**CITY OF HALLANDALE BEACH**
**MEMORANDUM**
CM12-108

DATE: August 1, 2012

TO: Honorable Mayor and City Commission

FROM: Renee C. Crichton, City Manager

SUBJECT: Additional Information for Fiscal Year 2013 Budget Workshops/Special Meetings

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As discussed in my June 29, 2012 transmittal memo for the FY2012-2013 City Manager's Proposed Budget, attached please find the following documents:

- White Paper on Capital Financing Options for the Citywide Parks Master Plan, Fire Station, and Post office acquisition.
- White Paper on the Proposed Options for Building and Operating a Compressed Natural Gas (CNG) Rapid Fueling Facility within the City.
- Summary of Budget Notes changes to the City Manager's Proposed Operating Budget transmitted June 29, 2012.
- Community Partnerships Grants Guidance.

I am looking forward to a constructive and open discussion during the Budget Workshops/Special Meetings scheduled for August 13 and 14, 2012.

In the meantime and as always, if you have any questions or concerns, please feel free to contact me.

Renee C. Crichton, City Manager

RC/nmr

# City of Hallandale Beach Long Term Capital Project Financing Strategy

## INTRODUCTION

In November 2011, the City Commission gave approval to staff to begin the process for the redevelopment of Scavo Park, BF James Park, and South Beach Park utilizing a Construction Manager at Risk. It is estimated that the cost of these three projects will be $ 8,233,000. The afore-mentioned parks were to be the first of 13 City park facilities to be redeveloped as a part of the Citywide Parks Master Plan implementation.

In accordance with the Citywide Parks Master Plan, the City Commission discussed the financing options available for the reconstruction of the 10 remaining parks for approximately $45 million dollars in March of 2012. If the City Commission were to issue debt for the full cost of the redevelopment, it is estimated that the debt service on this loan would be approximately $3.1 million dollars annually based on a 20-year bond. During the March 19, 2012, City Commission/City Manager Workshop, the Commission was advised that an increase in the millage rate would be necessary to support a debt service payment of this kind.

In July 2011, the City Commission also supported partial funding to re-build the main fire station and $500,000 was budgeted for Fiscal Year 2012 to begin its planning. It is estimated that the total project cost will be $9 M; $7.5 M for construction and $1.5 M for land acquisition. At this time, the City has allocated $500,000 and has budgeted $1,000,000 in FY 13, for a total of $1.5 M, to support the start of this construction project. Plans to fund the remaining costs associated with the construction project have not yet been finalized. Subsequently, staff is including the balance of the cost associated with the construction of the fire station in the long term financing calculations along with the costs associated with the acquisition and development of the post office site in an effort to take advantage of economies of scale.

The City's proposed operating millage rate would not support the issuance of additional debt service to cover a $56.7M bond. Consequently, staff has been working with Dunlap and Associates (City's financial advisors), Bermello Ajamil & Partners (parks master plan consultants), Ballard King & Associates (parks operational plan consultants), and the Fire Department to develop long term financing strategies for the Commission's consideration. It is staff's goal to provide the Commission through this document, recommendations on a strategic approach for a long term investment in our City.

## FIRE STATION – CAPITAL COST

While we are in the preliminary planning stages, City staff has obtained reliable cost estimates for the fire station based on comparable recent construction in Fort Lauderdale, Hollywood, and the Broward Sheriff's Office (BSO), which consistently calculates to $375/square foot. The new facility is estimated to be 20,000 square feet, equaling $7.5 M as a reasonable construction cost for a new station. This is in addition to the estimated $1.5 M set aside for land acquisition and other additional soft cost associated with this project.

For the purpose of the discussion, the City has committed to $1.5M in cash, as such, only the additional $7.5 M needed to complete the project is contemplated in this financing strategy.

**Table # 1**

| Phase/Item | Cost | Timeframe |
|---|---|---|
| **Architectural planning/platting** | $500,000 | 6 months |
| **RFP/Contracting** | $0 | 9-12 months |
| **Construction*** | $7,000,000 | 1-2 years |

* Includes furniture and fixtures for living areas such as kitchen countertops, appliances, etc.

## FIRE STATION- OPERATING COST

There is no negative implication with the new fire station regarding operating costs. The location of the new facility will be at a different corner on the same block (should the negotiations with ASPEX Eyewear work out); therefore, response times should not be affected. The station will continue to function as usual without interruption during construction. The Fire Rescue Department's first priority is to avoid any interruption to services while the new station is completed, so there will be no additional costs to maintain day-to-day operations during construction.

In addition, the day-to-day operations will not change, as the current fire station will perform the same functions as the new one. It is anticipated that some general operating costs may decrease as a result of constructing a more energy efficient building which will be large enough to house all of the equipment and staff. This will save the City in terms of energy costs and provide additional storage. Operations should run more smoothly, such as adequate sleeping and living areas, separate bathrooms for male and female firefighters, and state-of-the-art facilities that are in compliance with OSHA and NFPA standards.

## PARKS MASTER PLAN

Table# 2 identifies the total redevelopment cost and corresponding estimated operational impact of the Citywide Parks Master Plan. The chart below includes the redevelopment of the three parks currently in the design phase, and the cost to temporarily employ a Capital Projects Manager to manage the construction.

The Commission has indicated that there is a desire to move forward aggressively to implement the parks redevelopment. In order to manage these projects and ensure the proper accountability and timely delivery, it will be important to ensure that the proper oversight is in place to support these capital projects. With the significant time and attention required to manage multiple vertical construction projects, it will be necessary to hire project management staff to monitor the work of architectural and engineering consultants and contractors engaged in the design and construction of a variety of structures. These professionals will be expected to manage several projects simultaneously in various phases of development including planning, design management, selection of contractor, construction management, inspection and warranty administration. Finally, it is imperative that the City have the correct management structure in place for this project, as it will be necessary to spend down bond proceeds in 3- 5 years, or risk incurring penalties on our bond proceeds. The cost of these professionals would be capitalized in the bond and included in the overall project cost.

As part of the adoption of the Citywide Parks Master Plan, the City hired Ballard and King Associates to assist in establishing the projected operational cost increases associated with the capital improvements. As we plan for our future developments, it is important that we not lose sight of the additional operating costs that will be required to properly maintain and operate our investment.

As stated above, Table # 2 below details both the capital and operating costs associated with each park project. The final column shows the impact of the improvement on the General Fund (note that a proposed phasing structure has been assumed for discussion purposes). Based on the Ballard King study and certain adjustments by our new Parks administration it is estimated that the total operational impact that must be absorbed by the General Fund for all three phases is approximately $1.7 M (see Table #2 below). These increases in expenditures will need to be planned and incorporated in the budget as each new facility is brought on line.

**Table # 2**

| | Parks* | Estimated Capital Costs | Current Operating Expenditures | Est. Post MP Operating Expenditures | Est. Post MP Operating Additional Revenue | Impact (Additional Operating Revenue Needed) |
|---|---|---|---|---|---|---|
| PHASE 1 | BF James Park** | $ 2,886,000.00 | $ 43,503.00 | $ 302,616.00 | $ 13,700.00 | $ (245,413.00) |
| | Joseph Scavo Park | $ 2,629,000.00 | $ 45,532.00 | $ 110,466.00 | $ - | $ (64,934.00) |
| | South Beach Park** | $ 2,718,000.00 | $ 257,131.00 | $ 445,374.00 | $ 8,000.00 | $ (180,243.00) |
| | North Beach Park** | $ 2,229,000.00 | $ 133,838.00 | $ 260,142.00 | $ 12,000.00 | $ (114,304.00) |
| | Main Fire Station | $ 7,500,000.00 | | | | |
| | Post Office Land Acquisition | $ 6,000,000.00 | | | | |
| | Subtotal | $ 23,962,000.00 | $ 480,004.00 | $ 1,118,598.00 | $ 33,700.00 | $ (604,894.00) |
| | | | | | | |
| PHASE 2 | Peter Bluesten Park ** | $ 15,219,000.00 | $ 569,401.00 | $ 1,389,659.00 | $ 129,500.00 | $ (690,758.00) |
| | Post Office (est. Improvements) | $ 3,000,000.00 | $ - | $ - | $ - | |
| | Ingalls Park | $ 333,000.00 | $ 108,034.00 | $ 118,294.00 | $ 21,000.00 | $ 10,740.00 |
| | Historic Village | $ 30,000.00 | $ 21,042.00 | $ 21,042.00 | $ - | $ - |
| | Subtotal | $ 18,582,000.00 | $ 698,477.00 | $ 1,528,995.00 | $ 150,500.00 | $ (680,018.00) |
| | | | | | | |
| PHASE 3 | Oreste Blake Johnson Park | $ 9,933,000.00 | $ 489,652.00 | $ 807,132.00 | $ 187,044.00 | $ (130,436.00) |
| | Chaves Lake | $ 1,428,000.00 | $ - | $ 172,219.00 | $ 1,000.00 | $ (171,219.00) |
| | Golden Isles Park | $ 997,000.00 | $ 38,976.00 | $ 97,345.00 | $ - | $ (58,369.00) |
| | Golden Isles Tennis Ctr Dog Park | $ 430,000.00 | $ 53,083.00 | $ 55,083.00 | $ - | $ (2,000.00) |
| | Sunset Park | $ 24,000.00 | $ 28,776.00 | $ 28,776.00 | $ - | $ - |
| | Sunrise Park Expansion*** | $ 1,000,000.00 | $ 28,777.00 | $ 28,777.00 | $ - | $ - |
| | Administration | n/a | $ 499,084.00 | $ 595,634.00 | $ - | $ (96,550.00) |
| | Subtotal | $ 13,812,000.00 | $ 1,138,348.00 | $ 1,784,966.00 | $ 188,044.00 | $ (458,574.00) |
| | | | | | | |
| | Capital Project Manager | $ 336,000.00 | | | | |
| | TOTAL | $ 56,692,000.00 | $ 2,316,829.00 | $ 4,432,559.00 | $ 372,244.00 | $ (1,743,486.00) |

* Does not include DPW costs for contract mowers, maintenance, landscape, etc. Does not include in-kind services i.e., Trash Removal, Utilities

**Aquatics current expenditures are based on current contract, POST MP are based on in-house Aquatics

***Additional land development operations TBD

## FINANCING OPTIONS

As noted above, the City will have to engage in some form of debt issuance in order to support the capital investment that will be necessary to construct the fire station and to renovate the City's parks system. In light of this fact, staff worked with Dunlap and Associates to identify the most effective financing strategy for this project. Should the Commission decide to move forward with this ambitious capital campaign, there are two options that are available; (1) financing the capital projects in a lump sum, (2) financing the capital projects in phases.

### OPTION ONE: FINANCING THE CAPITAL PROJECTS IN A LUMP SUM

The City may choose to issue debt for the full $56.7 M using either a **Revenue bond** or a **General Obligation bond**. The issuance of a revenue bond will require the city to pledge qualified non-ad valorem revenue in order to secure the debt. The benefit of the revenue bond is that the City will have the ability to issue debt without the additional requirements and costs associated with a referendum. The limitation of this option is that the debt service will have to be accounted for as a part of the City's operating millage and would require an estimated .872 to 1.05 increase in the millage rate to support this debt.

General Obligation bonds are typically used to finance public improvements and land acquisitions when no, or minimal, revenues are generated by these projects. General obligation bonds are backed by the full faith and credit of the City (ad valorem revenue) and have marginally lower interest rates than revenue bonds. In order to issue a General Obligation bond, the City will have to seek approval from the voters through a referendum in order to pledge ad-valorem revenue. The cost of this debt will be enumerated as separate (voter approved) millage rate that would not be factored into the City's operating millage for tax rate purposes. This debt service millage rate will not be subject to the 10 mill cap.

Table # 3 below provides a comparison of the costs associated with issuing a lump sum $56.7 M bond for either 20 or 30 years. There are several concerns with issuing this much debt at one time. The first concern lies in the impact that this expense will have on the General Fund, especially in the current slow growth economy. The second concern is the immediate impact that would be borne by the homeowner. It is estimated that the average homeowner would pay an additional $85 per $100,000 in taxable value.

Finally, the benefit of the lump sum issuance (General Obligation or Revenue bond) is the ability to save money by taking advantage of the low interest rate environment. These bonds will carry a requirement that the City spend down all bond proceeds in 3 – 5 years or face penalties. Realistically, it is highly unlikely that the City will be able to complete construction on 15 separate projects in such a short timeframe. Therefore, the financial benefit of the lump sum issuance is lost.

**Table # 3**

| | 20 Year Bond (Lumped Project Funds 4/1/13) | 30 Year Bond (Lumped Project Funds 4/1/13) |
|---|---|---|
| Dated Date | 4/1/13 | 4/1/13 |
| Project Fund | 56,356,000.00 | 56,356,000.00 |
| All-In TIC* | 3.29% | 3.83% |
| Maximum Annual Debt Service | 3,823,750.00 | 3,165,837.50 |
| Total Debt Service | 78,338,031.25 | 96,476,381.25 |
| Final Maturity | 10/1/33 | 10/1/43 |
| **Debt Service Millage** | **1.053** | **0.872** |

*Assumptions:*

*Cost of Issuance - $175,000 Bond Issue/$75,000 Bank Loan*
*Underwriter Discount - $5.00/$1,000 (Bond Issues only)*
*10 year Par Call - 10/1/23 (Bond Issues only)*

*∗Data provided by Dunlap and Associates. Debt service estimates based on prevailing rates for a general obligation bond issue.*

*∗ TIC- True Interest Cost: Total annual cost of obtaining debt financing (incl. interest and all issuance costs) expressed as a % of the total debt amount.*

## OPTION 2: FINANCING CAPITAL IMPROVEMENTS IN PHASES

The City may choose to finance the capital improvements in phases. Under the phased approach, the City would issue Revenue bonds in accordance with a phasing plan approved by the City Commission. Among other things, the phases will be based upon our ability to complete all of the projects in 3-5 years, thereby ensuring that we do not violate the bond covenants. The benefit of the phased approach is that it provides the greatest flexibility to adjust the development program subject to then internal and external financial market conditions.

Furthermore, the phased approach will allow the City the ability to absorb the operational and debt service impacts gradually giving the Commission the opportunity to evaluate the City's financial position prior to the issuance of debt for the next phase. In addition, phasing lessens the impact to the homeowner and will allow for some tax base growth. The potential growth in tax base may mitigate the City's need to rely upon future debt issuances to finance the full cost construction in phases II and III.

The downside of this approach is that the City may not have the benefit of the low interest rate environment in future years. Table # 4 below details to cost of issuing bonds in phases.

**Table # 4**

| | 20 Year Bond, Series 2013 (Phase I) | 20 Year Bond, Series 2016 (Phase II) | 20 Year Bond, Series 2019 (Phase III) |
|---|---|---|---|
| Dated Date | 4/1/13 | 4/1/16 | 4/1/19 |
| Project Fund | 23,962,000.00 | 18,582,000.00 | 13,812,000.00 |
| All-In TIC* | 3.33% | 3.71% | 4.00% |
| Maximum Annual Debt Service | 1,634,100.00 | 1,313,750.00 | 1,002,525.00 |
| Total Debt Service | 33,451,587.50 | 26,876,275.00 | 20,511,000.00 |
| Final Maturity | 10/1/33 | 10/1/36 | 4/1/39 |
| **Debt Service Millage** | **0.450** | **0.362** | **0.276** |
| *Assumptions:* | *Cost of Issuance - $175,000 Bond Issue/$75,000 Bank Loan*<br>*Underwriter Discount - $5.00/$1,000 (Bond Issues only)*<br>*10 year Par Call - 10/1/23 (Bond Issues only)* | | |

* *Data provided by Dunlap and Associates. The interest rates stated for future years are based on presumed market conditions.*
* *TIC- True Interest Cost: Total annual cost of obtaining debt financing (incl. interest and all issuance costs) expressed as a % of the total debt amount.*

## 6 YEAR BUDGET PRO-FORMA

Table# 5 below provides an estimated six year view of the fiscal impact associated with the capital improvement program. All things being constant, this pro-forma shows the incremental increase in operating costs as the City brings on each new park facility, as well as the estimated impact that the increased operational cost would have on the City's millage. In addition, based on a lump sum issuance of $56.7M, this table shows the stand alone debt service millage rate should the residents vote for a General Obligation (GO) bond and the combined millage rate impact that would have to be incorporated into the City's operational millage if the Commission decided to select the revenue bond option.

**Table # 5 – Impact of Lump Sum Issuance**

| | FY 14 | FY 15 | FY 16 | FY 17 | FY 18 | FY 19 |
|---|---|---|---|---|---|---|
| **Addt'l Parks Operating Cost Due to CIP** | $ 302,616 | $ 858,456 | $ 1,118,598 | $ 1,118,598 | $1,236,892 | $ 2,626,551 |
| **Debt Service (based on lump sum )** | $ 3,165,837 | $ 3,165,837 | $ 3,165,837 | $ 3,165,837 | $ 3,165,837 | $ 3,165,837 |
| **Total Cost** | **$ 3,468,453** | **$ 4,024,293** | **$ 4,284,435** | **$ 4,284,435** | **$ 4,402,729** | **$ 5,792,388** |
| **Less Current Expenditure** | $ (43,503) | $ (346,166) | $ (480,004) | $ (480,004) | $ (588,038) | $ (1,157,439) |
| **Less Additional Revenue Generated by CIP** | $ (13,700) | $ (21,700) | $ (93,700) | $ (93,700) | $ (114,700) | $ (244,200) |
| **CIP Impact** | **$ 3,411,250** | **$ 3,656,427** | **$ 3,710,731** | **$ 3,710,731** | **$ 3,699,991** | **$ 4,390,749** |
| **Operating Cost Millage Rate Equivalent** | .067 | .135 | .150 | .150 | .147 | .337 |
| **Debt Service Millage Rate (*Separate rate if GO Bond)*** | .874 | .872 | .872 | .872 | .872 | .872 |
| **Combined Millage Impact (*Part of Operating If Revenue Bond)*** | **.939** | **1.001** | **1.022** | **1.022** | **1.019** | **1.210** |
| **Total Millage Rate** | **6.839** | **6.901** | **6.922** | **6.922** | **6.919** | **7.110** |

In contrast to the Table 5, all things being constant, Table 6 shows the estimated impact to the City over the same six year period if the City were to engage in a phased financing structure. As stated above, the phased plan allows for a more gradual growth in millage rate over time. However, with this structure there is no guarantee that the presumed interest rates will continue to be as favorable as estimated below.

**Table # 6-Impact of Phased Issuance**

| | Phase I | | | Phase II | | |
|---|---|---|---|---|---|---|
| | **FY 14** | **FY 15** | **FY 16** | **FY 17** | **FY 18** | **FY 19** |
| **Addt'l Parks Operating Cost due to CIP** | $ 302,616 | $ 858,456 | $1,118,598 | $1,118,598 | $1,236,892 | $ 2,626,551 |
| **Debt Service (based on phasing )** | $1,634,100 | $1,634,100 | $1,634,100 | $2,947,850 | $ 2,947,850 | $2,947,850 |
| **Total Cost** | **$ 1,936,716** | **$2,492,556** | **$ 2,752,698** | **$ 4,066,448** | **$ 4,184,742** | **$5,574,401** |
| **Less Current Expenditure** | $ (43,503) | $(346,166) | $(480,004) | $ (480,004) | $(588,038) | $(1,157,439) |
| **Less Additional Revenue from CIP** | $ (13,700) | $ (21,700) | $ (93,700) | $ (93,700) | $(114,700) | $(244,200) |
| **CIP Impact** | $ 1,879,513 | $ 2,124,690 | $ 2,178,994 | $ 3,492,744 | $3,482,004 | $ 4,172,762 |
| **Millage Rate Equivalent** | **.518** | **.585** | **.660** | **.962** | **.959** | **1.149** |
| **Total Millage Rate** | **6.418** | **6.485** | **6.560** | **6.862** | **6.859** | **7.049** |

**Table # 7-Fiscal Year 2011/12 Broward County Millage Rate Comparison**

| MILLAGE RATE COMPARISON<br>TOTAL (OPERATING & DEBT SERVICE)<br><br>ADOPTED RATES FY 11/12 | | | | |
|---|---|---|---|---|
| **CITY** | **TOTAL** | **OPERATING** | **DEBT SERV** | **Rank** |
| WESTON | 2.0000 | 2.0000 | | 1 |
| HILLSBORO BEACH | 3.3900 | 3.3900 | | 2 |
| LIGHTHOUSE POINT | 3.8602 | 3.5893 | 0.2709 | 3 |
| SOUTHWEST RANCHES | 3.9404 | 3.9404 | | 4 |
| LAUDERDALE BY THE SEA | 3.9990 | 3.9990 | | 5 |
| PARKLAND | 4.0198 | 4.0198 | | 6 |
| FORT LAUDERDALE | 4.2888 | 4.1193 | 0.1695 | 7 |
| PLANTATION | 4.6142 | 4.6142 | | 8 |
| CORAL SPRINGS | 4.6854 | 4.3939 | 0.2915 | 9 |
| LAZY LAKE | 4.9481 | 4.9481 | | 10 |
| POMPANO BEACH (incl .5000 for ems/fire) | 5.2027 | 5.2027 | | 11 |
| COOPER CITY | 5.2679 | 5.0526 | 0.2153 | 12 |
| BROWARD COUNTY | 5.5530 | 5.1860 | 0.3670 | 13 |
| DAVIE | 5.6007 | 4.8122 | 0.7885 | 14 |
| DEERFIELD BEACH | 5.7688 | 5.1865 | 0.5823 | 15 |
| **HALLANDALE BEACH** | **5.9000** | **5.9000** | | **16** |
| OAKLAND PARK | 6.0138 | 6.0138 | | 17 |
| SUNRISE | 6.0543 | 6.0543 | | 18 |
| DANIA BEACH | 6.2507 | 5.9998 | 0.2509 | 19 |
| PEMBROKE PINES | 6.3081 | 5.6368 | 0.6713 | 20 |
| COCONUT CREEK | 6.3857 | 6.3857 | | 21 |
| MIRAMAR | 6.4654 | 6.4654 | | 22 |
| TAMARAC | 6.7774 | 6.6850 | 0.0924 | 23 |
| WILTON MANORS | 6.9994 | 6.2068 | 0.7926 | 24 |
| SEA RANCH LAKES | 7.5000 | 7.5000 | | 25 |
| NORTH LAUDERDALE | 7.7504 | 7.4066 | 0.3438 | 26 |
| HOLLYWOOD | 7.8928 | 7.4479 | 0.4449 | 27 |
| MARGATE | 7.9892 | 7.7500 | 0.2392 | 28 |
| LAUDERHILL | 8.0949 | 6.8198 | 1.2751 | 29 |
| PEMBROKE PARK | 8.5000 | 8.5000 | | 30 |
| WEST PARK | 8.9900 | 8.9900 | | 31 |
| LAUDERDALE LAKES | 10.8560 | 9.5000 | 1.3560 | 32 |

**RECOMMENDATION:**

Staff recommends that the City Commission move forward with Citywide Parks Master Plan and the renovation of the main fire station utilizing a phased financing structure that will lessen the immediate impact of the improvements on the General Fund. This is a critical time for the financial health of the City. As the nation moves slowly out of the economic downturn, the City must be cautious to guard its growth in expenditures. This is especially important as we deal issues that have an impact on our financial health; namely the growing pension cost liability and maintaining a healthy fund balance.

Finally, at the request of the City Commission staff worked with Cornell University to conduct a telephone survey, to gauge community support for issuing debt in order to pay for parks improvements. The survey was conducted in July with 400 residents responding and 95% confidence rate. Attached for your review are the results of the Cornell University survey (Attachment 1).

## Respondent Demographics

**Property type:** **Provided by PI**

**Residency (Q0):** **To begin, would you please tell me if you live in Hallandale Beach year-round or not?**
Do live in Hallandale Beach year-round, Do not live in Hallandale Beach year-round

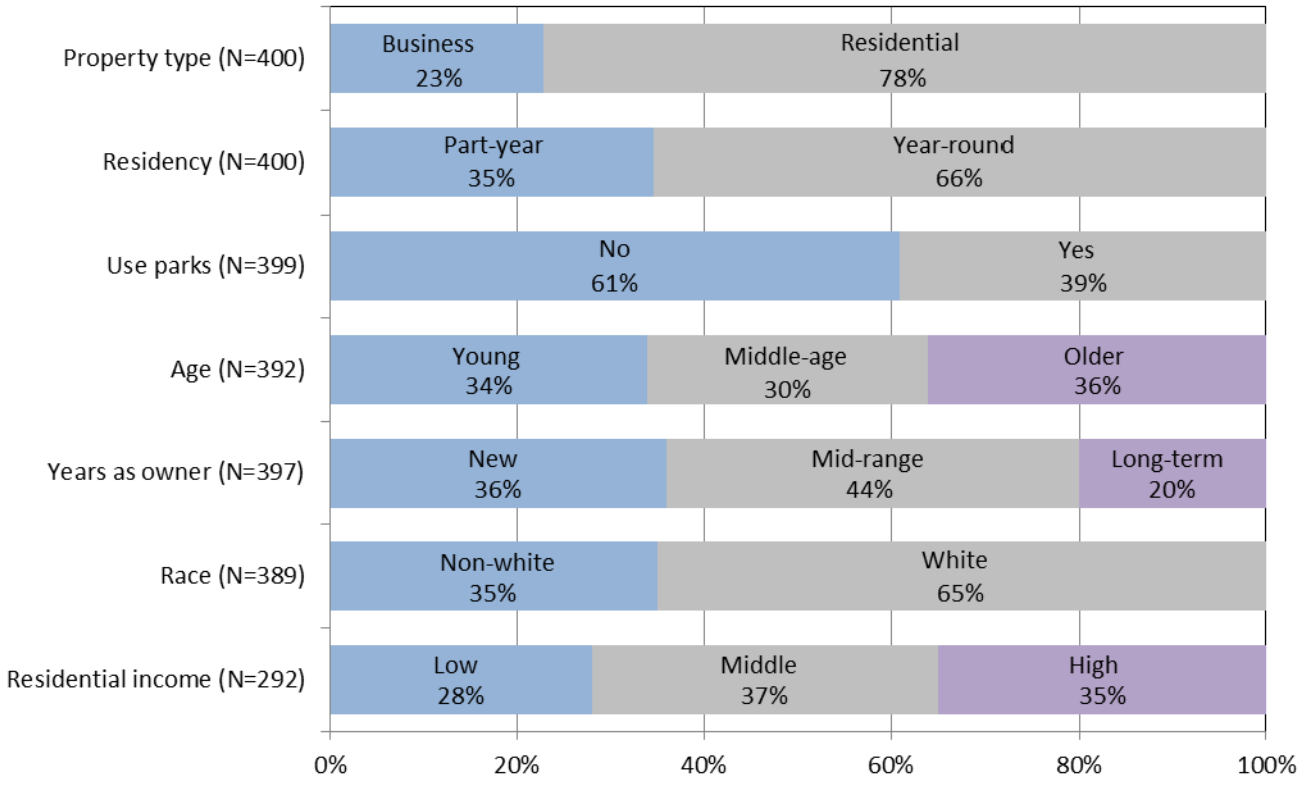
**Use parks (Q1):** **When you are in Hallandale Beach how often do you or any member of your household use any of the parks in the city?**
Never, Rarely (3-4 times/year), Sometimes (3-4 times/month), Often (2-5 times/week), Always (6-7 times/week)
***No = Never/Rarely, Yes = Sometimes/Often/Always***

**Age:** **Are you 18-25 years of age, 26-35, 36-45, 46-55, 56-65, or over 65 years of age?**
***Young = 18-45, Middle-age = 46-55, Older = 56+***

**Years as owner: (yrsown)** **How many years have you owned [property address]?**
***New = 0 - 5 years, Mid-range = 6 - 15 years, Long-term = 16+ years***

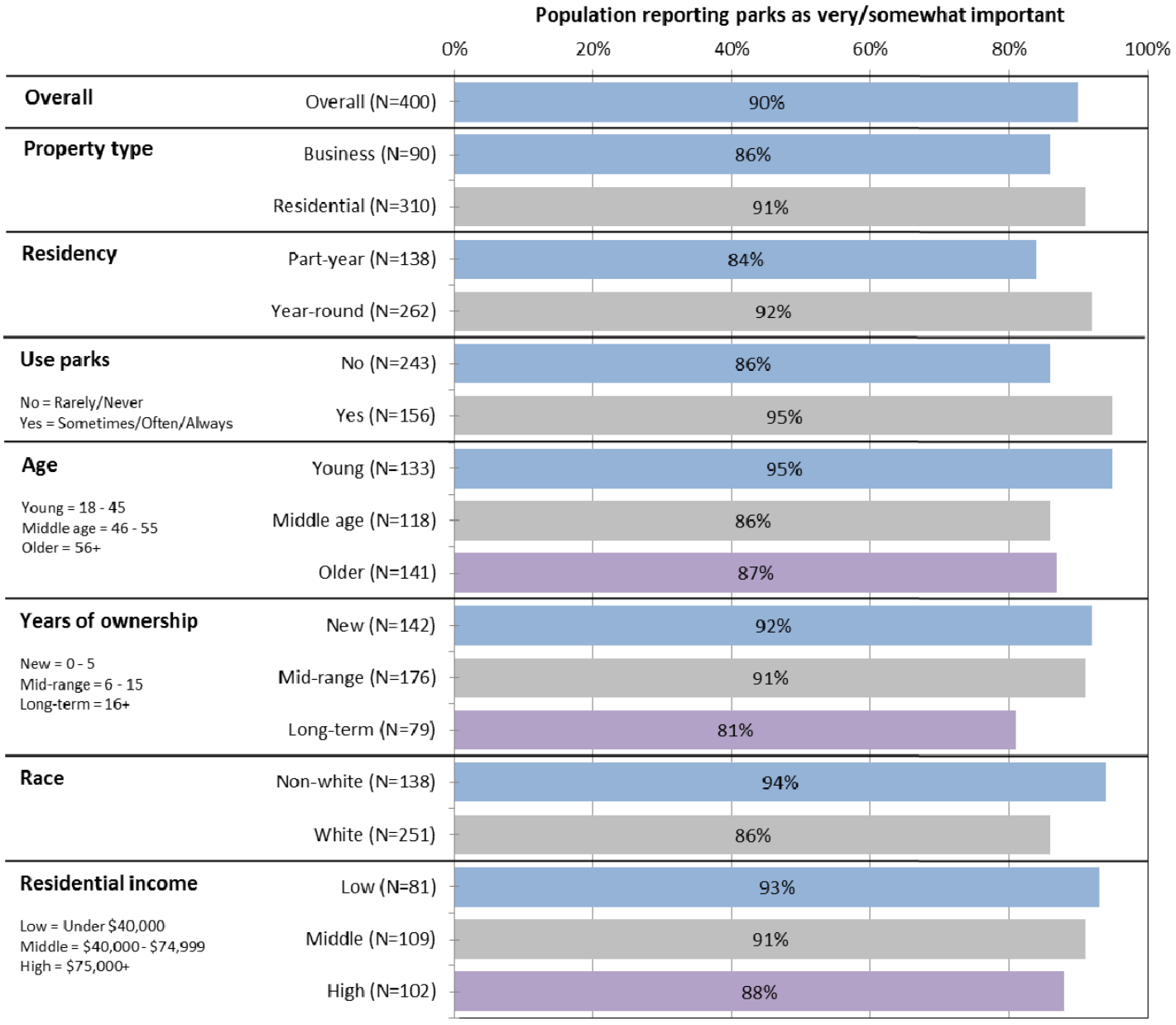
**Race:** **What best describes your race?**
White or Caucasian, African American or Black, American Indian/Aleut/Eskimo, Asian or Pacific Islander, or something else?

**Residential income: (hhinc)** **Finally, for statistical purposes to allow us to compare across demographic characteristics, last year (that is in 2011), what was your total household income from all sources before taxes?**
***Low = Under $40,000, Middle = $40,000 - $74,999, High = $75,000+***



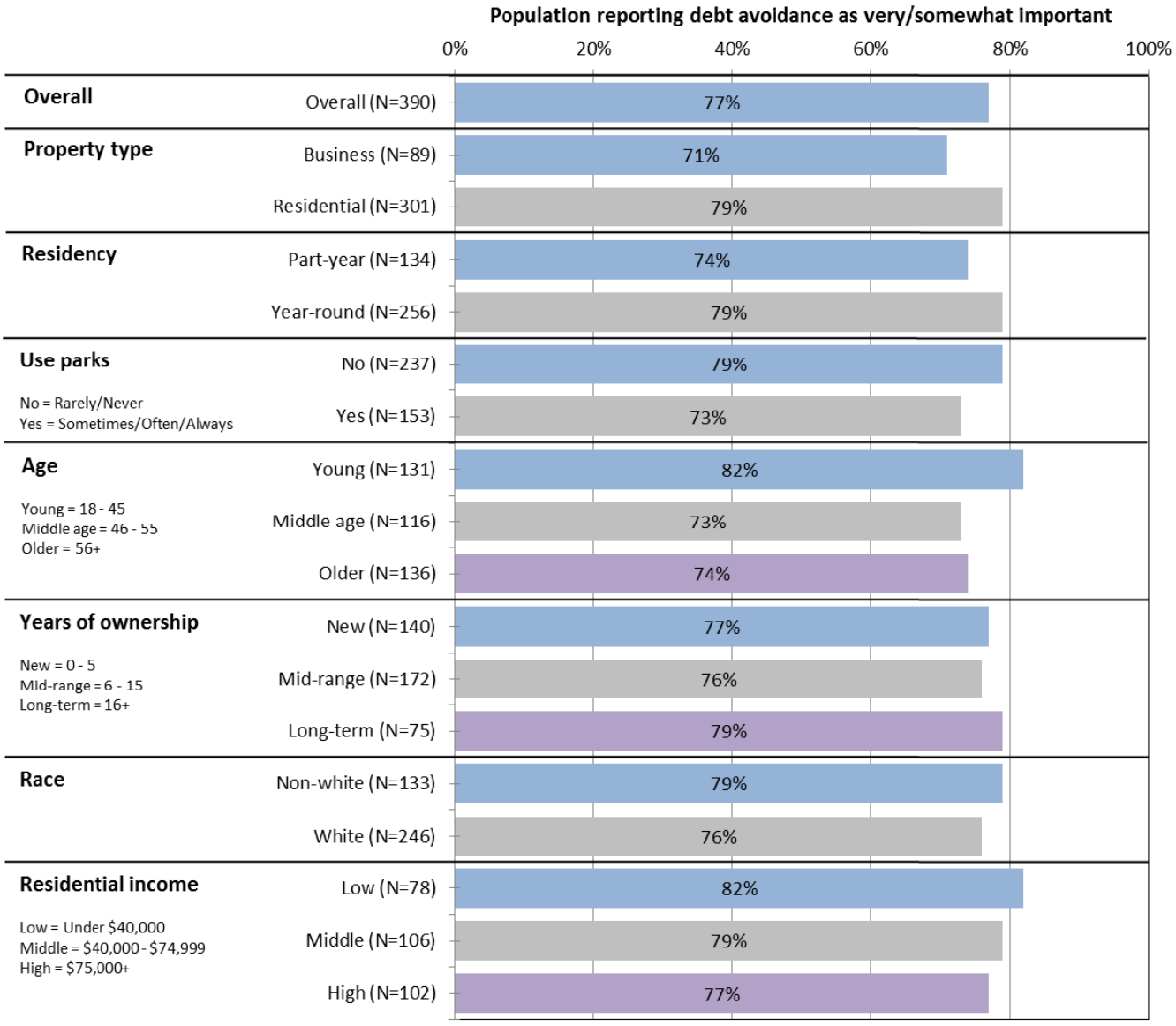
**Q2: How important is it to you that the City of Hallandale Beach have parks and recreational facilities for its residents to use and enjoy?**

**Would you say very unimportant, somewhat unimportant, somewhat important, or very important?**



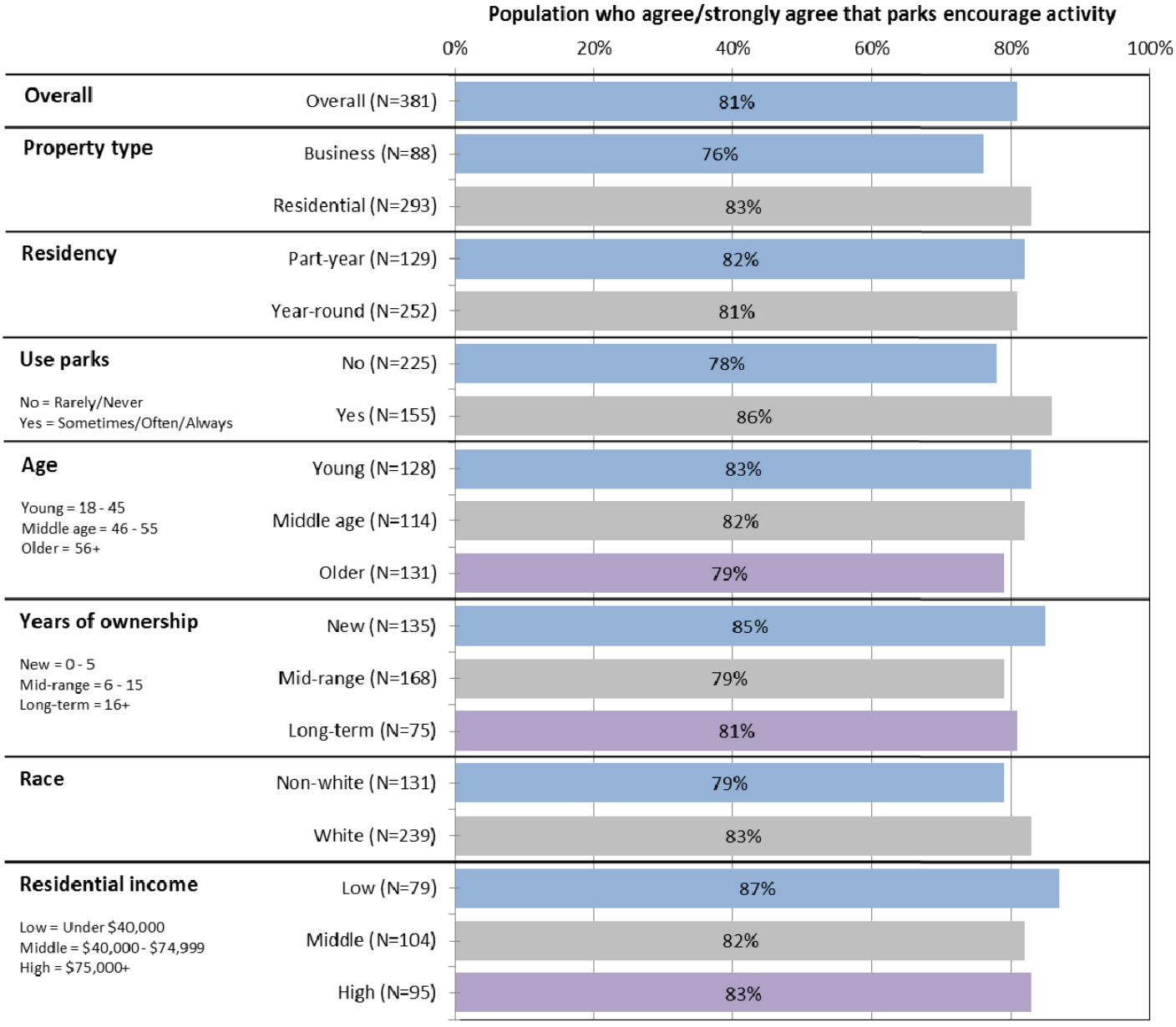
**Q3: And how important is it to you that the City of Hallandale Beach not go into debt to build and maintain its parks and recreational facilities?**

**Would you say very unimportant, somewhat unimportant, somewhat important, or very important?**



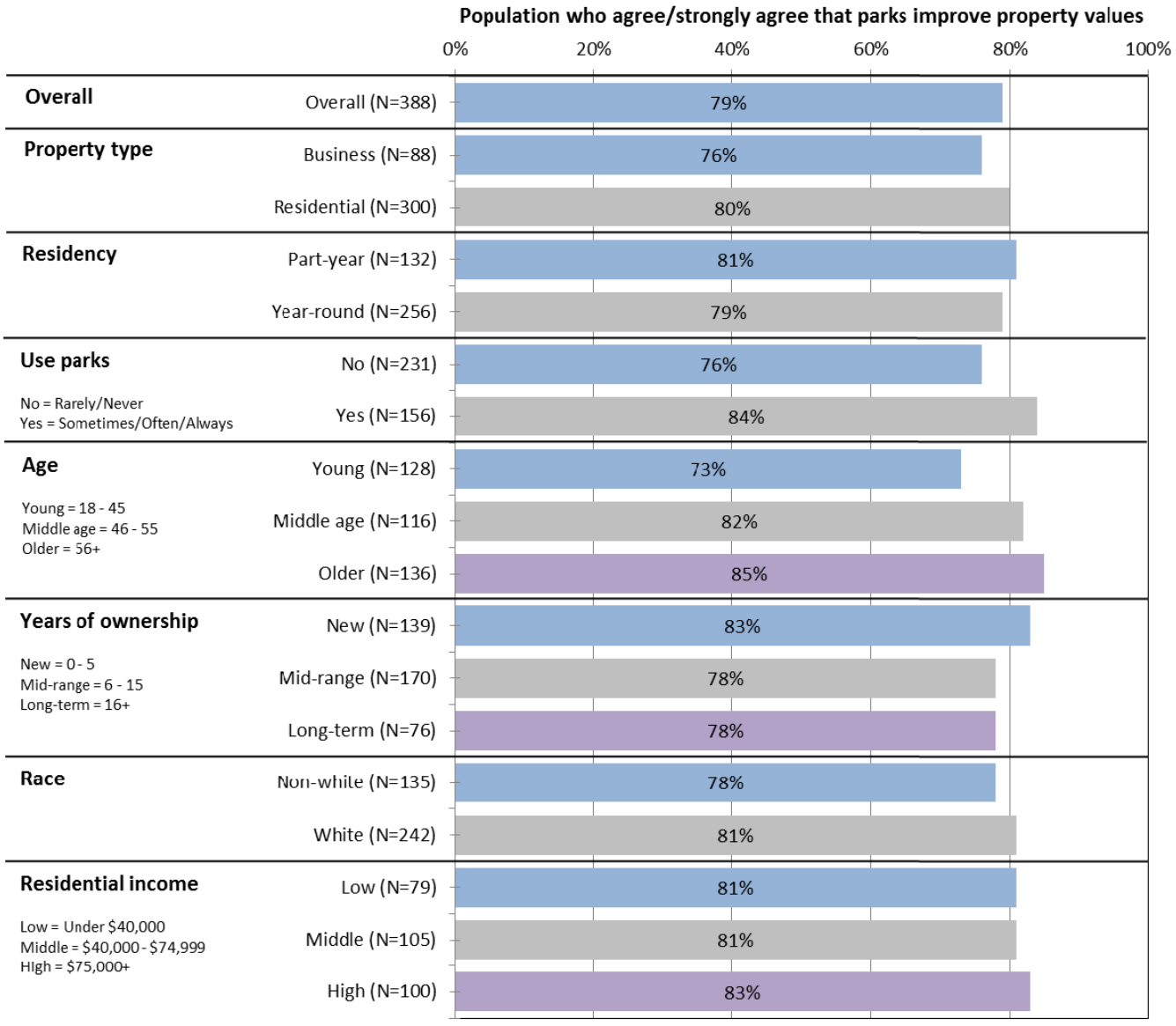
**Q4a: Please indicate if you agree or disagree with the following statements:**
**Hallandale Beach City parks encourage physical activity.**

**Do you strongly disagree, disagree, agree, or strongly agree?**



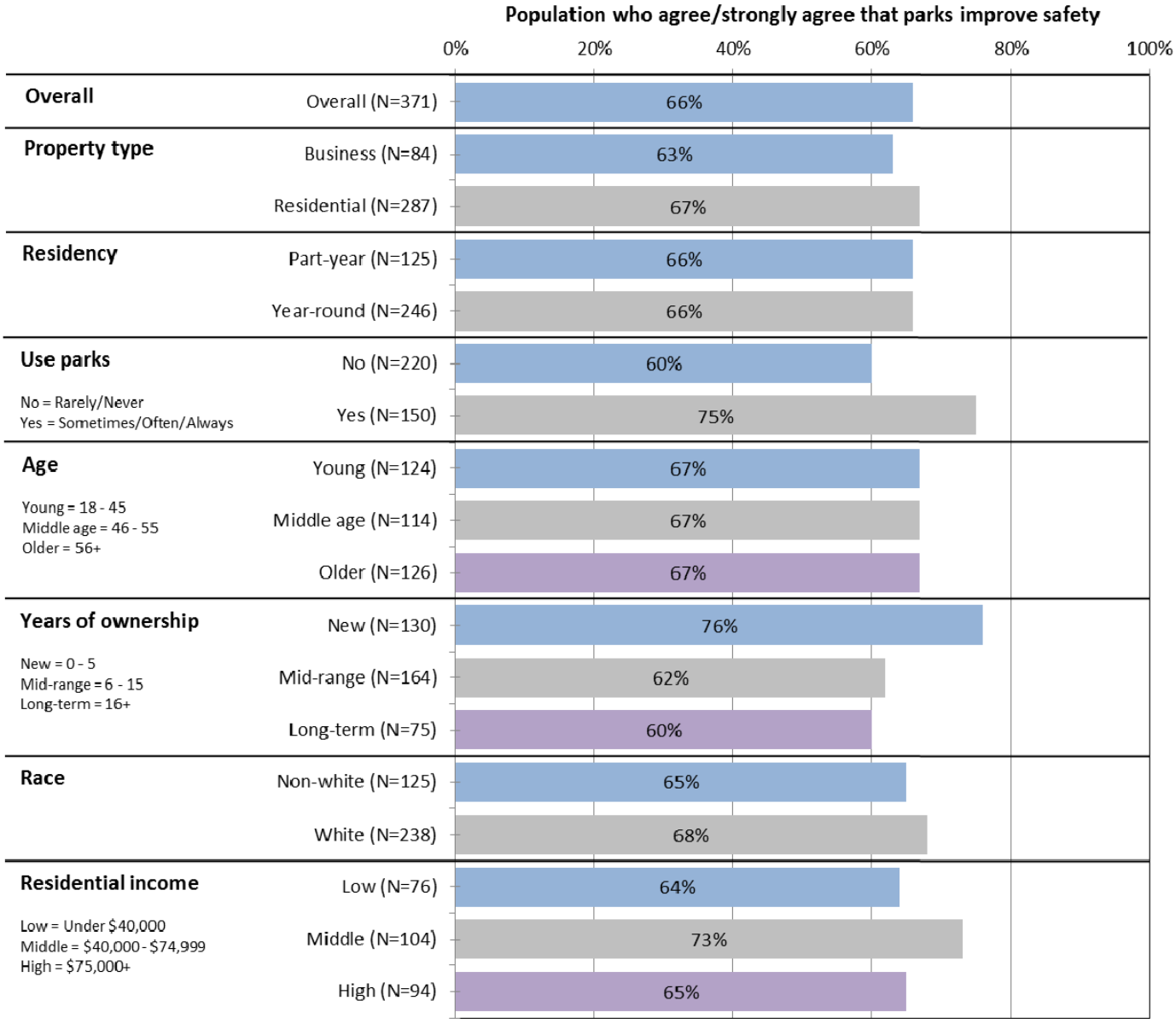
**Q4b: Please indicate if you agree or disagree with the following statements:**
**Hallandale Beach City parks improve the property values of neighboring areas.**

**Do you strongly disagree, disagree, agree, or strongly agree?**



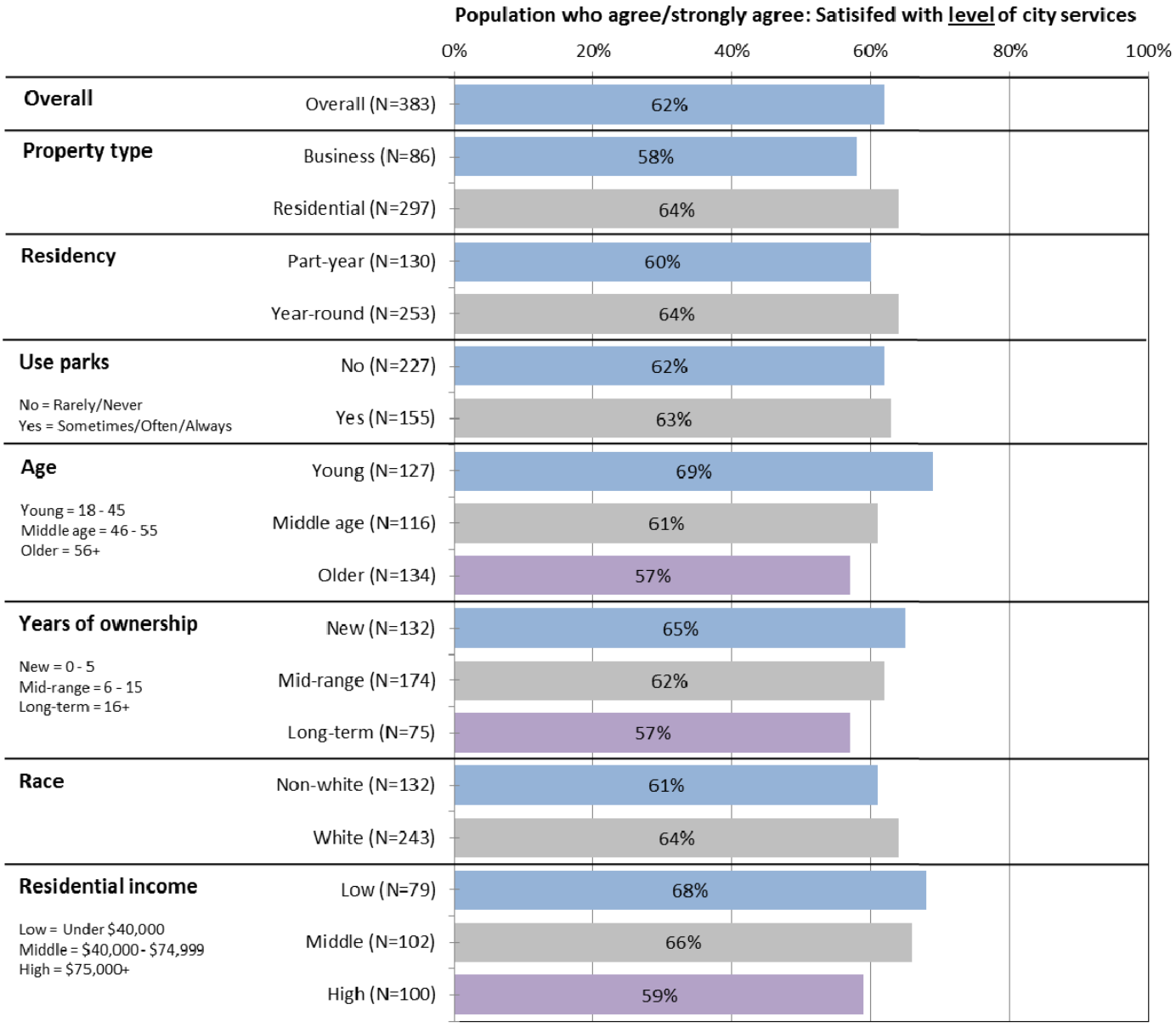
**Q4c: Please indicate if you agree or disagree with the following statements:**
**Hallandale Beach City parks improve the overall safety of neighboring areas.**

**Do you strongly disagree, disagree, agree, or strongly agree?**



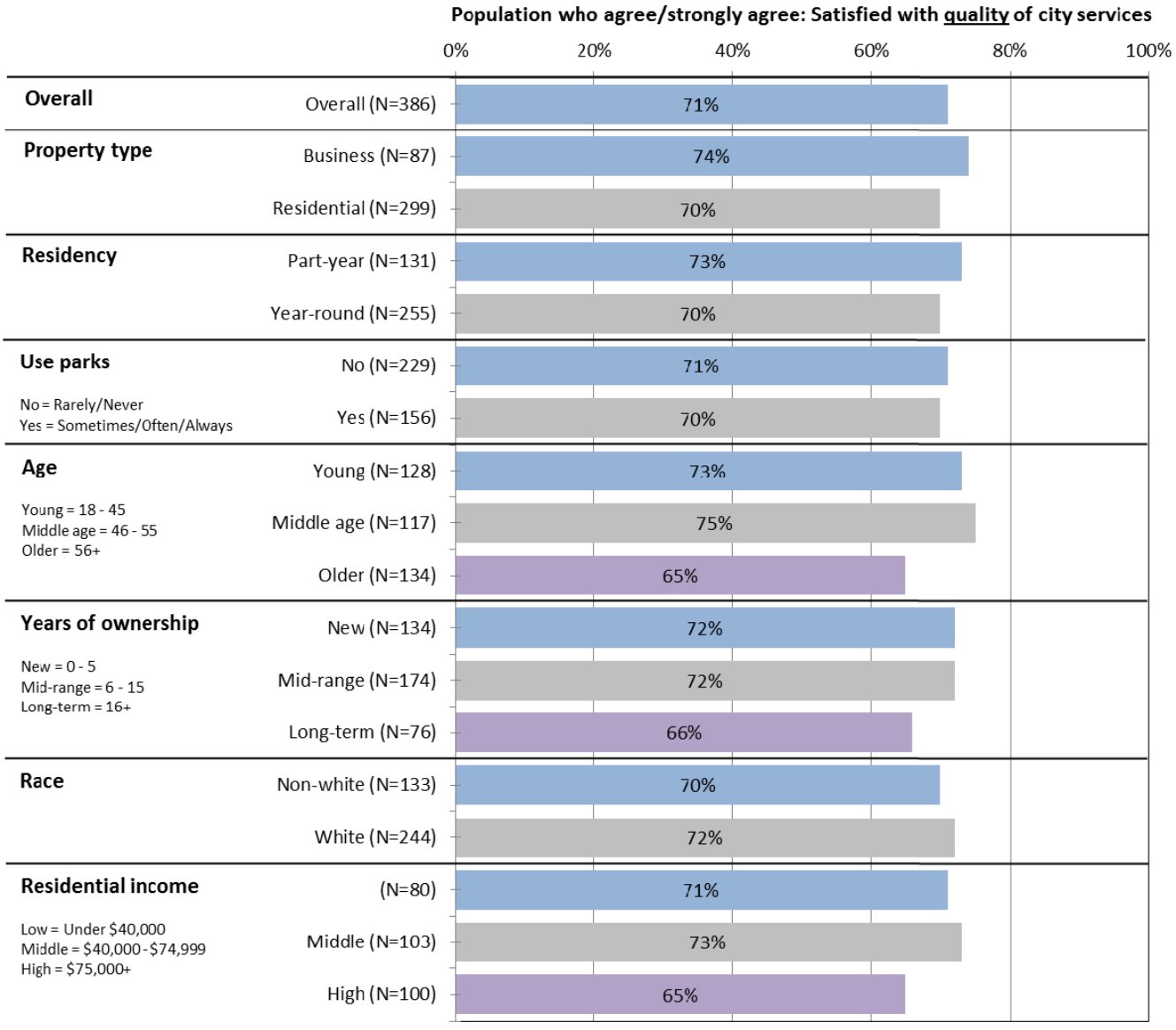
**Q4d: Please indicate if you agree or disagree with the following statements:**
**I am satisfied with the level of services provided by the city relative to the property taxes I pay.**

**Do you strongly disagree, disagree, agree, or strongly agree?**

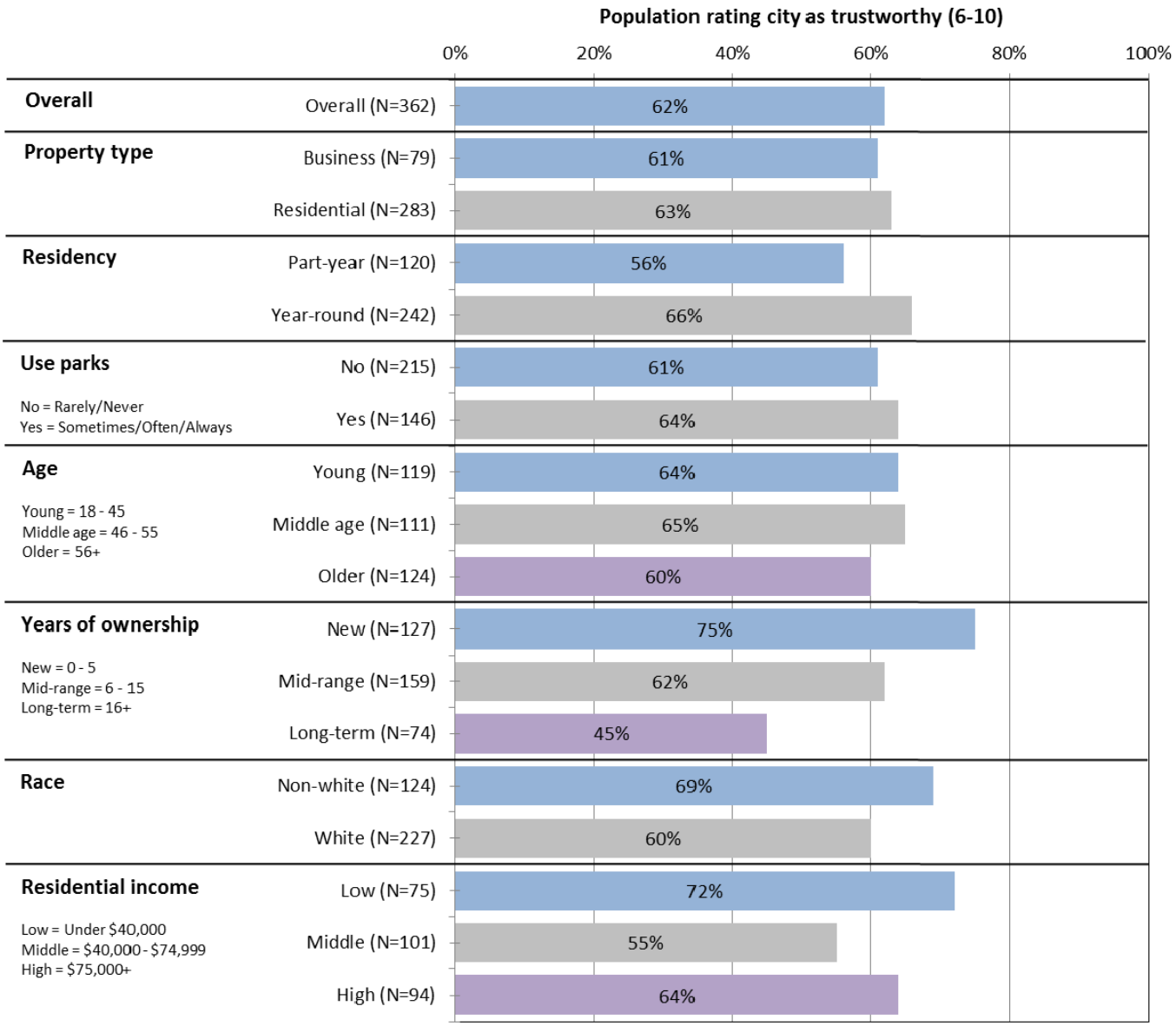


**Q4e: Please indicate if you agree or disagree with the following statements:**
**I am satisfied with the quality of services provided by the city relative to the property taxes I pay.**

**Do you strongly disagree, disagree, agree, or strongly agree?**



**Qtrust: On a scale of 1 to 10, where 1 is untrustworthy and 10 is trustworthy, how would you rate the trustworthiness of the City of Hallandale Beach local government (overall)?**

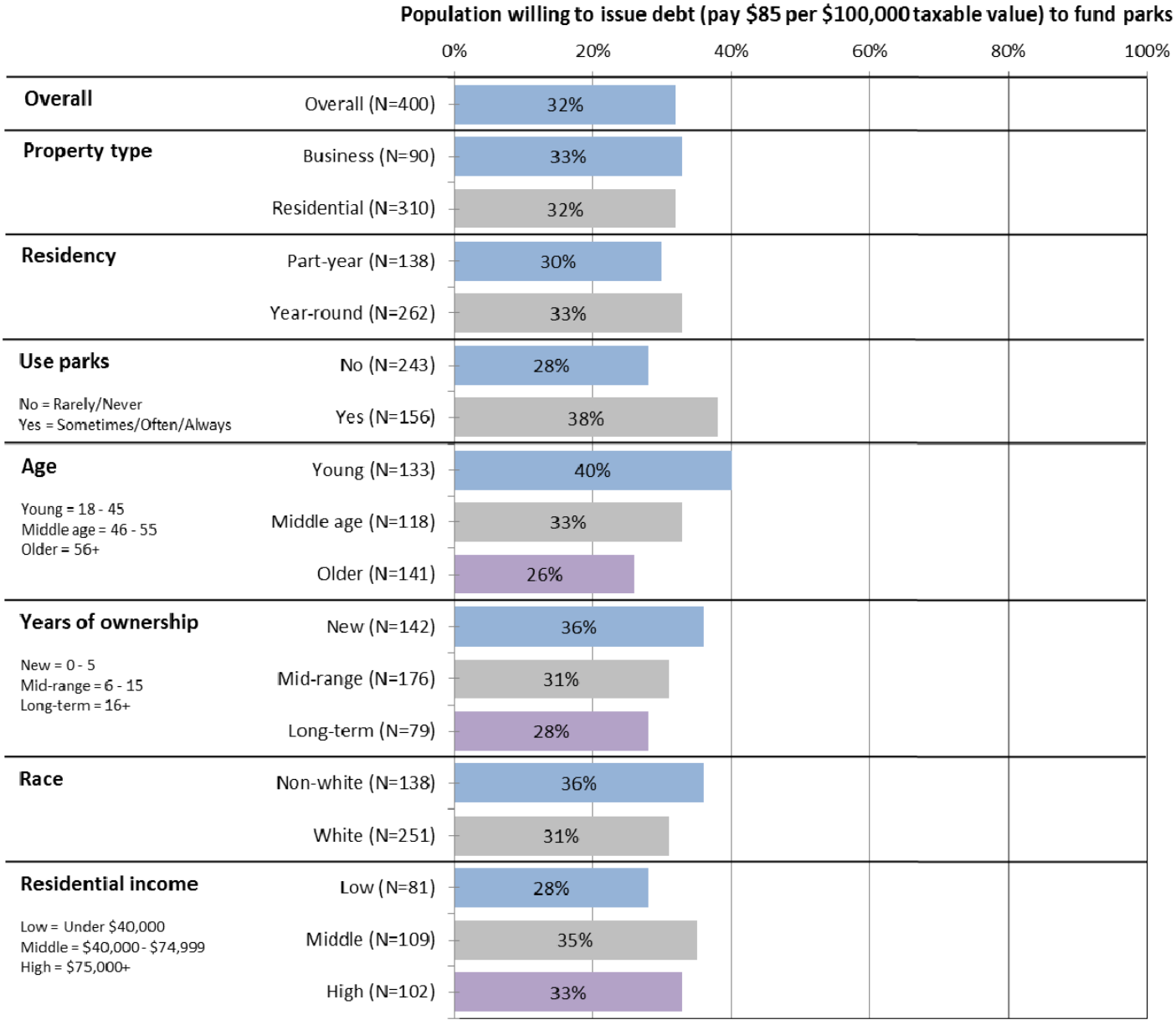


**Q5: The parks in the city are funded by property taxes. The estimated cost to improve the parks is approximately $50 million. Currently, as a resident in Hallandale Beach, you are paying 40% less than Broward County overall to support the local parks and recreation.**

**If the City was to issue debt to pay for the new park facilities, which would be constructed within the next 5-10 years, the average property tax increase would be $85 per $100,000 of taxable value.**

**A second option is to use a pay-as-you-go approach; it would take the city approximately 20 years to raise the funds and, by then, the redevelopment costs will most likely be higher.**

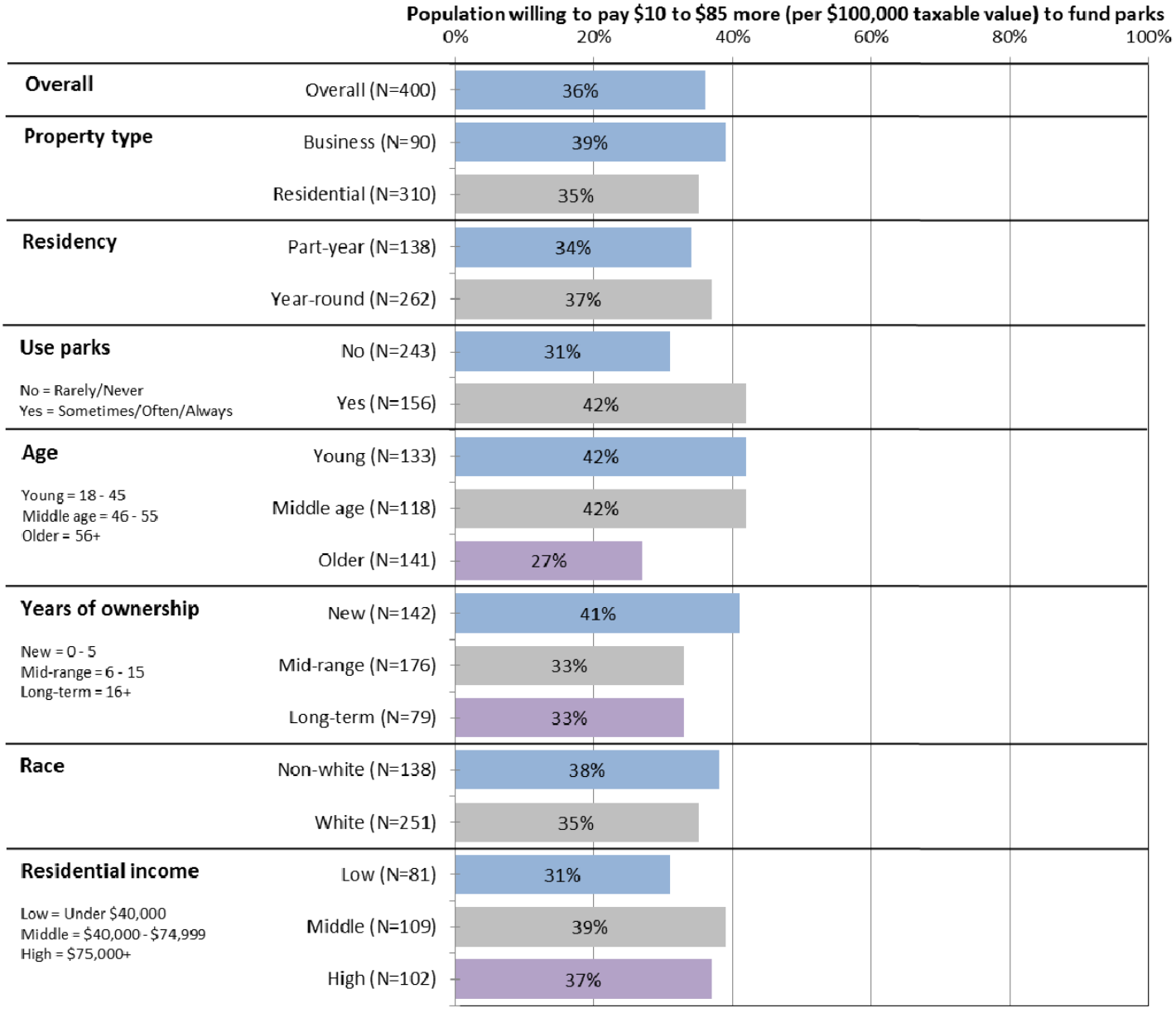
**Would you prefer the City of Hallandale Beach to:**
**Issue debt to pay for the parks now or**
**Pay for the parks only when there is enough money to do so (pay as you go option)**



**Qtaxes: [For respondents who answered that they preferred a pay-as-you-go plan in Q5]**
**If I told you that studies by the National Parks and Recreation Association have found that parks have the potential of increasing physical activity, as well as increasing the property values and safety of the surrounding neighborhoods, also that to pay-as-you-go would potentially take 20 years to raise the $50 million, would this change your mind about how the city should fund the improvements for the parks?**
**Yes, I would be willing to issue debt**
**No, it would not change my mind about how the city should fund the parks**

**[For respondents who answered "Yes, I would be willing to issue debt"]:**
**Please let me know how much more you would be willing to pay in property taxes to fund the parks in the city so they can be built within the next 5-10 years. Would you be willing to pay $80/year more for each $100,000 of your property's taxable value? $75, $70, ... $45, $40, $30, $20, $10, $0 (not willing to pay anything more)?**

**[Note that the responses shown below include people willing to pay $85 more (per $100,000 taxable value) from Q5.]**



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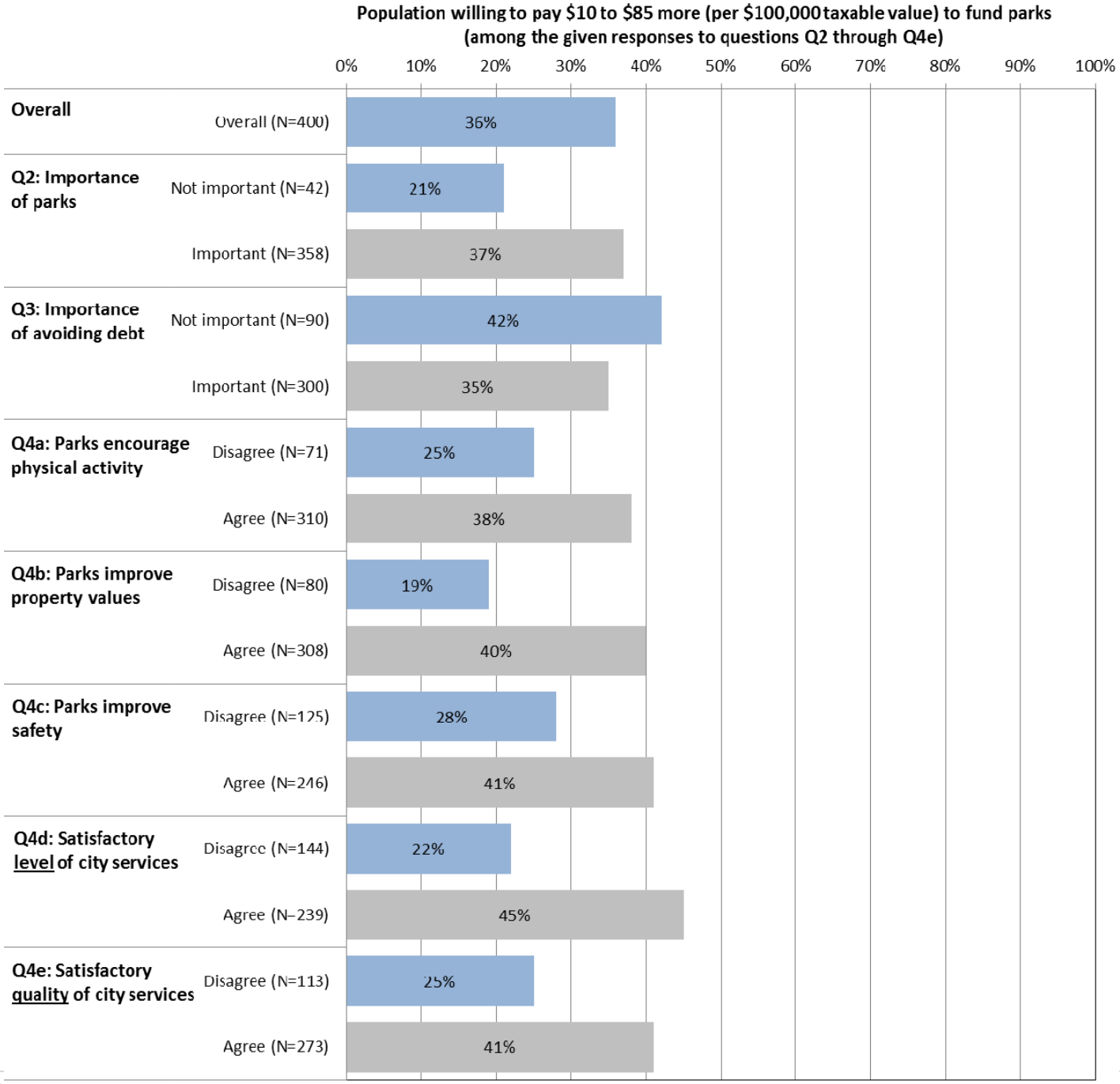
**No, it would not change my mind about how the city should fund the parks**

**[For respondents who answered "Yes, I would be willing to issue debt"]:**
**Please let me know how much more you would be willing to pay in property taxes to fund the parks in the city so they can be built within the next 5-10 years. Would you be willing to pay $80/year more for each $100,000 of your property's taxable value? $75, $70, ... $45, $40, $30, $20, $10, $0 (not willing to pay anything more)?**

**[Note that the responses shown below include people willing to pay $85 more (per $100,000 taxable value) from Q5.]**



# CITY OF HALLANDALE BEACH
# COMPRESSED NATURAL GAS FUELING FACILITY PROJECT

During the May 14, 2012 City Commission/City Manager Workshop, where new proposed initiatives for the 2012/2013 Fiscal Year were discussed, the City Commission directed staff to research the proposed Compressed Natural Gas (CNG) initiatives to include a detailed explanation and analysis on the investment into CNG. One of the initiatives was to research the option to convert our Sanitation Fleet vehicles to CNG fuel, and to explore options to construct a Compressed Natural Gas fueling facility either as a stand-alone venture or through a public/private partnership venture. This report outlines the progress staff has made toward the goal of converting our fleet of sanitation vehicles to CNG-powered vehicles, and determining the feasibility of building a City-owned, or jointly-owned through a Public/Private Partnership, CNG fueling depot.

On August 1, 2012, the City Commission will consider several agenda items pertaining to the purchase of Sanitation Collection Vehicles fueled by Compressed Natural Gas (CNG). Should these items be approved, the City Commission will be embracing an initiative to convert the City's entire fleet of solid waste collection vehicles, and possible other vehicles within the fleet, to run on clean burning, environmentally beneficial CNG. As part of the approval to purchase the vehicles, the City Commission will also consider a temporary means of fueling the new CNG-powered vehicles using a cooperative agreement with the City of Hollywood. While this temporary fueling arrangement will allow the City to begin the process of converting the City's fleet to CNG, this will not be a long-term solution to the City's CNG fueling needs. A better solution would be for the City to own and operate, or jointly own and operate through a Public/Private Partnership, its own rapid CNG fueling facility.

Toward that end, staff has performed a preliminary market study and contacted other municipalities and natural gas suppliers to determine the feasibility of constructing a rapid fill CNG fueling depot at either the City's DPW compound, or the City-owned property on Ansin Boulevard, and to evaluate markets that might be interested in accessing CNG fuel from a publicly-owned or joint public/private partnership-owned CNG fueling Depot. Exhibit "1" is a study performed for the U.S. Department of Energy by the National Renewable Energy Laboratory (NREL) that identifies business cases for converting municipal fleets to operate using CNG fuel. The 2010 report specifically identifies Refuse Collection municipal fleets as an ideal candidate for the conversion. The report is one of many that concurs with this approach, and also promotes the concept of municipal owned or joint public/private owned CNG fuel depots.

To: Renee Crichton, City Manager
From: Hector D Castro, P.E., Director of DPW/Utilities & Engineering
Re: Compressed Natural Gas Fueling Depot Concept
Date: August 13, 2012

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Staff identified a number of benefits of constructing a rapid fill CNG depot at the Ansin Boulevard site. There is ample space at the Ansin Blvd. site for a fuel depot, it is in close proximity to the DPW Compound (where the Sanitation Collection Vehicles are staged), and access from the I-95 corridor is available which would allow the City to operate the CNG fueling depot as an enterprise to sell retail CNG fuel to the public and to other commercial fleets. The site is properly zoned for this purpose and TECO Gas, Incorporated has a gas main within the Ansin Boulevard right-of-way that has sufficient capacity to serve a rapid CNG fueling depot. Accordingly, Federal, State and/or local permitting for the site is not considered to be a problem.

Staff has been informed by Wise Gas, Incorporated (a local wholesale and retail supplier of natural gas) that several commercial fleets have converted or are in the process of converting their delivery fleets to CNG fuel. AT&T, FEDEX, UPS and other large, highly recognized organizations are some of the companies that the Wise Gas identified as future possible customers for a CNG fueling depot. There is a dearth of CNG rapid fueling stations in South Florida, with most CNG fueling stations located in Miami-Dade County or in Fort Lauderdale, near the international airport. According Mr. Jeff Greene, Business Development Manager for Wise Gas, the City's Ansin Boulevard site is ideally situated between existing fuel depots, and would likely be used by most of these large delivery fleets, due to its proximity to the I-95 corridor.

While the Ansin Boulevard site is strategically located between the two existing CNG rapid fuel stations in Miami-Dade and Fort Lauderdale, there remains an issue of ingress/egress by large, tractor-trailer type vehicles, which could limit the overall market for the station. Clearly, smaller delivery vehicles, such as those used by United Parcel Service, FEDEX, AT&T, Comcast, and Solid Waste Collection vehicles, would have no problems accessing the site. Larger vehicles may require some changes to the Ansin Boulevard intersections with Hallandale Beach Boulevard and Pembroke Road. Should the City Commission authorize staff to continue with the research presented in this report, this large vehicle access concern would be identified and alternative designs for ingress/egress of large transport vehicles would be developed, with cost estimates and schedules, and presented to the City Commission and other appropriate agencies.

## Future of CNG as a Transportation Fuel

Natural gas is one of America's greatest resources. While reserves of other fossil fuel resources are diminishing, new drilling technologies and techniques are allowing the recovery of natural gas in the shale deposits found all across America. A recent Rice University study (James A. Baker Institute for Public Policy, Rice University; "Shale Gas and U.S. National Security"; published in July 2011) projects that U.S. shale gas production will more than quadruple by 2040 from 2010 levels of more than 10 billion cubic feet per day, reaching more than 50 percent of total U.S. natural gas production by the 2030s. The study incorporates independent scientific and economic literature on shale costs and resources, including

assessments by organizations such as the U.S. Geological Survey, the Potential Gas Committee and scholarly peer-reviewed papers of the American Association of Petroleum Geologists.

As President Obama has pointed out in a speech at Georgetown University on March 30, 2011, the energy available from natural gas contained in these shale deposits can provide ample supplies for the next 100 years. The United States imported 25% of all the oil we used in 1970. In 2011, imported oil represents over 60% of our daily consumption. Much discussion has taken place about the economic importance of reducing the Country's dependence on foreign oil. By adopting a fiscally responsible plan to convert a portion of the City's fleet to CNG fuel, and by ensuring that the City controls the ability to fuel its own vehicles, Hallandale Beach will be doing its part in our Country's goal of energy independence.

**CNG and the Environment**

Natural gas is cleaner than coal, diesel, or gasoline. In fact, natural gas is the cleanest fossil fuel and a highly efficient form of energy. The U.S. Energy Information Administration has stated that natural gas is twice as clean as coal.

Natural gas has lower carbon content and fewer impurities than other fuels, and produces less sulfur dioxide (a primary cause of acid rain) and other pollutants. Natural gas produces 22 to 29% less greenhouse gas emissions than diesel- or gasoline-powered vehicles, respectively.

For instance, carbon monoxide (CO) and nitrogen oxides (NOx) are reduced by more than 90 and 60%, respectively, and carbon dioxide (CO2), a greenhouse gas, is reduced by 30 to 40%. When used in medium and heavy-duty engines, CO and particulate matter (PM) reductions of over 90%, and NOx reductions of over 50%, have been demonstrated compared to diesel engines.

**Is this Action Goal Related**

This action addresses the following City's Strategic Priorities:

*Excellence in Government* by ensuring that local government is accountable, accessible and transparent in its operations; and is effective in its management of tangible assets and fiscal responsibilities. CNG is the cleanest fuel available commercially today, it is the least expensive and most plentiful fuel resource in our country, and it reduces and possibly will eliminate our foreign oil dependency.

*Environmental Sustainability* by enhancing the quality of life of residents and visitors by protecting natural resources, the environment, and planning for the conservation of these assets.

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CNG vehicles can run as much as 90% cleaner than diesel and gasoline, creating very little pollution. CNG fuel is the cleanest fuel available commercially today. Investment in CNG now will benefit the City indefinitely.

**Options for Building and Operating a CNG Fuel Depot**

Two models for constructing and operating a CNG rapid fuel depot are common across the country. Some municipalities have opted to build and operate their own fuel depots (as is the case in Hollywood and Sunrise, both Florida communities). Other municipalities have chosen to enter into public/private partnerships with natural gas suppliers to jointly own and operate CNG fueling depots. Examples of public/private enterprises include the cities of Riverside and Los Angeles, California; Chicago, Illinois; West Haven and Hartford, Connecticut; Las Vegas, Nevada; and Ogden, Utah. In Florida, the City of Pensacola has announced that it will partner with the Emerald Coast Utility Authority (ECUA) to transition all City and ECUA vehicles to CNG fuel, according to the American Natural Gas Alliance (ANGA).

Staff has conducted preliminary research on the feasibility of constructing a rapid fill CNG fueling station at the City's Ansin Boulevard site through a public/private partnership venture. Some of the benefits of partnering with a private natural gas supplier to build and operate a rapid fill fueling station include:

- A business model that has been implemented successfully in other communities throughout the United States, such as those Cities listed above.
- Reduced initial cost to the City for the capital improvements. No operational cost to the City as the private entity operates the station.
- No maintenance obligation of the site as the private entity assumes the maintenance cost.
- Revenue from leasing of the site, typically City-owned property such as our proposed Ansin Blvd. site.
- Generate significant revenue for the City as a shared profit agreement is part of the leasing agreement.
- Limited liability to the City for site operations.
- Availability of CNG during emergencies and natural disasters. Because natural gas delivery infrastructure is primarily subterranean, the likelihood of disruption during hurricanes and other natural emergencies is reduced.

The proposed site would be the west portion of the City's Ansin Boulevard Storage Facility. This location would lend easy accessibility from I-95 from both Pembroke Rd. and Hallandale

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Beach Blvd. An aerial sketch of the Ansin Blvd. site in relation to major roadways is provided as Exhibit "2". While challenges exist for large vehicle access to the site, zoning, land use and availability of natural gas (from a TECO Gas pipeline on Ansin Boulevard) make the site attractive for the location of a fueling depot.

As there is a growing trend across the Nation to develop CNG fuel delivery systems and convert delivery and service fleets to CNG-fueled vehicles, and as the number of private fleets that run on CNG increases, the City could benefit from a new revenue stream, should the City construct a CNG fueling depot and choose to operate it as both a means to fuel our own fleet vehicles and as an enterprise operation, providing CNG fuel to the public. The current retail rate for CNG is $2.19 per Diesel Gallon Equivalent (DGE). Should the City decide to invest in a properly sized rapid fuel CNG station at Ansin Boulevard, corporate fleet vehicles could utilize the City's facilities at a markup, providing a significant potential new revenue stream. Some of these vehicles have a fuel capacity of 100 gallons per fill. The City could enter into contractual agreement with these private fleet operators to fuel at the City's CNG facility. Staff believes that this conversion of CNG could be expanded to the majority of the Sanitation fleet over the next 10 years. This is especially beneficial to our large diesel trucks, busses, and vans. Over the last two years several companies have developed a combination CNG- and Diesel-fueled fleets, and CNG and Gasoline systems that can be retrofitted on existing vehicles for approximately $2,000. Great advances have been made including CNG home filling stations at home for private vehicles, longer range ability, and a dedicated Cummings CNG engine which is now readily available for all large garbage trucks and dump trucks.

Due to the abundance of Natural Gas in this country and the unstable economy and foreign fuel prices, staff believes now is the time to make the commitment to convert the remainder of our sanitation collection fleet and begin a process to evaluate the potential to construct a CNG fueling depot through a public/private venture. Much of the current time spent by the Fleet Maintenance Division on repairs of the old sanitation trucks will be reduced by the current reduction of windshield time coupled with the conversion to new CNG trucks.

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**Fiscal Impact/Cost Summary:**

Funding for an endeavor to construct a CNG fueling depot would be from the existing Sanitation Enterprise fund, paid for by revenues received from solid waste collection fees, waste hauler licensing fees, recycling revenue, and cost savings associated with conversion of our collection vehicles to CNG fuel. These revenue streams, coupled with the savings already achieved by the recent contracts negotiated with Choice and Sun Recycling, could fund the capital project to construct a CNG fuel depot with little or no impact to Sanitation rates paid by our customers. This would be especially true if the public/private partnership option is selected.

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## Summary and Recommendation

The City Commission has demonstrated its support of the environment and our Country's efforts to achieve energy independence from foreign oil by approving the purchase of new Sanitation Collection Vehicles fueled by CNG. Combined with the Commission directive to research an option to build a CNG fuel depot, as either a stand-alone venture or as a public/private partnership, these events have started the process of converting our entire collection fleet (and perhaps many other heavy trucks and construction equipment) to CNG fuel. In order to ensure that the City controls its access to CNG, a City CNG rapid fueling depot would be necessary. Two options are available to construct and operate a CNG fueling depot: 1) A City-owned and operated facility; or 2) A public/private partnership.

Costs to build a CNG fuel depot range from approximately $400,000 (public/private joint partnership option) to approximately $1.7 Million (City owned and operated exclusively). Funding for a CNG fuel depot would be entirely from the Sanitation Enterprise Fund, without impact to the General Fund or ad valorem taxes.

Staff recommends that a Request for Proposal (RFP) be developed to explore the public/private option of constructing a CNG rapid fuel depot at the Ansin Boulevard site. Furthermore, staff recommends the City Commission authorize the Manager to retain an Economist to assist with the development of the RFP and subsequent evaluation of the Private/Public Partnership proposals.

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## Attachments

Exhibit 1 – Business Case for Compressed Natural Gas in Municipal Fleets, Caley Johnson.

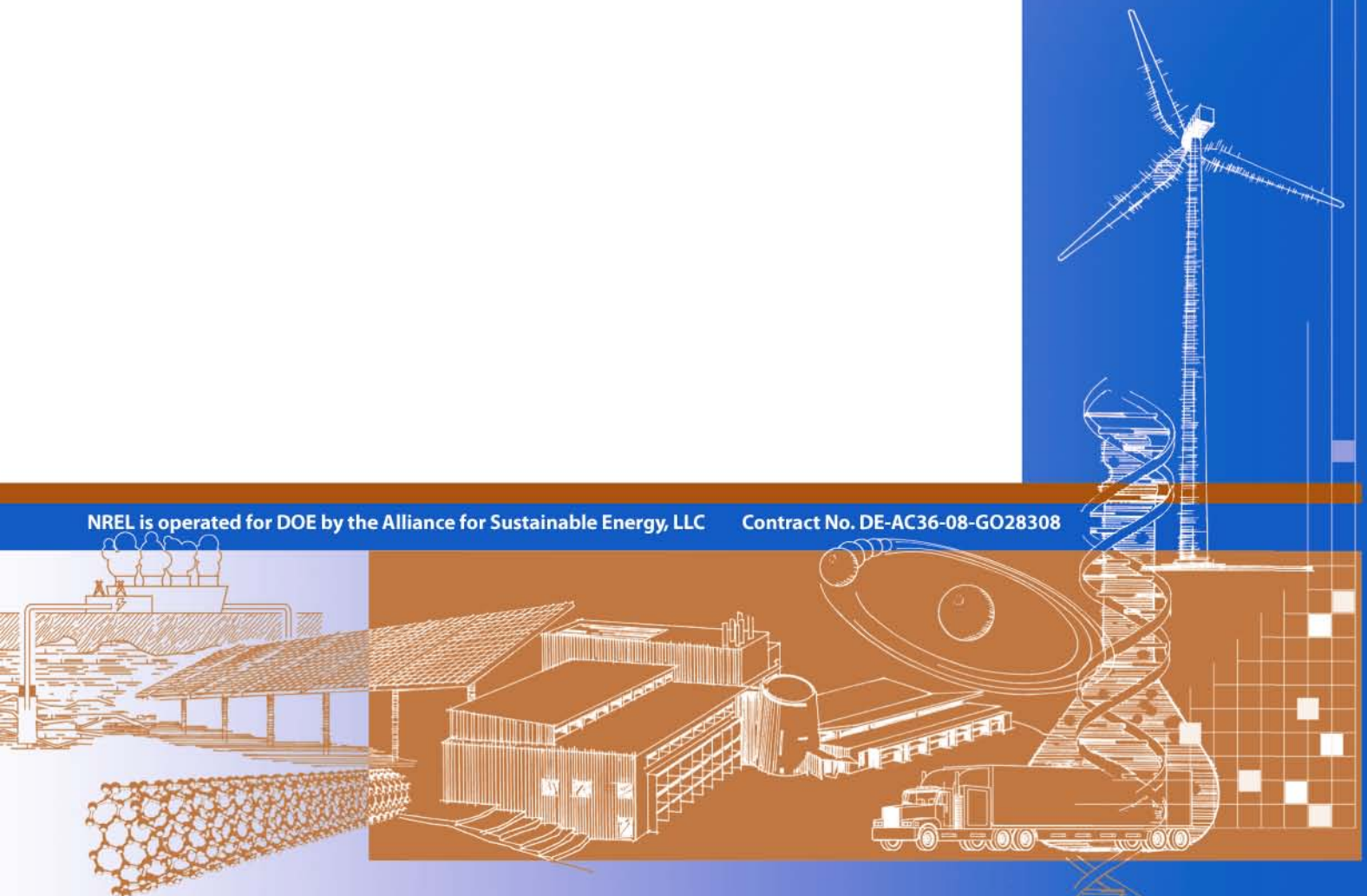
Exhibit 2 – Aerial Map of Proposed Ansin Boulevard CNG Fuel Depot Site, with Ingress/Egress Routes.

National Renewable Energy Laboratory
A national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
Innovation for Our Energy Future

# Business Case for Compressed Natural Gas in Municipal Fleets

Caley Johnson

*Technical Report*
NREL/TP-7A2-47919
June 2010



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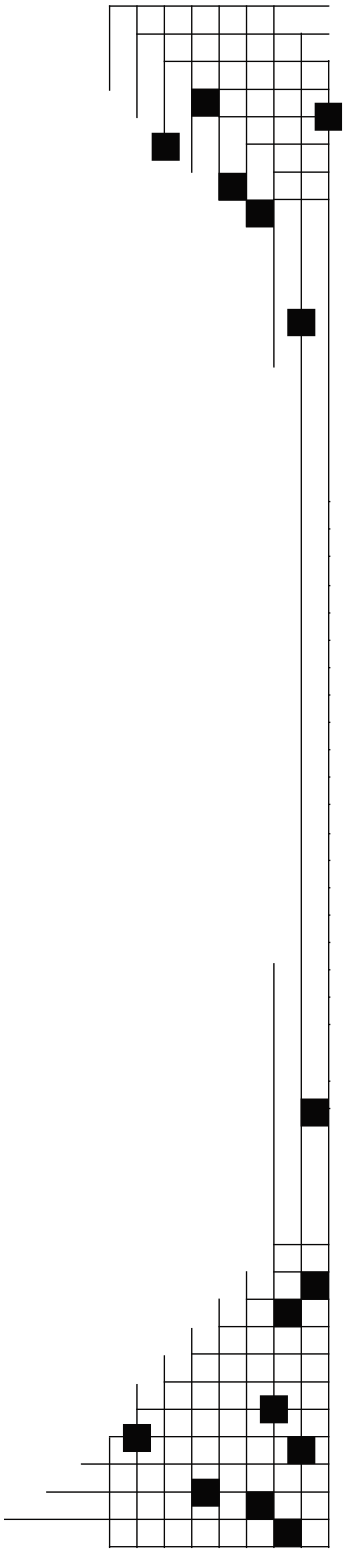
# Business Case for Compressed Natural Gas in Municipal Fleets

*Technical Report*
**NREL/TP-7A2-47919**
**June 2010**

Caley Johnson

Prepared under Task No. FC08.0032



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Operated by the Alliance for Sustainable Energy, LLC

Contract No. DE-AC36-08-GO28308

## Acknowledgements

Funding for this report came from the Clean Cities activity within the U.S. Department of Energy Vehicle Technologies Program.

This report has greatly benefitted from the time and insight shared through personal communications with various fleet operators and industry specialists as indicated in the bibliography.

The author owes a particular gratitude to Rob Adams with Marathon Technical Services. Rob shared his extensive knowledge of building and operating compressed natural gas refueling stations by patiently answering numerous questions, sharing his station cost calculator, and reviewing multiple drafts.

All assumptions and any inaccuracies are the responsibility of the author and not the experts acknowledged above.

## Introduction

Compressed natural gas (CNG) vehicle projects can be highly profitable, or they can lose money, depending on numerous aspects of the fleet and station. To assist fleets and businesses in evaluating the profitability of potential CNG projects, the National Renewable Energy Laboratory (NREL) built the CNG Vehicle and Infrastructure Cash-Flow Evaluation (VICE) model. The VICE model demonstrates the relationship between project profitability and fleet operating parameters. This report describes how NREL used the VICE model to establish guidance for fleets making decisions about using CNG.

The first section establishes a base-case scenario for three fleets that commonly use CNG—transit buses, school buses, and refuse trucks. This base-case tries to represent the average or most-common parameters affecting the CNG project's profitability for average fleets of each type.

The second section uses the model to show how specific project parameters (such as station cost or price of fuel) change profitability from the base-case. The section then prioritizes these parameters to help fleet operators understand the most important factors affecting the business case of the project. Through a question-and-answer format, this section presents common CNG-related questions answered by NREL using the VICE model.

The business case targets municipal governments, which operate fleets suited well for CNG vehicles because they drive circular routes that enable refueling at the same station. These fleets are transit buses, school buses, and refuse trucks. Municipal governments are also targeted because their primary goal is to improve their residents' quality of life. This goal allows the government to utilize all the advantages of CNG, including long-term cost-effectiveness, more-consistent operational costs, increased energy security, reduced greenhouse gas emissions, reduced local air pollution, and reduced noise pollution. A forthcoming report will focus on private fleets that are suited well for CNG, such as taxi cabs and delivery trucks.

# Table of Contents

# VICE Model Baseline Parameters

This analysis uses multiple input variables to simulate the financial circumstances faced by municipal fleets. In this section, average or common values are used to establish a baseline scenario for common operating circumstances. This scenario provides a snapshot from which we can test the sensitivity of CNG project economics to changes in various parameters.

## CNG Station Cost

Station cost is derived by a cost calculator constructed by Rob Adams with Marathon Technical Services (Marathon). The calculator replicates a buffered fast-fill station, which is best suited for quickly fueling large numbers of heavy-duty, high-fuel-capacity vehicles. It is recognized that under scenarios with low throughput and large refueling windows, a time-fill station might be preferred. However, under these scenarios, the calculator takes into account the reduction in equipment needed by reducing the overall cost of the station close to that of a comparable time-fill station. Therefore, the cost estimate is realistic over a wide range of station sizes.

Constants in the calculator are as follows:

- Spare ratio is 10%. This means that 10% of the fleet is expected to not refuel on any given day.
- Station inlet pressure is 100 pound-force per square inch gauge (psig)
- Compressor package is a fully enclosed electric drive
- Dryer consists of a single manual tower for stations dispensing fewer than 30,000 diesel-gallon equivalents (DGE) per month (depending on fleet type) and a fully automatic twin tower for stations dispensing more than 30,000 DGEs per month.
- The system is designed to store CNG at 5500 psig
- Installation costs are assumed to be 50% of the equipment costs based on numerous Marathon projects of a variety of sizes.

Variables in the station cost calculator are throughput (amount of fuel dispensed per month), refueling window (number of hours per day when vehicles are available to refuel), and peak capacity (flow required to keep the fleet fueled). These parameters affect the size and number of tanks, compressors, and supporting equipment. Throughput is calculated from the VICE model by dividing the number of vehicles by the average fuel economy of the fleet. The refueling window is fleet-dependent, and the following scenarios were used for the calculator:

- Transit bus fleets were assumed to have a refueling window of 6 hours based on significant Marathon industry project experience.
- School bus fleets were assumed to have a refueling window of 12 hours. This figure comes from interviewing school fleet managers (Andre 2009 and Linder 2009).
- Refuse truck fleets were assumed to have a refueling window of 12 hours. This figure comes from the director of numerous refuse fleets (Lemmons 2009).

- Combining two fleets allows them to keep the larger of the two refueling windows. This assumption is conservative; in actuality, it would probably expand the refueling window and lower station requirements further for a given number of vehicles. We used a conservative assumption because we do not know of anybody who has optimized this refueling window (by staggering their fleets) to date.
- The scenario where three fleet types share a central refueling station assumes the refueling window is 12 hours a day. This is a conservative assumption when the schedules of all three fleets are taken into account, but it is used because it retains flexibility for the fleets to refuel at more-convenient times.

Test runs were then done with the calculator, and the results were plotted to establish a relationship between the size of the station and its cost. A linear trendline was then fitted to these lines, and equations were derived to represent the best relationship between a station's size and cost. The trendlines are shown in Figure 1, and their matching equations were entered in the VICE model to derive station cost.

It should be noted that the school station is less expensive for the practical range of a school fleet, yet its costs rise at a steeper rate than the others because it uses equipment that cannot be scaled up as efficiently. The school station is only charted up to 65,000 DGEs per month because school fleets use less fuel, so no scenarios were modeled that involved a school fleet using more than this amount of fuel. Refuse stations achieve greater economies of scale than transit stations—presumably because their larger refueling window allows for greater increase of throughput without a corresponding increase in equipment.

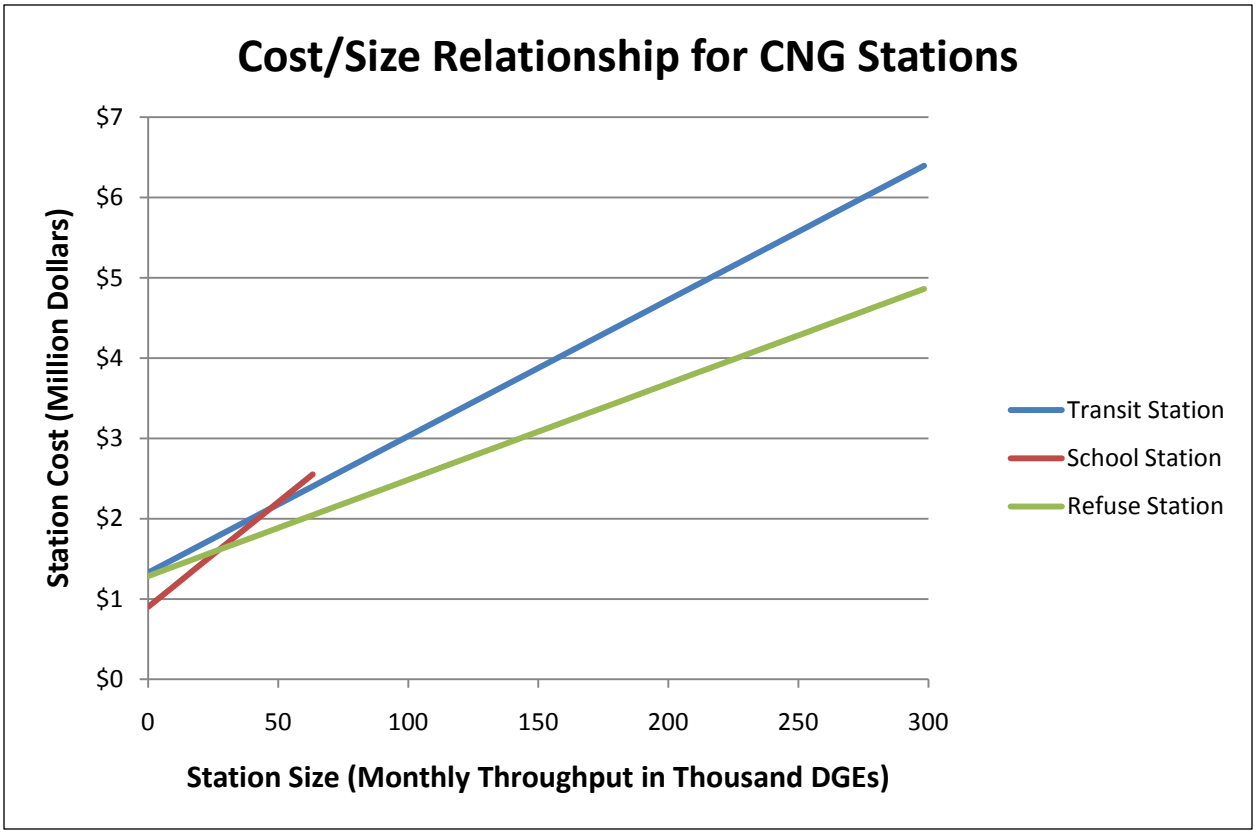


**Figure 1. The relationship between the size of a CNG station and its cost. It should be noted that the upper end of the station throughput range (300,000 DGE) is uncommon.**

## Fleet Scenarios

The VICE model considers seven different fleets with the following parameters:

**Table 1. Seven Modeled Fleets and Their Parameters**

| Scen-ario | Fleet Type | Avg. VMT | FE Diesel (mpg) | FE CNG (mpDGE) | Incremental Cost | Vehicle Life |
|---|---|---|---|---|---|---|
| 1 | Transit Buses | 35,286 | 3.27 | 3.02 | $50,502 | 15 |
| 2 | School Buses | 12,000 | 7.00 | 6.13 | $31,376 | 15 |
| 3 | Refuse Trucks | 25,000 | 2.80 | 2.51 | $30,295 | 12 |
| 4 | 1/2 Transit, 1/2 School | 23,643 | 5.14 | 4.57 | $40,939 | 15 |
| 5 | 1/2 Transit, 1/2 Refuse | 30,143 | 3.04 | 2.76 | $40,399 | 14 |
| 6 | 1/2 School, 1/2 Refuse | 18,500 | 4.90 | 4.32 | $30,836 | 14 |
| 7 | 1/3 Each | 24,095 | 4.36 | 3.88 | $37,391 | 14 |

The parameters for the combination fleets (scenarios 4 through 7) are weighted averages according to their composition by the first three fleets. Parameters for the first three fleets are listed below.

### *Transit Buses*

- The average vehicle-miles traveled (VMT) of transit buses is 35,286 miles/year derived from tables 8 and 9 in American Public Transit Association (APTA) 2009.
- The average fuel economy of diesel buses in the United States is 3.27 mpg, which is calculated from tables 8, 9, and 12 in APTA 2009.
- The average fuel economy of CNG buses is 3.02 miles per DGE (mpDGE), which is calculated from tables 8, 9, and 15 in APTA 2009.
- Incremental cost ($50,502) is an average of the incremental costs found in Chandler et al. 2006 (Table 6 adjusted for inflation) and from an interview with Bob Antila (Antila 2009).
- Bus lifetime (15 years) is the average retirement age of buses as reported in table ES-2 in the Federal Transit Administration's study on the useful life of buses (FTA 2007).

### *School Buses*

- Average VMT of a school bus is 12,000 miles/year (American School Bus Council 2009).
- Average fuel economy of a diesel school bus is 7 mpg (American School Bus Council 2009 and Andre 2009).
- Fuel economy of a CNG bus is 6.13 mpDGE, which is calculated as a 12.5% reduction in efficiency from diesel school buses (Linder 2009).
- Incremental cost is $31,376 (average of four sources—Linder 2009, Leonard et al. 2001, Cohen 2005, and USCS 2003—where the latter three sources have been adjusted for inflation).
- Bus lifetime (15 years) is taken from *School Bus Fleet Magazine*'s 2009 Maintenance Survey.

### *Refuse Trucks*

- Average VMT of a refuse truck is 25,000 miles/year (Gordon et al. 2003).
- Fuel economy of a diesel refuse truck is 2.8 mpg (Gordon et al. 2003).
- Fuel economy of a CNG refuse truck is 2.51 mpDGE, which is calculated as a 10.5% reduction in efficiency from diesel refuse trucks (Gordon et al. 2003).
- Incremental cost of a CNG refuse truck is $30,295 (average of three sources: Lemmons 2009, Andrews 2009, and San Antonio 2009).
- Useful life of a refuse truck is 12 years (Gordon et. al. 2003 and Lemmons 2009).

## Maintenance and Operation Costs

This section describes some maintenance and operation (M&O) costs associated with vehicles and CNG stations.

### *Vehicle M&O*

Maintenance and operation costs for a CNG bus are considered the same as those for a diesel bus because evidence supports both a cost decrease (Chandler et. al 2006) and a cost increase (CVEF 2010) when switching from CNG to diesel. The unclear cost signal portrayed in these studies represents a factor that is in flux due to maintenance learning curves, new diesel emissions equipment, a sub-competitive CNG parts market, and other factors. This cost parity for CNG buses is assumed to apply to CNG refuse trucks as well, which is supported by Engle (2010).

### *CNG Station M&O*

The VICE model assumes that M&O costs for a diesel refueling station are wrapped into the retail price of diesel fuel because the fuel retailer needs to cover these costs to stay in business. Natural gas prices, on the other hand, do not include CNG station costs because most natural gas is sold to the non-transportation market. Therefore, all M&O costs for the CNG station are incremental.

Maintenance costs of a CNG station include the cost of parts, consumables, labor, breakdowns, and on-call staff to keep a station functioning properly. The labor is generally provided by a technician that is "on call" for a number of stations in a given area. The estimated annual maintenance costs used in the model are 5% of the upfront cost of a large station, rising to 8% of the upfront costs of a small station. This assumption came from Rob Adams, who uses this as a rule of thumb when bidding on maintenance contracts. A rule-of-thumb estimate was needed because maintenance costs vary so widely according to station, and the rule of thumb takes most of these variations into account. This estimation technique is based on the idea that when more money is spent on equipment, more money must be spent to keep up and replace the equipment. It also takes into account economies of scale.

Rob Adams' estimation technique was chosen not only for its logic and simplicity, but because it splits the difference between two other maintenance estimates that we received from other sources. Figure 2 compares the three estimates on a monthly cost-per-station-size scale. It is not surprising that the three estimates are so different because the contractors rely heavily on station-specific circumstances that were not available for these general estimates. Given the choice between three qualified industry experts, we selected the middle estimate.

Next, the "8% to 5%" was distilled into an equation so it could be inserted into the model. As shown in Figure 2, a polynomial equation fit the line very well for the range from 0 to 300,000 DGE throughput. After that, it was set to rise 0.06% per DGE. The polynomial equation used in the model is:

$$Y = -2.225 * 10^{-7} X^2 + 0.1257X + 7{,}014.3$$

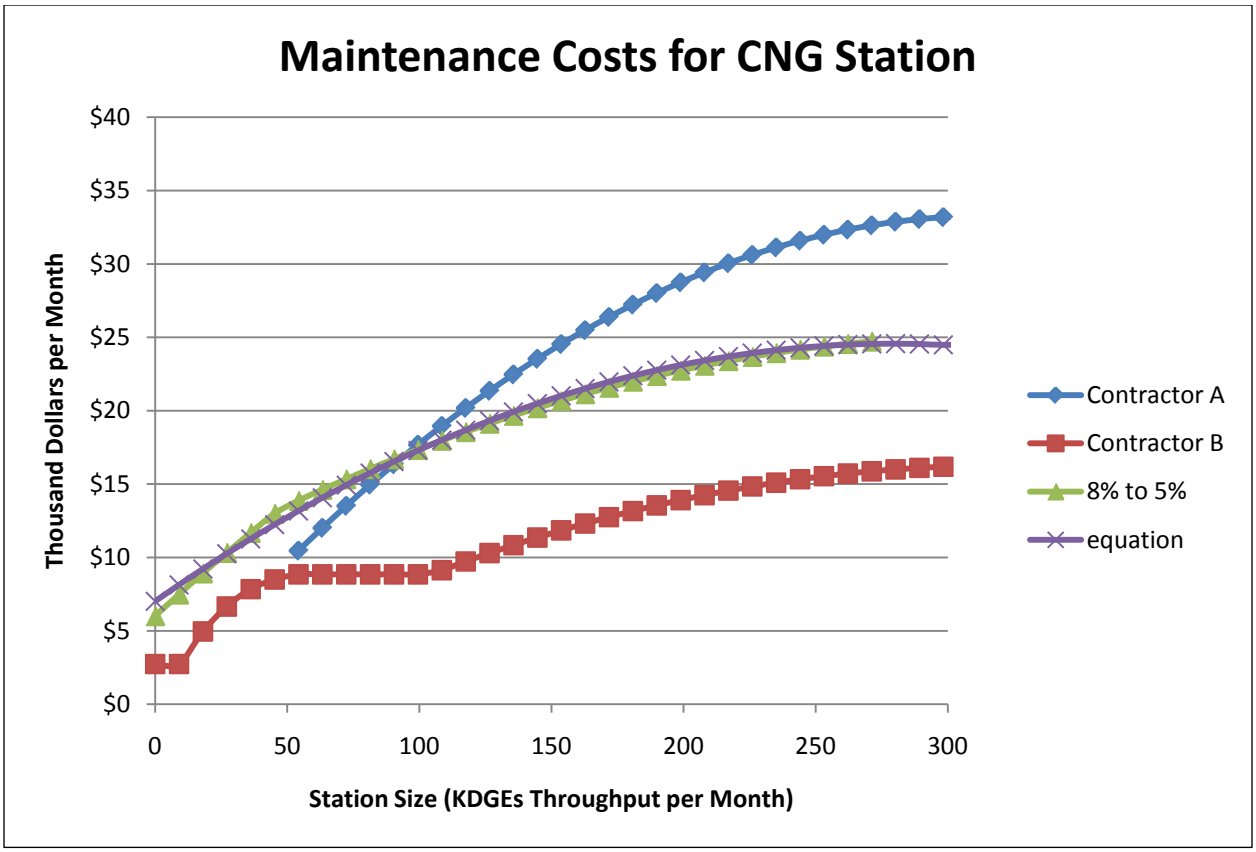


**Figure 2. Three M&O contractors' estimates at maintenance costs according to station size with the equation used in the VICE model**

Electricity is the primary operation cost considered in the base-case scenario. "Commercial" electricity clients in most states pay both an energy charge and a capacity charge (often called demand charge) for electricity. The capacity charge reflects how much electricity the utility needs to be prepared to produce for you and therefore depends on how quickly you draw electricity from the grid, which is especially important for CNG stations because they can have a very large ampere draw. The model assumes the energy charge to be $0.10/kWh, which is between the mid-peak and on-peak prices in California in January 2009. The assumed capacity charge is $12/kW/month for the same reasons. The combined electricity charges result in different monthly electricity prices for the three fleets based on throughput, as seen in Figure 3. The two trendlines were converted to equations and inserted into the model. It should be noted that the transit station's electric costs start higher than the refuse and school's cost because its smaller refueling window requires larger compressors, which leads to higher electric capacity requirements. This demand charge represents a fixed cost portion of the electric bill. This difference is minimized as throughput increases because the variable cost portion of the electrical bill (the energy charge) becomes more pronounced, which decreases the previous advantage that these stations had over the transit station.

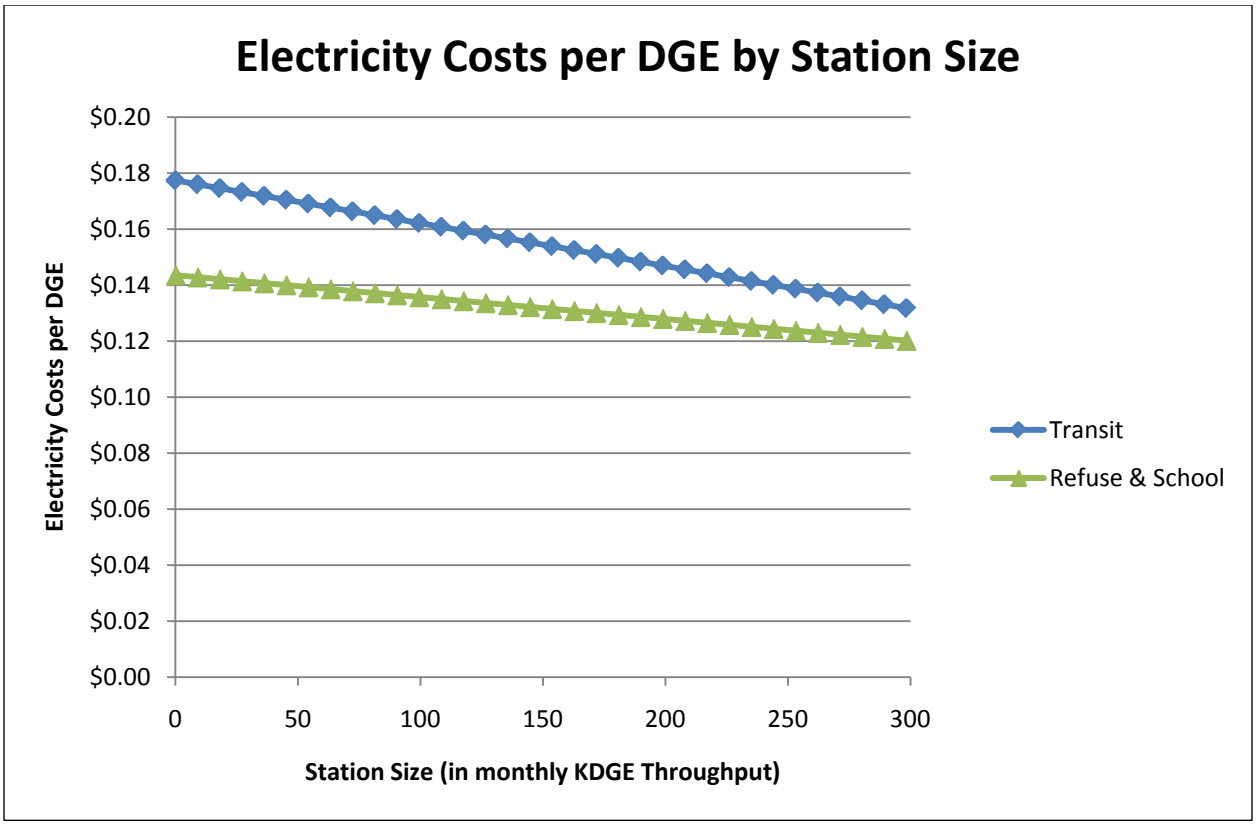


**Figure 3. Electrical costs per DGE by station size**

Labor for hostlers (people who refuel, clean, and maintain fleets) is not considered an additional cost in the base case because diesel vehicles need them also. Furthermore, hostlers are not an additional cost because it is generally more economical to use a hostler than to have drivers or other staff refuel the vehicles. Even though they are not included in the base case, additional hostlers will be considered in the sensitivity analysis.

### Fuel Price and Rate of Increase

The VICE model's diesel fuel price of $2.563/gal is the average of the most recent 12 months (ending February 2010) listed by EIA (2010a). The natural gas price of $1.183/DGE is taken as the commercial price listed by EIA (2010b) and converted from cubic feet to DGEs using EIA's conversion factor of 1,028 Btu per cubic foot. Both diesel and natural gas fuel prices are averaged over the most recent 12 months to take into account seasonal changes.

It should be noted that fleet operators frequently purchase their natural gas for less than the commercial price mentioned above. They can do this by purchasing from a gas marketer in deregulated markets, from a commodities market, or from a middle man that purchases from the market and sells a contract to provide fuel and optional services for a given amount of time. These other purchasing avenues are not used in the model because they are less common and have no common price that can be tracked and forecasted.

Diesel fuel is projected to increase at a linear rate of 5.6% per year, and natural gas is projected to increase at 1.6% per year. These are the rates that EIA projected for the 15 years between 2010 and 2025 (EIA 2010c), as shown in Figure 4 below.

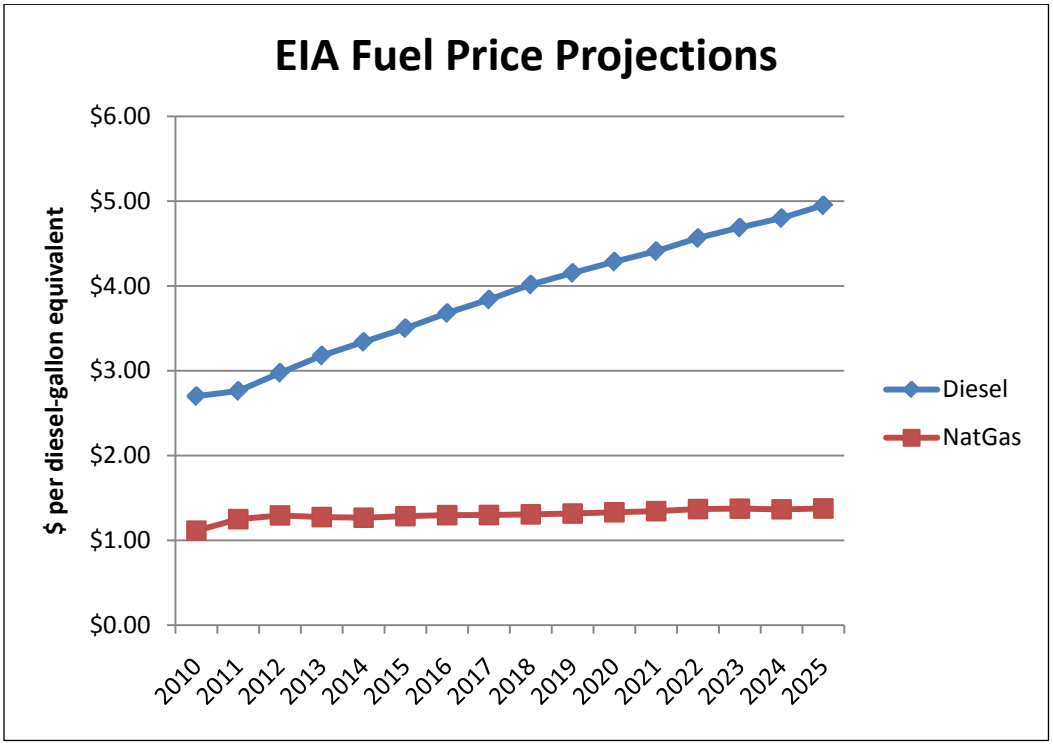


**Figure 4. EIA fuel price projections**

## Taxes and Incentives

The federal government taxes fuel use and provides incentives for CNG use through tax credits. These credits are intended to reduce the overall cost of installing the CNG refueling station, to purchase the CNG vehicles, and to purchase CNG. The incentives have been crafted so tax-exempt entities such as municipal governments can pass the credits to suppliers and therefore take advantage of the tax credits.

### *Refueling Station*

The Alternative Fuel Infrastructure Tax Credit is available to reimburse 50% of the cost of installing a CNG station, up to $50,000. Tax-exempt entities are allowed to pass this credit onto the company that is building the station. The VICE baseline assumes that the builder reduces the purchase price by an amount equal to this tax credit.

### *Vehicles*

The Alternative Motor Vehicle Credit provides a tax credit equal to 80% of the incremental cost of a CNG vehicle, to a maximum of $32,000 per vehicle. The VICE model assumes that this tax credit is fully capitalized on by passing to the vehicle manufacturer in exchange for a lower purchase price.

### *Fuel*

The VICE model assumes CNG and diesel are taxed at the same level, which treats tax-exempt and non-exempt fleets the same. To do this, we had to subtract the $0.183 federal or $0.20 average state motor fuels excise tax on diesel or CNG fuel (IFTA 2008) from the projected retail price of diesel, which included these motor fuel taxes.

The SAFETEA-LU Act of 2005, the Tax Extenders Act of 2009, and the two NAT GAS Acts currently under consideration provide a $0.50 motor fuels excise tax credit for each gasoline-gallon equivalent (GGE) (or $0.55 per DGE) of CNG purchased. This credit is applicable to both taxable and tax-exempt fleets through a rebate provision in the Act (NGVAmerica 2008) and is applied to both in the VICE model.

## Financing

The analysis assumes that municipal governments will fund the CNG project through their annual budgets without taking a loan or issuing bonds. This assumption is supported by the experience of a number of Clean Cities coordinators whereby an ordinance was passed one year and the funds allocated for a CNG project the following fiscal year.

When looking at the payback period and net present value (NPV) of a CNG project, we need to consider the discount rate. The discount rate is considered 6%—the upper limit for a key municipal bond index since 1997 (WM Financial 2009). This rate is assumed because it is the upper end of the cost of capital for municipal governments.

## Garage Cost

The facility upgrade costs associated with upgrading a fleet from diesel to CNG are considered zero. This is in agreement with the fact that the incremental cost of making a new garage and maintenance facility compatible with CNG is minimal (Marathon 2006). Therefore, the model implicitly assumes the fleet already has well-ventilated facilities or that they are building new facilities that would be the same cost regardless of fuel type. However, garage upgrade costs will be modeled in part two of this analysis to explore their effects on the economics of a CNG project.

## Project Life and Salvage Value

The project life, or investment period, is the same duration as the vehicle's useful life. As discussed above, this is 15 years for transit and school buses, 12 years for refuse trucks, and 14 years for any fleet that combines refuse trucks with buses.

The station is assumed to be used throughout the entire project period (vehicle life) and then salvaged at the end of that period. The salvage value of the station is assumed to be 20% regardless of how many years (12, 14, or 15) it has been in service. This number is static throughout time because the value is more a function of demand for components than it is the age of the components. The 20% value was chosen after interviewing two CNG station technicians that have overseen dozens of projects.

The difference between diesel and CNG salvage values of all three vehicle types is considered zero (Linder 2009 and Lemmons 2009). This means that at the end of the vehicle's life, a CNG vehicle is worth no more than a diesel vehicle.

## CNG Project Q&A

The base case represents an average or common CNG project. Every project deviates from this base case, which is why fleet operators question the specific parameters of their projects. The questions and answers in this section are organized to first give fleet managers their bearings and show how profitable the base-case project is. The following questions go on to address changes in fuel expenditures, changes in operating costs, and changes in upfront costs.

### How do I know if a CNG project makes financial sense?

Most investors use three indicators of financial viability, which all stem from a discounted cash-flow analysis performed by models such as the VICE model. These indicators are:

1. Net Present Value (NPV). This is the total present value of a CNG project, including the cost of CNG equipment purchased now along with future costs and cost savings from fuel and operations throughout the lifetime of the project. These costs and cost savings are called "cash flow," with costs being a negative cash flow and savings being a positive cash flow. Please see the baseline parameters section (pp. 1–9) for all cash flows that are included in the VICE model. All future cash flows are discounted at a "discount rate" to compensate for the fact that money is worth more today than it is in the future because it can be invested today and increased. If the NPV of the project is positive or zero at the desired discount rate, the project makes financial sense. The NPV of the hypothetical investment in Figure 5 is $7.2 million, where cumulative cash flows stop increasing at the end of the project life.
2. Rate of Return (ROR). The ROR is the desired annual return on investment. When choosing a target ROR, many companies compare it to what they could make if they invested their money in another project with similar risk. Ten percent is often considered a good baseline in the private sector because that is what the stock market has averaged over the long term. In municipal governments, 6% is generally considered the baseline because that is what it costs a government to raise money through bonds. ROR is also the discount rate on money if one sets the NPV to equal zero.
3. Payback Period. This lets an investor know when the investment has broken even and is starting to turn profits. At this point, an investment no longer carries the risk of losing money. When assessing the payback period, the investor uses the same discount rate as used when looking at the NPV. In Figure 5, it takes the fleet manager 4 years to pay back the initial investment of $2.6 million. Stable, progressive fleets can have a target payback of 7 years while more risk-adverse fleets can require a 3-year payback. The payback period seems to be the metric of choice for fleet managers despite its drawback of not being able to quantify losses on a bad investment.

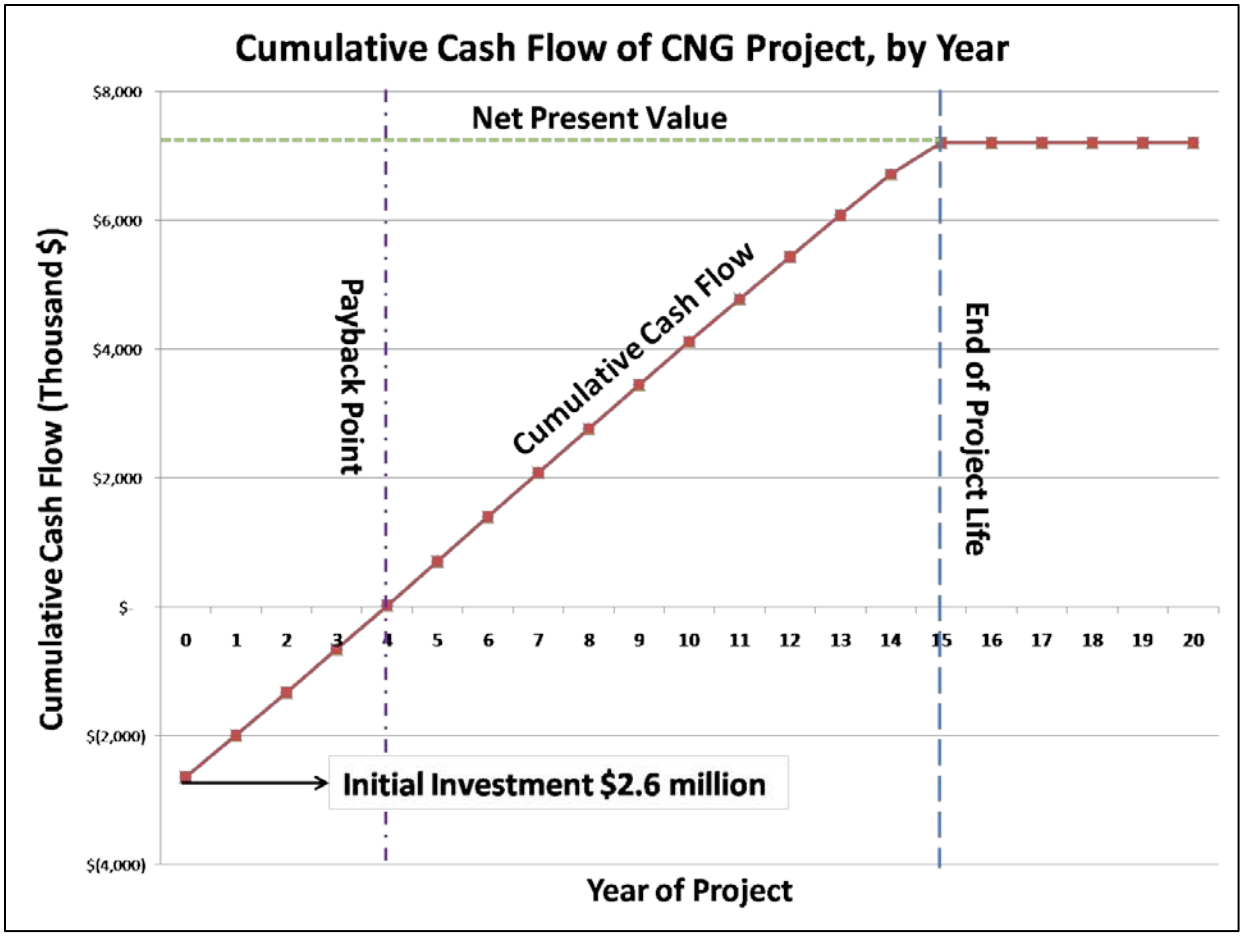


**Figure 5. Cumulative cash flow of an example CNG project, by year**

## Base-Case Results

This section answers three questions about the base-case results.

### *What will my payback period be?*

NREL ran the VICE model under a base-case or most-probable scenario for a transit fleet, school fleet, and refuse fleet (as described in Section 1). The results of this run show that the payback periods depend largely on fleet size and fleet type (Figure 6). Transit and refuse projects have a precipitous drop in payback period at around 30 vehicles. Any fleet larger than this will have a payback period of less than 7 years.

School bus fleets need to be larger than the other two fleets for a given payback period because each school bus uses less fuel. A fleet of 250 school buses pays back in about 7 years, but there is no clear dropoff the way there is for the other two fleets. Please note that the maximum payback period for a refuse truck is 12 years because that is the average life of these trucks while transit buses and school buses have an expected 15-year life.

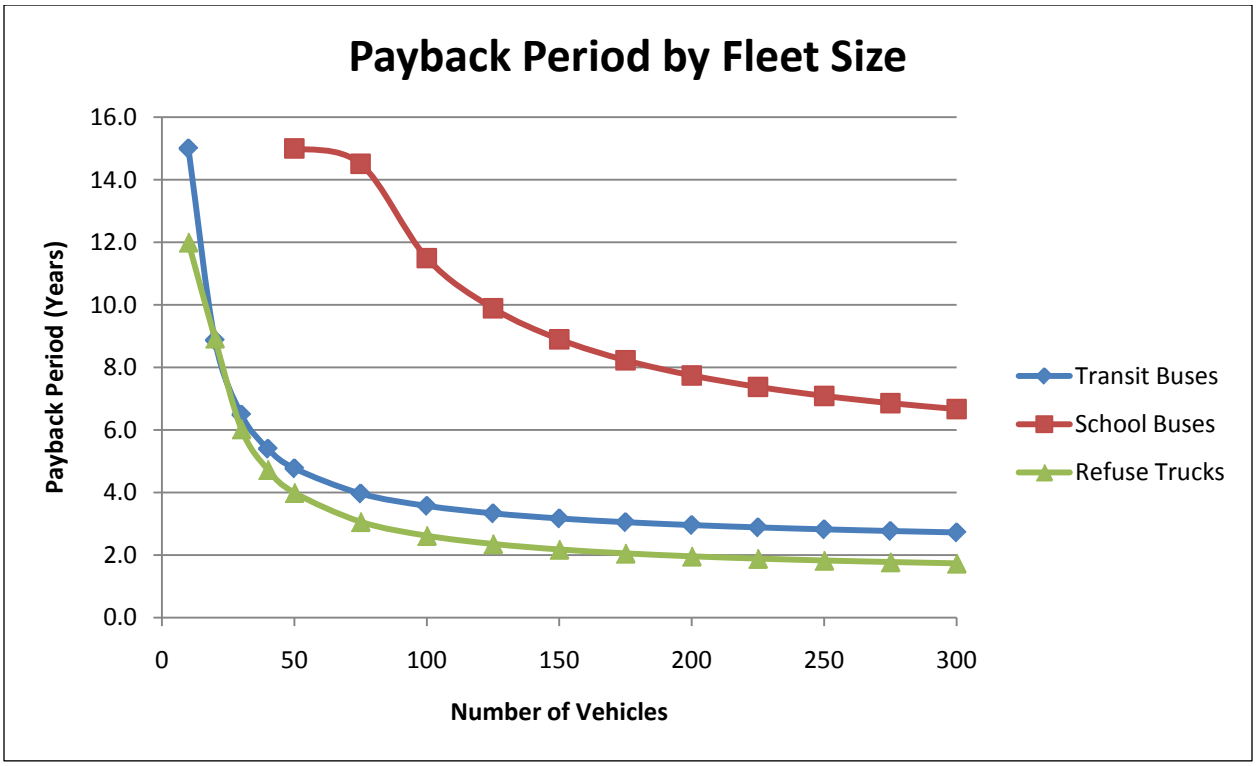


**Figure 6. Payback period by fleet size**

### *What will my ROR be?*

Base-case refuse and transit projects look very profitable when judged on the basis of ROR. With fleets as small as 25 buses, they can provide returns that are deemed acceptable by any organization, and large fleets yield extraordinary returns. Refuse projects become more profitable than transit projects as the fleet size increases—probably because the larger refueling window allows increased vehicle usage without increasing fueling capacity.

School bus projects require large fleets to provide a good ROR. The ROR surpasses 6% with a 75-vehicle fleet and 10% with a 100-vehicle fleet. It then maxes out at 21% ROR, which is quite a good investment for a municipal government.

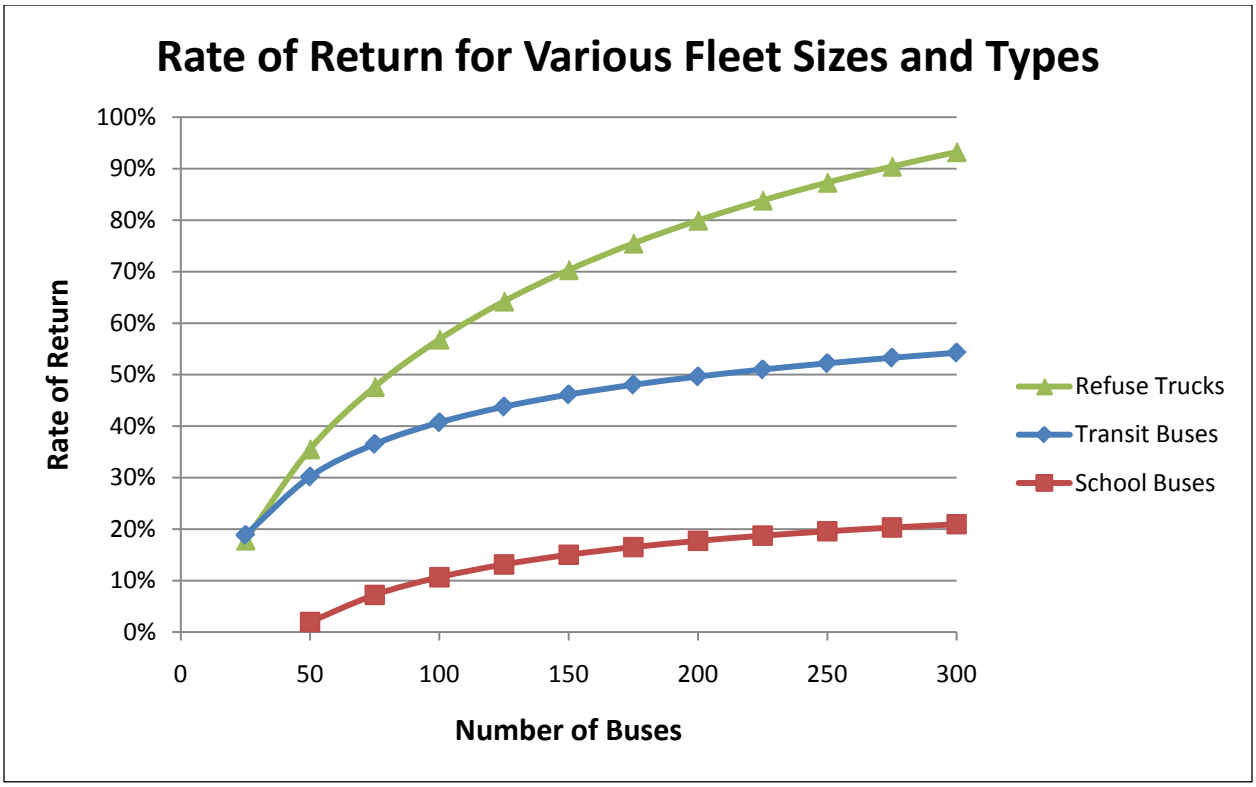


**Figure 7. Rate of return for various fleet sizes and types**

### *What is the NPV of my investment?*

Transit buses are the best fleets to convert when judged by the NPV metric because they use more fuel than the other fleets, which results in greater fuel savings by the end of the project's life. The reason why transit fleets are more profitable than refuse fleets when looking at NPV but less profitable when looking at ROR is that they require a larger upfront investment. As shown in Figure 8, a 300-transit-bus fleet, which requires an initial investment of $11.8 million, has an NPV of $55 million. The NPV for transit fleets turns positive at 11 buses, for refuse fleets at 14 trucks, and at 68 school buses.

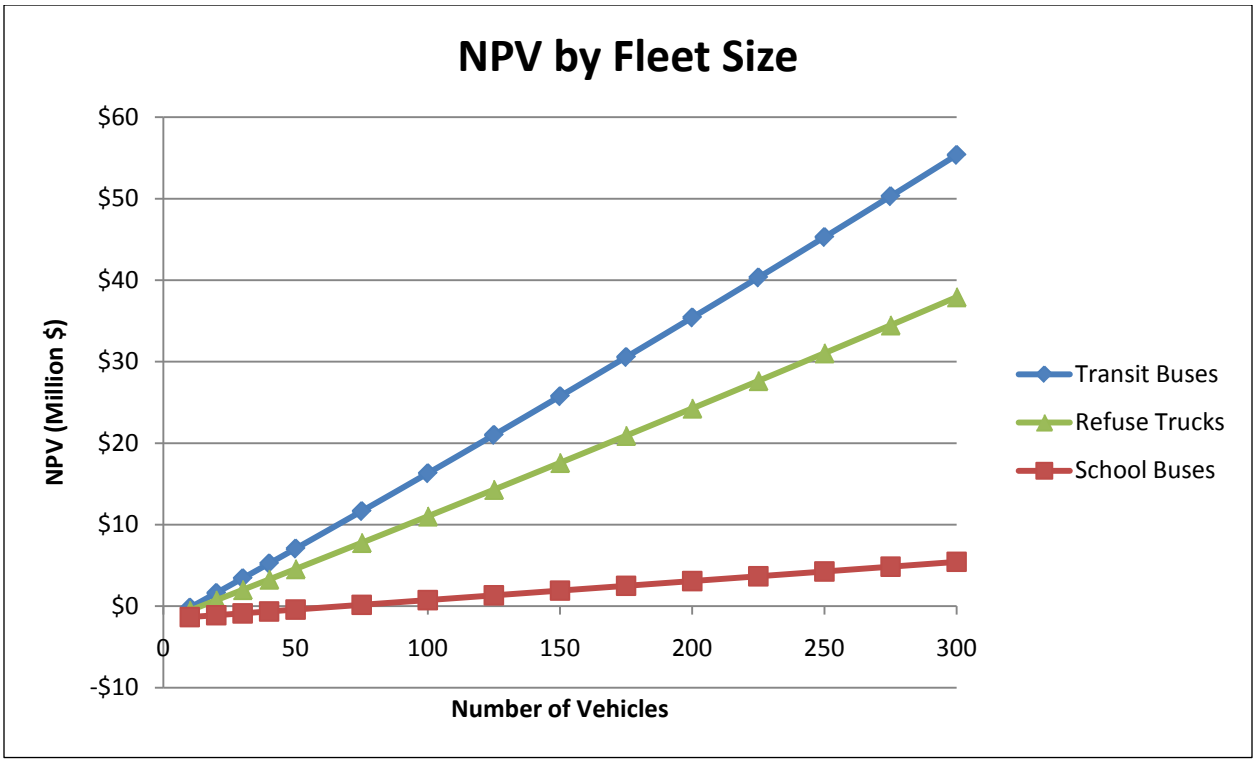


**Figure 8. Net present value by fleet size**

### *What is the minimum number of vehicles required to break even?*

The minimum goal of an investor is to break even when taking into account the cost of tying his money up for the life of the project. This is the point in Figure 8 where the NPV of a project crosses from negative to positive, and it is also the point in Figure 7 where the ROR reaches 6% (the discount rate for municipal governments). Table 2 summarizes the minimum number of vehicles to break even for the three main municipal fleets and various combinations where vehicles of different types share municipal infrastructure.

**Table 2. Minimum Number of Vehicles to Have a Positive NPV or 6% ROR**

| Type of Vehicle | # of Vehicles |
|---|---|
| Transit Buses | 11 |
| School Buses | 68 |
| Refuse Trucks | 14 |
| 1/2 Transit, 1/2 School | 26 |
| 1/2 Transit, 1/2 Refuse | 12 |
| 1/2 School, 1/2 Refuse | 32 |
| 1/3 Each | 22 |

## Variations in Fuel Expenditures

The base case has already shown that project profitability is very dependent on fleet size. This is one factor affecting the fuel expenditures of a project. Fuel expenditures are very influential on project profitability because upfront costs are largely paid for by a reduction in CNG

expenditures below those of diesel. Therefore, to achieve maximum benefit from the use of CNG, negotiating and securing low long-term natural gas prices is critical. Other questions that explore fuel expenditures follow.

### *How many miles per year do I need to drive my vehicles to break even?*

Fuel costs are dependent on both the price of the fuel and the number of miles driven by the fleet. Because natural gas is generally less expensive than diesel, the greater the number of miles a vehicle drives, the more savings a fleet will see compared to conventional fuel. Figure 9 shows the relationship between average VMT and the number of vehicles needed to pay off a CNG investment. The area above the curve is profitable for the fleet, and the area below the curve is not profitable.

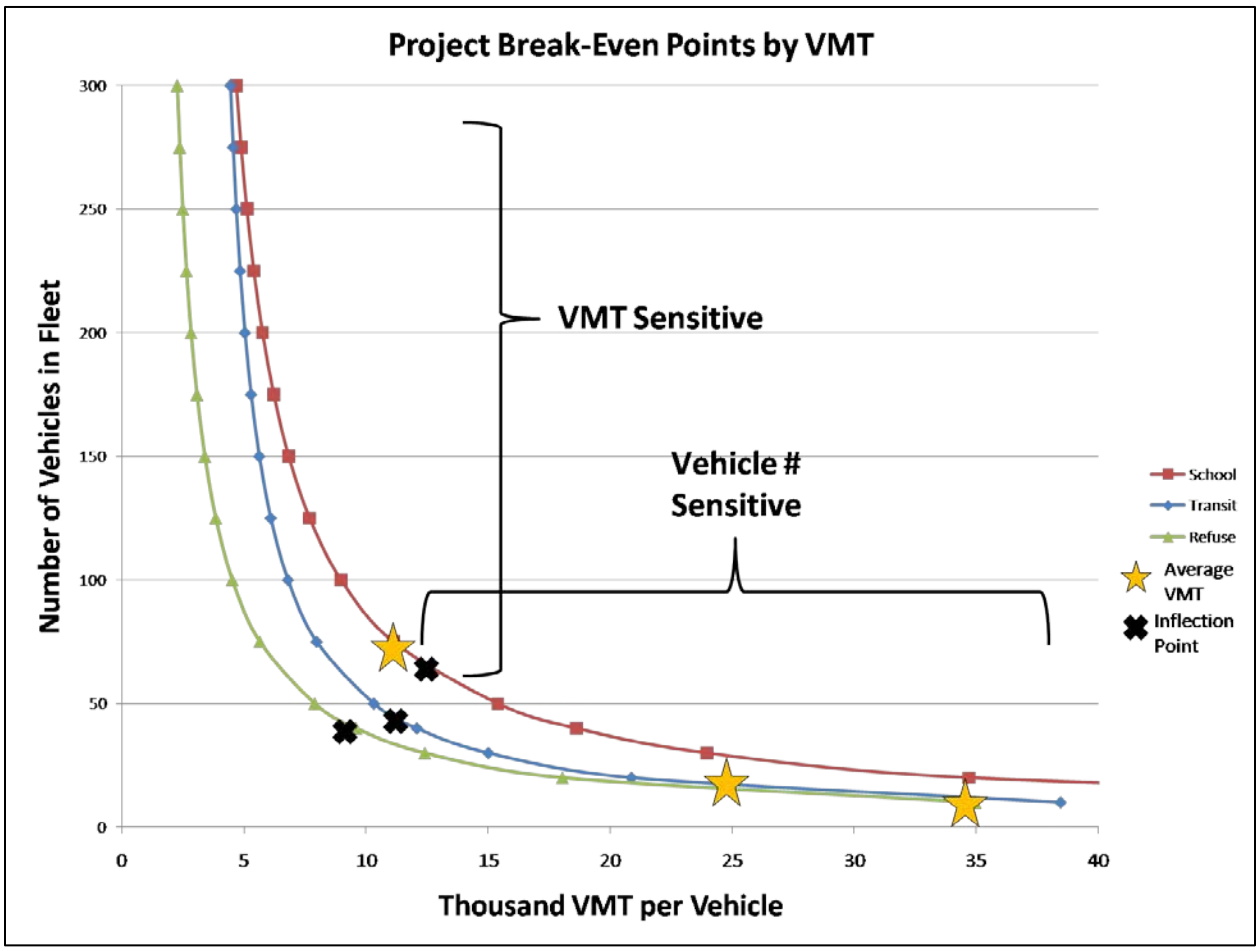


**Figure 9. Project break-even points by VMT**

The most noteworthy part about Figure 9 is how steep the transit and refuse fleet lines drop between 2,500 and 10,000 VMT and how flat they are after 10,000 VMT. The point of transition is labeled as the inflection point. The inflection of the school bus fleet is less pronounced than the other two but still there. The profitability of any point above the inflection point is more sensitive to the VMT changes, and any point to the right of the inflection point is more sensitive to changes in the number of vehicles. Given where the average VMTs of transit and refuse fleets

fall, their economics are much more sensitive to their vehicle number than VMT. Average school fleets are barely above the inflection point, so they should be only slightly more concerned with their VMT than the number of vehicles when considering a CNG project. Keep in mind that any VMT-vehicle combination to the right or above the curves is considered a profitable project.

### *What will a change in diesel prices do to my payback period?*

Diesel prices are highly variable. Over the past two years, they have varied 0.8 standard deviations from the mean, as opposed to 0.2 for CNG (Laughlin 2010). Therefore, it is very important to find out what effect a change in diesel price will have on project economics. To answer this question, NREL compared the baseline price of natural gas at $1.18/DGE against different diesel prices. Both CNG and diesel were set to increase 3% per year to keep up with inflation. The effect that diesel price has on payback period is shown in Figure 10 for the three municipal fleets at 50 and 100 vehicles each.

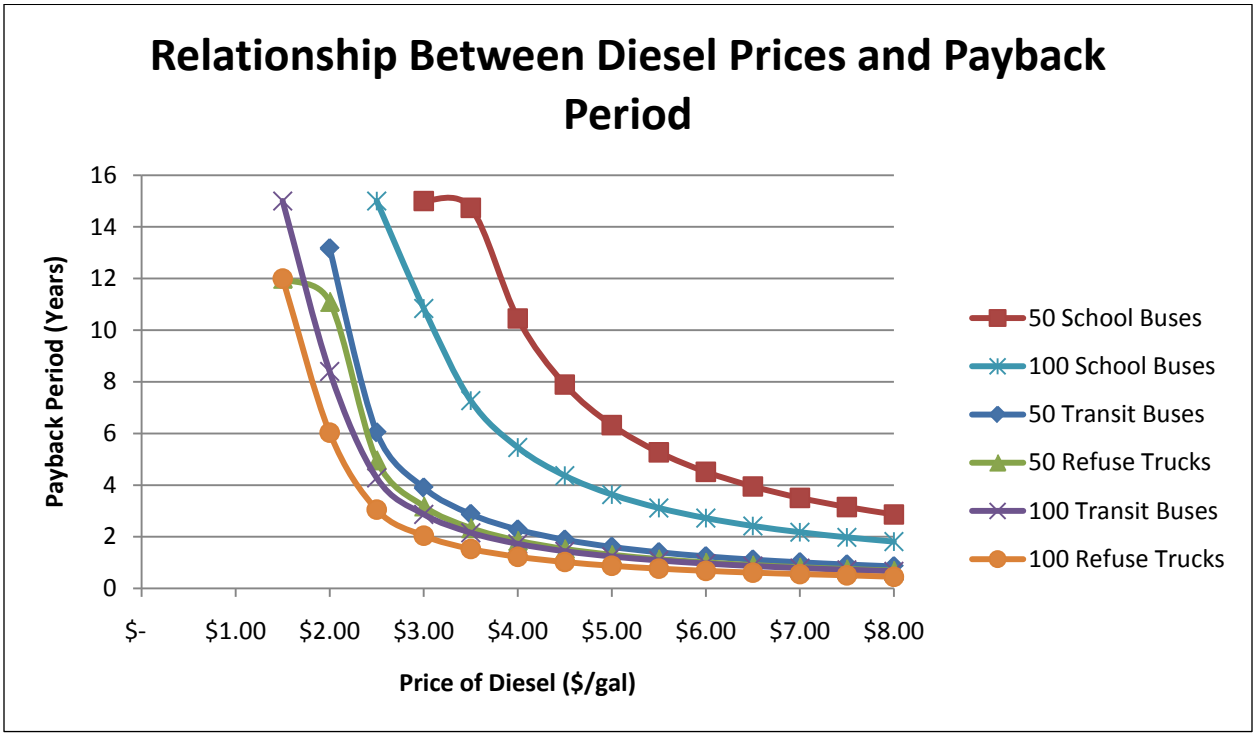


**Figure 10. Relationship between diesel prices and payback period**

Figure 10 reiterates that the economics for a school bus fleet under the base-case scenario are very dependent on the size of the fleet. A school bus project appears to achieve only a reasonable payback once diesel prices approach $4/gallon for 100-bus fleets and $5/gal for 50-bus fleets.

The main observations when considering fluctuating diesel prices (shown in Figure 10) for refuse and transit fleets are:

1. Project economics look strong for transit and refuse fleets of either size if the price of diesel is $2.50 or greater. This responds to a payback period between 3 and 6 years, depending on fleet type and size.
2. As the price of diesel increases past $2.50, the size and fleet type (transit or refuse) become increasingly irrelevant. For prices below $2.50, larger fleets are favored, and refuse fleets are favored over transit.
3. Recent diesel price of $2.56 is on the inflection point of this graph. If diesel prices rise, project economics look very good, and if they fall to $2.00, they do not look very good.

### *What does the composition of my fleet do to my project economics?*

Some municipal governments have a unique capability to fuel multiple fleets/vehicle types from one CNG station. This offers the primary advantage of staggering refueling times and expanding the station's refueling window because different fleet types can refuel at different times of the day. NREL modeled combination fleets by taking the weighted average of the vehicle attributes such as VMT, fuel economy, efficiency penalty, and incremental cost. NREL then assumed these fleets would use a refuse-style CNG station because of its 12-hour refueling window and ability to be scaled up in a cost-efficient manner. Multi-purpose fleets used the transit fleet electricity cost assumptions if there were any transit buses involved (because they raise the capacity charges), and non-transit combinations used the refuse-school electricity charge assumptions. The payback periods for these combined fleets are shown in figure 11.

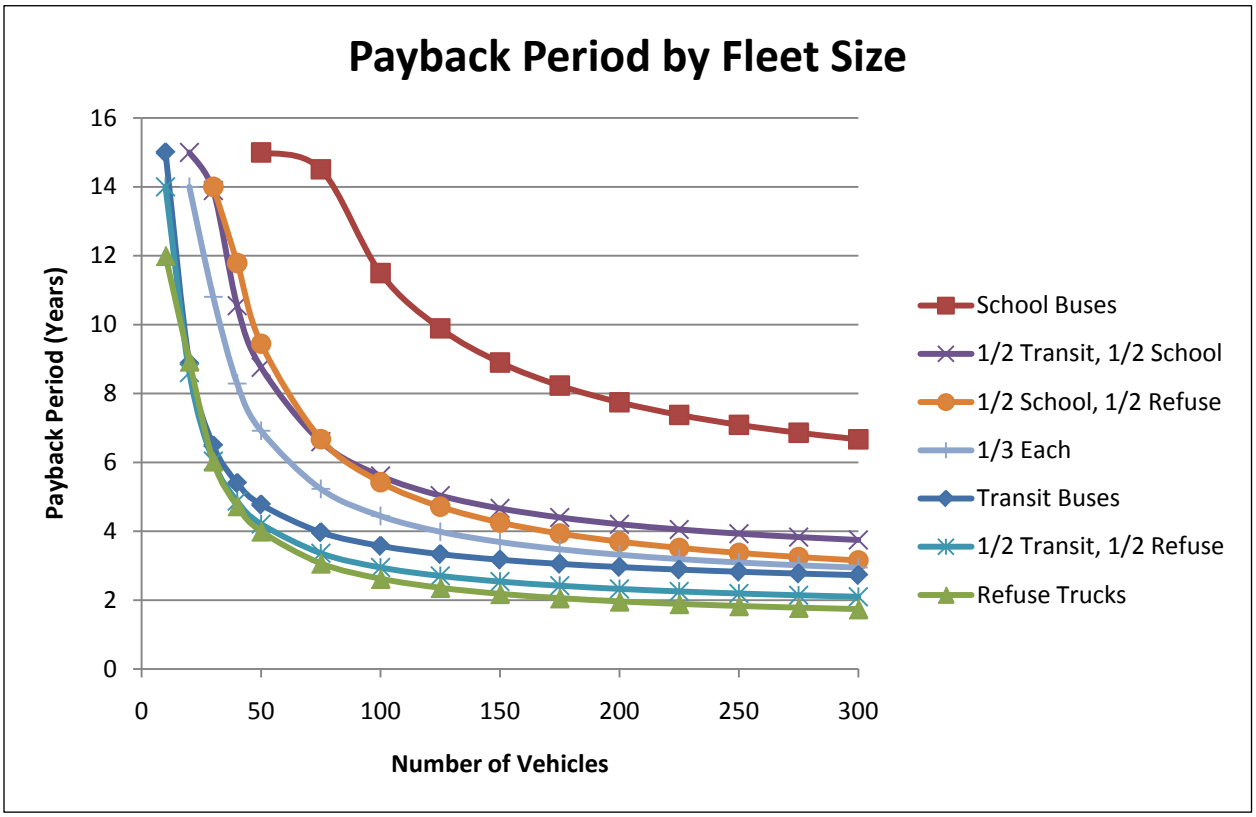


**Figure 11. Payback period by fleet size for main and combination fleets**

The most conspicuous feature of Figure 11 is how much a school bus fleet's economics improve by combining with a transit or refuse fleet. The payback for a fleet of 100 is 2.9 years if a school has combined with a refuse fleet, compared to 11.5 years if they don't combine.

A second important point to be learned from Figure 11 is that the combined fleets' payback periods are always less than the midpoint between the two fleets. This means that combining the fleets tends to capitalize on the relative economic advantages of each fleet while minimizing each fleet's disadvantages. This advantage holds for the fleet that combines all three vehicle types and has payback periods well below the weighted average of the three individual fleets.

### *What happens as my vehicle efficiency changes?*

CNG vehicles are generally less efficient than diesel vehicles when compared on a BTU (or DGE) basis. However, this drop in efficiency varies widely, depending on the specific engines and vehicles being compared. Furthermore, this drop is being reduced as CNG technology improves and as diesel engines strive to comply with new emissions standards. It is plausible, but unlikely, that some fleets could compare vehicles where the CNG vehicle is more efficient than its diesel counterpart.

To test the effect of this efficiency change in CNG fleets, NREL ran the VICE model with varying assumptions in the diesel-to-CNG efficiency change. The results are shown in Figure 12, where a negative efficiency change means that the CNG vehicle is less efficient than the diesel vehicle. This efficiency change was found to not have much effect on the transit and refuse fleets—on average, a 10% improvement in relative efficiency reduced the payback period by 0.43 years. Efficiency change had more of an effect on 100-school bus fleets, where a 10% increase in efficiency subtracted 1.2 years off the payback period. The change had no effect on 50-school bus fleets because none of them had a payback period of less than the project life.

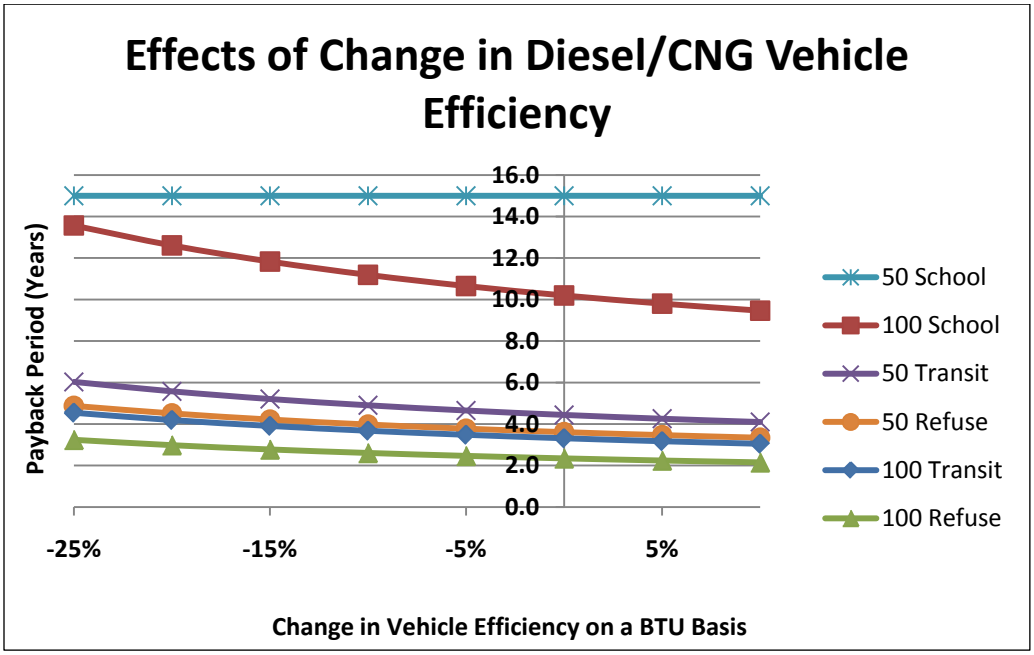


**Figure 12. Effects of a change in diesel/CNG vehicle efficiency**

### *What if the $0.55/DGE, 80% vehicle incremental cost, or $50,000 station tax credit is taken away or not passed along?*

The base case takes into account government subsidies that encourage the use of CNG. These include a $0.50 credit for every GGE ($0.55 per DGE) purchased, a credit to cover 80% of the incremental cost of a CNG vehicle, and a credit of $50,000 for installing a CNG station. These are tax credits that, as discussed in the model parameters section of this report, are supposed to be made accessible to tax-exempt entities through certificates and pass-alongs. However, they are often not made available to the fleet. Table 3 shows what happens if these credits are not made available.

**Table 3. Payback Period (Years) with Various Tax Credits Missing**

| Fleet (100 Vehicles) | All Credits | No Fuel Credit | No Vehicle Credit | No Station Credit | No Credits |
|---|---|---|---|---|---|
| Transit Buses | 3.6 | 5.9 | 5.5 | 3.6 | 9.1 |
| School Buses | 11.5 | ≥15.0 | ≥15.0 | 11.8 | ≥15.0 |
| Refuse Trucks | 2.6 | 4.6 | 4.8 | 2.7 | 7.8 |

Note that taking away the two tax credits from the transit (or refuse) scenario only increases payback period 4.2 (2.3 + 1.9 + 0.0) years independently, yet they increase 5.5 years combined. Therefore, there are synergies between the three tax credits that result in additional benefits, making it important to consider the relationships between tax incentives when evaluating the benefits of them. It is also important to note that taking either one of the first two tax credits away makes school projects not pay off.

### *What if I have to pay fuel excise taxes on diesel but not CNG?*

The base case assumes that a fleet pays the same excise tax on diesel as on CNG. However, this is not always the case. Fleets might refuel at various private diesel stations where they have to pay excise taxes while their future CNG station would be tax-free. There are also cases where a tax-paying entity (such as a contractor) gets state tax breaks for CNG but not diesel. Table 4 shows how this lopsided taxation decreases the payback period for CNG projects by over 20% for all three fleets.

**Table 4. Payback Period for 100-Vehicle Fleet**

| Fleet Type | Both Fuels Exempt | Only CNG Exempt | % Reduction |
|---|---|---|---|
| Transit Buses | 3.6 years | 2.8 years | 22% |
| School Buses | 11.5 years | 9.0 years | 22% |
| Refuse Trucks | 2.6 years | 2.0 years | 23% |

### *How does vehicle life affect my project economics?*

The VICE model sets project duration to the same length as vehicle life, so a change in vehicle life essentially influences how much fuel is used over the course of a project. The model found, however, that a change in vehicle life had only a small effect on project profitability. As vehicle life changed from 10 years to 20 years, the ROR for 50-vehicle transit and refuse fleets increased less than 4%. A 50-vehicle school fleet showed the greatest improvement with an 11% increase in ROR over the same range of vehicle life.

## Changes in Upfront Costs

Many profitability questions focus on upfront costs because these are the costs that need to be paid back for the ROI, NPV, or payback period to be acceptable to the fleet manager.

### *What happens if the price of my station changes?*

Station prices vary widely depending on location, specific fleet requirements, lot characteristics, and many other factors. To test the effect of this variation on project economics, NREL modeled three CNG projects with baseline cost, baseline +50%, and baseline -50%. The school and refuse stations are shown in Figure 13; transit is not shown because it was so similar to refuse that it obscured the curves.

Figure 13 reveals the effects of changing the station cost, such as:

- The influences of increasing/decreasing 50% are symmetrical. Increasing the station cost 50% has an equal and opposite effect on payback years as decreasing it 50%.
- The school bus fleet is much more sensitive to changes in station cost than the other fleets. A 50% reduction in cost reduces payback by 4.9 years in a 75-bus fleet and 1.7 years in a 300-bus fleet.
- In the refuse fleet, a 50% reduction in cost reduces the payback period by less than a year if the fleet is over 100 buses. It can make up to a 4-year difference in very small (20-truck) fleets.

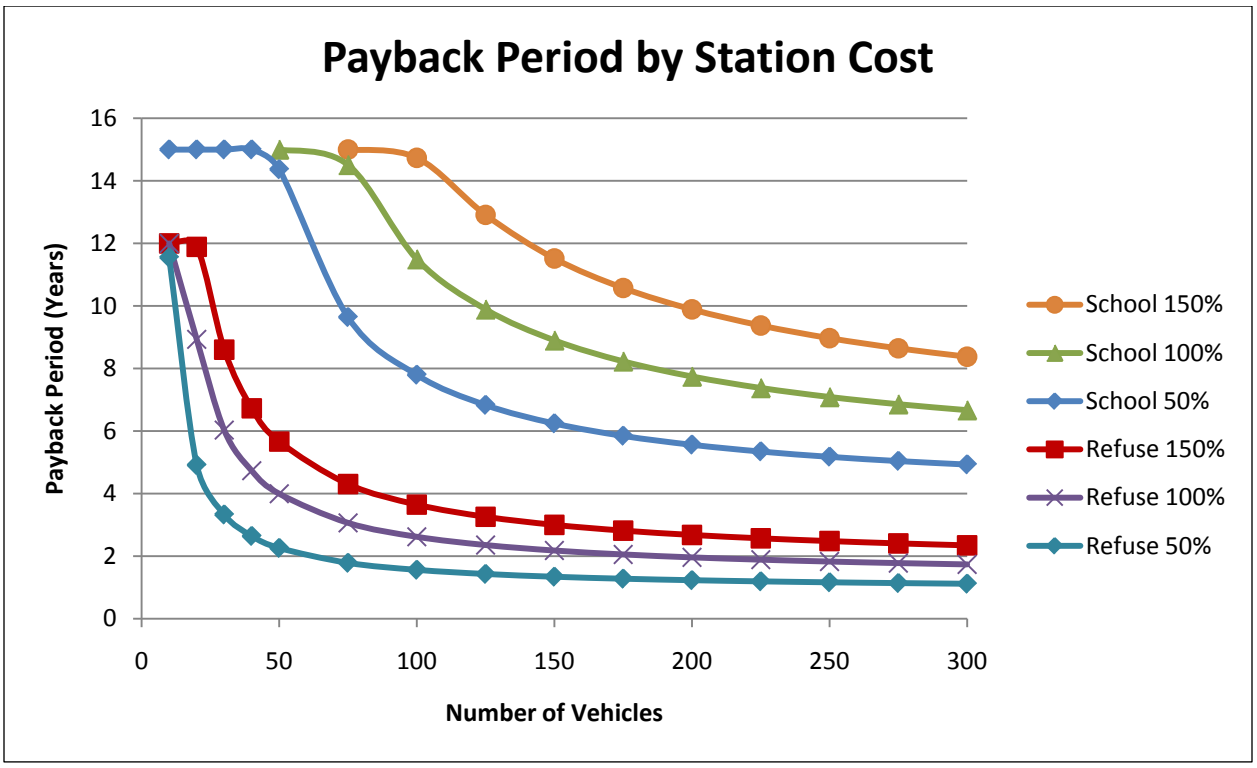


**Figure 13. Payback period by station cost**

### *What happens as my vehicle incremental cost changes?*

There is a distinct possibility that manufacturing efficiencies will decrease the cost of a CNG vehicle or that 2010 emissions requirements will increase the cost of a diesel vehicle. Either of these events would reduce the incremental cost of a CNG vehicle (over a diesel vehicle). There is also a possibility that the CNG vehicle purchased by your fleet has a higher incremental cost than the averages used in the base case. To explore the impact of these scenarios on project profitability, NREL modeled one case where the incremental cost of a CNG vehicle is zero, one scenario where it is at the baseline, and one where it is double the baseline. The results are shown in Figure 14.

For both fleets shown in Figure 14, the base-case line is much closer to the zero-incremental-cost line than it is to the double-incremental-cost line. This is largely due to the fact that incremental costs are displaced by the tax incentive up to approximately the base incremental cost. Beyond the base incremental cost, the government's incentive helps very little because it caps out when the incremental cost is greater than $40,000.

The doubling of incremental costs is particularly damaging to the school bus fleet for two reasons. Foremost, each bus uses less fuel over its lifetime, so there is less opportunity for fuel cost savings to make up for this cost. Secondly, the baseline incremental cost is slightly more expensive for a school bus than for a refuse hauler.

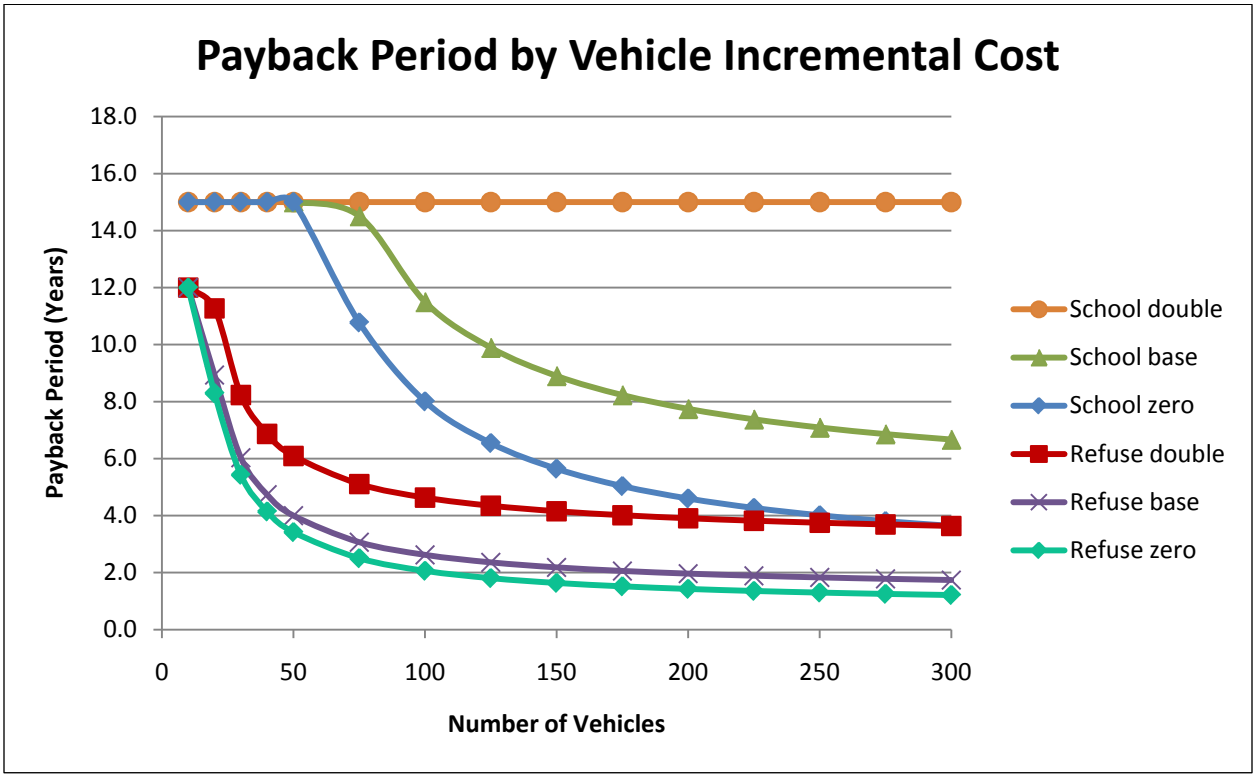


**Figure 14. Payback period by vehicle incremental cost**

### *What if I receive a grant from the Federal Transit Administration?*

The Federal Transit Administration (FTA) offered grants for transit buses in urban areas through its Urbanized Area Formula Program and Clean Fuels Grant Program. The funding for these programs has recently expired but is expected to resume through upcoming legislation. The grants are expected to pay for 80% of the cost of a diesel bus and 83% of the cost of a CNG bus to those eligible recipients. This funding scenario results in the CNG buses actually being $2,700 less than the diesel buses in the VICE model. FTA grants nullify the previously mentioned vehicle tax credit, so those were not factored into the cost. When this scenario was modeled, it reduced the payback period for transit buses by approximately 1.6 years for all fleet sizes over 10 vehicles, as shown in Figure 15.

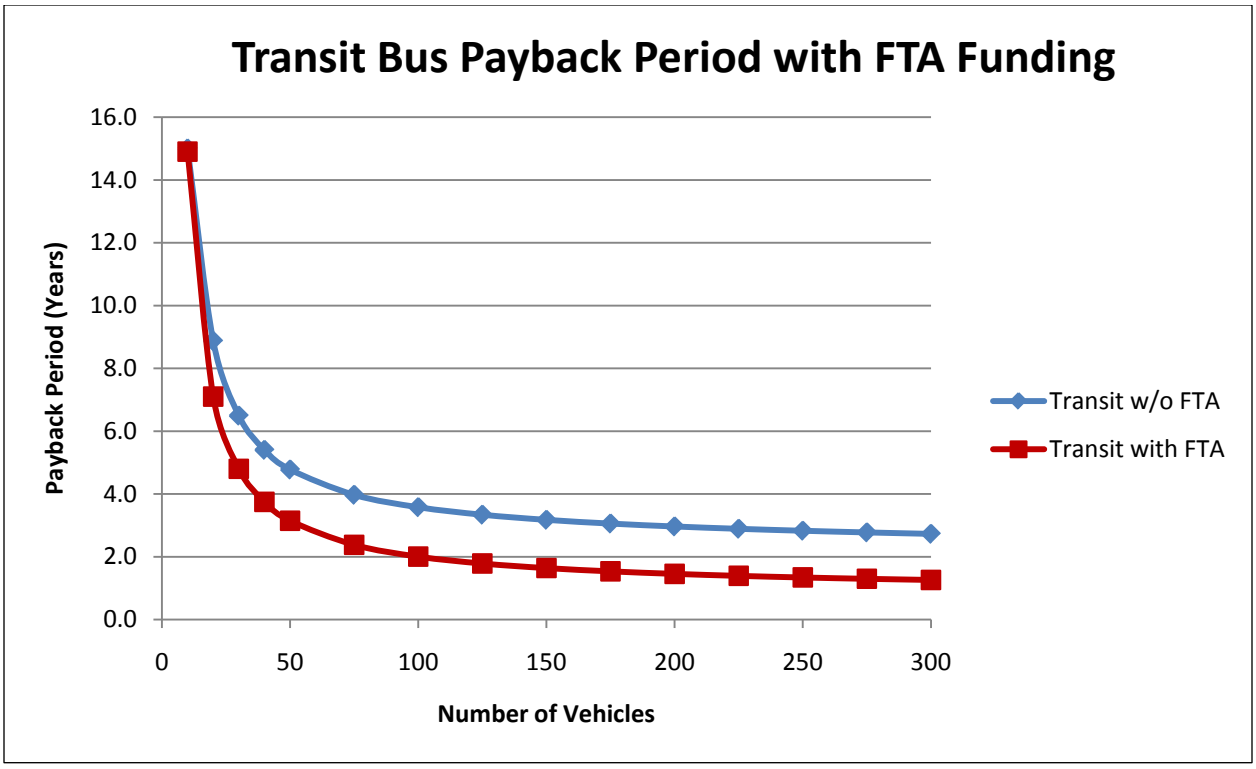


**Figure 15. Payback period of a transit bus with and without FTA funding**

### *What happens as I have more or less time to refuel?*

A fleet's refueling window (the time in which vehicles are available to refuel) increases if the fleet's schedule is more relaxed or staggered. This staggering usually increases as the station's fleet is diversified by serving different types of vehicles or by opening to the public.

To test the impact of an increased refueling window, NREL ran the VICE model with identical fleets of refuse trucks being refueled by stations with a 6-hour and 12-hour refueling window. The stations were automatically sized, equipped, and priced to accommodate their respective refueling windows. As shown in Figure 16, the CNG project with the 12-hour refueling window provided an increasingly larger ROR as the fleet size increased.

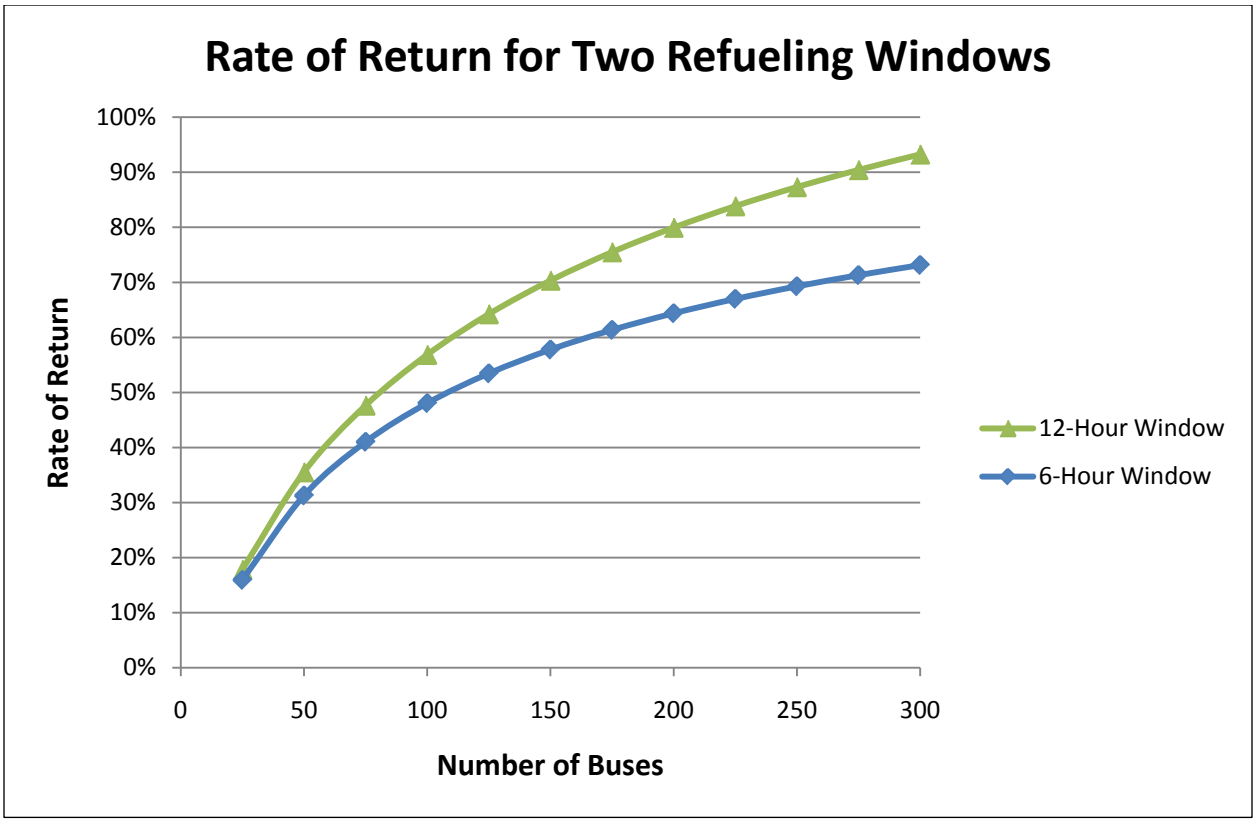


**Figure 16. Rate of return for a 6-hour and 12-hour refueling window**

### *What if I have to upgrade my garage?*

Some garages are not equipped to store CNG vehicles. Upgrades to the garage are part of the upfront costs for the fleet, such as infrastructure. The cost to retrofit a garage varies widely, as explained by Adams (2006). In one scenario, a garage required a gas-detection system that cost $3,750 per bus plus $40,000 for a control panel. The VICE model indicated this garage cost had no significant impact on transit and refuse fleets. However, it increased the payback time to school fleets 1.8 years to 2.3 years depending on the size of the fleet.

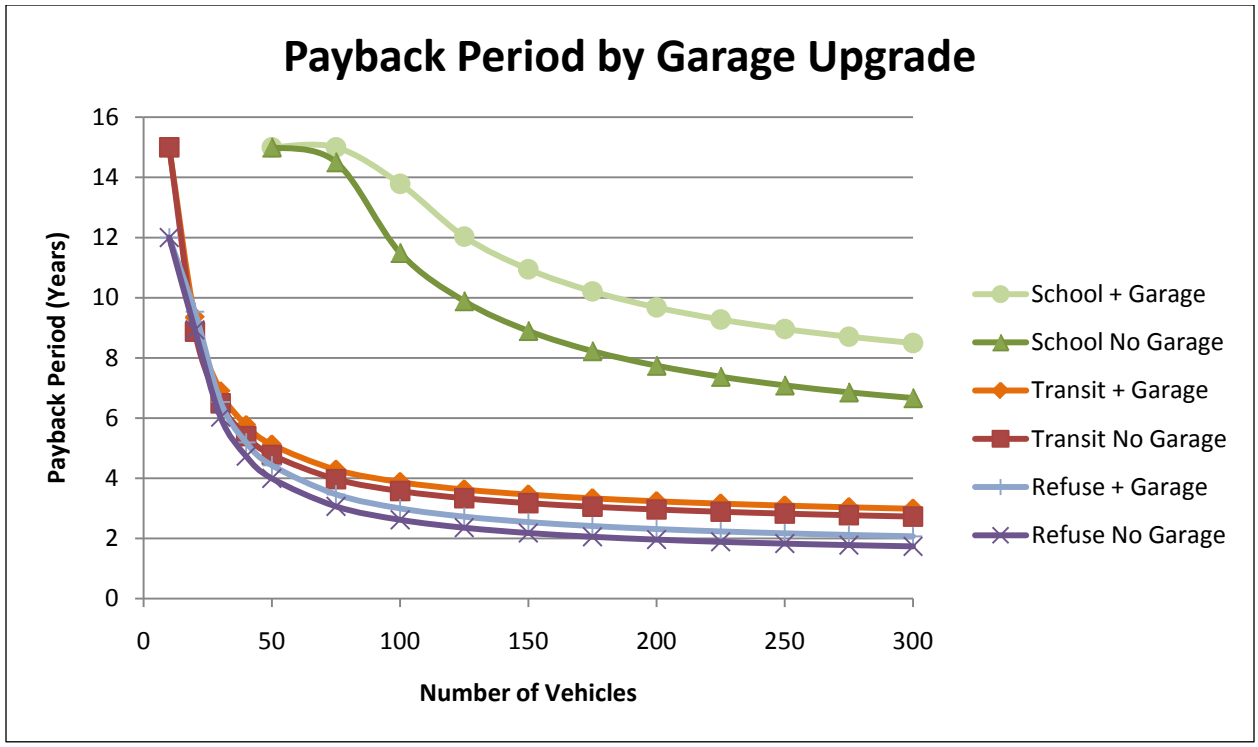


**Figure 17. Payback period by garage upgrade**

## Changes in Operating Costs

### *What happens if my vehicle maintenance costs change?*

Switching to CNG can increase or decrease maintenance costs, depending on the particular vehicle, application, and mechanic (Lemmons 2009). NREL models both scenarios by setting both CNG and diesel maintenance costs equal (at $0.50 per mile), then increasing CNG maintenance cost to $0.75 per mile (150%), and then decreasing them to $0.25 per mile (50%).

Figure 18 shows that a 50% change in vehicle maintenance cost makes a big difference in project profitability. These costs are tracked on a per-mile basis, so they quickly add up to some very large costs in fleets where there are a lot of miles driven. This is one of the few costs that, by changing up or down 50%, can make a school CNG fleet more profitable than a refuse fleet. This is also one of the few costs that can make a school project not pay off no matter how large the fleet is. So school bus fleets that travel a lot of miles realize more cost benefits from CNG.

Notice that the 100% line is much closer to the 50% line than the 150% line, which indicates a given reduction in maintenance costs has a larger impact on project economics if the starting CNG maintenance cost is greater than the diesel maintenance costs.

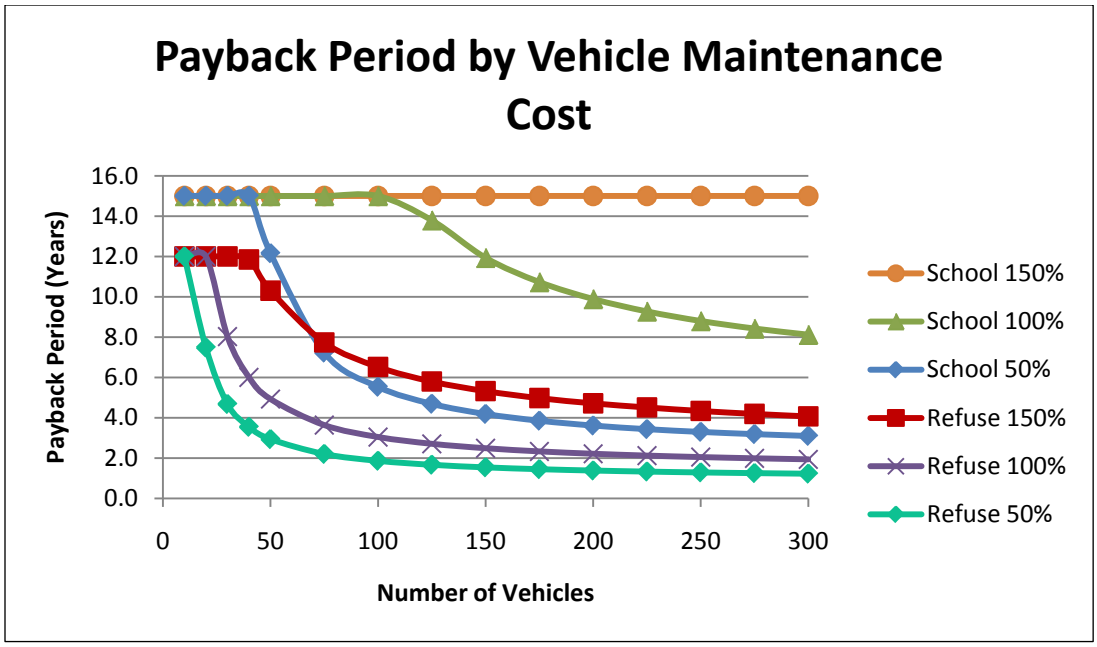


**Figure 18. Payback period by vehicle maintenance cost**

### *What if I have to hire a hostler or attendant?*

The VICE model's baseline assumes that fleets will not encounter additional staff costs when they switch from diesel to CNG. However, numerous circumstances can contribute to the need for more hostlers or attendants at the CNG station. There is also a case where a fleet can eliminate hostlers if they use slow-fill. To test the effect of hiring or firing personnel, NREL ran the model from a two-hostler reduction to a four-hostlers addition and looked at how that affects the number of vehicles a fleet needs for a 7-year payback. The results are shown in Figure 19.

The hostler is assumed to cost $24 per hour when benefits are added. He is assumed to work an 8-hour shift 5 days a week, and additional refueling is done by the drivers before or after their routes. Therefore, the addition of a hostler costs school and refuse fleets $4,200 per month or about $50,000 per year.

For the transit and refuse fleets, each hostler required 4 additional vehicles to pay himself off in 7 years. Because both of these numbers are less than a hostler can handle, these fleets should never limit their number of CNG buses based on what their current staff can handle. It seems to be a sound decision to increase staff to accommodate as many CNG vehicles as possible.

Each hostler for a school fleet required 55 additional buses. Therefore, it would only make sense to hire an additional hostler if he can service 55 buses or more.

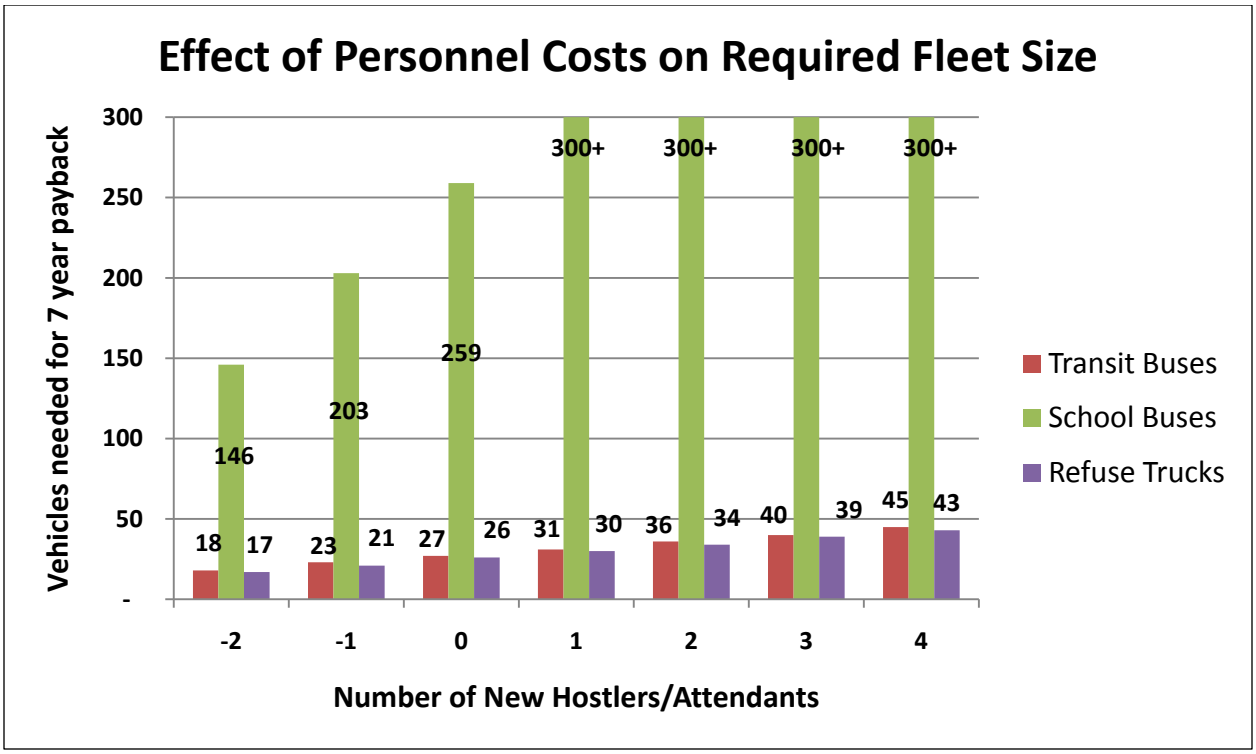


**Figure 19. Effect of personnel costs on required fleet size**

### *What if I open my refueling station to the public?*

Opening a refueling station to the public changes the project economics in a number of ways that are listed below. There is too much variability to model all of these factors in one scenario, but each factor was modeled independently in response to questions earlier in the report.

1. Many project grants are tied to the station opening to the public. This is the same as if the upfront station cost was reduced, as modeled for this question: "What happens if the price of my station changes?"
2. Excess capacity may be added to the station to accommodate public vehicles refueling at the same time as the primary fleet. Other equipment such as card readers may also be necessary. These both add to the upfront cost, which is also modeled in the "What happens if the price of my station changes?" section.
3. The refueling window might need to be expanded to accommodate public vehicles. Increased refueling windows were modeled when answering this question: "What happens as I have more or less time to refuel?"
4. The number of attendants must be increased to facilitate sales to the general public. This increase is also modeled in the "What if I have to hire a hostler or attendant?" section.
5. Opening to the public will likely increase wear and tear on station equipment. This increase is explored under this question: "What if my maintenance costs increase or decrease?"

6. A profit can be made on each GGE of CNG sold to the public. The profit on each gallon affects the firm's finances the same as if the price of diesel went up so the firm saved more money on each gallon of CNG used. This impact is very significant, as shown in the "What will a change in diesel prices do to my payback period?" section.

### *How do electricity prices change my project economics?*

Not much. Increasing electricity prices 50% increased the payback period a maximum of 0.7 years (for a 100-bus school fleet) or 0.5 years (for a 20-truck refuse fleet).

### *How do station maintenance costs change my project economics?*

Maintenance costs affect project economics more than electricity prices, but they are still not very influential. Increasing maintenance costs 50% increased payback time for a 100-school bus fleet by 2.7 years and a 300-school bus fleet by 0.7 years. The same cost increase resulted in one additional year to pay back for a 30-truck refuse fleet and only 0.1 additional years to pay back a refuse fleet of 125 or more trucks.

## Conclusions

As with all fleet projects, predicting whether a project is financially sound is challenging but critically important. Decisions made on equipment purchases, capital upgrades, and fuel contracts have long-term impacts on the operational success of the fleet. NREL has modeled the impact of these decisions and other fleet parameters with its VICE model and analyzed fleet projects. When these parameters are compiled as a fleet, the fleet can be classified as "Resilient," "Marginal," or "No-CNG." Resilient fleets tend to use a lot of fuel and are profitable enough to be resilient to multiple changes in fleet parameters. Marginal fleets are profitable but can quickly become unprofitable if parameters change. No-CNG fleets are ones for which CNG would be an unprofitable proposition.

Larger transit and refuse fleets (75+ vehicles) tend to be profitable and resilient to variations in project parameters. This is because the miles driven by the fleet overall use enough fuel to magnify the benefits of the lower-price CNG to offset the entry costs of CNG (vehicle incremental costs and infrastructure costs). Their payback period only rises above 5 years when diesel drops below $2.25/gallon, vehicle incremental costs are doubled, CNG vehicle maintenance costs increase 50%, VMT drops below 26,000 miles/year (transit) or 14,000 miles a year (refuse), vehicle incremental costs are doubled, or when these factors combine.

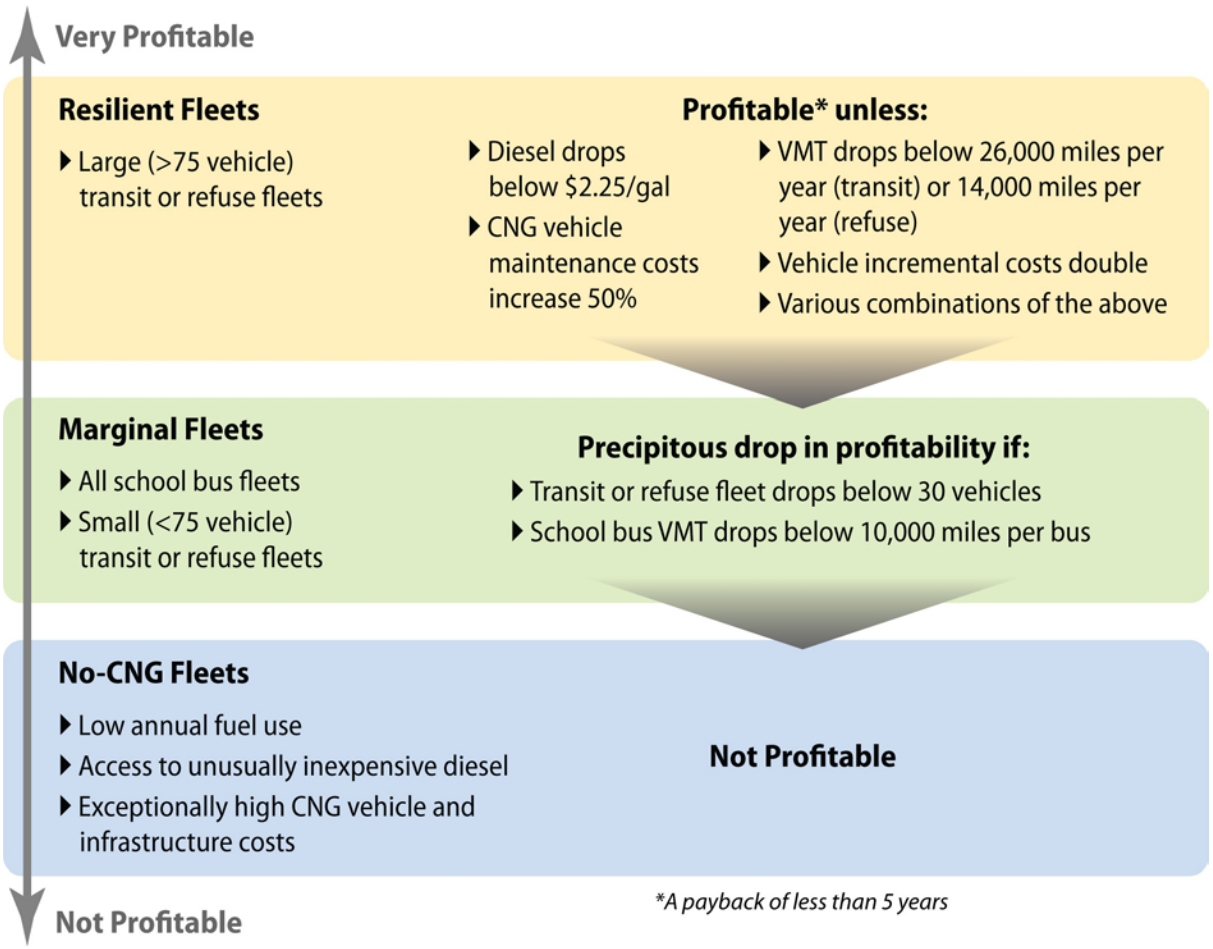


**Figure 20. Largest factors affecting the profitability of marginal and resilient fleets**

In general, school fleets and small transit/refuse fleets tend to be marginal. Marginal fleets are heavily influenced by many factors, but their profitability drops precipitously if the number of transit/refuse vehicles drops below 30. School fleets have no clear cutoff point for the number of buses, but their profitability deteriorates rapidly if the VMT drops below 10,000 miles per bus because of the overall low fuel use of the fleet.

Fleet type makes a large difference in profitability. At any given fleet size, refuse projects are slightly more profitable than transit projects, and both are much more profitable than school buses. Mixed fleets are more profitable than the mid-point between the individual component fleets, which is particularly helpful for school buses.

Diesel prices are a powerful indicator of profitability given that natural gas prices are relatively consistent. A school bus project appears to only make economic sense once diesel prices approach $4/gallon for 100-bus fleets and $5/gallon for 50-bus fleets. For transit and refuse fleets, the size and fleet type become increasingly irrelevant as the price of diesel increases past $2.50. For prices below $2.50, larger fleets are favored, and refuse fleets are favored over transit. Our current diesel price of $2.56 is on a transitional point of the payback curve for transit and

refuse fleets. If diesel prices stay where they are or rise, project economics look resilient, and if they fall, the economics look marginal.

Per-vehicle VMT is almost as strong an indicator of profitability as the number of vehicles for school fleets. However, VMT is not a relevant factor in transit or refuse fleets unless their VMT is reduced to 1/3 of the average fleet's VMT.

Project success is very sensitive to vehicle maintenance costs. Doubling these costs increases the payback period of the least-sensitive fleet from 1.7 years to 3.3 years. Doubling them can also make a school project not pay off no matter how large the fleet is.

An increase in vehicle incremental cost has a large effect on project profitability. A reduction in incremental cost has a much smaller impact on profitability because most of the amount up to the base case was subsidized by the government, and very little of the amount over the base case is subsidized.

Tax issues have a strong influence on profitability. There are synergies with the vehicle and fuel tax credits, so together, they reduce the payback period of a project more than the sum of both of their impacts. Taking either one of the tax credits away makes school projects not pay off. If a fleet has to pay taxes on diesel but not CNG, their payback period is reduced by 22%.

The cost of the station has a significant influence on the profitability of marginal projects. In general, a 50% increase in station cost results in a 30% increase in payback years. This could be make-or-break for many school fleets and smaller (<50 vehicle) transit and refuse fleets.

Factors that don't have much effect on project profitability over the range tested are:

- Efficiency difference between CNG and diesel engines (-25% to +10%)
- Change in vehicle/project life (10 years to 20 years)
- Electricity prices (50% and 150% baseline)
- Maintenance costs for CNG station (50% and 150% baseline)
- Garage upgrade (for minimal-upgrade scenario)
- Number of new attendants/hostlers (-2 to +4 personnel).

These conclusions were derived from testing parameter changes on what NREL deemed a common or average fleet. Synergies between these parameters were not tested and could have surprising effects. To account for these synergies and the specific operating conditions of individual fleets, we encourage fleet managers to use the VICE model when it is posted on the Alternative Fuels and Advanced Vehicles Data Center (www.afdc.energy.gov/afdc/) or to have a CNG infrastructure contractor do an individual assessment of their fleet.

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## Glossary and Acronyms

Capacity charge—Also termed "demand charge," it is the charge that an electric utility charges a customer to be ready to meet the customer's demands immediately. It is therefore dependent on how quickly the customer pulls electricity out of the grid.

Compressed natural gas (CNG)—A gas, consisting primarily of methane, that is compressed to allow more energy to fit into a smaller fuel tank.

Diesel-gallon equivalents (DGE)—The amount of energy that is in 1 gallon of diesel fuel. This is larger than a GGE.

Federal Transit Administration (FTA)—An agency within the United States Department of Transportation (DOT) that provides financial and technical assistance to local public transit systems.

Gasoline-gallon equivalents (GGE)—The amount of energy that is in 1 gallon of gasoline. CNG is typically measured in this unit.

Hostler—A person who refuels, cleans, and performs regular maintenance for a fleet of buses or trucks at the end of the day.

Net present value (NPV)— The difference between the present value of cash inflows and the present value of cash outflows. All present-value cash flows have been discounted so that recent flows are worth more than future flows.

National Renewable Energy Laboratory (NREL)—One of the U.S. Department of Energy's 16 national laboratories, NREL is the primary laboratory for renewable energy and energy efficiency research and development.

Rate of return (ROR)—The gain or loss on an investment over a specified period expressed as a percentage increase over the initial investment cost (investopedia.com).

Refueling window—The period of time in which vehicles are available to refuel.

Vehicle-miles traveled (VMT)—The number of miles traveled by 1 vehicle in 1 year.

Vehicle and Infrastructure Cash-Flow Evaluation (VICE) model—An NREL-built model that assesses the profitability of investing in alternative fuel infrastructure under for various fleets. NREL plans to expand the VICE model to assess more fuels than CNG.

# REPORT DOCUMENTATION PAGE

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**14. ABSTRACT** *(Maximum 200 Words)*
This report describes how NREL used the CNG Vehicle and Infrastructure Cash-Flow Evaluation (VICE) model to establish guidance for fleets making decisions about using compressed natural gas.

**15. SUBJECT TERMS**
compressed natural gas; CNG; municipal fleets; CNG Vehicle and Infrastructure Cash-Flow Evaluation model; Vehicle and Infrastructure Cash-Flow Evaluation; VICE; VICE model

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
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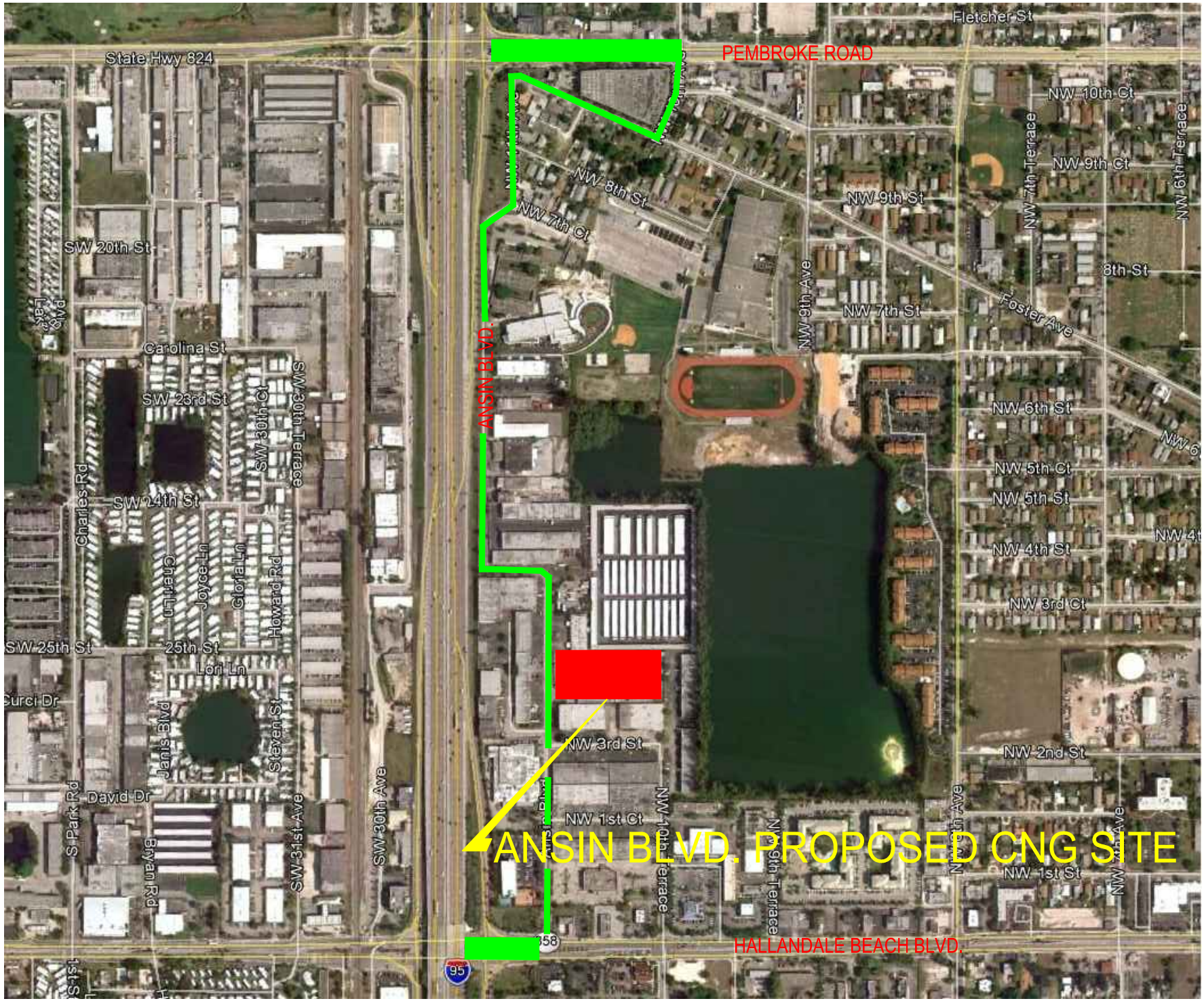
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S Park Rd
David Dr
Bryan Rd
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SW 30th Ave
NW 1st Ct
NW 1st Terrace
NW 9th Terrace
NW 1st St
NW 11th Ave
95

# BUDGET AMENDMENT NOTE SUMMARY
## FY 2012-13 BUDGET NOTES

| BUDGET NOTE # | DESCRIPTION | FUND | EXPENSE INCREASE | EXPENSE DECREASE | REVENUE INCREASE | REVENUE DECREASE | FINANCIAL EFFECT ON FUND BALANCE INCREASE (DECREASE) |
|---|---|---|---|---|---|---|---|
| 1 | Special Election - due to a vacated commission seat effective midnight 11/6/12 the vacated seat will require the City to hold a special election | General | $65,750 | | | | ($65,750) |
| 2 | Rolled-Back Rate - reduce the millage rate from 5.9000 mills to 5.6833 which is the rolled-back rate for FY 2013 | General | | | | $783,049 | ($783,049) |
| 3 | Hollywood sewer treatment costs - the City of Hollywood is raising their sewer treatment costs from $2.86 to $3.40 per 1,000 gallons, a 19% increase | Sewer | $1,298,690 | | | | ($1,298,690) |
| 4 | Contingency funding reduction in the General Fund from $645,000 to $445,000 due to budgetary constraints | General | | $200,000 | | | $200,000 |
| 5 | Administrative charge - from HBCRA to the General Fund for indirect costs based on a revised cost allocation study | General | | | | $388,720 | ($388,720) |
| 6 | Code Compliance fines - based on revised revenue estimates and historical trends | General | | | $80,000 | | $80,000 |
| 7 | Various HBCRA funding cuts - during the HBCRA budget meetings certain shared funding costs were eliminated which required additional funding from various City funds. Programs include: Code Red, citizen newsletter, postage, advertising, and IT technical support | City funds | $49,208 | | | | ($49,208) |
| 8 | Ambulance Fees - based on revised revenue estimates and historical trends | General | | | $75,000 | | $75,000 |
| 9 | Multi-family refuse collection - initial revenue projections were based on the implementation of enhanced multi-family recycling program. However, the program is still being developed by DPW/U&E | Sanitation | | | $285,000 | | $285,000 |
| 10 | Water sales - based on revised revenue estimates and historical trends | Water | | | $300,000 | | $300,000 |
| 11 | Cemetery lot sales - nonresident - based on revised revenue estimates and historical trends | Cemetery | | | | $9,000 | ($9,000) |
| 12 | DPW Facility Improvements - change funding source from general fund to transportation fund to properly reflect the paving costs associated with the project | General | | $20,000 | | | $20,000 |
| 13 | DPW Facility Improvements - change funding source from general fund to transportation fund to properly reflect the paving costs associated with the project | Transportation | $20,000 | | | | ($20,000) |
| 14 | Wayfinding - change funding source from general fund to transportation fund to properly reflect the transportation related costs associated with the project | General | | $25,000 | | | $25,000 |
| 15 | Wayfinding - change funding source from general fund to transportation fund to properly reflect the transportation related costs associated with the project | Transportation | $25,000 | | | | ($25,000) |
| 16 | 50/50 Sidewalk Program - change funding source from general fund to transportation fund to properly reflect the transportation related costs associated with the project | General | | $10,000 | | | $10,000 |

# BUDGET AMENDMENT NOTE SUMMARY
## FY 2012-13 BUDGET NOTES

| BUDGET NOTE # | DESCRIPTION | FUND | EXPENSE INCREASE | EXPENSE DECREASE | REVENUE INCREASE | REVENUE DECREASE | FINANCIAL EFFECT ON FUND BALANCE INCREASE (DECREASE) |
|---|---|---|---|---|---|---|---|
| 17 | 50/50 Sidewalk Program - change funding source from general fund to transportation fund to properly reflect the transportation related costs associated with the project | Transportation | $10,000 | | | | ($10,000) |
| 18 | Enterprise System Replacement capital project - additional funding for GIS to enhance City services | San/Storm Transp/Water | $400,000 | | | | ($400,000) |
| 19 | Crosswalk upgrade capital project - there is sufficient funding in the current fiscal year ($300k) to move the project forward in FY 2013 with out the additional $100,000 in the transportation fund | Transportation | | $100,000 | | | $100,000 |
| 20 | Main Fire Station capital project - there is sufficient funding in the current fiscal year ($500k) and the additional $1M in FY 13 to move the project forward. The additional $500k is not needed at this time. | General | | $500,000 | | | $500,000 |
| 21 | Funding splits - Chidsey, Bower, and Benitez - 50% general fund and 50% sanitation fund to properly reflect their tasks and duties | General | | $133,311 | | | $133,311 |
| 22 | Funding splits - Chidsey, Bower, and Benitez - 50% general fund and 50% sanitation fund to properly reflect their tasks and duties | Sanitation | $133,311 | | | | ($133,311) |
| 23 | Compressed Natural Gas (CNG) Fueling Station capital project - decrease funding by 50% due to possible public/private partnership opportunities | Sanitation | | $834,795 | | | $834,795 |
| 24 | Debt Service adjustment - refinance of the series 2001A Florida Municipal Loan Council bond. There are no principal payments ($235,000) due in FY 13 and the interest payment is being reduced by $93,061 | Water/Sewer<br>Storm | | $328,061 | | | $328,061 |
| 25 | Sewer rate adjustment - due to the 19% increase in treatment costs from the City of Hollywood a sewer rate adjustment of 15% is proposed to ensure a stable fund balance in the sewer fund. | Sewer | | | $1,618,593 | | $1,618,593 |
| 26 | Custodial Services - outside company - initial funding request of $25,000 was insufficient based on the current contract | Sanitation | $35,000 | | | | ($35,000) |
| 27 | Legislative Management Services - implementation of a cloud-based solution which focuses on citizen participation, webcasting, and agenda flow | Gen/San/Water Storm/Sewer | $19,300 | | | | ($19,300) |
| 28 | Lifeguard Services - the contract wit the current vendor for lifeguard services is expiring on 9/30/12. The City will be exploring various options such as assuming aquatic management of the pool and beach areas for a start-up cost of approximately $700k. | General | $366,077 | | | | ($366,077) |
| 29 | HBB & I-95 Aesthetic Improvement capital project- utilize Developer Agreement funds set aside for this type of expenditure | Transportation | | $15,000 | | | $15,000 |
| 30 | City-wide Speed Control Devices capital project- utilize Developer Agreement funds set aside for this type of expenditure | Transportation | | $45,000 | | | $45,000 |
| 31 | A1A Pedestrian & Lighting Improvement capital project- utilize Developer Agreement funds set aside for this type of expenditure | Transportation | | $96,000 | | | $96,000 |

# BUDGET AMENDMENT NOTE SUMMARY
## FY 2012-13 BUDGET NOTES

| BUDGET NOTE # | DESCRIPTION | FUND | EXPENSE INCREASE | EXPENSE DECREASE | REVENUE INCREASE | REVENUE DECREASE | FINANCIAL EFFECT ON FUND BALANCE INCREASE (DECREASE) |
|---|---|---|---|---|---|---|---|
| 32 | Enhanced median maintenance - change the funding source of 6 additional full-time positions from general fund to transportation fund to properly reflect the transportation related expenditures | General | | $300,050 | | | $300,050 |
| 33 | Enhanced median maintenance - change the funding source of 6 additional full-time positions from general fund to transportation fund to properly reflect the transportation related expenditures | Transportation | $300,050 | | | | ($300,050) |
| 34 | Beach Renourishment capital project - utilize Developer Agreement funds set aside for this type of expenditure | General | | $250,000 | | | $250,000 |
| 35 | Enterprise System Replacement capital project - funding reduction (multi-year funding) | General | | $50,000 | | | $50,000 |
| 36 | 3 Islands Fire Station - minor construction project - utilize Developer Agreement funds set aside for this type of expenditure | General | | $4,000 | | | $4,000 |
| 37 | City's Green Initiative/Water Conservation Program - duplicate funding correction (cost is already included in the capital account number) | Water | | $41,100 | | | $41,100 |
| 38 | Additional tuition reimbursement request | General | $3,600 | | | | ($3,600) |
| 39 | Eliminate 4 additional Parks Maintenance positions - tasks will be accomplished through other means | General | | $115,677 | | | $115,677 |
| 40 | Revised General Fund TIF requirement to the HBCRA based on July !st certified values and the City adopting the rolled-back rate of 5.6833 | General | | $150,429 | | | $150,429 |
| 41 | ($300k), Fire Assessment ($325k), Sanitation Equipment Repl ($500k), and Stormwater Equipmnet Repl ($108,400) due to $5M vehicle financing option for FY 13 and 14. | Various Equip Repl reserve | | | | $1,233,400 | ($1,233,400) |
| 42 | ($300k), Fire Assessment ($325k), Sanitation Equipment Repl ($500k), and Stormwater Equipmnet Repl ($108,400) due to $5M vehicle financing option for FY 13 and 14. | Various Funds | | $1,233,400 | | | $1,233,400 |
| 43 | Debt Proceeds from $5M vehicle loan | Various funds/equip repl | | | $5,000,000 | | $5,000,000 |
| 44 | Transfer to Equipment Reserves (Fire Assessment and Police Vehicle Reserve) to account for the debt proceeds collected in the General Fund | General | $2,313,500 | | | | |
| 45 | Transfer to Equipment Reserves (Fire Assessment and Police Vehicle Reserve) to account for the debt proceeds collected in the General Fund | Police Veh/Fire Assmt | | | $2,313,500 | | |
| 46 | Increase in debt service payment for $5M vehicle financing option. Only interest payment of $36,458.33 is due in FY 13. | Various | $36,463 | | | | ($36,463) |
| 47 | Increase of FY 13 vehicle budget due to funding FY 13 **and** FY 14 purchases utilizing a $5M vehicle financing option | Various | $2,400,000 | | | | ($2,400,000) |
| | **TOTAL ALL FUNDS** | | **$7,475,949** | **$4,451,823** | ######### | ######### | **$4,233,798** |

# BUDGET AMENDMENT NOTE SUMMARY
## FY 2012-13 BUDGET NOTES

| BUDGET NOTE # | DESCRIPTION | FUND | EXPENSE INCREASE | EXPENSE DECREASE | REVENUE INCREASE | REVENUE DECREASE | FINANCIAL EFFECT ON FUND BALANCE INCREASE (DECREASE) |
|---|---|---|---|---|---|---|---|

## TOTALS BY FUND

| FUND | EXPENSE INCREASE | EXPENSE DECREASE | REVENUE INCREASE | REVENUE DECREASE | FINANCIAL EFFECT ON FUND BALANCE INCREASE (DECREASE) |
|---|---|---|---|---|---|
| General | $3,132,980 | $2,383,467 | $2,797,500 | $1,171,769 | $876,218 |
| Sanitation | $280,304 | $1,334,795 | $285,000 | $0 | $1,339,491 |
| Sanitation Equip Repl | $680,493 | $0 | $1,437,000 | $500,000 | $256,507 |
| Water | $115,766 | $231,639 | $300,000 | $0 | $415,873 |
| Water Equip Repl | $81,660 | $0 | $229,500 | $0 | $147,840 |
| Cemetery | $0 | $0 | $0 | $9,000 | ($9,000) |
| Sewer | $1,309,142 | $177,161 | $1,618,593 | $0 | $486,612 |
| Sewer Equip Repl | $503,974 | $0 | $549,500 | $0 | $45,526 |
| Stormwater | $103,860 | $68,761 | $0 | $0 | ($35,099) |
| Stormwater Equip Repl | $199 | $0 | $27,500 | $108,400 | ($81,099) |
| Transportation | $455,050 | $256,000 | $0 | $0 | ($199,050) |
| Police Veh Reserve | $472,488 | $0 | $1,035,500 | $300,000 | $263,012 |
| Fire Assmnt | $337,242 | $0 | $1,278,000 | $325,000 | $615,758 |
| Equitable SH | $2,791 | $0 | $114,000 | $0 | $111,209 |
| **TOTAL ALL FUNDS** | **$7,475,949** | **$4,451,823** | ######### | ######### | **$4,233,798** |