

Alternative Fuel Tool Kit

Case Study on Compressed Natural Gas (CNG):

BuildSense

Introduction

Located in Durham, North Carolina, [BuildSense](#) offers architecture, building, remodeling and energy retrofit services to its clients. Its fleet consists of the following vehicles:

- Two 2011 CNG Ford Transit Connects
- Three 2009 CNG Ford Escapes
- Two 2012 CNG Ford E-350 Vans
- Three light-duty diesel vehicles, including a Jetta sedan, a Jetta wagon, and a Dodge Sprinter

Motivation and Selection

This organization adopted natural gas in 2011 because of the fuel's environmental and cost benefits. BuildSense's customers depend on the company for energy efficiency and green building services. By using natural gas to fuel its vehicles, the company is leading by example. Natural gas is domestically produced, reduces greenhouse gases when compared with conventional gasoline, and is currently experiencing a surplus in North America.



Ford TransitConnect, retrofitted to run on CNG

In addition to energy independence and air quality benefits motivating the change at BuildSense, the monetary savings of up to \$2.00 per gallon was also a significant factor. Their price per gallon of gasoline in April 2014 averaged \$3.63. Compared to an average of \$1.77 per gallon for the converted natural gas vehicles during those same months, the decision was well worth it.

Because the nature of the work at BuildSense involves travel to places that may not have CNG available, BuildSense opted to go with a bi-fuel package, which means that they can run on either compressed natural gas or conventional petroleum gasoline. BuildSense also chose to install a CNG station at their headquarters, which allows all vehicles returning to the yard at the end of each day to fill up.

When selecting their CNG vehicles, staff at BuildSense considered the duties of the drivers, a technique also known as "right-sizing." By analyzing the needs of its employees, BuildSense was able to identify the most fuel-efficient vehicle for each duty. For example, managers need good transportation to visit clients and job

sites, and therefore were assigned Ford Escapes and Transit Connects. Laborers generally need heavier trucks and vans to haul equipment, on the other hand, and they could be assigned either TransitConnects or box vans. The Transit Connects are more versatile, and can also be used to haul tools and materials. The Econoline box vans are ideal for hauling heavier tools and materials. They can also be used to pull trailers to the job site.



BuildSense's CNG station during the building process

Implementation

BuildSense hired a consultant when planning the project. The consultant recommended Altech-Eco for the vehicle conversions based on their experience and good reputation. BuildSense also valued that Altech-Eco was a local, in-state company.

BuildSense paid cash for a few of the vehicles, and financed the rest. Ford now offers a great program to finance the conversion kit and the vehicle all at once.

In order for staff to safely operate the vehicles and fueling station, BuildSense instituted a scheduled program of training and refresher courses. Every staff member is trained on operating the vehicles and the station. A record of that training goes into the employee's HR record.

Station maintenance is contracted with the equipment installer. Two people on staff perform light maintenance and monitoring of the equipment, checking oil levels and the compressors. These employees were trained initially and repeat that training every year.

BuildSense routinely offers tours of their CNG station, and special events for the public and their clients to learn more about their varied sustainability efforts.

Impact

This project was conducted as part of the Carolina Blue Skies Initiative, an American Recovery and Reinvestment project. BuildSense paid for half of the total cost of the project, and the Carolina Blue Skies Initiative paid for the other half. As such, BuildSense reached their return on investment at the outset of the project and began saving money on fuel costs immediately. Without the grant funding, however, BuildSense would have still seen a payback period of 4.25 years on their CNG vehicle purchases. For the purposes of this case study, the payback period calculations described below excluded the grant funding and CNG station costs.



Completed CNG station

Using past average fuel usage for the fleet and average fuel prices since deployment, the average annual fuel cost savings per vehicle is estimated in Table 1 below (based on average figures for Ford Transit Connect and Ford Escape).

Table 1. Average Annual Fuel Savings Estimate Compared to Conversion Cost

Cost Breakdown	Alt fuel vehicle	Conventional	Difference
Initial cost	Purchase cost + \$11,500 average conversion cost	Purchase cost	(\$11,500)
*\$0.50 per gallon tax rebate incentive	\$800		\$800
Annual fuel cost	\$4,500	\$6,400	\$1,900
Average annual fuel savings (including rebate)			\$2,700
Payback Period			4.25 Years

Assumptions used for calculation: 1. Average gasoline fuel usage per vehicle of 1,428 gallons per vehicle per year. 2. A \$1.77/gallon lower fuel cost for CNG compared to gasoline. 3. *The payback period estimate assumes that the \$0.50 per gallon alternative fuels tax rebate incentive is in place. This federal rebate has lapsed several times and then has been renewed retroactively. Without the tax incentive, the average payback period is six years.

Looking at total project costs and savings over a 5-year period, the results are positive. Projected savings and return on investment (ROI) are shown in Table 2 below.

Table 2: 5-year ROI and Cumulative Savings BuildSense Vehicle Investment

Year	0	1	2	3	4	5
ROI	-100%	-79%	-59%	-38%	-17%	3%
Cumulative Savings	\$ (46,000)	\$ (36,495)	\$ (26,990)	\$ (17,486)	\$ (7,981)	\$ 1,524

There are two important things to consider in the above calculations. First, some of the vehicles achieved a return on investment much more quickly than others. For example, the conversion cost on the Transit Connect vehicles equaled \$12,217.25 apiece, but their annual per vehicle fuel savings was \$6,026. Excluding preventative maintenance costs, which can be lower on a CNG vehicle, the payback for the Transit Connect is just two years.

Second, because BuildSense vehicles travel fewer miles annually than the national fleet average of almost 10,000 miles per vehicle per year, the payback period is longer than a business whose focus may be on transit or delivery service.¹ While grant funding did play a role in shortening the return on investment, it allowed BuildSense to further their sustainability goals more rapidly and make the future business case for purchasing additional CNG vehicles.

Lessons Learned

As a small business, BuildSense plans to purchase additional fleet assets on an as-needed basis. In fact, Jeff Andre, former BuildSense Partner and Operations Lead, expects that all future purchases will be CNG vehicles. At the time that BuildSense began this CNG transition project there were no OEM-prepped conversion options. For future conversions they would strongly consider taking advantage of the value of OEM-prepped conversion vehicles.

“I’m glad that we undertook this project. This was the right choice for our fleet operations, and I highly recommend it to other vehicle fleets.” --Jeff Andre.

¹ A 2011 report from Utilimark, a national fleet consulting firm, indicates that average annual vehicle usage in municipal fleets is almost 9,500 miles per year. <http://utilimarc.com/wp-content/uploads/2012/02/utilimarc2.pdf>, page 6.