Sean Hiebert, ConocoPhillips' operations energy efficiency team lead, led a team focused on testing methane emissions reduction technologies.

PHOTO: CONOCOPHILLIPS

METHANE MISERS

ConocoPhillips presents field-test results for 10 methane emission-reduction technologies

BY **R.P. STASTNY**

There are a host of known technologies for reducing methane emissions in upstream oil and gas processes. The missing link for wide industry adoption has been a lack of field-testing and analysis of the various technologies. So in 2010, ConocoPhillips Canada, Climate Change and Emissions Management, and the Canadian Environmental Technology Advancement Corporation-West (CETAC-WEST) took on an initiative to improve energy efficiency and reduce methane emissions across ConocoPhillips' Alberta field operations.

As part of that agreement, ConocoPhillips agreed to share its results with the wider industry, and the company did just that in December when it discussed what it had learned about the 10 technologies it tested over the last five years. ▶

"We took this on ourselves," ConocoPhillips' president Ken Lueers told the audience of some 200 business and regulatory professionals. "It wasn't something our corporate office in Houston told us to do. It wasn't something the government told us to do. We found a way to go and enhance the economics and competitiveness of our operation through implementation of green technologies."

The ConocoPhillips team focused on fugitive emissions and vented waste of natural gas, anticipating Alberta's new policy target of reducing methane emissions by 45 per cent by 2025. Methane capture is important because, as a greenhouse gas (GHG) emission, its effect is 25 times more potent than CO_2.

Sean Hiebert, ConocoPhillips' operations energy efficiency team lead, told the audience that because of the early success of the project, the company actually doubled its emission-capture expectations. In 2010, it set out to capture 50,000 tonnes/year of CO_2 equivalent (CO_2e) through 404 trials for an average cost of $13.80/tonne. As of mid-2015, the average cost had been more than halved to $6.79/tonne. ConocoPhillips had also tripled the number of field trials to 1,214 and achieved 98,000 tonnes/year of emission cuts—the equivalent to taking 21,350 passenger cars off the road.

Winners

Of the 10 technologies tested, one was a clear winner, both for its low cost of emission capturing and the number of potential applications across ConocoPhillips' operations (and, consequently, across the industry). This technology was high-to-low bleed pneumatic controls conversion at just $2/tonne of CO_2e to capture 52,000 tonnes/year of CO_2e across its operations.

The most expensive technology ConocoPhillips tested was waste-heat-to-electricity conversion at $160/tonne CO_2e. Its high cost was due to its unsuitability for low-intensity emissions applications and the fact that ConocoPhillips had to custom build the equipment.

"Waste-heat-to-electricity might make sense in industrial applications like the oilsands, but not in smaller applications," says Cam Dowler, technical specialist at Spartan Controls, a process control, measurement and automation provider that represents leading technology manufacturers in western Canada.

Cam Dowler is the technical specialist at Spartan Controls, which provided four of the 10 technologies tested.

Spartan provided four of the technologies tested by the ConocoPhillips team: high-to-low-bleed conversions, SlipStream, dehydration optimization and REMVue (developed internally by Spartan's technology development group called REM Technology). All of these technologies made the shortlist of the economically viable and promising solutions tested by ConocoPhillips.

The other missing link

At $16/tonne, the REMVue technology seems expensive, but there's more to the story. Dowler says REMVue is actually one of the most viable emission-reducing technologies because it offers other benefits than just capturing carbon emissions.

"When this air-fuel-ratio control system is retrofitted onto a natural gas engine, one of the biggest benefits is increased performance and reliability. That increased performance and reliability translates directly into increased production, which means more dollars in the cash register," Dowler says.

In the real world of oil and gas technologies, REMVue is sold on improved reliability and production. Yes, the customer gets 50 per cent better fuel efficiency and lower emissions from the tailpipe, but in the absence of CO_2 legislations that apply to oilfield operations or financial incentives to help producers to make environmentally beneficial retrofits, emission capturing is a tough sell. There has to be more.

As Dowler notes, producers create value by finding new reserves and growing production profitably. "Producers don't necessarily get increased profits by reducing their emissions," he says. "Some of these

PHOTO: SPARTAN CONTROLS

technologies do both so companies can justify investing in technologies with a good return on investment. REMVue and SlipStream have a return on investment that is pretty healthy, but it's still not as good as drilling a well. Capital dollars for emissions reductions are always competing for capital recognition on Bay Street or Wall Street."

SlipStream is another Spartan innovation that offers more than just emission reductions. It targets vented emissions. (Fugitive emissions, by contrast, aren't supposed to happen. They typically occur around leaking flanges or other connections. Vented emissions are designed into some equipment such as pneumatic controls of reciprocating natural gas compressors.)

Fitted on a reciprocating compressor, SlipStream captures blow-by gas from the pistons and feeds it back into the engine for combustion. The engine automatically adjusts for the addition of that fuel, thereby reducing fuel consumption.

So the catchy industry tagline, "We can be green while making green," should more accurately read, "We need to make green while being green." Even replacing an operating high-bleed pneumatic device with a low-bleed device is a tough sell unless the device has failed or introduces some kind of handicap to the producer. High-bleed pneumatics aren't available for sale in Alberta anymore, so low-bleed becomes the default choice.

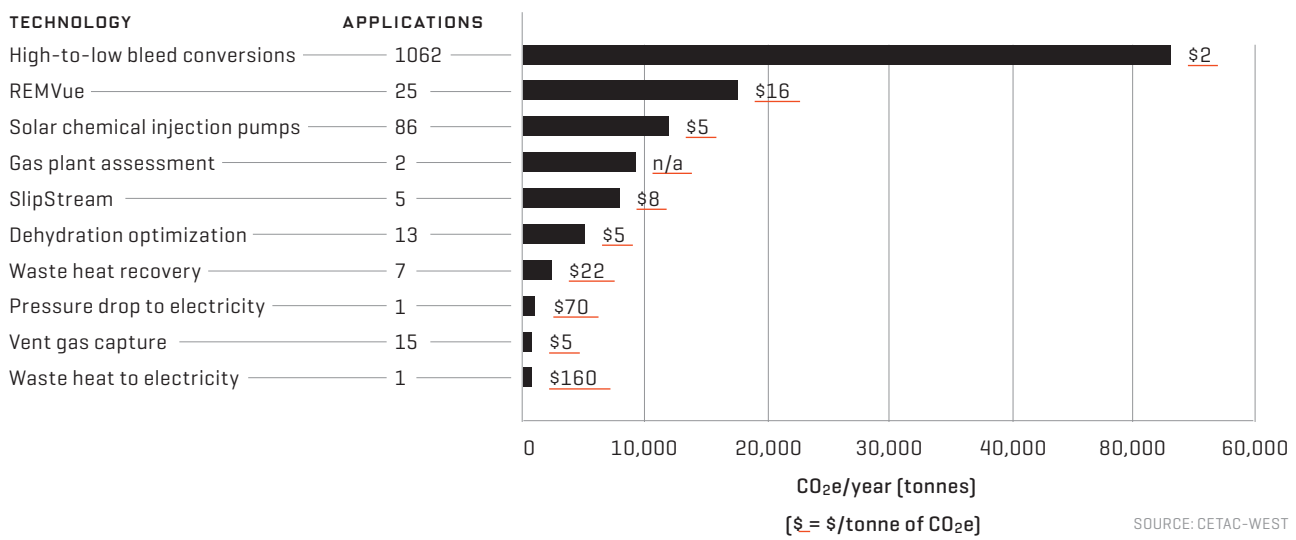
ConocoPhillips is currently finalizing a multi-year emission-reduction strategy to voluntarily, proactively and economically reduce its air emissions footprint. But Hiebert says, "A further roll-out of even the best economic green technologies will require improved economics [capital support such as subsidization, rebates or offsets], and defined details about the new vented methane reduction regulation/policy framework. The Canadian upstream oil and gas sector is currently struggling though a low commodity cycle, and projects of this type may not proceed at the required rate without these two major pieces."

What's needed

Emission-reducing solutions, especially in today's economic climate, are a tough sell. If they offer multiple benefits, they stand a better chance of adoption. Both REMVue and SlipStream have approved protocols in Alberta and B.C. and qualify for carbon offsets from the fuel savings each technology delivers. That helps too. But what will it take for industry-wide adoption of emission-reducing technologies?

"There just has to be a plan put in motion to get it done, and the main challenge is that this plan needs capital and government incentives so that producers can make those changes without punishing their balance sheets," Dowler says. ■

Project expected annual GHG reductions for each technology applied with associated cost per tonne of CO_2e



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