

Vent Gas Mitigation Options

Project Update

Review options for reducing vent gases from upstream oil and gas operations

ERAC - Environmental Research Advisory Council

January 2002

What is the purpose of this project?

Methane venting from upstream oil and gas operations accounts for 8 per cent of Canada's greenhouse gas emissions and ranges from large-volume casing and dehydrator vents to small-volume equipment leaks and ground seeps. Much of this venting can likely be economically reduced, and even generate financial returns, when existing technology is applied in new ways.

Upstream operators face a confusing array of commercial options when choosing which technology is most appropriate for their specific venting problem. To help make this selection process easier, this study is

reviewing and summarizing potential options to reduce vent gas, mainly through methods that efficiently capture and use it as fuel in upstream operations. One example is to harness the energy content of methane to displace fuel gas on producing sites and thus generate revenue, often with payouts of a few months. In some cases, methane can simply be converted to carbon dioxide, resulting in greenhouse gas emission reductions of up to 85 per cent, with costs covered through emission credits or offset trading.

How is the project being conducted?

The project is being conducted in the following phases:

1. Phase Ia – Identify technical and economic opportunities around using sweet methane vents, from casing gas, at conventional heavy oil sites to fuel engines and tank heaters, which often account for 90-100 per cent of these facilities' fuel. The remaining vent gas could be used to power small-scale enhanced oil recovery, compress and dry gas for local sales or generate power for use or sale.
2. Phase Ib – Identify opportunities specific to thermal heavy oil operations, where most of the vent stream is water vapour from steam. The focus here is on energy-efficiency improvements.
3. Phase IIa – Identify opportunities for reducing vent streams from conventional oil and gas production facilities such as dehydrators, line heaters, oil production tanks and power gas vents. The primary focus is again to divert the vent stream for use as fuel, meeting up to 50 per cent of fuel needs at many sites.
4. Phase IIb – Identify opportunities for reducing fugitive methane emissions at gas processing, compression and transmission sites. The focus is detection and repair of leaks, collection and concentration of fugitive methane for potential use as fuel (less than 5 per cent of fuel demand) or conversion to carbon dioxide.
5. Phase III – Identify opportunities for reducing low-volume ground seepage from abandoned wells or coal/oil sands mine face emissions.

ERAC was founded in the mid-1970s by the Canadian Association of Petroleum Producers (CAPP) to initiate research and technology development on environmental issues relating to the production of crude oil and natural gas in western Canada. In the past five years, direct and in-kind contributions to ERAC from CAPP, individual member companies, the Small Explorers and Producers Association of Canada (SEPAC), federal and provincial governments, academic institutions, and research groups have totaled over \$6 million.

DISCLAIMER: PTAC does not warrant or make any representations or claims as to the validity, accuracy, currency, timeliness, completeness or otherwise of the information contained in this report , nor shall it be liable or responsible for any claim or damage, direct, indirect, special, consequential or otherwise arising out of the interpretation, use or reliance upon, authorized or unauthorized, of such information.

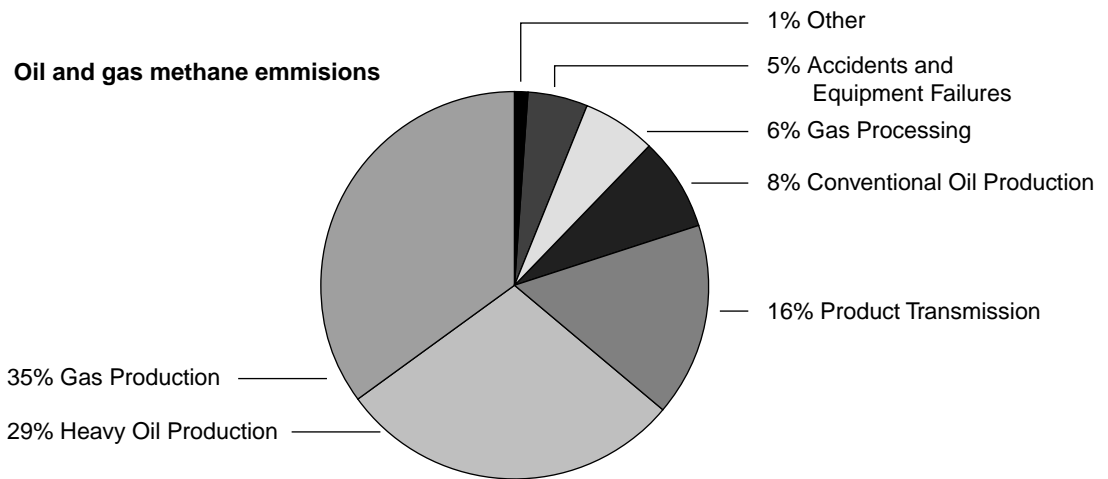
The material and information in this report are being made available only under the conditions set out herein. PTAC reserves rights to the intellectual property presented in this report, which includes, but is not limited to, our copyrights, trademarks and corporate logos. No material from this report may be copied, reproduced, republished, uploaded, posted, transmitted or distributed in any way, unless otherwise indicated on this report, except for your own personal or internal company use.

What are the results?

The conventional heavy oil phase (1a) has been completed, with results being passed on to operators via technology transfer workshops (also available through www.newparadigm.ab.ca). One case study of 15 wells suggested operators could save \$200,000 in fuel costs and reduce methane venting by up to 25,000 tonnes of carbon dioxide equivalent per year. The payout for these systems could range from less than two months to just over a year, depending on the well. To demonstrate and test some of the Phase I results, researchers are conducting a well-by-well audit of one field operation

that has significant vent gas volumes and limited supplies of alternative fuels. Economic spreadsheet tools are also being developed to help producers assess economical conventional heavy oil options.

Lead researcher New Paradigm Engineering is working with Scott-Can Industries to develop a low-cost methane converter, a prototype of which is being field tested. These stand-alone and portable catalytic units can also be used to provide incremental heat to process streams. In the thermal steam phase, several sites have been toured and their facilities are being evaluated.



What happens next?

To help communicate the results of all completed phases, one-page option sheets and flowcharts are being prepared and workshops and courses organized. Follow-up projects are being developed to build on opportunities identified in the initial phases and to demonstrate the direct economic benefits of vent gas mitigation for

producers. For example, proposals have been issued for vent gas demonstration projects and for a prototype trial of a catalytic unit that can convert up to 50 cubic metres per day of methane to carbon dioxide, at a cost of less than \$5,000 per unit.

Project Funding

This project is being funded by Husky Energy, Canadian Natural Resources, Alberta Energy Company, Nexen Inc., BP Canada Energy, EnerPlus Resources, ExxonMobil Canada, Devon Energy and Alberta Energy Research Institute.

More information on ERAC is available on CAPP's web site: www.capp.ca (bookstore). To order the above materials, ERAC project updates, or technical reports, call the Petroleum Technology Alliance Canada (PTAC) at (403) 218-7703 or visit <http://www.ptac.org/techenvp.html>



Canadian Association of Petroleum Producers
2100, 350 - 7 Avenue S.W.
Calgary, Alberta, Canada T2P 3N9
Phone: (403) 267-1100 Fax: (403) 261-4622