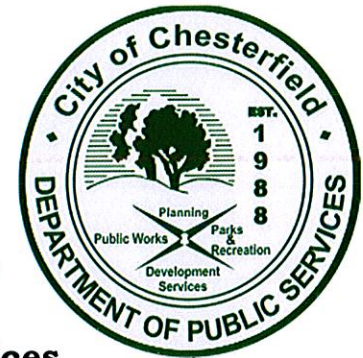


MEMORANDUM



DATE: December 11, 2014

TO: Michael Herring, City Administrator

FROM: *MGH*
Mike Geisel, Director of Public Services

RE: Compressed Natural Gas
Fuel Strategy Initiation

✓ MGH
12/11/14

→ P/PW COMMITTEE

As discussed at the Committee of the Whole budget workshop on November 17, 2014, \$125,000 has been set aside from the 2014 General Fund savings, to provide for five CNG vehicles and to fund use of the Parkway School District CNG Fueling station. Also as discussed, the original recommendation was to fund this project in the amount of \$200,000, but negotiations were ongoing with Parkway to reduce the cost associated with the use of their fueling facility. I am pleased to include the letter of intent from Parkway School District reflecting the success of your negotiations. As more fully described in the attachment, Parkway has agreed to the reduced sum of \$12,500 while committing to provide Compressed Natural Gas to the City of Chesterfield at the Districts direct cost, without administrative mark-up.

City Council has appropriated \$125,000 from the 2014 General Fund savings, to provide for five CNG vehicles and to fund use of the Parkway School District CNG Fueling station. City Council had requested that Staff forward the strategy memorandum to Committee prior to proceeding with any purchases. As such, I requesting that this information be forwarded to the Planning and Public Works Committee (PPW). It is my recommendation that the PPW review the information provided herein, authorize you as City Administrator to execute the Letter of Intent, and to immediately authorize Staff to proceed as budgeted and outlined herein.

We have discussed over the span of multiple years, due to erratic fuel pricing, fuel shortages, budget spikes and emission standards it is imperative that the City of Chesterfield develop a long term fuel strategy. If we fail to develop a long term plan, we subject ourselves to the vagaries of erratic costs and potential shortages. Due to the size and complexity of our fleet, we are simply unable to rapidly or rapidly react to market influences. Any conversions or vehicle replacements will necessarily span several years and be completed simultaneously with the normal capital replacement schedule. It will take several years to fully implement a

comprehensive strategy and it is critical that we initiate the plan prior to a crisis occurring. I believe that we must begin to plan and implement a comprehensive fuel strategy ahead of the market, or our service delivery could be severely jeopardized.

From the Public Works and Administrative view, a long term fuel strategy is essential. The Public Works and Parks Fleet has a replacement cost between \$3 and \$4 million. The vehicles have different replacement cycles and at any given time we have vehicles at various stages of their life cycle. It is clearly financially impossible and operationally unwise to attempt any rapid conversion to an alternative fuel source. The wiser strategy, in my opinion, is to convert or purchase alternative fuel vehicles as vehicles are normally scheduled for replacement. Over time, the composition of the fleet changes as normal vehicle replacement occurs.

Industry trends suggest that CNG is, and will increasingly be, one of the preferred fuels for municipal fleets. However, CNG should not be the sole fuel type considered. **I fully expect that our long term strategy will include a mix of fuel uses, including, but not limited to: 1) CNG, 2) Electric, 3) LNG or Propane, and 4) Conventional unleaded or Diesel.**

Throughout recent history, there has been widespread concern relative to our consumption of gasoline and diesel fuels. This memorandum is not intended to be a treatise on such issues, but to explain the motivation and need to develop a long term municipal alternative fuel strategy. Clearly, the environmental concerns relative to conventional diesel and unleaded gasoline are well documented. From a fleet manager's perspective, the environmental issues have driven extensive and very expensive emissions equipment. Especially on the diesel side, such equipment additions have increased the replacement cost of fleet vehicles. While everyone desires to be environmentally sensitive, the compliance cost of environmental standards is increasing expensive for the City.

Notwithstanding the environmental issues, a fleet manager's interest is driven by fuel availability and cost stability. For the last several years, we have experienced extremely volatile fuel costs. Many of us have lived through shortages where fuel was limited or even rationed. Although we obtain competitive pricing, the markets for fuel are affected by numerous outside events. At the present time, CNG cost is approximately 60% of the cost of conventional unleaded or diesel fuel and has been very stable over the last decade while conventional fuel prices have fluctuated. Additionally, there is widespread consensus that conventional crude oil is a finite resource, a significant proportion of which is imported into the

United States. For national security concerns, using a fuel source that is produced abundantly in the United States is advantageous.

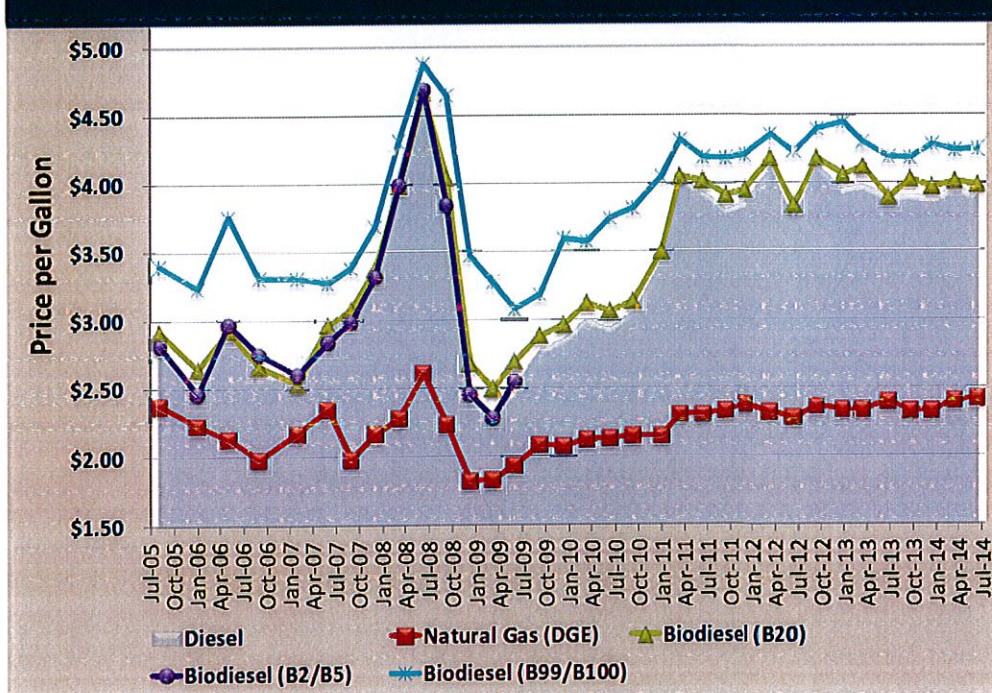
As detailed in the attached memorandum prepared by Civil Engineer, Chris Krueger, **I recommend that five (5) vehicles be converted and dedicated to allow use of Compressed Natural Gas during 2015 and that the City participate with the Parkway School District to utilize their CNG fueling station.**

Specifically, those vehicles range from 2 ½ ton dump trucks, to pick-up trucks. As was approved by City Council at their budget workshop on November 17th, 2014, \$125,000 has been set aside from the 2014 excess fund reserves to fund the purchase and incremental premium for this CNG equipment.

132 Month Average Retail Price Chart



Alternative Fuel Prices versus Diesel



The Parkway School District has agreed to make their rapid fill CNG fueling station available to the City and to charge the City its direct cost for the CNG fuel, if the City financially contributes to help offset their initial capital investment. Be advised that the actual cost of their fueling station was approximately \$1.4 million.

It should be clear that use of the Parkway School District's fueling station is not, and will not, be the primary, sole or complete source of CNG fueling for the City's use going forward. Ultimately, if the City elects to fully embrace a CNG conversion, a fueling source will have to be located at, or near the City's maintenance operations. **Use of the Parkway facility allows early entry and an incremental transition into the CNG fleet, without the enormous initial cost of building our own fueling facility.** Staff continues to investigate such CNG infrastructure opportunities, but we are simply not in a position to recommend construction of our own independent fueling station at this juncture.

Participation with the Parkway School District in the use of their CNG fueling station, allows the City to begin the use of CNG in a measured and controlled manner with a known fixed investment. It provides the opportunity for the City to have direct experience with the use of alternative fuel vehicles without having to go "all in". It allows the City to initiate and implement a long term alternative fuel strategy without the threat of an emergent fuel crisis. It expands the City's options, takes advantage of the successful partnerships and relationships developed with other public agencies, and reduces the potential for costly errors associated with hastily implemented plans resulting from fuel shortages or rapidly increased costs. Use of the Parkway fueling station is not the sole answer to our long term needs, but it certainly affords us an opportunity to initiate the strategic planning and obtain direct experience with one of the preferred alternative fuel sources. We either drive the strategy, or we are subject to the conditions that result.

If you have any questions or require additional information, I would be happy to provide same.

attachments

Cc Jim Eckrich P.E., Public Works Director\City Engineer
Chris Krueger P.E., Civil Engineer



Patricia Bedborough, Chief Financial Officer

December 10, 2014

Michael G. Herring
City Administrator
City of Chesterfield
690 Chesterfield Parkway West
Chesterfield, MO 63017

Dear Mr. Herring:

Following years of study and analysis, the Parkway School District has committed to Compressed Natural Gas (CNG) as a fuel source for its vehicles. As you know, we secured a substantial amount of grant funds to construct a CNG Fueling Facility and to purchase 30 CNG-powered school buses. Our long-term goal is to annually convert/replace vehicles, as funding will allow.

We understand the City is similarly planning on purchasing CNG-powered vehicles. The City's interest in CNG is to be commended and, as a result of numerous meetings with you and Mr. Geisel and as reflection of the fact that Parkway and the City of Chesterfield have a long-standing mutually beneficial relationship, we are pleased to offer the following, as the basis for an AGREEMENT between our two entities. We both understand that this letter only attempts to set forth certain terms that the parties are contemplating would be in the actual agreement and in no event will it be construed to create any binding or enforceable agreement against either the District or the City:

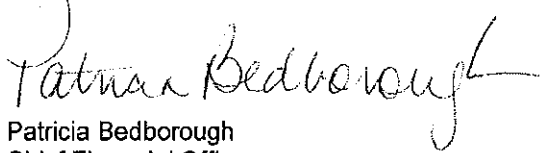
1. The City of Chesterfield will be authorized to fuel its CNG-powered vehicles at our CNG Fueling Facility, located at Parkway Central High School. The School District will charge the City at a per gallon rate which is at the district's total cost, which currently equates to approx. \$1.50/gallon and will vary as the costs to the District vary. Should prices rise or fall, we commit to charging you the same price we pay for this fuel. This authority extends to the five (5) CNG-powered vehicles to be initially purchased by the City only. If the City desires to fuel additional vehicles, it will submit a request to the District and the parties will meet to determine if the feasibility of adding such additional vehicles and any necessary modifications to our agreement (including price) as a result.
2. Taking into consideration the fact that a good portion of the City of Chesterfield is located within the Parkway School District, we would propose a total annual fee of just \$2500, for an initial period of five (5) years in addition to the amounts charged for the CNG. That fee will include gate access into our facility, general pump/facility maintenance and the provision of keys/codes for your vehicles. We will bill you, on a monthly basis, based on actual consumption and current price of natural gas for your CNG usage. Additionally, the \$2500 fee can be paid annually, or in advance (all \$12,500.00 at once), at your discretion.
3. The parties shall work out a mutually agreeable schedule for the fueling times for the City.
4. The City of Chesterfield will be required to notify the Parkway School District, ninety (90) days in advance should any additional CNG-powered vehicles be added to your fleet and/or if/when the City of Chesterfield constructs its own CNG Fueling Facility. The addition of any vehicles will be subject to the terms of item 1 above.
5. The City will carry adequate liability insurance naming the District as an additional insured as well as adequate property insurance and will be responsible for any damage or injury caused that arises out of the City's use of the facility.

6. The initial term of this agreement shall be for five (5) years and will automatically be renewed, for unlimited 1-year terms, with the same terms/conditions, unless either party gives notice to the other of intent to terminate the agreement, or as noted below, both parties agree to a subsequent 5-year agreement. The agreement can be terminated by either party at any time on 90 days advance notice. Both parties agree to meet annually to discuss the agreement and make any mutually acceptable minor adjustments, including increases in the annual fee amount as necessary to reflect increases in operating costs for the District. Both parties agree to meet at least six (6) months prior to the end of the initial five-year timeframe to discuss a possible 5-year renewal and/or any other mutually acceptable major changes to the original agreement including increases in the annual fee amount as necessary to reflect increases in operating costs for the District.

7. Parkway School District affirms that it will not make its CNG Fueling Facility available to the general public during the initial 5-year term of the Agreement; however, it will consider and may enter similar agreements with other governmental entities, at its discretion, on a limited basis.

Please sign below to indicate your agreement to pursue discussions with the School District to determine if a binding agreement can be reached with respect to the foregoing.

Best regards,



Patricia Bedborough
Chief Financial Officer

THE CITY OF CHESTERFIELD

By: _____



Its: _____

MEMORANDUM



DATE: November 26, 2014

TO: Michael O. Geisel, Director of Public Services

FROM: Chris Krueger, Civil Engineer 
James A. Eckrich, Public Works Director/City Engineer 

RE: CNG Fuel Strategy

As requested, I have investigated the potential incorporation of Compressed Natural Gas (CNG) into the City of Chesterfield vehicle fleet. Included in this memo is a basic description of CNG, grant opportunities, and options as to how the City of Chesterfield can implement CNG as an alternate fueling source. To be clear, CNG is one component of a system wide fuel strategy and we are not suggesting that CNG is, or will be the sole source of energy now or in the future. It is simply one piece of a larger fuel source mix.

CNG is made by drying and compressing natural gas directly from the local gas utility (Laclede Gas) service lines at approximately five pounds per square inch (psi) to a stored, compressed delivery pressure of 3,600 psi. Compressed Natural gas is currently routinely available and delivered to businesses and households throughout the Country. The largest CNG fleet in the Country is owned by United Parcel Service (UPS). Natural gas is currently produced in 32 states across the country. Accessible natural gas from shale formations a mile or more below the earth's surface are home to vast supplies of this domestic clean energy resource across the United States. The U.S. Energy Information Administration currently estimates that the US has 2,543 trillion cubic feet of natural gas reserves. That is enough to meet the country's needs for generations. The vast majority of CNG consumption is for energy generation (31%), followed by Industrial usage (29%), residential (19%) and commercial at (13%). The current natural gas market sector for vehicular fuel use is only 0.13%. Industry experts have concluded that even if CNG becomes the vehicular fuel of choice, it would still represent a minor proportion of total Natural Gas consumption and not significantly impact consumer prices for Natural Gas.

Vehicles can be fueled exclusively with CNG or be equipped to operate as a bi-fuel (CNG and gasoline or CNG and diesel) system. The operator of a bi-fueled vehicle can switch back and forth between fuel sources at any time. Vehicles

fueled through CNG emit lower amounts of carbon dioxide and typically require lower maintenance costs. CNG vehicles burn fuel at higher temperatures and require fewer oil changes over the life of the vehicle.

According to the Federal Transit Administration, CNG is one of the safest vehicle fuels available and is considered safer than gasoline as a fuel for vehicles. I've provided an appendix attached to this correspondence to specifically address safety concerns. In summary, technical data, appropriate safety regulations and years of experience show natural gas vehicles to be as safe as, or safer than, conventionally fueled vehicles.

The most significant obstacle to CNG use as a vehicular fuel, is the limited fueling infrastructure currently available. While there are hundreds of gas / diesel stations in the vicinity of Chesterfield, there exists a very limited number of public CNG Fueling Stations within the St. Louis Area. One such station CNG station is located at Interstate 70 and Cypress Road, near Lambert Airport. The public consumer CNG price at this location is currently \$2.00 for a gasoline gallon equivalent (GGE) of CNG. While the price is certainly well below gas and diesel, it is fairly obvious the cost savings would be more than offset by the time and expense necessary to travel the additional 22 miles to access this CNG station.

There also exists a private CNG station in the City of Chesterfield which the City has the opportunity to access. This CNG station is located at the Parkway School District Transportation Center on Highway 141 near Ladue Road. **While Parkway does not allow the public to use this station, they have offered to allow access for City owned vehicles for an initial five year term, in return for a nominal payment of not more than \$12,500 to help defray their original capital cost, and provide the necessary security access modifications.** After the initial five year period, the agreement would be re-evaluated and renewed with mutual consent, but each party would have had an opportunity to analyze their logistics and value. Parkway would allow the City of Chesterfield to purchase natural gas at their direct cost, currently anticipated at \$1.50 GGE. While not the permanent fueling solution for the City, it affords an opportunity to delve into the CNG market without the financial commitment of constructing an entirely new station.

The City of Chesterfield applied for a 2014 grant to convert multiple public works vehicles and construct a new CNG fueling facility adjacent to the Public Works Facility. Specifically, the grant application (through the Congestion Mitigation and Air Quality Improvement Program (CMAQ) included the conversion cost of 20 fleet vehicles to CNG, the incremental purchase price

premium for five new bi-fuel vehicles, and the construction of a CNG Station near the Public Works Facility. The 2014 CMAQ program recommended funding of 15 projects worth over 19 million in federal dollars. Unfortunately, while the Chesterfield project was not funded, it scored well enough to be the highest scored project not to receive funding. It is noteworthy that the Chesterfield CNG project was the only CNG application submitted through the CMAQ program. Since CMAQ funding is available each year, it is our intention to refine and resubmit that grant project in 2015.

Given the number of fueling options and the limited grant opportunities, it appears to be financially implausible and operationally unwise to convert all or a large portion of the fleet to CNG at this time. However, we believe there is merit in implementing a partial fleet conversion to CNG. This would allow us to begin a movement toward an alternative fuel source and better prepare the City for grant or fueling opportunities when they become available. It will also allow us to directly experience CNG use in our specific applications and refine our strategy moving forward.

The City of Chesterfield's fleet is comprised of approximately 120 vehicles. Reviewing our vehicle usage and operation, we recommend initially transitioning seven (7) vehicles to CNG in conjunction with our annual capital equipment replacements. This would include four light duty pickup trucks that serve the engineering inspectors and the Director of Public Services, one 1.5 ton truck within the street division, and two 2.5 ton trucks within the Street Maintenance Division. These vehicles were chosen for the following reasons:

- The engineering inspectors are frequently in the northwest quadrant of the City which will allow for fueling. Additionally, these trucks can be purchased through the State Bid with the CNG option and are practical and relatively inexpensive to convert to CNG (bi-fuel).
 - The Director of Public Services uses a vehicle that is subsequently passed down to the Superintendent of Street Maintenance. Both users respond during emergencies, require high vehicular clearance for off-road use, construction purposes and provide recognizable leadership for organizational "buy-in".
 - The Street Maintenance Division can designate one 1.5 ton truck to work in the northwest portion of the City to allow for local refueling. A 1.5 ton truck is offered through the State Bid with a designated CNG option.
 - The Street Maintenance Division services Snow Map A with two 2.5 ton trucks during snow removal operations. Accordingly, it would be logical to purchase two 2.5 ton trucks fueled by CNG. 2.5 ton trucks are not
-

currently available through the State Bid, so we would purchase those through the open market.

Based upon estimated CNG costs (\$1.50 per gallon), historical vehicle mileage, and an estimated CNG / conventional fuel ratio, the expected annual savings would be approximately \$6,400. There are additional savings that would be realized, but cannot be accurately quantified or projected. As an example, the Tier 2 diesel emission standards were phased in between 2009 and 2012. The last of which involved equipping trucks with particulate collection systems, which added roughly \$10,000 to the purchase cost of each truck. The Tier 3 diesel emission standards became law in March of 2014 and vehicle compliance is phased in beginning in 2017. A new, CNG engine already meets Tier 3 emission standards and no additional retro-fits are required. There will be no additional costs for a CNG vehicle to comply with the new emission standards as there will be for diesel trucks.

Additionally, as gasoline and diesel costs continue to rise, the payback on conversions and/or CNG up-charges will be offset more quickly. At this time we will not argue the move toward CNG, and participation in the Parkway CNG station, on an immediate financial basis. However, it is likely that when the conversion to CNG makes economic sense that it will take years to make the fleet conversion. It also appears that a measured, limited conversion to CNG is appropriate at this time. This will allow us to monitor the cost of fuel and the proximity of new CNG fuel stations each year to determine when to make additional conversions. This will also allow time to submit another CMAQ application and look for other grant opportunities.

Participation with the Parkway School District in the use of their CNG fueling station, allows the City to enter the CNG fleet in a measured and controlled manner with a known fixed investment. It allows the City to have direct experience with the use of alternative fuel vehicles without having to go "all in". It allows the City to initiate and implement a long term alternative fuel strategy without the threat of an emergent fuel crisis. It expands the City's options, takes advantage of the successful partnerships and relationships developed with other public agencies, and reduces the potential for costly errors associated with hastily implemented plans resulting from fuel shortages or rapidly increased costs.

APPENDIX

SAFETY

(excerpted from multiple sources)

Data collected over time has demonstrated natural gas vehicles to be safe in actual operation. Based on a survey of 8,331 natural gas utility, school, municipal and business fleet vehicles (NGVs) that traveled 178.3 million miles on CNG:

- The NGV fleet vehicle injury rate was 37% lower than the gasoline fleet vehicle rate.
- There were no fatalities compared with 1.28 deaths per 100 million miles for gasoline fleet vehicles.
- The collision rate for NGV fleet vehicles was 31% lower than the rate for gasoline fleet vehicles
- The fleet of 8,331 NGVs was involved in seven fire incidents, only one of which was directly attributable to failure of the natural gas fuel system.

Because CNG is mostly made of methane and methane is odorless CNG is odorized with Mercaptan to provide a ready means of leak detection. An average person can easily detect the smell of gas at a concentration as low as 0.3% by volume in air. That concentration is about 16 times lower than the level which will support combustion.

CNG has a high ignition temperature, about 1,200 degrees Fahrenheit, compared with about 600 degrees Fahrenheit for gasoline. It also has a narrow range of flammability, that is, in concentrations in air below about 5 percent and above about 15 percent, natural gas will not burn. The high ignition temperature and limited flammability range make accidental ignition or combustion of CNG unlikely.

CNG has no known toxic or chronic physiological effects (it is not poisonous). Exposure to a moderate concentration may result in a headache or similar symptoms due to oxygen deprivation but it is likely that the smell would be detected well in advance of concentrations being high enough for this to occur.

The fact that CNG is lighter than air further enhances its safety. Unlike other fuels such as diesel, petrol or LPG, which are heavier than air, and pool on the ground creating a fire hazard and potential pollution to waterways. Should a CNG leak occur, the gas will disperse rapidly upwards into the atmosphere and dissipate.

CNG fuel systems are "sealed," which prevents any spills or evaporative losses. Even if a leak were to occur in an NGV fuel system, the natural gas would dissipate into the atmosphere because it is lighter than air. Natural gas is not toxic or corrosive and will not contaminate ground water. CNG combustion produces no significant aldehydes or other air toxins, which are a concern in gasoline and some other alternative fuels.

CNG fuel cylinders are much, much stronger than gasoline tanks. The design of the cylinders is subject to a number of "severe abuse" tests such as heat and pressure extremes, gunfire, collisions and fire. The systems are also fitted with valves and other safety devices to prevent leakage and eliminate the risk of an explosion - actually making them safer than the legal requirements stipulate.

CNG cylinder pressure - as CNG is stored at high pressure, it is often perceived that the high pressure of the product makes it more hazardous than other fuels. While a high pressure gas leak tends to make a lot of noise as the gas is escaping. The resulting high concentrations of gas and its tendency to dissipate upwards make it less likely for the gas in the immediate vicinity of the leak to ignite.

Compressed Natural Gas is delivered via underground pipeline networks, the same networks that deliver natural gas to our homes and businesses. This method not only eliminates the need for road tankers to deliver fuel from the refinery, but also the need for ocean going oil tankers to deliver crude oil to the refinery.

The CNG delivery system itself also has an excellent and proven safety record. According to statistics from the U.S. Department of Transportation, the natural gas transmission and distribution system is the safest way to transport.

Any fuel, including those used in motor vehicles, can be dangerous if handled improperly. Fuels contain energy, which is released when the fuel is ignited. Gasoline is a potentially dangerous fuel, but, by understanding how to handle it, we have learned to use it safely. The same is true of natural gas. Natural gas safely generates our electricity, heats our homes and cooks our meals. But, like gasoline, natural gas must be understood and respected in order to be used safely. As with all vehicle fuels, natural gas can be used safely if the unique properties of the fuel are understood and common sense procedures are followed.

In fact, natural gas itself has safety advantages compared to gasoline and diesel: it is non-toxic, non-corrosive, and has no potential for ground or water contamination in the event of a fuel release. Natural gas is less combustible

than most other fuels, and has few associated health risks. CNG is stored under high pressures; however, the range of flammability and combustion is much narrower with CNG, making it safer than gasoline. CNG will not burn at concentrations below 5% or above about 15% when mixed with air. The flashpoint for gasoline is 250 degrees whereas the flashpoint for natural gas is 1,100 degrees, making the risk of a vehicular fire in an accident much lower. Further, natural gas is lighter than air and will dissipate if leaked whereas gasoline will sink and puddle, causing damage to environment. Dedicated NGVs produce little or no evaporative emissions during fueling and use. An odorant is added to provide a distinctive and intentionally disagreeable smell that is easy to recognize. The odor is detectable at one-fifth of the gas' lower flammability limit.

In gasoline vehicles, evaporative and fueling emissions account for at least 50% of a vehicle's total hydrocarbon emissions. Exposure to the levels of suspended fine particulate matter found in many U.S. cities has been shown to increase the risk of respiratory illness and other health problems. Much of the particulate matter in urban areas is due to transportation emissions. Burning natural gas results in lower emissions of sulfur dioxide, particulate matter, and 20% less carbon dioxide than gasoline or diesel. It is one of the cleanest burning fuels available today.

Safety of CNG vehicles is on par or higher than with gasoline. The pressurized tank is built to withstand severe impact, temperature and environment exposure. CNG storage tanks also have an automatic relieve valve. When the pressure or temperature is excessive this valve will open and release the gas into the atmosphere to reduce the pressure. Although the use of high storage pressures might appear dangerous, compression, storage and fueling of natural gas vehicles meet stringent industry and government safety standards. Remember that high-pressure gases are used safely every day in industrial and medical applications.

Natural gas powered vehicles are designed and built to be safe both in normal operation and in accidents. New OEM natural gas vehicles are subjected to the same federal government crash tests as other vehicles. OEM natural gas vehicle fuel systems must meet Federal Motor Vehicle Safety Standards 303 and 304. Natural gas cylinders are much thicker and stronger than gasoline or diesel tanks. Cylinders are designed not to rupture when fully fueled over six times a day, 365 days a year, far beyond what they will see in service. They are designed for a specific lifetime from 15 up to 25 years and are required to be inspected every 3 years or 36,000 miles. Industry standards test them far beyond normal environmental and service damage risks. Cylinders must even

withstand a bonfire test, crash tests, and penetration by a 30-caliber bullet without rupture! Please see the links on the left side of our page to see these tests in action.

How do natural gas vehicles behave in crashes? The strength of the natural gas cylinders and fuel system generally avoids any leakage or fire. For example an accident involving a CNG-powered pickup...proved to be a testimonial to the safety of CNG tanks.

As reported in the May 1995 edition of Automotive Fleet: When the 1992 CNG pick-up was broadsided in Midland, Texas, the most vulnerable part of the fueling system bore the brunt of the hit. While the force drove an imprint of the tank safety valve into the side of the truck, the CNG tanks did not rupture, and the driver Jimmy Oden walked away.

And in a tragic 1998 accident, a stopped bi-fueled Honda (a vehicle which could run on either natural gas or gasoline) was impacted by another vehicle moving at nearly 100 mph and a fire fed by gasoline broke out. The 50-liter natural gas fuel tank was intact and remained secured in its support brackets. (Reported in a June 1998 BC Gas press release).

Nationwide Insurance, in looking at the safety of natural gas buses in a fleet, concluded as long ago as 1992 that **"...the natural gas powered vehicles will be the safest vehicles in your fleet and (we) have no reservations about insuring them."** (Palmer, Pat, Nationwide Insurance, letter to Kenneth E. Bauman Bus, Inc., September 10, 1992)

	STATE CONTRACT PRICE CONVENTIONAL FUELS	BI-FUEL (Diesel + CNG) PURCHASE PRICE	INCREMENTAL EXPENSE FOR CNG EQUIPMENT	GAS PRICE PER GALLON	CNG \$ PER GGE	Yearly Fuel Savings	Return period (fuel only)
1 replacement Ford F150 (Inspector)	\$23,176	\$33,926	\$10,750	\$3.25	\$1.50	\$1,441	7.5
1 replacement Ford F150 (Director)	\$26,176	\$36,926	\$10,750	\$3.25	\$1.50	\$1,647	6.5
1 replacement 1.5 Ton Dump Truck (F550) (Street Department)	\$35,524	\$40,910	\$5,386	\$3.50	\$1.50	\$1,083	5.0
2 replacement 2.5 Ton Dump Trucks** (Street Department)	\$150,000	\$180,000	\$30,000	\$3.50	\$1.50	\$2,200	13.6 ***

*Mileage is 3/4th's of what is actually projected due to vehicle using both gasoline and CNG.

**2.5 ton Ford truck is not on State Contract.

*** Return period for 2 1/2 Ton vehicles is heavily impacted by the Tier 3 diesel emission standards became law in March of 2014. Vehicle compliance is phased in beginning in 2017.