TUG Tidbits

Newsletter of the Natural Gas Transit Users Group

June, 2006

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New Natural Gas Bus Purchases

Orange County, CA: "The county's mass-transit agency decided today to buy 249 compressed-natural gas buses – in part to prepare for a possible rush of passengers should motorists ditch their autos because of the skyrocketing cost of gas." (Orange County Register, May 28)

Fort Worth, TX: "The city of Fort Worth hopes 12 new compressed natural gas (CNG) buses will help ease the commute for those using the T…. With the addition of the new buses, 96 percent of the city's fleet is now running on CNG." (NBC5i.com Dallas-Ft Worth, May 2)

Portland, ME: - "On Monday, Maine Governor John Baldacci joined Rep. Tom Allen (D-ME) in cutting the ribbon for Portland METRO's … new natural gas fueling station and welcoming 13 new CNG buses to METRO's fleet. "We're going to get cleaner burning vehicles," said Governor Baldacci. "Global warming has been taking place and Maine again is showing leadership in that regard." The natural gas fueling station will also be used by the Portland School Department and made available to fuel other vehicles that use natural gas. (NGVAmerica Newsletter, May 5)

Los Angeles, CA: - "…Los Angeles County Metropolitan Transportation Authority (LA Metro) has exercised its first option to acquire 96 additional … compressed natural gas (CNG) fueled Metro Liners. The first 200 Metro Liners were ordered in 2003 and delivered in 2005 and 2006. (Cummins Westport News Release, March 28)

Sydney, Australia: - "Almost half of Sydney's buses will be powered by natural gas in five years, and clean diesel buses using new technology will progressively replace older models in a $250 million program. (Sydney Morning Herald, April 3)
Kuala Lumpur, Malaysia: - "Malaysia has launched into compressed natural gas (CNG) buses in a big way, with the country's largest bus operator, Nadicorp Holdings, signing contracts with Samsung (Korea) for the supply of 800 CNG buses." (NGV Global, April 4)
Beijing, China: - "Fiat Powertrain Technologies, a Company of Fiat Group, has signed an Agreement with Beijing Public Transport Company for the supply of 1000 natural gas engines." (NGV Global, April 12)
Moscow, Russia: - "This week, Cummins Westport Inc. announced that Russian Buses of Moscow, Russia has ordered 278 Cummins Westport C Gas Plus natural gas (CNG) engines." (NGVAmerica Newsletter, March 1)
Reykjavik, Iceland: – "Iceland continues to grow its NGV fleet with a recent addition of CNG buses fueled by biomethane. The bio-methane for the buses comes from the Reykjavik capital-area landfill site." (NGVAmerica Newsletter, April 21)

Biomethane = Renewable Natural Gas

Some people are concerned that natural gas vehicles simply trade one fast-depleting non-renewable fuel for another. That's not necessarily so! The biomethane (or "biogas" - natural gas is about 90% methane) for the Icelandic buses mentioned above comes from the Reykjavik capital-area landfill site.

Although Europe leads the US in the use of biogas to replace natural gas, in the US Waste Management and other refuse companies has been cleaning landfill gas, liquefying or compressing it and using it as fuel for fleets of refuse trucks for a number of years.

Biogas is renewable and sustainable. It comes from waste and by-products which have to be treated anyway, such as sewage sludge, municipal biowaste, and waste from the agro-food sector. Biogas is formed when organic material is decomposed by methane producing bacteria in an anaerobic environment. Biogas is typically composed of 55-70% methane, 30-45% carbon dioxide and small amounts of hydrogen sulfide and ammonia. It has to be cleaned to remove solids and corrosives and "upgraded" (removal of CO_2) to obtain a higher heating value.

In Europe it is estimated that 20-40% of the energy used in the road transport sector could be provided by upgraded biogas. In Sweden, where all natural gas is imported, biomethane has the potential to replace all the natural gas used. In Switzerland, 37% of the natural gas used for NGVs is biogas. Thirty-two of the planned 100 CNG buses in Berne will be fueled with biogas, mostly from the local sewage treatment

plant. The "Biogasmax" project involves 270 LDVs and 100 HDVS using upgraded biogas in Holland, Sweden, Italy and France.

(European information is from papers delivered at the April European Natural Gas Vehicle Association Conference)

"SCAT Expected to End Hybrid Bus Plan"

The following is reprinted without comment from the May 24 Ventura County Star – article by Charles Levin – SCAT (South Coast Area Transit) serves the five-cities in the southern portion of San Luis Obispo, CA

> "'South Coast Area Transit officials are backing away from plans to convert their bus fleet to gasoline-electric hybrid models, choosing a new form of compressed natural gas technology instead.
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> SCAT board members approved a plan last year to convert 35 of their 46 buses, powered by an older compressed gas technology, to a hybrid system like that of the Toyota Prius. The board even ordered eight of the vehicles, at roughly $550,000 each.
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> But unexpected increases in gasoline costs, improved compressed natural gas technology and a new federal rebate for use of natural gas sparked the change in direction, officials said Tuesday.
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> The board will meet at its Oxnard headquarters June 7 to formally consider the change, officials said. SCAT provides bus service in Ventura, Ojai, Oxnard, Port Hueneme and unincorporated areas between those cities.
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> The agency began exploring hybrid buses as it looked to replace its aging fleet. The situation became more urgent after a March 1, 2005, mudslide ruptured a natural gas pipeline near Piru and cut SCAT's supply.
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> SCAT stopped service for a day. Limited service started the next day, but it was difficult to get a specific type of compressed natural gas required for the buses.
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> In July, board members voted 4 to 1 for the hybrid conversion plan, with Oxnard's representative lobbying for the change and Ventura's dissenting. The thinking was that hybrids would save money on maintenance and fuel while improving air quality.
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> 'That made gas-electric hybrids look like a favorable deal,' Bill Fulton, a Ventura councilman and SCAT board member, said Tuesday. "Then the price of gasoline went up and up and up."
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> Meanwhile, hybrid buses operated by Long Beach Transit — one of only a few agencies using them — didn't live up to their promise, getting about 2.5 miles per gallon instead of an expected 5 mpg, said Deborah Linehan, SCAT's general manager. Buses using compressed natural gas also get only 2.5 mpg, but the fuel is cheaper than gasoline.
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> Also, new federal energy legislation adopted last year provides a 50-cents-per-gallon rebate for compressed natural gas used by motor vehicles. The rebate takes effect in October and runs through Sept. 30, 2009.

After gasoline prices soared past $3 a gallon at the pumps, Oxnard Mayor Tom Holden, a SCAT board member, asked the agency to research how to switch back to natural gas, Linehan said.

New natural gas buses cost about $450,000 each and compare favorably to hybrids on air quality, Linehan said. The new buses also run on a more common form of compressed natural gas, meaning fewer supply problems, she said.

SCAT is negotiating with the bus manufacturer to see if it can sell the previously ordered hybrids to another agency, Linehan said.

'At this point, we're still in negotiations, but they seem amenable,' Linehan said, adding that delivery of the new natural gas buses would take up to 18 months. "

Designing New Transit Bus Garages to be "Fuel Flexible"

Even if you plan to operate only diesel buses out of a new or refurbished garage, you should probably plan ahead to provide for the possibility of using a gaseous fuel (CNG or hydrogen) sometime in the future.

The cost of retrofitting a diesel bus maintenance garage to be safe for use by CNG or hydrogen vehicles can be substantial. But if the garage was designed from the outset to be "fuel flexible" the incremental cost is small, and the transit authority then has freedom and flexibility to operate a fleet with varying types of fuel. Many of the features that are desirable in a fuel flexible facility are not additional cost items, but are simply an adaptation of equipment or systems needed in a diesel bus garage. When constructing a garage that may be operated for 25 to 50 years, it's wise to look down the road and design a facility that will allow the introduction of new fuels/technologies.

Marathon Technical Services has provided a brief overview in layman's terminology of the special considerations required to make bus garages safe for use with lighter-than-air gaseous-fuelled vehicles. It gives background information comparing CNG and hydrogen to diesel fuel, discussing the codes and construction methods, heating and ventilation, and electrical and safety equipment for maintenance garages using either liquid or gaseous fuels. It also recommends allocating room in the layout of the site for the possible future construction of a gaseous fuel station and summarizes cost differences between a facility designed for only diesel and one which is fuel flexible.

For a copy of the *Designing New Transit Bus Garages to be Fuel Flexible* document, contact Hank Seiff at hseiff@cleanvehicle.org or 704-534-6151

CNG Safety for First Responders

Los Angeles County Metropolitan Transportation Authority (LACMTA) has an excellent training program on CNG safety for first responders. LACMTA, which has by far the largest fleet of natural gas buses in the US (over 2000), serves one of the nation's largest and most heavily congested urban areas, with over 20 million residents and a service area of over 1500 square miles. Their CNG Safety for First Responders program includes sections on Basic CNG Safety Principles, Making the Bus Safe – Shutdown Sequence, and Emergency Response at CNG Fueling Facilities. Although it is obviously tailored for the their own specific buses, fueling stations and operations, the training program can be extremely useful for any transit authority which needs to interact with first responders in their area and does not have its own detailed program. The training package includes a Training Outline and CNG Guide for first responders and two DVDs, "CNG Safety for Law Enforcement," and "CNG Safety for First Responders."

Contact Charles (Pat) Chism at LACMTA (213 922 7314, chismc@metro.net) for more information on their training program.

New NREL Report on Alternative Fuel Buses

The National Renewable Energy Laboratory (NREL) has recently published the following report for DOE:
Washington Metropolitan Area Transit Authority: Compressed Natural Gas Transit Bus Evaluation, by K. Chandler and E. Eberts of Battelle and M. Melendez of the National Renewable Energy Laboratory, available at:
http://www.nrel.gov/docs/fy06osti/37626.pdf

The study compared 12 months of diesel bus operation with twelve months of CWI-powered and six months of Deere-powered CNG buses at WMATA:

The CNG and diesel buses at the Bladensburg depot were used randomly on routes with only 40-foot buses. The CNG buses did not have restrictions due to range or power. The diesel buses (without diesel particulate filters) used in the evaluation operated from Bladensburg depot from 2001–2002 (before the use of the CNG buses). The CNG buses operated from Bladensburg depot starting in 2002.

The CNG buses had fuel economies 16%–18% lower than the diesel buses: 2.3–2.4 mpDGE (miles per diesel gallon equivalent) for the CNG buses versus 2.8 mpg for the diesel buses.

CNG fuel cost averaged $1.19/DGE (diesel energy gallon equivalents) during the evaluation period. Adding the electricity cost for the CNG compressor station ($0.14/DGE), the total CNG fuel cost was $1.33/DGE. The ultra-low sulfur diesel (ULSD) fuel cost during the evaluation period for the diesel bus operation at Bladensburg (2002) averaged $0.75/gal. However, during the CNG bus evaluation period, the ULSD fuel cost averaged $1.33/gal.

For the evaluation periods, the CWI CNG buses had 12% lower total maintenance costs than the diesel buses, and the Deere CNG buses had 2% lower total maintenance costs than the diesel buses, however engine and fuel system maintenance costs were slightly higher for the CNG buses.

Mean time between road calls (total road calls and engine/fuel system related road calls) was substantially longer for the CNG buses than for the diesel baseline buses.

The total operating costs for the study buses were similar. The fuel costs for CNG and diesel during the CNG bus evaluation periods were the same at $1.33/DGE. The total operating costs were as follows: diesel, $1.06/mile; CWI CNG, $1.09/mile; and Deere CNG, $1.14/mile. The major contributing factors are the fuel costs and fuel economy. Significant changes in the fuel cost or fuel economy would change total operating costs significantly.

Emissions measurements of the diesel and CNG buses, as reported in an earlier study, showed much lower Carbon Monoxide, NOx and PM emissions for the CNG buses and slightly lower hydrocarbon emissions for the diesels.

Scholarships Still Available for Natural Gas Vehicle Cylinder Inspection Training and Certification

The March edition of *TUG Tidbits* announced that scholarship funding for compressed natural gas vehicle cylinder inspection training and certification is available from a Clean Vehicle Education Foundation (CVEF) program underwritten by the U.S. Department of Energy (DOE).

Like a gasoline-or diesel fueled-vehicle, a natural gas vehicle's fuel system should be inspected periodically. In fact, U.S. Department of Transportation regulations require all vehicular compressed natural gas (CNG) cylinders to be labeled with a notice stating, "This container should be visually inspected after a motor vehicle accident or fire and at least every 36 months or 36,000 miles, whichever comes first, for damage or deterioration."

If you would like to have a technician trained and CSA-certified as a qualified cylinder inspector, scholarships to cover the cost of training and certification testing are still available. To find out about the Natural Gas Vehicle Cylinder Safety, Training and Inspection Program, where training is available and how to apply for a scholarship, go to www.cleanvehicle.org/technology/cylinder.shtml or contact Hank Seiff (703-534-6151, hseiff@cleanvehicle.org). In addition, we expect the TUG meeting this Fall (probably to be held at in Los Angeles at LACMTA in October) will include a cylinder training course and certification test, at no cost to attendees.

Please send all questions, comments, requests for information, etc. to Hank Seiff at 703-534-6151 or hseiff@cleanvehicle.org. Photo courtesy of Greater Portland Transit District (METRO) Press Release.