WASTE TO WHEELS — NEW EV REPORT ON TURNING WASTE INTO VEHICLE FUEL

On May 13th, Casella Waste Systems, one of the largest waste hauling firms in New England, became the first waste hauler in Vermont to put natural gas fueled trucks into operation. Vermont Governor Peter Shumlin, CEO Don Gilbert of Vermont Gas, John Casella, CEO of Casella Waste, and EV’s President Joanna Underwood spoke at the opening and cut the Blue Ribbon on Casella’s new natural gas refueling station in Williston. Casella Waste System’s CEO John Casella, Vermont Governor Peter Shumlin, EV President Joanna Underwood, and Vermont Gas CEO, Don Gilbert.

Casella has its first three trucks powered by compressed natural gas (CNG) in operation. By mid-summer, it will have a total of seven trucks plus one which has been repowered from diesel to “dual fuel.” That truck now burns 30% natural gas. By Sept 2011 Casella’s refueling station will be able to accommodate the whole local fleet of 13 trucks.

The three CNG trucks and the one repowered truck cost Casella out of pocket $428,331 ($198,925 more was covered by a grant from the US

Every year, U.S. homes and institutions throw away enough garbage, yard trimmings, farm residues, and other organic waste to make renewable natural gas, a clean, petroleum-free fuel that could power millions of the nation’s trucks and buses. A new Energy Vision report, Waste to Wheels: Building for Success, highlights the many benefits of this renewable resource. Waste to Wheels summarizes the proceedings of a workshop, held in Columbus, Ohio, in December, sponsored by the U.S. Department of Energy’s Clean Cities Program, Argonne National Laboratory and Clean Fuels Ohio. The workshop brought together 120 industry and government leaders from 29 states, who heard presentations by national experts on technologies for waste-based fuel production, projects, and financial incentives. Energy Vision’s VP for Programs, Gail Richardson, a member of the workshop planning group, wrote up the proceedings. Waste to Wheels discusses the characteristics of this waste-based fuel. Much cleaner than petroleum fuels, it is chemically similar to natural gas and can be blended with or used instead of it. A significant difference is that it is made, not by drilling, but by processing the gases created wherever organic materials break down: in landfills; at sewage treatment plants, and on farm or dairy operations. Because this fuel is produced from a renewable resource, it is called “renewable natural gas,” “RNG” or “biomethane.”

Given rising national and global concerns about climate change, RNG

Greenhouse Gas Emissions Plunge
Using Fuels Made from Renewable Natural Gas

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>GHG Emissions (gCO2e/MJ)</th>
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<td>Gasoline</td>
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<tr>
<td>Ethanol (E85)</td>
<td>30</td>
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<tr>
<td>LFG RH</td>
<td>10</td>
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<tr>
<td>LFG RNG</td>
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FUELS COMPARED

- Diesel
- Gasoline
- Ethanol (E85): 85% corn/15% gasoline
- LFG RH: Renewable hydrogen made from landfill gas
- LFG RNG: Renewable natural gas made from landfill gas

GHGs are measured on a “life cycle” basis.

Greenhouse Gas Emissions

Source: GREET model 1.6D
LETTER FROM THE PRESIDENT

Joanna D. Underwood

For the past 35 years since President Jimmy Carter warned of the dangers of the US’s addiction to foreign oil, our efforts to find alternative vehicle fuels have focused on electric vehicles, bio-diesel, ethanol, natural gas, hydrogen and more. Yet just one commercially available, fully renewable fuel has emerged that could significantly displace 25% or more of petroleum used in trucks and buses, with off-the-shelf technology. That fuel is biomethane, a renewable form of natural gas (RNG). Virtually pollution-free and carbon-neutral, it requires no drilling because it is made from organic wastes. That’s right, garbage!

“Virtually every community can produce renewable gas vehicle fuel from its wastes while reducing pollution and greenhouse gases and creating new green jobs.”

We encourage EV readers to take a close look at our new report, Waste to Wheels (see p.1) which describes what RNG is, how it is produced by cleaning up gases emitted by decomposing organic materials, and the huge impact it can have nationwide, especially as a substitute for diesel in medium- and heavy-duty trucks and buses.

You will discover that thousands and thousands of potential sites for producing this fuel exist coast to coast—at landfills and sewage treatment plants, on farms, dairies, and elsewhere. Virtually every community has the chance to produce a local renewable fuel supply for its fleets, while reducing pollution and greenhouse gas emissions, and creating new jobs. Communities that have already converted their fleets to conventional natural gas are one step ahead in having refueling infrastructure in place that can distribute RNG blended with or substituted for conventional gas.

Energy Vision has embarked on a multi-faceted initiative to build momentum nationwide to develop and use RNG for truck and bus fleets. As a follow-up to Waste to Wheels, EV is preparing a guide for community decision makers on how to identify and pursue opportunities to develop local RNG fuel resources. In partnership with CALSTART, a membership organization in California dedicated to clean transportation, Energy Vision is preparing fact sheets on RNG as a transportation fuel, which are intended for national distribution. With Rutgers University’s EcoComplex, EV coordinates a business/government/non-profit Work Group aimed at jump starting an RNG industry in New Jersey. The Work Group is identifying RNG project opportunities and recommending policy changes in preparation for a statewide public outreach campaign over the next year.

Gail Richardson, our VP for Programs, directs EV’s RNG-related research and outreach. She is a member of the RNG team for a large study of Future Transportation Fuels, which the National Petroleum Council is preparing at the request of U.S. Energy Secretary Chu, due for release in early March 2012.

We are eager to hear from members who can help us advance and find broader support for our work on this critical new energy frontier.

EV ON THE ROAD

March 10th. EV’s President conducted a Webinar for the American Council of Engineering Companies (ACEC) “Helping Communities “Green” their Bus and Truck Fleets: A Leadership Role for Engineers.”

March 16th. EV’s President, participated in a workshop for small businesses at Stonybrook University on Long Island, praising Long Island’s leadership in shifting their refuse fleets to natural gas and encouraging exploration of converting local organic wastes into natural gas fuel as well.

March 31st. EV and Pace Law School’s Energy & Climate Center launched a clean fuels initiative for Westchester Cy (NY) at a lunch in White Plains for business and municipal leaders. The goal: to bring the energy, environmental and economic benefits of shifting bus and truck fleets from diesel to natural gas fuel to the County’s 924,000 residents.

March 31st. & May 2nd. EV and its partner, Rutgers University’s EcoComplex, chaired the 4th and 5th monthly meetings of the New Jersey Renewable Natural Gas Work Group, a group of 30 government, business, and environmental leaders working to jump start a new “green fuel” industry to turn NJ’s heavy burden of organic wastes into a clean vehicle fuel solution.

April 14th. EV’s president was the monthly speaker at the Westchester County Assn of Municipal Public Works Administrators (a group of about 50).

May 13th. & June 8th. EV’s Joanna Underwood celebrated the opening of two new CNG refueling stations: in Williston, VT (see p.1) and in Camden, NJ. The Camden station will fuel 45 Waste Management trucks and other fleets, and will serve the public. (See EV website for more and photos: http://www.energy-vision.org/)
To read or download Waste to Wheels, go to EV's website: http://www.energy-vision.org/index.html.

For the report and for background materials and presentations from the DOE workshop, go to DOE's website: http://www1.eere.energy.gov/cleancities/waste_to_wheels.html.

To read or download Waste to Wheels, go to EV's website: http://www.energy-vision.org/index.html.

RENEWABLE NATURAL GAS PRODUCTION TAKING OFF

Cow Manure! A Great Source of Biogas and Fuel

In 2004, the Vander Haak family, owners of a dairy in Lynden, Washington, built, with public and private sector partners, the first commercial anaerobic digester in the state. It processes the manure from 1200 cows along with “fish trimmings” and other organic material, generating enough biogas to provide electricity for about 180 homes. The solids left behind are used on the farm as soil amendments and animal bedding, and the liquid stream is applied as a largely pathogen-free fertilizer. Costing $1.2 million, the payback from selling electricity would be ten years. So the family is exploring turning some of the biogas into vehicle fuel, which would bring a price 2 to 4 times higher.

The Vehicle Research Institute’s rule of thumb: each cow produces about 120 pounds of manure a day, which has the energy content of one-half gallon of gasoline!

Bay Area Landfilled Waste Fuels 400 Garbage Trucks

In 2009, Waste Management, owner of the Altamont landfill in northern California, and Linde, an international industrial gas supplier, built the world’s largest plant for upgrading landfill gas into liquefied natural gas (LNG) fuel. The plant cost $15.5 million, and it produces the equivalent of 13,000 diesel gallons a day which fuel about 400 refuse trucks serving 20 nearby communities.

Fuel From Municipal Waste Treatment Plant Sludge

An unusual 21 year partnership between the City of Flint Michigan and Swedish Biogas International (also involving other state, federal, and university entities) is extracting biogases from the Flint municipal wastewater treatment plant’s sludge (plus some added food wastes) to produce electricity, heat, and eventually pipeline grade gas and vehicle fuel. (Swedish Biogas is a prominent player in Sweden, where it owns 6 biomethane production plants, 16 public fueling stations, and 2 bus depots.)
Environmental Protection Agency’s Diesel Emissions Reduction Act (DERA). Fuel savings with the four vehicles powered by natural gas will total about $36,867 a year. Casella paid the full $354,000.00 cost of the refueling station.

CEO John Casella says the company is just getting started. It is installing two more natural gas stations (handling 16 compressed natural gas trucks each) in Geneva and in Hudson Falls, NY. It is also pursuing projects to produce the renewable form of natural gas (RNG) (see lead story p.1 on RNG) from local organic wastes. In Rutland, Massachusetts, Casella and the Ohio-based company, quasar energy, just collaborated in a $3 million project installing a digester at Jordan Farms to process the methane gases from its milking herd. This fuel will power a 300 Kw methane-fired generator set.

Casella’s Peter Vanderhoof with one of the company’s three new CNG trucks.