Compressed Natural Gas Refuse Trucks

A NEW KIND OF ENERGY

Presentation to TARE Board
May 25, 2011

Chris Benge
City of Tulsa
Intergovernmental and Enterprise Director

Eric Lee
City of Tulsa
Field Customer Service Manager

Meredith Webber
INCOG
Office of Energy Management
Clean Cities Coordinator

Adriane Jaynes
INCOG
Clean Cities Communication Specialist

May 20, 2011

Tulsa Authority for the Recovery of Energy (TARE)
C/O Eric Lee
175 E 2nd Street
Tulsa, Ok 74103

Dear TARE Board Members,

We would like to thank you for the opportunity to look further into the benefits of Compressed Natural Gas (CNG) proposed for Tulsa's refuse fleet. We would also like to commend the board on the decision to require CNG refuse trucks in the request for bid language that will be issued in the coming month.

Enclosed in this packet you will find our presentation for the May 25, 2011 meeting, a paper on the consequences of nonattainment, letters of intent to bid on fueling infrastructure from various companies, NGVAmerica's CNG refuse truck insert, excerpts from NGVAmerica's weekly newsletter on infrastructure development, and a summary of the proposed Natural Gas Act which is currently working its way through Congress.

Thank you again for the opportunity to investigate the potential use of CNG by the City of Tulsa. We look forward to presenting at your next meeting.

Sincerely,

Chris Benge
City of Tulsa
Intergovernmental and
Enterprise Director

Eric Lee
City of Tulsa
Field Customer Service Manager

Meredith Webber
INCOG
Office of Energy Management
Clean Cities Coordinator

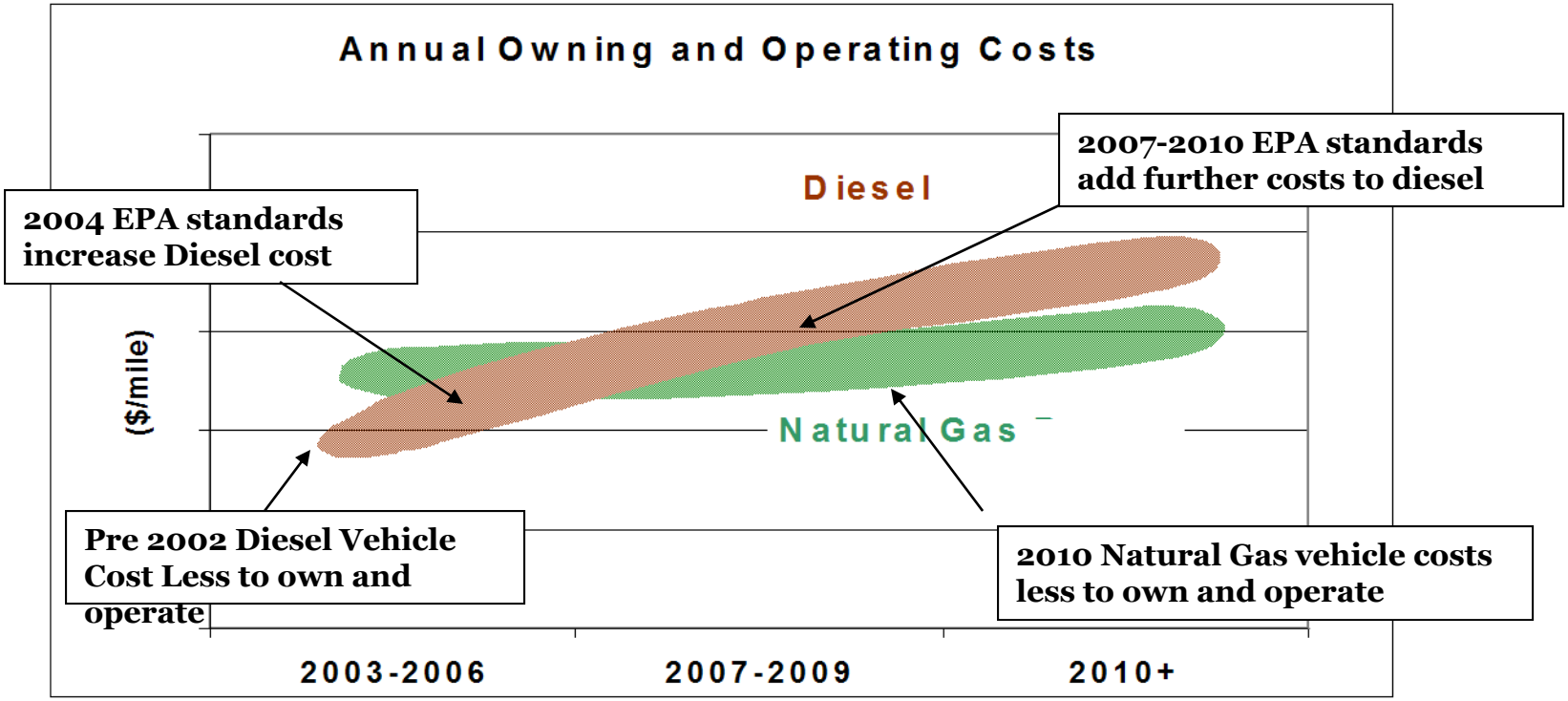
Adriane Jaynes
INCOG
Clean Cities Communication Specialist

Table of Contents

Compressed Natural Gas Refuse Trucks

A NEW KIND OF ENERGY

Cost per Mile Trends



Diesel Costs Increase:
- efficiency drops as NOx level drop
- engine system costs and maintenance go up as NOx and PM levels drop (EGR, DPF, SCR)
- Crude cost rises, Diesel fuel cost increases, ULSD costs more

Natural Gas Costs Remain Relatively Constant
-engine efficiency improves with EGR strategy
-Maintenance free TWC after treatment
- technology incremental cost offset by improved economy
- natural gas fuel prices lower than diesel

Source: Cummins, Inc.

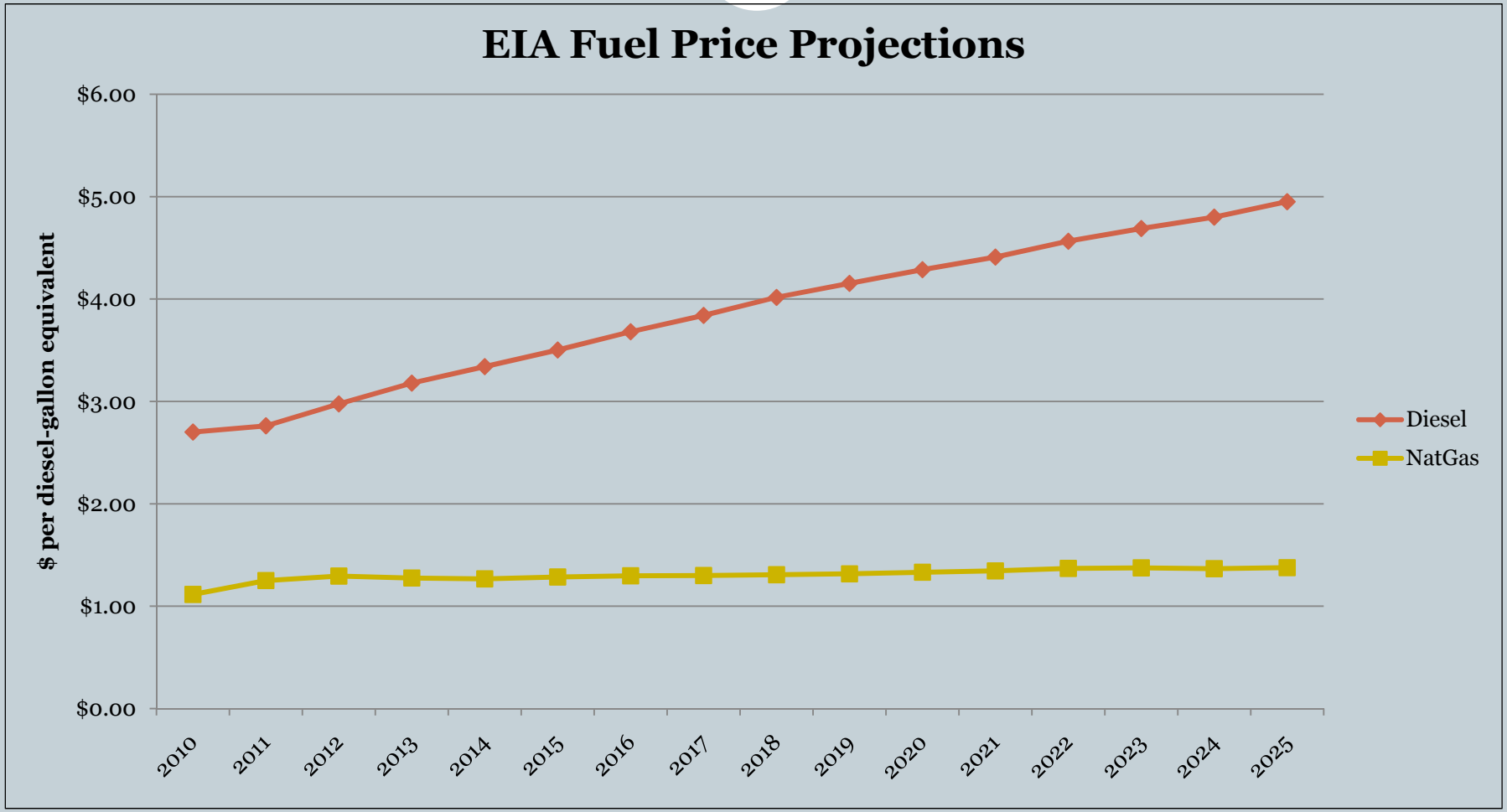
Cost Savings: CNG vs. Diesel

Each new truck is projected to travel approximately 1,136 miles per month

	CNG	Diesel
Miles Per Gallon	2.2 MPG	2.7 MPG
Fuel Needed Per Month	516.4 DGE's	420.7 Gallons
Approximate Fuel Cost	$1.39	$3.39
Monthly Fuel Cost	**$717.80**	**$1,426.17**

- **Monthly fuel savings with CNG - $708.37 Per Truck**
- **Annual fuel savings of $8500.44 Per Truck**
- **Annual fuel savings for a 60 truck fleet: $510,454.40**

Cost Savings: CNG vs. Diesel



Source: Energy Information Administration and NREL

CNG Trucks: Return on Investment

- CNG trucks cost $30,000 more than diesel for the 60 gallon tank and $35,000 for the 75 gallon tank

$35,000 (cost of CNG truck components)
- $17,500 (OK tax credit, 50% of CNG components)
$17,500
÷ $708.37 (monthly savings per truck)
23.9 months to recover cost difference

Return on Investment

$1,250,000 – estimated cost of CNG fueling station

÷ 42,502.20 – monthly fuel savings for 60 trucks

= 29.4 months – Station payback period

+ 23.9 months – Truck component payback period

53.3 months – Total payback period

42.7 months – Time left in contract after payback

x 42,502.20 – Monthly fuel savings for 60 trucks

$ 1,814,843.90 – Fuel savings over contract balance

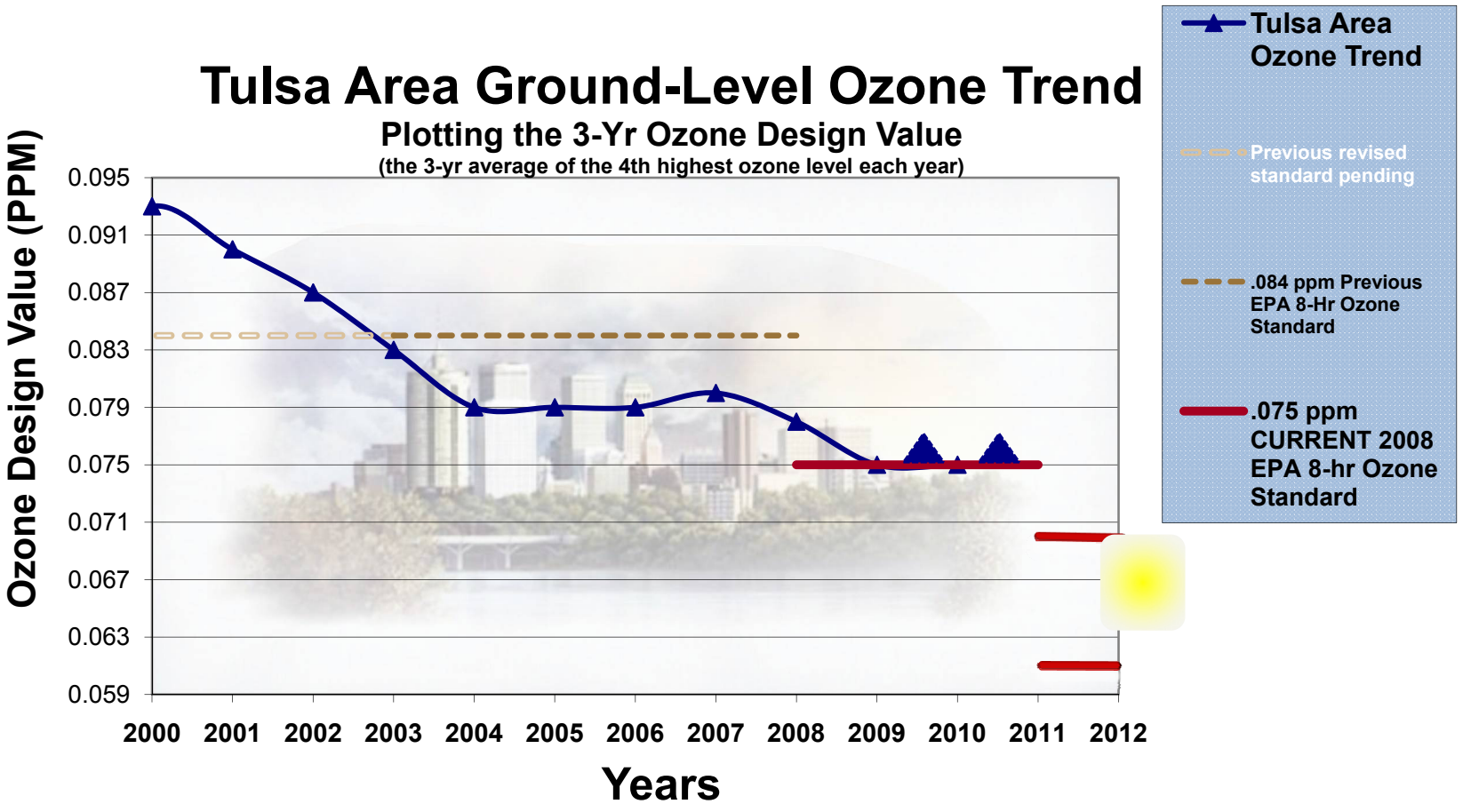
Impact on Ratepayers

- Fuel savings over initial term of contract is $ 1,814,843.90
- With an eight-year contract, 116,500 customers could expect a **$0.16 monthly savings** on their solid waste billing
- Savings on the two, 3-year optional renewals could vary depending on the number of trucks that are replaced and any changes to the incremental cost difference between diesel and CNG

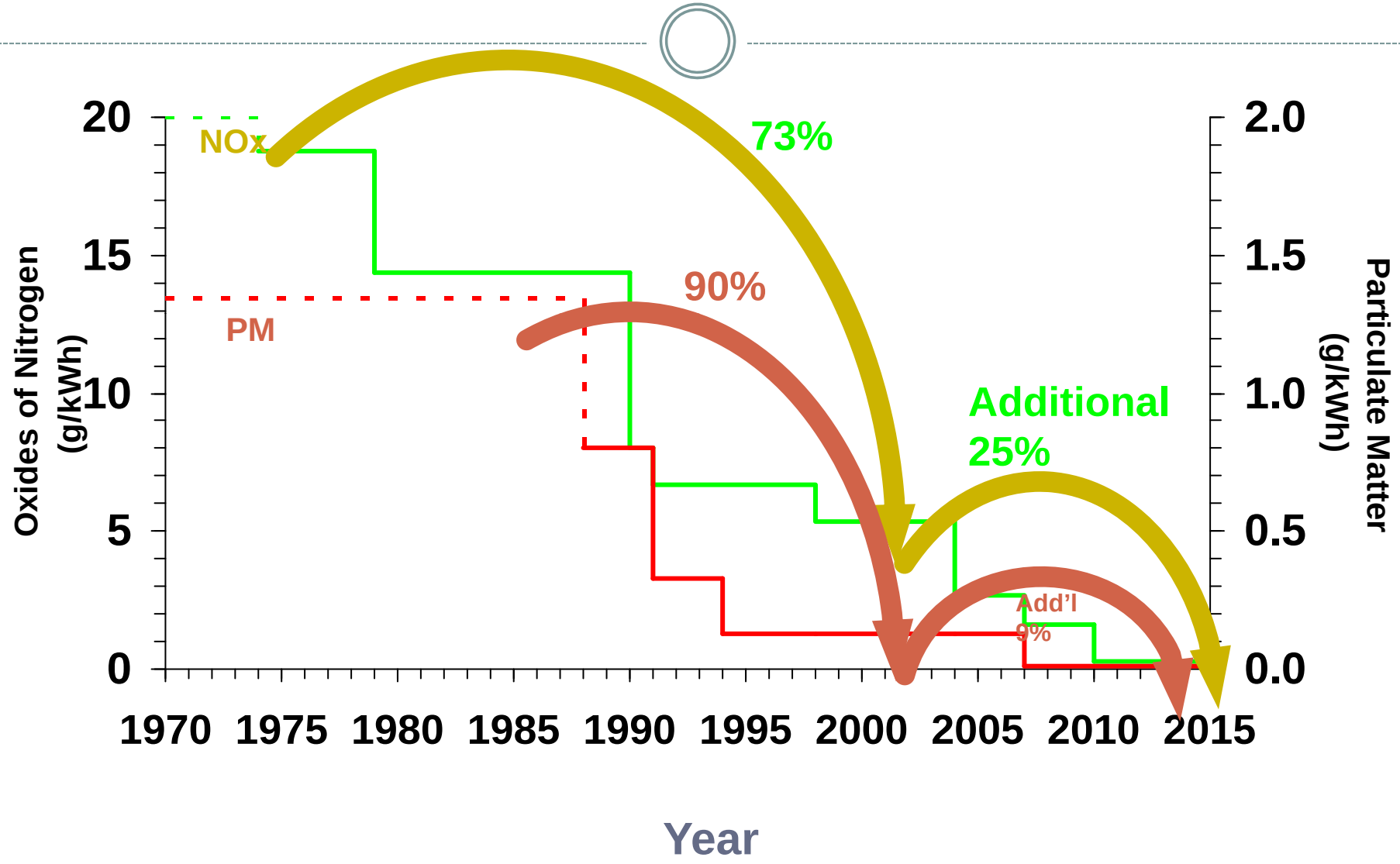
Air Quality

EMISSIONS AND NON-ATTAINMENT

Air Quality


Tulsa Area Ground-Level Ozone Trend
Plotting the 3-Yr Ozone Design Value
(the 3-yr average of the 4th highest ozone level each year)
Ozone Design Value (PPM)
0.095
0.091
0.087
0.083
0.079
0.075
0.071
0.067
0.063
0.059
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Years
Tulsa Area Ozone Trend
Previous revised standard pending
.084 ppm Previous EPA 8-Hr Ozone Standard
.075 ppm CURRENT 2008 EPA 8-hr Ozone Standard

United States On-Highway Emission Standards



Source: Cummins, Inc.

Likely Consequences of Non-Attainment

- Increased energy cost
- Stringent and expensive control equipment for industry
  - includes industries using burners, boilers, heavy engines, as well as paint and solvent users
- Vehicle emissions inspection and maintenance program
- Costly summer gasoline
- Reduced speed limits
- Limits on business expansion and development
  - Result in lost jobs as businesses relocate to areas with cleaner air

Other Benefits of CNG

Other Benefits of CNG

- From well to wheels, CNG benefits Oklahoma's economy

All made in Oklahoma!

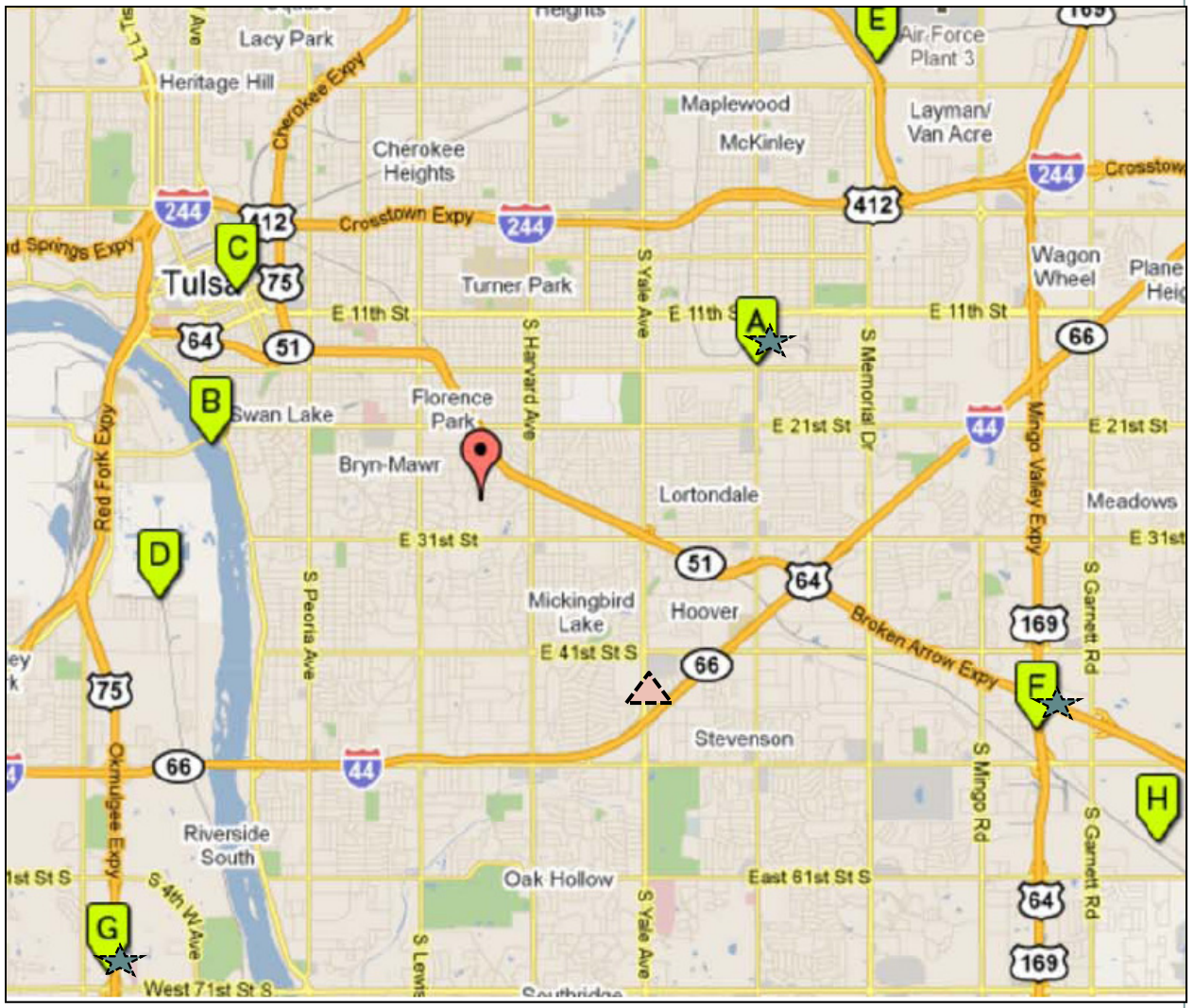
  - Fuel
  - Compressors
  - Controls & Switches
  - Storage and Skid Tanks
  - Heat-Exchangers
  - Engines
  - Refuse Trucks
  - And more

- Noise abatement
- Energy Security

CNG Infrastructure

Current CNG Infrastructure

- Planned Public Station
- Existing Station
- Existing Station with Public Access



Pathways to Infrastructure

- Private Industry Only
  - Sufficient interest from the private sector to meet this need
  - No financial involvement from TARE or the City of Tulsa is required to build CNG infrastructure
- Public-Private Partnership
  - Unique opportunity exists to seed the CNG market by creating a demand for infrastructure and creating a new revenue stream for the City of Tulsa
  - No financial involvement from TARE and little involvement from the City of Tulsa

Public-Private Partnership

- City owned land leased to Private Company
- Private Company designs, builds and maintains the station
- In exchange for a guaranteed quantity of fuel consumption, prices are held steady for a set number of years
- City receives a portion of 3rd party public sales and a guaranteed fuel price in return for a guaranteed capacity and land
- The station creates a new revenue stream that the city uses to replace gasoline vehicles with CNG vehicles
- After a period of time sunset regulations are enacted and the city exits the fueling market with an increased demand for CNG and a private industry presence

Consequences of Nonattainment Designation for the Tulsa Area

BACKGROUND: Tulsa's air quality status and potential may soon violate the federal ozone standard. Many factors including vehicle emissions standards, unseasonably mild weather experienced in the past two summers, and our significant reductions in air emission made by local industries have helped to keep the area in compliance. The Environmental Protection Agency (EPA) evaluates the standards every five years. EPA announced it intends to lower the ozone limit because studies indicate that the U.S. continues to experience significant adverse health impacts from ozone.

In 2008 EPA established the federal ozone standard at 0.075 parts per million (ppm). In January 2010, EPA remanded that ozone limit and announced it would set a new standard between the levels of 0.060 ppm and 0.070 ppm in August, 2010. The EPA decided to delay their announcement of the new standard. It is now expected in the summer of 2011.

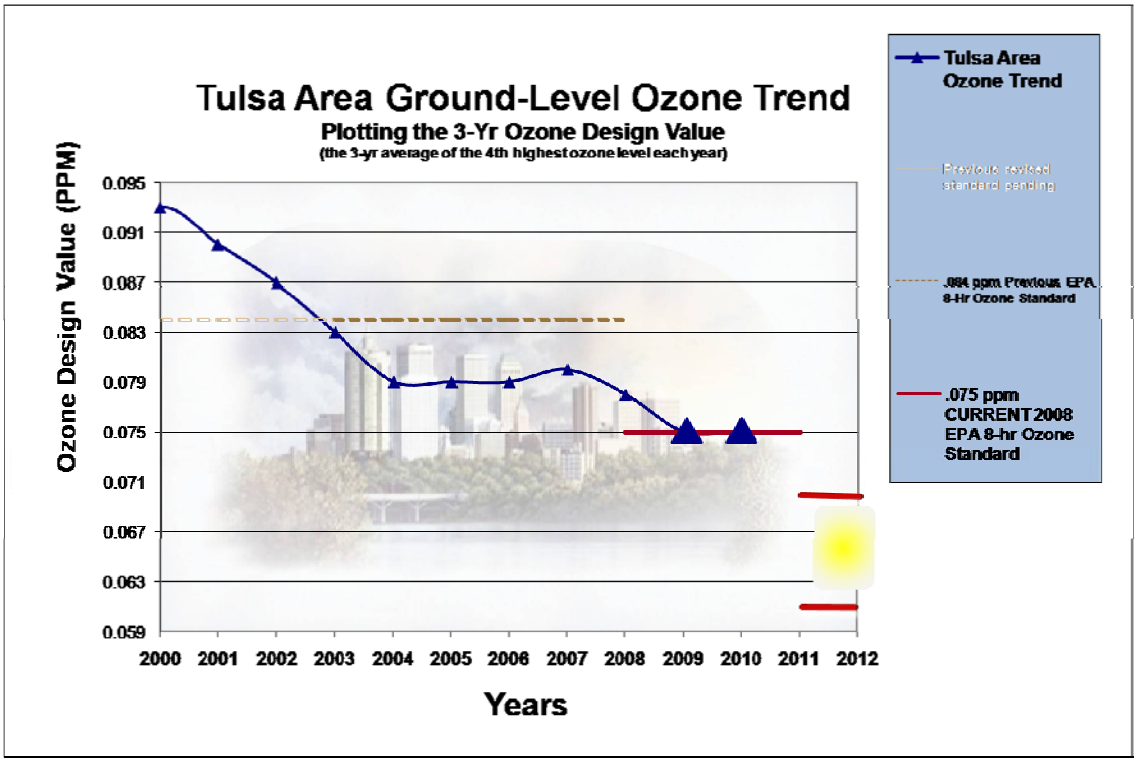
Many questions are being asked regarding the consequences of a nonattainment designation for the Tulsa area. Some of these questions have clear answers. Unfortunately, many do not. This paper will address the questions and issues, providing answers when possible and professional opinion and explanation to the uncertainties.

What is a Nonattainment Area and how much of the Tulsa Metropolitan area could or would be 'in nonattainment'?

A nonattainment area is a federal designation given to an area not meeting one or more National Ambient Air Quality Standards (NAAQS). The designation process provides opportunity for local and state negotiation with the Environmental Protection Agency (EPA) to best determine the appropriate nonattainment boundary. In the boundary determination, EPA considers factors such as locations and concentrations of industrial sources, county population density and traffic and commuting patterns. The Tulsa area boundary could be as small as Tulsa County or as large as our Combined Metropolitan Statistical Area (CMSA) consisting of Tulsa and seven surrounding counties. The Oklahoma Department of Environmental Quality (ODEQ) is the lead agency responsible for negotiations with EPA to determine the boundary. Within 30 days of a violation of the ozone standard, ODEQ will provide the Tulsa area an initial boundary designation recommendation with technical support justification. Upon local concurrence, ODEQ will submit the boundary recommendation through the Governor to EPA for approval.

What is the EPA ozone standard?

The EPA sets the ozone standard to protect the public from ozone exposure over an extended period of time. The standard is calculated by averaging hourly ozone data throughout the highest eight-hour ozone period of the day. These highest daily '8-hr averages' are captured for each monitor. At the season's end, each monitor's fourth highest value is averaged with the 4th highest value for the two previous years. Thus, the standard calculates a 'rolling' 3-year average of 4th highest 8-hour ozone values. Using the most recent EPA ozone standard, a violation of the standard occurs if the 3-year average for any monitor is greater than 0.075 ppm (or 0.076 ppm). The table below reflects Tulsa's current ozone data in relation to meeting the EPA ozone standard at five monitor locations. It also indicates whether or not the most recent data (2011averages) would meet new standards. Using the most recent data, as of April 1, 2011 any new standard will be violated at four locations.



2011 Tulsa Area Ozone Highest 8-Hr Averages*

Last Updated: 05/02/11 9:00 AM Exceedance Days: April 12th; April 13th; April 17th

Monitor Site			2011 Highest 8-Hr Ozone Averages (ppm) (1st through 4th highest readings)				DESIGN VALUE 3-Year Average of the 4th highest readings	
2008 4th High	2009 4th High	2010 4th High	1st Highest date	2nd Highest date	3rd Highest date	4th Highest date	08-10 Avg	CURRENT 2009-2011 3-Yr Avg
West (#144 Mannford)			**0.077** *17-Apr*	**0.076** *13-Apr*	**0.073** *18-Apr*	**0.070** *3-Mar*	*0.070*	**0.071**
0.69	0.074	0.069						
East (#178 Lynn Lane)			**0.077** *13-Apr*	**0.072** *12-Apr*	**0.072** *17-Apr*	**0.071** *3-Mar*	*0.070*	**0.071**
0.069	0.072	0.071						
Central (#1127 Tulsa)			**0.079** *13-Apr*	**0.079** *12-Apr*	**0.078** *17-Apr*	**0.073** *18-Apr*	*0.070*	**0.071**
0.069	0.072	0.070						
North (#137 Skiatook)			**0.076** *13-Apr*	**0.075** *12-Apr*	**0.072** *17-Apr*	**0.070** *3-Mar*	*0.075*	**0.072**
0.079	0.073	**0.073**						
South (#174 Glenpool)			**0.074** *13-Apr*	**0.073** *17-Apr*	**0.072** *3-Mar*	**0.066** *6-Apr*	*0.067*	**0.067**
0.066	0.067	0.069						

An ozone exceedance = .076 ppm or greater

Is our 2009-2011 Design Value meeting the ozone standard? Yes

An ozone Exceedance occurs any day that the 8-hr average is .076 ppm or greater. It does not necessarily mean a violation of the ozone standard has occurred. The standard uses the ozone monitor with the highest 'Design Value'. The Design Value is the monitor with the highest ozone data (4th highest value), averaged over a rolling 3-year average. Thus, our current ozone Design Value is the average of 2009's 4th high value + 2010's + 2011's 4th high (with no rounding).

So what do all the numbers mean?
Based upon 2010 data gathered through October 31st, 2010:
• If EPA maintains the current ozone standard of 0.075ppm, then the Tulsa CMSA is in attainment.
• If EPA lowers the ozone standard to any number between and including 0.070 ppm and 0.060 ppm, then the Tulsa MSA could be designated as nonattainment using the average fourth highest of the current three years (2008, 2009 and 2010). Since we are entering a new ozone season, it is possible that 2011 data would be used instead of 2008, 2009, and 2010. This would require updated calculations.

What are the requirements of an ozone nonattainment area?
The Clean Air Act (CAA) requires that EPA review the national air quality standards at least every five years; and when setting the standard, the CAA restricts EPA from considering economic costs to achieving the standard. When an area is designated not in compliance with the standard (nonattainment), the CAA requires state and local governments to take steps to reduce ozone pollution and regain compliance with the standard. The steps must be detailed in technically supported and legally enforceable plans known as State Implementation Plans (SIPs). A SIP must be submitted and approved by EPA within three years of the date for nonattainment designations as published in the Federal Register. Potential reduction strategies are listed in the next section.

Since the exact consequences cannot be determined, what are the "likely" consequences to a Non-attainment designation for the Tulsa area?
A nonattainment designation for any area not only reflects a health concern, but also brings a business and economic development concern. Attaining the standard will likely require a diversity of emission reduction measures. Although these exact measures cannot be known, a nonattainment designation will result in both direct and indirect costs to both citizens and businesses in the Tulsa CMSA.

Potential direct economic consequences could include:
• More costly summer gasoline specifically designed to reduce ozone-forming emissions.
• More stringent and expensive control equipment for industry. Most affected would include those using burners, boilers and heavy engines as well as painting, coating and solvent users.
• A costly and inconvenient new vehicle emissions inspection and maintenance program.
• Reduced speed limits on highways and expressways in the metropolitan area.
• Increased energy cost. AEP-PSO operates 4 power plants in the Tulsa CMSA. Emission improvement costs to these plants are estimated by AEP-PSO to cost more than 700 million and will likely be passed on to the consumer.
• Existing business expansion could be limited and new business could be denied air emissions permits. This could result in lost jobs as businesses relocate to areas with cleaner air.
• Other actions may be mandated by the state of Oklahoma such as no idling regulations.

Potential indirect consequences could include:
• **Cost of establishing the State Implementation Plan (SIP**) – The SIP is the technical and strategic document outlining emission reduction strategies developed to bring the area back into compliance with the standard. SIPs include the enforceable strategies for implementation and must be approved by EPA no later than three years from nonattainment designation. To develop the SIP, photochemical modeling may be required to support the effectiveness of the emission reduction strategies within the SIP. This type of computer modeling would also likely require significant resources to upgrade local emissions inventories (off and on-road mobile, area source industry, large point source industrial and biogenic) and dedicated ongoing resources to keep the inventories and model current.

Cost of 'Transportation Conformity' – Nonattainment communities are required to conduct extensive analysis and coordinate transportation and air quality issues. Computer modeling is used to ensure transportation projects do not affect the area's ability to regain and/or maintain attainment. Transportation conformity requirements are time consuming, costly and include using a mobile emissions 'budget' from which to determine the impact transportation projects, once implemented, would have on regional air quality. In nonattainment areas, transportation projects can proceed only if it can be demonstrated that they will not result in increased emissions.

What is the actual cost of a nonattainment designation?
The Tulsa Authority of the Recovery of Energy (TARE) asked Clean Cities to develop a rough numbers cost estimate to the community if Tulsa CMSA became an ozone nonattainment area. Clean Cities compiled numbers from cities of various sizes across the United States that were currently in ozone nonattainment, and found that the costs somewhat related to the size of the CMSA. A conservative number for an MSA the size of Tulsa, the estimated cost to local government, local businesses, and citizens would be approximately $16,000,000 per year for ten years. A better cost model has not been found. However, Pima County, Arizona estimates it costs their community $39 million per year.

Why are we unable to determine an actual 'cost of a nonattainment designation' at this time?
Many issues create significant challenges to determining clear and concise economic cost analysis of a nonattainment designation for the Tulsa CMSA. There is a massive disconnect between estimating the cost of various emission control strategies and what the Tulsa area may or may not actually be required to do upon a nonattainment designation. Explanations to some of these challenges include:

- **EPA guidance has not yet been issued.** Although EPA has stated that they plan to legally tighten the ozone standard in July, they have not identified the standard. The EPA has not yet provided the necessary guidance and information explaining the requirements that areas will need to comply with upon a nonattainment designation. This pending implementation guidance will specify criteria for nonattainment, degrees of severity and corresponding industrial emission requirements, whether or not photochemical modeling is required and if so to what degree, and how long areas will have to get back into attainment.
- **The extent of emission reductions necessary is unknown.** Costs of emission reduction strategies for ozone precursors are most often proportional to the amount of ozone reduction required to regain compliance with the standard. Importantly, until an actual nonattainment designation occurs, it will not be known how much ozone an area must reduce to get back into compliance. Unknowns at the federal level (i.e. the actual standard, policy and economic uncertainties, lawsuits regarding the ozone standard) may force EPA to delay designations. Every year designations are delayed provides Tulsa an opportunity to continue ozone improvement to achieve compliance with the standard and an attainment designation.
- **Cost to individual businesses and manufacturing companies are difficult to predict.** Each company that has a point source air permit may be required to add new and costly control technology if a community is designated a nonattainment area. The cost of control technology is unique to each company and individual industrial processes. This is also dependant on the degree of severity of the community's ozone status. Also, new regulations and permit requirements would be imposed on previously unregulated businesses and industries.

We cannot simply look to other areas to identify emission reduction strategies we will need to implement. Many other metropolitan areas, including Oklahoma City, are facing the same challenges we are; however, there are no metro areas to look to as a reference or example.

- The chemical structure of an area's ground-level ozone is complex and will not be the same in any two metropolitan areas. It is possible for a NOx emission reduction strategy to effectively decrease ozone in one metro area, and for that same strategy in another area to result in an ozone increase.
- EPA has made no designations under the current new standard. When designations were made under the previous standard (2004), all 'new' nonattainment areas were either already in nonattainment/ maintenance under the former standard, or were new nonattainment areas in states which already had defined nonattainment boundaries. States with nonattainment areas have existing air shed boundaries, emission inventories, transportation conformity analyses are being performed, etc.
- With all of Oklahoma currently in attainment, our state has not developed a SIP, nor has it been required to by the EPA. Our metro areas are in a unique situation without example to reference or precedence to follow. Oklahoma's two largest metropolitan areas, Oklahoma City and Tulsa have different industries and chemical emission components compared to each other. Therefore, some emission strategies will likely need to be unique to the region.
- Wichita is in a different EPA region with different rules and requirements. Their industries and transportation needs are different compared to the Tulsa CMSA. They are similar to Tulsa in that ozone transport is a significant factor in the ozone measured at downwind monitors. This creates an element of uncertainty relative to the influence of costly emissions reductions.
- Changing technologies (industrial, automobile engines/emission standards, fuel standards/requirements) have eliminated the effectiveness of many previously consistent, quantifiable, and EPA approved emission control strategies. One example is the Stage II Vapor Recovery devices currently found on gasoline pumps in many nonattainment areas throughout the nation. Although many nonattainment areas formerly included this strategy in their SIPs, it is no longer a viable emission reduction strategy for new nonattainment areas. Auto manufactures now install simple onboard vapor recovery systems in all vehicles, making Stage II Vapor Recovery devices obsolete and a strategy no longer considered by EPA.
- Even though the Tulsa area ozone levels have improved, the EPA standard for ozone continues to tighten. As the standard changes, the implementation and industrial requirements will change.

How will we proceed?
Tulsa's ozone levels continue to improve. Although it is still too early to tell, our improvement may or may not be soon enough to avoid a nonattainment designation. The Tulsa area and all of Oklahoma has remained in attainment since 1990. Cleaner air quality and lower costs of living are obvious benefits to many years of having met the challenge and avoiding the significant and long-term economic costs of a nonattainment designation.

We continue to be challenged by air quality in our region but every impact counts. By putting 60 plus CNG refuse trucks on the road, the City of Tulsa will make an impact that will help reduce our chances of nonattainment in a year that could be the most important air quality year of all.

Letters of Intent to Bid

May 3, 2011

Steve Berlin
Chairman, Tulsa Authority for the Recovery of Energy (TARE)
C/O Sherry Cartwright
175 E 2nd Street
Tulsa, Ok 74103

Dear TARE Board Members,

I am writing to express the intent of Blue Energy Fuels/Tulsa Gas Technologies to bid on your forthcoming Request for Bid (RFB) regarding the design, construction and operation of a Compressed Natural Gas (CNG) station(s) to fuel Tulsa's potential new CNG powered refuse fleet. We will be in a position to discuss specifics once the parameters of the RFB are made public, but as you move forward with your investigation of mandating the use of CNG in your refuse fleet you should know that we are indeed interested in bidding on such a project. Blue Energy Fuels currently owns and operates one of the largest CNG Compressors in the State of Oklahoma. It is located in East-central Tulsa and is ready today to fill TARE trucks with cost effective CNG, 24 hours per day, 7 days per week.

As a natural gas compression company and CNG fuel retailer, I want to commend you on your efforts to investigate the many benefits of converting Tulsa's refuse fleet to CNG. As I am sure you will soon find out, CNG will be a benefit to Tulsa, to Oklahoma, and to all parties involved with the upcoming RFB and subsequent contract.

Regards,

Tom Sewell
President
TGT

Regards,

Court Newkirk
General Manager
BEF

OnCue Marketing, L.L.C.

May 20, 2011

Steve Berlin
Chairman, Tulsa Authority for the Recovery of Energy (TARE)
C/O Sherry Cartwright
175 E 2nd Street
Tulsa, Ok 74103

Dear TARE Board Members,

I am writing to express our intent to bid on your forthcoming Request for Bid (RFB) regarding the design, construction and operation of a Compressed Natural Gas (CNG) station(s) to fuel Tulsa's potential new CNG powered refuse fleet. We will be in a position to discuss specifics once the parameters of the RFB are made public, but as you move forward with your investigation of mandating the use of CNG in your refuse fleet you should know that we are indeed interested in bidding on such a project.

Last year our company added nine new CNG public fueling locations and we anticipate adding approximately six more this year. Our primary location consideration is determining where there is sufficient CNG demand. The commitment you are describing is ideal for our business model.

As a natural gas retailer/provider, I want to commend you on your efforts to investigate the many benefits of converting Tulsa's refuse fleet to CNG. As I am sure you will soon find out, CNG will be a benefit to Tulsa, to Oklahoma, and to all parties involved with the upcoming RFB and subsequent contract.

I have also enclosed a brief summary of our company.

Sincerely,

Stephen T. James, CFO

Enclosure

Phone: 405-372-3579 405-372-7665 • Fax: 405-372-3749 • 916 N. Main Stillwater, Oklahoma 74075

Trillium
Making CNG Work for You.

2150 South 1100 East • Suite 450 • Salt Lake City UT 84106
T 800 920 1166 • P 801 521 1166 • F 801 521 7092

May 16, 2011

Steve Berlin
Chairman, Tulsa Authority for the Recovery of Energy (TARE)
C/O Sherry Cartwright
175 E 2nd Street
Tulsa, Ok 74103

Dear TARE Board Members,

I am writing to express Trillium USA's interest in participating in your forthcoming Request for Bid (RFB) process for the design, construction and operation of a Compressed Natural Gas (CNG) station(s) to fuel Tulsa's potential new CNG powered refuse fleet. Trillium USA will look forward to evaluating the specifics of the project once the parameters of the RFB are available, but as you move forward with your investigation of the use of CNG in your refuse fleet you should know that we are indeed interested in bidding on such a project.

As a national natural gas provider, with employees in Tulsa, Trillium USA wants to commend you on your efforts to investigate the many benefits of converting Tulsa's refuse fleet to CNG. As I am sure you will soon find out, CNG will be a benefit to Tulsa, to Oklahoma, and to all parties involved with the upcoming RFB and subsequent contract.

If you have any questions, please feel free to contact me at 801.243.2240 or jdetapia@trilliumusa.com. We look forward to working with you.

Sincerely,

J de Tapia

Jennifer de Tapia
Director of Market Services
Trillium USA

8117 Preston Road, Suite 202
Dallas, Texas 75225 USA
214.572.6584 fax 214.572.6581
Email: rnoll@cleanenergyfuels.com

www.cleanenergyfuels.com

Reagan Noll

Clean Energy
North America's leader in clean transportation

May 20, 2011

Steve Berlin
Chairman, Tulsa Authority for the Recovery of Energy (TARE)
C/O Sherry Cartwright
175 E 2nd Street
Tulsa, Ok 74103

RE: Letter of Intent to Bid – City of Tulsa CNG Refueling Station(s)

Dear TARE Board Members,

The purpose of this letter is to express Clean Energy's (CE) intent to bid on the City of Tulsa's (City) forthcoming Request for Bid (RFB) regarding the design, construction and operation of a Compressed Natural Gas (CNG) station(s). CE will be in a position to discuss specifics once the parameters of the RFB are made public, but as the City moves forward with the evaluation of deploying more CNG powered vehicles please be aware that CE are indeed interested in bidding on such a project.

As a vertically integrated, vehicular natural gas fueling solution provider, CE commends the City's efforts in investigating the many benefits of CNG. As per the current industry trends, CNG will be a benefit to Tulsa, to Oklahoma, and to all parties involved.

If you have any further questions please don't hesitate to contact me.

Regards,

Reagan Noll
Infrastructure Development – South/Midwest

NGVAMERICA

Natural Gas Vehicles for America

Advocating the increasing use of NGVs where they benefit most.
For the economy. For the environment. For health. For security. **For America.**

Natural Gas Trucks

Proven, Reliable Performance
Using Our Abundant, Economical Resource
For a Cleaner, Stronger America

NGVAmerica is a non-profit organization that promotes greater use of natural gas vehicles through outreach, education and technical assistance programs. For more information about this educational supplement or to learn more about how your community can implement an NGV program, contact Stephe Yborra, Director of Marketing & Communications at 301-829-2520 or syborra@ngvamerica.org. NGVAmerica, 400 North Capitol Street., NW - Suite 450, Washington, DC 20001. www.ngvamerica.org

Advance Fuel Systems Corp (AFSC)
11013 Woodstock Street
Huntley, IL 60142
David G. Chacon, President & CEO
866-725-0801 x704
david_chacon@advancefuelsystems.com
www.advancefuelsystems.com

AFSC designs, manufactures and installs CNG fueling systems using the highest quality products and providing superior customer service. We work with clients to determine their fuel system requirements and budget and then provide safe, reliable cost-effective solutions that meet their needs.

Air & Gas Technologies (AGT), Inc.
42 Industrial Drive
Cliffwood Beach, NJ 07735
Brian Keelen, Vice President, 732 566 7227
bkeelen@airgastech.com
Graham Barker – Sales 203 374 1795
grahambarker@earthlink.net
www.airgastech.com

AGT designs, builds and maintains CNG stations. We have the in-house capability and experience to customize facilities to suit specific customer and site requirements, and we utilize the most appropriate equipment to meet project scope and cost.

Applied LNG Technologies USA, LLC
5310 Harvest Hill Road – Ste 229
Dallas, TX 75230
Kevin Markey, VP Operations
214-634-6246
kmarkey@altlng.com
www.altlng.com

ALT provides LNG and CNG product and delivery systems. We execute turnkey fuel solutions, including equipment leasing, station installations, safety & training, natural gas production low BTU gas processing, temporary fueling stations, and consulting in the LNG and CNG markets.

ANGI Energy Systems
15 Plumb Street
Milton, WI 53563
Dan Hicks, Sales, 608-868-4626 x237
dhicks@angienergy.com
www.angienergy.com

As a pioneer in the NGV industry and a continuing force in the establishment of CNG refueling technologies, ANGI has built a reputation on delivering solutions that successfully satisfy customer's specific refueling requirements and expectations, independent of size and scope of application.

AVSG LP
C6 Shipway Place
Boston, MA 02129
Michael Manning, Dir. of Marketing and Business Dev.
617-242-8755, ext 14
mm@avsglp.com
www.avsglp.com

AVSG LP assists fleet customers implement successful natural gas vehicle (NGV) programs by providing compressed natural gas (CNG) fleet opportunity assessment, vehicle specification and purchasing consultation, grant writing, and turnkey CNG station solutions from design through commissioning and O&M services. AVSG is based in Boston, MA and serves the six-state New England region.

Natural Gas Refuse Trucks

The Right Choice Right Now.

Economics, Environment and Performance Drive Preference For Natural Gas

Natural gas-powered refuse and recycling trucks are on the job every day in more than 100 communities all across North America with nearly 3500 in service as of January 2009 and over a thousand more expected to hit the streets in the coming year. The waste industry is just one of several sectors that are embracing natural gas as a motor fuel. Port authorities, food and beverage companies, and telecommunications and other commercial service businesses are joining more established natural gas vehicle (NGV) market leaders such as utilities, airports and transit agencies.

The trend toward natural gas is building momentum says Rich Kolodziej, president of NGVAmerica, a non-profit association that advocates greater NGV use. Industry data shows that vehicular natural gas use nearly doubled between 2003 and 2009, now displacing more than 300 million diesel-gallon equivalents (DGE), which reduces our dependence on foreign oil. Waste collection and transfer vehicles that run on compressed natural gas (CNG) or liquefied natural gas (LNG) now account for about 10 percent of total vehicular natural gas use and that number is expected to grow significantly in the next several years, says Kolodziej. "Growth of natural gas use is accelerating each year, especially in refuse and other heavy-duty work truck applications," he says.

"Policy makers and businesses that compare the great attributes of natural gas to gasoline, diesel and other options are finding that natural gas is the better choice by far," he says. He cites the thousands of tons of oxides of nitrogen (NOx) and particulate matter (PM) that would have been emitted

Waste haulers have a variety of OEM truck options. Left: Rainbow Disposal CNG-powered Crane Carrier LET with roof-mounted fuel cylinders in service at Huntington State Beach, CA. Top: LNG-powered Peterbilt LCF at Fresno, CA fueling facility. Above: Kenworth's LNG-powered T800 is well-suited to waste transfer applications.

by gasoline and diesel engines that are now eliminated by using clean burning natural gas – improving air quality. Millions of dollars that would have been spent on imported oil are now saved thanks to abundant, domestic affordable natural gas – reducing operating costs for fleet operators and their customers and strengthening America's economy.

These compelling advantages are driving municipal waste haulers' and private contractors' decisions to transition to natural gas. "Natural gas garbage and recycling trucks have established a solid track record of clean, reliable, cost-efficient service. They've proven their worth in major metro markets and dozens of small communities and secured a foothold in the refuse market that will only get bigger with time," says Kolodziej.

Diesel Truck Ownership Costs Continue to Climb

Kolodziej acknowledges that many waste fleet operators have opted to stick with what's familiar and go the so-called 'clean diesel' route based on the assumption it would be easier. "Now that operators have had a few years of in-the-field experience with *'clean diesel,'* they realize it's more complicated and expensive than originally promised and are re-evaluating their vehicle and fuel choices."

"Heavy-duty clean diesel fleet operators have had to grapple with complex emissions reduction strategies, decreases in performance and fuel economy and increased maintenance costs – all of which drive up purchase and operating costs," says Doug Horne, President of the Clean Vehicle Education Foundation (CVEF), an Acworth, GA-based non-profit organization that provides educational, analytical and technical services concerning clean transportation fuels and technologies.

"Diesel engine performance and fuel efficiency took a hit in late 2002 with the first phase of the EPA emissions regulations, then again in 2007 when the next phase took effect," says Horne. To meet EPA emission requirements thus far, diesel engine manufacturers have utilized exhaust gas recirculation (EGR) and modified fuel injection and timing strategies to reduce NOx. They've also had to incorporate expensive and maintenance-intensive particular trap-filters, exhaust stream monitoring systems and supplemental oxidation systems to meet PM limits.

"Diesel engine manufacturers have had

continued on page S-4

BAF Technologies
2415 Beatrice
Dallas, TX 75208
Bill Calvert, Vice President - Sales
214-231-1450
bcalvert@baftechnologies.com
www.baftechnologies.com

BAF Technologies is the leading natural gas and propane vehicle upfitter in the United States, offering systems for light-, medium- and heavy-duty vehicles. BAF's proprietary Cal-Comp gaseous fuel system meets the strictest EPA and CARB emissions standards.

Baker Equipment
1310 Roseneath Road
Richmond, VA 23230
Skip Baker, President
804-864-6800 x6815
sbaker@bakerequipment.com
www.bakerequipment.com

Baker Equipment utilizes trained and certified technicians to convert OEM gasoline engines to run on CNG utilizing BAF Technologies' Calcomp engine systems and Baytech Corp's CNG fuel injection systems, which are certified to meet the stringent EPA and CARB requirements. Baker sells, installs, and services these engine systems throughout the Eastern United States.

Baytech Corporation
P.O. Box 1148
Los Altos, CA 94022
Richard Turner, Vice President
650-949-1976
rpturner@baytechcorp.com
www.baytechcorp.com

Baytech engineers, manufactures and markets EPA and CARB-certified CNG and propane fueling systems for select General Motors, Isuzu, and Workhorse vehicles and engines. Baytech's gaseous Sequential Multi-Port Fuel Injection systems meet stringent emissions standards with high performance and reliability, and are fully compatible with onboard engine diagnostics.

Clean Energy
3020 Old Ranch Parkway – Ste 200
Seal Beach, CA 90740
Ray Burke, VP Business Development – Refuse
562-493-2804
rburke@cleanenergyfuels.com
www.cleanenergyfuels.com

Clean Energy is the leading provider of natural gas for transportation in the United States and Canada, enabling low-cost, state-of-the-art, environmentally friendly fleet operations for the transit, refuse, airport, taxi, trucking, port and other key markets.

Cummins Westport, Inc.
101 - 1750 W. 75th Ave.
Vancouver, BC Canada V6P 6G2
Jeff Campbell, Director of Product Marketing
604-718-8100
jcampbell@cumminswestport.com
www.cumminswestport.com

Cummins Westport Inc. (CWI) is a joint venture between engine manufacturer Cummins Inc. and alternative fuels engine technology company Westport Innovations Inc. CWI sells the world's widest range of low-emissions alternative fuel engines for commercial transportation applications such as truck and bus.

Emission Solutions, Inc. (ESI)
2001 Central Circle, Suite 106
McKinney, TX 75069
Jim Cole, Vice President - Sales
972-369-0099
jimcole@emissionsolutionsinc.com
www.emissionsolutionsinc.com

ESI manufacturers medium-to-heavy duty diesel engines to operate on natural gas. Our 2010-compliant EPA-/CARB-certified engines come with a standard OEM warranty and deliver power, performance and reliability comparable to diesel at far lower operating cost. ESI engines help you achieve your air quality goals while saving you money.

enviroMECH Industries (EMI)
17011 Beach Boulevard - Ste 900
Huntington Beach, CA 92647
Joe Pike, CEO
250-765-1777
jpike@emifuel.com
www.emifuel.com

EMI is an alternative fuel system engineering and manufacturing company with extensive experience with CNG, LNG, hydrogen and other industrial gases, providing vehicle manufacturers, fleet operators and dealers turnkey service from specification and design, through manufacturing, installation, training, and service.

Exterran Company
20602 E. 81st St.
Broken Arrow, OK 74014
Tim Boyle, Alt. Fuels Business Development
216-832-7645
tim.boyle@exterran.com
www.exterran.com

Exterran provides CNG & LNG Fueling Systems and System Components for nearly every CNG application. From design through installation, Exterran utilizes its extensive industry experience and capabilities to provide solutions to meet your specific CNG/LNG fueling need.

FAB Industries / AFV Fleet Service
14642 Rancho Vista Drive
Fontana, CA 92335
Paul Mader
909-350-7500
pmader@fabind.com
www.fabind.com

FAB Industries specializes in alternative fuel packaging, applications, infrastructure and support. We provide a full spectrum of services from prototype to full production and offer a broad range of maintenance, service and support to OEM's and fleet operators.

FirmGreen, Inc.
2901 West Coast Hwy., Suite 200
Newport Beach, CA 92663
Tony Wong, Business Development Director
t.wong@firmgreen.com
www.firmgreen.com

FirmGreen® uses its award-winning, patented CO2 Wash® technology to convert landfill gas to renewable CNG. The company provides fleet services to help communities make the transition to green CNG (gCNG™) — FirmGreen's brand name for compressed natural gas (CNG) fuel from renewable sources.

Summary of Federal NGV Tax Incentives

In 2005, Congress passed – and the president signed into law – new energy and transportation bills that created/revised income tax credits for investment in natural gas vehicles and fueling infrastructure. The transportation bill also included a federal motor fuels excise tax credit for vehicular natural gas fuel sales/use. Additional bills passed in 2008 amended these tax credit provisions, increasing some credits and extending others. As of the writing of this special educational supplement (May 2009), new bills under consideration by Congress and supported by the Obama administration further improve and expand these tax credits and extend them significantly.

In addition, a number of federal agencies have established grant programs that promote greater use of natural gas-powered and other alternative fuel vehicles and petroleum displacement and emissions reduction technologies. When investigating potential NGV deployment and fuel station development plans, be sure to reference NGVAmerica (http://www.ngvamerica.org) for the latest information about available federal tax incentives and grants. In addition, many states have enacted – or are considering enactment of – state tax credits, grants and other incentives that foster accelerated use of NGVs. The U.S. Department of Energy's Clean Cities Alternative Fuel and Advanced Vehicles Data Center (AFDC) maintains a web page that tracks these incentives (http://www.afdc.energy.gov/afdc/incentives_laws.html).

Vehicle Tax Credits (effective January 1, 2006)

- Income tax credit goes to buyer: equal to 50-80% of incremental cost of new, dedicated NGV and/or the cost to upfit an existing vehicle for dedicated operation on natural gas.
- Credit is based on emissions level and Gross Vehicle Weight Rating (GVWR).
- If buyer is tax exempt, seller may take credit (discount to tax exempt is negotiable issue).

Light-duty vehicle (up to 8,500 lbs GVWR):
Credit range: $2,500-4,000

Medium-duty vehicle (8,501-14,000 lbs GVWR)
Credit range: $5,000-8,000

Medium-Heavy-duty vehicle (14,001-26,000 lbs GVWR)
Credit range: $12,500-20,000

Heavy-duty vehicle (over 26,000 lbs GVWR)
Credit range: $20,000-32,000

Fuel Use Credit (effective October 1, 2006)

- A motor fuel excise tax credit of 50 cents per gallon of liquefied natural gas (LNG) or gasoline-gallon-equivalent of compressed natural gas (CNG)
- Credit is payable to seller. If customer is "seller/user" of gas, tax credit goes to customer
- Credit is paid *regardless of whether user pays excise tax.* (i.e., tax exempt organizations qualify for credit)
- New laws increase CNG and LNG excise tax (for taxable sales) to same as gasoline and diesel, respectively

Fueling Station Credit (effective January 1, 2006)

- Income tax credit goes to buyer: equal to 50% of refueling equipment up to $50,000 per location
- If buyer is tax exempt, seller may take credit (discount to tax exempt is negotiable issue)
- Up to $2,000 tax credit for home NGV fueling appliance

continued from page S-3

to dig down deep in their technology bag of tricks to meet these emission requirements – and they've done it – but at a cost," says Horne. He cites widely-reported problems with decreased torque at lower RPMs and lower fuel economy. There are also heat gain, pressure sensor and maintenance issues associated with particulate traps and oxidation systems. "The real challenge for the diesel engine industry is coming in 2010," he adds. That's when NOx emission requirements will drop to 0.2 grams per brake-horsepower-hour (g/bhp-hr).

Most diesel engine manufacturers have announced they plan to use selective catalytic reduction (SCR), which injects "diesel emission fluid" (a euphemism for a solution of urea and ionized water) into the exhaust stream. This requires onboard storage and monitoring systems and development of a urea distribution infrastructure along with the codes and standards for proper storage and handling. While some diesel engine companies are doing their best to put a positive spin on their ability to achieve the lower emissions goals without penalty, Horne and many other experts agree that these additional emissions reduction and monitoring technologies will push up diesel fleet purchase and operating costs even further.

Natural Gas Engines: Lower Emissions and Superior Performance

Meanwhile, advances in natural gas engines over the last several years have *improved* performance while *exceeding* EPA emissions requirements ahead of schedule. Since 2007, Cummins Westport Inc. (CWI), supplier to leading refuse truck OEMs Autocar, Peterbilt, ALF-Condor, Crane Carrier and Mack, has offered a 2010-compliant spark-ignited natural gas 8.9L ISL-G engine. Available in configurations ranging from 250HP/730ft-lb torque to 320HP/1000 ft-lb. torque, CWI's ISL-G uses cooled EGR, stoichiometric combustion and

continued on page S-6

Fuel Solutions, Inc.
12340 Santa Monica Boulevard - Ste 133
Los Angeles, CA 90025
Reb Guthrie, Principal
310-207-8548
rebg@fuelsolutionsinc.com
www.fuelsolutionsinc.com

Fuel Solutions provides comprehensive and objective design consulting services to fleet owners considering implementing or expanding CNG or LNG fueling infrastructure, including needs analysis, design-build specifications, engineered construction drawings, RFP development. Also consulting for garage modifications and petroleum fueling.

Gas Equipment Systems, Inc.
8753 Lion Street
Rancho Cucamonga, CA 91730
Larry Ozier, President
909-466-6920
cngfuelsystems@earthlink.net
www.cngfuelsystems.com

GESI designs, supplies, manufactures, constructs and maintains CNG fueling station infrastructure, nationwide. Compressors, dispensers, controls and related components. North America's compressor skid packager for Gardner Denver, Co/CompAir.; distributors for Ingersoll-Rand CNG, and FuelMaker. GESI has constructed 100+ CNG fueling stations over the past ten years.

GreenField Compression
909 N. Bowser Road
Richardson, TX 75081
Jared Hightower, Sales Manager
972-889-2400 x129
jared.hightower@us.atlascopco.com
www.atlascopco.com

GreenField Compression, Part of the Atlas Copco Group, is your SINGLE SOURCE for natural gas and hydrogen fueling station equipment and support. Since 1914, GreenField has engineered and manufactured the most reliable and technologically advanced equipment available for gaseous vehicle fueling applications.

IMPCO Technologies, Inc
3030 South Susan Street
Santa Ana, CA 92704
Tim Standke, Director – Automotive Operations
714-656-1250
sales@impcotechnologies.com
www.impcotechnologies.com

IMPCO Technologies, Inc., a global leader in the alternative fuel industry since 1958, introduces Sequent; an injected bi-fuel alternative fuel technology. IMPCO offers the ideal solution to encourage infrastructure, combat global warming and create energy security, now.

IMW Industries Ltd
CNG Fueling Systems
43676 Progress Way
Chilliwack, BC, Canada V2R 0C3
Roger Conyers, Director of Sales & Marketing
801-773-2575
rconyers@imw.ca
www.imw.ca

IMW manufactures and packages state-of-the-art non-lubricated natural gas and hydrogen refueling stations worldwide.

Municipal Policies That Spur Use of Natural Gas Refuse Trucks Can Be a "Win-Win" For All

Local governments that use contract haulers to collect trash may find them unfamiliar with natural gas trucks and therefore reluctant to switch or transition their fleets. The Town of Smithtown, NY initiated an innovative program that overcame this challenge, simultaneously accelerating use of natural gas trucks in their community and the surrounding area while keeping contractors' operating costs down and avoiding increased tax burdens on constituents. The 56-square mile municipality located 50 miles from New York City issues multi-year contracts with competing private carters to collect trash and recycling from the Town's 36,000 residential households. Environmental stewards, officials of this coastal community nestled on the Long Island Sound had already purchased several light-duty CNG vehicles. In 2006, as they prepared to negotiate a new waste hauling contract, they chose to expand their alternative fuel efforts and focus on reducing diesel emissions. At that time, their contractors' diesel refuse trucks averaged 15 years old, making them far more polluting than currently available technology. Furthermore, diesel prices had escalated so much more than contractors had planned for during the previous six year fixed-price contract period, that town representatives braced themselves for big increases in the new bids. After investigating other successful natural gas trash truck programs, the Town's Director of Environment and Waterways, Russ Barnett, suggested that town leaders require CNG trash trucks in their next contract RFP. This would require that contractors purchase new trucks – a move that was sure to encounter resistance – and establishing a convenient fueling location. Working with National Grid – his local gas utility, and Clean Energy – an independent natural gas fuel retailer, the Town negotiated an agreement in which it would adopt the CNG requirement and Clean Energy would invest in upgrading an existing nearby CNG fueling station, setting a pre-determined pricing plan for the 7-year duration of the contract. Clean Energy also worked with local refuse truck dealers to provide financing. The result was both surprising and gratifying. The Town received more bids than ever before, all of them competitive. Leveling the playing field by requiring all interested bidders to purchase clean new trucks, and eliminating unpredictable fuel price fluctuations, was the key. The increased cost for new trucks was more than offset by the lower CNG cost. The Town awarded the bids, truck dealers placed their orders, Clean Energy and National Grid completed the station upgrade and 23 new CNG trucks started providing refuse and recycling services January 1, 2007. The program, which earned Smithtown national recognition, has been adopted elsewhere. Several neighboring jurisdictions have purchased their own CNG trash trucks and/or initiated similar contract policies now that local area waste haulers have CNG trucks available for additional service.

This Crane Carrier truck is one of 23 CNG powered trucks purchased by contract haulers in response to the Town of Smithtown's (NY) natural gas truck requirement.

continued from page S-5

a familiar and maintenance-free three-way catalytic converter. Current operators report that these units deliver better performance and they like the quieter operation.

Emission Solutions Inc. (ESI) offers two versions of its EPA- and CARB-certified Phoenix NG 7.6L spark-ignited natural gas engine. The first version, introduced in 2007 for repowering 12-valve DT 466™-powered trucks, delivers 265Hp/800ft-lb torque – including better low-end torque than the diesel units they replaced. The other, rated at 300HP/900ft-lb torque, is for trucks equipped with the 24-valve MaxxForce DT™ iteration of the same block. Both of ESI's stoichiometric engines achieve 2010 emissions compliance without EGR.

For medium- and medium-heavy-duty refuse and other work truck applications, Baytech Corporation holds EPA and CARB certificates for natural gas retrofits of the spark-ignited GM 8.1L engine used in TopKick and Kodiak trucks. Hundreds of these units are in refuse and debris hauling service in public works departments across the U.S.

For heavier applications like waste transfer trucks, Westport Innovations Inc. offers the 15L GX, featuring a High-Pressure Direct Injection (HPDI) fuel system that utilizes 5 percent diesel fuel as the pilot ignition source and running primarily (95 percent) on liquefied natural gas. Based on the Cummins ISX block, Westport's LNG engine is available from Kenworth and Peterbilt in 400HP and 450HP configurations up to 1750ft-lb torque.

Sensing the momentum toward greater specification of natural gas engines, these manufacturers – and others who've indicated plans to enter the North American market soon – are investing in additional engine development and certifications to expand natural gas options for the refuse sector.

While emissions regulations thus far have focused on particulate matter (PM) and oxides of nitrogen (NOx), there is increased attention to – and potential regulation of – greenhouse gases (GHG). CVEF's Horne points out NGVs emit far less GHG than petroleum fueled vehicles – almost 25 percent less than diesel and nearly 30 percent less than gasoline. While the implementation of federal GHG regulations is still somewhat uncertain, it appears that both mandates and market-based mechanisms including incentives will be enacted. Several states, most notably California, have already taken proactive steps to curb greenhouse gases, establishing low-carbon fuel standards and requirements that will put a cost premium on carbon-intense fuels like diesel. "Lower

continued on page S-8

Kraus Global, Inc
25 Paquin Rd.
Winnipeg, Manitoba Canada R2J 3V9
Dev Patel, Account & Business Development Manager
204-663-3601 / 512-663-7292 cell
dpatel@krausglobal.com
www.krausglobal.com

Kraus Global Inc. is a world leader in the alternative fuels transportation industry, designing and manufacturing refueling station equipment for CNG, LNG, LPG, and compressed hydrogen fuels. We have over 4,000 dispensers in operation around the world with major installations in North & South America, Asia, and Europe.

Lincoln Composites, Inc.
5117 NW 40th Street
Lincoln, NE 68524
Brock Peterson, Business Development Manager
402-470-5000
bpeterson@lincolncomposites.com
www.lincolncomposites.com

Lincoln Composites, a Hexagon Company, designs and manufactures all-composite NGV/hydrogen fuel tanks and modular fuel storage systems for auto, bus and truck applications. Tuffshell™ fuel tanks meet all industry standards, and are robust, lightweight, and competitively priced.

Luxfer Gas Cylinders
3016 Kansas Avenue
Riverside, CA 92507
Dave Myers, Sales Manager - Alt Fuel Products
800-764-0366
dave.myers@luxfer.net
www.luxfercylinders.com

Luxfer Gas Cylinders, the world's largest manufacturer of composite cylinders, offers Type 2 hoop-wrap and Type 3 full-wrap carbon-composite AFV cylinders manufactured in its new, dedicated, state-of-the-art AF facility in Riverside, California.

continued from page S-7

greenhouse gases is one more natural gas advantage over diesel, gasoline as well as most alternative fuels," says Horne.

Driven by ever-increasing energy costs and recognition that current energy use and environmental impacts are unsustainable, natural gas vehicle industry stakeholders are coordinating closely with government, academic institutions and the OEM community to research and develop the next generation of natural gas-based fuels, engines and power-train systems.

Field tests have been conducted with hydrogen-CNG (HCNG) blends to lower emissions even further and to gain experience in what many predict will be a hydrogen-based transportation future. Natural gas, which is mostly methane – a single-carbon four-hydrogen molecule, will play a pivotal role in that future – although it is still unclear how long before that marketplace will materialize, says Horne.

In addition, initial research is underway to develop hybrid natural gas-electric drive systems for heavy-duty platforms and prototypes of hybrid natural gas engine-hydraulic drive systems are also in field test. "Conceptually, hybrid-drive systems – regardless of the primary power plant's fuel type – show long-term promise in some applications," says Horne. "But hybrid technology has a long way to go before it is cost-effective. There are still a number of significant remaining hurdles to overcome."

Independent studies show that fuel efficiency and increased MPG rating gains are less than originally projected and, with energy storage costs remaining high and diesel costs soaring, paybacks and life-cycle savings are not materializing as hoped.

"Natural gas has – and always will – play a leading role in environmental stewardship and advanced transportation solutions," says Horne. RDD&D into HCNG blends, natural gas hybrid-electric and hybrid-hydraulic drive systems and fuel cells are just a continuation of that long tradition, he says, adding that the research provides manufacturers insight into how to optimize the integration of these power-train systems with natural gas engine technology.

Smaller fleets or those just starting to use natural gas trucks may find that existing infrastructure, like this public-access CNG station in Asheville NC, meets their needs. As the fleet grows and additional fueling is needed, it may be best to develop on-site natural gas fueling capability, either independently or in partnership with a fuel retailer.

Widening Fuel Price Gap Improves NGVs' Economic Advantages

Many municipally-run and contracted waste operations initially opted for natural gas for environmental reasons. Although environmental policies are still important determinants, economics have become the main driver today, says Stephe Yborra, a market analysis and education director for both CVEF and NGVAmerica. "Refuse trucks'

tough duty-cycles, low MPG ratings and high engine hours translate into seven to ten thousand gallons of fuel use per year. This makes them excellent prospects for running on natural gas." says Yborra. "Vehicle premiums are quickly paid back and life-cycle savings can reach six figures."

According to industry data, factory-built natural gas-powered refuse trucks from the major OEMs fetched an incremental cost of $45,000 to $55,000 in early 2009, a price premium that has dropped steadily as the market has grown and orders have increased. "Natural gas costs 30 to 50 percent less than diesel on a DGE basis. When you factor in the fuel cost differential and high fuel use, the economics speak loud and clear." He notes that federal tax credits for vehicles, station investment and vehicular natural gas fuel use further improve these economics as do grants and state incentives (see story on page S-4).

Based on government and independent gas and oil industry projections, the gap between petroleum-based fuels and natural gas is likely to grow. Yborra points to forecasts issued by the U.S. DOE's Energy Information Agency (EIA), the American Gas Association (AGA), academic institutions and independent oil and gas industry analysts. "They don't all agree on specific numbers, but the general consensus is that petroleum-based fuels will rise at a significantly faster

continued on page S-10

NexGen Fueling
NexGen Fueling
407 7th Street N.W.
New Prague, MN 56071
James Turvey, Business Development
512-868-0467
James.turvey@chart-ind.com
www.nexgenfueling.com

NexGen Fueling provides all the equipment needed for LNG Fuel Stations and Vehicle Fueling. From the distribution to the on-board fueling system, we have the innovation, performance, and experience to make your system integrate seamlessly. When you choose Chart's NexGen Fueling, you get single-source accountability for your entire LNG system. NexGen Fueling is a group of Chart Inc.

Phoenix Energy Corporation
100, 25th Street South
Birmingham AL 35233
Steve Bouchillon, Executive Director
205-337-5802
sbouchillon@phoenixenergycorp.net
www.phoenixenergycorp.net

Phoenix Energy specializes in complete CNG fueling station design, installation and maintenance. CNG conversions from all the top EPA-certified kit manufacturers are installed at our facility in Birmingham AL. We strive to insure Quality without Question.

Pinnacle CNG
300 N. Marienfeld/P.O. Box 2499
Midland, TX 79702
Drew Diggins, Operations Manager
432-686-7002
sales@pinnaclecng.com
www.pinnaclecng.com

Pinnacle provides innovative, cost-effective CNG solutions for transit, refuse, airport and delivery fleet operators. Since 1991, we've built a reputation for service, dependability and advanced technology in the manufacture, sales and operation of automatic, unmanned CNG fueling stations.

Raymundo Engineering Co., Inc
488 North Wiget Lane
Walnut Creek, CA 94598
Bill Raymundo, President
925-988-0172
info@raymundo.com
www.raymundo.com

RECI is an independent company specializing in the planning, design, equipment specification, facility construction observation, and facility testing for CNG fueling facilities and maintenance building modifications to accommodate CNG vehicles.

Saybr Contractors Inc
3852 S 66th St.
Tacoma, WA 98409
Mike Muller – Sales Manager
253-531-2144
mmuller@saybr.com
www.saybr.com

Saybr is a general contractor with extensive involvement, experience and expertise in constructing CNG stations and other alternative fuel projects.

continued from page S-9

pace than natural gas," says Yborra.

For many years, the ratio of the price of a barrel of oil as compared to a thousand cubic feet (Mcf) of gas remained steady at about 6-to-1. While not equivalent energy values, the ratio serves as a relative value measure of the two energy resources. He notes that this ratio began to change fairly significantly several years ago climbing to nearly 10-to-1 – the new 'norm.' In late spring-early summer 2008 when oil prices skyrocketed to more than $145, the ratio jumped dramatically to 15-to-1.

"The spike in world oil prices and its impact at diesel and gasoline pumps in spring 2008 was an unpleasant wake-up call," says Yborra. "Most fleet operators were caught flat-footed without options and had to scramble to cut budgets elsewhere in order to absorb as much of the increase as possible. They all suffered sticker shock." While fuel switching in the industrial and power generation sectors and speculation in the markets caused some natural gas fleets to experience a temporary spike in their own fuel costs as oil climbed, the impact was less dramatic, says Yborra. "A lot of fleets use longer-term natural gas contracts that shield them from short-term variances," he says.

In the late summer-fall of 2008 when oil prices began their steep drop due to the slumping world economy, the ratio dropped to 8-to-1 for a short period but gradually crept back up to about 12-to-1 by early-spring 2009. The market's recent responses to even mildly favorable economic news have again pushed up oil prices, further widening the diesel-natural gas price gap, suggesting that economic recovery will likely be accompanied by higher petroleum fuel prices and a growing advantage for NGVs.

Yborra and other NGV industry stakeholders report a tremendous uptick in calls from refuse fleet operators taking the initiative to explore options like natural gas – before diesel prices inevitably hit the roof again. "The refuse market is a competitive business. Fleet managers that become complacent with temporary lulls in prices and get caught flat-footed a second time won't have to worry about it – that will be the job of the person who replaces them."

America's Abundant Supply: New Additions From Shale. Biomethane Enters Market.

Part of the reason for the widening fuel price differential between petroleum fuels and natural gas is the ever-growing supply of natural gas here in North America and, more specifically, the addition of new recoverable supplies from shale formations. Current estimates of natural gas supply and demand – including a healthy increase in natural gas vehicle use – pegs supply at 120 years or more, says NGVAmerica's Kolodziej. North America has long had ample natural gas supplies. Now, improved exploration technologies have made it cost-effective to extract gas from shale formations that previously were considered marginal in long-term supply projections. The industry also invested millions to expand its robust network of pipelines and local distribution systems.

The potential of this extensive new resource has barely been tapped, says Kolodziej. Production thus far from just a few of the more than 25 major shale formations – namely The Barnett Shale, the Haynesville Shale, the Fayetteville Shale and the Marcellus Shale – have changed the way geologists and government experts view the gas supply-demand model and there are dozens more shale deposits that haven't been fully assessed.

Another source of natural gas for vehicles, renewable biomethane has been getting traction in the U.S. Already a well-established technology application in Sweden and other European countries, several biomethane development projects have begun to bear fruit here in the U.S., producing vehicular grade natural gas from landfills, livestock farms and sewage plants. In some cases, the biomethane is captured, cleaned and compressed for injection into local gas distribution lines for sale to downstream customers. Other projects have provided CNG directly to local fleets including the refuse haulers who tip their loads there. Still other projects employ liquefaction technology to produce LNG, which is then shipped to nearby customers by tanker truck.

Although still a burgeoning market with a limited number of operating sites, the poten-

tial is tremendous as entrepreneurs, public policy makers and fleet operators partner to bring biomethane development projects to fruition. NGVAmerica estimates that renewable biomethane could one day displace nearly 10 billion GGEs of fuel, helping the U.S. meet its renewable fuel mandate without the adverse consequences associated with corn ethanol and other farm-based bio-fuels.

"Nearly 100 percent of the natural gas we currently use in the U.S. comes from North America" says Yborra. "About 85 percent comes from the lower forty eight and we get an additional 13 percent from our friends to the north. That's secure 'home-grown' energy, American jobs and paychecks, and additional tax revenues to bolster our economy. The best part about it is that there's a lot of room to grow; room to take on more of the oil-based transportation energy portfolio, and an opportunity to take our energy destiny into our own hands instead of teetering on the whims of unfriendly regimes with geopolitical motives." ■

SSP Fittings Corp.
8250 Boyle Parkway
Twinsburg, OH 44087
Mark Hurt / Mike Spears
330-425-4250
mark.hurt@sspfittings.com/mike.spears@sspfittings.com
www.sspfittings.com

SSP Fittings Corp designs & produces hydraulic & instrumentation tube fittings and valves made from stainless steel, Monel®, brass and other exotic alloys. SSP is a world leader in high-quality NGV and CNG station components and tube fabrication assemblies.

Structural Composites Inc (SCI)
325 Enterprise Place
Pomona, CA 91768
John Coursen, Product Line Manager
909-444-2503
jcoursen@scicomposites.com
www.structuralcomposites.com

SCI has over 50 years experience in the manufacture of composite pressure vessels for natural gas vehicles, hydrogen storage systems and bulk gas transport.

Swagelok Company
31500 Aurora Rd.
Solon, OH 44139
440-649-5934
marketing@swagelok.com
www.swagelok.com

Swagelok provides products and services to support the design and production of natural gas vehicles, filling stations, and hydrogen fuel cell technology.

Trillium
2150 South 1300 East - Ste 450
Salt Lake City, UT 84106
Jennifer deTapia, Director of Market Services
800-920-1166
info@trilliumusa.com
www.trilliumusa.com

Trillium builds and operates Compressed Natural Gas fueling stations nationwide. Reliable equipment, comprehensive maintenance programs and competitive pricing make our stations the easy and economical way for fleets to meet clean air requirements.

TransEco Energy & Altech-Eco Corporation
1 West Pack Square, Suite 1409
Asheville, North Carolina 28801
Par Neiburger, Sales Manager
828-654-8300
par@transecoenergy.com
www.transeoenergy.com

TransEco & Aletch-Eco provide CNG station development and O&M services, certify CNG conversion systems with the EPA as a small volume manufacturer, and operate a state-of-the art facility for converting light-, medium- and heavy-duty vehicles to operate on natural gas or propane (dedicated, bi-fuel and diesel re-powers).

Tulsa Gas Technologies, Inc.
4809 S. 101st E. Ave.
Tulsa, OK 74146
Tom Sewell, President
918-665-2641
tsewell@tulsagastech.com
www.tulsagastech.com

Tulsa Gas Technologies is a manufacturer of CNG dispensing equipment, metering devices, sequencing panels and provers; compressor and compressor part sales.

Fueling Options

Fill'er Up

Top: This public access station in Hauppauge, NY serves local refuse fleets, other commercial businesses and consumer vehicles. Right: LNG storage tanks at Waste Management's El Cajon, CA depot. Waste Management operates the largest natural gas refuse fleet in the U.S. Left: Time fill dispenser post.

The key to a successful NGV program is a well-planned and well-run fueling infrastructure. Refuse operators must decide (1) whether existing or new fueling infrastructure will be used and, if a new station is needed, (2) whether it is located on site or offsite, (3) what type of station(s) is needed, (4) what development, ownership and operations models best suit the agency's criteria, and (5) the operational characteristics of the fleet that will affect all of the above. There is no "best" or "right" option as each fleet has its own specific decision criteria and circumstances that will determine what is most appropriate.

Small waste hauling operations with only a few vehicles may find it best to use an existing CNG or LNG fueling station in the area, if available. It might be operated by the local gas distribution company (LDC) or independent natural gas fuel retailer, or it could be one that is run by another nearby public or private NGV fleet operator willing to allow use of its fueling facility. When evaluating this option, work with the station operator to make sure existing infrastructure has the appropriate dispensing capability and can handle the added throughput and, if necessary, investigate options to upgrade equipment. This option may also be appropriate for a short term "field test" of an initial vehicle or two before proceeding with a larger vehicle purchase commitment and station development contract.

If use of existing fueling infrastructure is not practical, convenient or economical, it may be better to build a new CNG, LNG or L/CNG station on site or nearby. This may be handled in several ways. A waste hauler may contract construction of a station with the intent to then own, operate and maintain it themselves. While this option offers the greatest savings, it also incurs the greatest risk as the fleet must keep its maintenance crews trained about station equipment and controls and keep critical parts on hand.

Another option is to build and own a station, but contract with a knowledgeable station Operations and Maintenance (O&M) company to monitor, operate and maintain it. This type of service agreement most often involves a multi-year large-volume contract where services are charged on a GGE or other fuel unit basis with different preventative maintenance and emergency service options offered. In these cases, fleet operators usually procure and retain ownership of their gas supply and their equipment but willingly cede a portion of their potential savings to off-load

day-to-day O&M responsibility, thus lessening their risk.

Another option involves complete outsourcing of development, ownership and O&M to an independent fuel provider. The developer invests the capital to build the station, retains ownership, operates and maintains it, and provides the fuel to the customer at an agreed upon long-term price per gallon. In return for this investment, the 'anchor fleet' customer signs a fuel consumption/purchase commitment agreement that typically involves minimum 'take-or-pay' clauses. In these partnerships, the anchor fleet may provide land for the station (e.g., through a no-cost or low-cost lease) and the independent fuel provider usually retains the right to offer 'outside the fence' retail fuel services to other vehicles, often with a royalty/commission paid back to the station site fleet on these sales.

The first option described above is applicable to any size fleet, but the latter two options typically are available only to fleets that have minimum monthly fuel use of 15–20,000 DGE or more.

Regardless of who owns and/or provides O&M service for the station, it may be built for "private-access only," i.e., dedicated for use only by the targeted fleet for which it was built, or it may offer either "limited public access" (e.g., requiring a pre-approved fueling card, perhaps during limited or restricted hours), or "full public access" (e.g., allows any/all NGV users to buy fuel using credit cards). These access options are affected by – but not necessarily dictated by – the development, ownership and O&M options noted above. It is becoming more prevalent for anchor fleets to install 'outside the fence' fuel dispensing capability, thus facilitating a more robust fueling infrastructure network that promotes NGV market penetration. This often qualifies the project for federal or state financial assistance. Generally, more NGVs and fuel throughput create better operational economies of scale and amortization of investment in equipment.

If LNG vehicles are to be used and an existing nearby LNG fueling facility is not already available to handle the additional load, then a regular supply of vehicle grade LNG must be located and on-site cryogenic storage and dispensing equipment will be installed. Most of today's available vehicular LNG supply comes from a limited number of large-scale production plants. Their large volumes create economies of scale but, due to their remote locations and transportation costs, their economic feasibility is directly impacted by distance from the prospective customer. Additional vehicular grade LNG production facilities are in development and advances in small- and mid-scale liquefaction technologies now make it possible to produce cost-competitive LNG closer to the fleets they serve – typically at a higher production cost but with lower transportation costs.

If CNG vehicles are planned, most waste haulers choose to install compressors that take local natural gas distribution company gas from lower delivery pressures up to 4500-5000psi, store it on-site, then transfer it during the vehicle fueling process to the

continued on page S-14

Universal Air Products
1135 Lance Road
Norfolk, VA 23502
Steve Davis
757-461-0077
info@uapc.com
www.uapc.com

Universal Air Products Corp. (UAPC) has decades of successful experience in turn-key, alternate fuels system design and construction, providing a complete line of station components including gas compression, storage, dispensing, regulation and controls, as well as consulting, station design/engineering, and construction management services.

Westport Innovations Inc
101 - 1750 W. 75th Avenue
Vancouver, BC Canada V6P 6G2
Kelly Mills
888-978-4734
sales@westport.com
www.westport.com

Westport is the leading developer of environmental technologies that allow engines of our leading OEM ally-partners to operate on clean-burning fuels such as natural gas, hydrogen, and hydrogen-enriched compressed natural gas (HCNG).

continued from page S-12

onboard CNG cylinders at 3600psi. Another option for fleets that do not have gas available to their site, is use of an L/CNG fueling station, which compresses LNG (available via delivery or onsite liquefaction), then "flashes" it through a high-pressure heat exchanger to gaseous state before dispensing to the onboard 3600psi CNG cylinders.

The design, capacity and cost of a CNG, LNG or L/CNG fueling station will vary based on 1) number of vehicles to be fueled, total daily fuel requirements and maximum hourly flow rate; 2) whether time-fill, fast-fill or both capabilities are needed; 3) the level of remote station equipment monitoring and diagnostics capability desired; 4) the type and sophistication of the dispenser including flow meter accuracy, data collection and payment processing needs; 5) the real estate space required; 6) availability, quality and pressure of gas service and/or availability of LNG supply; 7) availability

of back-up fueling or, if none available, the required system redundancy; and 8) site-specific factors such traffic access/road improvements, sound attenuation, labor availability and rates, and permitting requirements and fees, among other factors.

The best option will depend on current and projected NGV fleet size and fuel throughput, contractual parameters and/or limitations set by governing agency's, governing body, available funding and financing and lease options, experience with natural gas fuel purchasing and mechanics' capabilities in operating and maintaining CNG or LNG equipment.

An fleet operation's internal corporate culture also will play a role, e.g., management's tolerance for risk and/or willingness to partner with private industry for fueling services in order to maintain focus on core competencies. Furthermore, it is possible that a large fleet operator with multiple depots may choose different solutions for different fueling locations.

Whether purchasing/leasing fueling equipment directly or paying for it through the price per gallon paid to a fuel provider, a fleet operator should work with its suppliers to make the most of federal grants and tax incentives that reduce equipment cost. Federal tax credits enacted in 2005 and amended in 2008 provide up to $50,000 per property for equipment placed into service on or after January 1, 2006. (See "Federal NGV Tax Incentives", page S-4). Many federal

Station sizing, design and equipment selection is determined by many factors including private versus public access; number of vehicles expected each day; total daily fuel volume; maximum hourly flow requirement; available utilities including natural gas volume and pressure and size of electric service; need for redundancy; and available space.

grant programs for NGVs allow a portion of the funds to be used for natural gas fuel infrastructure.

In addition, many states offer grants, which may be leveraged to secure additional federal funding. Generally, state grants emanate from energy, environment, transportation and commerce departments.

Resources To Help You

Municipal waste program managers and private haulers are encouraged to contact their local natural gas utility, station development/O&O companies and compressor packagers to assess fueling needs and evaluate potential station requirements and options. A good first step is to prepare a 3-year vehicle replacement and fueling needs projection schedule that estimates which existing vehicles and fuel use could be transitioned to natural gas. Joining your local Clean Cities Coalition [http://www1.eere.energy.gov/cleancities/] and Regional Diesel Emissions Reduction Collaborative [http://www.epa.gov/otaq/diesel/whereyoulive.htm] is also recommended as these organizations can provide information about grant availability and solicitation guidelines, introduce you to other area fleets with experience or interest in starting an NGV program, and refer you to additional resources. For more information about these organizations and other NGV program implementation tips, contact CVEF at www.cleanvehicle.org or NGVAmerica at www.ngvamerica.org. ■

When it came to diesel fuel costs, we were being taken for a ride.

Talk about waste!

"We got off the diesel cost rollercoaster and switched to CNG."

Along California's Central Coast, half way between Los Angeles and San Francisco, the South County Sanitary Company began hauling community trash in 1903, using a horse-drawn wagon for transport.

Today, South County Sanitary — now a unit of industry-leading Waste Connections, Inc. — deploys a growing fleet of gleaming white trash trucks that are powered by clean-burning compressed natural gas (CNG). The trucks roll out every morning to serve customers in picturesque San Luis Obispo County.

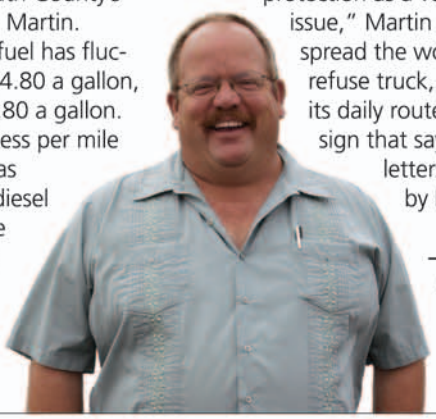
South County contracts with the San Luis Obispo Integrated Waste Management Authority to provides trash collection and recycling services to nearly 45,000 residents and 10,000 businesses. Close to 20 percent of its trucks now operate with CNG fuel, and more CNG trucks are on order. As each new CNG truck comes on line, it replaces a diesel model. Clean Energy Fuels supplies the fuel for the CNG fleet operation.

Why the switch to natural gas? "We wanted to get off the diesel cost rollercoaster," said South County's General Manager Tom Martin.

"The price of diesel fuel has fluctuated up as high as $4.80 a gallon, and CNG averages $2.80 a gallon. It costs us 30 percent less per mile to operate a natural gas truck, compared to a diesel truck." In addition, the purchase of each new CNG truck qualifies for a $32,000 federal tax credit as well as $22,000 in grant funding from the San Luis Obispo Air Pollution Control District.

Achieving a clean, green operating profile is another key objective of this ongoing transformation of South County's refuse fleet. Compared to diesel, natural gas fuel provides significant reductions in smog-generating, health-harming pollutants and greenhouse gas emissions.

"We know that the communities we serve rank environmental quality protection as a very important issue," Martin said. To help spread the word, each CNG refuse truck, as it travels its daily route, displays a sign that says, in big, bold letters, "Powered by Natural Gas."



— Tom Martin
General Manager
South County Sanitary Company

Clean Energy
www.cleanenergyfuels.com

REAL NGV USERS. REAL REASONS.

To find out how your fleet can benefit from natural gas, call **Ray Burke** at Clean Energy, North America's leader in clean transportation: **562.493.2804**.

NGVAmerica Newsletter Excerpts 5/9/2011

Clean Energy to Add New CNG Fueling Stations at Airports in Four States

This week, Clean Energy Fuels Corp. announced that had signed long-term agreements with four major airport complexes in four states to design, build, own and operate new CNG stations to support ground transport vehicles and off-airport parking shuttles. The new stations, all available 24/7 for public access, will be located in Tampa, Florida; New York City, New York; New Orleans, Louisiana; and Philadelphia, Pennsylvania. This will bring to 27 the number of major airports at which Clean Energy supports CNG fueling.

At Florida's Tampa International Airport, the Clean Energy public access facility will support the airport's expanding fleet of low carbon, low emission CNG passenger and employee transit buses, as well as off-airport hotel and parking shuttle fleets. Tampa International will be the first airport in Florida to implement CNG power for its ground transportation vehicle fleets.

At New York's JFK airport, Clean Energy has contracted with JFK AP, LLC to develop, own and operate a new CNG fueling station at the Airport Plaza convenience store and fueling center adjacent to JFK International Airport. The station, located on land owned by the Port Authority of New York and New Jersey, will support JFK's expanding on-airport CNG-powered ground transport vehicle fleets, off-site Parking Spot CNG shuttle buses, taxis and other CNG vehicles operating in the area.

At New Orleans Louis Armstrong International Airport, the company has contracted for a new CNG fueling station adjacent to the Airport on property leased by off-airport shuttle operator Park N' Fly. The station will provide CNG fueling services to Airport Authority-operated shuttle vehicles, CNG-powered taxis, and varied off-airport parking shuttle fleets, including the Park N' Fly fleet.

The Philadelphia Airport CNG fueling station will be located on property owned by Wallypark, a national off-airport parking shuttle operator. The station will provide CNG fueling services to Airport Authority-operated shuttle vehicles, CNG-powered taxis, and varied off-airport parking shuttle fleets, including the Wallypark CNG shuttle fleet. For more information, contact Clean Energy's Jim Harger at 562.493.2804 or jharger@cleanenergyfuels.com

Oklahoma Airport to Add NGV Fueling Station

The Oklahoma University Airport will be the site of a new NGV fueling station. The station will be built on land owned by the city of Norman. The budget for the station was approved by the Norman City Council, which allowed for the purchase of materials for the station and for a fast-fill station for the public. This CNG station, which will be the second in Norman open to the public, is one of the goals of the Fleet Management Department in Norman. Fleet management started purchasing compressed natural gas vehicles in conjunction with the Alternative Fuels Program in 2009.

HR 1380 NAT GAS Act of 2011
Fact Sheet

On April 6, 2011, Representatives John Sullivan (R-OK), Dan Boren (D-OK), John Larson (D-CT) and Kevin Brady (R-TX) introduced the New Alternative Transportation to Give Americans Solutions (NAT GAS) Act of 2011. The bill is driven by the need for America to quickly reduce its dependence on foreign oil while simultaneously reducing greenhouse gases and urban pollution. To achieve those goals, the bill's objective is to accelerate the production and use of more natural gas-fueled vehicles. The basic provisions of the bill would:

1. **Create or Extend for 5 years tax credits for the use of natural gas as a vehicle fuel, the purchase of natural gas-fueled vehicles, and the installation of natural gas vehicle refueling properties, and make Indian tribes eligible for these credits:**
    - Currently, a version of the alternative fuel credit and the natural gas vehicle refueling property credit would expire on 12/31/11
    - A version of the natural gas-fueled vehicle credit expired on 12/31/2010

2. **Expand and modify the previous alternative fueled vehicle and refueling property tax credits as follows:**
    - Makes all new dedicated natural gas vehicles and certain bi-fuel and dual-fuel natural gas vehicles eligible for a credit equal to 80 % of the incremental cost up to a credit cap
    - Makes bi-fuel natural gas vehicles eligible for the maximum tax credit allowed (80% of incremental cost up to a credit cap) if the vehicle is capable of operating a minimum of 85 percent of its total range on compressed or liquefied natural gas
    - Makes dual-fuel natural gas vehicles eligible for the maximum tax credit allowed (80% of incremental cost up to a credit cap) if the vehicle is capable of operating on a mixture of no less 90 percent compressed or liquefied natural gas and no more than 10% gasoline or diesel;
    - Makes all other natural gas vehicles eligible for a credit worth 50% of the incremental cost up to a credit cap
    - Makes the maximum value of the tax credit provided $7,500 to $64,000 depending on the weight of the vehicle
    - Increases the refueling property tax credit from 30% or $30,000 to 50% or $100,000 per station (whichever is less) and the home refueling from $1,000 to $2,000

3. **Exclude natural gas vehicles and natural gas fueling infrastructure credits from coverage by AMT provisions, and to be transferable by the taxpayer back to the manufacturer, seller, or lessee.**

4. **Provide for a production tax credit to the manufacturer of NGVs**

5. **Clarify the definition of "Advanced Technology Vehicle" to include dedicated, bi-fuel, and dual-fuel natural gas powered vehicles, and to allow covered fleet under EPAct 1992 to receive EPAct credits for repowering vehicles and converting older vehicles.**

6. **Express Sense of the Congress resolutions that:**
    - Directs the EPA to take steps to reduce the regulatory burden on conversion manufacturers. (EPA finalized streamlining rules on March 29 but omitted some critical changes).
    - Directs the EPA and NHTSA to fashion appropriate credits to reward manufacturers of NGVs for their petroleum reductions and their greenhouse gas reductions.

7. **Directs the Secretary of DOE to provide funding for RD&D to improve NGV performance and efficiency and to integrate natural gas engines into additional on-road vehicles.**