TUG Tidbits

Newsletter of the Natural Gas Transit Users Group

December, 2004

Successful November TUG Meeting in Anaheim, CA

The Natural Gas Transit Users Group (TUG), 40 strong, met in Anaheim, CA on November 17-18, in conjunction with APTA's Bus Equipment & Maintenance/ Procurement & Materials Management Workshop. Presentations covered New Flyer Natural Gas Transit Buses, FAB's NG bus fuel systems, bus idling practices, CNG cylinder inspection requirements, a PRD training tool, NG bus incidents, fuel supply in time of disaster, and Cummins Westport and Deere NG bus engines. Proceedings of that meeting will be sent to each of you in the next few weeks and copies of most of the presentations are available. If you'd like more information or want to add any of your colleagues to our mailing list to keep up on TUG activities, contact Hank Seiff (see last page for contact information).

Cummins Westport and Deere Natural Gas Engines to Meet 2010 Emissions in 2007! (or "Why Use NG Engines After 2007?")

At the recent TUG meeting in Anaheim, CA, Cummins Westport and John Deere Power Systems reported their plans to switch their 2007 L Gas Plus and 8.1L HFNO4 natural gas engines, respectively, from lean to stoichiometric operation with cooled EGR, using a three-way catalyst (similar to that used in light-duty gasoline vehicles) to

control emissions and meet 2010 EPA emissions standards in 2007. A stoichiometric engine uses just the right amount of air to completely burn its fuel, in contrast to today's sparked-ignited natural gas engines, which use a "lean burn" (excess air) system.

While diesel engine and related operating costs are expected to increase substantially for engines that meet 2007 and 2010 emissions requirements, Cummins Westport said their stoichiometric NG engine will meet 2010 regulations without complex aftertreatment, and with an approximately five percent improvement in fuel economy compared to current lean burn offerings. Their Life Cycle Cost (LCC) model estimates this could bring the annual cost (including infrastructure) of owning and operating natural gas transit buses down below diesel by the 2007-2009 period, and have further LCC benefits in the post 2010 period. This new technology platform also will allow for further NOx reduction beyond 2010.

John Deere Power Systems said it also will meet the 2010 0.2 gm NOx standard by 2007, with the 8.1 liter engine increased to 9.0 liters displacement with an increase in horsepower. They added that their CNG/LNG engines "provide fleet owners with an alternative path that provides significant environmental and operating cost advantages, and high levels of product reliability. For further information on Cummins Westport and Deere's plans, contact Gordon Exel at Cummins Westport, 604-718-8384, gexel@cumminswestport.com) and Tom Cummings at Deere Power Systems, 319-292-5220, cumminsthomase@johndeere.com.

How Much are People Paying for NG Fuel (Part 2)?

Fuel prices have changed a lot since the last edition of "TUG Tidbits" reported on retail prices and transit agency costs in August. In early November, 11 agencies told us that their latest diesel prices ranged from $1.32 - $2.20 per gallon. At the same time natural gas costs ranged from $0.86 - $2.02 per diesel-gallon equivalent (dge). The average of the 11 agencies was $1.72/gallon for diesel and $1.38/dge for natural gas. The wide range in costs was based on such things as how the fuel was purchased (e.g., long-term contract vs spot market), costs included (taxes, fees, costs of compression, etc.), and section of the country.

How much are you paying for diesel and natural gas bus fuel? Contact Hank Seiff (see contact information on last page) and let us know. Please include information on whether you are paying retail, have a long term contract, etc., whether your diesel is regular or ultra-low sulfur and whether your NG prices include taxes, compression or other costs.

Daily Updates on NG and Diesel Spot Market Prices

For a daily update on natural gas and diesel spot market prices, including historical data, take a look at http://www.wtrg.com/daily/oilandgasspot.html. Today's prices for Cushing, Oklahoma and North Sea Brent Crude petroleum were $41.83 and $37.38 per barrel (42 gallons) or $0.996 and $0.89 per gallon. Henry Hub natural gas was $6.84/MMBTU (10 therms) or $0.53/dge. Remember, those prices vary from day to day and don't include factors such as oil refining, CNG compression, transportation, and some "profit" costs.

What's the Status of Detroit Diesel Series 50 Engines?

Detroit Diesel representatives said that series 50 engines, both natural gas and diesel, are "all gone as of May 2005." DDC has no plans to build natural gas bus engines in the future. They assume that all emissions needs will be met by the diesel engines meeting the 2007 requirements (see "Cummins Westport and Deere Natural Gas Engines to Meet 2010 Emissions in 2007!" article above for a different take on that issue). DDC has no present plans for a medium duty diesel engine and the company has not decided whether to return to the urban bus market in the future.

Are Hybrid Buses Worth the Cost?

Hybrid buses were a major topic of conversation at the November APTA Bus Equipment & Maintenance/Procurement & Materials Management Workshop. Initial cost, fuel economy, durability and maintenance costs were discussed. Based on those discussions and other information, your editor has done some "back of the envelope" calculations to determine whether hybrid fuel savings justify the high initial cost of hybrid technology.

Although initial cost premiums over diesel buses range from $150,000 to $245,000 we assumed the lower number. Fuel economy improvements reported range from zero to one manufacturer's claim of "up to 60%" but we used a 20% number. And we assumed a bus runs 45,000 miles per year, getting 2.5 mpg (baseline) with diesel fuel costing $1.72/gallon.

Using those numbers, a hybrid bus would save $61,920 in fuel costs over a 12-year life, or $5,160 per year. So the payback period for the $150,000 cost premium would be a bit over 29 years! Since most transit agencies pay only about 20% of the cost of new buses (with the federal government paying the rest), the payback period would be "only" 20% of 29 years, or almost six years! Even six years is not generally an acceptable payback period, and that calculation sticks the Feds (our tax dollars) with the rest of the unrecovered costs.

Hybrids may have reduced brake and other maintenance costs, but battery maintenance and replacement may nullify those savings.

This is not to say hybrids (either diesel-electric or natural gas-electric) are a bad idea, but the numbers are interesting. If you'd like a copy of our "back of the envelope" calculations, contact Hank Seiff (see contact information below).

Disneyland Natural Gas Transit Systems

The nine Jungle Boats, two rafts, two keelboats, three "antique" cars, and double-decker buses at Disneyland are fueled by natural gas. The trams used for transportation to the parking lots use CAT engines which start on diesel and then run mostly on NG. Disney chose natural gas to avoid the diesel smell.

Disneyland Dual-Fuel Tram

Disneyland uses slow-fill compression. An outside company does station preventive maintenance approximately every four months with Disney doing normal fueling station maintenance. During the Anaheim TUG meeting, attendees rode a NG powered tram and viewed the outside of a fueling facility.

SAE Groups Will Meet on LNG Tanks, Composition and Connectors

Society of Automotive Engineers' (SAE) task forces will meet January 19-21 at OCTA in Orange County, CA, to begin work on an LNG vehicular fuel tank recommended practice and to continue work on vehicular LNG composition and connectors recommended practices. If you are interested in participating in any or all of these standards development activities, please contact Hank Seiff (see contact information below). You do not need to be a member of SAE (or TUG) to participate.

Please send all questions, comments, requests for information, etc. to Hank Seiff at 703-534-6151 or hseiff@cleanvehicle.org.

The photo of a CNG bus in the heading and dual-fuel tram at Disneyland were provided by, and used with the permission of the editor and Dennis Smith of DOE, respectively.