EXHIBIT 2

Hallandale Beach Green Paper on Alternative Fuels

"To enhance the quality of life of residents and visitors by protecting natural resources, environment, landscapes, tree canopy, heritage sites and planning for the conservation of these assets". (City of Hallandale Beach, 2012)

Chief Dwayne S. Flournoy, Hallandale Beach Police Department
Chief Daniel P. Sullivan, Hallandale Beach Fire Department
Captain Sonia Quinones, Hallandale Beach Police Department
Administrative Analyst Stephanie Shimko, Hallandale Beach Fire Department
Superintendent Fleet Services Reinhard Muller, Hallandale Beach Department of Public Works
Engineer Rafael Perdomo, Hallandale Beach Department of Public Works

Captain Sonia Quinones
11/6/2012

Overview:

Florida Statute 286.29 “Climate-friendly public business” recognizes the importance of energy efficient leadership by state government operations and outlines several policies to effect change at the level of procurement, maintenance, and reporting of fleet operations. (Florida State Legislature, 2012) Hallandale Beach’s Strategic Plan, written in concert with Mike Levinson, previous City Manager of the City of Coral Springs, reflects this goal of Environmental Sustainability. The City of Coral Springs demonstrates this leadership in their Sustainability Core Values statement to “Work toward efficient and cost-effective solutions to protect and conserve natural resources, while promoting green awareness in the Community.” (City of Coral Springs Strategic Plan Fiscal Years 2012 and 2013, 2012)

Migrating to alternative fuel sources represent significant up-front costs either in increased vehicle prices or the need to create infrastructure for fueling. Therefore, it is important for the project to be designed and implemented correctly the first time. Research conducted considers other cities’ environmental programs and the current environmental policy conditions of the State of Florida and the United States as a whole. Staff categorizes City fleet vehicles for fuel efficiency and use and recommends changes to policy which will allow us all to reduce the carbon footprint of City of Hallandale Beach operations for the betterment of our residents, our staff, and the global community. When costs are significant, staff presents green and lower cost alternatives where possible.

Research for this paper on the feasibility of using alternative fuels in the City’s vehicle fleet was able to identify success stories in other areas or municipalities or areas in other parts of the country, but was unable to find comparable local Florida cities or counties specifically utilizing alternative fuels in their fleet management successfully. The Cities of Hollywood and Sunrise both utilized compressed natural gas (CNG) in their vehicle fleets, but both discontinued these programs due to associated costs and performance complaints. The City of Sunrise encountered problems when the suppliers stopped making parts which caused them to become expensive or unavailable. This led them to discontinue all CNG vehicles in their entire city fleet. They have stated that they might revisit this idea as technology develops, but not anytime soon. The City of Hollywood’s Police Department complained of too frequent re-fueling stops and the lack of performance in CNG vehicles. A discussion with the local TECO People’s Gas Energy representative reveals currently there are no Police Departments utilizing Compressed

Natural Gas (CNG) in their service territory. The representative also confirmed Hollywood and North Miami Police are no longer using CNG in their patrol vehicles. Staff identified some significant alternative fuel success stories elsewhere and highlights a few here as illustration of components that assist in managing a successful transition.

In the Puget Sound area of Washington State, waste hauling vendors achieved "Evergreen" certification, which signifies a "cleaner than diesel" designation, by converting to natural gas and biofuels. This reduced annual greenhouse gas emissions by more than 2,000 metric tons annually. (US Deparment of Energy, 2011) Cities in this area belong to the Western Washington Clean Cities Coalition (WWCCC), an organization dedicated to promoting the use of cleaner domestic fuels and efficient transportation. (Western Washington Clean Cities, 2012) This success story demonstrates a nationwide trend in waste management fleet migration to alternative fuels as well as the impact of coalitions and regional initiatives.

Canyon County, Idaho's Fleet Manager Mark Tolman reduced the county's fleet from 325 units to 220 units in response to shrinking resources and high fuel costs. By teaming up with Treasure Valley Clean Cities, Tolman implemented a new replacement schedule that incorporated E85 and hybrid vehicles into the fleet and replaced air with nitrogen in every Canyon County vehicle tire. The county installed its own 12,000 gallon fuel tanks for gas and ethanol as well as its own mixing equipment. Further, Tolman collected data on police vehicle idling and identified five-hours of idling per day at a cost of one gallon/gas per hour. Next, the county installed idle-reduction equipment on 60 police vehicles eliminating 36 ghost miles and 100 pounds of carbon dioxide emissions per day per vehicle, illustrating that although significant initial costs may be incurred, the commitment to green energy can yield positive results. An interview with Mr. Tolman revealed Canyon County "built their own" idle-reduction system by purchasing and installing a separate absorbed glass mat (AGM) battery, powering the vehicle 3 to 4.5 hours, at a cost of $614 per vehicle.

The State of California launched the Low Carbon Fuels Infrastructure Initiative LCF13 to build 75 fuel stations. Funded by the American Recovery and Reinvestment Act (ARRA Project ID# ARRA VT-082) through 2014, this project has a budget of over $21M and boasts public sector partnerships with the State of California and the U.S. Department of Energy and private partnerships with industry giants such as 7-Eleven, Circle K and Zipcar. This project met ARRA goals by creating new sector jobs in an area hit hard by the economic recession, created long-term economic growth and spurred new alternative fuel markets by building 75 new alternative fuel stations.

(Harvey, 2012) This illustrates the desire of the private sector as well as the public sector to reduce reliance on traditional gasoline and highlights opportunities for collaboration.

Following in the footsteps of the LEED certified Foster Park Community Center, City staff therefore gladly researched options for the City to further reduce our carbon footprint. Staff presents this green paper with relevant research pertaining to options for alternative fueling for fleet vehicles. This research covers the pros and cons of each alternative fuel, compares projected costs and anticipated Return on Investment (ROI) and short-term versus long-term results with the anticipation of the City presenting a White Paper to publicly announce policy changes. Alternative fuels researched include biodiesel, electricity, ethanol, hydrogen, natural gas, and propane. This paper was developed as a collaborative effort between the Police Department, the Fire Department, and the Department of Public Works, Utilities and Engineering.

Alternative Fuels and Green Strategies:

Biofuel (biodiesel) – Biodiesel is a renewable fuel produced from vegetable oils, animal fats or recycled restaurant grease. It is nontoxic, biodegradable and burns cleanly. Temperature affects the performance of biodiesel and colder climates require lower percentages of biodiesel in the fuel blend. Using biodiesel reduces greenhouse gas emissions because of the concept of off-set: carbon dioxide released during combustion is offset by the carbon dioxide sequestered while growing soybeans and other feedstocks. (US Department of Energy) When compared to diesel, biofuel offers the same fuel efficiency. (How it Works)

Electricity – Electric vehicles are cleaner, quieter and run more efficiently than conventional vehicles. They are a possible solution for City vehicles that stay within City limits. An idling electric vehicle has a $0.12 cost per kilowatt hour. Electric vehicles require special fueling stations and moderate to significant time to refuel based on the voltage of the charger, require special certification for maintenance, and require different extraction techniques by first responders in cases of catastrophic motor-vehicle accidents. (US Department of Energy)

Hybrid Electric Vehicles – Hybrid vehicles utilize a traditional gasoline engine with an electric engine to compensate for the drawbacks of both. While electric cars pollute much less and consume less fuel, they do not have the power and performance possible with traditional vehicles. Hybrids are widely available, use less fuel and can be refueled anywhere, but they do incur significant up-front costs.

Ethanol (Flex fuel) – Biomass is the renewable resource that is the key ingredient in ethanol. To date, more than 95% of U.S. gas represents a low-level blend of ethanol which is primarily produced from corn. E85 is a high-level ethanol blend and may be used in flex fuel vehicles. Several steps are involved in creating ethanol which include growing and harvesting a crop, producing the ethanol and transporting it to market, mixing it with gasoline and finally distributing the product. The use of ethanol is required by the federal Renewable Fuel Standard (RFS). Some arguments were published stating the production of ethanol creates a negative energy balance due to the costs or production outweighing the benefits and the increase in wear and tear on engines. (US Department of Energy)

Hydrogen – Hydrogen is a potentially emissions –free alternative fuel that can be produced domestically, and is the simplest, most abundant element in the universe. While it is not widely used as a transportation fuel, research points toward a future of hydrogen fueled vehicles. Hydrogen has been used in space flight since the 1950's. There are currently only nine (9) hydrogen fueling stations in the U.S.

Compressed Natural Gas (CNG) – With natural gas prices the lowest in ten (10) years, this alternative fuel is forecast to become even cheaper and more abundant. However, converting fleet vehicles, especially first-responder vehicles to this solution has some significant drawbacks, the most noteworthy being the costs, which are outlined below. Natural gas also has some trade-offs. The refueling process is faster with higher cost compressors and tanks. Fast-fill tanks can act just like gasoline tanks. The lifespan of natural fuel cylinders must be considered when budgeting for conversions to CNG as well as the limited refueling infrastructure. While partnering with another city could address some of these drawbacks, the limited refueling infrastructure is a detriment that will not be remedied by the market anytime soon.

Propane – Propane is produced as part of natural gas processing, is clean burning and comprises 2% of the energy used in the United States. (US Department of Energy, 2012) The Jackson County, GA Sheriff reports conversion of their patrol cars to a hybrid propane/gas fuel system, funded by seized drug funds. Each vehicle operates two independent fuel systems, which allows the driver to switch from one to the other. Fueling time is less than natural gas fueling time and propane infrastructure is more plentiful in the Georgia area. The negative of installing propane fuel into police vehicles is space; propane conversion takes up nearly the entire trunk of the vehicle. The cost of a hybrid propane/gas fuel system is approximately $6,000.00, including installation.

Idle Reduction Equipment – Research identified idle-reduction equipment (known as the Independence Package or IP), from the GSA sole source vendor Energy Xtreme. The IP system is mounted underneath the vehicle and provides power to every electronic appliance imaginable including refrigerators for one to two and a half hours before needing to recharge via the vehicle's alternator. The vendor reports that installations in Texas and Nevada are saving eight (8) hours of idle-time, at 1.5 gallons/hour, resulting in a savings of 12 gallons of fuel per day. The lifetime of these units is estimated in charge cycles, the unit loses 15% of its charge capacity after 2,500 discharge cycles. This allows the vehicles to save fuel without sacrificing performance. However, they do represent significant initial costs, especially since Florida's hot and humid weather requires an additional unit to supply the power to operate the air conditioner without idling. These are most applicable to Police and Fire Rescue vehicles. An interview with Mark Boyds, Technical Services Manager for the City of Austin, Texas, revealed the City of Austin installed 450 IP packages in their police vehicles approximately a year ago. However, the City of Austin is "not using the IP packages as true anti-idling systems". Each of the 450 police vehicles are equipped with digital cameras requiring approximately four (4) hours of wireless upload to their computer server. At the end of an officer's shift, the vehicle is parked at the police station, the IP package is activated, and the uploading of the digital camera recording begins. The City of Austin does not have take-home vehicles or assigned vehicles. Mr. Boyds reports the IP packages have proven highly beneficial and provided cost savings to the City, as the vehicles are not idling for four (4) hours while upload is in progress. There are currently no law enforcement or fire rescue agencies utilizing IP packages in the State of Florida.

Fleet Considerations: Use, Maintenance and Replacement

Staff researched the availability of alternative fuel vehicles based on information from the last Florida Sheriff's bid and in-house research. While some of these vehicles have the option of being made to utilize various alternative fuels, they were not included in this study since they were either unavailable in our market or not included on the Sheriff's bid. Also included in the table are alternative fuel vehicles that were on the Sheriff's bid and considered in the past but are not available on the current Sheriff's bid. The results of this research are listed in the table below.

Make	Model	Gas	Hybrid	Electric	CNG
Chevy	Impala	20,159	–	–	–

Chevy	Caprice	25,924	–	–	–
Chevy	Tahoe	26,295	46,642	NA	–
Chevy	Cruze	17,389	–	–	–
Dodge	Charger	23,441	–	–	–
Ford	CVPI	NA	NA	NA	NA
Ford	Taurus (Int)	21,872	–	–	–
Ford	Expedition (Int)	25,328	–	–	–
Ford	Escape	18,247	NA	NA	NA
Ford	Explorer	22,699	–	–	–
Ford	Expedition	25,328	–	–	–
Ford	Fusion	16,667	23,414	–	–
Ford	F150	14,447	–	–	21,000
Ford	F250	17,589	–	–	27000 EST.
Ford	F350	19,635	–	–	35635 EST.
Ford	Econoline E350	23,564	–	–	42,584

Ford	Focus	14,892	–	–	–
Honda	Civic Hybrid	NA	NA	NA	NA
Honda	Civic CNG	NA	NA	NA	NA
Toyota	Prius	NA	19,683	NA	NA
Volt	–	–	–	37,150	–
Leaf	–	–	–	36,005	–

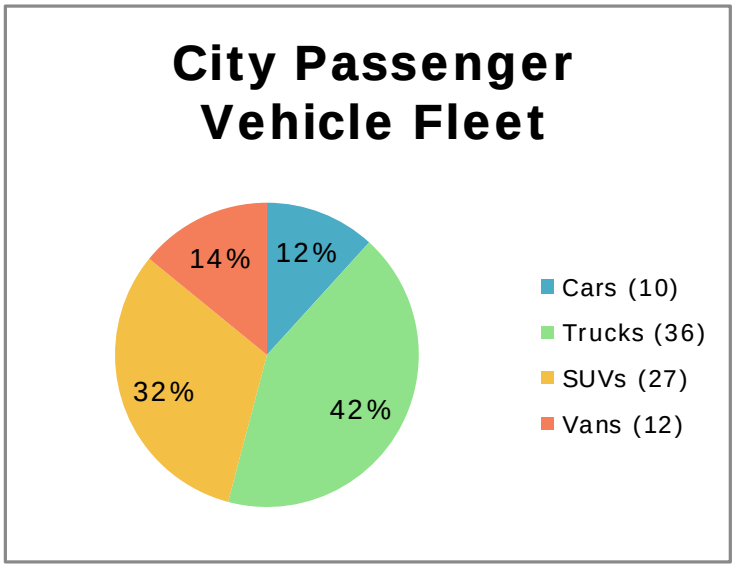
Staff reviewed City fleet vehicles and categorized them by how they were utilized by City employees, annual mileage, and gas consumption. They were then divided into four categories: passenger vehicles, rescue vehicles, police vehicles, and heavy diesel equipment.

Insurance costs were not included, as the City is self-insured. Taxes and fees were not included since the City is tax-exempt. Modifications and annual maintenance were taken as steady variables and were not included in the calculations. Any installation of modifications for vehicles, such as a police package, will be the same regardless of the engine's fuel type. After consulting with Fleet Management, most of the maintenance performed on vehicles would not change due to the type of fuel used, such as changing tires. Since this would not affect the bottom line concerning these vehicle purchases, it was taken into account but is not reflected in the charts.

Staff also attempted to review replacement schedules and depreciation, but this was very difficult due to the young age of the technology and the nature of our purchasing and selling procedures. Resale value and depreciation are usually taken from MSRP, but the City purchases from the Sheriff's bid and does not buy at retail prices, making it harder to assess depreciation since there are no standardized guidelines for this. Also, the City does not resell its vehicles in the traditional retail market. Instead, vehicles are auctioned which leads to inconsistent or unpredictable outcomes. According to the Department of Energy, "the cost of pre-owned alternative fuel vehicles can vary greatly depending on the local market, infrastructure, and incentives." Also, most of the alternative fuel vehicles available have not be around for 5 years, so staff was unable to find data on their potential resale value.

In order to aid in assessing the environmental impact of fuel choices, staff accounted for the "social cost of carbon" in the comparative calculations determined by carbon dioxide (CO_2) emissions per gallon of fuel type, miles per gallon (MPG) and annual mileage, as used by the EPA (See Appendix A). Based on a 2010 intergovernmental study regarding the cost of carbon, the accepted average value of $19 per ton was used.

Passenger Vehicles



Passenger vehicles are utilized by the City Clerk, Code Compliance, Developmental Services, Fire Prevention, Human Services, Parks and Recreation, Police Administration, and various operations under the Department of Public Works (DPW) including sanitation, storm water, grounds maintenance, ,facility maintenance and street maintenance. These vehicles rarely leave the city and therefore enjoy low annual mileage and little time idling overall. Because of this and the urban nature of our city, most vehicles in this category get close to industry stated city MPG although some city trucks and vans perform with decreased fuel economies of roughly 15-20% due to idling.

Passenger vehicles were divided into 4 categories: cars, trucks, SUVs, and vans. Staff compared vehicles on the 2012 Sheriff's bid which offered both gas powered and alternative fuel engines where possible. Fuel economy was acquired from Fueleconomy.gov. Fuel costs were obtained from fuel prices, MPG and annual mileage information supplied by DPW. Using this information, Staff used the cost calculator tool available from the Department of Energy to compare the true cost of ownership for a gas fueled vehicle and a hybrid as available on the Sheriff's bid. Below are the resulting charts for the Chevy Tahoe and Ford Fusion.

Chart 1: Cost of Ownership Comparison, Chevy Tahoe

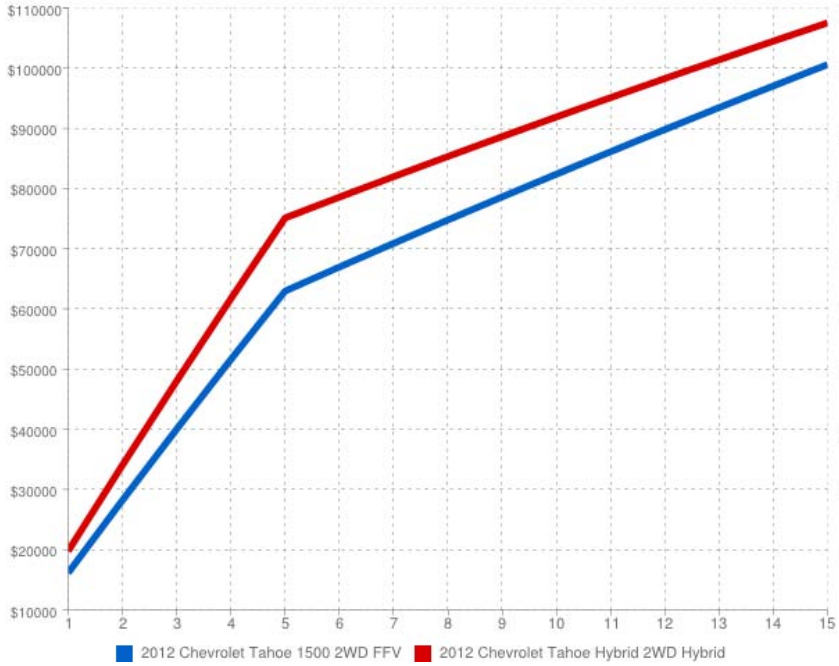
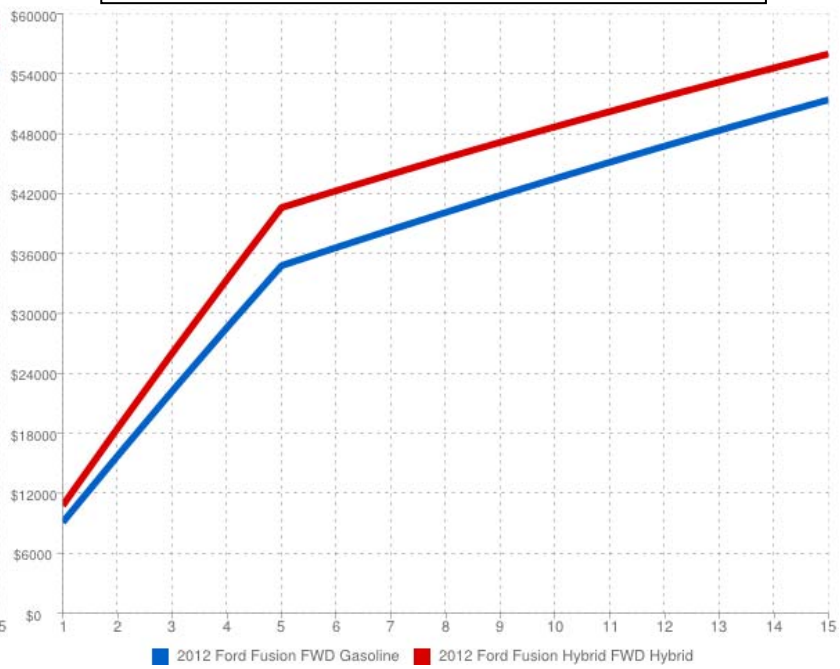


Chart 2: Cost of Ownership Comparison, Ford Fusion



The graphs clearly show that for the City's usage, the cost of owning hybrid vehicles as available on the Sheriff's bid will not save the City money. While alternative fuel vehicles offer decreases in fuel costs and carbon emissions, in its current state, the technology is much more expensive. This is confirmed by in house calculations in the breakdown charts below.

Passenger Vehicle Total 5 Year Cost Analysis

Make	Model	Engine	Dep't	Quantity	Sheriff's Bid	Total Initial Capital Cost	5 Yr Residual Value	Total 5 Yr Resale Value	Total Capital Cost
Chevy	Tahoe	Gas	Police	21	$ 26,295	$ 552,195	45%	$ 248,488	$ 303,707
Chevy	Tahoe	Hybrid	Police	21	$ 46,642	$ 979,482	45%	$ 440,767	$ 538,715
Ford	F250	Gas	DPW	5	$ 17,589	$ 87,945	49%	$ 43,093	$ 44,852
Ford	F250	CNG	DPW	5	$ 27,000	$ 135,000	49%	$ 66,150	$ 68,850
Ford	Econoline E350 Van	Gas	Any	3	$ 23,564	$ 70,692	unknown	unknown	cannot calculate
Ford	Econoline E350 Van	CNG	Any	3	$ 42,584	$ 127,752	unknown	unknown	cannot calculate
Ford	Fusion	Gas	Any	9	$ 16,667	$ 150,003	52%	$ 78,002	$ 72,001
Ford	Fusion	Hybrid	Any	9	$ 23,414	$ 210,726	43%	$ 90,612	$ 120,114
Ford	Escape	Gas	Any	5	$ 18,247	$ 91,235	54%	$ 49,267	$ 41,968

5 Year Fuel Costs Per Vehicle

Make	Model	Engine	Dep't	Fuel Cost	Total 2011 Miles Driven	City MPG	1 Yr Fuel Cost	5 Yr Fuel Costs
Chevy	Tahoe	Gas	Police	$ 3.83	8,416	15	$ 2,148.89	$ 10,744.43
Chevy	Tahoe	Hybrid	Police	$ 3.83	8,416	20	$ 1,611.66	$ 8,058.32
Ford	F250	Gas	DPW	$ 3.83	193,323	12	$61,702.26	$ 308,511.29
Ford	F250	CNG	DPW	$ 2.20	193,323	10	$42,531.06	$ 212,655.30
Ford	Econoline E350 Van	Gas	Any	$ 3.83	56,685	12	$18,091.96	$ 90,459.81
Ford	Econoline E350 Van	CNG	Any	$ 2.20	56,685	11	$11,337.00	$ 56,685.00
Ford	Fusion	Gas	Any	$ 3.83	17,657	22	$ 3,073.92	$ 15,369.62

Ford	Fusion	Hybrid	Any	$	3.83	17,657	41	$ 1,649.42	$	8,247.11
Ford	Escape	Gas	Any	$	3.83	63,374	20	$12,136.12	$	60,680.61

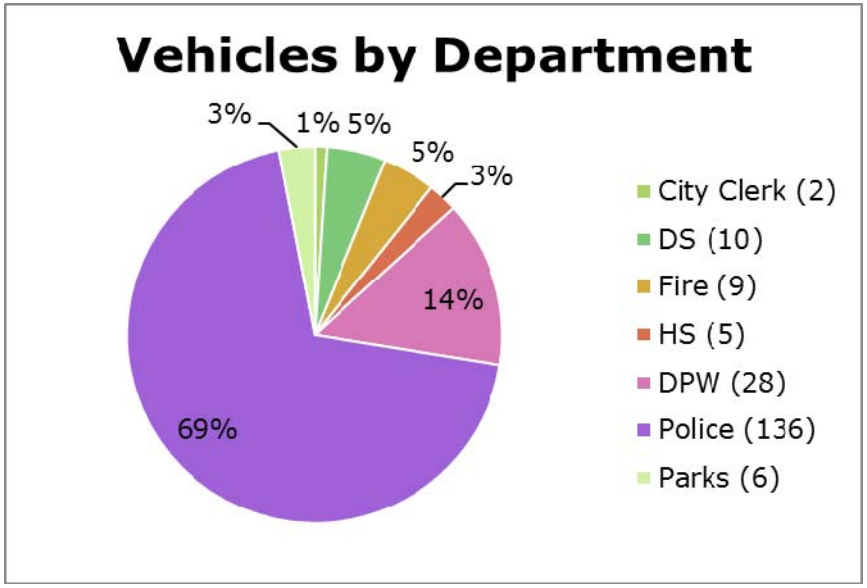
5 Year Carbon Costs Per Vehicle

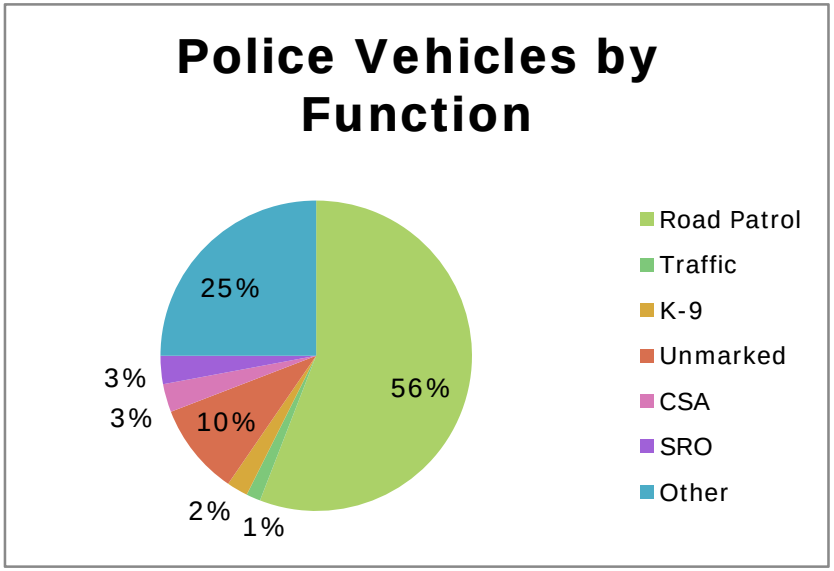
Make	Model	Engine	Dep't	Quantity	1 Yr CO2 Emissions	5 Yr CO2 Emissions	5 Yr CO2 Cost
Chevy	Tahoe	Gas	Police	21	4924482.133	24622410.67	$ 468
Chevy	Tahoe	Hybrid	Police	21	3693361.6	18466808	$ 351
Ford	F250	Gas	DPW	5	141399664.3	706998321.3	$ 13,433
Ford	F250	CNG	DPW	5	115517065.5	577585327.4	$ 10,974
Ford	Econoline E350 Van	Gas	Any	3	41460353.75	207301768.8	$ 3,939
Ford	Econoline E350 Van	CNG	Any	3	30792013.45	153960067.2	$ 2,925
Ford	Fusion	Gas	Any	9	7044340.409	35221702.05	$ 669
Ford	Fusion	Hybrid	Any	9	3779889.976	18899449.88	$ 359
Ford	Escape	Gas	Any	5	27811679.9	139058399.5	$ 2,642

As expected, the hybrid vehicles and CNG vehicles pollute less than the traditional gas vehicles. Hybrid vehicles are the most environmentally friendly. However, savings in fuel and even including the social cost of carbon does not compensate for the increase in initial capital cost.

Police Vehicles

Most of the City Fleet (69%) is in the Police Department. The Police Department uses vehicles for road patrol, traffic, canine (K-9) units, covert assignments, Community Service Aides (CSA), School Resource Officers, (SRO) and administrative functions. Police previously purchased vehicles with alternative fuel capabilities and currently has several E85 ethanol flex fuel vehicles in the fleet. There is one gasoline station in our City offering E85 fuel (U-Gas on West Hallandale Beach Boulevard), but this capability has not been used to date.





Uniform patrol division police vehicles idle for an estimated five hours a day, as police staff uses their vehicles as an office. When an officer pulls someone over, observes an area for suspicious activity or writes a report, their engine idles. While not in use, the vehicle idles and industry projections document that one hour of idling costs one gallon of gas. This results in a departmental average fuel economy of 10.71 MPG instead of the expected city MPG of 16, a 33% reduction in fuel economy. The reduced fuel economy for the department due to idling of patrol vehicles is $110,011.28 per year ($550,056.40 over 5 years), a significant expenditure, and approximately .42 tons of carbon emissions into the atmosphere per year (2.1 tons over 5 years).

Research identified idle-reduction equipment (known as the Independence Package or IP), also from the vendor Energy Xtreme, that would cost $6,000 per vehicle. Installation prices are approximately $575 per unit. The base cost of the product is $3,000, but due to South Florida's hot and humid environment, an additional $3,000 is required to purchase the package which allows officers to run an air-conditioning unit. This option would require significant capital improvement costs up front, but result in significant fuel savings after vehicles drive for 12,000 miles annually. The police fleet has 15 vehicles that are operated approximately 12,000 miles annually.

Status	Make	Model	Sheriff's Bid	IP Costs	Total Initial Capital Cost	Fuel Cost	Total 2011 Miles Driven	City MPG	1 Yr Fuel Cost	5 Yr Fuel Costs	Total 5 Yr Cost
Currently	Chevy	Tahoe	$26,295	$ -	$ 26,295	$ 3.83	8,416	10.71	$ 3,009.64	$ 15,048.22	$ 41,343.22
With IP	Chevy	Tahoe	$26,295	$ 6,575	$ 32,870	$ 3.83	8,416	16	$ 2,014.58	$ 10,072.90	$ 42,942.90
Currently	Chevy	Tahoe	$26,295	$ -	$ 26,295	$ 3.83	9,000	10.71	$ 3,218.49	$ 16,092.44	$ 42,387.44
With IP	Chevy	Tahoe	$26,295	$ 6,575	$ 32,870	$ 3.83	9,000	16	$ 2,154.38	$ 10,771.88	$ 43,641.88
Currently	Chevy	Tahoe	$26,295	$ -	$ 26,295	$ 3.83	10,000	10.71	$ 3,576.10	$ 17,880.49	$ 44,175.49
With IP	Chevy	Tahoe	$26,295	$ 6,575	$ 32,870	$ 3.83	10,000	16	$ 2,393.75	$ 11,968.75	$ 44,838.75
Currently	Chevy	Tahoe	$26,295	$ -	$ 26,295	$ 3.83	11,000	10.71	$ 3,933.71	$ 19,668.53	$ 45,963.53
With IP	Chevy	Tahoe	$26,295	$ 6,575	$ 32,870	$ 3.83	11,000	16	$ 2,633.13	$ 13,165.63	$ 46,035.63
Currently	***Chevy***	***Tahoe***	***$26,295***	***$ -***	***$ 26,295***	***$ 3.83***	***12,000***	***10.71***	***$ 4,291.32***	***$ 21,456.58***	***$ 47,751.58***
With IP	***Chevy***	***Tahoe***	***$26,295***	***$ 6,575***	***$ 32,870***	***$ 3.83***	***12,000***	***16***	***$ 2,872.50***	***$ 14,362.50***	***$ 47,232.50***

The lifetime of these units is estimated in charge cycles, the unit loses 15% of its charge capacity after 2,500 discharge cycles. Staff projects HBPD units will use two charge cycles per day and projects the product producing six years of service prior to losing 15% of its charge capacity. The city would recoup its investment in a 5 year timeframe if it purchased an IP package for each of the 15 road patrol vehicles that travel more than 12,000 miles per year or more. This would also reduce carbon emissions while saving money, as illustrated in the table below. The columns in white reflect the IP carbon emissions compared to the unaltered units in the green. Over a five year period, each car would release almost 17 less tons of carbon into the atmosphere without increasing costs.

Status	Make	Model	Total 2011 Miles Driven	City MPG	1 Yr CO2 (Tons)	5 Yr CO2 (Tons)
Currently	Chevy	Tahoe	8,416	10.71	6.90	34.49
With IP	Chevy	Tahoe	8,416	16	4.62	23.08
Currently	Chevy	Tahoe	9,000	10.71	7.38	36.88
With IP	Chevy	Tahoe	9,000	16	4.94	24.69
Currently	Chevy	Tahoe	10,000	10.71	8.20	40.98
With IP	Chevy	Tahoe	10,000	16	5.49	27.43
Currently	Chevy	Tahoe	11,000	10.71	9.01	45.07
With IP	Chevy	Tahoe	11,000	16	6.03	30.17
Currently	Chevy	Tahoe	12,000	10.71	9.83	49.17
With IP	Chevy	Tahoe	12,000	16	6.58	32.91

Rescue Vehicles

Rescue vehicles present a significant challenge to alternative fuel strategies. Medical rescue vehicles, fire engines, and the ladder truck must possess significant power to respond to all types of emergencies within the City and must be available all day every day. There are currently no available alternative fuel vehicles for fire or rescue trucks. There are prototypes of CNG rescue trucks, but they are not yet on the market. CNG canisters require eight (8) hours for refueling, which makes this option impractical for vehicles that run 24-7.

Staff instead analyzed the benefits of installing idle reducing equipment on the rescue trucks. In regards to the time these vehicles spend idling on scene, staff identified a product which may increase fuel efficiency. Currently, Energy Xtreme, the GSA sole source vendor for this product, offers several versions of the IP for EMS vehicles, based on kilowatt pull by the vehicle. Prices range from $11,995 for a 4kwh system to $15,995 for an 8 kwh system. Staff currently does not have data about expected fuel economy in rescue vehicles with or without the

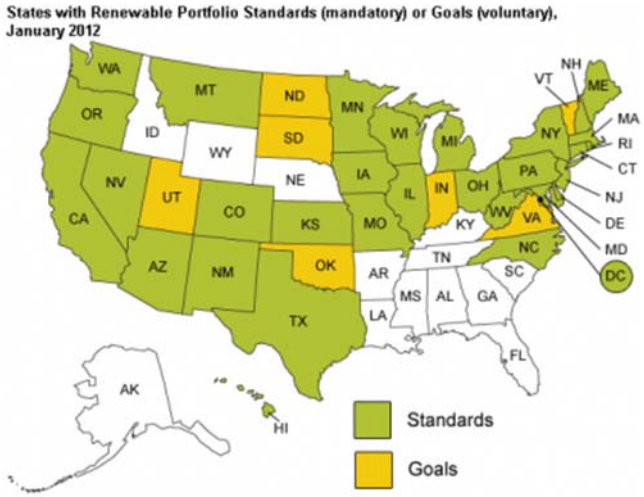
power management system to do an analysis of this option, but we can assume that the fuel economy savings are similar or greater than that of police vehicles.

Diesel Vehicles

Diesel vehicles represent the work-horses of the fleet. DPW heavy weight trucks represent strong tools when responding to emergencies within the City and working significant public works projects. These vehicles may be low on mileage but represent significant costs in maintenance and upkeep as well as idling costs.

Available Incentives:

Research at the Vehicle Technologies Division of the Federal Department of Energy found that most of the incentives for the purchase of alternative fuel vehicles were funded with limited grants from 2006-2008 and the American Recovery and Reinvestment Act of 2009. Most grants expired in 2010 and the rest expired in 2011. Under current fiscal conditions, they do not expect these incentives to return.



Unfortunately, there are no incentives for the City via State funding. Florida is one of 12 remaining states that have no standards and no targets for alternative fuels. (Association) Most of the remaining incentives are for research and development of alternative fuel sources for businesses in the energy sector.

Suggestions:

City driven vehicles: Due to the low mileage and maintenance costs of these vehicles, Staff recommends maintaining these as a gas fueled component of the fleet. The initial costs of switching to alternative fuels cannot be recouped by fuel savings due to lowered fuel costs because the vehicles simply are not driven enough and do not use a lot of fuel. Costs for hybrid and electric vehicles unfortunately far exceed the gas and maintenance costs of comparable vehicles. However, staff recommends replacing the air in the tires of each vehicle with Nitrogen which has been shown to reduce tire wear and tear, thus extending tire life and improving MPG.

Staff recommends replacing a significant majority of fleet vehicles prior to 2017 where possible due to the Corporate Average Fuel Economy (CAFE) regulation which mandates increased fuel efficiency by 2017. The implementation of CAFÉ regulation requires manufacturers to hit incrementally higher fuel efficiency targets and Staff anticipates increased costs for these compliant vehicles; Staff therefore recommends replacing gas driven vehicles while they are still cheaper.

Rescue Vehicles: Staff suggests researching the feasibility of installing innovative power management systems to reduce the fuel and environmental costs of idling. Prices for EMS vehicles vary from $11K - $15K, which does not include installation. Energy Xtreme recently released a new system that offers a payback period in under one year, making this a good investment in our environment and our finances.

Police Vehicles: Police vehicles must possess the raw power to respond immediately within the City limits. These vehicles are not ideal candidates for conversion to alternative energy sources for a number of reasons. Electric, hybrid, and CNG vehicles have not proven the capability to provide the necessary power needed by these vehicles in times of crisis. Hybrid propane/gas fuel conversion kits are an option but propane conversion takes up nearly the entire trunk of the vehicle. A demonstration provided by Ensida Energy of a Chrysler 300 vehicle, equipped with a Hemi engine with a hybrid propane/gas fuel conversion kit, along with a test drive of this vehicle, resulted in no loss in power or performance. If authorized, the representatives of Ensida Energy offered to install two (2) propane systems in our police vehicles for testing purposes, at no cost to the City.

Staff suggests the purchase and installation of several IP packages in our highest use (+12,000 miles annually) vehicles in order to test for cost savings. While manufacturers project that with rising fuel and maintenance costs, these idle-reduction systems can pay for themselves in two years (Moore, 2012), analysis specific to our City shows it would pay for itself between 5-6 years. This is more cost-effective for our City while simultaneously reducing our carbon footprint.

Refuse Haulers/garbage trucks: The City's purchase of two (2) refuse haulers with compressed natural gas (CNG) has the potential for positive public relations and potential revenue to the City. The addition of four (4) more trucks to this fleet will significantly reduce the carbon footprint of current garbage collection which the City may use as a platform to positively promote its green initiatives and brand the City as South Florida's Vanguard Green City.

The procurement of CNG distribution equipment and the installation of a CNG fueling station will allow the City to sell surpluses to neighboring Cities and to the public for a potential revenue stream. An alternative to procuring the CNG cell fueling equipment is to partner with a neighboring City or with the private sector on this big ticket item, creating a win-win for each city involved.

Promote "Green/Alternative Fuel" Branding and Lobby for State Incentives: Staff recommends following the footprints of the City Manager's intention to "brand" the City of Hallandale Beach and market the City as South

Florida's Vanguard Green City. Finding no comparable South Florida success stories, staff recommends the City invest in branding itself as the green city of South Florida by adopting the suggestions and presenting this research formally as a White Paper to the Commission for approval. Staff recommends Commissioners incorporate these changes into their discussions with other South Florida leaders, locally and at the State level, to bring awareness to this important effort and to achieve greater awareness in Florida.

Staff suggests lobbying state legislature to increase alternative fuel and "green" incentives. Staff proposes the City Commission instigate changes at the level of state legislature to take FS286.29 many steps further. Staff recommends this will include lobbying the Florida State legislature to pass legislation to increase and improve Florida alternative fuel infrastructure along the lines of the California Low Carbon Fuel Infrastructure Investment Initiative (LCF13) and build coalitions like the Western Washington Clean Cities Coalition (WWCCC). (Harvey, 2012) (US Deparment of Energy, 2011)

Build an Alternative Fuel Center at DPW: Staff suggests viewing the DPW existing infrastructure, staff capabilities, and land as assets in the promotion of green initiatives within and beyond the City's physical limits. Staff views the DPW facilities as a tremendous example of existing infrastructure on which to design and implement green initiatives and offers the potential to create additional revenues for the City. Staff suggests designing and creating an alternative fueling station within or near the DPW compound, perhaps at the Ansin Boulevard facility, especially for CNG.

With its prime location in south Broward County, the City is poised to be able to brand itself as a Vanguard Green City, offering alternative fueling options for residents, businesses and other government agencies within the surrounding area. This installation could provide DPW opportunities to generate revenues for the City. This project could be partnered with the Fort Lauderdale Airport (to convert taxis to alternative fuels), with green companies such as Whole Foods, and with LEED certified contractors.

It is with tremendous honor staff submits this research and suggestions to the City Manager for review.

Appendix A: Calculating the "Social Cost of Carbon"

CO_2 Emissions from a gallon of gasoline: 8,887 grams CO_2/gallon

CO_2 Emissions from a gallon of diesel: 10,180 grams CO_2/gallon

CO_2 Emissions from an equivalent to a gallon of CNG: 7,287 grams CO_2/gallon

$$Annual\ CO_2\ emmissions\ per\ mile = \frac{CO_2\ per\ gallon\ of\ gas}{MPG}\ X\ miles\ driven$$

Bibliography

City of Coral Springs Strategic Plan Fiscal Years 2012 and 2013. (2012). Retrieved from City of Coral Springs: http://www.coralsprings.org/Publications/Budget_FY2012/StrategicPlan2012-2013.pdf

Western Washington Clean Cities. (2012). Retrieved from Western Washington Clean Cities: http://www.wwcleancities.org/

Association, F. R. (n.d.).

City of Hallandale Beach. (2012). Annual Budget Fiscal Year 2011-2012, City of Hallandale Beach. p. 4.

True Cost to Own for all presented vehicles. Retrieved from Edmunds.com: http://www.edmunds.com/

Environmental Protection Agency Office of Transportation and Air Quality. (2011) *Greenhouse Gas Emissions from a Typical Passenger Vehicle*.

Floriday State Legislature. (2012). *The 2012 Florida Statutes*. Retrieved from Online Sunshine: http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0200-0299/0286/Sections/0286.29.html

Harvey, S. (2012). *California Low Carbon Fuels Infrastructure Investment Initiative (LCF13).* California Department of General Services.

How it Works. (n.d.). Retrieved from Discovery Channel: http://www.hielscher.com/ultrasonics/biodiesel_ultrasonic_mixing_reactors.htm?gclid=CPme3tri2bMCFQ4EnQodSSEAVA

Moore, M. (2012, October 17). NBC Story on EMS Idle Reduction Product. Austin, TX. Retrieved from http://www.youtube.com/watch?v=wovcrlgdmms

Interagency Working Group on Social Cost of Carbon, United States Government. (2010). *Techinical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*.

US Deparment of Energy. (2011, October 01). *Alternative Fuels Data Center: Seattle's Waste Haulers are Going Green*. Retrieved from Alternative Fuels Data Center: Seattle's Waste Haulers are Going Green: http://www.afdc.energy.gov/case/1053

US Department of Energy. (n.d.). Retrieved 10 18, 2012, from www.afdc.energy.gov/fuels/ethanol_fuel_basics.html

US Department of Energy. (2012, 10 18). *Energy Efficiency and Renewable Energy*. Retrieved from www.afdc.energy.gov/fuels/propane_benefits.htm.

US Department of Energy. (2012, 10 18). *Energy Efficiency and Renewable Energy*. Retrieved from www.afdc.energy.gov/vehicles/propane.html

US Department of Energy. (n.d.). *US Department of Energy*. Retrieved from www.afdc.energy.gov/fuels/electricity_basics.htm.

US Department of Energy. (n.d.). *US Department of Energy*. Retrieved from Alternative Fuel Data Center: www.afdc.energy.gov/fuels/biodiesel_benefits.html

US Deparment of Energy. (2012). Vehicle Fule Economy Information. http://www.fueleconomy.gov/feg/noframes