**Fuel-Gas Gains... an “Efficiency Resource”**

An Energy Management Workshop, spearheaded by CETAC-WEST and held at Kananaskis Jan. 15-17 drew more than 100 participants representing petroleum producers, gas-plant operators, technology providers, government, regulators and NGOs.

The event also was sponsored by the Petroleum Technology Alliance Canada (PTAC), Environment Canada and the “Markets Partnership.”

The gathering, the fifth of its kind in recent years, attracted participants from Canada, the United States and Mexico, who during the workshop heard how annually an estimated $5 billion of fuel gas is used in field-gathering systems and processing plants in Alberta alone. They also heard how integrated energy audits, initiated by CETAC-WEST, of 18 such Alberta facilities found that with improved energy efficiencies, up to 15 percent of that royalty-free fuel gas could be saved and sold. With some exceptions (notably straddle plants) the fuel gas is not even accounted for in producers’ or processors’ operating costs.

Even larger opportunities for fuel-gas savings exist beyond Alberta. If Canadian figures are extrapolated worldwide, fuel-gas consumption is likely to be worth around $75 billion/year but could very well be higher due to the different level of maturity of facilities and reserves in other countries. On the basis that 10 percent of this could be saved through improved practices and better technology, we are looking at a savings of about $12 billion a year.

CETAC-WEST, through workshops and other means, has been in the forefront of encouraging more responsible fuel-gas use. As Alberta’s gas fields age, fuel gas represents an increasing portion—now 10 percent vs. eight percent five years ago—of the volume and value of overall natural gas production.

“Who has stewardship of that resource?” asked Blaine Lee, in moderating a workshop panel of government and NGO officials. Lee then suggested: “We’re all stakeholders in this major challenge of fuel gas.”

Panellists included John Rilet, Director of Energy Efficiency and Conservation with Climate Change Central (C3), an Alberta-based public-private partnership focused on global climate change. Rilet noted that due to increased activity, particularly in the oil sands, recent greenhouse gas (GHG) emissions forecasts by Alberta Environment, C3 and the Pembina Institute now place Alberta on a path toward faster CO2 emission increases than those Alberta Environment predicted as recently as 2000.

But, Rilet said, improved efficiencies in the conventional upstream oil and gas sector, under one scenario, could lower projections by as much as 50 megaterranes a year by 2050 (see Fig. 1 on page 2).

“Upstream oil and gas efficiency is a significant piece in that projection. We’re talking about hundreds of millions of dollars in potential cost savings or enhanced revenue if we get this fuel gas into the pipeline and out to consumers,” said Rilet.

Rilet said: “When industry puts its mind to it, it tends to do it very well. Should government or business take the lead in delivering an aggressive response to the annual estimated $5 billion-worth of the fuel gas used during petroleum producing and processing in Alberta? An industry conscious of the bottom line and of the need to anticipate public concerns, rather than Governments and regulators, seems the better bet, judging by panel discussion at the Energy Management Workshop. It was one of a series of such events organized by CETAC-WEST in recent years aimed at improving fuel-gas efficiency. The events also have become venues for introducing new technologies, policies and practices leading to more responsible fuel-gas use.

During a panel discussion, Michael Burke, Director of the Industrial Programs Division of Natural Resources Canada, stressed the business case for energy conservation, but also listed several hurdles to better energy management. They include a lack of access to capital and perceived low returns from energy-efficiency improvements.

Helen Ryan, Director Oil, Gas & Energy with Environment Canada underlined the federal government’s commitment to tackling environmental issues in an “integrated” and “comprehensive” fashion. She indicated that the upstream oil and gas sector is a key sector that will be part of the government’s Clean Air Agenda. The fuel gas consumption from this sector accounts for nearly 99% of NOx and 73% of CO2. Fuel gas efficiencies and optimization opportunities exist and present a win-win opportunity for industry to save dollars and to reduce direct air emissions, “I encourage industry to take action to reduce emissions.”

Michael Bruni, Executive Manager of the Energy Team at the Alberta Energy and Utilities Board (UEB), listed environmental conservation, public safety and service as cornerstones of his organization’s goals. Bruni added: “Regulation is not always the way to ensure that those cornerstones are met.”

Acknowledging the need for improved fuel-gas accountability, Bruni cautioned against seeing the fuel-gas challenge as a “clean as gas” coal power plant.

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There appears to be a fairly strong consensus that we have a problem with fuel-gas ownership and waste. There’s less clear is just who is up to the challenge of championing the cause. We’re ready to dance but unclear as to who should lead. Should leader come from industry, from government or the public?

The fuel-gas challenge is reminiscent of what sometimes is referred to as the “tragedy of the commons” – a situation where a shared or “free” pasture that gives everyone access, while imposing responsibility on no one, results in overgrazing.

Responsible fuel-gas management is as much a fiscal responsibility for industry and government as it is a professional responsibility to ourselves.

Failure to respond appropriately to the fuel-gas challenge will not only add to environmental damage, it will also impact corporate bottom lines. As Albertans and Canadians, we have an unrivalled opportunity to become world leaders in the area of fuel-gas conservation. Who will lead us?

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Fig. 1: Alberta Non-Oil Sands GHG Reduction Potential

<table>
<thead>
<tr>
<th>Year</th>
<th>Natural gas use efficiency</th>
<th>CCS coal electricity</th>
<th>“Clean as Gas” coal power</th>
<th>Renewable electric energy</th>
<th>Electrical Efficiency</th>
<th>Transportation efficiency and biofuels</th>
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<td>250</td>
<td>100</td>
<td>150</td>
<td>100</td>
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New Technologies Bring Solutions for Energy Market

The 2007 Energy Efficiency Workshop provided opportunities during technology presentations to show new energy-related products and processes. Petroleum Technology Alliance Canada (PTAC), Methane to Markets, Environment Canada and CETAC-WEST sponsored the session.

Fuel-Gas Gains... an “Efficiency Resource” (continued)

Fuel-Gas Reporting Lacks Consistency

A comprehensive study of gas leaks in the upstream oil and gas industry was completed in 2006 by the Energy Resources Conservation Board (ERCB) of Alberta. The study determined that the primary source of fugitive emissions from the Alberta oil and gas industry was through compressor seals and relief valves, accounting for 80 per cent of total emissions.

Infrared Cameras Find the Leaks

Finding leaks from flange and equipment is not always easy and can be expensive. An infrared (IR) camera, with hydrogen and VOC filters, provides stable image of hydrocarbon gas-emissions in real time. The IR camera used by Comac/phoenixprovides rapid, accurate and safe leak detection.

Finding Fixing in Leaks Finding Leaks

Companies involved in the Methane to Markets partnership focus on delivery to users a reliable, comparable and easy-to-use source of leak-detection information. Gas leaks are invisible, unregulated and go unnoticed, but losses can be significant. For example, if 15 per cent of annual gas sales were lost via fugitive emissions, the impact would be approximately 12 billion cubic feet per year. This is equivalent to the emissions from 3,600 vehicles.

Fugitive losses can be dramatically reduced by implementing a directed inspection and maintenance program, Robinson said.

Improved Efficiency of Firetube Heaters

Firetube heaters are used extensively throughout the upstream oil and gas (UOG) sector to provide heat for production, dehydration and freeze protection. Currently, there are more than 40,000 such heaters in Alberta. A recent study, conducted by Petro-Canada Energy Efficiency Engineer Phil Crie麓ons, showed that many immersion heaters have low fuel efficiency (between 60 and 70 per cent) compared to the 70 to 80 per cent obtained by power boilers.

Consider This

At an average cost of $150/mmScf, this represents $100 million to $150 million a year for inefficiency due to inefficient operation and also an associated 1.5 million additional tonnes of carbon dioxide dislodged to the atmosphere.

Innovative Leak Detection Technologies

Innovative leak detection technologies are needed to address the growing demand for more stringent leak detection. These technologies can help operators to comply with increasingly stringent emission standards, reduce emissions and costs related to leaks, and reduce the resource demand for fugitive gases.

For instance, Infrared cameras use the principle of infrared radiation to detect leaks. Infrared cameras can scan a fixed area of 16 mmScf per day, while the same area can be scanned by the Infrared cameras in 24 hours.

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In the previous example, if we were to assume a 10 per cent increase in GHG emissions, the resulting increase would be equivalent to the emissions from 3,600 vehicles.

Towards Sustainability

Fixed Orifice Steam Traps Improve Efficiency & Cut Maintenance

Replacing mechanical steam traps with a fixed orifice trap can save 16–30 per cent of steam cost, according to A. I. Watson, of Energy Alberta. A fixed orifice steam trap avoids continuous flow of condensate. According to Lowe, the fixed orifice traps do not need to be removed – one nozzle and one seat make the trap easier to use.

More importantly, they improve heat transfer and reduce condensate problems.

Consider This

One Slipstream application using fugitive emissions as an energy source is the End reheat, the technology reduces the GHG emissions equivalent to that produced by 1,600 vehicles.

BP Cuts Fuel-Gas Use At Alberta Well Site

BP Canada has embarked on a program to dramatically decrease fuel-gas consumption and methane emissions from one of its Alberta well sites. BP Canada’s Mikos Kropka outlined how one well site “slipstreamed” fuel-gas use.

Consider This

The reliability of fixed orifice traps is important in places like Fort McMurray where dealing with frozen lines is costly.

Energy Recovery from Rejected Heat

Great Northern Power Corporation was a leader and a promoter of Organic Rankine Cycle (ORC) technology for small-scale base-load renewable power projects. These projects are fueled by recovering waste heat from the jet cooling jackets and exhaust stacks of conventional combustion engines. ORC technology can extract heat from any source over 90°C and use it to drive an electrical turbine or pumps and turbines. This makes combustion engines an ideal source of free energy.

Given that combustion engines typically run more than 50 per cent of the fuel energy as heat, the opportunities are large. Capturing a portion of the exhaust heat from the engines can improve the engine efficiency by more than five per cent or by 32 per cent by adding exhaust-heat capture. A side benefit is significantly reduced cooling requirements for the combustion.

Consider This

There are more than 3,000 natural gas engines employed in the UOG and the annual fuel bill is around $250,000 per year. Furthermore, they produce over one per cent of Canada’s GHG emissions.

Slipstream Technology

Slipstream Technology is an energy recovery system that focuses on cost-efficiency management at the highest possible level. A company is motivated to reduce production cost because the company’s total production cost is directly related to the amount of capital it has invested. Therefore, it’s used and fuel gas is viewed as free and does not show up as an addition to the company’s total cost.

There are hopeful signs that some international companies and their senior executives are handling the fuel gas challenge and taking that message to heart. The 19 “partnerships”, was also noted by Al Wakelin, Energy Experts. This call for collaboration and accountability, the responsibilities, and “healing” the environment, as they are deemed necessary.

Javier Becarreno of Mexico’s state oil company, Pemex, who co-chairs the oil and gas committee of the international Methane to Markets Partnership, was also a panelist. The 10th-

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Integrated Audits

Integrated audits are the keystone of the Eco-Efficiency Program developed through CETAC-WEST, according to John Sames of Sulphur Experts. This is the starting point for finding where the problems are and for coming up with practical solutions. Typically, a team of six to eight experts gather background data on the plant and in discussions with key operating staff flag potential problem areas. They then comb the plant for three to four days taking measurements and applying their process specific knowledge in areas such as compression, refrigeration, steam generation, dehydration and sulphur recovery. Process diagnostics is not unlike a visit to the doctor, said Sames. You need to be able to determine what and why things are happening before you can prescribe the remedy.

Benchmarking

Benchmarking is a powerful tool that can be used to gauge performance and to monitor the impact of changes but to date there has been limited application of this in the upstream oil and gas (UOG) sector. According to Al Wakealin, the primary objectives of the benchmarking program were to provide industry with a means to monitor the efficiency of their facilities in the same cluster. Many companies are making efforts to reduce energy use and designate a person to champion effective energy use and designate someone to champion effective energy use and designate someone to champion effective energy use and designate someone to champion effective energy use. That way, Tyers said, “You can retain energy conservation and have a positive energy management program.”

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Companies Take Up Fuel Gas Challenge

Several representatives of Canadian producing companies and gas-plant operators outlined progress being made on the fuel gas front. Blake Reid, of Husky Energy, explained that his company’s Ram River gas processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by processing plant near Rocky Mountain House has benefited by process.

Awards Need Follow-Up

When it comes to energy reductions, good intentions are not always enough – persistence and follow-through are also needed. Brian Tyers of Stantec Consulting noted that an energy audit of a Central Alberta gas plant pointed to production-energy savings averaging around 15 per cent and ranging from $480,000 (nine per cent) to $900,000 (20 per cent) annual savings. However, Tyers noted, when auditors checked back nine months later, it was apparent that many recommendations were not being followed partly because the plant had no system to monitor and target the energy use. That is not unusual, and Tyers noted a Stantec survey indicated that less than 25 per cent track their energy use. An outcome was Cumulative Summation (CUSUM), a tracking tool developed by Stantec. CUSUM establishes a baseline of a plant’s energy (including fuel gas and electricity) consumption, and then predicts energy use and compares it to actual use.

Audit Comments

“Benchmarking is not unlike a visit to the doctor, you need to be able to determine what and why things are happening before you can prescribe the remedy.”

With CUSUM you can hold and extend those gains,” Tyers said. Besides a monitoring tool, it is also important that every facility maintain ongoing reporting of energy use and designate someone to champion effective energy use.

That way, Tyers suggested, “You can retain energy conservation and have a positive energy management program.”

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