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Environmental, Energy & Technical Committee Meetings

September 13-14, 2011
Radisson Hotel, Reagan National Airport
Arlington, VA
(703) 920-8600

M I N U T E S

TUES-WED September 13-14, 2011

Technical Focus Group

Advanced Technology for Heat Recovery and Coal to Natural Gas Conversion
Eric Hallman, Cargill Inc., Moderator

Getting More Heat Out of the System
Robert (Bob) Stemen, Applied Heat Recovery, LLC

Heat recovery devices include economizers, air heaters, superheaters, and other heat exchangers to capture heat. Starting with economizers, the role of these heat exchangers is to recover heat from the flue gas. Heat loss from the flue gas at 350 F, using 80 F as the baseline, amounts to 21.9 MMBTU/hr for 300,000 lb/hr of flue gas. At 8,000 hour/yr, this amounts to nearly $875,000/yr. This simple calculation doesn't take into account other factors such as corrosion, heat transfer properties, and materials costs. For example, water that is to be heated up by cooling the flue gas, normally contains dissolved oxygen. This oxygen corrodes the inside of the tubing. Deaerating the water usually means heating the water up to around 250 F. That means that the gas must be at a temperature higher than 250 F plus some temperature difference between the gas and the water in order to drive the heat transfer process. Condensate returns, blow down, excess air, all impact the overall efficiency of the boiler. For additional heat recovery, condensation of the water in the flue gas must be taken into account.

In gas fired units (i.e. very, very low sulfur fuels), a stainless steel (304) secondary economizer can be used to heat raw water that is used for make up to the system. The use of stainless avoids the corrosion problems. The stack temperature can be reduced to 200 F. Provided that the stack can handle this flue gas, some 8 MMBTU/hr can be recovered. When there is ash and sulfur in the flue gas, the materials and the design must consider the amounts and corrosion rates in the system.

For these reasons, most coal fired applications do not get down to condensing temperatures. For gas fired units, if there is a place to put the heated water and a source of cold water, a secondary economizer may be an opportunity to recover some additional heat from the system. Space can be a consideration, but the secondary economizer can be located in the stack. Either a stack liner, or a suitable stack material needs to be considered. The condensate will likely be acidic and a sump and water treatment for the condensed water in the stack will be needed.

Advanced Heat Recovery System

Chris Giron, Cannon Boiler Works

Cannon Boiler Works has licensed some technology from the Gas Technology Institute for heat recovery in gas fired units. The system deploys a ceramic tube heat recovery system to provide a condensing heat exchanger. The system recovers sensible heat, latent heat, and water. Make up water to the boiler on the inside of the tubing. A partial vacuum is used to draw water from the flue gas through the ceramic tubing into the boiler water. The system is suitable for those systems with more than 35% make up rate (less than 65% condensate return).

The transport membrane economizer is combined with a low temperature economizer and called Ultramizer. The first system was designed for 300 boiler horsepower. The savings can include the cost of raw water (about 5 - 10% of the makeup), as some of the water in the flue gas is recovered. The ceramic tubes can have a long life, but they are brittle (ie dropping heavy equipment or tools on the tubing will break the tubes). Condensed water that drips from the outside has a pH of about 3.7 and must be treated for disposal. There are currently about 10 installations.

The patent license covers up to 3000 boiler horsepower. GTI is doing R&D on both larger and smaller sized applications. GTI also has a coal fired applications. The ceramic tube is made by extruding an initial ceramic tube which is followed by dipping the extruded tube into additional ceramic coatings to add two layers of coating to the tubing.

Coal to Natural Gas Conversions on Stoker Boilers

Robert (Bob) Morrow, Detroit Stoker Company

In the early 1990s, the automotive industry and the tobacco industry were changing over some of their plants to lower steam requirements. For economic reasons, these companies were looking at firing natural gas, but making use of existing equipment. By removing the grate and installing a vertically fired gas burner, the existing boiler equipment can be used.

For a recent 100,000 pph unit, the grate, the feeders, the overfire air, the ash removal system, and the conical bottom were removed. A flat floor with a vertically mounted gas burner was installed. A gas recirculation system was added for potential oil firing. The ash removal system, the hoppers, the ESP, and the ash reinjection system were all removed. The overall cost for the 100 kpph boiler system was estimated at $800 - 900 K in today's cost. For a recent 70 kpph unit the cost with installation was in the range of $400 - 500 K.

Some units are looking at co-firing gas with the stoker. This involved horizontal firing. In conjunction with this conversion, a 20 kpph unit was converted to gas. The grate was removed and a horizontal burner was used. This unit was converted for about $270 - 300 K. Many of the customers realized savings from reduced personnel and operating costs (fuel handling, ash handling, emissions controls, etc.).

For these existing units, the boiler efficiency is reduced partly due to the loss of radiation and partly due to increased moisture loss. The conversion can be done in 18 weeks. The overall process from

permit to operation was on the order of a year. As the units went from coal to natural gas, the emissions of sulfur dioxide and particulates went down. As emissions were generally lower, NSR was not triggered.

Robert (Bob) Corbin, CIBO Consultant, asked the group about topics for future Focus Group Meetings. In December, the Focus will be on the Energy Assessment requirements associated with the MACT rules. Topics for next year include water issues (availability, discharge requirements, intakes, etc.), Boiler MACT compliance, energy efficiency economics, and conversion of solid fuels to natural gas. Package boiler design considerations (including transportation) could be an interesting topics. Expanding the scope a little to plant wide equipment might include RICE requirements, record keeping, supply chain efficiency, and other factors involving plant operations.

ENERGY COMMITTEE SESSION

Frederick (Fred) P. Fendt, The Dow Chemical Company, Energy Committee Chairman
Robin Mills Ridgway, Purdue University, Energy Committee Vice-Chairman

Energy Assessment Protocol – Michael (**Mike) Budin,** TRC Environmental

The idea is to be a little up front and develop a framework for the protocols for both the Area Source MACT and the Industrial Boiler MACT. The requirement is a one time, beyond the floor standard to identify cost effective, energy conservation measures. All major sources and all existing area sources over 10 million BTU/hr are subject to the rule. The rule defines one day, 3 day, and longer assessments depending upon size. The breakpoints are 34 MMBTU/hr, 114 MMBTU/hr, and larger based on actual annual usage.

The assessment covers the boiler and the energy use system. This included process heating, compressed air, machine drives, process cooling, and other plant uses. The boiler system includes the boiler and most of the components including the air, fuel, and combustion control systems. Cost effective energy conservation measures will have a simple payback of 2 years. Energy Star is not a requirement, but is recommended.

A visual inspection of the boiler, operating characteristics, specifications of energy using systems, operating and maintenance, inventory of major energy consuming systems, recommendations for improvements, list of energy conservation measures, payback estimates, and a report. A qualified energy assessor is required. The requirements for the assessor are mostly related to the boiler. The capabilities and knowledge requirements are mostly related to the boiler system.

CIBO has commented to EPA that the assessment should be limited to the boiler steam system. Another possibility might be to use the EPA boiler system definition with the restriction that the system applies to steam use rather than energy use. The DOE source book recommends evaluating excess air, heat transfer surface, heat recovery, water treatment, heat losses, and deaerator vent rate. On the distribution side reduce steam leaks, reduce vented steam, insulation, steam traps, substitutions, condensate recovery, high pressure condensate to steam, turbines, combined heat and power, and equipment insulation. (The CIBO "Energy Efficiency Handbook" at www.cibo.org could be a good place to begin).

The MIT Natural Gas Study - **Joseph (Joe) Hezir**, MIT

The MIT study on The Future of Natural Gas was a 2 year study conducted by the MIT Energy Initiative. The study was divided into 3 parts: supply, market models, and technical issues impacting demand on a sector by sector basis. On the supply side, there is a lot of gas, but there is a lot of uncertainty on the recoverable levels. The supply did not include unconventional gas in other countries (not available at the time). Even so, there could be over 100 years of natural gas supply available.

There is a wide variation in the initial production rate and break-even price. For any given field, the break-even price can run from as low as $3/MMBTU to as high as $17/MMBTU. For a shale gas well, there are permits, site prep, drilling and casing, perforation and fracture, flow back of fracture fluid, and well production. Most of these wells are over 1 mile deep. There were some issues raised about ground water contamination and other environmental problems. Further examination revealed that these problems were more related to typical drilling issues rather than specific to shale gas. Gas that is one mile deep is not likely to be migrating into groundwater.

For a more optimal long term development, a better understanding of shale gas science and technology is needed. More specifically, the water use and disposal are the more likely problems needed to be addressed. Looking out even further, methane hydrates could eventually be a source of natural gas, however, not in the near future.

The natural gas system parts studies included carbon constraints. One study looked at price based mitigation of 50% reduction by 2050 with no offsets. Under this scenario, coal use in the electric sector is nearly eliminated. Gas initially picks up, but is subsequently replaced by nuclear (pre-Fukushima). Demand reduction occurs due to higher prices for electricity. With 25% renewables and 55% coal retirements, coal remained in the system but gas and nuclear were up.

The natural gas supply situation has increased the potential for natural gas substitution for coal in the economy. One aspect of the study showed that existing natural gas plants could be operated at higher capacity factors, allowing the shut-down of older coal fired plants. The estimated cost would be on the order of $16/ton of CO2 reduced. About 20% of the power sector CO2 emissions could be reduced in this manner with no new capital funding requirements. Large scale penetration of intermittent wind power forced cycling on both gas plants and coal plants.

Industry represents about 35% of gas consumption, or 7.4 TCF. The bulk of the use was for process heating, followed by boiler use and combined heat and power. Looking at gas fired boilers with nominal 80% boiler efficiency; there are some opportunities for replacement of these units with higher efficiency units (90 - 93% boiler efficiency). For existing coal fired boilers, there was also some opportunity for conversion to gas with both conventional and high efficiency boilers. Using EPA's cost estimates, it was calculated that the conventional gas boiler was more expensive than adding controls to the coal fired plant.

The higher efficiency boiler had a modest opportunity to impact replacements. Currently, the relative prices of oil and gas are distorted from historical values. This price spread provides a potential for compressed natural gas substitution. However, with current prices for the equipment as well as costs of the fuel, the economics did not appear to work out. Truck fleets with high annual mileage use

might possibly make some economic sense. With increased power use, there will be a need for more gas storage in the US. For a full copy of the report visit www.web.mit.edu/mitei/research/studies/natural-gas-2011.shtml. For questions, send to askmitei@mit.edu.

Combined Heat and Power Policy Development - **Robert D. (Bob) Bessette,** CIBO

CIBO has had policy statements about combined heat and power in the past. Bob would like us to send comments and markups on these statements so that we can finalize a new policy statement for CIBO on combined heat and power. Energy efficiency and combined heat and power are likely topics for new legislation.

ENVIRONMENTAL COMMITTEE SESSION

Maxine D. Dewbury, The Procter & Gamble Company, Environmental Committee Chairman
Robert (Rob) Kaufmann, Koch Companies Public Sector, LLC, Environmental Committee, Vice-Chairman

Introductions and Meeting Minutes - **Maxine D. Dewbury,** The Procter & Gamble Company

The minutes from the last meeting were approved as written.

Boiler MACT Slate of Rules - **John C. deRuyter**, E.I. DuPont de Nemours & Company

The Area Source Rule has not been stayed. Affected units need to file with the EPA by Sept. 17th. Natural gas units have been exempted. However, if the unit has oil back up, the unit would have to file an initial notification by the 17th. Use of oil is limited to 48 hours per year. If the unit uses more than 48 hours of oil and has not made a notification, the unit becomes a new unit and is subject to new unit rules (which are more stringent). There are indications that EPA might be delaying the tune up compliance date. In order to keep the options open, it would be a good idea to submit the initial notification by the 17th.

The Major Source MACT and the CISWI MACT were stayed on May 18th. When the effective date got delayed, the rest of the dates got delayed as well. EPA plans a final proposal for the end of October. The rule would then be finalized next April. For those units that went for a case by case permit under Section 112(j), those units got up to 8 years until they needed comply with the new rule. However, if those units had to apply for a new Title V permit, the EPA might be able to insist that the proposed final rule would take precedence.

Amy Marshall, URS, reported that in a meeting with EPA, there was a lot of discussion of on the detection levels and the reported data. EPA is going back to do some QA/QC on the test reports to make sure that the data that is being used is actually correct. Variability is also an issue. AF&PA is conducting some studies on biomass units. EPA needs data this year in order to incorporate any results into a finalized rule by April 2102. EPA did hear from the testing companies that indicated that it was very difficult to get a reliable number for dioxin/furan. This would tend to strengthen the case for using a work practice standard for dioxin/furan. With regard to the definition of a fuel (as opposed to a waste), there are likely to be 3 significant criteria for a material to be a fuel. These are (1) the material is not hazardous, (2) there are recoverable BTUs, (3) and the EPA is notified. Legislation is

being considered to confirm this definition. There are state issues as well. If a state has defined a material as a waste, then the material will be considered a waste and cannot be used in a boiler as fuel. With PM CEMs, there is a problem with units that burn a variety of fuels. Light scattering devices would have to be calibrated for each different ash material. Further, it is difficult to get enough sample on the filter paper in 15 minute samples.

House Bill HR 2250 was reported out of committee without amendment. This bill puts the date of issue at 15 months after the enactment. Under the legislation, all 4 rules are stayed pending the issue of the new rules. Also, Section 112 (g) and Section 112 (j) are rejected as being applicable during that time. Net employment impacts would need to be considered. The proposed legislation would revert to the 2000 CISWI rule with regard to waste incineration. The achievability requirements include standards that can be achieved in actual practice while meeting all other emissions standards as well as taking into account variability. There is a companion Senate bill that is basically the same, except that the Senate bill contains a list of secondary materials that would be considered fuels. This is less desirable as there would always be some material that is left off.

Lisa Jaeger, Bracewell & Guiliani, L.L.P. reported that there was only one amendment to be considered. This amendment was proposed by Congressman Waxman and would have negated some of the provisions of the "achieved in actual practice". The amendment was defeated. Optimistically, there could be a bill on the President's desk by the end of the year. Should the President sign a bill, it would be 15 months after enactment for an EPA rule to come forth. Further, compliance would be 5 years, not 3 years. This would put compliance out to 2018. The Senate bill will not come out of committee. However, if the House passes a bill, the Senate will have to take it up. How this comes about remains to be seen. Of course, even if a rule is issued by EPA, there would likely be litigation.

On the litigation front, the Boiler MACT and the CISWI rules were stayed. As a result, the litigation suits are being held in abeyance. Although the Area Source rule was not stayed, the court stayed the law suit as well. For the definition of solid waste, that suit is going forward. At the present time, there is not a schedule on this suit as yet. These are the basic 4 cases. The EPA claimed completion on the MACT rules. This "completion rule" has been challenged by the environmental groups. EPA has asked the Court to dismiss the suit. There are 2 stay cases. The environmental groups sued EPA over the stay. They sued in two different Courts. The DC Circuit Court is held in abeyance. The District Court filing is going ahead. EPA has asked for dismissal and that the case belongs in the Circuit Court. The original Area Source case has also gone to the District Court to compel EPA to enforce the Area Source rule. The PC MACT (Portland Cement) oral argument is coming up on Oct. 11th. Many of our issues are in play. After that, the EPA will reissue the rules. On Nov. 16th, the Utility MACT will have to be finalized. The next date is the end of April for the final rule on Industrial Boiler MACT.

Utility MACT Comment Update - **Lisa Jaeger**, Bracewell & Guililani, L.L.P.

Lisa did not get the information she was looking for on the Utility MACT. Amy Marshall noted that the environmental groups have posted the usual complaints and comments to EPA. The unions are concerned about jobs. This may carry some weight with the Administration.

NAAQS Update – **Joseph (Joe) Stanko**, Hunton & Williams

Over the last decade, the standard setting process for NAAQS has moved towards a continual tightening of the standards every 5 years. EPA has shifted from a view that there is a threshold below which there are no effects to a view that there are always effects at any concentration above zero. Thus, even though the epidemiological studies are showing weaker and weaker significance levels in their studies, as long as some potential impact is discerned, EPA has taken the position that these impacts are potentially real. The other trend is the ever increasing use of modeling at the expense of monitoring for attainment designations and permit applications. This modeling approach has been used to estimate the background levels of ozone rather than utilizing measurements from monitors in remote areas. The modeling came up with lower background level calculations, which not only provides for potentially lower standards but also inflates the benefits calculations (because anything below background cannot be used to estimate health benefits).

On the ozone issue, there was a reconsideration of the 2008 ozone standard (which was set at .075 ppm) in 2010. The administration thought that the reconsideration would be quickly handled. However, since a reconsideration is not a requirement, but a policy decision, it left the door open to consider costs. It was pointed out that if the remote monitors were used to establish the background levels, more than half the benefits were wiped out. Further, EPA has been calculating benefits using levels below the NAAQS standards. Finally, with all of the standards being proposed, it is likely that some of the benefits are being counted more than once (for example, contingent benefits of PM2.5 reductions). With the current economic conditions, the Administration was able to pull back on the ozone issue since the reconsideration was not a requirement. Interestingly, the proposed CO standard is outside of the CASAC range. The language is basically the same as that used by Administrator Johnson for the 2008 ozone standard.

There are also proposed secondary standards for SO2 and NOx. The PM2.5 standard is on track to be issued. The current standard is 15 and the options appear to be 12 or 13. The lower level would start to approach a national non-attainment region. EPA now has to implement the 2008 ozone standard. They had proposed to accelerate the implementation. States have complained that the implementation plan was too fast and could not be done with state resources.

Cross State Air Pollution Rule - **Russell Bailey**, Trinity Consultants, Inc.

The Cross State Air Pollution Rule (CSAPR) is the update of CAIR. Several industrial units are impacted by the rule as they are either selling power or come under the NOx SIP Call. The rule is a transport rule and is referred to as the transport rule throughout the document. The name change was done at the 11th hour and was not changed throughout the document in order to avoid a publication delay. The transport rule implements a "good neighbor" policy on the part of the states. This is essentially that emissions from one state should not contribute to non-attainment in another state. The rule deals with 3 old NAAQS (1997 8 hour ozone .08 ppm, 1997 PM 2.5 annual 15 microgram/m3, and 2006 PM2.5 24 hour 35 microgram/m3).

As the NAAQS get modified, the requirements will be modified. The Transport Rule impacts most of the states east of the Mississippi. EPA avoids comparing to CAIR. The emissions reductions are based on the absence of the CAIR rule. However, the benefits calculations do not include the costs that were already expended to meet the CAIR rule. This has the effect of lowering the cost of CSAPR

while claiming maximum benefits. State budgets were modified, but some of these levels took into account state actions that were already in place. Overall, the total budget reductions may be on the order of 10 - 15% lower than the CAIR rule. However, the impacts on individual facilities can be quite different. Trading is severely limited under CSAPR. Further, the allowance allocations are quite different and may not be available.

The ozone season still runs from May 1 to Sept. 30. Budgets are calculated for each year. The basis for the reductions were the $/ton cost estimate and the pace at which controls can be implemented. The allowance cost level was estimated to be $500/ton for SO2 and NOx. Banked credits from CAIR cannot be used. Acid Rain credits have been devalued. EPA believes that there are substantial reductions available in the Industrial area for $1,000/ton. The new date for applicability is Jan. 1, 2005.

The rule applies to EGUs serving a generator of nameplate rating of 25 Mw producing electricity for sale. States can lower this rating to 15 Mw. The exemptions are essentially the same as CAIR. The definition of fossil fuel for this rule has been expanded. Any fuel that has an item of fossil origin is a fossil fuel for this rule. This is also a "once in, always in" rule. The allocation approach is based on a unit's historic heat input and maximum historic emissions.

Assurance provision start in 2012. The penalties have increased to 2 allowances/ton for every ton above a state's assurance level. EPA is finalizing FIPs for each state. The Assurance level is to take into account variability in a given state. This approach allows a state to miss the budget due to "normal" variability (ie a cold winter) without getting into the penalty situation. The penalty is in addition to the allowances already turned in (essentially a 3 to 1 penalty for those that are over).

Although most industrials are not included in this round, the industrials are "queued up" for future reductions. The EPA believes that the utility units have limited additional reductions between a cost of $500/ton and $2500/ton for NOx. They think that industrial units have significant reductions available at $1000/ton for NOx. There are some "orphan" industrial units from the NOx SIP call. These units were allowed in CAIR for trading, but are not allowed in the Transport Rule. Thus, allowances for them are not available. Those units that were buying allowances for compliance could be left out.

GHG Regulatory Developments - **Maxine Dewbury**, The Procter & Gamble Company

The GHG Reporting Rule requires report GHG emissions by the end of this month. Due to comments on the confidential business information, the EPA has deferred some of the requirements to either 2013 or 2015. These requirements stem from the methods used to estimate the GHG emissions (as opposed to measurements). EPA wants the inputs to the calculations and to make these available to the public (in order to verify the emissions). The Tailoring Rule remains. Biomass has gotten a deferral for PSD or Title V permits. There have been no changes to the EPA BACT guidance thus far. There was a biomass guidance document issued in March of this year.

EPA is proposing a GHG Utility NSPS. No details are available. The schedule was for Sept. 30th, but the proposal is not at OMB as yet, so a delay is likely. A refinery NSPS is scheduled for December. A few states have adopted Tailoring Rule Thresholds. There have been a few cases of units that applied for permit long before some of these new rules have been instated. The Avenal Case in California for a 600 Mw combined cycle plant was delayed for a number of years. The owner

sued the EPA for not issuing a permit within 12 months (statutory requirement). The court ruled in favor of the plant and EPA issued the permit without GHG and the new NOx NAAQS requirements. The environmental groups petitioned against the permit. They were recently denied and the permit was finalized.

Cooling Water Intake Structure Rulemaking - **Ann McIver**, Citizens Thermal

The comment period was extended to the middle of August. These comments range from form letters to specific comments such as "one size fits all" is not workable, cost impacts, and flexibility. Hawaiian Electric submitted 354 pages of comments. EPA now has to evaluate the comments and finalize the rule. States are looking at their water quality standards as well. Water treatment facilities are having trouble meeting some of these standards. Water is becoming a major issue.

RCRA Ash - **Gary Merritt** – Inter-Power/AlhCon Partners, L.P.

A substantial number of Congressman have sent letters to the President and the EPA recommending regulation under sub title D (non-hazardous). The major utility and coal associations are lobbying both houses of Congress for legislation supporting this approach. OSM is planning on coming out with a rule next year on placement of ash in mines.

Litigation Update - **Lisa Jaeger**, Bracewell & Guililani, L.L.P.

There were five climate cases. They have been reduced to four. The mandatory reporting is still in abeyance. The endangerment finding is going forward. The reply briefs are due 10/17/2011 and the final briefs on 11/14/2011. The PSD Interpretive Rule (Johnson memo) is going forward. The EPA response is due Sept. 16th. The Tailoring Rule and the PSD Rule were consolidated. The HMIWI case was decided. The NSPS cases will result in the new rules proposed for NSPS. On the Ozone NAAQS, the White House has withdrawn the proposed ozone rule. The question of the legality of the reconsideration is still outstanding. On the SO2 NAAQS, the opening brief (industry) was filed at the end of August. The EPA response brief is due at the end of October. At this point, the argument is about procedure (notice and comment). The issue of "monitoring vs modeling" would have to be resolved during any remand process. For the Portland Cement MACT, oral argument is set for Oct. 11, 2011. The RICE MACT is held in abeyance.

GOVERNMENT AFFAIRS SESSION

Anthony Reed, Archer Daniels Midland Company, Government Affairs Committee Chairman
Karen Neale, Hummingbird Strategies, LLC

The major effort has been to get bipartisan support of the legislation that has been proposed to provide EPA with the time to address the substantive comments that have been submitted to them. The full House is expected to bring the bill to the floor on October 3rd. The House will likely pass the bill. The focus is on the Senate. The goal is to get as much bipartisan support as possible. The coal ash legislation could be taken up in the October-November time frame.

Karen Neale reported on Energy Efficiency activities. There is a legislative proposal to promote energy efficiency by a joint program with utilities and industrials. The proposal would involve tax credits to the both the utility and the industrial entity to promote combined heat and power

opportunities. In this program, the utility would put up to 50% of the cost of a CHP facility along with the industrial. The utility would get their cost added to their rate base. As the plant operates, the investment tax credit is paid back. The industrial owns the facility. This legislation may also be considered in the same time frame.

There is also a proposed Regulation Moratorium and Jobs Preservation Act of 2011. We will learn more about that this afternoon.

Next Technical Focus Group/Environmental & Energy Committee Meetings
TUESDAY & WEDNESDAY, December 6-7, 2011

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