

Greenhouse Gas Technology Verification News

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Mariah Energy's Walker Court Live/Work Facility

Center to Verify New High Efficiency Microturbine CHP

GHG Reductions as High as 50% May be Possible

In October, the GHG Center announced plans to verify the performance of a new high efficiency microturbine combined heat and power (CHP) system in collaboration with Natural Resources Canada. Mariah Energy Corporation of Calgary, Alberta designed and installed the system at Walker Court; a 12 unit commercial live/work facility located in downtown Calgary. The unit will provide most of the electricity and all of the hot water required by Walker Court. The unit will also supply space heating, except during some of the coldest winter months, when a back-up gas-fired boiler will be used to supply up to 20 percent of the space heating required.

The Mariah CHP uses a Capstone MicroTurbine™ for electricity generation. It also contains additional systems and modifications to Capstone's Industrial housing to enhance sound control, a turbine exhaust heat recovery unit, and an integrated building energy management system. The system also provides on-site backup power with fully automated transfer to stand-alone operation in case of grid failure. (Continued on page 6, see CHP)

GHG Center to Host Technology-Focused Forum in New York

Hopes to Fill Ongoing Need for Technology Data By: Stephen Piccot, GHG Center Director

Having worked in the greenhouse gas emission area for 15 years, I've attended over 100 meetings and conferences on the subject. Most have focused on global change policy, climate change science, GHG emissions, and modeling analyses. Many have offered "expert" opinions on how industry should reduce their emissions (e.g., scenario analyses), while others promote mitigation/sequestration technologies that, in my opinion, are not yet viable. Although these types of meetings are important, the GHG Center's third-party verification activities have revealed to me that an increasing number of industry leaders want more specific information on GHG technologies that are available for use now.

If you need to reduce GHG emissions today, want to meet vendors and users of that technology face-to-face, or simply want to learn more about available technology options, come join several hundred others like you at the *Commercial GHG Technology*



Solutions forum in New York City (March 14-15, 2001). If successful, the forum will be the first in a series of international meetings that provide a platform for industry to learn and exchange ideas on commercial GHG mitigation. By attending

now, you can become a part of that effort in the future. (continued on page 4, see Forum)

Center Issues 2 New Verifications for Natural Gas Industry Technologies

The natural gas industry is the second most significant methane emission source in the US. Significant methane leaks are known to occur from field gathering, gas transmission, and distribution operations. In the transmission sector, pipeline operators use large gas-fired engines to provide the mechanical energy needed to drive pipeline gas compressors. Emissions from these compressors, most of which are reciprocating compressors,



A&A - Seal Assist System

are significant and occur from several sources, including blowdown valves, rod packing, unit isolation valves, pressure relief valves, and other small fugitive sources. A large source of these emissions is gas leaks from compressor rod packing.



C. Lee Cook - Static-Pac

In late September, the Center completed and published verification results for two technologies designed to mitigate emissions from rod packing

used on reciprocating compressors. The Static-Pac, offered by C. Lee Cook Division, Dover Resources, Inc. (Louisville, KY), is a gas leak containment device designed to prevent rod packing leaks from escaping into the atmosphere during pressurized compressor standby periods. A Phase II Verification Report, just issued by the Center, presents the final field verification of Static-Pac gas savings, methane emission reductions, and payback period. Field testing was conducted at an ANR Pipeline transmission station.

In late 1999, A&A Environmental Seals, Inc. (La Marque, TX), offered the Seal Assist System (SAS) for testing at an Enron operated natural gas compressor station. The SAS is designed to capture methane from leaking compressor rod seals, and route the captured gas into the compressor engine fuel line for use. The recently issued Phase II Verification Report presents the final field assessment of SAS gas savings, methane emission reductions, and payback period.

Verification Reports, Verification Test Plans, and a generic Verification Guideline document for compressor emissions can be obtained free from the GHG Center or ETV Program Web sites (refer to bottom of page 6 for these Web site addresses). The generic Verification Guideline document contains field tested verification protocols for determining GHG reductions and other performance parameters associated with natural gas compressor systems. Both detailed and simplified verification procedures are presented.

Policy Corner

COP-6 - Just Work It Out?

The big event since our last issue was the Sixth Conference of the Parties (COP-6) held this November in The Hague. Attended by over 6,000 participants from around the world, this negotiation was widely understood to be a make-it-or-break-it event for the Kyoto Protocol. Challenged to resolve many basic issues left unaddressed by previous COP negotiations, delegates seemed stymied and frustrated at the end of the first week, and although the COP president employed them to "Work it Out", disagreements and public bickering continued between the European Union (EU) and the United States, developing and industrial nations, and others with a major stake in the Kyoto Protocol. By the end of the first week many major issues remained; e.g., should carbon sinks and nuclear power be allowed to meet GHG reduction obligations, to what extent can flexibility mechanisms like the CDM be used to meet GHG reduction obligations, should developing nations make commitments to ensure their future emissions growth does not undo reductions made earlier by industrial nations, will developing nations be provided meaningful financial assistance for adaptation and other actions, and how will Kyoto compliance be dealt with. *(continued on page 4, see COP-6)*



**Frank Loy,
Chief U.S. Negotiator**



New Technology Verifications Planned in Refrigeration and Biomass Areas

KMC Controls (KMC) has agreed to submit the KMC Sight Glass Monitor for independent performance verification. The Sight Glass Monitor is a new low-cost monitor that is used on commercial- and industrial-scale refrigeration systems to identify when a system's refrigerant charge is low and, thus, when the system is in need of maintenance and possible repair (including leak repair). This is accomplished using an infrared-based detector that continuously monitors refrigerant properties through an existing refrigerant sight glass. A data logging and interpretation system developed by KMC can be used as part of the system, or the monitor can be easily interfaced into existing building management systems with data logging capabilities. Since the monitoring system is automated and potentially sensitive, use of the Sight Glass Monitor is anticipated to reduce leakage of refrigerant into the atmosphere by detecting refrigerant loss more quickly than current methods allow. In addition to the environmental benefits, early detection may reduce costs associated with excessive refrigerant loss, energy usage, and equipment damage. The Sight Glass Monitor will be verified under actual field use conditions during the spring of 2001, and its ability to reduce refrigerant loss relative to existing inspection and maintenance programs will be quantified.



The GHG Center is currently negotiating an agreement with Southern Company to conduct independent performance verification of a Utility-scale Biomass Co-firing System. The system uses switchgrass as a supplemental fuel to reduce the use of coal, and is comprised of a switchgrass fuel handling and direct-injection system, retrofit onto an existing 60 MW coal-fired steam boiler. Current plans call for the technology to be verified at Alabama Power's Gadsden Electric Generating Plant located in Gadsden, Alabama. A life-cycle verification approach has been designed to provide credible data for combustion efficiency changes due to the use of switchgrass, changes in criteria air pollutant emission rates, and GHG emission reductions due to the production and use of switchgrass. Field testing is scheduled for the spring of 2001, and results should be available near the end of the year.



GHG Center and Canada Explore Cooperative GHG Verification



The GHG Center, which operates under U.S. EPA's ETV Program, Natural Resources Canada (NRCAN), and the Canada Center for Mineral and Energy technology (CANMET), have begun to explore the possibility of conducting joint GHG technology verifications in the future. NRCAN, CANMET, and the Center are working closely on the Center's verification of a microturbine combined heat and power system (related story on page 1). Stephen Piccot, GHG Center Director said, "There is strong interest in Mariah's CHP technology in the U.S. and Canada, and it may benefit the vendor and Stakeholders alike if we work together to ensure verification addresses issues relevant to both countries. Of course, it also facilitates the transfer of innovative and high performance technology across North America, and that's good for the environment."

David Hajesz, from NRCAN's Technology Early Action Measures (TEAM) Program, said "TEAM has sponsored over 75 GHG technology projects and, for us, credible technology verification helps secure private sector acceptance, particularly when it comes to very new technologies. I like U.S. EPA's ETV model because it offers credible verification along with other important benefits. If Canada and the GHG Center can collaborate effectively on TEAM sponsored technologies, it will help vendors avoid duplicate verifications in both countries, ensure credible country-specific performance results are obtained, and allow the best technologies to penetrate a broader market." Rob Brandon, CHP expert at the CANMET lab in Ottawa said, "We have been evaluating microturbine CHP systems for several years, and look forward to making use of our expertise on this test, and working with the GHG Center to share verification expertise and protocols."

COP-6

(continued from page 2)

In the end, it proved to be too difficult to just work it out. Under the disappointed eye of the COP-6 Youth Delegation, and against a backdrop of charges of intransigence by U.S. and EU negotiators, COP-6 was suspended. Negotiations broke down over disagreements on the use of carbon sinks to reduce emissions (forest and agricultural projects), an option championed by U.S. negotiators but decried as environmentally unsound by some EU members. Kyoto Protocol enforcement mechanisms, including verification, and the extent to which market mechanisms should be used, were two other significant areas where agreement could not be reached.



Center Director, Steve Piccot Chats with U.S. Delegates at the GHG Center's ETV Booth in The Hague



Youth Delegation presents Flag and a Message to COP President, Jan Pronk

In spite of the disappointment, the door was left open to reconvene COP-6 in 2001. "We will not give up," said Frank Loy, chief negotiator for the U.S. "The stakes are too high, the science too decisive, and our planet and our children too precious." Representatives of one Democrat and one Republican U.S. senator in attendance suggested that, regardless of the outcome at COP-6, the stage now seems set for the U.S. Congress to address the greenhouse gas issue in ways that account for economic and environmental factors. As this occurs, the GHG Center will play an increasingly important role as it continues to locate promising GHG mitigation technologies, subject them to independent performance testing, and report performance results to the purchasing public.

GHG Technology Verification News will continue to track legislative developments in the U.S. congress, the UN, and elsewhere, and provide reports here in the Policy Corner.

Forum

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As explained by David Hajesz of Canada's Technology Early Action Measures (TEAM) program, "The forum is about real people, in the real world, doing real GHG mitigation projects. It's consistent with TEAM'S focus to support the development of clean technologies we can use now, which is why we are a major co-sponsor of the forum. Of course, we hope to showcase new Canadian GHG technologies developed through the help of TEAM, and verified by the GHG Center." Robert Stokes, Vice President of Gas Technology Institute (GTI), an organization formed by the merger of Gas Research Institute (GRI) and Institute of Gas Technology (IGT) has indicated, "We are excited to be co-sponsoring this event. GTI continues to bring new gas technologies to industry and individuals, and we see this as a good way to get the word out about the GHG and economic benefits these technologies bring." (continued on page 5, see Forum)

Technology Areas Addressed

- Biomass Utilization
- Distributed Electrical Power Industry
- Electrical Utility Industry
- Energy End-Use Efficiency
- GHG Emission Monitoring
- Microelectronics Industry
- Municipal Solid Waste Management
- Oil and Gas Industry
- Refrigeration Industry
- Transportation Industry

Other Areas

- GHG Trading and Verification
- National GHG Reduction Plans
- Company-Specific GHG Reduction Plans

Forum

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Other major co-sponsors of the forum include Southern Company, Consolidated Edison of New York, SUBBOR/Eastern Power of Toronto, and the U.S. EPA's Natural Gas STAR Program.

The forum, organized and hosted by the GHG Center, will include speakers from several countries, representing over 50 different organizations (see text box). Over half of the speakers will describe GHG mitigation and monitoring technologies that are available for use now, while others will offer perspectives on GHG mitigation from the technology users point of view. Technology applicable to oil and gas facilities, the electrical power industry, the biomass use industry, municipal solid waste management industry, and others will be described and displayed.

Through aggressive promotional efforts, North America will be well represented, but we have offered special inducements to bring technology vendors and purchasers from western Europe, eastern Europe, and Asia, broadening opportunities for both vendors and users alike.



Well known technology vendors like Ballard Power and Honeywell Power Systems are participating, but vendors unknown to you will also be there to describe interesting new developments. Although technology is the primary focus, expert panel sessions addressing topics on GHG trading, monitoring, verification, and certification will also occur.

If you want to know more, or keep track of developments related to the forum, log onto the GHG Center's Web site and click on the GHG forum icon (www.sri-rtp.com). Space at the forum is limited, so register soon.

Center Moves Location of Honeywell Microturbine Verification

After working for a year to arrange verification testing of Honeywell's Parallon® 75 kW Turbogenerator at an Enron gas transmission station in Florida, the test location was moved and testing is now underway. "There were unanticipated complications with connecting the turbine to the grid at Enron's Florida site, and this threatened to further delay testing for an unspecified amount of time" said Sushma Masemore, microturbine Project Manager for the GHG Center.

The new test site is located in the Washington, DC area, where a turbogenerator was recently installed on a commercial building on the campus of the University of Maryland at College Park. The building is part of a project run by the Center for Environmental and Energy Engineering, which is managed by the University's Mechanical Engineering Department. The GHG Center, through a consortium of public and private sector participants (which now includes the GHG Center), is using the building to evaluate high efficiency building systems and new energy production technologies. A Test and Quality Assurance Plan, prepared specifically for this verification, is now available on the GHG Center's Web site.



Microturbine test site in College Park, MD

Speakers

Ballard Generation Systems
 British Petroleum (BP)
 C. Lee Cook
 Canadian Climate Change Secretariat
 Canadian Technology Early Action Measures Program (TEAM)
 Center for Environmental and Energy Engineering
 Conoco, Inc.
 Conoco Canada Limited
 Consolidated Edison of New York
 DynaMotive Technologies
 Ecogas Corporation
 EMCON/OWT, a Unit of the IT Group
 Energy Products of Idaho
 Enron Corporation
 Environment Canada
 Environmental Financial Products
 Environmental Interface, Ltd.
 First Environment
 Gas Technology Institute
 Greenx, Inc.
 Highland Energy, Inc.
 Honeywell Power Systems Inc.
 Industrial Center
 IOGEN Corporation
 KMC Controls
 KPMG London
 Laser Imaging Systems
 Mariah Energy Corporation
 MIRATECH Corporation
 Nextex
 NJ Department of Environmental Protection
 Ontario Power Generation
 Pacific Advanced Technology
 Siemens Westinghouse Power Corporation
 Solid Waste Association of North America (SWANA)
 Southern Company
 Stuart Energy
 Super Blue Box Recycling Corp. / Eastern Power, Ltd.
 Texaco, Inc.
 U.S. EPA Landfill Methane Outreach Program
 U.S. EPA Natural Gas STAR Program
 U.S. EPA Office of Research and Development
 U.S. EPA Office of Solid Waste
 Unocal Corporation

CHP

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In addition to the building's innovative energy management system, Walker Court features residential living above commercial bays, complete with full basements. A concrete shell and slab floor heating system provide a quiet and energy efficient space for living and work.

Mariah's contract with tenants will include delivery of heat and power, and Mariah will retain all responsibility for operation and maintenance of the building's energy systems. Unit owners simply receive monthly statements indicating the amount of heat and electricity consumed (as they do presently from conventional utilities), as well as an estimate of emissions displaced in the previous month. According to Paul Liddy, Mariah Energy President, "Mariah's commitment is to maintain prices for both heat and power lower than those experienced by residents in traditional condominiums."



The Mariah CHP at Walker Court

"I'm really excited about this" says Stephen Piccot, GHG Center Director. "This is one of the most appropriate uses of microturbine technology, and is the kind of technology innovation the Center was established to verify. We can only estimate at this point, but Mariah's unit may have a potential energy conversion efficiency of 70 to 80 percent, and with that, the technology could simultaneously reduce GHGs by 50 percent and still provide building tenants with high quality energy at a competitive price. That's a big gain with little pain, and it's possible that emissions of some conventional air pollutants will be reduced to an even greater extent."

The GHG Center is currently developing a Verification Test Plan, and will be performing measurements later this winter at the site in Calgary. The Center plans to verify the power quality, energy efficiency, air emissions, and GHG emission reduced at Walker Court. Using verification protocols developed by the Center, and measurements collected at Walker Court, GHG reductions for other potential locations in the US and Canada will also be estimated.

This verification will be conducted in collaboration with several Canadian governmental agencies (related story on page 3).

Mariah CHP Verification Parameters

Energy Efficiency

- Electrical Efficiency
- Thermal Efficiency
- Total Energy Conversion Efficiency

Power Quality

- Power Factor
- Electrical Frequency
- Voltage Transients
- Voltage and Current THD

Air Emissions

- NO_x, CO, VOCs, CO₂, and CH₄ Emission Rates

GHG Emission Reductions

- Mariah CHP GHG Emission at Walker Court
- Baseline and Model Facility GHG Emissions (U.S. and Canada)

Says Paul Liddy, "We have just established an agreement with Capstone to deliver 126 microturbine units over the next two years. We are already experiencing a strong interest in our system, and are augmenting our fabrication capabilities to meet what may be a sharp and growing increase in new installations and retrofits over the next 5 years."

The GHG Center is also evaluating other microturbine technologies and is in the process of forming a Stakeholder Technical Panel to focus specifically on distributed generation (DG) technologies, including the Mariah CHP verification. The role on the panel would be to actively assist the Center in planning verification tests, reviewing Verification Test Plans and Reports, identifying good verification candidates for future tests, and disseminating the performance results widely.

Contact the GHG Technology Verification Center by calling Stephen Piccot at Southern Research Institute (919/806-3456), or David Kirchgessner at the U.S. EPA (919/541-4021). Additional information can be viewed on the GHG Center Web site at www.sri-rtp.com or the U.S. EPA ETV Program Web site at www.epa.gov/etv

