

City of Hallandale Compressed Natural Gas (CNG) Filling Station & Fleet Conversion Market Guidance Findings

Lambert Advisory (Lambert) has completed its research associated with the development of a CNG filling station on a 2.74 acre City of Hallandale Beach (City) owned property along Ansin Boulevard. The site just east of Interstate 95, with appropriate signage, will be able to enjoy good visibility from the Interstate. This memorandum highlights our findings.

Summary

Lambert researched trends in the CNG market and conducted a variety of interviews with relevant industry officials covering:

- Current Industry Trends
- Public Sector Efforts
- Private Sector Efforts
- Other Considerations

Our research has indicated the following:

- Many of the largest public and private fleet owners of localized fleets (large municipalities, intra-city express package delivery vehicles, trash haulers) throughout Florida and the United States are converting their fleets to CNG given that to obtain the same equivalent performance of a gallon of gasoline or diesel (Gas Gallon Equivalent – GGE), CNG is approximately 50% of the cost. Given the prevalence of natural gas domestically, this ratio is expected to hold for some time into the future. Additionally, CNG produces less carbon admissions and is expected to reduce vehicle maintenance over the long term;
- Larger inter-city fleets of long haul trucks are also beginning to convert their fleets to natural gas as well given the potential savings, but these trucks require Liquid Natural Gas (LNG) rather than CNG for a variety of technical reasons. These trucks are principally 18-wheeler trucks which utilize the nation's highway system. Despite the potential savings, the conversion of these vehicles to LNG has principally been slowed due to the lack of refilling infrastructure in cities and along the interstate system;
- The capital costs associated with CNG filling stations is approximately \$250,000 per rapid filling station with a minimum of eight filling stations given the need to spread common infrastructure and equipment cost. The minimum economically efficient CNG filling station is approximately \$2.0 million to development net of the cost of land. LNG filling stations, given that LNG requires major cooling infrastructure is approximately double that of CNG for an equivalent number of hookups;

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- In addition to cost of the fueling station, there is also a cost of converting a fleet to CNG from gasoline or diesel. This cost is substantial. For example, sanitation trucks cost approximately \$65,000 per vehicle to convert and the cost per vehicle for a new truck is \$40,000 to \$50,000 per vehicle higher for CNG than for gas or diesel. Additionally, the cost of converting or expanding maintenance facilities needs to be accounted for as well;
- Given a reasonable understanding of the cost of building the CNG infrastructure and converting an existing fleet or purchasing a new fleet, the metric for cost recovery through savings from utilizing natural gas over gasoline or diesel is a reasonably straight forward calculation. To recover the capital cost of infrastructure and conversion in approximately 5 years, a fleet of 70 vehicles which drive 40,000 plus miles a year would have to be converted (Appendix A – Conversion Analysis). While Hallandale Beach meets the threshold in fleet size, the small size of the municipality means that it never comes close to meeting the mileage threshold;
- Given the rapidly changing natural gas market, expansion of infrastructure throughout the United States and substantially longer than five year time frame to recover the cost of investment we do not recommend the City develop a facility for its own purposes exclusively. Likewise, we have interviewed a number of municipalities which have developed CNG facilities and have accommodated the utilization of private fleets but this business has turned out to be a modest part of the utilization of most of these facilities given that the fleets need to be utilized principally within a seven to ten mile radius of the refueling facility so that to-and-from drive time is minimized;
- While the time frame to recover the City's infrastructure investment given the relative miles per year its fleet travels may be too long to comfortably project, given the strong location and visibility of the Ansin Boulevard site and the economic and environmental benefits of converting a fleet to CNG we do recommend that the City issue a solicitation to identify a private development/fleet partner who would make the required investment in the refueling facility in return for a long term agreement with the City to purchase fuel from the facility at preferred rates. Likewise, the City should explore the potential of concurrently allowing the investor the rights to develop a LNG fueling station in addition to the CNG station on site to capture the soon to be expanding I-95 truck traffic which will run on LNG fuel;
- As it relates to issuing the solicitation, we strongly recommend two other elements. First, the City needs to move very quickly given that the market appears to be changing and expanding so rapidly that there is likely to be increased competition from other municipalities and strong sites in the near future to establish large refueling stations. Second, the City should strongly consider taking any value of its land through a long term reduction in CNG cost rather than any participation in revenue from the land lease

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given the rapidly changing nature of the industry. This would take a form of a fixed percent below the best customer rate and concurrently benchmarked against the regional or national CNG gas gallon equivalent retail cost.

Current Industry Trends

Beyond the documented environmental benefits of burning cleaner natural gas in local truck fleets, conversion programs began growing at an accelerated rate in 2008 as the average price of gasoline reached \$4.00 a gallon and have generally hovered between \$3.00 and \$4.00 since then. Diesel fuel prices typically are 15 to 20 percent higher than unleaded gasoline.

CNG prices can range from 30 to 60 percent lower than diesel fuel price per Gas Gallon Equivalent (GGE), which is broadly defined as the amount of natural gas required to drive the same number of miles under the same operating conditions as diesel. Savings have averaged 50 percent over the past several years.

The growing gap between diesel fuel and CNG has facilitated increased efforts by units of government as well as private sector industries to convert vehicles to CNG or LNG, especially those with truck fleets that use diesel fuel (typically Class 6, 7 and 8 trucks).

Public Sector Efforts

Up until the present, California, Texas, Arizona, Louisiana and Michigan have maintained the most aggressive public sector CNG conversion programs. Besides the environmental benefits and the savings from eventual payback of conversion these states have extensive natural gas pipeline infrastructure.

Florida is beginning to make in-roads, but biggest issue in Florida is infrastructure – most notably, lack pipeline infrastructure to provide supply, which is more cost effective than providing supply by tanker truck.

However, Hallandale Beach would not be the first unit of government in the State to convert its fleet to natural gas. Public sectors conversion programs among units of government in Florida to date include:

- ✓ **In 2012, the City of Clearwater Solid Waste Department**, in partnership with Clearwater Gas System (owned by the City) built the first CNG facility in the Tampa Bay area. The facility cost \$2.0 million and eight pumps/hoses on two islands (four per island). The City has a fleet of 70 solid waste trucks that will be replaced with new trucks designed to run on CNG. The replacement program will take 6-7 years at a cost of \$200,000 per truck. The City chose the replacement option over conversion of the existing fleet, which would have cost \$65,000 per truck on an older fleet of trucks since many of the trucks in the City's fleet were going to require

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replacement in the near future in any event. Since the opening of the facility, the City has entered into contracts with Verizon to provide CNG to 13 of their service vans locally, and two waste/recycling trucks owned by a local private company. The City estimates that over the long term, 80% of demand will be for City Solid Waste Trucks and 20% for other users, with a 7+-year payback. They plan to open the facility to the public in the next year. Current price for CNG at the facility is \$2.05/gallon.

- ✓ **Energy Services of Pensacola (ESP, which is owned by the City of Pensacola), in partnership with the Emerald Coast Utilities Authority (ECUA), opened the panhandle's first CNG facility in November 2012.** The facility cost \$1.8 million. As part of the effort, the City of Pensacola and ECUA agreed to transition their vehicle fleets to CNG. ECUA plans to ultimately convert 275 vehicles over the next 10 years. ECUA expects savings of \$250,000 per year in maintenance costs and \$1.0 million a year in fuel costs. Under the terms of the agreement, ECUA will pay ESP a monthly transportation charge as well as an indexed price per diesel gallon equivalent of CNG fuel used by ECUA vehicles. Two other stations are planned for the Pensacola area, including one in Gulf Breeze. Current price for CNG at the facility is \$2.05/gallon
- ✓ **Hillsborough County Aviation Authority (Tampa International Airport) opened a CNG facility in March of 2012.** The Authority plans to convert 83 its 115 vehicle fleet to CNG within the next ten years. The Authority anticipates fuel cost savings of \$1.0 million over the first five years and payback on investment over the same time period. The facility was built by Clean Energy Fuels (T. Boone Pickens) (costs were not reported). Through an agreement with the Aviation Authority, Clean Energy will also operate and maintain a "turnkey" facility at the airport for a term of 20 years and pay the Authority rent as well as royalties on CNG sales. TECO People's Gas will supply the natural gas pipelined to the facility. The facility is open to the public. Current price for CNG at the facility is \$2.34/gallon
- ✓ **City of Milton, in cooperation with Natural Gas of Milton, opened a public access CNG fueling station in January 2103.** Funds for the facility were provided through a federal grant. Current price for CNG at the facility is \$1.98/gallon.

Other units of government in Florida have already made the conversion or are planning CNG conversion programs for vehicle fleets. A number of these agencies reportedly have received grants through the Florida Energy Office of Department of Community Affairs. These include:

- ✓ Miami-Dade Aviation Authority
- ✓ Palm Beach County
- ✓ Broward County, which reportedly has three CNG fueling stations including: Commercial Blvd Station, SW 4th Avenue Station and Andrews Avenue Station.

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- ✓ Palm Beach Gardens
- ✓ City of North Miami
- ✓ City of Deerfield Beach
- ✓ City of Sunrise
- ✓ City of Leesburg
- ✓ Sarasota County Sheriff's Department

Private Sector CNG Efforts

Heavily driven by economics and with a secondary benefit of enhancing their green credentials, waste management companies are one of the leading industries converting fleets of Class 7 and 8 trucks from diesel fuel to CNG.

Waste Management Inc., based in Houston, with operations throughout North America, has a fleet of 17,000 Class 8 truck vehicles. Currently, 1,400 have been converted to CNG. Waste Management plans to convert all 17,000 over the next 5 years. They have also developed 28 CNG fueling stations in North America, with plans to have 50 stations by the end of 2012 or early in 2013.

Existing or planned facilities by Waste Management of Florida Inc., as well as other waste management companies in Florida include:

- ✓ Waste Management Inc., of Florida opened a CNG fueling station in Pompano Beach. The "Clean N' Green" station opened in November 2012. The station will serve its fleet of 75 trucks at the Pompano Beach facility and be open to units of government and commercial fleets. The CNG trucks service Cooper City, Coral Springs, Dania Beach, Davie, Lauderdale Lakes, Lighthouse Point, Margate, Parkland, Plantation, Pompano Beach, Tamarac, Wilton Manor and unincorporated Broward County. ET Environmental built the facility, which was funded by Waste Management. The cost of development is not available however the current price for CNG at the facility is \$2.20/gallon.
- ✓ Waste Management also has a slow fill CNG facility in Sarasota and plans to open two other two other facilities in Palm Beach County and Tampa Bay in 2013.
- ✓ In 2009, Choice Environmental Services (Choice), a provider of solid waste and recycling services to south Florida communities, became one of the first waste management companies in Florida to convert a portion of their fleet of trucks to CNG. In late October of 2009, Choice also opened a CNG refuse truck fueling station,

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in Pompano Beach, which was designed, built and is being operated by Clean Energy Fuels Corp. Natural gas is supplied by TECO People's Gas.

- ✓ Waste Pro has partnered with Clean Energy Fuels to build and operate a “multi-million dollar” CNG facility in Fort Pierce, Florida. Waste Pro plans to convert 150 of its truck fleet to CNG. Waste Pro operates in 115 communities with plans to open additional facilities throughout the south, including Florida.
- ✓ JJ Taylor Companies of Tampa (a beer distributor) is replacing its 95-unit fleet running on diesel fuel to CNG. As of the program they also plan to build a CNG fueling station for their operations in Tampa and Ft. Myers.

There are also several companies with semi/tractor trailer truck fleets which are implementing pilot programs to test the effectiveness of converting to Liquid Natural Gas (LNG) given that these long haul vehicles cannot yet run on CNG. Some examples include:

- ✓ Wal-Mart;
- ✓ UPS;
- ✓ Staples;
- ✓ Tyson Chicken;
- ✓ Con-way Freight; and,
- ✓ Ryder

Companies with large Class 8 truck fleets (tractor trailers) which require LNG fuel have been proceeding more cautiously about implementing a comprehensive conversion program than their local and governmental fleet counterparts. The principal reasons are as follows:

- ✓ The cost of a new truck running on CNG cost \$35,000± more than a truck running on diesel fuel, while the cost of a new truck running on LNG cost \$65,000 more than a truck running on diesel fuel. Alternatively, it costs anywhere from \$5,000 to \$80,000 to convert existing trucks running on diesel fuel to CNG or LNG;
- ✓ Uncertainty over the cost to maintain a truck running on LNG; and,
- ✓ Lack of fueling stations which is especially the case in Florida at this point.

As it relates to the lack of fueling stations, substantial change appears to be on the way. Clean Energy Fuels Corporation was in the process of building 70 LNG stations in 2012 and is planning to open another 80 stations in 2013. They are building these stations along some of the busiest truck routes in the United States, about 250 to 300 miles apart so that trucks running on LNG can be fueled easily. Clean Energy is working with Flying J and Pilot to add LNG pumps at existing truck stops throughout the country. Given the strong location with

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potential sign visibility from I-95 of the Ansin Boulevard site, designing the facility to accommodate LNG “pumps” to complement the CNG filling station may be wise. If a growing number of intercity vehicles are converted to LNG, the site may be well positioned to capture I-95 truck traffic.

Finally, there is a growing market niche for passenger cars running CNG. Honda is the market leader in the small market niche for passenger cars. Other manufacturers that offer a CNG option include:

- ✓ Ford
- ✓ BMW
- ✓ Volvo
- ✓ Mercedes
- ✓ Volkswagen
- ✓ Chevrolet – Cavalier model

This market will continue to grow, and making sure that facilities are open to the public will only further support the move to cleaner natural gas for vehicular fuel and broaden the revenue potential of the facility. However, as natural gas becomes ubiquitous, existing filling stations will seek to add CNG filling capacity and the prime locations along Hallandale Beach Boulevard will become competitors for auto refilling. Trucks will be the principal source of business for the facility over the long term.

Other Considerations

Currently, there are two types of CNG fuel systems available: dedicated vehicles or conversions that run solely on CNG and normally have a fuel capacity equal to or larger than the original gasoline or diesel tank and bi-fuel vehicles that have the ability to run on either CNG or gasoline/diesel. These bi-fuel vehicles typically retain their original gasoline/diesel tank and are retrofitted with an additional, smaller-capacity CNG tank. While it is beyond the scope of our analysis to determine which better meets the City’s need, the amount of fuel utilization and infrastructure investment will depend upon which system is chosen.

Based upon our interviews the cost to build a facility is a minimum of \$1.0± to \$2.0million for a CNG facility (\$250,000± per pump/hose) and \$3.0 to \$4.0 million for LNG facilities given the additional cooling equipment required. One of the reasons why multiple pumps or hoses are needed is the desire to maintain “quick fill”, however all quick fill CNG equipment systems need recovery time—i.e., adequate time for the ground storage tanks to be recharged (refilled) with CNG after customer vehicles have been fueled. Such recovery time is not needed in slow-fill CNG systems, where the compressor fills the vehicle directly

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from the compressor with no ground storage tanks. Slow-fill systems take much longer to fuel a vehicle than quick-fill systems. Slow fill is generally eight to 12 hours versus quick fill which is approximately four minutes. However, due to the needed recovery time, more quick fill stations are required than would be the case with slow fill.

There are also a series of other operating system cost considerations which need to be accounted for when determining the desirability of converting to CNG which we identified in our assessment and interviews:

- Determining the adequate size and type of compressor systems has been noted as a critical item. Undersized systems can lead to significantly higher operating and maintenance costs; oversized means higher up front costs than is warranted;
- Size and type of storage tanks needs to be carefully considered;
- CNG product conditioning systems (e.g., driers) are a key and costly project element;
- Control systems vary broadly from supplier to supplier; and,
- Acquisition, operation and maintenance costs of the facility and the fleet over the long term need to be taken into account in any assessment.

Finally, the biggest pipeline supplier of natural gas in Florida is TECO People's Gas. Other significant suppliers include:

- Southern Natural Gas in North Florida
- Florida Gas Transmission
- Gulfstream Natural Gas Systems

One key determination at the outset is an understanding of the availability of lower cost pipeline gas supply to the site as opposed to truck fill which will almost certainly be at a higher wholesale price.

Cost/Benefit Summary

For the cost benefit analysis undertaken as part of this study, we completed two separate evaluations which are described in the following:

- 1.) *Analysis of Payback Period For Sample CNG Station* – In this first case, we evaluate the estimated payback period associated with the infrastructure investment under various fleet and mileage scenarios which is not specific to Hallandale Beach's operating structure. Rather, this initial analysis is being performed to provide an understanding of the payback period for the City's investment in CNG Station based upon industry standard capital costs, operating costs and utilization (revenues). Importantly, the analysis is based upon insight from the research completed as part of this assessment and may be subject to refinement based upon updated information (such as changes in

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infrastructure cost structure or operating efficiencies) that may result from near term advances of a relatively newly evolving industry. The detailed proforma analysis is provided in Attachment A herein.

Generally, for units of government or private sector business contemplating building a CNG facility the following thresholds should be met to insure a **reasonable (5-7 years)** payback is achieved:

- The fleet should consist of at least 50 vehicles targeted for conversion;
- Average mileage per vehicle should be from 40,000 miles per year, at a minimum and preferably 70,000+ miles per year;
- According to sources interviewed, it costs \$35,000 to \$80,000 to convert an existing Class 6, or 7 vehicle to CNG and from \$200,000 to \$350,000 for a new vehicle equipped with CNG system; and,
- There is an additional cost of \$250,000 to \$350,000 to retrofit maintenance facilities for CNG vehicles.

- 2.) *Hallandale Beach CNG Conversion Assessment* – The second analysis completed for this study provides an evaluation of the City’s CNG station/facilities investment based upon:
- a.) estimated costs associated with a detailed analysis of either converting existing vehicles and/or purchasing new vehicles among the City’s current 125± vehicle fleet based upon age, condition, and class of vehicle (not including Police and Fire Department vehicles); and, b.) and an estimate of the fuel cost savings resulting from the fleet conversion. The fleet conversion Attachment B provides a detailed proforma of conversion costs (under varying cost scenarios) and fuel savings calculations, with a summary of results as follows:

City of Hallandale Beach (Vehicle Fleet)	
Total City’s Fleet – Miles Driven (2012)	380,500
Regular/Diesel Fuel Consumed (2012)	97,800
Annual Diesel/Regular Fuel Cost (2012)	\$331,500
Est. Annual CNG Fuel Cost (2012) (@ 50% Regular/Diesel)	<u>\$165,750</u>
Est. CNG Fuel Savings/Year (2012 \$’s)	\$165,750
Total Vehicle Conversion/Maintenance Cost (Mid Range)	\$3,596,000
Number of Years for Investment Payback	21.7
- <i>Investment Payback (if Regular/Diesel increases by 25%)</i>	14.5
- <i>Investment Payback (if Regular/Diesel increases by 50%)</i>	10.5

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As summarized above, City provided data indicates that its entire vehicle fleet traveled a total 380,000 miles in 2012 (or an average 3,100 miles per vehicle per year). Based upon the City's 2012 fuel consumption (97,800 gallons), the City spent \$331,500 in regular/diesel fuel. If we assume that regular/diesel fuel costs remain constant (2012 \$'s) than the payback period for the \$3.6 million CNG Vehicle Conversion and Maintenance Facility upgrade cost is 21.7 years – which clearly does not justify the investment from strictly an economic perspective. Accordingly, even if regular/diesel fuel costs increase 25 percent or even 50 percent, then the payback period shortens though only too roughly 15 and 11 years, respectively. As a result, the analysis above clearly indicates that given the level of utilization (or total mileage for its fleet), the City's investment in a CNG vehicle conversion and station is not warranted from an economic standpoint. However, perhaps the City's best option is to identify a private fleet operator or private investor who would partner with the City to development the CNG filling station. In this scenario, the private investor would be assured the City would be a long term customer to establish a base of business and have access to a well located ready-to-build site.

Findings and Recommendations

Based upon our interviews and industry research we recommend the following:

- Beyond the environmental benefits, it makes strong economic sense for the City to convert its truck fleet to CNG if it does not have to develop its own filling infrastructure but can refill in a privately developed station on the Ansin Boulevard site.
- The City should rapidly issue a request to identify a private partner to develop a CNG with LNG expansion potential on the Ansin Boulevard site. Beyond the contribution of land, the City can assure the operator/investor a significant annual purchase of CNG which while not enough to support the construction of the facility certainly minimizes risk. The reason for speed in issuing the request is due to the fact that as in any rapidly expanding and changing industry, the competition among land owners and municipalities with similarly well located sites for CNG/LNG filling stations will expand rapidly as well and the sooner to market the better given competition among land owners to offer up strong sites up-and-down I-95 in Broward and northern Miami-Dade County will expand as well.
- One aspect of the request for private CNG investors should include an option to the lessee of the site to either indicate a proposed fixed ground lease payment or payment through a long term reduction-to-market CNG cost expressed as a percent of best customer or surrounding competitive market cost. We strongly recommend against the City attempting to realize land value through a revenue participation

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agreement. The market is too fluid at this point to accurately estimate the long term viability of any given filling station's revenue.

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ATTACHMENT A

FLEET CONVERSION TO CNG COST/BENEFIT ASSESSMENT

Compressed Natural Gas (CNG) Conversion - Cost/Benefit Analysis

Assumptions for Fleet or Municipality

Inputs:

Number of vehicles
Miles driven per year per vehicle

Scenarios			
A	B	C	D
50	60	70	100
40,000	40,000	40,000	40,000
50,000	50,000	50,000	50,000
60,000	60,000	60,000	60,000
70,000	70,000	70,000	70,000

Existing Vehicles - Average Miles Per Gallon

5.00	5.00	5.00	5.00
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Based on Converting Older Vehicles

Cost of Diesel Fuel Per Gallon

\$4.00	\$4.00	\$4.00	\$4.00
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Gallons per year/all vehicles

400,000	480,000	560,000	800,000
500,000	600,000	700,000	1,000,000
600,000	720,000	840,000	1,200,000
700,000	840,000	980,000	1,400,000

Diesel Fuel Cost Per year

\$1,600,000	\$1,920,000	\$2,240,000	\$3,200,000
\$2,000,000	\$2,400,000	\$2,800,000	\$4,000,000
\$2,400,000	\$2,880,000	\$3,360,000	\$4,800,000
\$2,800,000	\$3,360,000	\$3,920,000	\$5,600,000

Cost to Convert Old Vehicles- Per Vehicle

\$65,000

\$3,250,000	\$3,900,000	\$4,550,000	\$6,500,000
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Cost of CNG Facility at 4 Pumps - Variable

\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
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Cost to Upgrade Maintenance Facility-Variable

\$300,000	\$300,000	\$300,000	\$300,000
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Estimated Total Capital & Conversion Costs

\$4,550,000	\$5,200,000	\$5,850,000	\$7,800,000
\$4,550,000	\$5,200,000	\$5,850,000	\$7,800,000
\$4,550,000	\$5,200,000	\$5,850,000	\$7,800,000
\$4,550,000	\$5,200,000	\$5,850,000	\$7,800,000

CNG Cost Gas Gallon Equivalent (GGE)

\$2.00	\$2.00	\$2.00	\$2.00
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CNG Cost Savings per year

\$800,000	\$960,000	\$1,120,000	\$1,600,000
\$1,000,000	\$1,200,000	\$1,400,000	\$2,000,000
\$1,200,000	\$1,440,000	\$1,680,000	\$2,400,000
\$1,400,000	\$1,680,000	\$1,960,000	\$2,800,000

Additional Revenue from 3rd Party Contracts

0.00%

\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0

Payback in years - Vehicle Conversion

5.7	5.4	5.2	4.9
4.6	4.3	4.2	3.9
3.8	3.6	3.5	3.3
3.3	3.1	3.0	2.8

Based on Buying New Vehicles

Cost to Buy New Vehicles- Per Vehicle

\$250,000

\$12,500,000	\$15,000,000	\$17,500,000	\$25,000,000
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Cost of CNG Facility at 4 Pumps

\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
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Cost to Upgrade Maintenance Facility

\$300,000	\$300,000	\$300,000	\$300,000
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Estimated Total Capital Costs

\$13,800,000	\$16,300,000	\$18,800,000	\$26,300,000
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Payback in years - New Vehicles

17.3	17.0	16.8	16.4
13.8	13.6	13.4	13.2
11.5	11.3	11.2	11.0
9.9	9.7	9.6	9.4

ATTACHMENT B

**HALLANDALE BEACH CNG VEHICLE
CONVERSION/PURCHASE ANALYSIS**

**City of Hallandale Beach
Vehicle Fleet Data for CNG Conversion Assessment**

#	Vehicle Make	Vehicle Model	Vehicle Year	Diesel (D) or Gas (G)	Total Current Miles	2012 Miles Driven	2011 Miles Driven	Gallons Purchased 2012	Total Fuel Purchase \$ 2012	Estimated Replacement Year	Expected Conversion Cost or Marginal Cost to Purchase CNG Engine	Low Conversion Cost or Marginal Cost to Purchase CNG Engine	High Conversion Cost or Marginal Cost to Purchase CNG Engine
888	Ford	Explorer	2005	G	121,845	15,106	13,659	943.62	\$3,167.35	2013	\$ 11,000	\$ 9,800	\$ 13,000
627	Chevrolet	S-10 Utility	1998	G	86,759	4,670	4,649	507.18	\$1,693.66	2013	\$ 11,000	\$ 9,800	\$ 13,000
645	Chevrolet	S-10 Pick-up	1999	G	86,654	4,825	6,900	532.83	\$1,779.78	2013	\$ 11,000	\$ 9,800	\$ 13,000
624	Ford	F-150	1998	G	20,062	4,702	5,271	767.50	\$2,535.78	2013	\$ 11,000	\$ 9,800	\$ 13,000
672	Dodge	RAM-1500 Pick-up	2000	G	80,950	2,314	3,778	454.70	\$1,478.00	2013	\$ 11,000	\$ 9,800	\$ 13,000
680	Dodge	RAM 1500	2000	G	60,546	4,230	2,430	681.58	\$2,269.53	2013	\$ 11,000	\$ 9,800	\$ 13,000
611	Ford	F-250	1997	G	108,023	3,121	8,818	958.73	\$3,201.66	2013	\$ 11,000	\$ 9,800	\$ 13,000
612	Ford	F-250	1997	G	88,897	4,764	4,657	938.94	\$3,124.91	2013	\$ 11,000	\$ 9,800	\$ 13,000
653	Dodge	2500 Pick-up	1999	G	67,559	3,464	4,479	580.95	\$1,921.46	2013	\$ 11,000	\$ 9,800	\$ 13,000
542	Ford	2-Yard Dump	1995	D	42,463	2,614	1,145	331.27	\$1,139.76	2013	\$ 40,000	\$ 35,000	\$ 50,000
712	Dodge	15 Passenger	2001	G	57,481	3,478	5,424	560.24	\$1,864.84	2013	\$ 11,000	\$ 9,800	\$ 13,000
713	Dodge	15 Passenger	2001	G	100,093	666	3,162	197.52	\$660.71	2013	\$ 11,000	\$ 9,800	\$ 13,000
666	Ford	F-650 10 Yard	2000	D	52,006	4,252	2,087	1656.90	\$5,713.52	2013	\$ 40,000	\$ 35,000	\$ 50,000
781	Ford	F-650 10 Yard	2002	D	42,226	1,317	3,944	604.93	\$2,071.04	2013	\$ 40,000	\$ 35,000	\$ 50,000
649	Volvo	Heil Side Loader	1999	D	102,192	349	983	3120.59	\$10,619.10	2013	\$ 40,000	\$ 35,000	\$ 50,000
773	Volvo	Heil Side Loader	2002	D	116,595	5,983	7,176	4311.52	\$14,955.00	2013	\$ 40,000	\$ 35,000	\$ 50,000
785	Autocar	Heil Side Loader	2002	D	88,902	3,361	5,783	2933.33	\$10,099.45	2013	\$ 40,000	\$ 35,000	\$ 50,000
836	Mack	Mcneilus Front Loader	2004	D	162,301	4,824	7,438	2781.23	\$9,562.98	2013	\$ 40,000	\$ 35,000	\$ 50,000
825	Sterling	Bucket Truck	2003	D	10,646	566	647	250.67	\$857.83	2013	\$ 40,000	\$ 35,000	\$ 50,000
434	ICH	20 Ft. Flat Bed	1990	D	52,241	876	466	351.20	\$1,189.78	2013	\$ 40,000	\$ 35,000	\$ 50,000
651	Sterling	Catch Basin	1999	D	60,165	1,656	2,614	1294.11	\$4,507.03	2013	\$ 40,000	\$ 35,000	\$ 50,000
661	Ford	F-750 Container	2000	D	101,290	1,828	2,925	578.96	\$2,008.04	2013	\$ 40,000	\$ 35,000	\$ 50,000
857	New Holland	TB120	2004	D	6,074	0	2,825	866.30	\$2,578.60	2013	\$ 40,000	\$ 35,000	\$ 50,000
682	Case	590 Super L	2000	D	5,012	72	205	194.34	\$672.74	2013	\$ 40,000	\$ 35,000	\$ 50,000
963	KUBOTA	ZD331LP MOWER	2008	D	1,025	0	30	17.49	\$61.07	2013	\$ 11,000	\$ 9,800	\$ 13,000
784	John Deere	GATOR 4X2	2003	G	533	0	0	2.71	\$8.70	2013	\$ 11,000	\$ 9,800	\$ 13,000
679	Chevrolet	Cavalier	2000	G	38,098	4,312	4,032	331.24	\$1,104.03	2015	\$ 11,000	\$ 9,800	\$ 13,000
729	Chevrolet	Cavalier	2002	G	20,875	1,583	1,969	160.73	\$537.11	2015	\$ 11,000	\$ 9,800	\$ 13,000
730	Chevrolet	Cavalier	2002	G	30,737	2,823	2,881	202.63	\$671.20	2015	\$ 11,000	\$ 9,800	\$ 13,000
731	Chevrolet	Cavalier	2002	G	34,517	3,794	4,159	347.67	\$1,153.44	2015	\$ 11,000	\$ 9,800	\$ 13,000
821	Chevrolet	Cavalier	2003	G	11,191	160	651	12.12	\$37.98	2015	\$ 11,000	\$ 9,800	\$ 13,000
822	Chevrolet	Cavalier	2003	G	18,904	1,686	1,379	131.08	\$437.41	2015	\$ 11,000	\$ 9,800	\$ 13,000
823	Chevrolet	Cavalier	2003	G	24,328	2,856	3,229	207.10	\$694.90	2015	\$ 11,000	\$ 9,800	\$ 13,000
824	Chevrolet	Cavalier	2003	G	24,950	1,764	3,118	137.53	\$445.98	2015	\$ 11,000	\$ 9,800	\$ 13,000
623	Ford	Taurus	1998	G	34,347	470	176	86.05	\$291.49	2015	\$ 11,000	\$ 9,800	\$ 13,000
675	Ford	Taurus	2000	G	99,790	1,045	8,450	136.96	\$435.98	2015	\$ 11,000	\$ 9,800	\$ 13,000
676	Ford	Taurus	2000	G	69,010	1,892	1,854	227.83	\$768.10	2015	\$ 11,000	\$ 9,800	\$ 13,000
707	Chevrolet	Malibu	2001	G	40,678	7,221	5,279	734.39	\$2,442.74	2015	\$ 11,000	\$ 9,800	\$ 13,000
907	Ford	Explorer	2006	G	102,600	7,665	9,970	690.18	\$2,317.64	2015	\$ 11,000	\$ 9,800	\$ 13,000
610	Chevrolet	S-10 Utility	1997	G	24,791	1,151	1,562	166.01	\$553.38	2015	\$ 11,000	\$ 9,800	\$ 13,000
621	Chevrolet	S-10 Pick-up	1998	G	48,568	3,164	2,695	319.98	\$1,063.67	2015	\$ 11,000	\$ 9,800	\$ 13,000
795	Chevrolet	S-10 Pick-up	2003	G	27,613	3,092	2,826	281.50	\$942.73	2015	\$ 11,000	\$ 9,800	\$ 13,000
870	Chevy	1500 4x4	2005	G	79,344	3,037	4,888	891.03	\$2,987.76	2015	\$ 11,000	\$ 9,800	\$ 13,000
673	Dodge	RAM 2500	2000	G	58,953	4,156	4,738	932.40	\$3,098.07	2015	\$ 11,000	\$ 9,800	\$ 13,000
710	Dodge	250 HD	2001	G	73,608	7,604	8,579	1284.65	\$4,313.58	2015	\$ 11,000	\$ 9,800	\$ 13,000
736	Dodge	RAM 2500	2002	G	61,083	3,489	4,367	942.49	\$3,172.16	2015	\$ 11,000	\$ 9,800	\$ 13,000
819	Ford	F-250	2003	G	61,917	1,598	6,493	606.99	\$2,011.16	2015	\$ 11,000	\$ 9,800	\$ 13,000
856	Ford	F-250	2004	G	51,777	4,643	5,225	965.53	\$3,192.84	2015	\$ 11,000	\$ 9,800	\$ 13,000
889	Ford	F-250	2005	G	52,665	5,751	3,342	1410.96	\$4,710.33	2015	\$ 11,000	\$ 9,800	\$ 13,000
690	Dodge	3500 1-Ton	2000	G	38,362	4,341	1,184	923.65	\$3,097.26	2015	\$ 40,000	\$ 35,000	\$ 50,000
717	Dodge	3500	2001	D	25,818	2,675	1,176	338.39	\$1,165.58	2015	\$ 40,000	\$ 35,000	\$ 50,000
733	Ford	F-350	2002	G	49,875	5,376	4,327	861.48	\$2,891.95	2015	\$ 40,000	\$ 35,000	\$ 50,000
735	Ford	F-350	2002	D	24,009	1,492	1,476	151.89	\$525.96	2015	\$ 11,000	\$ 9,800	\$ 13,000
877	Ford	F-350 Extended Cab 4x4	2005	G	44,297	3,906	6,240	885.38	\$2,928.01	2015	\$ 11,000	\$ 9,800	\$ 13,000

City of Hallandale Beach
Vehicle Fleet Data for CNG Conversion Assessment

#	Vehicle Make	Vehicle Model	Vehicle Year	Diesel (D) or Gas (G)	Total Current Miles	2012 Miles Driven	2011 Miles Driven	Gallons Purchased 2012	Total Fuel Purchase \$ 2012	Estimated Replacement Year	Expected Conversion Cost or Marginal Cost to Purchase CNG Engine	Low Conversion Cost or Marginal Cost to Purchase CNG Engine	High Conversion Cost or Marginal Cost to Purchase CNG Engine
662	Chevrolet	2500 VAN	2000	G	58,168	6,416	10,017	1501.72	\$4,986.48	2015	\$ 11,000	\$ 9,800	\$ 13,000
732	Dodge	RAM 3500 VAN	2002	G	52,181	3,590	5,709	565.69	\$1,883.19	2015	\$ 11,000	\$ 9,800	\$ 13,000
797	Sterling	Leach Rear Loader	2003	D	36,522	3,147	3,822	1497.88	\$5,139.67	2015	\$ 40,000	\$ 35,000	\$ 50,000
694	Ford	F-550 TV Truck	2000	D	42,864	2,358	2,913	1215.30	\$4,063.37	2015	\$ 40,000	\$ 35,000	\$ 50,000
828	Sterling	5 Yd. Dump	2003	D	16,238	260	468	115.48	\$399.73	2015	\$ 40,000	\$ 35,000	\$ 50,000
858	Sterling	5 Yd. Dump	2004	D	29,682	792	662	154.13	\$532.38	2015	\$ 40,000	\$ 35,000	\$ 50,000
594	Ford	32 Yd. Dump	1997	D	49,508	0	910	0.00	\$0.00	2015	\$ 40,000	\$ 35,000	\$ 50,000
711	Sterling	32 Yd. Dump	2001	D	40,915	665	1,537	155.99	\$537.21	2015	\$ 40,000	\$ 35,000	\$ 50,000
582	Ford	Water Truck	1996	D	31,223	600	1,914	172.06	\$587.89	2015	\$ 40,000	\$ 35,000	\$ 50,000
868	IHC	Catch Basin	2005	D	43,487	5,765	6,547	2671.42	\$9,126.31	2015	\$ 40,000	\$ 35,000	\$ 50,000
678	Sterling	Peterson CA	2000	D	12,423	643	968	307.62	\$1,051.74	2015	\$ 40,000	\$ 35,000	\$ 50,000
613	Ford	6640 Tractor	1997	D	493	44	12	126.84	\$431.51	2015	\$ 40,000	\$ 35,000	\$ 50,000
726	Case	Backhoe/Loader	2002	D	5,097	220	144	277.26	\$954.72	2015	\$ 40,000	\$ 35,000	\$ 50,000
869	Terex	Backhoe/Loader	2005	D	3,940	154	212	343.61	\$1,185.72	2015	\$ 40,000	\$ 35,000	\$ 50,000
734	Case Skid	Steer Load.	2002	D	772	0	0	39.94	\$142.30	2015	\$ 40,000	\$ 35,000	\$ 50,000
607	ING	IR Vibratory Roller	1997	D	596	14	0	87.60	\$300.71	2015	\$ 40,000	\$ 35,000	\$ 50,000
783	John Deere	GATOR 6X4	2003	D	917	0	0	0.00	\$0.00	2015	\$ 40,000	\$ 35,000	\$ 50,000
892	Ford	Ranger Pick-up	2006	G	18,111	1,800	3,071	176.73	\$592.37	2016	\$ 11,000	\$ 9,800	\$ 13,000
893	Ford	Ranger Pick-up	2006	G	21,140	4,019	3,746	330.87	\$1,109.17	2016	\$ 11,000	\$ 9,800	\$ 13,000
897	Ford	F-150 Pick-up	2006	G	31,781	2,791	3,736	476.96	\$1,580.97	2016	\$ 11,000	\$ 9,800	\$ 13,000
898	Ford	F-150 Pick-up	2006	G	41,397	6,228	4,742	1040.37	\$3,467.54	2016	\$ 11,000	\$ 9,800	\$ 13,000
899	Ford	F-150 Pick-up	2006	G	51,565	5,097	4,394	927.45	\$3,095.28	2016	\$ 11,000	\$ 9,800	\$ 13,000
900	Ford	F-150 Pick-up	2006	G	47,418	5,387	11,188	625.71	\$2,068.95	2016	\$ 11,000	\$ 9,800	\$ 13,000
901	Ford	F-350 4x2 Regular Cab	2006	G	52,763	8,071	7,561	1508.27	\$5,024.56	2016	\$ 11,000	\$ 9,800	\$ 13,000
902	Ford	F-350 4x2 Regular Cab	2006	G	36,573	4,056	5,075	759.51	\$2,537.85	2016	\$ 11,000	\$ 9,800	\$ 13,000
903	Ford	F-350 4x2 Regular Cab	2006	G	39,093	5,862	7,105	1213.27	\$4,051.78	2016	\$ 11,000	\$ 9,800	\$ 13,000
906	Ford	E-350 D EXT VAN	2006	G	23,562	3,943	3,350	766.21	\$2,573.39	2016	\$ 11,000	\$ 9,800	\$ 13,000
904	Sterling	Condor Front Loader	2006	D	89,447	3,975	1,333	2731.08	\$9,341.41	2016	\$ 65,000	\$ 55,000	\$ 70,000
905	Sterling	Condor Front Loader	2006	D	91,158	2,908	5,096	2510.77	\$8,607.52	2016	\$ 65,000	\$ 55,000	\$ 70,000
909	Caterpillar	4WD	2006	D	4,289	207	299	479.99	\$1,651.67	2016	\$ 65,000	\$ 55,000	\$ 70,000
1004	SCAG	61" RIDING MOWER	2011	G	677	2,102	188	410.71	\$1,376.02	2016	\$ 11,000	\$ 9,800	\$ 13,000
1029	SCAG	52" RIDING MOWER	2011	G	955	184	0	99.96	\$338.55	2016	\$ 11,000	\$ 9,800	\$ 13,000
1031	John Deere	7400 MOWER	2011	D	250	42	0	100.48	\$350.51	2016	\$ 11,000	\$ 9,800	\$ 13,000
908	John Deere	1200A	2006	G	0	0	0	4.00	\$13.50	2016	\$ 11,000	\$ 9,800	\$ 13,000
985	Sterling	LT9500	2007	D	25,608	3,313	8,872	895.56	\$3,086.36	2017	\$ 65,000	\$ 55,000	\$ 70,000
986	Sterling	LT9500	2007	D	31,824	8,315	5,970	2346.43	\$8,075.07	2017	\$ 65,000	\$ 55,000	\$ 70,000
958	Ford	F-250 XL 4x2	2008	G	44,938	7,471	6,977	1730.33	\$5,801.25	2018	\$ 11,000	\$ 9,800	\$ 13,000
966	Ford	F-250 XL 4x2	2008	G	30,925	8,140	6,806	1323.97	\$4,416.03	2018	\$ 11,000	\$ 9,800	\$ 13,000
967	Ford	F-250 XL 4x2	2008	G	28,325	4,871	5,240	1378.01	\$4,612.74	2018	\$ 11,000	\$ 9,800	\$ 13,000
960	Ford	F-350 CREWCAB	2008	D	35,247	6,475	4,850	1297.30	\$4,470.05	2018	\$ 65,000	\$ 55,000	\$ 70,000
962	Ford	F-450 4x2 9' Dump	2008	D	37,125	3,900	5,226	911.86	\$3,140.37	2018	\$ 65,000	\$ 55,000	\$ 70,000
968	Ford	F-450 4x2 11' Dump	2008	D	15,608	1,398	2,388	643.85	\$2,219.28	2018	\$ 65,000	\$ 55,000	\$ 70,000
965	John Deere	544J	2008	D	2,879	239	1,041	781.99	\$2,686.05	2018	\$ 65,000	\$ 55,000	\$ 70,000
980	Autocar	W/EZ Pack 40	2009	D	56,987	6,485	7,596	5113.78	\$17,658.03	2019	\$ 65,000	\$ 55,000	\$ 70,000
988	GMC	W3500/Schwarze	2009	D	19,710	3,330	4,012	1081.87	\$3,735.24	2019	\$ 65,000	\$ 55,000	\$ 70,000
771	New Holland	TRAC/SWE	2002	D	3,709	0	14	0.00	\$0.00	2019	\$ 65,000	\$ 55,000	\$ 70,000
987	Ford	Escape XLS	2010	G	14,000	2,825	4,658	300.48	\$1,008.49	2020	\$ 11,000	\$ 9,800	\$ 13,000
1024	Ford	Explorer	2012	G	20,208	12,223	512	774.59	\$2,580.61	2020	\$ 11,000	\$ 9,800	\$ 13,000
1058	Ford	Explorer	2012	G	6,219	1,660	0	124.82	\$426.07	2020	\$ 11,000	\$ 9,800	\$ 13,000
1059	Ford	Explorer	2012	G	12,845	4,733	0	260.06	\$890.31	2020	\$ 11,000	\$ 9,800	\$ 13,000
992	Ford	E-250 ADA VAN	2010	G	12,699	5,103	2,885	785.89	\$2,618.55	2020	\$ 11,000	\$ 9,800	\$ 13,000
983	Autocar	W/EZ Pack 40	2010	D	24,765	3,739	7,268	4844.09	\$16,696.15	2020	\$ 65,000	\$ 55,000	\$ 70,000
993	CAT	297C TRAC LOADER	2010	D	247	0	0	0.00	\$0.00	2020	\$ 65,000	\$ 55,000	\$ 70,000
1009	Ford	Fusion	2011	G	5,704	2,550	626	183.25	\$604.09	2021	\$ 11,000	\$ 9,800	\$ 13,000

**City of Hallandale Beach
Vehicle Fleet Data for CNG Conversion Assessment**

#	Vehicle Make	Vehicle Model	Vehicle Year	Diesel (D) or Gas (G)	Total Current Miles	2012 Miles Driven	2011 Miles Driven	Gallons Purchased 2012	Total Fuel Purchase \$ 2012	Estimated Replacement Year	Expected Conversion Cost or Marginal Cost to Purchase CNG Engine	Low Conversion Cost or Marginal Cost to Purchase CNG Engine	High Conversion Cost or Marginal Cost to Purchase CNG Engine
1065	Ford	Explorer	2013	G	2,275	0	0	131.72	\$439.69	2021	\$ 11,000	\$ 9,800	\$ 13,000
1022	Ford	F-150 4x4	2011	G	9,607	4,761	0	885.54	\$2,948.72	2021	\$ 11,000	\$ 9,800	\$ 13,000
995	Ford	F-250 4x2 CREWCAB	2011	G	16,131	5,300	4,975	1469.45	\$4,918.53	2021	\$ 11,000	\$ 9,800	\$ 13,000
996	Ford	F-250 4x2 CREWCAB	2011	G	14,500	4,264	4,229	1054.11	\$3,503.14	2021	\$ 11,000	\$ 9,800	\$ 13,000
1007	Ford	E-350 EXT 15 Passenger	2011	G	19,467	3,688	3,954	1164.47	\$3,863.38	2021	\$ 11,000	\$ 9,800	\$ 13,000
998	Freightliner	M2 18 Yd.	2011	D	2,900	526	366	212.77	\$728.82	2021	\$ 65,000	\$ 55,000	\$ 70,000
999	Freightliner	Crane	2011	D	7,112	2,828	2,562	1199.78	\$4,148.21	2021	\$ 65,000	\$ 55,000	\$ 70,000
1005	CAT	303C CR Mini	2011	D	256	0	22	0.00	\$0.00	2021	\$ 65,000	\$ 55,000	\$ 70,000
1057	Ford	Escape XLS	2012	G	2,778	884	0	80.36	\$277.00	2022	\$ 11,000	\$ 9,800	\$ 13,000
1055	Ford	F-150 Regular cab	2012	G	5,746	2,267	0	230.24	\$788.95	2022	\$ 11,000	\$ 9,800	\$ 13,000
1056	Ford	F-150 Regular cab	2012	G	4,870	2,169	0	240.35	\$825.06	2022	\$ 11,000	\$ 9,800	\$ 13,000
1034	Ford	F-250SD XL 4x2	2012	G	8,621	3,441	0	553.98	\$1,902.01	2022	\$ 11,000	\$ 9,800	\$ 13,000
1035	Ford	F-250SD XL 4x2	2012	G	7,174	3,711	0	649.68	\$2,253.47	2022	\$ 11,000	\$ 9,800	\$ 13,000
1036	Ford	F-250SD XL 4x2	2012	G	10,438	5,483	0	724.74	\$2,494.23	2022	\$ 11,000	\$ 9,800	\$ 13,000
1054	Ford	E-350 EXT 15 Passenger	2012	G	5,097	1,351	0	248.50	\$837.63	2022	\$ 11,000	\$ 9,800	\$ 13,000
1062	Caterpillar	420F	2012	D	4	0	0	0.00	\$0.00	2022	\$ 65,000	\$ 55,000	\$ 70,000
1068	Ford	Escape S	2013	G	3	0	0	0.00	\$0.00	2023	\$ 11,000	\$ 9,800	\$ 13,000
1066	Autocar	ACX64/WAYNE	2013	Natural Gas	1,971	0	0	0.00	\$0.00	2023	\$ -	\$ -	\$ -
1067	Autocar	ACX64/WAYNE	2013	Natural Gas	1,951	0	0	0.00	\$0.00	2023	\$ -	\$ -	\$ -
Totals						380,567	395,528	97,805.88	\$331,492.31		\$ 3,246,000	\$ 2,819,800	\$ 3,798,000
Maintenance Facility Upgrade											\$ 350,000	\$ 300,000	\$ 400,000
Total Cost of Conversion											\$ 3,596,000	\$ 3,119,800	\$ 4,198,000
Payback at 2012 Gas Prices(in Years)											21.70	18.82	25.33
Payback if Gas Prices Increase by 25% without corresponding Increase in CNG Cost (in Years)											14.46	12.55	16.89
Payback if Gas Prices Increase by 50% without corresponding Increase in CNG Cost (in Years)											10.85	9.41	12.66