.4	0.04	0.004	0.01	0.070	$21,975	$16,256		1,2,3
	COMPACT SEDAN	Chevrolet	HHR	E85/Gas	19.0	26.8	EPA T2/B4	397.3	0.04	0.004	0.01	0.070	$18,720	$15,679	Automatic or Manual	1,2,3
	COMPACT SEDAN	Chrysler	200	E85/Gas	16.0	22.6	EPA T2/B4	471.8	0.04	0.005	0.01	0.070	$19,245		Sedan or Convertible	1,2
	COMPACT SEDAN	Dodge	Avenger	E85/Gas	16.0	22.6	EPA T2/B4	471.8	0.04	0.005	0.01	0.070	$20,230			1,2
	COMPACT SEDAN	Dodge	Charger	E85/Gas	15.0	21.2	EPA T2/B4	503.2	0.04	0.005	0.01	0.070	$25,170			1,2
	COMPACT SEDAN	Dodge	Challenger	E85/Gas	15.0	21.2	EPA T2/B5	503.2	0.07	0.005	0.01	0.090	$24,670			1,2
	COMPACT SEDAN	Ford	Fusion	E85/Gas	16.0	22.6	EPA T2/B5	471.8	0.07	0.005	0.01	0.090	$19,820	$15,488	AWD (15 mpg)	1,2,3
	COMPACT SEDAN	Mercedes	C300	E85/Gas	15.0	21.2	LEV II	503.2	0.07	0.005	0.01	0.090	$33,990			1,2
	COMPACT SEDAN	Mercedes	C300 4-Matic	E85/Gas	15.0	21.2	LEV II	503.2	0.07	0.005	0.01	0.090	$38,690			1,2
	COMPACT SEDAN	Saab	9-5 Sedan	E85/Gas	18.0	25.4	EPA T2/B4	419.4	0.04	0.004	0.01	0.070	$38,525			1,2
	FULL SIZE SEDAN	Bentley	Continental	E85/Gas	10.0	14.1	LEV II	754.9	0.07	0.008	0.01	0.090	$181,200		Flying Spur, GTC or Supersports	1,2
	FULL SIZE SEDAN	Buick	Lucerne	E85/Gas	15.0	21.2	EPA T2/B4	503.2	0.04	0.005	0.01	0.070	$29,730			1,2
	FULL SIZE SEDAN	Chevrolet	Impala	E85/Gas	15.0	21.2	EPA T2/B4	503.2	0.04	0.005	0.01	0.070	$24,390	$16,782	3.5L engine (17 mpg combined)	1,2,3
	FULL SIZE SEDAN	Chrysler	300	E85/Gas	15.0	21.2	EPA T2/B4	503.2	0.04	0.005	0.01	0.070	$27,170			1,2
	FULL SIZE SEDAN	Lincoln	Town Car	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$47,165			1,2
	COMPACT SUV	Chevrolet	Equinox	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$22,745		2WD or 4WD	1,2
	COMPACT SUV	Dodge	Journey	E85/Gas	15.0	21.2	EPA T2/B4	503.2	0.04	0.005	0.01	0.070	$22,245			1,2

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	COMPACT SUV	Ford	Escape	E85/Gas	16.0	22.6	EPA T2/B4	471.8	0.04	0.005	0.01	0.070	$21,215	$19,054	4WD (14 mpg)	1,2,3
	COMPACT SUV	GMC	Terrain	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$24,250		2WD or AWD	1,2
	COMPACT SUV	Mazda	Tribute	E85/Gas	16.0	22.6	EPA T2/B4	471.8	0.04	0.005	0.01	0.070	$20,555		4WD (14 mpg)	1,2
	COMPACT SUV	Nissan	Armada	E85/Gas	11.0	15.5	EPA T2/B5	686.2	0.07	0.007	0.01	0.090	$37,910.00		2WD or 4WD	1,2
	FULL SIZE SUV	Caddilac	Escalade	E85/Gas	12.0	16.9	EPA T2/B5	629.0	0.07	0.006	0.01	0.090	$63,160.00			1,2
	FULL SIZE SUV	Chevrolet	Suburban	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$40,925	$29,985	2WD or 4WD	1,2,3
	FULL SIZE SUV	Chevrolet	Tahoe	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$37,570	$28,350	2WD or 4WD	1,2,3
	FULL SIZE SUV	Ford	Expedition	E85/Gas	12.0	16.9	EPA T2/B4	629.0	0.04	0.006	0.01	0.070	$37,070	$25,958	4WD (11 mpg)	1,2,3
	FULL SIZE SUV	GMC	Yukon	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$38,535		2WD or 4WD, 6.2L (12mpg)	1,2
	FULL SIZE SUV	Jeep	Grand Cherokee	E85/Gas	14.0	19.7	EPA T2/B5	539.2	0.07	0.006	0.01	0.090	$30,215		2WD or 4WD	1,2
	FULL SIZE SUV	Lincoln	Navigator	E85/Gas	12.0	16.9	EPA T2/B4	629.0	0.04	0.006	0.01	0.070	$57,570		4WD (11 mpg)	1,2
	FULL SIZE SUV	Toyota	Sequoia	E85/Gas	10.0	14.1	EPA T2/B5	754.9	0.07	0.008	0.01	0.090	$40,030			1,2
	PICK UP	Chevrolet	Avalanche	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$36,111		2WD or 4WD	1,2
	PICK UP	Chevrolet	Silverado 1500	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$20,850	$15,528	4.8L (12 mpg) 6.2L (11 mpg)	1,2,3
	PICK UP	Chevrolet	ilverado 1500 4W	E85/Gas	12.0	16.9	EPA T2/B5	629.0	0.07	0.006	0.01	0.090	$24,090		4.8L (11 mpg) 6.2L (10 mpg)	1,2
	PICK UP	Dodge	Dakota	E85/Gas	10.0	14.1	EPA T2/B4	754.9	0.04	0.008	0.01	0.070	$23,110		2WD or 4WD	1,2
	PICK UP	Dodge	Ram 1500	E85/Gas	10.0	14.1	EPA T2/B4	754.9	0.04	0.008	0.01	0.070	$20,810	$16,927	2WD or 4WD	1,2,3
	PICK UP	Ford	F-150	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$22,415	$15,260	4WD (13 mpg)	1,2,3

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2-e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	PICK UP	GMC	Sierra 1500	E85/Gas	13.0	18.3	EPA T2/B5	580.7	0.07	0.006	0.01	0.090	$21,240		4.8L (12 mpg) 6.2L (11 mpg)	1,2
	PICK UP	GMC	Sierra 1500 4WD	E85/Gas	12.0	16.9	EPA T2/B5	629.0	0.07	0.006	0.01	0.090	$24,390		4.8L (11 mpg) 6.2L (10 mpg)	1,2
	PICK UP	Nissan	Titan	E85/Gas	11.0	15.5	EPA T2/B5	686.2	0.07	0.007	0.01	0.090	$26,820		2WD, 4WD (10 mpg)	1,2
	PICK UP	Toyota	Tundra	E85/Gas	11.0	15.5	EPA T2/B5	686.2	0.07	0.007	0.01	0.090	$23,935			1,2
	VAN	Chevrolet	Express 1500	E85/Gas	11.0	15.5	EPA T2/B5	686.2	0.07	0.007	0.01	0.090	$24,860	$18,294	AWD or 2WD	1,2
	VAN	Chevrolet	Express 2500	E85/Gas	9.0	12.7	EPA T2/B5	838.7	0.07	0.009	0.01	0.090	$27,320	$18,854		1,2
	VAN	Chevrolet	Express 3500	E85/Gas	9.0	12.7	EPA T2/B5	838.7	0.07	0.009	0.01	0.090	$29,300	$20,000		1,2
	VAN	Chrysler	Town and Country	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$30,160			1,2
	VAN	Dodge	Grand Caravan	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$23,995	$17,867		1,2,3
	VAN	Ford	E150	E85/Gas	11.0	15.5	EPA T2/B8	686.2	0.20	0.007	0.02	0.125	$25,840	$17,002	5.4L (10 mpg)	1,2,3
	VAN	Ford	E250	E85/Gas	11.0	15.5	EPA T2/B8	686.2	0.20	0.007	0.02	0.125	$26,840	$15,090	5.4L (10 mpg)	1,2,3
	VAN	Ford	E350	E85/Gas	10.0	14.1	EPA T2/B8	754.9	0.20	0.008	0.02	0.125	$29,770	$19,492		1,2,3
	VAN	GMC	Savana 1500	E85/Gas	10.0	14.1	EPA T2/B5	754.9	0.07	0.008	0.01	0.090	$24,860			1,2
	VAN	GMC	Savana 2500	E85/Gas	9.0	12.7	EPA T2/B5	838.7	0.07	0.009	0.01	0.090	$25,980			1,2
	VAN	GMC	Savana 3500	E85/Gas	9.0	12.7	EPA T2/B5	838.7	0.07	0.009	0.01	0.090	$29,300			1,2
	VAN	Volkswagen	Routan	E85/Gas	14.0	19.7	EPA T2/B4	539.2	0.04	0.006	0.01	0.070	$26,930			1

[1] MPG is EPA combined City/Highway rating operating on E85.

MPGG is EPA combined City/Highway rating operatring on gasoline.

[2] Based on EPA certification level. CO_2-e and SO_2 emissions assumes operation on E85.

[3] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

FFV: FLEX FUEL VEHICLES (Emissions Based on Gasoline Operation)																
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	COMPACT SEDAN	Buick	Regal	E85/Gas	17.0	24.0	EPA T2/B4	453.9	0.04	0.007	0.01	0.070	$26,245			1,2
	COMPACT SEDAN	Chevrolet	Malibu	E85/Gas	18.0	25.4	EPA T2/B4	428.7	0.04	0.007	0.01	0.070	$21,975	$16,256		1,2,3
	COMPACT SEDAN	Chevrolet	HHR	E85/Gas	19.0	26.8	EPA T2/B4	406.2	0.04	0.006	0.01	0.070	$18,720	$15,679	Automatic or Manual	1,2,3
	COMPACT SEDAN	Chrysler	200	E85/Gas	16.0	22.6	EPA T2/B4	482.3	0.04	0.008	0.01	0.070	$19,245		Sedan or Convertible	1,2
	COMPACT SEDAN	Dodge	Avenger	E85/Gas	16.0	22.6	EPA T2/B4	482.3	0.04	0.008	0.01	0.070	$20,230			1,2
	COMPACT SEDAN	Dodge	Charger	E85/Gas	15.0	21.2	EPA T2/B4	514.5	0.04	0.008	0.01	0.070	$25,170			1,2
	COMPACT SEDAN	Dodge	Challenger	E85/Gas	15.0	21.2	EPA T2/B5	514.5	0.07	0.008	0.01	0.090	$24,670			1,2
	COMPACT SEDAN	Ford	Fusion	E85/Gas	16.0	22.6	EPA T2/B5	482.3	0.07	0.008	0.01	0.090	$19,820	$15,488	AWD (15 mpg)	1,2,3
	COMPACT SEDAN	Mercedes	C300	E85/Gas	15.0	21.2	LEV II	514.5	0.07	0.008	0.01	0.090	$33,990			1,2
	COMPACT SEDAN	Mercedes	C300 4-Matic	E85/Gas	15.0	21.2	LEV II	514.5	0.07	0.008	0.01	0.090	$38,690			1,2
	COMPACT SEDAN	Saab	9-5 Sedan	E85/Gas	18.0	25.4	EPA T2/B4	428.7	0.04	0.007	0.01	0.070	$38,525			1,2
	FULL SIZE SEDAN	Bentley	Continental	E85/Gas	10.0	14.1	LEV II	771.7	0.07	0.012	0.01	0.090	$181,200		Flying Spur, GTC or Supersports	1,2
	FULL SIZE SEDAN	Buick	Lucerne	E85/Gas	15.0	21.2	EPA T2/B4	514.5	0.04	0.008	0.01	0.070	$29,730			1,2
	FULL SIZE SEDAN	Chevrolet	Impala	E85/Gas	15.0	21.2	EPA T2/B4	514.5	0.04	0.008	0.01	0.070	$24,390	$16,782	3.5L engine (17 mpg combined)	1,2,3
	FULL SIZE SEDAN	Chrysler	300	E85/Gas	15.0	21.2	EPA T2/B4	514.5	0.04	0.008	0.01	0.070	$27,170			1,2
	FULL SIZE SEDAN	Lincoln	Town Car	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$47,165			1,2
	COMPACT SUV	Chevrolet	Equinox	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$22,745		2WD or 4WD	1,2
	COMPACT SUV	Dodge	Journey	E85/Gas	15.0	21.2	EPA T2/B4	514.5	0.04	0.008	0.01	0.070	$22,245			1,2

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2-e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	COMPACT SUV	Ford	Escape	E85/Gas	16.0	22.6	EPA T2/B4	482.3	0.04	0.008	0.01	0.070	$21,215	$19,054	4WD (14 mpg)	1,2,3
	COMPACT SUV	GMC	Terrain	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$24,250		2WD or AWD	1,2
	COMPACT SUV	Mazda	Tribute	E85/Gas	16.0	22.6	EPA T2/B4	482.3	0.04	0.008	0.01	0.070	$20,555		4WD (14 mpg)	1,2
	COMPACT SUV	Nissan	Armada	E85/Gas	11.0	15.5	EPA T2/B5	701.5	0.07	0.011	0.01	0.090	$37,910.00		2WD or 4WD	1,2
	FULL SIZE SUV	Caddilac	Escalade	E85/Gas	12.0	16.9	EPA T2/B5	643.1	0.07	0.010	0.01	0.090	$63,160.00			1,2
	FULL SIZE SUV	Chevrolet	Suburban	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$40,925	$29,985	2WD or 4WD	1,2,3
	FULL SIZE SUV	Chevrolet	Tahoe	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$37,570	$28,350	2WD or 4WD	1,2,3
	FULL SIZE SUV	Ford	Expedition	E85/Gas	12.0	16.9	EPA T2/B4	643.1	0.04	0.010	0.01	0.070	$37,070	$25,958	4WD (11 mpg)	1,2,3
	FULL SIZE SUV	GMC	Yukon	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$38,535		2WD or 4WD, 6.2L (12mpg)	1,2
	FULL SIZE SUV	Jeep	Grand Cherokee	E85/Gas	14.0	19.7	EPA T2/B5	551.2	0.07	0.009	0.01	0.090	$30,215		2WD or 4WD	1,2
	FULL SIZE SUV	Lincoln	Navigator	E85/Gas	12.0	16.9	EPA T2/B4	643.1	0.04	0.010	0.01	0.070	$57,570		4WD (11 mpg)	1,2
	FULL SIZE SUV	Toyota	Sequoia	E85/Gas	10.0	14.1	EPA T2/B5	771.7	0.07	0.012	0.01	0.090	$40,030			1,2
	PICK UP	Chevrolet	Avalanche	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$36,111		2WD or 4WD	1,2
	PICK UP	Chevrolet	Silverado 1500	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$20,850	$15,528	4.8L (12 mpg) 6.2L (11 mpg)	1,2,3
	PICK UP	Chevrolet	Silverado 1500 4WD	E85/Gas	12.0	16.9	EPA T2/B5	643.1	0.07	0.010	0.01	0.090	$24,090		4.8L (11 mpg) 6.2L (10 mpg)	1,2
	PICK UP	Dodge	Dakota	E85/Gas	10.0	14.1	EPA T2/B4	771.7	0.04	0.012	0.01	0.070	$23,110		2WD or 4WD	1,2
	PICK UP	Dodge	Ram 1500	E85/Gas	10.0	14.1	EPA T2/B4	771.7	0.04	0.012	0.01	0.070	$20,810	$16,927	2WD or 4WD	1,2,3
	PICK UP	Ford	F-150	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$22,415	$15,260	4WD (13 mpg)	1,2,3

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
					MPG (E85)	MPGG		CO_2-e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	PICK UP	GMC	Sierra 1500	E85/Gas	13.0	18.3	EPA T2/B5	593.6	0.07	0.009	0.01	0.090	$21,240		4.8L (12 mpg) 6.2L (11 mpg)	1,2
	PICK UP	GMC	Sierra 1500 4WD	E85/Gas	12.0	16.9	EPA T2/B5	643.1	0.07	0.010	0.01	0.090	$24,390		4.8L (11 mpg) 6.2L (10 mpg)	1,2
	PICK UP	Nissan	Titan	E85/Gas	11.0	15.5	EPA T2/B5	701.5	0.07	0.011	0.01	0.090	$26,820		2WD, 4WD (10 mpg)	1,2
	PICK UP	Toyota	Tundra	E85/Gas	11.0	15.5	EPA T2/B5	701.5	0.07	0.011	0.01	0.090	$23,935			1,2
	VAN	Chevrolet	Express 1500	E85/Gas	11.0	15.5	EPA T2/B5	701.5	0.07	0.011	0.01	0.090	$24,860	$18,294	AWD or 2WD	1,2
	VAN	Chevrolet	Express 2500	E85/Gas	9.0	12.7	EPA T2/B5	857.4	0.07	0.013	0.01	0.090	$27,320	$18,854		1,2
	VAN	Chevrolet	Express 3500	E85/Gas	9.0	12.7	EPA T2/B5	857.4	0.07	0.013	0.01	0.090	$29,300	$20,000		1,2
	VAN	Chrysler	Town and Country	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$30,160			1,2
	VAN	Dodge	Grand Caravan	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$23,995	$17,867		1,2,3
	VAN	Ford	E150	E85/Gas	11.0	15.5	EPA T2/B8	701.5	0.20	0.011	0.02	0.125	$25,840	$17,002	5.4L (10 mpg)	1,2,3
	VAN	Ford	E250	E85/Gas	11.0	15.5	EPA T2/B8	701.5	0.20	0.011	0.02	0.125	$26,840	$15,090	5.4L (10 mpg)	1,2,3
	VAN	Ford	E350	E85/Gas	10.0	14.1	EPA T2/B8	771.7	0.20	0.012	0.02	0.125	$29,770	$19,492		1,2,3
	VAN	GMC	Savana 1500	E85/Gas	10.0	14.1	EPA T2/B5	771.7	0.07	0.012	0.01	0.090	$24,860			1,2
	VAN	GMC	Savana 2500	E85/Gas	9.0	12.7	EPA T2/B5	857.4	0.07	0.013	0.01	0.090	$25,980			1,2
	VAN	GMC	Savana 3500	E85/Gas	9.0	12.7	EPA T2/B5	857.4	0.07	0.013	0.01	0.090	$29,300			1,2
	VAN	Volkswagen	Routan	E85/Gas	14.0	19.7	EPA T2/B4	551.2	0.04	0.009	0.01	0.070	$26,930			1

[1] MPG is EPA combined City/Highway rating operating on E85.

MPGG is EPA combined City/Highway rating operatring on gasoline.

[2] Based on EPA certification level. CO_2-e and SO_2 emissions assumes operation on gasoline.

[3] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

EV: ELECTRIC VEHICLE

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1] [kWh/mi]	EMISSIONS [g/mi] [2] CO_2.e	NOx	SO_2	PM	VOC	PURCHASE COST [3] MSRP [3]	NY Contract Price [3]	RANGE PER CHARGE [mi]	NOTES	SOURCES
LIGHT DUTY	COMPACT SEDAN	Ford	Focus Electric	Elec	0.21	65.5	0.07	0.12	0.004	0.001	UNK	N/A	112	No price announced yet	6
	COMPACT SEDAN	Nissan	Leaf	Elec	0.34	109.6	0.12	0.19	0.006	0.002	$32,780	NA	73		1,2
	COMPACT SEDAN	SMART	ForTwo	Elec	0.39	124.7	0.13	0.22	0.007	0.003	$34,153	NA	63	48 month lease - $599/month, ~$6,000 down.	1
	COMPACT COUPE	Tesla	Roadster	Elec	0.23	72.9	0.08	0.13	0.004	0.002	$109,000	N/A	245		6
	COMPACT SEDAN	Tesla	S	Elec	0.30	95.7	0.10	0.17	0.005	0.002	$57,400	N/A	300	Available 2012	6
	VAN	Ford	Transit Connect	Elec	0.35	111.7	0.12	0.20	0.006	0.002	UNK	NA	80		2
MEDIUM DUTY	VAN	Boulder	Delivery Truck	Elec	0.67	212.8	0.23	0.37	0.012	0.005	UNK	NA	120		2
	VAN	Electric Vehicles Int.	WIV	Elec	1.10	351.1	0.38	0.62	0.020	0.008	UNK	NA	90		2
	VAN	Electrorides	ZeroTruck	Elec	1.33	425.5	0.46	0.75	0.024	0.009	$130,000	NA	75		2
	VAN	Enova Systems	Ze Step Van	Elec	0.80	255.3	0.28	0.45	0.014	0.006	UNK	NA	150		2
	VAN	Navistar	E-Star	Elec	0.80	255.3	0.28	0.45	0.014	0.006	UNK	NA	100		2
	VAN	Smith Electric Vehicles	SEV Newton	Elec	1.20	383.0	0.41	0.67	0.021	0.008	UNK	NA	100		2
	UTILITY	Electric Vehicles Int.	MD EVI	Elec	1.10	351.1	0.38	0.62	0.020	0.008	$120,000	NA	90		2
HEAVY DUTY	UTILITY	Balgon	Mule M150	Elec	1.87	595.7	0.64	1.05	0.033	0.013	UNK	NA	150		2
	TRACTOR	Balgon	Nautilus E20	Elec	1.37	436.7	0.47	0.77	0.024	0.010	$208,000	NA	95		2

[1] Source: Manufacturer literature. For Nissan Leaf and Smart ForTwo this is based on EPA electric vehicle test protocol; for others the test cycle is unknown. It is assumed that in all cases these values represent plug-to wheels energy use, and account for charging losses.

[2] Emissions from electricity production; see Electricity worksheet for g/kWh emission factors. G/mi emissions assumes 4.5% transmission losses (NYS average per 2008 EIA State Electricity Profile)

[3] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

PHEV: PLUG-IN HYBRID GASOLINE-ELECTRIC (Charge-depleting)																					
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		ALL-ELECTRIC RANGE	EPA/CARB EMISSION CERT	EMISSIONS [g/mi]											PURCHASE COST [4]		NOTES	SOURCES
					HEV	Electric			HEV [2]					ALL-ELECTRIC [3]						MSRP [3]	NY Contract Price [3]		
					[MPG]	[kWh/mi]	[mi]		CO_2.e	NOx	SO_2	PM	VOC	CO_2.e	NOx	SO_2	PM	VOC				
LIGHT DUTY	COMPACT SEDAN	Chevrolet	Volt	Gas/Elec	37.0	0.36	35	EPA T2/B4	294.2	0.04	0.005	0.010	0.070	114.9	0.12	0.20	0.006	0.003	$40,280	NA		1,2
	COMPACT SEDAN	Fisker	Karma	Gas/Elec	Unk	0.40	50	Unk						127.7	0.14	0.22	0.007	0.003	$87,900	N/A	Releases 2012	6
	COMPACT SEDAN	Ford	C-Max energi	Gas/Elec	Unk	Unk	Unk	Unk											Unk	NA	Releases 2012	6
	COMPACT SEDAN	Hyundai	Blue-Will	Gas/Elec	50.0	Unk	38	Unk											Unk	NA	Releases 2012	6
	COMPACT SEDAN	Suzuki	Swift PHEV	Gas/Elec	30.0	0.22	12	EPA T2/B4	217.7	0.04	0.00	0.01	0.070	70.7	0.08	0.12	0.00	0.002	Unk	NA	Releases 2013	6
	COMPACT SEDAN	Toyota	Prius PHEV	Gas/Elec	50.0	0.23	13	SULEV	217.7	0.02	0.00	0.01	0.010	73.6	0.08	0.13	0.00	0.002	$36,000	NA	Approximate Cost, See Reference 7	6
	COMPACT SEDAN	Volkswagen	TwinDrive	Gas/Elec	Unk	Unk	Unk	Unk											Unk	NA	Releases 2013	6
	FULL SIZE SEDAN	Volvo	V60 PHEV	Diesel/Elec		0.38	32	Unk						119.7	0.13	0.21	0.01	0.003	Unk	NA		
	COMPACT SUV	Ford	Escape PHEV	Gas/Elec	25.0	0.25	40	ULEV II	435.4	0.07	0.01	0.01	0.055	79.8	0.09	0.14	0.00	0.002	Unk	NA	Releases 2012	6
	COMPACT SUV	Mitsubishi	PX-MiEV	Gas/Elec	Unk	0.52	31	Unk						164.7	0.18	0.29	0.01	0.004	Unk	NA	Releases 2013	6
MD DUTY	VAN	Smith Electric Vehicles	Edison	Gas/Elec	Unk	0.4	100	Unk						127.7	0.14	0.22	0.01	0.003	Unk	NA	Available in Europe now	6

[1] For light duty vehicles MPG is EPA combined City/Highway rating in charge-sustaining HEV mode. All-electric mode fuel use (kWh/mi) is plug-to-wheels energy use per manufacturer literature, and does not include transmission losses.

[2] For light duty vehicles, based on EPA certification level. For medium & heavy duty vehicles, based on listed MPG and EPA engine certification standards.

[3] Emissions from electricity production. See Electricity worksheet for g/kWh emission factors. g/mile emissions assumes 4.5% transmission losses (NYS average per 2008 EIA State Electricity Profile)

[4] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

HEV: HYBRID GASOLINE-ELECTRIC (Charge-sustaining)															
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1] MPG	EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
							CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
LIGHT DUTY	COMPACT SEDAN	Honda	Civic Hybrid	Gas	41.0	SULEV II	265.5	0.020	0.004	0.010	0.010	$23,950	$22,015		1,2,3
	COMPACT SEDAN	Honda	CR-Z	Gas	37.0	SULEV II	294.2	0.020	0.005	0.010	0.010	$19,345		6-speed (34 mpg combined)	1,2
	COMPACT SEDAN	Honda	Insight	Gas	41.0	SULEV	265.5	0.020	0.004	0.010	0.010	$18,200	$18,688		1,2,3
	COMPACT SEDAN	Hyundai	Sonata Hybrid	Gas	37.0	SULEV	294.2	0.020	0.005	0.010	0.010	$25,795			1,2
	COMPACT SEDAN	Lexus	CT 200h	Gas	42.0	SULEV	259.2	0.020	0.004	0.010	0.010	$29,995			1,2
	COMPACT SEDAN	Lexus	HS 250h	Gas	35.0	SULEV	311.0	0.020	0.005	0.010	0.010	$35,525			1,2
	COMPACT SEDAN	Toyota	Prius	Gas	50.0	SULEV	217.7	0.020	0.003	0.010	0.010	$23,050	$19,812		1,2,3
	FULL SIZE SEDAN	BMW	ActiveHybrid 750i	Gas	20.0	ULEV II	544.3	0.070	0.008	0.010	0.055	$102,300			1,2
	FULL SIZE SEDAN	Ford	Fusion Hybrid	Gas	39.0	SULEV II	279.1	0.020	0.004	0.010	0.010	$28,340	$24,711		1,2,3
	FULL SIZE SEDAN	Lexus	GS 450h	Gas	23.0	SULEV II	473.3	0.020	0.007	0.010	0.010	$58,925			1,2
	FULL SIZE SEDAN	Lexus	LS 600h	Gas	20.0	SULEV II	544.3	0.020	0.008	0.010	0.010	$112,225			1,2
	FULL SIZE SEDAN	Lincoln	MKZ Hybrid	Gas	39.0	SULEV	279.1	0.020	0.004	0.010	0.010	$34,605			1,2
	FULL SIZE SEDAN	Mercedes Benz	S400 Hybrid	Gas	21.0	SULEV	518.4	0.020	0.008	0.010	0.010	$91,000			1,2
	FULL SIZE SEDAN	Nissan	Altima	Gas	33.0	SULEV	329.9	0.020	0.005	0.010	0.010	$26,800	$21,498		1,2,3
	FULL SIZE SEDAN	Toyota	Camry Hybrid	Gas	33.0	SULEV II	329.9	0.020	0.005	0.010	0.010	$26,675	$22,808		1,2,3
	COMPACT SUV	BMW	ActiveHybrid X6	Gas	18.0	ULEV II	604.8	0.070	0.009	0.010	0.055	$88,900			1,2
	COMPACT SUV	Ford	Escape Hybrid	Gas	32.0	SULEV II	340.2	0.020	0.005	0.010	0.010	$30,045	$28,564	4WD (29 mpg combined)	1,2,3
	COMPACT SUV	Lexus	RX 450h	Gas	30.0	SULEV II	362.9	0.020	0.006	0.010	0.010	$44,810		AWD (29 mpg combined)	1,2
	COMPACT SUV	Mazda	Tribute Hybrid	Gas	32.0	SULEV II	340.2	0.020	0.005	0.010	0.010	$29,500		4WD (29 mpg combined)	1,2
	COMPACT SUV	Mercedes Benz	ML-450 Hybrid	Gas	22.0	SULEV II	494.8	0.020	0.008	0.010	0.010	$55,790			1,2
	COMPACT SUV	Porsche	Cayenne S Hybrid	Gas	21.0	ULEV II	518.4	0.070	0.008	0.010	0.055	$67,700			1,2
	COMPACT SUV	Toyota	Highlander Hybrid	Gas	28.0	SULEV II	388.8	0.020	0.006	0.010	0.010	$37,490	$30,202		1,2,3
	COMPACT SUV	Volkswagen	Touareg Hybrid	Gas	21.0	ULEV	518.4	0.070	0.008	0.010	0.055	$60,565			1,2

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1] MPG	EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]		NOTES	SOURCES
							CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]		
L D	FULL SIZE SUV	Caddilac	Escalade Hybrid	Gas	21.0	EPA T2/B5	518.4	0.070	0.008	0.010	0.090	$73,840		2WD or 4WD	1,2
	FULL SIZE SUV	Chevrolet	Tahoe Hybrid	Gas	21.0	EPA T2/B5	518.4	0.070	0.008	0.010	0.090	$50,735	$46,551	2WD or 4WD	1,2,3
	FULL SIZE SUV	GMC	Yukon Hybrid	Gas	21.0	EPA T2/B5	518.4	0.070	0.008	0.010	0.090	$51,200	$46,414	2WD or 4WD	1,2,3
	PICK UP	Chevrolet	Silverado Hybrid	Gas	21.0	EPA T2/B5	518.4	0.070	0.008	0.010	0.090	$44,670	$35,880	2WD or 4WD	1,2,3
	PICK UP	GMC	Sierra Hybrid	Gas	21.0	EPA T2/B5	518.4	0.070	0.008	0.010	0.090	$38,710	$37,300	2WD or 4WD	1,2,3
MD DUTY	VAN	Ford	E-450 Balance	Gas	6.64	UNK	1335.0	0.229	0.026	0.020	0.230	NO INFO	NA	Emissions & MPG: NYCC Chassis Dynamometer Cycle—Results on model year 2009 E-450	5

[1] For light duty vehicles MPG is EPA combined City/Highway rating.

[2] For light duty vehicles, based on EPA certification level.

[3] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

D HEV: HYBRID DIESEL-ELECTRIC (Charge-sustaining)															
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					PURCHASE COST [3]	NOTES	SOURCES
					MPG	MPGG		CO_2-e	NOx	SO_2	PM	VOC			
MD DUTY	VAN	Freightliner	MT45	Diesel	16.5	14.9	EPA 2010	751.4	0.202	0.006	0.010	0.141	No info	40% Fuel Savings	5
	UTILITY	Navistar	DuraStar	Diesel	24.8	22.3	EPA 2010	500.9	0.135	0.004	0.007	0.094	No info	60% Fuel Savings	5
HEAVY DUTY	UTILITY	Peterbuilt	Model 348	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	2
	UTILITY	Peterbuilt	Model 337	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	2
	TRACTOR	Kenworth	T270	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	2
	TRACTOR	Freightliner	Business Class M2	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	5
	TRACTOR	Crane Carrier Company	LET2	Diesel	7.9	7.1	EPA 2010	1575.9	0.423	0.012	0.021	0.296	No info	25% Fuel Savings	5
	TRACTOR	Peterbuilt	Model 330	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	2
	TRACTOR	Peterbuilt	Model 386	Diesel	8.4	7.6	EPA 2010	1470.9	0.395	0.011	0.020	0.277	No info	30% Fuel Savings	2

[1] For all vehicles MPG is based on fleet average fuel economy, per USDOE Transportation Energy Data Book, Table 5.4 (MDV = 9.9 MPG; HDV = 5.9 MPG), adjusted per manuf claims of average fuel savings. MPGG = Miles per gasoline equivalent gallon. One gallon of #2 diesel fuel is equivalent to 1.11 gallons of gasoline, based on energy content (see Fuel Properties worksheet).

[2] CO_2-e and SO_2 g/mi emissions based on listed MPG and fuel carbon and sulfur content. NOx, PM, and VOC g/mi emissions based on EPA engine certification standards & listed MPG.

[3] No information available

LPG: LIQUID PETROLEUM GAS (PROPANE) VEHICLES (LPG only)													
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	FUEL ECONOMY [1]		EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]			PURCHASE COST [3]	NOTES	SOURCES
					MPG	MPGG		CO_2.e	NOx	VOC			
LT DUTY	PICK UP	Ford	F250	LPG	Unk		Unk				$35,185	4x4	3
	PICK UP	Ford	F350	LPG	Unk		Unk				$35,824	4x4	3

[1] No data on fuel economy available.

[2] No information available

[3] Based on NYS OGS Fleet Price List

NGV: NATURAL GAS VEHICLES (Natural Gas Only)																
SIZE	TYPE	MANUF	MODEL	FUEL TYPE	Fuel Economy [1] MPGG	EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					Purchse Price			NOTES	SOURCES
							CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]	NGV Co Op Price		
LIGHT DUTY	COMPACT SEDAN	Honda	Civic	CNG	28.0	SULEV II	314.5	0.02	0.00	0.01	0.010	$25,490	$24,833	$24,256		1,2,3,4
	PICK UP	Chevrolet	Silverado 1500	CNG	14.0	EPA T2/B5	629.1	0.07	0.00	0.01	0.090	NO INFO	$38,542			3
	PICK UP	Chevrolet	Silverado 2500	CNG	12.0	EPA T2/B5	733.9	0.07	0.00	0.01	0.090	NO INFO	$41,264	$45,960		3,4
	PICK UP	Chevrolet	Silverado 3500	CNG	12.0	EPA T2/B5	733.9	0.07	0.00	0.01	0.090	NO INFO	$41,986	$45,670		3,4
	PICK UP	Ford	F-150	CNG	14.0	SULEV II	629.1	0.02	0.00	0.01	0.010	NO INFO	$36,415			3
	PICK UP	Ford	F-250	CNG	13.0	EPA T2/B8	677.5	0.20	0.00	0.02	0.125	NO INFO		$37,088		4
	PICK UP	Ford	F-350	CNG	12.0	EPA T2/B8	733.9	0.20	0.00	0.02	0.125	NO INFO		$37,985		4
	VAN	Chevrolet	Express 2500	CNG	12.7	SULEV	629.1	0.02	0.00	0.01	0.010	NO INFO	$41,050	$46,774		2,3,4
	VAN	Chevrolet	Express 3500	CNG	12.7	SULEV	677.5	0.02	0.00	0.01	0.010	NO INFO	$44,801	$49,955		2,3,4
	VAN	Chevrolet	Express 4500	CNG	12.7	SULEV	733.9	0.02	0.00	0.01	0.010	NO INFO				2
	VAN	Ford	E-150	CNG	14.0	SULEV II	693.5	0.02	0.00	0.01	0.010	NO INFO	$26,738			3
	VAN	Ford	E-250	CNG	13.0	EPA T2/B8	693.5	0.20	0.00	0.02	0.125	NO INFO		$38,425		4
	VAN	Ford	E-350	CNG	12.0	EPA T2/B8	693.5	0.20	0.00	0.02	0.125	NO INFO	$38,050	$40,495		3,4
	VAN	GMC	Savanna 3500	CNG	12.7	SULEV	693.5	0.02	0.00	0.01	0.010	NO INFO				2

SIZE	TYPE	MANUF	MODEL	FUEL TYPE	Fuel Economy [1] MPGG	EPA/CARB EMISSION CERT	EMISSIONS [g/mi] [2]					Purchse Price			NOTES	SOURCES
							CO_2.e	NOx	SO_2	PM	VOC	MSRP [3]	NY Contract Price [3]	NGV Co Op Price		
MD DUTY	VAN	GMC	Savanna 4500	CNG	12.7	SULEV	693.5	0.02	0.00	0.01	0.010	NO INFO				2
	FLAT/STAKE BED	Ford	E-450	CNG	NO INFO	NO INFO						NO INFO		$47,975		4
HEAVY DUTY	UTILITY	Freightliner	Business Class M2	CNG	5.3	EPA 2010	1651.3	0.625	0.000	0.031	0.437	NO INFO				
	UTILITY	Peterbuilt	Model 365	CNG	NO INFO	EPA 2010						NO INFO				
	TRACTOR	Freightliner	Business Class M2	CNG	5.3	EPA 2010	1651.3	0.625	0.000	0.031	0.437	NO INFO				
	TRACTOR	Peterbuilt	Model 365	CNG	NO INFO	EPA 2010						NO INFO				

[1] Fuel economy values are miles per gasoline equivalent gallon (MPGG). For light duty vehicles MPGG is EPA combined City/Highway rating. For medium & heavy-duty vehicles MPGG is from manufacturer literature.

[2] For light duty vehicles, based on EPA certification level. For medium & heavy duty vehicles, based on EPA engine certification level and reported fuel economy.

[3] Based on published MSRP, NYS OGS Fleet Price List, or other manufacturer literature

ALTERNATIVE FUEL PROPERTIES

Fuel		Energy Content [1]		Gasoline Gallon Equivalent (GGE) per Gallon	Density [2]	Sulfur Content [3]		SO_2 Emissions [4]	NY Green House Gas Emissions [5] [g CO_2-e/gallon]				CA Green House Gas Emissions [5] [g CO_2-e/gallon]				US AVG Green House Gas Emissions [5] [g CO_2-e/gallon]				
		Unit	Value		lb/gal	ppm	g/gal	g/gal	Tailpipe	Well-to-tank	Indirect Land Use	Total	Tailpipe	Well-to-tank	Indirect Land Use	Total	Tailpipe	Well-to-tank	Indirect Land Use	Total	
Gasoline		Btu/gal	116,090	1.00	6.25	30	0.09	0.17	8,788	2,098	0	10,886	8,788	2,713	0	11,501	8,788	2,189	0	10,977	
Diesel	#2 ULSD	Btu/gal	128,450	1.11	7.08	15	0.05	0.10	10,084	2,313	0	12,397	10,084	2,599	0	12,683	10,084	2,449	0	12,533	
	B100 Biodiesel	Btu/gal	119,550	1.03	7.33	0	0.00	0.00	0	2,482	7,820	10,302	0	2,680	7,820	10,500	0	2,835	7,820	10,656	
	B20 Biodiesel	Btu/gal	126,670	1.09	7.13	12	0.04	0.08	8,067	2,347	1,564	11,978	8,067	2,616	1,564	12,247	8,067	2,526	1,564	12,157	
	B5 Biodiesel	Btu/gal	128,005	1.10	7.09	14	0.05	0.09	9,580	2,322	391	12,293	9,580	2,603	391	12,574	9,580	2,468	391	12,439	
Natural Gas		Btu/lb	20,268	0.17 GGE/lb	NA	0	0.00	0.00	7,145	1,662	0	8,807	7,145	1,263	0	8,408	7,145	2,021	0	9,166	*g/GGE*
Ethanol	E100	Btu/gal	76,330	0.66	6.61	10	0.03	0.06	0	5,840	1,119	6,960	0	5,589	1,119	6,708	0	5,722	1,119	6,841	
	E85	Btu/gal	82,294	0.71	6.56	13	0.04	0.08	1,318	5,279	951	7,549	1,318	5,158	951	7,427	1,318	5,192	951	7,462	
LPG		Btu/gal	84,950	0.73	4.22	NA	0.62	1.24	5,805	1,183	0	6,988	5,805	1,165	0	6,970	5,805	1,232	0	7,037	

[1] U.S. Department of Energy, Alternative Fuels & Advanced Vehicles Data Center (www.afdc.energy.gov/afdc/fuels/properties.html)

[2] Average fuel density from: www.afdc.energy.gov/afdc/pdfs/fueltable.pdf

[3] Fuel sulfur content of diesel fuel and gasoline based on EPA maximum allowable. Sulfur content of ethanol based on industry recommended practice.
Fuel sulfur content of natural gas and LPG from : http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/k-2.pdf

[4] Assumes that all fuel-borne sulfur is converted to SO_2 during combustion.

[5] *Tail-pipe emissions:*

Gasoline and #2 diesel values are from: EPA420-F-05-001 February 2005

For Natural gas, assume: 75% carbon by weight (CH_4 453.6 g/lb.

LPG value is from: Transportation Energy Data Book, Table 11.11

Tail pipe emissions from 100% Ethanol and 100% Biodiesel are not zero, but by convention are assumed to be 0 since the released CO_2 is recycled back into new feed crops

Well-to-tank Emissions:

These "well-to-tank" values are from the Argonne National Laboratory's GREET model, assuming US-default, NY, and CA specific values for various input parameters (for NY-GREET; see NYSERDA Report 9576, Assessing the Total Fuel Cycle Energy and Environmental Impacts of Alternative Transportation Fuels, Development and Use of NY-GREET, Final Report, Sept. 2007; for CA-GREET see California Low Carbon Fuel Standard documentation). They include CO_2 and other GHG emissions from farming/recovery, production, and tranport of fuel. GHGs are converted to CO_2-equivalent emissions using global warming potential (GWP100) values published by the Intergovernmental Panel on Climate Change. Indirect CO2-equivalent GHG emissions from land use changes are from calculations done by California Air Resources Board for the California Low Carbon Fuel Standard. Values for well-to-tank GHG emissions per MJ of fuel energy content are as follows:

	g CO2-e/MJ			
	Well-to-tank			Indirect
	NY	CA	US	
Gasoline	17.13	22.15	17.87	
#2 Diesel	17.07	19.18	18.07	
Natural Gas	13.57	10.31	16.50	
Ethanol (corn, dry mill)	72.52	69.40	71.05	13.90
B100 Biodiesel (soy)	19.68	21.25	22.48	62.00
LPG	13.20	13.00	13.75	

← *Note: Well-to-tank is GREET average value for corn ethanol. Some production methods for corn ethanol result in higher values. Sugar cane and cellulosic ethanol have lower values.*

Emissions per kWh of Electricity Use in New York (2008)

Source	% of Total [3]	Emission Factor (g/kWh)				
		CO_2	NOx	SO_2	PM	VOC
NYS Production [1]	86%	335.66	0.36	0.59	0.019	0.007
Imported Electricity [2]	14%	115.08	0.12	0.20	0.006	0.003
AVERAGE NYS USAGE	**100%**	**304.78**	**0.33**	**0.54**	**0.017**	**0.007**

[1] Average CO_2, NOx, SO_2 emission factors from: *State Electricity Profiles 2008*, U.S. Energy Information Adminsitration, DOE/EIA-0348 (01)/2, pg 193

Average PM, VOC based on emission factors from AP-42 and NYS electricity production by fuel type as follows:

	NG	Nuclear	Hydro	Coal	Petroleum	Wind	Other	WGTD AVG	
% of NYS Production	30.2%	30.2%	19.8%	14.0%	2.3%	1.2%	2.3%		*per NYSERDA 2008 NYS Energy Fast Facts*
AP-42 PM emissions (g/kWh)	0.0256	0.0	0.0	0.0172	0.2736	0.0	0.1000	0.0187	
AP-42 VOC emissions (g/kWh	0.0186	0.0	0.0	0.0076	0.0176	0.0	0.0100	0.0073	

[2] The EIA 2008 New York State Electricity Profile (Table 10) shows that net international electricity imports to New York total 9.2% of retail sales. This electricity is assumed to be all hydro power imported from Canada with zero emissions. The remaining 4.8% of power that is imported is assumed to be from neighboring states and to have the same average emission factors as electricity produced in New York.

[3] New York State Energy Research & Development Authority, *Patterns and Trends, New York State Energy Profiles: 1994-2008*, Jan 2010, 2008 New York State Energy Fast Facts

Appendix B: Alternative Fueled Fleet Options Analysis

GLOBAL ASSUMPTIONS

		Unit	GAS	E85	# 2 Diesel	B5	B20	ELECT	Source
FUEL	Current Cost	$/gal	$3.13	$3.08	$3.31	$3.69	$3.79	$ 0.15 /kWh	NYS OGS 8/8/11
	Annual Fuel Inflation	%	4%	4%	4%	4%	4%	2%	EIA 2011 Energy Outlook
	Energy Equivalence	GGE/gal	1.00	0.71	1.11	1.10	1.09	0.03 /kWh	www.afdc.energy.gov/afdc/fuels/properties.html
	Petrolem Content	GGE/gal	1.00	0.15	1.11	1.05	0.89	0.00 /kWh	
	Emissions CO_2-e	g/gal	10,886	7,549	12,397	12,293	11,978		
	Emissions SO_2	g/gal	0.17	0.08	0.10	0.09	0.08		
	Current Annual Usage	gal	122,820	0	49,620	60,005	5,770		

		Unit	LDV	MDV	HDV	M/HDV
FLEET	Number	#	267	161	38	199
	Avg Annual Fuel Use	gal/veh	460	535	770	580
	Avg Annual Miles	mi/veh	11,500	5,400	5,400	5,400
	Fleet Average Emissions NOx	g/mi	0.157	4.13	7.86	4.84
	Fleet Average Emissions PM	g/mi	0.025	0.05	0.15	0.07
	Fleet Average Emissions VOC	g/mi	0.126	0.39	0.67	0.44

Discount Rate	6%

		B5	B20	Source
Emission Reduction	PM	2.5%	10.1%	EPA420-P-02-001, *A comprehensive Analyis of Biodiesel Impacts on Exhaust Emissions* , October 2002
	VOC	5.3%	21.1%	

BUSINESS AS USUAL BASELINE - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			*NYPA Policy*
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			*White Plains Motor Pool*
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			*NYPA Current Practice*
	Annual Purchases		#	**1**	**10**	**14**	**16**	**3**	**1**	**0**	*45*	**4**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	*8*	**53**	*Current Fleet Distribution*
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			*NYPA Current Fleet*
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			*NYS OGS Contract*
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			*EPA combined City/Highway*
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	*gal/mi*		*EPA combined City/Highway*
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			*Fuel WTW GHG & MPG*
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			*EPA Certification*
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			*Fuel sulfur content & MPG*
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			*EPA Certification*
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			*EPA Certification*
																	75%	*Incremental Cost, MPG*				
																	EV Mode	*Incremental emissions*				

BUSINESS AS USUAL BASELINE - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	43.0%	52.0%	5.0%		
LDV Fleet Fuel Use				100%	0%

EPAct Biodiesel AFV Credits:	2

	LDV	M/HDV
VMT Reduction	0.0%	0.0%

BUSINESS AS USUAL BASELINE - ANALYSIS

	Vehicle Type		Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
				COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		LDV	M/HDV	
COST	Fuel		$	$1,343	$16,979	$22,298	$31,471	$5,481	$2,322	$0	***$79,894***	$2,880	$0	$4,499	$0	$0	$0	$0	$0	***$7,379***	**$87,273**	$308,117	$407,529	**$802,920**
	Vehicle Purchase		$	$16,000	$170,000	$266,000	$464,000	$48,000	$19,000	$0	***$983,000***	$80,000	$0	$116,000	$0	$0	$0	$0	$0	***$196,000***	**$1,179,000**	NA	NA	**$1,179,000**
	TOTAL ANNUAL		$	**$17,343**	**$186,979**	**$288,298**	**$495,471**	**$53,481**	**$21,322**	**$0**	$1,062,894	**$82,880**	**$0**	**$120,499**	**$0**	**$0**	**$0**	**$0**	**$0**	**$203,379**	**$1,266,273**	$308,117	$407,529	**$1,981,920**
FUEL USE	Annual Fuel Use	Gas	GAL	429	5,425	7,124	10,055	1,751	742	0	25,525	920	0	1,438	0	0	0	0	0	2,358	**27,883**	98,440	0	**126,323**
		E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
		#2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	49,620	**49,620**
		B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	60,005	**60,005**
		B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	5,770	**5,770**
		Elec	kWh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Petroleum Use		GGE	429	5,425	7,124	10,055	1,751	742	0	25,525	920	0	1,438	0	0	0	0	0	2,358	**27,883**	98,440	123,477	**249,800**
EMISSION	Annual Emissions	CO_2-e	ton	5.1	65.2	85.6	120.4	21.0	8.9	0.0	306.2	11.0	0.0	17.2	0.0	0.0	0.0	0.0	0.0	28.3	**334.5**	1,181.2	1,567.3	**3,083.1**
		NOx	lb	1.0	10.1	14.2	28.4	3.0	1.8	0.0	58.6	2.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	4.1	**62.6**	851.8	11,471.5	**12,386.0**
		SO_2	lb	0.2	2.0	2.7	3.8	0.7	0.3	0.0	9.6	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.9	**10.4**	36.9	23.9	**71.2**
		PM	lb	0.3	2.5	3.5	4.1	0.8	0.3	0.0	11.4	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	**13.4**	135.6	160.7	**309.8**
		VOC	lb	1.8	17.7	24.8	36.5	5.3	2.3	0.0	88.5	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	**90.5**	683.6	1,010.6	**1,784.7**
ANNUAL FLEET MILES			mi	11,500	115,000	161,000	184,000	34,500	11,500	0	517,500	46,000	0	46,000	0	0	0	0	0	92,000	**609,500**	2,461,000	1,074,600	**4,145,100**
																		Incremental emissions						

ALTERNATIVE COMPLIANCE - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		NYPA Current Practice
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			NYPA Policy
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			White Plains Motor Pool
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			NYPA Current Practice
	Annual Purchases		#	0	0	0	0	0	1	0	1	5	10	18	16	3	0	0	0	52	53	Current Fleet Distribution
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			NYPA Current Fleet
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			NYS OGS Contract
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			EPA combined City/Highway
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	gal/mi		EPA combined City/Highway
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			Fuel WTW GHG & MPG
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			EPA Certification
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			Fuel sulfur content & MPG
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			EPA Certification
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			EPA Certification
																	75% EV Mode	Incremental Cost, MPG / Incremental emissions				

ALTERNATIVE COMPLIANCE - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	0.0%	77.0%		
LDV Fleet Fuel Use				50%	50%

	LDV	M/HDV
VMT Reduction	35%	0%

EPAct Biodiesel AFV Credits:	39

ALTERNATIVE COMPLIANCE - ANALYSIS

				AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
	Vehicle Type		*Unit*	COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	*SUB-TOTAL*	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	*SUB-TOTAL*		LDV	M/HDV	
COST	Fuel		$	$0	$0	$0	$0	$0	$2,322	$0	***$2,322***	$3,600	$10,908	$20,247	$27,425	$5,142	$0	$0	$0	***$67,321***	**$69,643**	$207,062	$424,607	**$701,313**
	Vehicle Purchase		$	$0	$0	$0	$0	$0	$19,000	$0	***$19,000***	$100,000	$215,000	$522,000	$744,000	$108,000	$0	$0	$0	***$1,689,000***	**$1,708,000**	NA	NA	**$1,708,000**
	TOTAL ANNUAL		$	**$0**	**$0**	**$0**	**$0**	**$0**	**$21,322**	**$0**	$21,322	**$103,600**	**$225,908**	**$542,247**	**$771,425**	**$113,142**	**$0**	**$0**	**$0**	$1,756,321	**$1,777,643**	$207,062	$424,607	**$2,409,313**
FUEL USE	Annual Fuel Use	Gas	GAL	0	0	0	0	0	742	0	742	1,150	3,485	6,469	8,762	1,643	0	0	0	21,508	**22,250**	27,727	0	**49,977**
		E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	39,051	0	**39,051**
		#2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
		B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
		B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	88,854	**88,854**
		Elec	kWh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Petroleum Use		GGE	0	0	0	0	0	742	0	742	1,150	3,485	6,469	8,762	1,643	0	0	0	21,508	**22,250**	33,584	108,363	**164,197**
EMISSION	Annual Emissions	CO_2-e	ton	0.0	0.0	0.0	0.0	0.0	8.9	0.0	8.9	13.8	41.8	77.6	105.1	19.7	0.0	0.0	0.0	258.1	**267.0**	657.7	1,535.8	**2,460.5**
		NOx	lb	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	2.5	5.1	9.1	28.4	5.3	0.0	0.0	0.0	50.5	**52.2**	479.8	11,471.5	**12,003.6**
		SO_2	lb	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.4	1.3	2.4	3.3	0.6	0.0	0.0	0.0	8.1	**8.3**	17.3	21.5	**47.1**
		PM	lb	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	1.3	2.5	4.6	4.1	0.8	0.0	0.0	0.0	13.2	**13.4**	76.4	151.0	**240.8**
		VOC	lb	0.0	0.0	0.0	0.0	0.0	2.3	0.0	2.3	1.3	2.5	4.6	36.5	6.8	0.0	0.0	0.0	51.7	**54.0**	385.1	879.9	**1,319.0**
ANNUAL FLEET MILES			mi	0	0	0	0	0	11,500	0	11,500	57,500	115,000	207,000	184,000	34,500	0	0	0	598,000	**609,500**	1,386,325	1,074,600	**3,070,425**
																		Incremental emissions						

STANDARD COMPLIANCE OPTION 1 - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
		Unit	COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	*SUB-TOTAL*	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	*SUB-TOTAL*		
POLICY	**Vehicle Type**																				*NYPA Current Practice*
	Vehicle Life	**YR**	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			*NYPA Policy*
	Annual Use	**MI**	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			*White Plains Motor Pool*
	Fuel Used		GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			*NYPA Current Practice*
	Annual Purchases	**#**	**1**	**5**	**8**	**9**	**2**	**1**	**0**	*26*	**4**	**5**	**10**	**7**	**1**	**0**	**0**	**0**	*27*	**53**	*Current Fleet Distribution*
VEHICLE	**Make/Model**		Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			*NYPA Current Fleet*
	Purchase Cost	**$**	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			*NYS OGS Contract*
	Fuel Economy Elec	**kWh/mi**	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
	Fuel Economy E85	**MPG**	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			*EPA combined City/Highway*
	Fuel Economy GAS	**MPG**	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	*gal/mi*		*EPA combined City/Highway*
	Emission Factors CO_2-e	**g/mi**	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			*Fuel WTW GHG & MPG*
	Emission Factors NOx	**g/mi**	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			*EPA Certification*
	Emission Factors SO_2	**g/mi**	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			*Fuel sulfur content & MPG*
	Emission Factors PM	**g/mi**	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			*EPA Certification*
	Emission Factors VOC	**g/mi**	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			*EPA Certification*
																75%	*Incremental Cost, MPG*				
																EV Mode	*Incremental emissions*				

STANDARD COMPLINACE OPTION 1 - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	38.5%	38.5%		
LDV Fleet Fuel Use				100%	0%

	LDV	M/HDV
VMT Reduction	0%	0%

EPAct Biodiesel AFV Credits:	19

STANDARD COMPLINACE OPTION 1 - ANALYSIS

	Vehicle Type		Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
				COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	*SUB-TOTAL*	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	*SUB-TOTAL*		LDV	M/HDV	
COST	**Fuel**		$	$1,343	$8,489	$12,742	$17,702	$3,654	$2,322	$0	***$46,253***	$2,880	$5,454	$11,248	$11,998	$1,714	$0	$0	$0	***$33,294***	**$79,547**	$308,117	$420,165	**$807,829**
	Vehicle Purchase		$	$16,000	$85,000	$152,000	$261,000	$32,000	$19,000	$0	***$565,000***	$80,000	$107,500	$290,000	$325,500	$36,000	$0	$0	$0	***$839,000***	**$1,404,000**	NA	NA	**$1,404,000**
	TOTAL ANNUAL		$	**$17,343**	**$93,489**	**$164,742**	**$278,702**	**$35,654**	**$21,322**	**$0**	**$611,253**	**$82,880**	**$112,954**	**$301,248**	**$337,498**	**$37,714**	**$0**	**$0**	**$0**	**$872,294**	**$1,483,547**	$308,117	$420,165	**$2,211,829**
FUEL USE	**Annual Fuel Use**	**Gas**	GAL	429	2,712	4,071	5,656	1,168	742	0	14,777	920	1,742	3,594	3,833	548	0	0	0	10,637	**25,414**	98,440	0	**123,854**
		E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
		#2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
		B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		Elec	kWh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Petroleum Use		GGE	429	2,712	4,071	5,656	1,168	742	0	14,777	920	1,742	3,594	3,833	548	0	0	0	10,637	**25,414**	98,440	115,760	**239,614**
EMISSION	**Annual Emissions**	**CO_2-e**	ton	5.1	32.6	48.9	67.7	14.0	8.9	0.0	177.3	11.0	20.9	43.1	46.0	6.6	0.0	0.0	0.0	127.6	**304.9**	1,181.2	1,551.3	**3,037.4**
		NOx	lb	1.0	5.1	8.1	16.0	2.0	1.8	0.0	34.0	2.0	2.5	5.1	12.4	1.8	0.0	0.0	0.0	23.8	**57.8**	851.8	11,471.5	**12,381.2**
		SO_2	lb	0.2	1.0	1.5	2.1	0.4	0.3	0.0	5.5	0.3	0.7	1.3	1.4	0.2	0.0	0.0	0.0	4.0	**9.5**	36.9	22.5	**68.9**
		PM	lb	0.3	1.3	2.0	2.3	0.5	0.3	0.0	6.6	1.0	1.3	2.5	1.8	0.3	0.0	0.0	0.0	6.8	**13.4**	135.6	155.7	**304.8**
		VOC	lb	1.8	8.9	14.2	20.5	3.5	2.3	0.0	51.2	1.0	1.3	2.5	16.0	2.3	0.0	0.0	0.0	23.1	**74.3**	683.6	943.8	**1,701.7**
ANNUAL FLEET MILES			mi	11,500	57,500	92,000	103,500	23,000	11,500	0	299,000	46,000	57,500	115,000	80,500	11,500	0	0	0	310,500	**609,500**	2,461,000	1,074,600	**4,145,100**
																		Incremental emissions						

STANDARD COMPLIANCE OPTION 1A - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		NYPA Current Practice
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			NYPA Policy
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			White Plains Motor Pool
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			NYPA Current Practice
	Annual Purchases		#	0	1	8	9	2	1	5	26	0	4	10	7	1	5	0	0	27	53	Current Fleet Distribution
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			NYPA Current Fleet
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			NYS OGS Contract
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			EPA combined City/Highway
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	gal/mi		EPA combined City/Highway
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			Fuel WTW GHG & MPG
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			EPA Certification
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			Fuel sulfur content & MPG
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			EPA Certification
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			EPA Certification
																	75%	Incremental Cost, MPG				
																	EV Mode	Incremental emissions				

STANDARD COMPLINACE OPTION 1A - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	38.5%	38.5%		
LDV Fleet Fuel Use				100%	0%

	LDV	M/HDV
VMT Reduction	0%	0%

EPAct Biodiesel AFV Credits:	19

STANDARD COMPLINACE OPTION 1A - ANALYSIS

	Vehicle Type		Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
				COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		LDV	M/HDV	
COST	Fuel		$	$0	$1,698	$12,742	$17,702	$3,654	$2,322	$2,933	***$41,051***	$0	$4,363	$11,248	$11,998	$1,714	$3,545	$0	$0	***$32,869***	**$73,920**	$308,117	$420,165	**$802,202**
	Vehicle Purchase		$	$0	$17,000	$152,000	$261,000	$32,000	$19,000	$163,900	***$644,900***	$0	$86,000	$290,000	$325,500	$36,000	$201,400	$0	$0	***$938,900***	**$1,583,800**	NA	NA	**$1,583,800**
	TOTAL ANNUAL		$	**$0**	**$18,698**	**$164,742**	**$278,702**	**$35,654**	**$21,322**	**$166,833**	$685,951	**$0**	**$90,363**	**$301,248**	**$337,498**	**$37,714**	**$204,945**	**$0**	**$0**	$971,769	**$1,657,720**	$308,117	$420,165	**$2,386,002**
FUEL USE	Annual Fuel Use	Gas	GAL	0	542	4,071	5,656	1,168	742	0	12,178	0	1,394	3,594	3,833	548	389	0	0	9,757	**21,936**	98,440	0	**120,376**
		E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
		#2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
		B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		Elec	kWh	0	0	0	0	0	0	19,550	19,550	0	0	0	0	0	15,525	0	0	15,525	**35,075**	0	0	**35,075**
	Annual Petroleum Use		GGE	0	542	4,071	5,656	1,168	742	0	12,178	0	1,394	3,594	3,833	548	389	0	0	9,757	**21,936**	98,440	115,760	**236,136**
EMISSION	Annual Emissions	CO_2-e	ton	0.0	6.5	48.9	67.7	14.0	8.9	6.9	153.0	0.0	16.7	43.1	46.0	6.6	10.1	0.0	0.0	122.5	**275.5**	1,181.2	1,551.3	**3,008.0**
		NOx	lb	0.0	1.0	8.1	16.0	2.0	1.8	15.2	44.1	0.0	2.0	5.1	12.4	1.8	12.7	0.0	0.0	34.0	**78.1**	851.8	11,471.5	**12,401.4**
		SO_2	lb	0.0	0.2	1.5	2.1	0.4	0.3	24.1	28.6	0.0	0.5	1.3	1.4	0.2	19.2	0.0	0.0	22.7	**51.3**	36.9	22.5	**110.7**
		PM	lb	0.0	0.3	2.0	2.3	0.5	0.3	0.8	6.1	0.0	1.0	2.5	1.8	0.3	0.9	0.0	0.0	6.5	**12.5**	135.6	155.7	**303.9**
		VOC	lb	0.0	1.8	14.2	20.5	3.5	2.3	0.3	42.6	0.0	1.0	2.5	16.0	2.3	2.5	0.0	0.0	24.3	**66.9**	683.6	943.8	**1,694.3**
ANNUAL FLEET MILES			mi	0	11,500	92,000	103,500	23,000	11,500	57,500	299,000	0	46,000	115,000	80,500	11,500	57,500	0	0	310,500	**609,500**	2,461,000	1,074,600	**4,145,100**
																		Incremental emissions						

STANDARD COMPLIANCE OPTION 1B - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		NYPA Current Practice
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			NYPA Policy
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			White Plains Motor Pool
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			NYPA Current Practice
	Annual Purchases		#	1	5	17	0	2	1	0	26	4	5	17	0	1	0	0	0	27	53	Current Fleet Distribution
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			NYPA Current Fleet
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			NYS OGS Contract
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			EPA combined City/Highway
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	gal/mi		EPA combined City/Highway
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			Fuel WTW GHG & MPG
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			EPA Certification
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			Fuel sulfur content & MPG
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			EPA Certification
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			EPA Certification
																	75%	Incremental Cost, MPG				
																	EV Mode	Incremental emissions				

STANDARD COMPLINACE OPTION 1B - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	38.5%	38.5%		
LDV Fleet Fuel Use				100%	0%

	LDV	M/HDV
VMT Reduction	0%	0%

EPAct Biodiesel AFV Credits:	19

STANDARD COMPLINACE OPTION 1B - ANALYSIS

			AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles								SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
	Vehicle Type	Unit	COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		LDV	M/HDV	
COST	Fuel	$	$1,343	$8,489	$27,076	$0	$3,654	$2,322	$0	***$42,885***	$2,880	$5,454	$19,122	$0	$1,714	$0	$0	$0	***$29,170***	**$72,055**	$308,117	$420,165	**$800,337**
	Vehicle Purchase	$	$16,000	$85,000	$323,000	$0	$32,000	$19,000	$0	***$475,000***	$80,000	$107,500	$493,000	$0	$36,000	$0	$0	$0	***$716,500***	**$1,191,500**	NA	NA	**$1,191,500**
	TOTAL ANNUAL	$	**$17,343**	**$93,489**	**$350,076**	**$0**	**$35,654**	**$21,322**	**$0**	$517,885	**$82,880**	**$112,954**	**$512,122**	**$0**	**$37,714**	**$0**	**$0**	**$0**	$745,670	**$1,263,555**	$308,117	$420,165	**$1,991,837**
FUEL USE	Annual Fuel Use — Gas	GAL	429	2,712	8,650	0	1,168	742	0	13,701	920	1,742	6,109	0	548	0	0	0	9,319	**23,021**	98,440	0	**121,461**
	Annual Fuel Use — E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Fuel Use — #2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
	Annual Fuel Use — B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
	Annual Fuel Use — B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
	Annual Fuel Use — Elec	kWh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Petroleum Use	GGE	429	2,712	8,650	0	1,168	742	0	13,701	920	1,742	6,109	0	548	0	0	0	9,319	**23,021**	98,440	115,760	**237,221**
EMISSION	Annual Emissions — CO_2-e	ton	5.1	32.6	103.9	0.0	14.0	8.9	0.0	164.6	11.0	20.9	73.3	0.0	6.6	0.0	0.0	0.0	111.8	**276.4**	1,181.2	1,551.3	**3,008.9**
	Annual Emissions — NOx	lb	1.0	5.1	17.2	0.0	2.0	1.8	0.0	27.1	2.0	2.5	8.6	0.0	1.8	0.0	0.0	0.0	15.0	**42.1**	851.8	11,471.5	**12,365.4**
	Annual Emissions — SO_2	lb	0.2	1.0	3.2	0.0	0.4	0.3	0.0	5.1	0.3	0.7	2.3	0.0	0.2	0.0	0.0	0.0	3.5	**8.6**	36.9	22.5	**68.0**
	Annual Emissions — PM	lb	0.3	1.3	4.3	0.0	0.5	0.3	0.0	6.6	1.0	1.3	4.3	0.0	0.3	0.0	0.0	0.0	6.8	**13.4**	135.6	155.7	**304.8**
	Annual Emissions — VOC	lb	1.8	8.9	30.2	0.0	3.5	2.3	0.0	46.6	1.0	1.3	4.3	0.0	2.3	0.0	0.0	0.0	8.9	**55.5**	683.6	943.8	**1,682.9**
ANNUAL FLEET MILES		mi	11,500	57,500	195,500	0	23,000	11,500	0	299,000	46,000	57,500	195,500	0	11,500	0	0	0	310,500	**609,500**	2,461,000	1,074,600	**4,145,100**
																	Incremental emissions						

STANDARD COMPLIANCE OPTION 1C - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		NYPA Current Practice
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			NYPA Policy
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			White Plains Motor Pool
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			NYPA Current Practice
	Annual Purchases		#	1	5	8	9	2	1	0	26	4	5	10	7	1	0	0	0	27	53	Current Fleet Distribution
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			NYPA Current Fleet
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			NYS OGS Contract
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			EPA combined City/Highway
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	gal/mi		EPA combined City/Highway
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			Fuel WTW GHG & MPG
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			EPA Certification
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			Fuel sulfur content & MPG
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			EPA Certification
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			EPA Certification
																	75%	Incremental Cost, MPG				
																	EV Mode	Incremental emissions				

STANDARD COMPLINACE OPTION 1C - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	38.5%	38.5%		
LDV Fleet Fuel Use				100%	0%

	LDV	M/HDV
VMT Reduction	5%	0%

EPAct Biodiesel AFV Credits:	19

STANDARD COMPLINACE OPTION 1C - ANALYSIS

	Vehicle Type		Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
				COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	*SUB-TOTAL*	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	*SUB-TOTAL*		LDV	M/HDV	
COST	Fuel		$	$1,343	$8,489	$12,742	$17,702	$3,654	$2,322	$0	***$46,253***	$2,880	$5,454	$11,248	$11,998	$1,714	$0	$0	$0	***$33,294***	**$79,547**	$288,896	$420,165	**$788,608**
	Vehicle Purchase		$	$16,000	$85,000	$152,000	$261,000	$32,000	$19,000	$0	***$565,000***	$80,000	$107,500	$290,000	$325,500	$36,000	$0	$0	$0	***$839,000***	**$1,404,000**	NA	NA	**$1,404,000**
	TOTAL ANNUAL		$	**$17,343**	**$93,489**	**$164,742**	**$278,702**	**$35,654**	**$21,322**	**$0**	$611,253	**$82,880**	**$112,954**	**$301,248**	**$337,498**	**$37,714**	**$0**	**$0**	**$0**	$872,294	**$1,483,547**	$288,896	$420,165	**$2,192,608**
FUEL USE	Annual Fuel Use	Gas	GAL	429	2,712	4,071	5,656	1,168	742	0	14,777	920	1,742	3,594	3,833	548	0	0	0	10,637	**25,414**	92,299	0	**117,713**
		E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
		#2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
		B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
		Elec	kWh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Petroleum Use		GGE	429	2,712	4,071	5,656	1,168	742	0	14,777	920	1,742	3,594	3,833	548	0	0	0	10,637	**25,414**	92,299	115,760	**233,473**
EMISSION	Annual Emissions	CO_2-e	ton	5.1	32.6	48.9	67.7	14.0	8.9	0.0	177.3	11.0	20.9	43.1	46.0	6.6	0.0	0.0	0.0	127.6	**304.9**	1,107.5	1,551.3	**2,963.7**
		NOx	lb	1.0	5.1	8.1	16.0	2.0	1.8	0.0	34.0	2.0	2.5	5.1	12.4	1.8	0.0	0.0	0.0	23.8	**57.8**	798.7	11,471.5	**12,328.0**
		SO_2	lb	0.2	1.0	1.5	2.1	0.4	0.3	0.0	5.5	0.3	0.7	1.3	1.4	0.2	0.0	0.0	0.0	4.0	**9.5**	34.6	22.5	**66.6**
		PM	lb	0.3	1.3	2.0	2.3	0.5	0.3	0.0	6.6	1.0	1.3	2.5	1.8	0.3	0.0	0.0	0.0	6.8	**13.4**	127.2	155.7	**296.4**
		VOC	lb	1.8	8.9	14.2	20.5	3.5	2.3	0.0	51.2	1.0	1.3	2.5	16.0	2.3	0.0	0.0	0.0	23.1	**74.3**	641.0	943.8	**1,659.1**
ANNUAL FLEET MILES			mi	11,500	57,500	92,000	103,500	23,000	11,500	0	299,000	46,000	57,500	115,000	80,500	11,500	0	0	0	310,500	**609,500**	2,307,475	1,074,600	**3,991,575**
																		Incremental emissions						

STANDARD COMPLIANCE OPTION 1A - 1C COMBINED - ANNUAL NEW VEHICLE PURCHASE ASSUMPTIONS

			Unit	AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles									TOTAL	Source
POLICY	Vehicle Type			COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		NYPA Current Practice
	Vehicle Life		YR	5	5	5	5	5	5	5		5	5	5	5	5	5	7	7			NYPA Policy
	Annual Use		MI	11,500	11,500	11,500	11,500	11,500	11,500	11,500		11,500	11,500	11,500	11,500	11,500	11,500	5,400	5,400			White Plains Motor Pool
	Fuel Used			GAS	GAS	GAS	GAS	GAS	GAS	ELEC		GAS	GAS	GAS	GAS	GAS	GAS	ELEC	DIESEL			NYPA Current Practice
	Annual Purchases		#	0	1	17	0	2	1	5	26	0	4	17	0	1	5	0	0	27	53	Current Fleet Distribution
VEHICLE	Make/Model			Chevy HHR FFV	Chevy Impala FFV	Ford Escape FFV	Chevy Tahoe FFV	Ford F150 FFV	Chevy Express 1500 FFV	Nissan Leaf		Toyota Prius HEV	Nissan Altima HEV	Ford Escape HEV	Chevy Tahoe HEV	Chevy Silverado HEV	Chevy Volt	TBD	TBD			NYPA Current Fleet
	Purchase Cost		$	$16,000	$17,000	$19,000	$29,000	$16,000	$19,000	$32,780		$20,000	$21,500	$29,000	$46,500	$36,000	$40,280	$50,000	$50,000			NYS OGS Contract
	Fuel Economy	Elec	kWh/mi	NA	NA	NA	NA	NA	NA	0.34		NA	NA	NA	NA	NA	0.27	1.20	NA			
		E85	MPG	19.0	15.0	16.0	13.0	14.0	11.0	NA		NA	NA	NA	NA	NA	NA	NA	NA			EPA combined City/Highway
		GAS	MPG	26.8	21.2	22.6	18.3	19.7	15.5	NA		50.0	33.0	32.0	21.0	21.0	148.0	-9.9	-0.016	gal/mi		EPA combined City/Highway
	Emission Factors	CO_2-e	g/mi	406.2	514.5	482.3	593.6	551.2	701.5	109.6		217.7	329.9	340.2	518.4	518.4	159.7	(864.00)	(205.00)			Fuel WTW GHG & MPG
		NOx	g/mi	0.040	0.040	0.040	0.070	0.040	0.070	0.120		0.020	0.020	0.020	0.070	0.070	0.100	0.07	(0.05)			EPA Certification
		SO_2	g/mi	0.006	0.008	0.008	0.009	0.009	0.011	0.190		0.003	0.005	0.005	0.008	0.008	0.151	0.66	(0.002)			Fuel sulfur content & MPG
		PM	g/mi	0.010	0.010	0.010	0.010	0.010	0.010	0.006		0.010	0.010	0.010	0.010	0.010	0.007	0.00	0.00			EPA Certification
		VOC	g/mi	0.070	0.070	0.070	0.090	0.070	0.090	0.002		0.010	0.010	0.010	0.090	0.090	0.020	(0.22)	0.00			EPA Certification
																	75% EV Mode	Incremental Cost, MPG Incremental emissions				

STANDARD COMPLINACE OPTION 1A-1C COMBINED - OTHER ASSUMPTIONS

	#2	B5	B20	Gas	E85
M/HDV Fleet Fuel Use	23.0%	38.5%	38.5%		
LDV Fleet Fuel Use				100%	0%

EPAct Biodiesel AFV Credits:	19

	LDV	M/HDV
VMT Reduction	5%	0%

STANDARD COMPLINACE OPTION 1A-1C COMBINED - ANALYSIS

			AFVs Compliant With EPAct								Non-EPAct Compliant Vehicles								SUB-TOTAL NEW VEHICLES	REMAINDER OF FLEET		TOTAL
	Vehicle Type	Unit	COM SEDAN FFV	SEDAN FFV	COM SUV FFV	SUV FFV	PICKUP FFV	VAN FFV	COM SEDAN EV	SUB-TOTAL	COM SEDAN HEV	SEDAN HEV	COM SUV HEV	SUV HEV	PICKUP HEV	SEDAN PHEV	MD VAN EV	M/HDV UTILITY HEV	SUB-TOTAL		LDV	M/HDV	
COST	Fuel	$	$0	$1,698	$27,076	$0	$3,654	$2,322	$2,933	***$37,683***	$0	$4,363	$19,122	$0	$1,714	$3,545	$0	$0	***$28,744***	**$66,427**	$288,896	$420,165	**$775,488**
	Vehicle Purchase	$	$0	$17,000	$323,000	$0	$32,000	$19,000	$163,900	***$554,900***	$0	$86,000	$493,000	$0	$36,000	$201,400	$0	$0	***$816,400***	**$1,371,300**	NA	NA	**$1,371,300**
	TOTAL ANNUAL	$	**$0**	**$18,698**	**$350,076**	**$0**	**$35,654**	**$21,322**	**$166,833**	**$592,583**	**$0**	**$90,363**	**$512,122**	**$0**	**$37,714**	**$204,945**	**$0**	**$0**	**$845,144**	**$1,437,727**	$288,896	$420,165	**$2,146,788**
FUEL USE	Annual Fuel Use — Gas	GAL	0	542	8,650	0	1,168	742	0	11,102	0	1,394	6,109	0	548	389	0	0	8,439	**19,542**	92,299	0	**111,841**
	Annual Fuel Use — E85	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	**0**
	Annual Fuel Use — #2 D	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	26,541	**26,541**
	Annual Fuel Use — B5	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
	Annual Fuel Use — B20	GAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	44,427	**44,427**
	Annual Fuel Use — Elec	kWh	0	0	0	0	0	0	19,550	19,550	0	0	0	0	0	15,525	0	0	15,525	**35,075**	0	0	**35,075**
	Annual Petroleum Use	GGE	0	542	8,650	0	1,168	742	0	11,102	0	1,394	6,109	0	548	389	0	0	8,439	**19,542**	92,299	115,760	**227,601**
EMISSION	Annual Emissions — CO_2-e	ton	0.0	6.5	103.9	0.0	14.0	8.9	6.9	140.3	0.0	16.7	73.3	0.0	6.6	10.1	0.0	0.0	106.7	**247.0**	1,107.5	1,551.3	**2,905.8**
	Annual Emissions — NOx	lb	0.0	1.0	17.2	0.0	2.0	1.8	15.2	37.3	0.0	2.0	8.6	0.0	1.8	12.7	0.0	0.0	25.1	**62.4**	798.7	11,471.5	**12,332.6**
	Annual Emissions — SO_2	lb	0.0	0.2	3.2	0.0	0.4	0.3	24.1	28.2	0.0	0.5	2.3	0.0	0.2	19.2	0.0	0.0	22.2	**50.4**	34.6	22.5	**107.5**
	Annual Emissions — PM	lb	0.0	0.3	4.3	0.0	0.5	0.3	0.8	6.1	0.0	1.0	4.3	0.0	0.3	0.9	0.0	0.0	6.5	**12.5**	127.2	155.7	**295.5**
	Annual Emissions — VOC	lb	0.0	1.8	30.2	0.0	3.5	2.3	0.3	38.0	0.0	1.0	4.3	0.0	2.3	2.5	0.0	0.0	10.1	**48.1**	641.0	943.8	**1,632.9**
ANNUAL FLEET MILES		mi	0	11,500	195,500	0	23,000	11,500	57,500	299,000	0	46,000	195,500	0	11,500	57,500	0	0	310,500	**609,500**	2,307,475	1,074,600	**3,991,575**
																	Incremental emissions						

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