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Canada

Canadian Capabilities in Methane Emissions Reduction

Guide and Company Directory for the Oil and Gas Sector

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TRADE COMMISSIONER SERVICE (TCS)

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This document has been prepared by Petroleum Technology Alliance Canada (PTAC) for the Trade Commissioner Service, Global Affairs Canada.

Introduction

Inter-governmental cooperation, with respect to climate change initiatives, has increased in recent years due to the threat of a warming planet. With over 180 countries participating in the Paris Agreement, signatory countries are looking for ways to reach their Nationally Determined Contributions. For oil and gas producing countries like Canada, this has spawned many new ideas and initiatives that focus on mitigating atmospheric release of greenhouse gases (GHGs), including methane.

Reducing methane emissions is seen as a key strategy to slow the rate of global GHG warming. Methane's Global Warming Potential (GWP) is ~25 times more than that of carbon dioxide over a 100-year time frame and has even higher GWPs over shorter timeframes. This gas is estimated to be responsible for up to 25% of global warming from GHGs. Because of its high global warming potential, the fact that it is reactive, and that conserved methane can provide the energy required to mitigate emissions, it is considered a "low-hanging fruit" in the effort to reduce man-made GHG emissions. Taking action to reduce methane emission levels in oil and gas operations can provide many near-term benefits. This includes slowing global warming and helping to improve air quality. Conserving or combusting methane also destroys more hazardous impurities in raw gas streams.[1] Abatement costs for GHG reduction through mitigating methane emissions can be less than $5/t$CO_{2e}$[2] over a 10 year life for combustor units, while other options such as Carbon Capture Utilization and Storage (CCUS) may have abatement costs in the range of $50-150+/t$CO_{2e}$[3] from large Mt/yr CO_2 emission sources. CCUS has longer timeframes which spreads out the capital costs over decades.

Globally, the upstream oil and gas sector is responsible for a large share of reported methane emissions. Methane is a main constituent in natural gas which is widely used for power generation, heating, and petrochemical applications, and is emitted from upstream production and processing operations. The International Energy Agency (IEA) estimates that 11 BCF/day[4] of methane is lost from global oil and gas operations and could represent a potential annual product revenue loss of approximately $30 billion.[5] In Canada the oil and gas sector is responsible for 38% of methane emissions compared to the other main domestic methane sources: agriculture (30%) and waste treatment (28%) facilities[6]. At the same time, technologies and solutions have been developed by Canadian innovators and entrepreneurs to cost effectively reduce methane emissions or transform them into saleable products.

The objective of this guide and company directory is to share Canada's experience and expertise in methane emissions reduction in the oil and gas sector. The guide highlights Canadian capabilities with the purpose of assisting both Canadian producers and other oil and gas producing countries in reducing methane emissions, with a focus on upstream and midstream operations.

[1] https://www.ccacoalition.org/en/activity/global-methane-alliance
[2] PTAC public report "Systemic Third Party Methane Reduction Project" - 2023
[3] Circular Carbon Economy Section 6 Remove: Carbon Capture and Storage, August 2020, Figure 5, Global Capture and Storage Institute, https://www.globalccsinstitute.com/wp-content/uploads/2020/11/Remove-Carbon-Capture-and-Storage-6.pdf
[4] https://www.iea.org/reports/methane-emissions-from-oil-and-gas and PTAC: 82 MT methane/year, converted to oil field units. Global methane emission from all sources are estimated at 570 MT methane/year.
[5] https://www.ccacoalition.org/en/activity/global-methane-alliance
[6] https://publications.gc.ca/collections/collection_2022/eccc/En4-491-2022-eng.pdf

Methane Emissions Reduction in Canada

Canada has a global reputation of developing unique and innovative solutions for use in the production of its vast oil and gas resources. Its oil and gas production ranges from sour acid gases, sweet gas, hydrocarbon rich solution gases, liquid condensates, natural gas liquids, light to heavy oil, and bitumen. Canadian production comes from a wide range of clastic (sandstone), carbonate (limestone) and shale reservoirs, found at depths from 4,000m from surface to mineable bitumen deposits on the surface. Canadian production of oil and gas are ranked as the 5th highest in the world, making a major contribution to global energy supplies. It is also blessed with petroleum reserves which are the third largest in the world[7] with conventional natural gas reserves ranked as the eighteenth largest (excluding the enormous potential of undeveloped shale gas resources not currently counted as reserves). As a result, there has been tremendous investment in developing new, efficient, and environmentally friendly extraction, processing, and transportation technologies. The invention and development of Steam Assisted Gravity Drainage (SAGD) for bitumen production is a prime example of Canadian innovation in action. This technique is now being used globally for production of viscous oil deposits. Canadian oil producers are continuing to improve the SAGD process through use of solvents and other innovations in well bore design, high temperature artificial lift and processing technologies. Meanwhile, the last two decades have shown significant reductions in the GHG and energy intensities of oil and gas production.

Canada is also a world leader in responsible development of natural resources, and in particular, the reduction of methane emissions in the oil and gas sector. Globally, the IEA estimates[8] that the global energy industry emits 135 Mt/yr (200 BCM/yr or 545 MCM/d) of methane with coal, oil, and gas production each accounting for 30% with the remaining 10% from incomplete combustion of bioenergy fuels and leakage from end user facilities. The IEA also indicates that their estimate of global methane emissions for the energy sector are 70% higher than the values submitted formally by national governments. In order to manage methane emissions, they must be measured, and the Canadian industry has been working diligently to continuously improve measurement, or estimation, of methane streams for over 20 years. Recent changes in reporting of oil and gas methane emissions, incorporated in both federal and provincial regulations, should greatly increase the accuracy of the volumes being reported. Today, Canada is believed have a solid handle on methane emissions and a better understanding of the challenges associated with specific sources.

In 2020, Environment and Climate Change Canada (ECCC) reported that total Canadian methane emissions were 92 $MtCO_{2e}$/yr or about 3.68 $MtCH_4$/yr, with 38% of that attributed to oil and gas production operations or about 1.4 $MtCH_4$/yr (about 2 BCM/yr or 5.7 MCM/d). So, while Canada is the 5th largest producer of oil and gas in the world, the IEA indicates it is only the 10th largest emitter of methane. Several factors have enabled the oil and gas industry in Canada to develop technologies and expertise in methane emissions measurement, management, and mitigation. These factors include Canada's policy and regulatory environment, access to financing and financial incentives, investment in research and development and industry collaboration. Outside influences such as increased awareness of environmental, social and governance (ESG) performance of companies, along with the economic requirements to reduce capital and operating expenditures also drive the industry forward.

[7] https://www.nrcan.gc.ca/energy/energy-sources-distribution/crude-oil/oil-resources/18085
[8] https://www.iea.org/reports/global-methane-tracker-2022/overview

Policy and Regulation

In its commitment to the Paris Agreement, the Canadian government developed a plan[9] to meet emissions targets, grow the economy, and build resilience to climate change. As part of this plan, it enacted legislation to reduce methane emissions in the oil and gas sector by 40-45% by 2025, which was subsequently revised in November 2021 to target a 75% reduction of oil and gas methane emissions by 2030.[10] It is expected the new draft Federal regulations will be published in 2023[11]. The Canadian government has also planned for future carbon tax increases - from $50 CAD per tonne of GHG emissions today up to $170 CAD per tonne by 2030 which provides producers with an economic incentive for improvement outside of the vagaries of natural gas prices changes. In addition, the province of Alberta was the first regional government in North America to commit to a methane emissions reduction target for the oil and gas sector.[12] Alberta plans to achieve these targets through a combination of policy tools, including regulatory requirements, market-based programs, and investments in technology and innovation[13]. Governments at the federal and provincial levels ensure the responsible development of hydrocarbon resources by using the results of scientific studies, stakeholder engagements and application of technologies to govern the industry. In Canada, regulators and governments work with industry stakeholders to create a regulatory environment that supports the development of resources with smart policies and regulations that reduce costs and provide improved outcomes. These policies encourage companies to improve on their environmental, social and governance (ESG) performance in areas such as land use, water use, air quality, well abandonment, land reclamation and rehabilitation as well as community and stakeholder engagement and consultation.

Access to Financing and Financial Incentives

Federal and Provincial governments in Canada invest heavily in developing methane emissions reduction expertise. This is most evident through the provision of capital in the form of grants and loans that help accelerate research and development efforts and encourage market uptake of technologies and solutions. Of note was the Government of Canada's Emissions Reduction Fund[14] which provided $750 Million (CAD) for technology deployment and research development to reduce methane emissions from oil and gas producers for both onshore ($675M) and offshore ($75M) facilities all of which was allocated as of March 31, 2023. The Government of Alberta is also reinvesting money from carbon taxes into technology development for emissions reduction through the Technology Innovation and Emissions Reduction (TIER) regulation, with a $17M Alberta Methane Emissions Program. These actions have enabled Canada to take large steps forward in the development of technologies that detect methane emissions, and in the development of technologies and processes to manage and reduce emissions. Furthermore, these grants and loans provided a bridge to enable methane technology rollouts after 2020 when industry investment dollars were curtailed as a result of the drop in commodity prices caused by the decline in world demand from restrictions due to COVID-19.

[9] https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework.html
[10] https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/reducing-methane-emissions.htmll
[11] https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/consultation-reducing-methane-emissions-oil-gas-sector.html
[12] https://www.alberta.ca/climate-methane-emissions.aspx
[13] https://www.alberta.ca/climate-methane-emissions.aspx
[14] https://www.nrcan.gc.ca/science-data/funding-partnerships/funding-opportunities/current-funding-opportunities/emissions-reduction-fund/22781

Investment in Research and Development

The Canadian petroleum industry is heavily involved in research and development of new ideas and technologies, with oil and gas producers providing substantial investment in clean technology development. This includes associations, including Petroleum Technology Alliance Canada (PTAC), Canada's Oil Sands Industry Alliance (COSIA), Pathways Alliance, and the Clean Resource Innovation Network (CRIN) which provide a collaborative framework for developing appropriate technologies. These organizations assist entrepreneurs and companies at various stages of development, from start-up to scale-up, and testing and proving new technologies. A hurdle that many entrepreneurs face is in gaining access to field sites to test their technologies. Through these collaborative associations, technology developers have access to the producers and their sites to develop and test their technologies.

Industry Collaboration

One major attribute Canadians possess and demonstrate is collaboration. There are many associations, such as the Canadian Association of Petroleum Producers (CAPP) and the Petroleum Services Association of Canada (PSAC), that enable employees and companies to easily associate with each other and develop solutions to address common issues. Federal and Provincial governments, such as owners and regulators of the resource, are active in many of these associations and help to guide the discussions and suggest areas of research. Researchers are involved as well, providing the unique detailed perspective on the science that the industry relies on to improve their performance. Technology vendors and service providers, highlighted in this guide, collaborate to understand the needs of industry and develop appropriate solutions. Once solutions are created in this collaborative environment, the market is ready to accept them. In this spirit of sharing and collaboration, technologies and services develop faster, and risk is shared between industry producers and the supply chain.

In recent years, several new initiatives have been created with the goal of reducing methane emissions. Of note is the Methane Emission Leadership Alliance, composed of solution providers; Natural Gas Innovation Fund, comprised of producers; and the PTAC-led Canadian Emission Reduction Innovation Consortium (CanERIC), consisting of 16 producers and 16 research institutions.

Environmental, Social, and Corporate Governance

Canada has a long tradition of responsible development within its oil and gas fields. Local leaders and company executives are committed to land restoration and conservation. Oil sands operators have committed to ambitious GHG reduction goals through the formation of Pathways Alliance. Companies are active in consulting with local communities and stakeholders, contributing to their communities. Companies and their executives are continuously striving to improve their ESG performance through the many alliances and groups highlighted in this directory. Efforts to reduce methane emissions from oil and gas operations through the development and deployment of suitable technologies and services demonstrates a commitment to this increased performance.

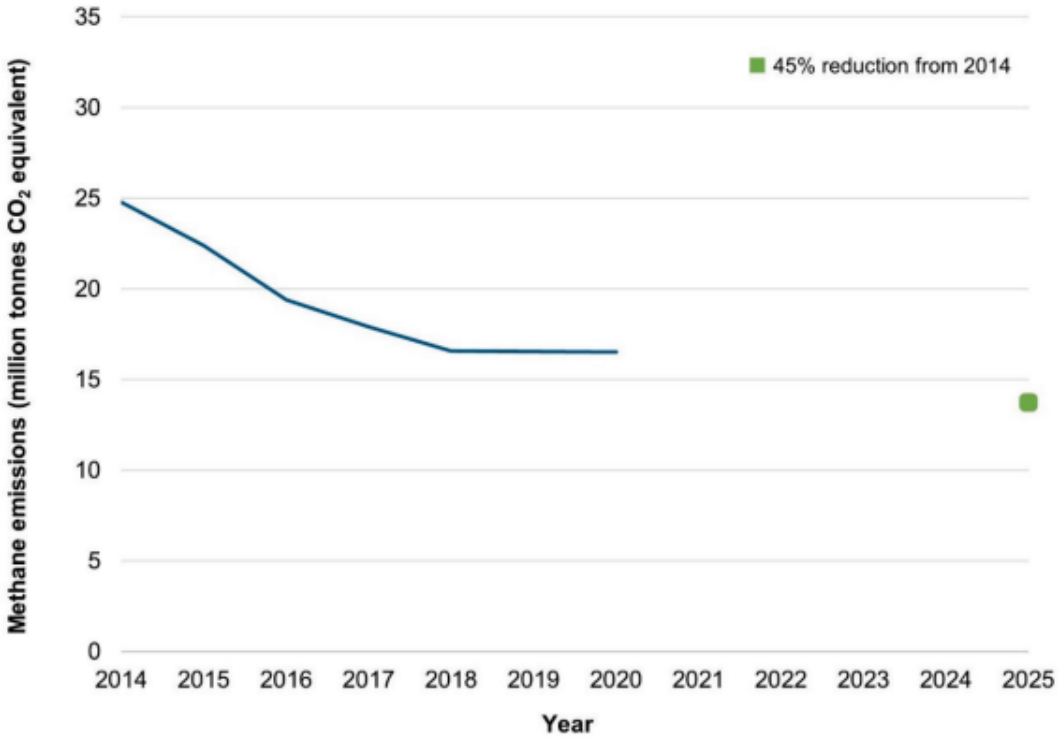
Availability of Capital and Operating Expenditures

Canada and the Provinces allow private corporations to lease and develop its natural resources on Crown leases. These private and public companies are driven by their shareholders to invest capital and provide a rate of return while meeting ESG commitments. While oil and gas prices have improved since the last downturn in world prices in 2014, there continues to be a great deal of uncertainty related to future oil and gas demands as a result of the energy transition, and energy supplies as a result of international conflicts like the war in Ukraine and on-going tensions in other parts of the world.

New technologies and services to reduce methane emissions now provide opportunities for producers to continue to improve their ESG performance which will increase access to capital, reduce operating costs, recapture saleable product, and participate in carbon credit programs to generate additional revenue. In doing so, producers are able to reduce methane emissions and simultaneously improve profitability.

Impacts of Progress to Date in Alberta

The above regulatory and policy incentives as well as growing support from investors, innovators, and producers to demonstrate and implement methane mitigation technologies has resulted in a significant reduction of methane emissions since 2014 towards the stated target of a 45% reduction by 2025. The figure below shows the performance to date for Alberta. The leveling out between 2018/20 was due to a number of economic (commodity prices), societal (pandemic disruptions) and systemic changes (redefinition of some vent sources in the 2020 AER ST60B report) and general uncertainties in the industry. Since 2020, there has been renewed funding and energy put into further methane emission reductions. (Note that the conversion used in the chart is based on 1 tCH_4 = 25 tCO_{2e} with adjustments for gas stream composition and conversions in combustion equipment).



Methane Mitigation Performance in Alberta 2014 to 2020 (AER ST60B 2021 Figure 17)

Summary

Canada is contributing to the global goal of methane emission reduction through its efforts domestically. New technologies, services, and expertise in identifying, managing and reducing methane emissions have been developed in Canada as a result of the factors noted above. Canada has the opportunity to export these innovations and expertise to the world, working together to reduce methane emissions in a cost-effective manner to tackle the global challenge of climate change.

Sources of Upstream Methane Emissions

Methane emissions from upstream oil and gas have been classified into several themes to create a better understanding of the issues involved in mitigating the emissions. The following section provides the emission source categories typically used by the industry for upstream emission sources. Midstream and downstream emission sources such as pipelines, refineries and filling stations are not detailed here.

The percentages and emission volumes shown are based on the latest published *"ST60B Upstream Petroleum Industry Emissions Report"* for 2021[15] published by the Alberta Energy Regulator. Reporting of emissions in this document went through considerable adjustments from prior years. Starting in January 2020 adjustment in production and regulator reporting were made to provide a more accurate assessment of the emissions from each methane and combustion source. These percentages will vary by each region or country depending on local practices and will also decline over time as mitigation methods are implemented in any jurisdiction.

% of Methane Emissions (e^6m^3/yr)	Type of Emissions	Emissions Sources and Methods of Reduction
20% (164)	Tank Vents	A tank vent is normally located at the very top of a tank and is intended to provide pressure and/or vacuum relief for atmospheric or low-pressure storage tanks to protect the tank against overpressure or vacuum conditions. Tank vents are a difficult to mitigate source of methane emissions as the individual vent gas flows are low, highly variable in composition, and may even reverse flow when tanks are being emptied. The pressure in the tanks is close to atmospheric pressure, so even changes in atmospheric temperature or pressure can impact the gas flow volumes. Gases emitted from tanks need to be compressed for capture, usually with a Vapour Recovery Unit (VCU), and then transferred from the tank to sales, flares/combustors or to fuel other on-site equipment.
18% (148)	Wells; Solution Gas Production Casing Vents	In some operations, especially with cold heavy oil production (Crude Bitumen sites), the wells often produce uneconomic volumes of produced gas, which is vented from the "production casing" to avoid downhole pumps from "gas-locking" and to increase pumping efficiency. Because heavy oil and some other types of oil wells use trucks to transfer fluids from the wells sites, there is no production flowline to gather fluids and gases, and the gas flows are sometimes not high enough to justify installing a separate compressed gas gathering system. The gas produced is solution gas from the oil and the volumes are usually proportional to the oil production and ceases if production is stopped. At sites with low gas rates these streams have been vented to atmosphere after all the site's fuel energy needs for heating and pumping have been met. Mitigation is normally through collection with compression and flowlines, use of combustors if the gas is sweet, and flares if the gas is sour or causes odours.

[15] https://www.aer.ca/providing-information/data-and-reports/statistical-reports/st60b

17% (136)	Chemical Pumps	A chemical pump is a pneumatic-type device that injects chemicals into production vessels, flowlines, or down wellbores to provide better operations by preventing freezing, corrosion, or to reduce the impact of emulsions. Pressurized methane provides power through pressure reduction and is then vented. The amount of methane emitted is a function of the volume of chemical being pumped and the characteristics of the pump design. Chemical pumps are now being replaced by electrically driven (grid, on-site generated or solar) pumps or by replacing gas power with instrument air systems.
16% (131)	Pneumatics	Pneumatic devices are used extensively in industry for control of various vessels, valves, pumps, and emergency shutdown systems. Historically at natural gas production sites, methane from production was the most reliable source of powering these devices. As a result, methane is emitted after providing power to actuate the devices and is then vented. The use of pressurized methane as an energizing gas can be replaced by compressing air, using electrical controllers powered from the grid, on-site power generators or solar power, or using other gases such as nitrogen. Alternatively, the methane emitted from these devices could be captured through compressors, combusted, or used as fuel for other on-site energy needs.
9% (70)	Fugitives: Equipment Leaks	Fugitive emissions are leaks that are mostly created through small fitting leaks or large failures caused equipment vibration, mechanical damage, or corrosion. These leaks are found through routine inspections and monitoring but may require the shutdown of the installation before the repairs can be made, which in turn can increase wear and tear, and may even cause new leaks. Fugitive emissions can also increase the risk of accidents on site. The key technologies for mitigating these leaks are monitoring and detection devices and site survey services.
8% (65)	Wells; Surface Casing Vent Flows (SCVF) and Gas Migration (GM)	In addition to production casing, wells also have "surface casing" which may be found to have vent flows where the source of the methane is coming from other shallower formations (e.g., shallow gas, soil methane or coal seams) outside of the production casing. These flows are generally unrelated to the well production and may continue even when a well is no longer producing. Cement repairs or other plugging methods are used to permanently shut off the gas flows. Prior to repair and permanent mitigation, small catalytic or other combustors or "bio-beds" may be used to mitigate emissions until a permanent fix can be implemented.
5% (44)[16]	Flares	Flaring is the process by which natural gas, which may contain contaminants such as heavier hydrocarbons, water vapour, other hazardous or odorous compounds, is burned off in a controlled manner and the combustion products are dispersed. Standard flares are not 100% efficient at converting methane into carbon dioxide, water vapour and heat especially in adverse weather conditions, or where the flare is sized for emergency conditions and operates less efficiently at lower flow rates. In these cases, some methane

[16] Methane from flares is not specifically reported in ST60B so this value assumes that only 95% of the flare gas volume is converted to Carbon Dioxide. ST60B on page 33 shows a range of emissions factors derived for vent and flares for Gas Production, Crude Oil and Crude Bitumen. All other values in this table are given in the ST60B report.

		may not be destroyed. Some flares can be replaced by incinerators or enclosed flares for hazardous/noxious streams or simpler combustors to provide a more complete conversion of methane. If the flare is part of an emergency relief system where high volumes of gas may have to be flared for short periods, there exist no alternative method which would meet regulatory safety and dispersion requirements.
3% (27)	Compressor Seals	Compressor seals are designed to seal the rotating assemblies to prevent the process gas in the compressor from getting into the atmosphere. Some compressors are designed with "wet seals" to allow oil to lubricate the moving components, however, the oil absorbs methane which is then released when the oil is depressurized. "Dry gas seals" are preferred for gas compressors as they result in lower methane emissions. These methane emissions can be captured and handled through other compressors, through injecting the seal gas into the compressor fuel stream, combustors or other equipment requiring natural gas on the site.
2% (17)	Dehydrators	Dehydrators remove moisture from the natural gas stream typically through the use of a circulating glycol stream. The regeneration of the glycol uses heat to drive off the water vapour and can release methane and other volatile hydrocarbons into the atmosphere which may have been absorbed by the glycol. To contain or mitigate these emissions, condensers may be required to reduce the water vapour content from the gas to the point where the gas may be combusted or used for other purposes.
Total 100% (802)	**All Upstream Sources**	

Estimation of Upstream Methane Emissions

A major challenge for mitigating upstream oil and gas methane emissions is that historically many of the high methane content low volume streams had no economic value and were also not seen as hazardous pollutants. Emitted streams containing more hazardous Criteria Air Contaminants (CACs) such as hydrogen sulphides, heavier hydrocarbons, and carcinogens like BTEX (Benzene, Toluene, Ethylbenzene and Xylene) have been regulated for decades due to the harm they could have on local residents and workers. Interest in methane measurement has, however, grown with increasing concerns over global GHG emissions, due to its potency as a GHG compared to carbon dioxide. Motivation for improved measurement and control of methane streams has been drive by international agreements and federal commitments which have migrated down other levels of government and into corporate governance objectives. Many of the streams are also extremely difficult or expensive to measure on a continuous basis and often it is less expensive to mitigate the emissions rather than measure them.

Estimating Methane Emissions - To effectively implement methane solutions, it is necessary to have some estimate of the volumes and compositions of the streams being contained or converted. A number of reports have been done in the past to estimate volumes from methane sources. One such report, which may be useful to those developing product solutions or planning mitigation installations, is the Alberta Energy Regulator's *"Manual 015 – Estimating Methane Emissions"* [17] issued in December 2020 which also covers changes made in reporting emissions effective January 2020. Similar documents may be used in other jurisdictions, however, since Alberta has such a wide variety of emissions sources Manual 15 may cover source not defined in other provinces or states.

Reporting Methane Emissions – Another AER produced report which may be valuable to suppliers and service providers to identify markets are the annual *"ST60B Upstream Petroleum Industry Emissions Report"*[18], referred to in the previous section, which documents current levels of emissions and trends from fuel gas, solution gas conservation, flares, vents and other sources. It also provides rankings of company specific emissions various type of emissions and GHG emissions from solution gas venting and flaring which may be useful to suppliers in identifying potential customers for their products and services.

AER ST60B GHG Emissions Estimates for Vented and Flared Volumes as tCO_{2eq}

Note: The emission factors vary with the production type due to differences in gas composition (presence of water vapour, CO_2 and other components in unprocessed gas streams). ST60B showed the following variations:

- Gas Production
  - Vented gas GHG emission factor = 15.4 tCO_{2eq} per e^3m^3 of gas
  - Flared gas GHG emission factor = 2.7 tCO_{2eq} per e^3m^3 of gas
- Crude Oil
  - Vented gas GHG emission factor = 12.5 tCO_{2eq} per e^3m^3 of gas
  - Flared gas GHG emission factor = 2.9 tCO_{2eq} per e^3m^3 of gas
- Crude Bitumen (non-thermal)
  - Vented gas GHG emission factor = 16.3 tCO_{2eq} per e^3m^3 of gas
  - Flared gas GHG emission factor = 2.6 tCO_{2eq} per e^3m^3 of gas

[17] https://static.aer.ca/prd/documents/manuals/Manual015.pdf
[18] https://www.aer.ca/providing-information/data-and-reports/statistical-reports/st60b

Emission Sources and Product Solutions

Sources of methane emissions can be addressed by a variety of product solutions. The following table shows the various options available to reduce each emissions source.

	Products					
Emissions Source	**Combustion**	**Compressors**	**Instrument Air**	**Chemical Pumps**	**Electric Devices**	**Electricity Generation**
Pneumatics						
Tank Vents						
Wells; Solution Gas Vents & Production Casing Vents						
Wells; Surface Casing Vent Flows and Gas Migration						
Chemical Pumps						
Fugitives; Equipment Leaks						
Compressor Seals						
Flares						
Dehydrators						

Ranking of Mitigation Solutions Based on Abatement Cost per tCO_{2eq}

Ranking of potential product solutions to mitigate methane emissions is best done through use of a standard metric. Calculating an abatement cost is one metric used in a number of places in the case studies. It also makes it easier to compare methane migration options to other methods of decarbonization such as CCUS which are larger in scale and will be designed to operate for decades. A suggested rough method for methane mitigation could be:

(CAPEX + 10 * OPEX)/((Emissions avoided/10 yrs – Emissions due to solution/10 yrs)) = Abatement cost over 10 years

- CAPEX & OPEX should be based on experience with actual installations
- (Emissions avoided) should be based on a measurement of the current annual emissions. Ideally, they should be projected as a trend over 10 years, since few upstream methane vents will stay constant over 10 years as they should decline as production declines,
- Emissions due to solution may be proportional to the emissions avoided over any given period and could be due to fuel combustion, carbon intensity of the local grid, and could include life cycle emissions for producing the equipment if that information is available.

Case Studies

These case studies provide examples of Canadian technologies and services applied in the field, along with the impacts on clients. In some examples, multiple technologies and services are used to provide the best solution to the client.

Vapour Recovery Units (VRU's)

At various stages of oil and gas production, there are numerous points of controlled venting of methane and other hydrocarbon gases that have traditionally occurred by design at process facilities and were described in an earlier section of this report. Industry is now choosing to eliminate atmospheric venting of hydrocarbon gases to meet new regulations, increase revenue and improve ESG. Currently the largest reported source of controlled venting is from atmospheric tanks where produced gases come out of solution as the pressure is reduced. Tank vents have unique challenges for which Marathon Compression spent the past 10 years developing unique product solutions.

Vapour Recovery Units have been developed to take vent gas away from atmospheric tanks, boosting the gas pressure to a point suitable for re-injection back into the process. This equipment captures valuable gas production that was previously vented as waste-gas into the atmosphere. **Marathon Compression** works with producers and EPCM's to design custom single or multi-stage VRU's specific to their site needs.

Combustion

One solution for reducing methane emissions is to convert the methane into carbon dioxide, water vapour and heat through a combustor. Most combustors have very high conversion efficiencies of 99.9%+. The methane combustion reaction: **$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ reduces the GHG impact of the stream from 25 tCO_{2e}/tCH_4 to ~2.75 tCO_2** for about a 90% reduction in GHG emissions. The energy generated can also be used for other purposes.

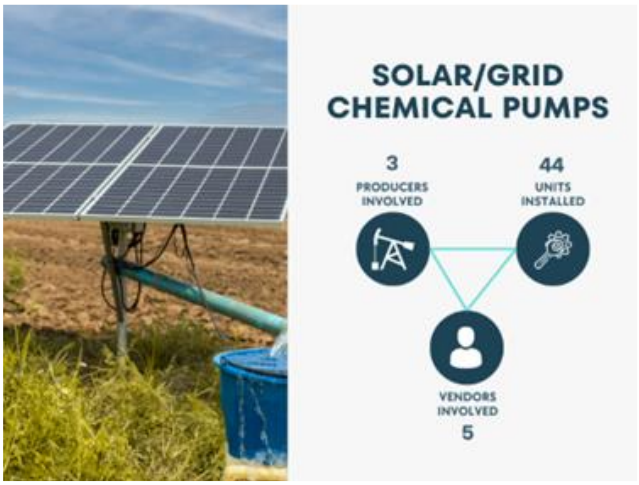
As part of a project on Systemic Third-Party Validation (STV)[19] managed by PTAC an enclosed combustor was tested to convert solution gas venting at a crude oil/bitumen battery. The calculated abatement cost for the test was **~$3/$tCO_{2e}$ over a 10-year period**. The unit could have handled much more gas than the battery was venting at the time, while at a second test site the vent gas flow stopped with a sudden drop in production. This showed a need for these devices to be actively managed to maximize combustor capacity utilization with a fleet of relocatable units.

[19] A public report on the project was prepared for Alberta Innovates and should soon be available on their project site or can be obtained from PTAC on request. This reference is used for other case studies in the directory.

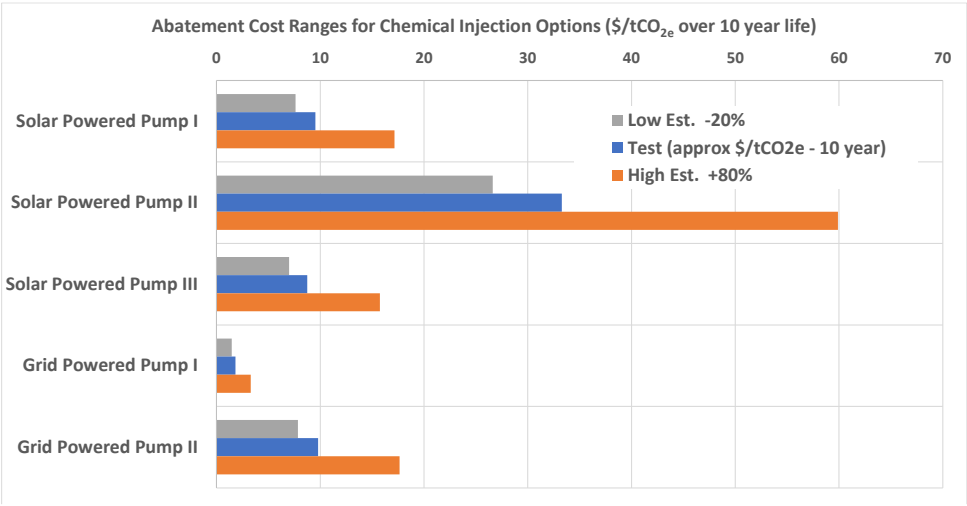
In another case - One **client of Questor** installed 13 Q-Series Thermal Oxidizers to replace its previous methane emission venting practices. In addition, at three of these sites, the thermal oxidizers generated sufficient heat from combustion to power drilling operations. Questor also supplied 200 kW Organic Rankine Cycle power generators to transform waste heat into useable power. This use is beneficial and helped ensure necessary permitting for existing and future projects.

The total gas flow was 0.1 MCM/d (3.5 mmscf/d); greenhouse gas reduction (clean combustion with 99.99% efficiency) has been 1,487 tonnes CO_{2e}/d, at an abatement cost of less than $2.00/tonne. The total project cost was $8.9 million over a 10-year period.

Chemical Pumps Conversion



Based on ST60B 2021 data chemical pumps represented the 3rd largest source of methane emissions. The PTAC STV project worked with producers to undertake widespread testing to replace gas activated chemical pumps with electrically driven pumps powered by solar power or power from the grid, where it was available. All of these systems were permanently installed and observations were provided by the producers on operability, maintenance, suggested improvements acted on by the equipment vendors, and advantages of features such as use of multi-head pumps, remote monitoring and control of chemical dosing and other factors. In most applications in this group the pumps were the main methane sources on the test sites. The chart below shows a range of abatement costs for various types of pumps and power sources available.



Electric Devices Replace Pneumatics

Retrofitted Separator with Bear Solar Electric Control System

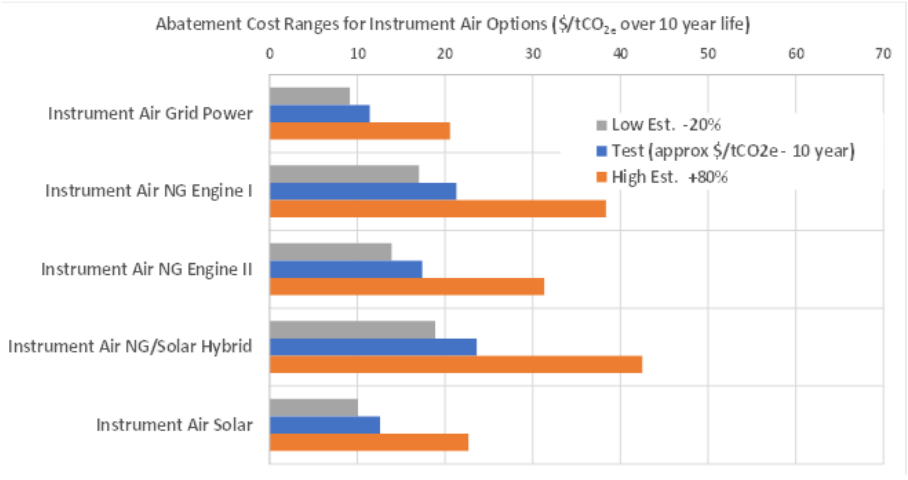
Calscan Solutions has been creating electric actuators to replace pneumatic controllers for over 10 years. Replacing traditional pneumatic devices with electrical ones eliminates the challenge of wet or sour gas causing issues with pneumatic controllers. When the oil and gas industry began looking for solutions to reduce methane emissions through pneumatic devices, it was already there with a solution.

In 2018, a producer approached Calscan to provide a complete electrical solution for reducing greenhouse gases at its well sites for both brownfield and greenfield developments in Northern Alberta. Calscan helped the producer by designing the solution, and supplied various electrically controlled actuators, controllers and chemical injection pumps powered by solar panels and batteries. The solutions were included in the design and the separators built and retrofitted using these electrical devices.

The project successfully eliminated all methane emissions from pneumatics. This saved the producer maintenance costs as well as plumbing and installation of traditional pneumatically controlled devices. The producer estimated that it reduced methane emissions by over 300 tCO_{2eq}/year for each separator package since deploying the Calscan devices. The producer has now installed over 20 packages on brownfield and greenfield well-site separators.

Instrument Air and Air/Power Hybrids

At existing sites with a wide range of pneumatic pumps and other devices already installed, the STV projects assessed the potential for replacing methane power gas with instrument air. Air compressor units were powered by power from the grid, natural gas engines, solar power or hybrid systems depending on what was available and the most appropriate for the site. Abatement costs were generally in the range of \$10-\$20/tCO_{2e} over a ten-year life. GHG emissions from natural gas engines were much smaller than what would have resulted from mitigation through use of a combustor.



The Marathon Compression **KL8 Air-Power Unit** has been developed to supply 100 psig instrument air and 24V DC electrical power, providing a simple and economic means to eliminate the use of methane gas traditionally used to power pneumatic instruments. The KL8 APU is designed for autonomous operation at remote sites for which there is no other power source available such as well pads, separator sites and metering stations.

In a specific case **Shell Canada** updated the well pad design in its Alberta Shales business in 2019 to eliminate methane emissions from pneumatic devices by transitioning to instrument air. At the time, Shell used surplus generators with a load bank in order to supply the power required to run an air compressor on its sites.

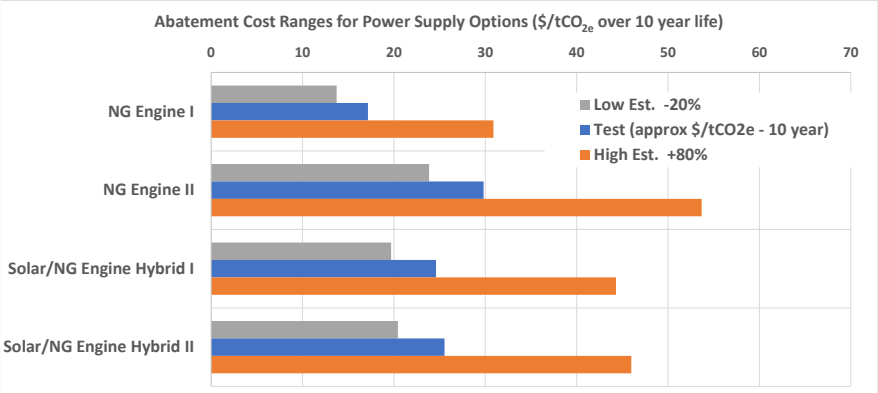
In April 2020, Shell later trialed a 20kW Engineered Power on Demand (EPOD) remote power generation module from Westgen Technologies. This powers an instrument air compressor using a generator/battery/solar panel system. The EPOD deployment on the Shell site resulted in greenhouse gas reductions through reduced power demand (elimination of oversize generator + load bank), elimination of venting from pneumatics, and minimizing construction scope.

By integrating components such as a generator, distribution skid, uninterruptible power supply, and instrument air skid into one modular shop-fabricated solution, Shell realized a 26% capital cost savings from its previous design. Coupled with Shell's zero venting well pad design, switching to EPOD resulted in >35% overall reduction in greenhouse emissions from previous gas pneumatic designs. In addition to improved environmental performance, Shell also realized capital and operating cost savings.

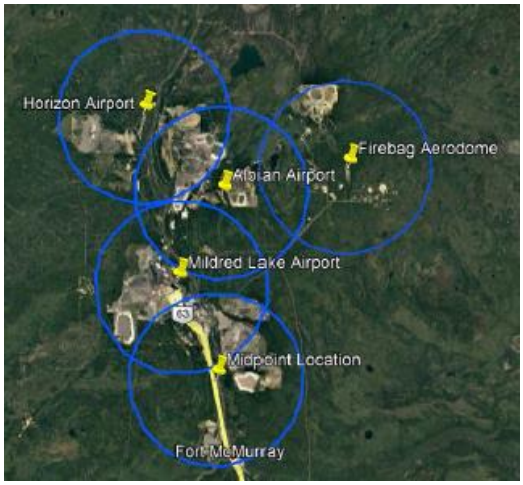
The success of this trial has resulted in the adoption of the EPOD in all future well pads in Shell's Alberta Shales operations. "The EPOD fills a void that existed in the power generation market for remote locations. The EPOD trial unit operated consistently and demonstrated a significant reduction of fuel gas consumption, GHG emissions and maintenance costs." David Hatch, Shell Facilities Engineer.

Power Generation Retrofits

As seen in the cases above, providing power at remote sites can significantly reduce methane emissions from a number of sources, especially in "greenfield" applications. However, PTAC's STV project also showed significant benefits through retrofitting power into larger remote "brownfield" sites, where grid power was not available. Due to the power demand at these sited pure solar was not usually considered viable.



Detection, Measurement, Quantification, and Monitoring



A large producer in Canada noted, "Our company's goal is to achieve a net-zero methane emissions target by 2030 and we are currently on track to meet that goal. However, to do so we need to be able to monitor all our assets to ensure that no methane is escaping in controlled environments such as gas plants, pipelines, and compressor stations. To be a good operator, we also need to look at our uncontrollable assets such as oil sands mines and tailings ponds to measure the impact their methane emissions are contributing to the environment. We have found that the best way to measure each of these operations is with Unmanned Aerial Vehicle (UAV) operations as these have sensor miniaturization, a fully electric vehicle, and the ability to fly close to the ground to collect the necessary data. The costs associated with these operations proved uneconomical, until now."

In October and November of 2020, Canadian UAVs (CUAVs), a provider of long-range UAVs, provided demonstrations of its capabilities to key operator personnel with flights outside their fence line to gather the requested data. With this operational capability, CUAV was able to cover over 100 km² of area from a single launch location outside of the operator's boundaries. This reduced the need for operator intervention, and no permitting or security check-in was required as the UAVs never entered the site. The operator received the required data the following day through the CUAVs secure online portal.

Canadian UAVs model has taken the use of UAVs to an advanced level for methane monitoring. By integrating their ground-based radar systems into various airport locations throughout the oil sands region, CUAVs can cover a total area over of 3,200 km² and approximately 1.2 million bbls/day of producing assets. CUAVs is a valued addition for methane monitoring that would otherwise require shutting down parts of mining operations for shorter ranged UAVs.

Research and Testing of New Technologies

Canada has many companies skilled at detecting and reporting on methane emissions. The Carbon Management Canada's Containment and Monitoring Institute (CaMI) in Southern Alberta has been helping to commercialize methane detection equipment.

One methane detection vendor wished to observe how its laser technology would perform in harsh weather conditions on the Canadian Prairies, including summer heat waves and winter snow blizzards. The vendor chose to test their equipment at CaMI, where staff provided facilities and expert advice in a real-world environment, along with access to operating industrial emission sources.

As the methane detection technology scanned an area of 7.5 km^2, the performance of the equipment was monitored and evaluated. Tests helped to fine tune and adapt the system's peripheral equipment to specific features of the Canadian environment to ensure maximum performance and nearly continuous monitoring.

The vendor benefited from the opportunity to deploy and test its system where observations from operating upstream facilities can be augmented through controlled methane releases. It gained valuable experience dealing with extreme weather conditions and improved their technology. The technology developer noted, "The Canadian industry tends to have a different way of viewing things and a different way of operating, so getting that progressive and knowledgeable perspective has been a really valuable asset."

Managing Emissions Reductions with Limited Resources

A medium-size producer was having a difficult time keeping up with all the environmental regulatory changes that were taking place. Dozens of technology companies were approaching it with various solutions for abatement and monitoring, but it was unsure of which ones to adopt.

It stated, "After years of struggling to keep up, reaching out to Highwood Emissions Management was the best thing we could have done." The producer hired Highwood Emissions Management to help it navigate the changing regulations and identify suitable new technologies. Highwood provided it with several options and recommendations for how best to manage its data. With a strong understanding of their assets and baseline emissions, Highwood worked with the producer to develop a cost-effective, long-term emissions reduction strategy that keeps their investors happy and demonstrates their global leadership. An end-to-end solution, Highwood developed and implemented abatement strategies and the fugitive emissions monitoring program while taking responsibility for all reporting requirements. The operator noted, "We are now spending less to achieve more, and we are proud to be showcasing our use of cutting-edge technologies to the public." Highwood has demonstrated that it is possible to significantly reduce emissions with limited resources.

Prioritizing Initiatives to Reduce Methane Emissions

Montrose Environmental Group looked at a vast depth of information available to companies once they start collecting data on their fugitive methane emissions.

Montrose Environmental Group investigated the results from 2,650 Leak Detection and Repair (LDAR) surveys across 6 provinces, in 21 locations. From these locations, they detected just under 6,000 leaks exclusively using Optical Gas Imaging (OGI) for detection and a Hi Flow sampler for gas rate quantification. Of these emissions, 490 sources were emitting at rates greater than 20 m^3/d (0.5 ft^3/minute), and the volume from these sources represented 64% of the total emitted volume of the data set.

Montrose estimated that the repair cost for these sources of emissions would be $227,000, and that the fugitive natural gas would have an estimated value of $1,343,000 of lost product if left unchecked over the year.

This study demonstrates the value in having management firms accumulate and analyze all the data to provide recommendations to clients in order to assist them in prioritizing initiatives to reduce methane emissions.

Canadian Capabilities to Address Methane Emissions

The following table lists the Products and Services available from Canadian experts to assist in the global effort to reduce methane emissions from upstream oil and gas operations. Product categories below describe the type of products available to physically remove or reduce the methane emissions. Service categories describe the solutions available to detect, quantify, monitor, manage and mitigate methane emissions. Note that many of the products and services listed may also be applied to midstream and downstream operations.

Category	Description
Products	
Combustion	The manufacturing and/or commercialization of combustors and catalytic oxidizers, to efficiently consume and destroy the methane emissions from a wide range of sources.
Compress Methane	The manufacturing and/or commercialization of compressors to capture methane from tank vents, wells, or other sources, and deliver this recovered methane back into the process, flares or fuel systems.
Instrument Air	The delivery of air or other gases to existing pneumatic devices to replace methane as the power fluid.
Chemical Pumps	The manufacturing and/or commercialization of chemical pumps that operate on systems that do not vent methane, such as electric pumps or air. These alternatively powered pumps are a solution specific to chemical pump venting.
Electric Devices	The manufacturing and/or commercialization of devices that operate on electricity that replace pneumatically operated devices.
Electricity Generation	The collection, storage, and use of methane to power a generator to provide electricity. This methane would have otherwise been released to the atmosphere. Electricity can be used on site to power operations or be delivered to a grid.
Services	
Detection, Measurement, Quantification, Monitoring	The detection and measurement of gas flow, including the physical capability of travelling to the field and detecting and measuring the volumes/rates of methane emitted from various pieces of equipment. This category includes monitoring if equipment is left in place.
Research	The investigation of the suitability of various technologies in methane detection or mitigation, and/or supplementing testing and development services to vendors or producers.
Reporting	The use of software to take the measured volumes of methane to prepare governmental or internal reports.
Management	The supply of management services, including: to identify, measure and mitigate methane emissions, to provide recommendations on how to optimize capital spending, and to provide training. These organizations have a broad understanding of the intricacies of various leak detection and elimination products and services, and typically have an in-depth knowledge of governmental regulations and policies.
New Technology/Redesign	The investigation of the overall production, separation and delivery process and recommendations of design changes to improve efficiency or otherwise reduce methane emissions.

Canadian Company Directory

The Canadian companies listed here have identified a "primary" product/service category, and each company is listed under its respective "primary" category. Each company has also identified additional products and services that it offers. Click on a company name to skip to its listing. This directory will also be made available on the PTAC CRIN Innovation Showcase in April 2023. A link will be provided in updated versions of this document.

		Product Categories							Service Categories				
Company	**Page Number**	Combustion	Compress Methane	Instrument Air	Chemical Pumps	Electric Devices	Electricity Generation	Alternative Cement Products	Detection, Measurement, Quantification, Monitoring	Research	Reporting	Management	New Technology/Redesign
Combustion													
Alberta Welltest Incinerators	25	■											
Clear Rush Co.*	26	■	■				■			■	■		
Emissions Rx Ltd.*	27	■							■				
Metan Group LLC+	28	■					■					■	
PureJet Inc.*	29	■					■						■
Questor Technology Inc*	30	■					■		■	■	■	■	■
Total Combustion Inc.	31	■											
Compress Methane													
Compact Compression	32		■										■
Gaspro Compression*	33		■							■			■
IJACK Technologies Inc.*	34		■			■							
NEXT Compression Corporation	35		■										■
Spartan Controls*	36		■	■	■				■	■		■	■
Vapure Engineering Ltd.*	37		■		■				■	■			
Instrument Air													
Blair Air Systems	38			■	■								

Company	Page Number	Product Categories: Combustion	Compress Methane	Instrument Air	Chemical Pumps	Electric Devices	Electricity Generation	Alternative Cement Products	Services Categories: Detection, Measurement, Quantification, Monitoring	Research	Reporting	Management	New Technology/Redesign
Envision Manufacturing & Supply Ltd.	39	■	■	■									■
Kathairos Solutions Inc.*	40			■					■		■		■
LCO Technologies*	41		■	■	■						■		
Marathon Compression +	42			■			■						
Westgen Technologies*	43			■			■						
Chemical Pumps													
Bruin Instruments Corp.	44				■	■							■
General Magnetic Canada Inc.	45				■	■							
MCI Solar Mfg. Ltd.	46				■	■							
Sirius Instrumentation and Controls*	47				■								■
Electric Devices													
Calscan Solutions*	48					■			■				
Caron Measurement & Controls Ltd.*	49		■	■	■	■			■				
Electricity Generation													
Global Power Technologies Inc.*	50	■		■			■		■	■			■
NexSource Power Inc.*	51			■	■	■	■		■				■
SFC Energy Ltd.*	52						■						■
Alternative Cement Products													
Pluto Ground Technologies	53							■					

Changes in 2023: (* 2023 revisions); (+ 2023 additions)

Company	Page Number	Product Categories: Combustion	Compress Methane	Instrument Air	Chemical Pumps	Electric Devices	Electricity Generation	Alternative Cement Products	Services Categories: Detection, Measurement, Quantification	Research	Reporting	Management	New Technology/Redesign
Detection, Measurement, Quantification, Monitoring													
Airdar	54												
Canadian UAVs*	55												
CMC Research Institutes Inc.*	56												
Current Surveillance Inc.*	57												
EnviroTrace Ltd.*	58												
Eosense	59												
Gas Recon Inc.	60												
GHGSat*	61												
GreenPath Energy Ltd*.	62												
HETEK Solutions Inc.+	63												
IntelliView Technologies Inc.*	64												
Intricate Group Inc.	65												
Kuva Systems +	66												
Montrose Environmental Group Ltd.*	67												
SolutionCorp Inc.	68												
Surface Solutions Inc +	69												
Telops*	70												
Ventbuster Instruments Inc.	71												
Vertex Resource Group Ltd.+	72												
Research													
Energy & Emissions Research Lab*	73												

Company	Page Number	Product Categories: Combustion	Compress Methane	Instrument Air	Chemical Pumps	Electric Devices	Electricity Generation	Alternative Cement Products	Services Categories: Detection, Measurement, Quantification,	Research	Reporting	Management	New Technology/Redesign
Reporting													
CNTRAL Inc.	74												
Envirosoft Corporation*	75												
Process Ecology*	76												
Management													
Arolytics Inc.*	77												
Carbon Connect International*	78												
enSift Corp.	79												
Highwood Emissions Management*	80												
Modern West Advisory, Inc.	81												
Radicle	82												
Validere*	83												
New Technology/Redesign													
Clearstone Engineering Ltd.*	84												
Durlon Sealing Solutions*	85												
OilPro Oilfield Production Equipment*	86												
SensorUp	87												
Valence Natural Gas Solutions*	88												

Changes in 2023: (* 2023 revisions); (+ 2023 additions)

Canadian Methane Emissions Reduction Products

Combustion

Alberta Welltest Incinerators

www.awincinerators.com

LOCATION
Red Deer, Alberta

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
Rick Henders, Business Development Manager
rick@awincinerators.com
+1 (403) 816-7116

SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION
Alberta Welltest Incinerators (AWI) provides incinerators that replace a flare stack, allowing operators to burn natural gas on site, virtually eliminating emissions. It reduces visibility of oil and gas operations while greatly reducing emissions. AWI is the only incinerator rental company with a forced draft air combustion system. Due to integral systems on its incinerators, they are able to be operated extremely safely. AWI helps operators with their ESG targets, focusing on the environmental side. It helps its clients be a "good neighbor" by not burning natural gas in a visible (flare stack) way.

AWI started in the early 2000's with a couple of rental incinerators. Over the last 15+ years, it has increased its inventory to 37 units available. AWI's business has grown to the point where, prior to COVID, the company experienced its best year ever despite low commodity prices.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
AWI service and equipment is applicable in the same way internationally as it is in North America as it helps operators burn natural gas in a socially acceptable way (lessening visibility and lessening emissions).

TECHNICAL CAPABILITIES
The AWI HF (high flow) incinerator can handle approximately 3 mmscf/d of typical wellhead gas, dependent on the BTU value of the gas. To burn a higher volume of gas, it incorporates multiple units. It has a 99.9% destruction efficiency (backed up by third party testing). AWI has a forced draft air combustion system with variable frequency drives (VFDs). Its equipment handles flow rates from very minimal up to the max flow per unit, all automatically. AWI units have two ignitors that run steady, so ignition is never an issue, even if flowing back a non-burnable gas while waiting for burnable gas to come to surface.

www.clearrushco.com

Clear Rush Co.
A Clean Technology Group

LOCATION
Sundre, Alberta

PRIMARY CATEGORY
Clean Combustion

CONTACT INFORMATION
Dallas Rosevear, Chief Business Development Officer
dallas@clearrushco.com
+1 (403) 507-0485

SECONDARY CATEGORIES
Burner management systems, Flarestack ignition systems, Regulatory, Research & Reporting

COMPANY DESCRIPTION
Clear Rush Co (CRC) products include its patented enclosed vapour combustors designed for low pressure, low volume vent gas from sources such as casing gas, storage tanks, and pneumatic instruments, compressor vent seals and surface casing vent flows (SCVF). CRC designs and manufactures industry leading ACL burner management and the "All In One" Rush Burner. The Clear Rush enclosed vapour combustors are designed to be the safest combustors on the market. CRC has been the pioneer in enclosed vapour combustor technology and works with producers and regulators to ensure that the units can be safely operated within reduced spacing (10m) applications.

Cleanly combusting these small volumes of vent gas significantly decreases the taxes which companies would need to pay for emitting methane or allows producers to speed up wells which have been slowed down to reduce vent volumes. The ability to generate carbon offsets with the enclosed vapour combustors provides a revenue stream rather than simply an operational expense. Currently, CRC has deployed enclosed vapour combustors across the United States, Canada and internationally. In Western Canada, every producer in the Lloydminster region is utilizing the enclosed vapour combustor for either casing gas or storage tank vapours. In West Texas, Clear Rush currently has over 100 units operating in the field.

COUNTRIES EXPORTED TO
Albania, India, United Arab Emirates (UAE), United States (USA)

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Canada has led the world in methane reduction. Internationally, methane reduction is fast becoming a necessary practice in order to produce energy in a sustainable manner. The Clear Rush Co enclosed vapour combustors provide producers the right tool for methane reduction.

TECHNICAL CAPABILITIES
CRC offers a complete line of enclosed vapour combustors for flow rates up to 1.7MMSCF/d and as low as 100SCF/D. Low pressure gas is difficult to combust. The CRC enclosed vapour combustor can effectively achieve 99.9% total hydrocarbon destruction as low as 0.09 psi or 2 oz's of pressure. Each combustor has been third party tested for combustion efficiency verification. A key feature of its combustor is that each and every one has crimped ribbon style air intake flame arrestors. The arrestors provide the necessary safeguards to operate the units within hazardous areas. The ACL CSA approved burner management system controls ignition, monitoring and shutdown of the units. All combustors offered are approved for reduced spacing of 10m from existing equipment.

Click here to see their product on the innovation showcase!

Emission Rx Ltd.

www.emission-rx.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
Ritchie Stagg, Director of Sales
rstagg@emission-rx.com
+1 (403) 452-5633

SECONDARY CATEGORY
Detection, Measurement, Quantification, Monitoring

COMPANY DESCRIPTION
Emission Rx Ltd (ERx) is a Calgary based service company that provides high-efficiency waste gas combustion for use in emission mitigation technologies in the North American oil and gas industry. ERx's combustion systems are utilized in the effective management of oil and gas emissions from sources that include tank vapours, surface casing vent flows, glycol dehydrators, fugitive emission vents, hydrocarbon loading operations and solution gas that is typically vented or flared.

The ERx engineering team has designed a series of combustors that have the operational capability of effectively managing waste gas streams of varying pressures, rates and compositions. ERx offers its clients enclosed combustion technology at the lowest available price point. Since coming to market in late 2018, ERx has sold over 400 combustor units into the Canadian oil and gas market and are well positioned to serve any waste gas mitigation applications that arise.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
ERx's combustion technology meets or exceeds the requirements for all regulatory jurisdictions in North America.

TECHNICAL CAPABILITIES
The ERx standard combustor designs can effectively manage gas flow rates between ~2 mscf/d - 5 MM scf/d and can accept waste gas pressure as low as 1 oz/in2 without pressurized assist gas. Its combustors have been independently tested to provide a combustion efficiency >99.9% and can accept varying waste gas flow rates and compositions without impacting the combustion efficiency.

Metan Group LLC

www.metangroupllc.com

LOCATION
USA & CANADA

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
Julian Nurkowski
metan@metangroupllc.com

SECONDARY CATEGORIES
Management

COMPANY DESCRIPTION

Metan Group LLC (www.metangroupllc.com) is a startup group of four technical professionals with a total of 100+ years' experience in oil and gas exploration, development and production and heavy equipment and chemical manufacturing. We are a multinational group with two members located in Canada and two in the USA. We are incorporated as a Limited Liability Company (LLC) in the State of Illinois, USA on December 2014. Metan has obtained patents in the US 10,150,081 and Canada 2,987,342 for our Methane Abatement technology.

The Catalytic Methane Abatement System (CMAS) is manufactured and marketed by Etter Engineering, Connecticut, USA, a process heating and combustion engineering firm (www.etterengineering.com) who has patented the unit's enclosure which is suitable for the extreme conditions of many oil and gas wells in North America and elsewhere (US 10,150,081).

COUNTRIES EXPORTED TO

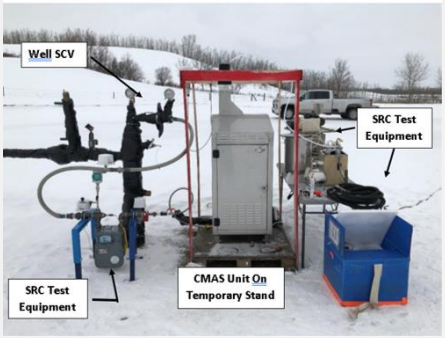
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

United States and Canada

TECHNICAL CAPABILITIES

Metan's objective was to develop a safe and effective means to oxidize low flowrate/low pressure methane to carbon dioxide using catalysis instead of combustion or flaring with an open flame. Our initial thrust was towards Surface Casing Vents (SCV) and oil/condensate storage vents where supply pressures are low and flows are generally below 25 m^3 per day however the technology can be used to oxidize other methane sources.



We have manufactured three prototypes nominally 2.5, 10 and 25 m^3 per day although the units can be manifolded up to 100m^3 per day. The units require an electrical current from a truck battery or portable generator to start after which they continue as a self-sustaining chemical reaction. The units are designed for outdoor installation and can be operated in close proximity to active or capped oil and gas wells. They are provided as a complete "Plug & Play" assembly and can operate indefinitely without any on-site electrical power or other infrastructure support as long as fuel is available. The units attach directly to the surface casing vent with little additional pipe and fittings.

Two units have been field tested under winter conditions in Western Canada where methane emission regulations are more advanced than in the USA. The attached picture is the installation at a test site in Saskatchewan, Canada in February 2022. We have also made contact with the UAE who are reviewing our technical capabilities.

PureJet Inc.

www.purejet.ca

LOCATION
Medicine Hat, Alberta

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
info@purejet.ca
+1 (403) 437-7873

SECONDARY CATEGORIES
Electricity Generation
New Technology/Redesign

COMPANY DESCRIPTION

PureJet is an industry leading combustor technology that eliminates harmful methane emissions. With its patented intake technology, PureJet provides industry-leading capacities and turndown ratios in a minimal footprint. Utilizing no-moving parts, PureJet offers reduced maintenance and increased service life, while simultaneously achieving greater performance than traditional gas flare technology. The PureJet is a family of incinerators that apply patented aerospace technologies to efficient waste gas destruction. A major component of the operation of PureJet is its patented intake system. Providing sufficient air to facilitate the combustion of a large amount of waste gas is a complex engineering challenge. PureJet's unique design allows it to achieve high capacities and turn down ratio.

PureJet is designed to integrate into existing facilities for ease of deployment and ability to tie into existing infrastructure. Further research is being done to integrate PureJet with waste-heat-to-power and water recovery technologies. PureJet is a quick and cost-effective solution to emissions compliance.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Purejet has designed its products to be standardized for suitability in international markets. Its technology can perform in a wide range of conditions, making it a good fit for diverse conditions throughout the world.

TECHNICAL CAPABILITIES

PureJet runs a continuous pilot that can be tied into existing infrastructure. It can run on waste gas or an alternative fuel source based on the application. The system can be operated from on-site power or deployed to a remote location using an optional solar / battery system. Fuel train and ignition system is CSA B149.3 compliant. Ignition is managed by an electronic control box.

All units are 99.9% efficient up to units' maximum capacities. Purejet technology allows for a wide range of flows and pressures to be handled. Unique intake design allows PureJet to handle a variability of flow rates without compromising efficiency.

Questor Technology, Inc.

www.questortech.com
Video - https://www.youtube.com/watch?v=a8i6ArE5tuk

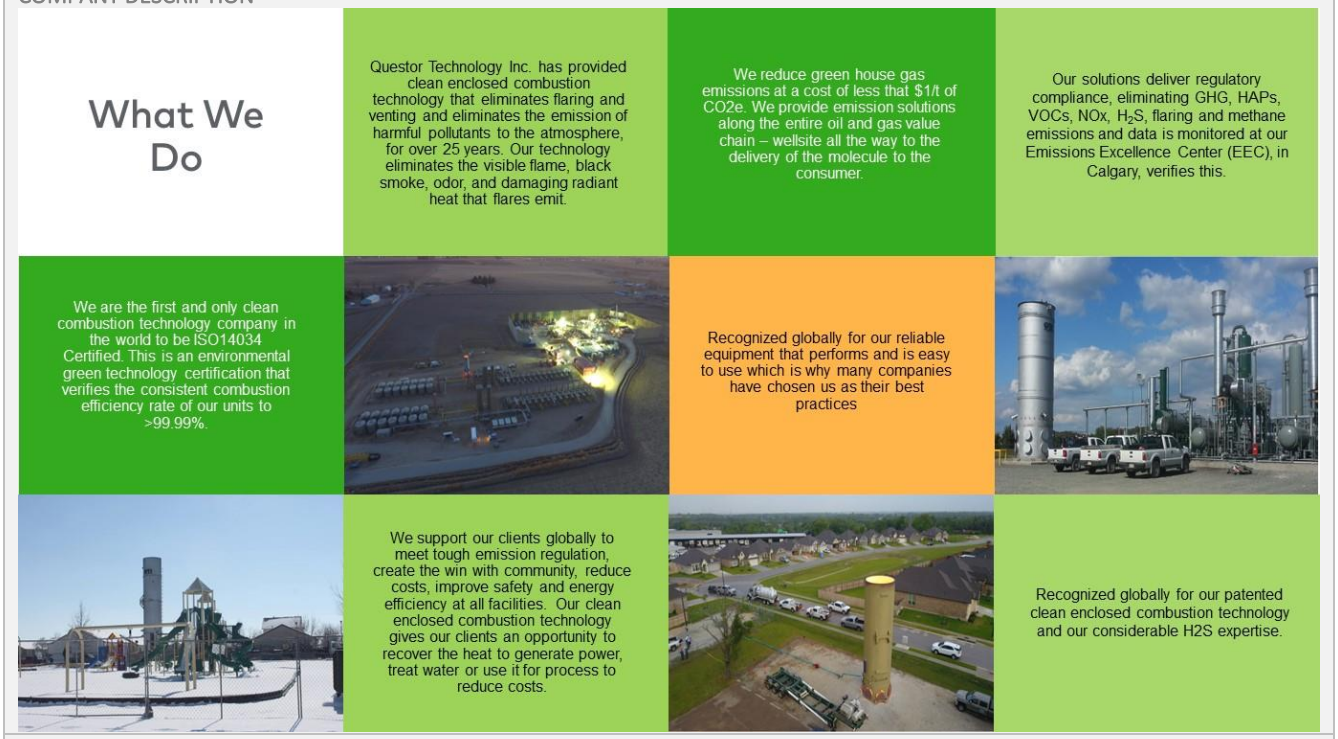
LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
Audrey Mascarenhas, President and CEO
amascarenhas@questortech.com
+1 (403) 571-1530

SECONDARY CATEGORIES
Catalytic Oxidation, Electricity Generation, Detection, Measurement, Quantification & Monitoring, Research, Reporting, Management, New Technology/Redesign

COMPANY DESCRIPTION



COUNTRIES EXPORTED TO
China, Cuba, Egypt, France, Germany, India, Indonesia, Italy, Mexico, Russia, Thailand, Trinidad & Tobago, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Questor Technology designs and builds to meet and exceed individual market specifications of the host country. Its strong engineering team has global experience and has a 21-year track record of international projects.

TECHNICAL CAPABILITIES
Questor provides a wide selection of units that are capable of cleanly combusting gases as low 5mcf/d all the way to 5MMsc/d. With multiple units in parallel it has handled volumes in excess of 20MMscf/d. Questor has unlimited turndown and a single Questor unit has the ability to handle multiple streams of different pressure and temperature. It has cleanly combusted methane streams with low methane content, fugitive emissions, rich flow back gas, associated rich solution gas, engine and pipeline maintenance. Its expertise in methane includes fugitive emissions, streams with low methane content or methane slip, and all routine and non-routine flared streams.

Click here to see their product on the innovation showcase!

Total Combustion Inc.

www.tciburners.com

LOCATION
Red Deer, Alberta

PRIMARY CATEGORY
Combustion

CONTACT INFORMATION
Julie Wiseman, VP Operations
j.wiseman@tciburners.com
+1 (403) 875-9924

SECONDARY CATEGORY
N/A

"Engineered Solutions For Combusting Waste Gas"
www.tciburners.com

COMPANY DESCRIPTION

Total Combustion Inc. (TCI) is a gas combustion company focused on providing reliable and easy to use combustion equipment for field operations and engineering teams. Our solutions are engineered for simplicity, so it does what it needs to do, to ease field operations oversite burden and costs.

- TCI has been around for over 22-Years
- We provide an Alternative to Venting & Flaring, which in turn helps our clients Reduce Methane Emissions
- There is No Smoke, No Odor and No Visible Flame
- Third party testing on our equipment proves our claim of over 99.9% Combustion Efficiency
- High quality materials require less servicing than competitors.
- Simple To Operate and Reliable
- Various Mounting Options such as Trailer, Skid, Piles or Platforms

The cost to purchase a Total Combustion Inc. depends on the type and quantity of gas being incinerated. Rates can range from $15,000-$500,000. Operating costs are very low. Typically, only a small amount of fuel gas is needed to operate the continuous pilot burner.

COUNTRIES EXPORTED TO
Cuba, Ecuador, France, New Zealand, Oman, UAE, United States, Venezuela

INTERNATIONAL APPLICATIONS AND EXPERIENCE
All countries with oil and gas production have the opportunity to utilize patented TCI technology to reduce methane.

TECHNICAL CAPABILITIES
TCI incinerator combustors range from TCI 60 to TCI 6000, ranging from 200 m3/day (7.2 MSCFD) to 110,000 m3/day (3800 MSCFD) of methane gas. The TCI incinerator is made up of a barrage of individual burners. Small units have just burners on the base but bigger units have burners on the rings. Units can be turned up or down (i.e. handle variable flow from 0 to 110,000 m3/day on the largest unit). TCI uses venturi aspirated burners for good premixing of waste gas and air, and do not require combustion air blowers. Power to operate the B149.3 regulatory compliant burner management system can be supplied by a small solar power system. TCI offers the following methods of ignition with its own control panel; constant/automatic ignition and manual ignition. TCI also offers a solar panel and battery to power the control panel.

Compress Methane

Compact Compression Inc.

www.compactcompression.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Compress Methane

CONTACT INFORMATION
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SECONDARY CATEGORIES
New Technology/Redesign

COMPANY DESCRIPTION
Compact Compression's (CCI) Hydraulic Casing Gas (HCG) compressor and Wet Gas Compressor (WGC) technologies are ideally suited for methane emissions reduction in the following ways: casing gas compression; flaring and venting elimination at satellites and batteries by compressing gas from separator vessels; vapour recovery from tanks and low-pressure vessels. Rather than a custom engineered package for each individual application, Compact Compression offers a fit for purpose compressor design in a few standard models that cover a wide range of pressures and flowrates. The total cost of ownership of CCI compressors is among the lowest available, therefore increasing ROI.

CCI's compressors were designed with value, reliability, performance and user-friendliness in mind. They are highly liquid tolerant and capable of over 20m3/d without the use of separate vessels and liquid pumps. They have self-regulating capacity control, 100% turndown, no recycle circuit, and feature demand based maintenance enabled by IoT technology. Compared to other compression technology, the HCG and WGC compressors offer a lower capital cost on a gas flowrate basis, low operating cost, and fixed maintenance costs. This leads to industry leading uptime, increased oil production, additional revenue from conserved gas, and a reduced need to purchase fuel gas for process heat. CCI has logged over 800 installations of the HCG since its introduction in 2015. It is active with over 30 clients, from large multinational organizations to small privately-owned firms.

COUNTRIES EXPORTED TO
Australia, Colombia, Oman, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
CCI compressors are built according to Canada / USA oilfield and electrical standards. We can engineer packages for other standards systems (e.g. IEC, ATEX) and configure for different power grid voltages and frequencies.

TECHNICAL CAPABILITIES
CCI compressors may be powered electrically or by natural gas engine. Their flow ranges from 0 e3m3/d to >50 e3m3/d, varying according to suction pressure. Maximum absolute pressure capability of 1500 psi and a maximum pressure differential up to 500 psi, model dependent. The suction pressure and discharge pressure is controlled by PLC and pressure transducers. High resolution transducer options are available for vapour recovery unit (VRU) service. Compressors are rated for H2S and CO2 service with 100% turndown, for continuous liquid flow up to 5% of swept volume, and can handle occasional liquid slugs.

Gaspro Compression

www.gaspro.ca

LOCATION
Three Hills, Alberta

PRIMARY CATEGORY
Compress Methane, Eletcric Devices

CONTACT INFORMATION
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+1 (403) 443-8886

SECONDARY CATEGORIES
Research, New Technology/Redesign,

COMPANY DESCRIPTION

Gaspro Compression builds, services and sells casing gas compressors that are used to capture the otherwise vented casing gas on oil wells. It also builds, sells and services Vapour Recovery Unit (VRU) packages used to capture the vapors off of storage tanks. Gaspro Compression has a 100% (zero emission) BTEX recovery package that has been recognized by Canadian regulators as an approved product for this application. When employed at a facility, there are zero emissions to report. One of its packages can remove 1,000 to 10,000 tonnes equivalent CO_2 of methane per year and its casing gas packages can recover up to 5.0 e3m3/day.

Gaspro Compression has focused on small emission capture and has developed the most cost-effective product for each application. As a small company, it is able to build a product to suit clients' individual requirements in the most dependable, cost-effective manner while meeting all of the industry safety standards that govern its design and build. First and foremost, Gaspro Compression helps its clients stay compliant with the ever-tightening restrictions on emissions in the oil and gas industry. Money saved on carbon taxes will pay for and maintain the package that has been implemented. Also, clients can sell the methane that was previously vented, putting more money in their pocket. Gaspro Compression has sold its casing gas compressors to well over 60 different companies. It has built over 400 packages for this purpose in several different volumes, pressures, and drivers, using the same design. It has built and installed five BTEX recovery systems implemented by large Canadian producers, helping them become environmentally compliant at two sites. It has also built and delivered over 25 VRU packages in 2022.

COUNTRIES EXPORTED TO
China, Russia

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The application for Gaspro Compression's product is international. The same issues are experienced in all oil and gas fields with only slight variations to the individual application.

TECHNICAL CAPABILITIES
Gaspro Compression provides natural gas fueled as well as electric (full VFD) drivers. It can operate from as low as 0.5 oz. suction pressure up to 400psi discharge. For the very low suction pressures (typically on storage tank vapor recovery units), it utilizes very accurate instrumentation to measure pressure in inches of water column. The transmitter is used to control the speed of the compressor to adjust to the changing flow rates while maintaining set points. The package is also able to start and stop automatically, and to manage set points if necessary. The packages have all of the necessary control panels, operational control valves, switches, etc., and all required safety shutdowns, these devices can be electric to mitigate the need for instrument gas or air. They are engineered for practicality as well as safety.

IJACK Technologies Inc.

www.myijack.com

LOCATION
Moosomin, Saskatchewan

PRIMARY CATEGORY
Compress Methane

CONTACT INFORMATION
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SECONDARY CATEGORY
Electric Devices

COMPANY DESCRIPTION

IJACK Technologies offers vapor recovery units (VRU), casing gas compressors and tri-phase (oil, water and gas) pumps to take the gas directly from a tank, VRT or the casing side of a well to a processing facility. 100% of emission venting and flaring can be prevented, sending the gas to a central gathering station for power generation or processing into products. By eliminating the need for separators, compressors, fluid pumps and other facility equipment, operating a single unit reduces leaking/emissions points in the process. In doing this, IJACK Technologies also relieves pressure on the well, casing and flowlines which lowers the possibilities of higher-pressure leaks/emissions in the system as well as increases oil production. Preventing 100% of venting and flaring and collecting the vapors and gas makes environmental and economic sense.

With IJACK Technologies, clients can lower capital, operating and maintenance costs, while prevent venting and flaring, and use the gas gathered at a central collection point. IJACK clients have business cases where ROI has been as low as 3 months. IJACK has equipment operating in the provinces of Manitoba, Saskatchewan, Alberta, British Columbia and the state of North Dakota. It works with the top O&G operators in North America, with over 1000 units in operation. IJACK possess over 13 Canadian and US patents.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
In the same way the IJACK equipment is used in Canada and the US, it can be used anywhere in the world. IJACK is actively working on international projects.

TECHNICAL CAPABILITIES
IJACK's casing gas compressors, vapor recover units (VRUs), booster intensifier pumps and tri-phase pumps have electric or NG engine powered units. It manufactures to ANSI 300 - 740 psi MAWP, 900 - 2200psi MAWP and 1500 - 3705psi MAWP specs, high temperature units to 200ºC (392ºF), and all its units are 100% automated. IJACK uses suction pressure transducers which can automate its units <1psi (4 oz/in2). Outputs can be to the MAWP.

NEXT Compression Corporation

www.nextcomp.ca

LOCATION
Rocky View County, Alberta

PRIMARY CATEGORY
Compress Methane

CONTACT INFORMATION
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SECONDARY CATEGORY
New Technology/Redesign

COMPANY DESCRIPTION
NEXT Compression provides flare gas reduction and vapor recovery compression technology to help gas plants and refineries reduce and/or eliminate fugitive methane emissions. Waste gas is a by-product of the oil extraction process, which is often burned or flared-off into the atmosphere, and is thus referred to as flare gas. Instead of flaring off the gas (burning the gas into the atmosphere), the flare gas is captured, treated and converted into usable electricity and is either used on site or sold into the grid. NEXT Vapor Recovery Units (VRU) provide similar technology.

Globally, 140 million cubic meters of natural gas are flared annually, emitting more than 300 million tons of carbon dioxide (CO_2) into the environment. Similarly, a lack of infrastructure to capture and productively utilize flare gas & vapor emissions released is a major environmental problem. Billions of dollars in wasted natural gas could be used to generate reliable, affordable electricity, and yield billions more per year in increased global economic output.

COUNTRIES EXPORTED TO
Indonesia, Ivory Coast, Russia, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The World Bank, which has launched an initiative called Zero Routine Flaring by 2030, has stated that, if this quantity of gas were used for power generation, it could provide about 750 billion kWh of electricity. NEXT Compression units can be used globally to help achieve this goal.

TECHNICAL CAPABILITIES
The gas source is typically entrained in a liquid (oil or water), or pulled off a heated source. This means it is often hot and saturated, and can have a high molecular weight. The gas supply is usually not constant, and the flow-rate fluctuates drastically. The theoretical maximum flow condition is often a rare combination of multiple factors such as ambient temperature, tank volumes and volatility, facility capacity, etc. Through the operating life of a VRU/FGR, it is very uncommon to see the max flow condition for any extended period of time.

Spartan Controls

www.spartancontrols.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Compress Methane

CONTACT INFORMATION
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SECONDARY CATEGORIES
Instrument Air, Chemical Pumps
Detection, Measurement, Quantification, Monitoring, Research, Management, New Technology/Redesign

COMPANY DESCRIPTION
Spartan Controls' patented SlipStream system has been designed to capture vented methane emissions from varying point sources (instruments, compressor packing vents, tanks, etc.) in order to utilize it as fuel for Natural Gas Engines in the Compression industry. The LCO Crossfire can act as a chemical injection pump or air compressor which will eliminate vented methane from pneumatic instruments and pumps on site. The unit can also be used for vent collection like a Vapour Recovery Unit or for pressure assist. SlipStream and the LCO Crossfire address vented methane emissions from varying sources on site. Installing these products can bring assets into compliance and achieve emissions reductions.

The SlipStream is a unique solution in which Spartan invested in the research and development, design and engineering to commercialization. It was patented in 2003. The LCO Crossfire was co-developed with Spartan Controls to fit several gaps in the market. It can replace up to 4 chemical injection pumps with one installation and transition easily to an instrument air compressor. The SlipStream has a payback period of 1-5 years with carbon offsets and fuel gas savings and the LCO Chemical Injection Pumps have a payback period of 6 months-4 years with carbon offsets and fuel savings. LCO Air Compressors have a payback period of 1-6 years with carbon offsets and fuel savings. The payback on each of these systems is highly dependent upon the volume that is being removed. Spartan Controls is working with multiple large Canadian producers.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The Spartan Controls product offerings are applicable across all markets. They are only restricted by the site designs and availability of the vented methane emissions.

TECHNICAL CAPABILITIES
The main vent sources that is captured by the SlipStream System are pneumatic instruments, compressor packing vents, and tank vents. The System is designed to capture the vented emissions and gather it in a common line where it can then be routed to fired equipment for use as a fuel. The System has a thermal mass flow meter installed to monitor flow rates and is used with its own control panel to manage the system. The fuel source is typically routed back to the air intake on a natural gas engine which will draw the gas through without needing to be pressurized. This also prevents backpressure on any instrumentation. The flow can range from zero to up to 50% of the engines required fuel flow.

Click here to see their product on the innovation showcase!

Vapure Engineering Ltd.

www.vapureengineering.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Compress Methane

CONTACT INFORMATION
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SECONDARY CATEGORIES
Chemical Pumps, Alternative Products, Detection, Measurement, Quantification, Monitoring, Research, New Technology/Redesign

COMPANY DESCRIPTION

Vapure Engineering Ltd (VEL) is an industry leader in vapor and hydrocarbon recovery applications for the Canadian heavy oil and gas sector. Vapure designs and manufactures vapor recovery unit (VRU) and emissions control solutions for a variety of industries including petrochemical, carbon capture and waste gas management. VEL provides full aftermarket support and manufactures augmented spare parts for Garo liquid ring compressors.

VEL's Garo liquid ring aftermarket parts are machined from solid forgings to offer better reliability with a reduced cost compared to the OEM. The improved durability and the ability to rapidly ship parts worldwide allows for vital operations to continue with decreased downtime. Vapure also provides custom spare part fabrication and critical maintenance and inventory programs.

Vapure's design innovations have led to the development of a fully scalable and modular vapor recovery system, the VRBox™. This system contains a series of pre-engineered modules, utilizing liquid ring and rotary vane compressors, that can be configured for a wide range of process vapors, inlet and outlet pressures, and volumetric capacity requirements. VEL VRU packages are designed for wet, corrosive, and contaminated vapors, allowing them to be adapted to almost any vapor emissions application. The return on investment (ROI) can be as low as 1-5 years when evaluating the cost savings from recovered hydrocarbon liquids and fuel gas.

COUNTRIES EXPORTED TO

Vapure's modular VRBox™ system is designed and fabricated to ISO-1496/DNV freight specifications and is easily transportable by truck, train, and ship to any location worldwide. Spare parts are typically in stock and ready for rapid deployment.

INTERNATIONAL APPLICATIONS AND EXPERIENCE

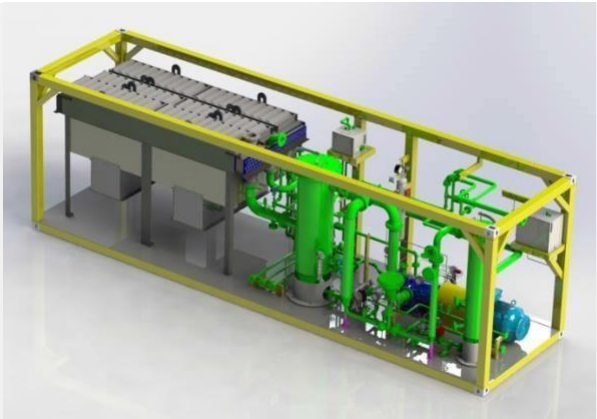
Vapure's technology can be adapted to most international offshore or onshore location requiring emissions control.

TECHNICAL CAPABILITIES

Each VRBox™ module is rated for:

- Inlet flow of 1,000 Am^3/hr (588 CFM)
- Vacuum inlet pressure
- Inlet temperature range from 5°C to 80°C (41°F to 176°F)
- Final discharge pressure of up to 1,378 kPag (200 psig)

The system is scalable and can be connected in multiple configurations, parallel and/or series, to accommodate the total volumetric flow rate and desired discharge pressure while fitting into smaller onsite footprints. The VRBox™ has 100% turndown capabilities.



Instrument Air

Blair Air Systems

www.blairair.com

LOCATION	PRIMARY CATEGORY
Morrin, Alberta	Instrument Air
CONTACT INFORMATION Jim Blair info@blairair.com +1 (403) 820-9715	SECONDARY CATEGORY Chemical Pumps

COMPANY DESCRIPTION

Blair Air Systems offers a mechanical Zero Emission device it calls the Blair Air System. This product provides compressed air to operate pneumatic pumps, controllers, and other pneumatic devices which normally operate using methane. By replacing the methane with compressed air, venting is completely eliminated, thereby resulting in a Zero Emission well site. The mechanical motion for compressing the air is achieved by harnessing the flowing gas stream pressure, but with no combustion, consumption, or venting. Electricity is not required. This product eliminates methane emissions from a site. The Blair Air System does not require electricity or solar panels, is a single package easily installed, and does not require daily supervision or maintenance. Therefore it is suitable even on remote locations. The equipment has significant operating history.

With the use of this product, all produced gas is sold, rather than a portion of it being lost to venting. Monetary carbon credits are available in some jurisdictions. Instrumentation repair costs are reduced by using clean instrument air rather than wet/dirty fuel gas. By employing the optional, integral chemical pumps available with the Blair Air System, capital costs are reduced. The Blair Air System package has been sold and installed in 9 locations in Canada, at a cost of approximately $30,000 each. In addition, producers have also rented units. The product has operated successfully, providing instrument air to 18 pneumatic devices that formerly were using and venting methane on a well pad in West Virginia.

COUNTRIES EXPORTED TO

United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

The Blair Air System is applicable to international markets as it is a compact, self-contained, easily installed package that completely eliminates methane emissions from well sites, regardless of where they are located in the world.

TECHNICAL CAPABILITIES

The power that drives the Blair Air System technology is the energy of the flowing gas coming from a wellhead, coming from a field compressor, or coming from any other gas stream on the location. A slipstream of this flowing gas is routed through the cylinder/piston component of the device, causing the piston to stroke, and then right back into the flowing gas stream, with no loss of product. On each downstroke of the piston, all gas pressures are equalized, resulting in no measurable loss of gas flow in a given period. The piston power output rod is mechanically connected to the reciprocating air compressor which draws in ambient air and compresses it into a receiver tank. Compressed air from the receiver tank is then distributed to the pneumatic devices on the location.

Envision Manufacturing & Supply Ltd.

www.envisionmanufacturing.ca

LOCATION
Lacombe, Alberta

PRIMARY CATEGORY
Instrument Air

CONTACT INFORMATION
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SECONDARY CATEGORIES
Combustion, Compress Methane
New Technology/Redesign

COMPANY DESCRIPTION
Envision Manufacturing & Supply provides: Vapour Recovery Compressors to recover methane being vented off production tanks and oil well vents; Instrument Air Compressor packages to provide air for pneumatic devices; and Enclosed Vapour Combustors to efficiently burn methane that cannot be recovered or prevented from being vented. The company focuses on developing standardized products that can be used in various applications. By focusing on product development, it can ensure consistent quality while continuing to drive down capital costs.

The range of sizes and costs of the Vapour Recovery Compressors, Instrument Air Compressors, and Combustors is quite vast but approximate capital cost can be paid out in approximately 2 years or less. Over the last 3 years, Envision has sold approximately 30 Instrument Air Compressor packages and 20+ VRU Compressors, with average annual sales between these product lines of $3MM+ over the last 3 years.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Production and storage tanks of petroleum products, under normal operation, that still use pneumatic control devices, control valves, ESD, pumps, dump valves etc. could use instrument air in place of methane instrument gas.

TECHNICAL CAPABILITIES
Envision offers the traditional grid powered 480V 3phase, 240Volt 3phase, and single phase powered Instrument Air Compressors. It is also in the midst of finalizing a new product for Instrument Air which is stand alone for remote sites without power. It is an engine driven 10HP Natural Gas-powered stand-alone instrument air compressor with 100% engine and compressor redundancy. This offering will be a more economical solution to others in the market where they generate electricity to run air compressors.

Kathairos Solutions Inc.

www.kathairos.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Instrument Air

CONTACT INFORMATION
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SECONDARY CATEGORIES
Detection, Measurement, Quantification, Monitoring, Reporting, New Technology/Redesign

COMPANY DESCRIPTION

The patent pending Kathairos™ solution eliminates methane emissions from pneumatic devices at remote oil and gas facilities effectively and affordably. The solution is elegant in its simplicity. Kathairos uses nitrogen to replace methane as the operating gas for pressurized devices, with no on-site electricity or operator involvement required. A specialized cryogenic tank is placed on site and tied into existing systems; liquid nitrogen stored in the tank is then vaporized at the pressures and quantities needed to drive devices. As the nitrogen depletes (about once a month), the Kathairos team refills the tanks, similar to a propane model.

The system works on a lease arrangement and involves no up-front capital costs. System cost and nitrogen usage reflect actual vent rates, making it economical to convert wellsites of all sizes (annual costs start at $3000/year). In addition to its hardware and software offerings, Kathairos has an in-house emission offset management team that converts customers' emission reduction activities to valuable emission offsets. In the vast majority of cases, the value of offsets more than covers the annual cost of the Kathairos technology.

COUNTRIES EXPORTED TO
United States (Active in Marcellus, D-J, Bakken, Permian, Haynesville basins; trials underway in others)

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Operations across Canada and the U.S.

TECHNICAL CAPABILITIES

Liquid nitrogen (LIN) is the backbone of the company's technology and powers the solution. Since LIN is inert, non-corrosive and waterless, it is the ideal candidate to replace natural gas used by pneumatic devices. Stored at -196c, LIN becomes gas naturally when exposed to everyday temperatures, even during winter. In addition, when stored in a tank, LIN builds pressure as it becomes gas. The Kathairos™ solution takes advantage of this naturally occurring phenomenon, resulting in a solution that has no moving parts, no maintenance, no electricity requirements and has no emissions. The only operator involvement is an on/off isolation valve, everything else is automated. On-site sensors and telemetry systems transmit all data to a cloud-based portal and Kathairos' proprietary emissions tracking software.

The solution has also been used by customers for pigging, and to act as back-up for grid-connected air systems liable to power outage.

LCO Technologies

www.lcotechnologies.com

LOCATION

Calgary, Alberta

PRIMARY CATEGORY

Instrument Air

CONTACT INFORMATION

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SECONDARY CATEGORIES

Compress Methane, Chemical Pumps, Reporting

COMPANY DESCRIPTION

The CROSSFIRE is an ultra-high efficiency drive system used as a configurable common platform to perform specific tasks that reduce or eliminate methane venting. One CROSSFIRE, configured as a chemical injection pump with 4 heads, can replace 4 pneumatic pumps. Configured as an instrument air compressor, the CROSSFIRE eliminates methane venting from instrumentation. Configured as a solar viable vapour recovery unit (VRU), the CROSSFIRE can capture 75 cubic meters/day of tank vent gas and re-compress it for destruction. Solid state control with Modbus communication protocol and data logging provides information on everything from operating parameters to data for carbon credits.

CROSSFIRE'S chemical injection pump generates the highest carbon credit value of any pump. At $30/Tonne, the solution can generate over $20,000/year in carbon credits. CROSSFIRE is the same cost as one electric explosion proof actuator but it can run an entire site on air (a brownfield single phase separator needs 750 milliamps). CROSSFIRE reduces power requirements by 50 to 75%, and solar power failures are resolved using efficiency gains. Chemicals are typically a "top three" expense, and the CROSSFIRE eliminates chemical cost overruns with the best chemical management available. Improved productivity, fewer power-related outages, reduced fuel gas related instrumentation failures, and reduced or eliminated maintenance costs are all benefits of the CROSSFIRE technology.

COUNTRIES EXPORTED TO

United States, Mexico, Brazil, Uruguay, Australia, Indonesia

INTERNATIONAL APPLICATIONS AND EXPERIENCE

The CROSSFIRE is applicable to oil and gas producers that want to reduce methane venting, collect carbon credits, manage chemicals and their delivery, improve reliability/productivity and reduce maintenance costs.

TECHNICAL CAPABILITIES

The CROSSFIRE was built to address the limitations of solar power, making solar power a viable option for instrument air (I/A). Generally, I/A compressors are 20% efficient at best. With the CROSSFIRE, however, efficiency jumps to 93% as it uses only 1/5th of the amount of power. As well, the CROSSFIRE solution protects the batteries through temperature compensation, and will work with a limited amount of power generated. Any standard power is suitable for a CROSSFIRE. In the past, organizations tried and failed with solar solutions because of the type of equipment run on solar or alternative power. Now, CROSSFIRE offers a solution to this issue.

Click here to see their product on the innovation showcase!

Marathon Compression

www.marathoncompression.com
KL8 Air-Power Unit Innovation Showcase

LOCATION

Calgary, Alberta

PRIMARY CATEGORY

Instrument Air

CONTACT INFORMATION

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SECONDARY CATEGORIES

Electricity Generation, Compress Methane

COMPANY DESCRIPTION

MARATHON COMPRESSION: Industy supplier of compression equipment to the oil and gas industry.

KL8 AIR-POWER UNIT: The KL8 Air-Power Unit (KL8-AP) is an industry-first in air compression and power generation, being a 5kW combined air-power unit utilizing a unique and highly reliable 5 kW reciprocating internal combustion engine. The engine, taken from the micro combined heat and power (mCHP) industry and unique in the marketplace, has a proven +40,000 hr service life with 4,000 hr service intervals. It is coupled with a heavy-duty industrial 2-stage reciprocating air compressor and a robust and maintenance-free brushless DC generator. Tying it all together is a state-of-the-art web-based platform RTU that is cellular and wi-fi enabled, ready to connect with a user's SCADA infrastructure or communicate independently via satellite internet providers (such as Starlink) for remote monitoring and control anywhere in the world.

COUNTRIES EXPORTED TO

USA, Egypt, Indonesia, Iraq

INTERNATIONAL APPLICATIONS AND EXPERIENCE

KL8-AP Unit comes in two base package sizes for simple and economical international shipment:
Cold-weather walk-in enclosure: 6' x 10' x 9' (2m x 3m x 3m)
Warm-weather walk-up enclosure: 3' x 5' x 6' (1mx 2m x 2m)

TECHNICAL CAPABILITIES

Marathon Compression has 10 years experience supplying natural gas compression equipment for use by the oil and gas industry for vapour recovery (VRU), conventional and unconventional natural gas production and plant processing. Equipment sizes range from 5 hp to 1500 hp, both natural gas engine and electric motor drive.

Click here to see their product on the innovation showcase!

Westgen Technologies Inc.

www.westgentech.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Instrument Air

CONTACT INFORMATION
info@westgentech.com
+1-(888)609-3763

SECONDARY CATEGORY
Power Generation

COMPANY DESCRIPTION
Westgen's Engineered Power on Demand (EPOD) technology provides cost effective instrument air to remote wellsites to eliminate methane venting from pneumatic devices while reducing capital costs, reducing operating costs, improving reliability, and generating carbon credits for oil and gas producers. The challenge in eliminating pneumatic methane emissions at wellsites is related to power generation. Established technologies such as thermoelectric generators and fuel cells cannot generate enough power to supply instrument air to wellsites. This gap in power generation to deploy instrument air is the root cause of the industry's legacy of venting gas to atmosphere through pneumatic devices.

Westgen developed proprietary technology to overcome the two traditional limitations associated with low power range reciprocating IC engines: maintenance interval and wellhead gas quality. The EPOD is a cost effective 6, 20, or 35 kW solar hybrid remote power generation solution which powers an instrument air compressor – providing an economic solution to eliminate methane venting. Westgen's EPOD can reduce capital and operating costs of a new remote wellsite, while increasing reliability and eliminating methane venting from pneumatic devices. Westgen has deployed, or is in the process of deploying, units with many oil and gas producers in Canada and the USA, including large multinationals.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The EPOD is built within a 10 or 20 ft shipping container and is well suited to shipment by truck, rail, or marine.

TECHNICAL CAPABILITIES
Westgen's EPOD features a solar hybrid power generation system. The primary means of power generation is solar, with a full backup internal combustion engine capable of operating on raw wellhead gas.

Click here to see their product on the innovation showcase!

Chemical Pumps

Bruin Instruments Corp.

www.bruinpumps.com

LOCATION
Edmonton, Alberta

PRIMARY CATEGORY
Chemical Pumps

CONTACT INFORMATION
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SECONDARY CATEGORIES
Electric Devices
New Technology/Redesign

COMPANY DESCRIPTION
Bruin Instruments Corp. is a dedicated Canadian manufacturer of chemical injection equipment. It has been producing equipment with methane reduction capabilities since its first methane recovery pump was successfully installed in Western Canada in 2003. Over the years, it has continued to develop more market-leading chemical injection equipment, providing energy producers with high quality methane reducing equipment for oil and gas installations throughout the world. Bruin has developed chemical injection equipment that allows producers to address some of the methane gas venting issues that they have been experiencing for years. This new equipment allows them to continue to produce oil and gas while giving them the opportunity to meet the new methane reduction regulations and targets that are being implemented worldwide. Bruin Pumps chemical injection equipment not only allows producers to install new methane reducing equipment, but also retrofit existing installations with the latest in methane reduction designs and technology. It has made every effort to try and provide cost effective solutions to producers while allowing them to adjust to methane reduction targets.

Depending on the application requirements and the equipment installation, there can be a number of operating costs reduced. For example, installing gas recovery pumps allows the operator to re-capture natural gas and return it to the sales gas stream, rather than venting methane emissions. Installing solar pumps can reduce the amount of electricity or power generation required. In 2003, Bruin was challenged by Canadian producers to design gas recovery pumps and solar driven chemical pumps. These pumps are still in use today. Along with its new developments, Bruin continues to provide customers throughout the world with chemical injection equipment that has a long, successful track record for quality and performance.

COUNTRIES EXPORTED TO
Albania, Bahrain, China, Colombia, Ecuador, Egypt, India, Indonesia, Kazakhstan, Kuwait, Libya, Malaysia, Mexico, Pakistan, Sweden, United Arab Emirates, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
With Canada being a leader in technology development, Oil & Gas production techniques are often adopted and transferred throughout the world. Bruin's equipment, which is designed for harsh Canadian weather, typically performs very well in most climates with small variations.

TECHNICAL CAPABILITIES
Bruin Instruments manufactures a wide range of pump 0 - 10, 000 psi and volumes up to 1760 GPD (6664 liters). It provides the option of pneumatic pumps that can be compressed air driven, DC powered solar pumps and AC powered electric pumps. Every well site has varied requirements and we provide a wide range of options to meet the customers' requirements.

General Magnetic Canada Inc.

www.generalmagnetic.ca

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Chemical Pumps

CONTACT INFORMATION
Al Duerr, CEO
alduerr@generalmagnetic.ca
+1 (403) 689-9850

SECONDARY CATEGORIES
Electric Devices

COMPANY DESCRIPTION

General Magnetic Canada Inc. (GMCI) has developed, manufactured and sold solar chemical injection pump technology that has been deployed in over 2,500 applications in North America over the past ten years, eliminating over 2 million tonnes of CO_2e emissions. The technology has also been used in micro compression for instrument air and in solar heat trace. It is a proven, reliable, and is one of the most cost-effective methane emission reduction technologies that can be readily deployed. Solar chemical injection replaces pneumatic chemical injection using fuel gas that creates high methane gas emissions with every stroke. Solar chemical injection eliminates these emissions. For pumps running year-round, emission reductions from a single pump can easily run to over 250 tonnes CO_2e annually, making it one of the most cost-effective methane emission reduction technologies available. Solar chemical injection is one of the most cost-effective technologies available for reducing methane gas emissions. Cost/tonne of CO_2e removed annually is less than $90, and around $5 over the product lifetime, making it one of the cheapest ways to achieve high impact GHG reductions. The system is simple to install and generates additional operating cost savings and operational improvements.

GMCI offers a highly cost-effective way to achieve GHG emission reductions with technology one quarter cost of other methane emission reduction technologies. It delivers proven reductions in chemical costs due to over injection and the ability to remotely monitor and control injection rates to optimize production, which is becoming increasingly important given emergence of smart well technologies. The product has delivered over ten years to almost all operating major and junior natural gas producers in Canada along with some in the United States. Over 2,500 systems deployed over 10 years as it remains a highly competitive and sought-after product. Canadian installs delivered through one distributor has captured a significant portion of the market.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Pneumatic chemical injection pumps are deployed worldwide and, in most cases, will be potential candidates for solar chemical injection retrofits. Producers worldwide are under pressure to reduce GHG emissions, and cost-effective solutions are critical components of any emission reduction strategy. Proven deployment in harsh Canadian climate a competitive advantage in international markets.

TECHNICAL CAPABILITIES

GMCI solar chemical injection pumps operate on solar power. With a power source, they can also operate from line power, but that is generally the exception. Depending on the solar conditions available, GMCI's solar powered chemical actuator operating at 1300 psi and 150 liters per day uses two 160-watt, 22-23 volt solar panels and two 125 Amp hour 12 volt batteries. Chemical injection rates can vary from .5 to 150 liters/day per pump head with a ½" piston. System is capable of injecting into pressures of up to 9000 psi, but these are extreme conditions and usually limited by the pump head chosen. Multiple pump heads are available off the same actuator gearbox, significantly reducing the cost/head of injection where applicable.

MCI Solar Mfg. Ltd.

www.mcisolutions.ca

LOCATION
Fort St John, British Columbia

PRIMARY CATEGORY
Chemical Pumps

CONTACT INFORMATION
Chris Kane, Sales
chris@mcisolutions.ca
+1 (250) 263-0977 x 102

SECONDARY CATEGORIES
Electric Devices

COMPANY DESCRIPTION
MCI offers two solutions: 1) Chemical injection pumps, 12V DC and 24V DC, are high-efficiency electric pumps that totally eliminate methane emissions. The minimum power drawn by these electric pumps make them ideal for alternative energy powered applications. 2) Fluid Management Technology (FMT) fluid end and light gauge return spring can be retrofitted to 5100 Series pneumatic drives to reduce the methane emissions. The FMT reduces the plunger-seal friction so the return spring size can be downsized. Because the plunger-seal friction is lower and the return spring smaller, the pneumatic pump can be operated at lower pressure, so there is lower emissions. MCI's products work to contain any chemical leaking associated with conventional chemical injection pump V-packing, found in many chemical injection pumps, by internally porting and redirecting the leaking chemical back to the suction side of the pump.

By using MCI pumps, operating costs are reduced and drive gas stays in the line for future processing and sales. Maintenance over the life of the plunger seals is reduced to zero. Penalties associated with methane gas emissions are eliminated.

COUNTRIES EXPORTED TO
Albania, Tunisia, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
MCI electric drives are available in 12V DC and 24V DC. Both voltages are used worldwide. The FMT fluid end is adaptable to any 5100 Series pneumatic drive.

TECHNICAL CAPABILITIES
Maximum injection pressure is 3000 psi. Maximum injection volume is 400 litres per day. For application specific solutions, including solar powered skid packages with and without chemical storage tanks, please contact MCI.

Sirius Instrumentation and Controls

www.siriuscontrols.com

LOCATION
Edmonton, Alberta

PRIMARY CATEGORY
Chemical Pumps

CONTACT INFORMATION
Tyler Teece, Business Development Manager
tteece@sirius@siriuscontrols.com
+1 (587) 985-4909

SECONDARY CATEGORIES
New Technology/Redesign

COMPANY DESCRIPTION

Sirius Instrumentation & Controls is breaking down barriers to make solar-powered chemical injection pumps practical and economical, paving the way to help the oil and gas industry reduce its environmental footprint. It used to be assumed that solar power could not be an effective solution because of the cost and lack of reliability in cold, dark, and forested oil and gas sites. Sirius is helping to demonstrate the use of solar as a reliable energy source and a means to optimize chemical injection pumps. Pneumatic chemical pumps are one of the largest methane emission sources on oil and gas sites. These pumps emit between 40 - 400 tonnes of CO_2e on site per pump. Sirius solar pumps can replace up to 15 pneumatic pumps on a site with one Sirius solar pump set up. Through significant chemical and manpower savings, Sirius has turned solar pumps into both a profitable and environmental solution. Sirius' number one focus is customer driven innovation. It has a team of dedicated in-house engineers who improve the solar power efficiency and operational ability of its system. Sirius has an advanced pump design which significantly increases the mechanical life of the pump system. It has paired that with its industry leading smart controls system, allowing for enhanced local or remote control.

Through reduced chemical use and maintenance, the pump can typically pay back the initial investment in a couple of months. Its customers often have an ROI of multiple times the initial investment in a couple of years. The savings are much larger through optimized production and reduced well workover costs. Cost abatement is well under $\$4/tCO_2e$ and the pumps are eligible for carbon credits. Ten years ago, Sirius was eliminating emissions by an estimated 0.4 $MMTCO_2e$. Today, Sirius has eliminated over 7,000,000 tonnes of CO_2e. Sirius is a leading solar pump manufacturer in North America and is significantly increasing market share every year because of its product innovations.

COUNTRIES EXPORTED TO

Colombia, Ecuador, Argentina, Tunisia, Libya, Nigeria, Oman, Iraq, Kuwait, Malaysia, Pakistan, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

The standard Sirius system is sized for 80% of the solar pump applications at the wellhead in the global oil and gas industry and its efficient power draw is ideal for all climates. The system is suited for onshore, offshore applications and is simple enough to use that operators can be trained effectively in minutes on site or remotely. Most troubleshooting and maintenance can be done on site.

TECHNICAL CAPABILITIES

Sirius' chemical injection systems can operate 0-700L/day, being very accurate at rates as low as .5 L/day. The higher end of the injection rate zone is pressure dependent. Sirius standard pumps are rated as high as 5000 psi. Higher pressure models are available upon request. These rates are all achieved electronically as there are no mechanical adjustments required for its 1000:1 turndown. Rates are achieved by adjusting motor speed and on time. The pumps do not use packing or elastomeric seals which prevents the pump from leaking. The only wetted materials are Teflon and SS, making its standard pump compatible with most chemicals.

Electric Devices

Calscan Solutions

www.calscan.net

LOCATION
Edmonton, Alberta

PRIMARY CATEGORY
Electric Devices

CONTACT INFORMATION
Henri Tessier, Managing Partner
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+1 (780) 944-1377

SECONDARY CATEGORY
Detection, Measurement, Quantification, Monitoring

COMPANY DESCRIPTION

Calscan provides an extremely simple, safe, and economical solution for producers to eliminate instrument gas which has methane emissions with the use our electric actuators. This solution not only eliminates methane emissions but reduces the carbon footprint by eliminating the need for air compressors, enhancing safety and reducing maintenance costs. Calscan's Hawk Vent Gas Meter offer producers an easy method for auditing and compliance monitoring of all vents. We are the metering standard with several producers, regulatory agencies and service companies. Our purchase and rental program make it easy.

Calscan's Zero Emission Bear Control System is a complete solution designed to replace all pneumatic devices that are using fuel gas and venting methane on the well site with its Solar Power Fail Safe Electric Actuators. The operation of its electric equipment does not generate any GHG emissions since the equipment is powered by solar panels and batteries. Its low power electric control product selection includes electric rotary actuators, electric linear actuators, fail-safe controls and dependable solid-state control signal relays. For a typical three phase separator package using fuel gas for pneumatic devices, Calscan can estimate an average reduction of 250tCO2e/year/wellsite when converting to its Zero Emission Bear Control System and a conservative assumption of a 15-year life of the equipment.

Calscan's Bear Electric Actuators are designed for the Modern Zero Emission Separator by easily replacing fuel gas actuators with electric and without replacing the process valve. Advanced electronics and high efficiency brushless DC motors gives its Bear actuators low active and standby energy consumption ideally suited for remote non-grid power sites. By using its Zero Emission Low Power Bear Electric Controls its customers are able to reduce their GHGs and comply to new regulations on venting methane gas. The Bear has proven to require little maintenance, has huge safety benefits and improved process optimization. With hundreds of field-proven well sites successfully installed since 2010, the Bear has reduced well operating expenses and emissions by rethinking current relationship with environmentally harmful fuel gas pneumatic devices. Calscan solutions are used by many large oil and gas producers.

COUNTRIES EXPORTED TO
Unites States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Low power 12 or 24 vdc system. Able to use solar and batteries for power. Bear Electric actuators are easily installed on many different manufacturers of process valves. Certified for Zone 1 or Zone 2 applications.

TECHNICAL CAPABILITIES
Calscan's Zero Emission Bear Control System is a complete solution designed to replace all pneumatic devices on the well site with its solar power Fail Safe Electric Actuators. Level controllers, big and small linear electric actuators, quarter turn actuators and Bear fail safe controllers are all part of the Bear Family. Its linear and quarter actuators are designed for on-off or throttling applications. They can be installed on a variety of linear or 1/4 turn process valves.

Click here to see their product on the innovation showcase!

Caron Measurement & Controls Ltd.

www.caroncontrols.net

LOCATION
Valleyview, Alberta
Grande Prairie, Alberta

PRIMARY CATEGORY
Electric/Pneumatic Devices

CONTACT INFORMATION
Allen Caron, President
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+1 (780) 524-5954

SECONDARY CATEGORIES
Methane Venting, Compress Methane, Instrument Air, Chemical Pumps, Measurement, Quantification and Monitoring

COMPANY DESCRIPTION
ELIMINATOR CONTROL VALVE: Caron offers a low maintenance, cost effective back pressure or differential control valve, using Zero Supply Gas or Air eliminated methane emissions. ELIMINATOR SOLAR AIR COMPRESSOR: Curb those methane emissions and reduce downtime with a reliable, clean source of instrument air supply. ELIMINATOR SOLAR CHEMICAL PUMP: Its innovative design features low power consumption and utilizes a proven pump to provide a robust solution that is ideal for running off solar energy.

Caron provides the ability to retrofit existing pumps to minimize costs when upgrading equipment, turning most types of pumps into a solar chemical pump! This is a reliable solution that goes beyond what competitors are offering. Caron has done the testing and has the knowledge to truly design a system that will last. With its ELIMINATOR products, clients can get to ZERO Methane venting on Well Separator Packages. Caron has been developing and manufacturing gas venting reduction products for over 29 years. The ELIMINATOR Solar Chemical Pumps and Zero Bleed Air Dryers are their newest product.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Caron's suite of products are applicable in the United States as new or increased methane emission regulations are implemented.

TECHNICAL CAPABILITIES
Solar Power is the most common source for its equipment as well as Electro-Hydraulic Actuators, Mechanical Zero Bleed Controllers and Valves.

Electricity Generation

Global Power Technologies Inc.

www.globalte.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Electricity Generation

CONTACT INFORMATION
Tara Dunn, Sales Manager
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+1 (403) 236-5556

SECONDARY CATEGORIES
Combustion, Instrument Air, Measurement, Quantification, Monitoring, New Technology/Redesign

COMPANY DESCRIPTION
Global Power Technologies (GPT) specializes in Remote Power Systems and Instrument Air Systems that can reduce CO_2 by up to 2,500 tonnes per site each year. GPT's EZAir systems are designed to eliminate methane emissions by incinerating the gas that would have traditionally been vented to atmosphere after pneumatic activation. GPT's power generation products consume 50% less gas than competing technologies and have very low annual maintenance requirements which reduce site visits. GPT has been a leader in reliable remote power applications for over 48 years.

GPT reduces emissions to meet government mandated reduction targets and its products can help generate carbon credits to offset initial capital investment. Meeting emissions targets will reduce carbon tax payments. Operating costs are reduced due to lower fuel consumption and fewer on-site maintenance visits. Hundreds of producers in Alberta and British Columbia utilize Thermoelectric Generators (TEGs) for electric actuation and chemical injection pumps. Instrument Air solutions are in operation and have been eliminating vented methane since 2018.

COUNTRIES EXPORTED TO
South America, Southeast Asia, Australia, Pakistan, India, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
GPT has been selling TEGs to international markets for over 40 years and maintains various certifications such as CE, IECEx, ATEX, CSA, FM for use in international markets.

TECHNICAL CAPABILITIES
Thermoelectric Generators efficiently combust natural gas or propane in order to generate electricity with efficiencies of 80% when combined with our Heat Recovery System. Our MSeries Generators have an electric efficiency of up to 84% when combined with heat. Internal combustion engines are often combined with our Instrument Air Systems.

Click here to see their product on the innovation showcase!

NexSource Power Inc.

www.nexsourcepower.com

LOCATION
Sylvan Lake, Alberta

PRIMARY CATEGORY
Electricity Generation, Emission Reduction Control Units

CONTACT INFORMATION
Blair Mack, Vice President of Operations
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+1 (403) 506-1771

SECONDARY CATEGORY
Instrument Air, Chemical Pumps Electric Devices, Detection, Measurement, Quantification, Monitoring, New Technology/Redesign

COMPANY DESCRIPTION
NexSource custom designs and fabricates remote instrument air/power generation combo units. From conception to inception, NexSource can provide instrument air driven by renewables, diesel, propane or a natural gas generator - regardless of how far away the site is from the power grid. NexSource eliminates the requirement of fuel gas to operate pneumatic valves and pumps where electricity is unavailable. It also provides a solar power option to charge batteries that operate a pneumatic compression system. This includes back up power options to provide seamless operation during seasonal changes that affect availability of solar power.

NexSource's solution prioritizes the use of solar power, decreasing the natural gas generator run time to ~50% averaged over the seasons. By using instrument air and removing methane as the fuel source, the solution eliminates raw methane emissions and significantly reduces greenhouse gas emissions. Companies using the solution can take advantage of carbon credits. NexSource has commercially deployed its first unit, which has over 6 months of operation in both summer and winter operating conditions.

NexSource is an exclusive distributor of The VoltOx Emission Reduction Control Unit, dramatically decreasing fuel consumption, lowering CO_2 emissions, eliminating wet stacking, extending generator life, accentuated by remote monitoring and controls.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Nexsource has experience with cold weather climates where solar power may be limited for long periods. This experience provides NexSource with unique expertise in technologies that provide functionality between renewables and traditional power generation to ensure long term dependable pneumatic and power sources.

TECHNICAL CAPABILITIES
POWER GENERATION 20kW to 1MW+
NexSource provide sales, service, fabrication and customization of natural gas and diesel generators from 20 kW to 1MW and beyond. Its technical service experts work in many industries to provide new and surplus power generation options to clients on a multitude of applications.

SFC Energy Ltd.

www.sfc-energy.ca

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Electricity Generation

CONTACT INFORMATION
Chelsea Kovacs, Director Business Development
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+1 (403) 354-3537

SECONDARY CATEGORY
Alternative Products, New Technology/Redesign

COMPANY DESCRIPTION

SFC Energy is a leading provider of hydrogen and methanol fuel cells for stationary and mobile hybrid power solutions. With the Clean Energy and Clean Power Management business segments, SFC Energy is a sustainably profitable fuel cell producer. The Company distributes its award-winning products worldwide and has sold more than 60,000 fuel cells to date. SFC Energy also takes pride on being an exclusive channel for exceptional Process Automation, and Drive and Motor Control Products

Products and Services:

- Off grid Energy Solutions: Hydrogen Fuel Cells, Methanol Fuel Cells and Solutions,
- Telemetry & SCADA
- Drives and Motor Control
- Measurement and Instrumentation

The hydrogen fuel cell we are about to launch is the perfect complement to an instrument air compressor that would be used to provide compressed air to pneumatic devices in an effort to eliminate methane venting. This fuel cell starts at 2.5kW of power and produces zero harmful emissions, compared to gensets that are currently being used for supplemental power on air compressors

COUNTRIES EXPORTED TO
Arctic Circle, Europe, United States, Japan, India

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Reliable, eco-friendly power generation is a challenge in every country. SFC Energy Canada tailors our energy solution specific to the application needs and environment for installation. SFC Energy AG solutions are used all over the world from Singapore to Antarctica. Power solutions provide electrical energy for measuring and early warning stations, Oil & Gas applications, defense applications, traffic monitoring systems, mobile homes, sailing yachts, and much more. Customers also rely on sophisticated, engineered solutions for oil and gas applications.

TECHNICAL CAPABILITIES
Manufacturing, Engineering, Design & Integration. After-sale service support

Click here to see their product on the innovation showcase!

Alternative Cement Products

Pluto Ground Technologies Inc.

www.plutogt.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Alternative Cement Products

CONTACT INFORMATION
Philip Tomlinson, Executive Vice President
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+1 (587) 973-1983

SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION
Pluto manufactures and provides engineering support for a cement-alternative product called SmartSet which is used to block methane leaks in oil, gas and geothermal wells. It has the shortest transition time from liquid to solid in the industry, providing the most effective tool available. SmartSet is environmentally friendly and safe to use near groundwater. SmartSet is patented in Canada, the U.S. and Europe. SmartSet enables producers to fix or abandon wells that are leaking methane in a more efficient, effective and environmentally sustainable way, contributing to reduced GHG emissions. Other products such as cement and resins can shrink, creating micro annulus cracks. These products can also gel when setting, allowing gas channeling. SmartSet solves these two main problems. SmartSet raises the success rate for remediating downhole gas and methane leaks from the industry average of 30% to 90%, helping companies plug and abandoned leaking wells more effectively and efficiently.

All SmartSet jobs have provided E&P companies significant operational expenditure (OPEX) reductions compared to multiple cement squeezes, including decreased material costs and rig costs. SmartSet is also priced at a discount compared to other premium competing products. SmartSet can be pumped through the drill bit if needed, drilled out and pressure tested in several hours. All these factors provide cost savings. Pluto has sold SmartSet® through NexTier Oilfield Solutions in Colorado, USA for plug and abandonment work, and has successfully completed 20 jobs to date.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
SmartSet can be used onshore or offshore and is easily exported abroad.

TECHNICAL CAPABILITIES
SmartSet is the only setting product that does not shrink (it expands 1%), preventing micro annulus cracks. It also does not gel when setting and has the shortest transition time from liquid to solid in the industry (under 2 minutes). This prevents gas channeling when setting. These factors solve the two main reasons other products fail to shut off gas leaks downhole. In addition, SmartSet® is a thin slurry able to penetrate small spaces underground. It is environmentally friendly, tolerant to high contamination (30% organics/inorganics) and has rapid compressive strength generation downhole. Clients are able to pick the length of time desired from mixing the product at surface to the right angle set point downhole, providing absolute predictability and confidence in field operations.

Canadian Methane Emissions Reduction Services

Detection, Measurement, Quantification, Monitoring

Airdar

www.airdar.com

LOCATION
Edmonton, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Dennis Prince, President
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+1 (780) 721-6390

SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION
Airdar is an innovative technology that provides locations, sizes and timing of emission sources. It is able to provide cost-effective 24/7 emissions surveillance with unattended operations for any compound including methane. Airdar technology equips industry with actionable information, enabling a proactive response to changing or emerging emission sources. Airdar works closely with clients to provide solution-based information, focused on individual company needs. Airdar removes uncertainty about emissions by continuously measuring all emissions site-wide and providing alarms to operators for upset events. Airdar can measure all important emission sources using common ambient measurements of the methane at a few locations remote to the sources. This means site wide surveillance of all methane emissions can be provided with unattended operation. The data needed for the Airdar system can come from existing monitoring networks or new monitors deployed for this purpose.

Airdar's clients have saved millions of dollars by changing their intervention plans to address emission situations based on accurate Airdar information. Airdar has won a Consulting Engineers of Alberta Award for solving an emission problem at a Calgary wastewater treatment plant. It has also won an ASTech Award. Airdar has been endorsed and recommended by many in the oil and gas industry, including large producers.

COUNTRIES EXPORTED TO
Singapore

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Airdar monitors emissions with unattended operation and can provide emissions surveillance anywhere in the world.

TECHNICAL CAPABILITIES
The Airdar system uses methane readings from any methane detector (stationary or vehicle mounted), identifies plume signatures and tracks them back to the sources. The system can detect, locate, and quantify sources - from a few L/min of methane at a range of 100 metres to large sources that are several kilometers away. The Airdar system measures sources from a safe distance so there are no problems with excessively high concentrations or impurities in the emission source.

Click here to see their product on the innovation showcase!

Canadian UAVs

www.canadianuavs.ca

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Jon Brydges, Program Manager - Commercial
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1 (403) 383-4104

SECONDARY CATEGORIES
Reporting, New Technology/Redesign

COMPANY DESCRIPTION

Canadian UAVs (CUAVs) has the ability to fly its Unmanned Aerial Vehicles (UAVs) further than any other company in Canada, and lower than any other manned aircraft, allowing it to gather more data in a very cost and time efficient manner. Its integrated radar system allows for areas of over 200 km^2 to be mapped by its UAVs from a single based of operations. Its cost per km^2 is lower than any other operator in the country. By affixing the right sensor, it can cover vast areas. CUAVs monitors oil sands operations and oil and gas gathering systems with a variety of sensor payloads that can be adapted to the clients choosing. This allows a company to determine where emissions are propagating and then devise a means to reduce their impact.

CUAVs increases safety and security for oil & gas operators by conducting flights from outside an operator's property line and reducing the need to send personnel into remote locations or hazardous areas. Operators have expressed interest at the possibility of monitoring their entire operation from an electrically powered UAV. The company is currently in discussions with various operators to monitor emissions from their mines and tailing ponds in a single flight for each site.

CUAVs provides a tool for producers and operators to execute on commitments to be net-zero for their emissions from their assets. Using CUAVs services, operators can implement a thorough and frequent investigation of their assets to understand what level of emissions they are contributing to today. CUAVs services will provide insight for their reporting and mitigation efforts.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Reducing methane emissions is a global initiative with many multinational corporations requiring a net-zero impact on the environment. Canadian UAVs will work directly for these companies to mitigate their needs on a global scale.

TECHNICAL CAPABILITIES
There are a myriad of UAV based sensors on the market that CUAVs will incorporate into its operations. From the Boreal laser methane detector that can measure in the ppm, to onboard multi- spectrum cameras looking for plumes, to gas sniffing technology from various providers. CUAVs can incorporate more than one type of sensor, depending on client requirements.

Click here to see their product on the innovation showcase!

CMC Research Institutes Inc.

www.cmcghg.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Kirk Osadetz, Manager Programs Development
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+1 (403) 919-4492

SECONDARY CATEGORIES
Research, New Technology/Redesign

COMPANY DESCRIPTION

Carbon Management Canada (CMC) is a national, not-for-profit organization working to develop and deploy emissions reduction solutions. With two research facilities, we assist innovators in developing methane monitoring, carbon capture, utilization, and storage (CCUS), and subsurface monitoring technologies. Our facilities allow technology developers to determine whether and how well detection and monitoring technologies work, and the variation or dependence of their performance as a function of methane release rate and environmental conditions. CMC has similar capabilities to the Fort Collins Methane Emission Technology Evaluation Center in Colorado.
However, the harsher environmental variations in Alberta provide a more appropriate test for the functionality of technologies that are to be deployed in Canada and some regions of Asia.

Unlike demonstrations at most upstream petroleum industry sites, CMC does not require a non- disclosure agreement, so companies can use their results for marketing purposes. The economic impacts vary depending on the site and type of deployment, but most companies find that they can better mitigate both methane emissions and reduce the costs of those mitigations by working with CMC.

COUNTRIES EXPORTED TO
CMC currently works with a global clientele base.

INTERNATIONAL APPLICATIONS AND EXPERIENCE
CMC's technology evaluation work is performed in Canada with US, European and Asian clientele. Companies can use its site to perform/test projects and then use the results to market their technologies.

TECHNICAL CAPABILITIES
CMC has the technical capabilities to support both the scientific and business analysis of technologies and strategies for emissions reduction at industrial sources. Our Newell County Facility is used to run subsurface and atmospheric testing, while our BC Research Facility helps to de-risk, test and scale-up innovations by simulating its performance in many industrial flue streams.

Current Surveillance Inc.

www.currentsurveillance.ca

LOCATION	PRIMARY CATEGORY
Evansburg, Alberta	Detection, Measurement, Quantification, Monitoring
CONTACT INFORMATION Don Iwaschuk, President don@currentsurveillance.ca +1 (780) 712-0155	Pipeline Right of Way Surveillance and Leak Detection

COMPANY DESCRIPTION

Current Surveillance Inc. (CSI) uses drones equipped with methane detectors to find leaks and general leak areas for pipelines and facilities. Where time efficiency is imperative, locating leaks and leak areas CSI is able to fly over a facility quickly and safely identifying leaks for further investigation or to give the area a "clean slate" report helping you maintain government regulatory compliance. CSI flies specialized drones in areas where walking is not practical or where flying with a helicopter may not give the needed accuracy to detect abnormalities on the ground. It also addresses areas where possible wildlife, crop weed or cross seed contamination, domestic animals, or hazardous terrain pose a threat to "personnel on the ground". Utilizing our 180 time zoom camera we are able to identify on-the-ground problems such as erosion, missing or inaccurate signage, ground movement, and/or encroachments that might put the pipeline at risk of damage. This also gives us an opportunity to video record the entire project. CSI uses a methane detector that can detect gas at ground level and the use of drones gives us the ability to cover areas unable to be patrolled by walking. All leaks or suspect areas can be geo-referenced for ease of locating for repairs. The reduction in time to perform a leak detection on a pipeline or facility and the expediency of reporting allows more time for required repairs and maintenance while freeing up your personnel to deal with aspects of operations and maintenance they are specifically trained for.

COUNTRIES EXPORTED TO

N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Current Surveillance is easily mobilized and can be used internationally to for methane and leak detection.

TECHNICAL CAPABILITIES

Current Surveillance uses an Unmanned Aerial Vehicle (UAV) equipped with a laser methane detector that can provide pinpointed location with geo-referenced concentration points.

EnviroTrace Ltd.

www.envirotrace.ca

LOCATION
St. Albert, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Kevin Hannan, Vice President - Business Development
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+1 (780) 418-0882

SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION

EnviroTRACE offers Infrared Thermography & Optical Gas Imaging services utilizing FLIR imaging technology to detect stray gas emissions over large or hard to access areas. This testing technology provides quick and accurate detection of methane, hydrocarbons and VOCs in a safe and cost-effective manner. To meet various government regulations to reduce emissions, EnviroTRACE infrared technology has the ability to detect the smallest leaks with pinpoint accuracy with a detection rate as low as 0.4g/hr. Its detection technology requires no downtime or interruption to facility operations. EnviroTRACE Infrared/Optical Gas Imaging technology provides for accurate detection with a non-intrusive visual record precisely identifying leak location. It has the ability to scan large areas and visualize all leaks in real time to ensure best in class fugitive emission management safely and quickly. All services are carried out by certified oil & gas technicians and certified thermographers.

Utilizing EnviroTRACE, fugitive emission detection will benefit its clients through reduced environmental impacts; ensuring regulatory compliance for carbon tax reductions; detecting, validating and pinpointing all leaks; reduced loss of product; and increased ROI with less downtime and improved productivity. EnviroTRACE has been providing various advanced leak detection services to the oil & gas industry since 1995 and has extensive knowledge and experience in the use of infrared technology.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE

EnviroTRACE was one of the first Canadian companies to utilize FLIR Systems thermal imaging products & services. As FLIR certified thermographers, its imaging equipment and services are recognized and adaptable internationally.

TECHNICAL CAPABILITIES

EnviroTRACE utilizes the FLIR GasFindIR Thermal Optical Gas Imaging technology which is capable of a leak detection and minimum flow range of 0.4g/hr. The camera technology provides for 100% accuracy through a visual recording. As its technology is completely mobile, it has the ability for detection and data collection by vehicle, or foot.

Eosense

www.eosense.com

LOCATION
Dartmouth, Nova Scotia

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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+1 (888) 352-8313

SECONDARY CATEGORIES
Research, Reporting, Management

COMPANY DESCRIPTION

Eosense offers methane monitoring tools and instrumentation. It provides stationary and semi-stationary continuous monitoring tools to support methane management programs. Eosense provides tools to improve site understanding, enabling companies to manage what they can measure. Continuous measurement allows for leaks to be detected sooner and for better characterization of leaks. Mobile monitoring allows more sites to be screened more frequently. Eosense's mobile tool allows asset screening to happen alongside regular site activities. It allows more sites to be visited and more labour-intensive tools to be used only as needed.

Eosense's sensors can be operated by anyone. It uses vehicles of opportunity to get better asset coverage at a lower cost. It reduces the cost of methane monitoring programs by screening assets so that resources can be better allocated. Eosense has customers at the USDA, UC Berkeley and various other US academic and government institutions. In the industrial methane space, it has completed 10 projects.

COUNTRIES EXPORTED TO

Australia, China, Czech Republic, Denmark, Germany, Hungary, India, Indonesia, Israel, Japan, Netherlands, South Korea, Spain, Sweden, United Kingdom, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Methane monitoring is a part of many operational activities and Eosense anticipates more countries to follow Canada's regulations. For the hardware, it has a very low detection limit, which would be appropriate under different regulations, and it can adapt the power as needed. It has established support for translation and distribution in Europe and Asia.

TECHNICAL CAPABILITIES

Eosense's sensor module measures ppb of methane concentration and has an emissions detection limit as low as 1 m3/day under ideal environmental conditions. Gas is sampled from near instrumentation and it uses a tunable diode laser, so the methane selection is quite good.

The sensor can be used both on a vehicle or stationary.

Click here to see their product on the innovation showcase!

Gas Recon Inc.

www.gasrecon.ca

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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+1 (403) 693-2690

SECONDARY CATEGORIES
Research, Reporting, Management

COMPANY DESCRIPTION

Gas Recon Inc (GRI) offers foot-based and Utility Terrain Vehicle (UTV)-based laser methane detection, GIS tagged data and a software suite. Its leak detection and repair (LDAR) capability utilizes laser and Optical Gas Imaging (OGI) sensors, while its Surface Emissions Mapping uses UTV system for large area surveys, including well sites. All data is GIS tagged, can use client secure servers for data delivery, and has rapid area surveys with UTVs. GRI also completes surveys on high and low pressure pipeline systems.

Return on investment comes in the form of recovered gas, increased safety and integrity of pipeline system, and leak identification and pinpoint. GRI has surveyed and mapped approximately half of the pipeline system operated by the Federation of Alberta Gas Co-ops and has entered into long term service agreements with several of its members. The company has long term contracts for wide-area surface emissions surveys for City of Calgary (for landfill emission testing), City of Regina (emission testing), and Fraser Fort George (BC). It has provided pipeline emission surveys for SaskEnergy.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Its methane detection equipment is method 21 compliant utilizing industry leading sensors.

TECHNICAL CAPABILITIES
Gazomat laser detectors, Boreal laser detector, Rover survey detector, Backpack portable hand-held systems, UTV mounted system, Sewerin Variotec EGA.

GHGSat

www.ghgsat.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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+1.403.701.9647

SECONDARY CATEGORIES
Reporting, Management

COMPANY DESCRIPTION

GHGSat provides actionable methane emissions data and insights to businesses, governments, and regulators worldwide. The firm is the first to combine its own satellite and aircraft sensors, with proprietary remote-sensing capabilities and patented technology to monitor methane emissions from individual facilities. These high resolution, frequent measurements are complemented by industry-specific analytics services to deliver valuable emission data and predictive insights to support business profitability, operational agility, environmental imperatives as well as health and safety objectives. GHGSat operates the only satellite system to address individual facility emissions monitoring from point sources as small as oil and gas wells. Each satellite features GHGSat's patented technology, which can detect and quantify emissions from sources 35x smaller than any other satellite, but with a resolution 10x higher. No other commercial operator or state-funded space organization can do this.

GHGSat's tiered methane emissions management system combines satellite data with aircraft surveys, augmented with analytics insights to identify regions/facilities of interest for emissions risk. This system is designed to detect big leaks at least three times faster, at a minimum of 25% lower cost to operators than performing OGI surveys three times per year across all assets. GHGSat is becoming the industry's de-facto choice for emissions monitoring using satellites for operators with multiple and/or remote assets.

COUNTRIES EXPORTED TO

Argentina, Australia, Bolivia, Italy, Netherlands, Spain, Germany, Poland, Ukraine, United Kingdom, United States, and more.

INTERNATIONAL APPLICATIONS AND EXPERIENCE

GHGSat's satellites provide global coverage to any industrial facility with a revisit time of 1 week (per satellite). The same sensor technology is used with aircraft, for specific needs, providing customers with a consistent monitoring method throughout all their assets worldwide. Reliable data is also favorable to ESG investment evaluation and to financial markets on energy asset risk.

TECHNICAL CAPABILITIES

GHGSat provides methane detection and quantification services using its own patented high-resolution spectroscopic sensors deployed on its satellites and aircraft platforms. These are complimented by proprietary analytics which are used in combination or as stand-alone solutions to best suit specific needs across the O&G value chain giving operators a comprehensive view of their assets. Depending on customers' data subscription, GHGSat's portal will give access to high-resolution imagery and core analytics capabilities such as global plume detection and quantification, global methane tracking, hotspots and emissions predictions, and more. Organizing assets and layers facilitates monitoring, leak risk assessment, data exports for further analysis, and reporting.

Click here to see their product on the innovation showcase!

GreenPath Energy Ltd.

www.greenpathenergy.com

LOCATION
Calgary, Alberta
Grande Prairie, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Joshua Anhalt, President
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+1 (403) 200-1553

SECONDARY CATEGORY
Research, Reporting, Management, New Technology/Redesign, OGMP 2.0

COMPANY DESCRIPTION
GreenPath Energy Ltd. is an emission management service and solution provider for the oil and gas industry. It specializes in emission detection, measurement, reduction and elimination solutions. This includes equipment inventory collection, leak detection and repair (LDAR) for fugitive emissions, root cause analysis, and methane emission reduction project development. Its technical expertise and diverse experience in emissions management ensures it provides clients with solutions that will allow for efficient use of capital while still achieving significant emission reductions and regulatory compliance.

GreenPath utilizes a variety of available technology solutions, combined with its expertise, to provide the following services: fugitive and vented emission detection and measurement; data management and reporting, including ESG and GHG reporting and regulatory compliance; alt-FEMP program design, implementation and execution; and identification of emission reductions opportunities.

Its expertise is designing and executing best in class fugitive and vented emission detection, measurement, data management and reporting service and technology solutions. GreenPath Energy engages regularly with government, regulatory bodies, industry associations, and technology providers to ensure it is at the leading edge of emission management program requirements and solutions.

COUNTRIES EXPORTED TO
Azerbaijan, Kazakhstan, Mexico, Norway, Tunisia, Ukraine, United States, Egypt

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Emission detection and measurement equipment, technical personnel, tools, etc. can be exported /imported under ATA Carnets or as per country specific laws.

TECHNICAL CAPABILITIES
GreenPath utilizes a variety of emission detection & quantification tools to ensure top down & bottom-up emission sources are identified, managed & reported.

Click here to see their product on the innovation showcase!

HETEK Solutions Inc.

www.hetek.com

LOCATION
London ON (Head Office)
Edmonton AB
Paradise NL

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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(519) 488 5391

SECONDARY CATEGORIES
Reporting

COMPANY DESCRIPTION
Hetek Solutions Inc. ("Hetek") is one of the Canada's primary vendors of products and services to municipalities, natural gas distribution utilities, midstream and upstream oil and gas companies, contractors, and other industrial clients. Hetek has been established in Canada since 1956 and currently has offices in Ontario, Alberta, British Columbia, and Newfoundland. Our products and services are offered through the following divisions: Wholesale Distribution, Field Services – Gas & Water, Repair and Service (including mobile), Manufacturing and Training.
Primary Products - Fugitive Emissions instrument toolkit, Personal Gas Monitors, Portable Gas Detectors, Fixed Gas Detectors, Area Gas Monitoring; New Products - Hetek Flow Sampler, Opgal EyeCGas OGI Camera, Heath DP-IR+, Heath RMLD-CS, GMI Gasurveyor
Primary Services - Gas and Water Leak Detection for Utilities and Municipalities; New Services - Natural Gas Pipeline Leak Inspection

COUNTRIES EXPORTED TO
United States, Denmark, Belgium, Japan, Australia, Ukraine, Middle East, China, United Kingdom, Eurozone

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Product Testing at METEC at Colorado State University, McGill University. Field testing with numerous end user contractor customers.

TECHNICAL CAPABILITIES
- Manufacturing, including factory certification for Intrinsic Safety for Hazardous Locations of the Hetek Flow Sampler
- 3rd Party Instrument Audit Calibration
- Service and Repair
- ISO Certification pending in 2023
- APEGA and PEO Engineering Permit Holder in Alberta and Ontario

IntelliView Technologies Inc.

www.intelliviewtech.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification,Monitoring

CONTACT INFORMATION
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+1-832-812-0534

SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION

IntelliView is a leading provider of AI-powered vision systems that make oil and gas operations SAFER, GREENER, and more EFFICIENT. Our solutions enhance monitoring capabilies and reduce validation times and costs. Monitoring applications include liquid and Natural Gas Liquid (NGL) leaks, methane emissions, intrusion, flame/flare/fire, and critical temperatures.

IntelliView's DCAM-M (Dual Camera Analytic Module – Methane) is a cost-effective, stationary, edge-based Industrial Internet of Things (IIoT) technology. It utilizes FLIR's latest LWIR thermal gas sensor (uncooled) with on-site patented/proprietary image processing artificial intelligence (AI). The DCAM-M is designed to provide continuous monitoring and automated real-time detection, and alerting (with image and video) of above-ground methane emissions. IntelliView's product reduces methane emissions and its consequences through real-time notification of new emissions and remote visual confirmation of alerts. These capabilities allow gas producers and transporters to make decisions and respond quickly. As a 24/7/365 solution, the DCAM-M also fills monitoring gaps between the periodic spot checks required by regulators.

Thermal and HD cameras can also facilitate other types of monitoring methods, such as security and maintenance inspections, to enhance monitoring capabilties, especially in high consequence areas. The return on investment in situations where material emissions are detected in seconds, not months, is incalculable. Multinational oil and gas operators have used IntelliView's leak detection cameras for over 10 years. Customers include large Canadian and multinational producers. The technology platform has clocked in over 1 million field operating hours in environments from northern Alberta to southern Texas and the Gulf of Thailand. Options include green power, and certified explosion proof housing for select products.

COUNTRIES EXPORTED TO
United States, Thailand, Peru, Angola

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The DCAM-M system is a turnkey solution that can be implemented at any global aboveground oil and gas site. IntelliView's in-house development team customizes its solutions to meet the unique requirements of customers and it can involve local specialists in distribution, training, implementation, and after-sales support

TECHNICAL CAPABILITIES
Platform: Fixed at the edge, typically tower or building mounted, and scalable. DCAM-M Technology: FLIR GF77a Uncooled Vox microbolometer (7.0-8.5 µm) with 320 x 240 pixels resolution and complementary HD color camera with IntelliView proprietary and patented image processing technologies operating on pixel level linear data (not compressed). Detection Sensitivity (as per GF77a specs): 100ppm, at 1 meter distance. Thermal Sensitivity: 25 mK, @+30°C (+86°F). Thermal Sensing Range -20°C to 70°C /-4°F to 158°F. Accuracy: Automated detection - 10g/s and above (depending on distance), Range: 10 – 40 meters

Click here to see their product on the innovation showcase!

Intricate Group Inc.

www.intricategroup.com

LOCATION
206 Pembina Rd., Sherwood Park, Alberta, T8H 0L8

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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SECONDARY CATEGORIES
Research, Reporting, Management, New Technology/Redesign, Capital

COMPANY DESCRIPTION
Intricate is an energy services provider of regulatory consulting, field services and software. Field services include leak detection and repair, fugitive emissions field surveys, MSAPR engine testing, compressor seal vent testing, and field data collection services.
Consulting services include FEMP program development, methane reduction and retrofit compliance program development, MSAPR program development, NPRI reporting, GHG inventory and reporting, carbon credit offset projects, and funding opportunity application development and submissions.
Software products include fuel, flare and vent management, fugitive emissions management, MSAPR emissions management, and NPRI and GHG inventory and reporting.
Intricate's integrated service offering combines services into one field visit, reducing costs while streamlining service delivery. Clients can benefit from reduced service costs of at least 15 - 20% when bundling multiple services, and ROI is typically less than 2 years with carbon credit offset projects.
Intricate has been providing client solutions since 2009 and has an established client base of over 40 companies in oil and gas.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Its suite of environmental field services and software products could easily be adapted to North American markets.

TECHNICAL CAPABILITIES
Intricate utilizes the FLIR GFx320 OGI camera to detect hydrocarbon and volatile organic compound (VOC) emissions from natural gas equipment and facilities. The OGI camera can check thousands of components quickly and efficiently to identify potential gas leaks in real-time. Leak quantification is completed after the leak has been identified and tagged using the FLIR QL320. Intricate utilizes the quantitative optical gas imaging (QOGI) system that measures the leak rates for methane and other hydrocarbons. Its equipment eliminates the need for secondary sampling with a vapor analyzer or similar tool. Quantification of a leak helps to determine the volume and optional economic cost of a leak.

Kuva Systems

https://www.kuvasystems.com/

LOCATION
Calgary, AB
Houston, TX
Cambridge, MA

PRIMARY CATEGORY
Detection, Measurement, Quantification and Monitoring

CONTACT INFORMATION
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SECONDARY CATEGORIES
Research, Reporting, Management, New Technology/Redesign

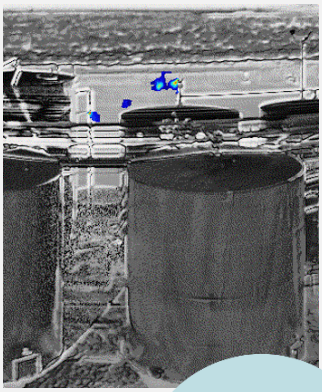
COMPANY DESCRIPTION
Kuva Systems enables oil and gas operators to detect and pinpoint methane and VOC emissions with its proprietary camera-to-cloud continuous monitoring solution. Kuva's actionable visual information enables operators to quickly find and fix significant emissions and further correlate with process data for operational insights, root cause determination and mitigation of future emissions. With its cost-scalable platform, the Kuva solution helps operators pursue operational efficiencies and meet ESG, regulatory reporting and methane intensity goals at an exceptional cost / performance ratio.

Kuva has offices in Calgary, AB, Houston, TX and Cambridge, MA.
Video at https://www.youtube.com/watch?v=YFhcxwrD2gk

COUNTRIES EXPORTED TO
Canada, USA (others under discussion)

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Installations with more than 20 upstream and midstream oil and gas companies across Canada and USA.

TECHNICAL CAPABILITIES
Methane and VOC image-based detection and quantification via continuous monitoring.
Multiband shortwave infrared (SWIR) sensor and ruggedized RBG optics with cloud reporting solution.
Multiple 45' fields of view with selectable zones within 360'.
Event alerts dashboard and API.
Operating temperatures '40'C to 50'C.
Expert third party validation of solution by METEC, confirming 90% probability of detection curve @ 3.5kgh, accurate leak pinpointing and zero false positives.
Able to monitor methane emissions from tanks, unlit or underperforming flares, compressors, separators, etc.



Click here to see their product on the innovation showcase!

Montrose Environmental Group Ltd.

www.montrose-env.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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SECONDARY CATEGORIES
Research, Reporting

COMPANY DESCRIPTION

Montrose Environmental offers best-in-class Optical Gas Imaging (OGI) fugitive emissions monitoring and reporting, pneumatic and equipment inventory support, drone and mobile/truck-based emissions monitoring, ambient air monitoring, stack testing, and environmental consulting services.

Our proprietary data and repair tracking platforms "Target Online" and "Target Track" are crucial for data integrity and support precise environmental reporting and faster repairs. The platform is scalable to accommodate small producers to large multinational corporations.

Our team of highly experienced technicians find leaks more efficiently, which reduces billable hours and enables faster repairs. This results in less emissions with more saleable methane flowing down the pipe.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
With more than 2,500 employees across over 75 locations around the world, Montrose Environmental combines deep local knowledge with an integrated approach to design, engineering and operations, enabling the company to respond effectively and efficiently to the unique requirements of each project. Montrose current serves clients in North America, Europe, and Australia. View our full list of services at montrose-env.com

TECHNICAL CAPABILITIES
Montrose's primary methane detection device is Optical Gas Imaging via an infrared thermal camera (min detection level of 2500 ppm). Gas quantification is done with a Hi Flow Sampler with an active range from 0.01 cfm - 10 cfm. Drone and mobile methane (truck) based detection is also available followed by a boots-on-the-ground approach with a hand-held device.

Click here to see their product on the innovation showcase!

SolutionCorp Inc.

www.solutioncorp.ca

LOCATION
Stettler, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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+1 (403) 742-0123

SECONDARY CATEGORY
Reporting

COMPANY DESCRIPTION
SolutionCorp offers Leak Detection and Repair (LDAR) services along with quantification of leaking and venting methane. SolutionCorp focuses and specializes in LDAR identification and reporting and has extensive field experience in upstream operations.

SolutionCorp's costs are typically less than its competitors, as it is specialized in keeping costs as low as possible. It provides LDAR services to 30 upstream producers in Alberta, British Columbia, Saskatchewan and Ontario. It has scanned over 5,000 sites over the past 10 years and has been in the LDAR space for the past 10 years.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
We are able to provide LDAR upstream services to producers in other countries.

TECHNICAL CAPABILITIES
FLIR GF320/ High Flow Sampler

Surface Solutions Inc.

www.surfacesolutions.ca

LOCATION
Grande Prairie, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
Michael Beck, CEO
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+1 (780) 831-1210

SECONDARY CATEGORIES
Regulatory Compliance & Emissions Testing

COMPANY DESCRIPTION

Founded in 1999, Surface Solutions Inc. (SSI) has remained focused on complete and accurate oil and gas well optimization. With technological advances in data acquisition, oil and gas producers can have test data that is flexible and affordable. Surface Solutions Inc. (SSI) has created and patented the design concept for a system to measure and data log methane emissions from wellhead surface casing vents, leaking wellbores, and other various emissions markets to support a growing carbon credit trading market. Existing regulations require that well head vent monitoring be done but reference antiquated technology that involves counting the bubbles produced by a submerged vent hose. Given current interest in mitigating greenhouse gas emissions, there exists a significant opportunity to advance technology where a robust system is needed to replace the existing technology gap to measure methane emissions.

COUNTRIES EXPORTED TO

NONE

INTERNATIONAL APPLICATIONS AND EXPERIENCE

USA PATENT # US 10,801,872

TECHNICAL CAPABILITIES

VentMEDIC is a unique measurement device in that it accurately quantifies the methane concentration as it measures the vent flow. Incorporating .2% full scale accuracy allows the system to comply with accounting standards needed in carbon credit trading. Having real time autonomous valve control gives user flexibility to access the equipment from their desk in real-time. Atmospheric pressure/temperature sensors ensure temperature compensated flowrates support standardized mass flow rate reference conditions. Remote operations are supported through a system designed to operate at -30 to 65 degrees Celsius for long durations.

Telops

www.telops.com

LOCATION
Quebec City, Quebec

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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SECONDARY CATEGORY
Research

COMPANY DESCRIPTION
Telops offers the Hyper-Cam Mini xLW and the Hyper-Cam Airborne Mini, both passive infrared hyperspectral imaging systems that combines high spatial and spectral resolution. They provide real-time radiometrically calibrated data for gas and solid detection and identification. The Hyper-Cam Mini xLW and the Hyper-Cam Airborne Mini can detect and quantify gaseous emissions, such as methane. They offer the best spectral resolution on the market, have a weatherproof enclosure ideal for field measurements, and are dual-use: they both can be used on the ground or in an airplane. The Hyper-Cam Airborne Mini is very lightweight and compact.

The Hyper-Cam Mini xLW and the Hyper-Cam Airborne Mini can be part of a safety plan to ensure the safety of employees or of the environment. They can also be part of a leak surveillance system. The technology detects leaks in real time above or on the ground. As such, clients can respond effectively to an urgent issue, saving time when facing a major problem, or use these tools as a preventive measure. Telops has sold more than $64 million worth of hyperspectral imaging products since its foundation.

COUNTRIES EXPORTED TO
China, Germany, Israel, Norway, South Korea, Sweden, Turkey, United Kingdom, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Its Hyper-Cam Mini xLW and Hyper-Cam Airborne Mini are available for purchase worldwide.

TECHNICAL CAPABILITIES
The Hyper-Cam Airborne Mini (Methane) is a high-performance thermal hyperspectral imaging camera designed for real-time detection and identification of methane gas leaks and emissions. This highly sensitive methane detection system allows the detection of gas leaks as well as the mapping of methane gas over an extended area. With its integrated calibration system and electronics, the Hyper-Cam Airborne Mini is more lightweight and compact than its predecessor and can be easily installed in a small airplane. Key Benefits include rapid visualization of leaks and emissions, and detection of small quantities of methane (1 ppm) due to high sensitivity.

Click here to see their product on the innovation showcase!

Vertex Resource Group Ltd.

www.vertex.ca

LOCATION
Sherwood Park, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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1 (403) 808-4630

SECONDARY CATEGORIES
Reporting, Management

COMPANY DESCRIPTION

Vertex offers a versatile suite of Emissions Management services including emissions detection, quantification, and reduction solutions to ensure our clients are equipped with specialized and efficient emissions compliance strategies tailored to individual client needs. Our team of skilled emissions management specialists are cross trained in fugitive emissions inspections using optical gas imaging (OGI) and quantification, direct measurement of methane emissions, gas migration and surface casing vent flow testing (GM & SCVF), sample collection, component and equipment inventorying, and other specialized services, allowing us to perform multiple emissions services in one trip and offer our client an efficient and streamlined experience. In addition to emissions detection and measurement, vertex offers a wide range of emissions reporting and strategic services, including emissions quantification and analysis, compliance and voluntary reporting, and strategic compliance design to support clients with their emissions management objectives.

The experience and capacity of qualified personnel throughout Vertex's geographical footprint allow for cost effective management of regulatory requirements and voluntary initiatives for emissions management. Vertex is committed to using local resources where experience and knowledge allow. Completing jobs on time and on budget is paramount to our clients' and Vertex's success. We are continually evolving to serve our clients with increasingly innovative solutions.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
United States (Select Locations)

TECHNICAL CAPABILITIES

Vertex uses a variety of emission detection, quantification, and data analysis tools to ensure emissions sources are identified, analyzed, and reported as per regulation and client specific requirements. Our approach is tailored to each client while maintaining the highest quality of work, while utilizing appropriate regulatory frameworks and quality standards as our benchmark.

Emissions Management services include: LDAR, Fugitive Emissions Inspections, Leak Quantification, QOGI, OGI follow-up inspections, MSAPR, Compressor Seal Vent Testing, Direct Measurement of venting emissions, regulatory reporting, FEMP development and Alt-FEMP support, GHG quantification and reporting, NPRI reporting, Methane Emissions reporting, DEOS and Benzene Reporting, TIER reporting, and support with carbon credit and offset projects.

Ventbuster Instruments Inc.

www.ventbusters.com

LOCATION
Airdrie, Alberta

PRIMARY CATEGORY
Detection, Measurement, Quantification, Monitoring

CONTACT INFORMATION
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+1 (403) 512-0902

SECONDARY CATEGORY
Reporting

COMPANY DESCRIPTION
Ventbuster® is a first-of-its-kind technology that accurately monitors venting methane emissions and revolutionizes venting emissions measurement. Ventbuster provides the only accurate instrument to continuously record and report all methane emissions to atmosphere. Most emissions are too low for conventional gas metering, and without quantification it is impossible for industry to implement mitigation measures. Ventbuster's patented flow channel technology is the key to the advancement of low-flow gas measurement. It has incorporated flowing temperature and pressure technology for a more quantitative measurement. The company's research and development efforts have made this technology suitable for the rigours of industrial conditions. With Ventbuster, companies can avoid subjective testing with inaccurate gas meters and inconclusive results from open-range devices or cameras. Ventbuster provides the user with an intuitive, precise, smart device that enables the client to deploy the units into the field without third party services. Further cost savings are realized as companies are able to self-manage and report their emissions.

Ventbuster has made methane emissions reporting more intuitive than ever. As methane emission regulations and reporting are introduced or tightened in various jurisdictions, companies can establish a scientific, accurate baseline measurement using the Ventbuster technology. The solution allows companies to plan for regulatory compliance, and then budget, design and engineer cost-effective mitigation measures. Ventbuster enables companies to get ahead of impending regulation and avoid or minimize potential taxes or penalties. In 2020, 24 Ventbuster® units were leased to oil and gas companies in Alberta, BC, and Montana through a controlled commercial release.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Its IoT communications platform and measurement technology is designed to be adapted and incorporated into all international measurement and hazardous area standards.

TECHNICAL CAPABILITIES
The Ventbuster has a portable carrying case, weighing only 14.5 kilograms, equipped with solar power for continuous long-term monitoring. It has a Bluetooth enabled user interface and has a field tested and scientifically proven flow monitor, able to detect negative flows to well beyond 450 m3 per day, with a full range flow error of less than 1%. It boasts an upstream liquid knock-out and in-line particulate filter, intuitive shut-in pressure stabilization to 7.0 MPa, and regulatory compliant digital reporting of real-time flow rates, pressures and temperatures to an IoT Platform. The Ventbuster has an intrinsically safe operation: Hazardous Area Certified – Zone 0 Group IIB T3 and a client real-time monitoring through an online Web Portal.

Click here to see their product on the innovation showcase!

Research

Energy & Emissions Research Lab

www.carleton.ca/eerl

LOCATION
Ottawa, Ontario

PRIMARY CATEGORY
Research

CONTACT INFORMATION
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SECONDARY CATEGORY
Detection, Measurement, Quantification, Monitoring

COMPANY DESCRIPTION
The Energy & Emissions Research Lab (EERL) specializes in data analytics, field measurements, research study design and coordination, measurement-based inventory development, technoeconomic assessment, methane survey analytics, airborne measurement coordination, liquid storage tank emission quantification, and flare emissions measurement.

All of EERL's work is backed by an exemplary record of peer-review publication and dissemination; it specializes in complex problems and getting detailed answers at the highest standards of scientific rigour, filling knowledge gaps and providing information to enable mitigation and set informed environmental policy. Key clients include the United Nations International Methane Emissions Observatory (IMEO), the BC Oil and Gas Research and Innovation Society (BC OGRIS); Natural Resources Canada (NRCan); Environment and Climate Change Canada (ECCC); World Bank Global Gas Flaring Reduction Partnership.

COUNTRIES EXPORTED TO
Ecuador; Mexico; United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Expertise is universal and easily crosses borders.

TECHNICAL CAPABILITIES
Globally unique laboratory facilities featuring: 1) multi-component gaseous and liquid fuel handling systems; 2) extensive combustion emissions equipment for both gas and particulate phase species; 3) controlled lab-scale flare testing; and 4) wind tunnel testing. EERL also has field equipment for flow line measurement, tank emissions measurement, controlled methane releases, UAV sampling, and IR camera measurements. The sensor development laboratory specializes in tuneable diode laser sensors. Also offers sky-LOSA technology for black carbon measurement.

Reporting

CNTRAL Inc.

www.cntr.al/

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Reporting

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SECONDARY CATEGORIES
Detection, Measurement, Quantification, Monitoring, Management

COMPANY DESCRIPTION

The CNTRAL Platform® is a comprehensive tool used internationally for the management of fugitive and venting emissions. With three core technology offerings the CNTRAL Platform® provides efficient and effective tools to improve productivity in the field, reduce uncertainty and increase transparency in your emission programs.
CNTRAL Mobile™ is an easy to use and intuitive field application that streamlines data collection, inspection workflows and allows field personnel to easily capture all regulatory required information.
CNTRAL Web™ is a powerful and comprehensive web-based application that provides advisors and coordinators with the information they need to plan and execute effective leak detection and repair surveys by utilizing the CNTRAL Regulation Engine™ and straight forward scheduling tools. CNTRAL Web™ also allows management to analyze trends, screen for outliers and uncover ways to improve the outcomes of their programs. The platform automatically determines a schedule for inspections and notifies personnel about required repair actions based on regulatory jurisdiction via CNTRAL's Regulation Engine™ which means you can focus on improving the effectiveness of your program instead of sending out reminders.
CNTRAL Handsfree™ means the field inspectors can now by hands-off during inspections, literally. Trade in the tablet for a next generation hard hart that has an integrated heads-up display and complete your inspection route using voice commands.
One of CNTRAL's core advantages is that it is not an in-field service provider. It is solely focused on providing a world-class software solution for its CNTRAL Certified™ Service Partners and Industry Partners. The solution will save you both time and money while providing you with an audit proof information trail. CNTRAL has been around for over 13 years, managing over 100 million records on the CNTRAL Platform® and working with some of the biggest corporations around the world.

COUNTRIES EXPORTED TO
Ireland, United Arab Emirates, United Kingdom, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

The CNTRAL Platform® at its core is an international solution, specializing in companies with assets that cross national and continental borders. It has been translated in multiple languages and the use of CNTRAL's Regulation Engine™ means regulatory compliance can be flexibly configured to meet any jurisdictions requirements of any complexity.

TECHNICAL CAPABILITIES

The CNTRAL Platform ® offers a full suite of tools to help manage the inventory, inspection, repair, reinspect, report workflow in a way that is easy to use and comprehensive to make sure that your business gets actionable insights
Bring your leak detection and repair program into the 21st century by having all data synchronized across your accounts and readily available to access anywhere in the world.

Envirosoft Corporation

www.envirosoft.com

LOCATION	PRIMARY CATEGORY
Calgary, Alberta	Reporting

CONTACT INFORMATION
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SECONDARY CATEGORIES
Management, New Technology/Redesign, Measurement, Quantification, Monitoring

COMPANY DESCRIPTION
Envirosoft provides ESG and emissions management software and engineering services to the energy industry. Celebrating 20 years of service in 2023, Envirosoft has been relied upon industry wide as the preferred emissions management solution for two decades. Envirosoft's Environmental Management platform aggregates emissions data and provides engineered calculations and advanced analytics to support customers in their emissions reduction journeys across jurisdictions. Our years of experience have produced robust software, developed by our in-house regulatory experts. Additional to our product suite, we offer consulting services provided by our team of environmental engineers to assist clients in achieving regulatory compliance and air emissions reduction. We are unique in providing both software and environmental engineering services and in our flexibility to achieve both regulatory compliance and corporate ESG reporting.
Envirosoft has a performance history of helping our clients realize significant cost savings in time and effort in the management of environmental data, the interpretation of regulations, and the complex calculations of emissions by jurisdiction. As regulations expand in scope and become more complex, ensuring your data is handled by our stable and expert team can help your organization cut overall costs, ease stress, and increase investor attractiveness. Data accessibility and accuracy reduce compliance risk and create defensible ESG reporting. We handle over 50% of all NPRI reporting annually and have been relied upon by the majority of the energy industry for 20 years.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Environmental and emissions data is generated in every market and requires a management platform to measure, track, and report on emissions.

TECHNICAL CAPABILITIES
Envirosoft offers the most comprehensive and up-to-date pre-configured air emissions platform. Envirosoft partners can compare and investigate emissions across business units, from facility- to equipment-level, to identify emissions reduction opportunities. Our software is secure, cloud-based, and powered by Microsoft Azure. The Environmental Management platform houses extensive calculations for a large number of jurisdictions and has been verified and audited hundreds of times.

Process Ecology

www.processecology.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Quantification, Reporting, Mitigation Decision Support

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SECONDARY CATEGORIES
Management, New Technology/Redesign, Research

COMPANY DESCRIPTION
Process Ecology's "Emissions Advisor" web-based software is an online integrated application that is used for air emissions reporting, ensuring compliance with various government regulations. It is also used for ongoing management of business reporting into government systems as well as corporate sustainability reporting and ESG strategic decisions. "TEAM", developed with Clearstone Engineering and Environment Canada, is a web-based application to enable industry, regulators and technology developers to screen opportunities and develop mitigation strategies best suited to its circumstances. Process Ecology helps companies achieve efficient and accurate compliance with air emissions regulations while finding opportunities to reduce emissions and cost. Process Ecology is unique in offering engineering, emissions and software expertise to address the challenge of emissions management and reduction.

Process Ecology provides expertise in software development, process engineering, ESG, and air emissions management. Its engineering activities include the application of advanced engineering methods to identify emissions mitigation technologies. Process Ecology has developed software tools to streamline data gathering, analysis and reporting. A key contribution is in helping companies reduce cost of compliance by integrating emissions reporting, removing reliance on spreadsheets and third-party calculations, enabling automation, and ensuring auditability. In addition, it uses the data and quantification used for regulatory purposes to efficiently identify emissions mitigation opportunities. Process Ecology currently supports over 50 operating companies in western Canada with their regulatory and emissions reduction requirements. Clients also include the Governments of Canada and Mexico, as well as several upstream, refining, and utility companies in the United States.

COUNTRIES EXPORTED TO
Mexico, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Process Ecology's software provides the flexibility to address the regulatory and emissions mitigation requirements of different countries.

TECHNICAL CAPABILITIES
Process Ecology's calculation engine ensures that emissions estimates are accurate and auditable. The applicable calculation methods are used, where necessary relying on engineering calculations, which can provide additional insight into emissions reduction and optimization. Data management is improved by providing a centralized platform for emissions data. This avoids the pain of spreadsheet maintenance, reducing costs over time. This also ensures that data can be used for multiple reporting types. Its system helps to identify compliance risks, as well as the best opportunities for emissions reduction.

Click here to see their product on the innovation showcase!

Management

Arolytics

www.arolytics.com

LOCATION	PRIMARY CATEGORY
Calgary, AB	Software and Data

CONTACT INFORMATION
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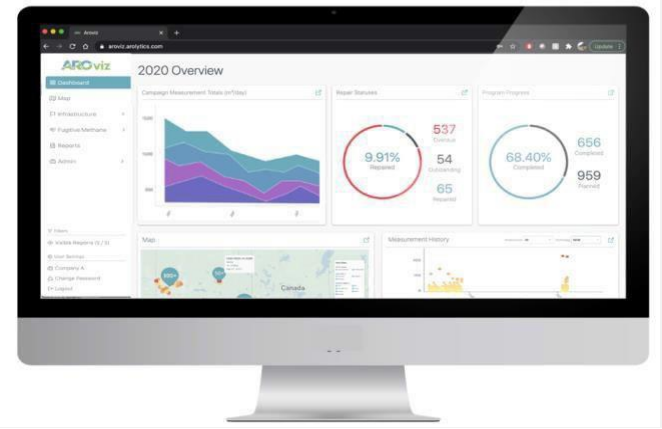
SECONDARY CATEGORIES
Research, Reporting, Management

COMPANY DESCRIPTION
Arolytics is an emissions software and services company. With proprietary algorithms, Arolytics has developed AroViz, a cloud-based software that enables oil and gas companies to centrally manage all measurement emissions data, and predict, manage, and disclose data for compliance and ESG purposes. AroViz is the first software platform tailored specifically for alternative fugitive emissions management (alt-FEMP) operational logistics, data management, and real-time progress tracking. AroViz is uniquely positioned to manage data originating from any technology, sensor, or third-party company within a centralized management system by standardizing and integrating disparate data sources.
Savings in AroViz are realized through the automation of emissions management processes, including reporting, creating a quickly realized ROI.
Offered separately or as an AroViz feature, Arolytics also offers AroFEMP, an emissions simulation model which can save companies over 40% on their emissions measurement costs through the modelling and creation of an optimized leak detection program. AroFEMP is the only commercial proprietary methane model tailored specifically for industry. AroFEMP enables you to build a bottom-up emission management strategy, while assessing costs and technology performance virtually. Programs designed with AroFEMP have achieved significant estimated savings for producers, on the order of hundreds of thousands of dollars for medium-large producers. The AroFEMP model has been used in the majority of alt-FEMP regulatory applications in Canada to-date, with a 100% regulatory approval rate. Companies in both the United States and Canada have planned their monitoring programs using AroFEMP, including some of Canada's largest oil and gas producers.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
AroViz is transferable to any jurisdiction, with or without regulatory methane requirements. The algorithms can be adapted to numerous regulatory frameworks, ensuring compliance and relevance in both domestic and international markets. AroFEMP modelling has been used internationally by service providers and oil and gas companies.

TECHNICAL CAPABILITIES
With proprietary algorithms, Arolytics has developed AroViz, a cloud-based software and emissions model that optimizes energy sector emissions management. The platform seamlessly tracks, manages, and reports methane emissions for compliance and ESG disclosure purposes, providing all methane metrics at your fingertips. Offered separately or as an AroViz feature, Arolytics has developed an emissions simulation model which can save companies over 40% on their emissions measurement costs through the modelling and creation of an optimized leak detection program.



Carbon Connect International

www.carbonconnectinternational.com

LOCATION	PRIMARY CATEGORY
Calgary, Alberta	Management

CONTACT INFORMATION
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SECONDARY CATEGORIES
N/A

COMPANY DESCRIPTION

Carbon Connect offers complete end-to-end emission management and reduction solutions that provide an accelerated path to near zero emissions within the oil and gas industry. This includes expertise, management and applications for determining the status of methane emissions and a proven method for delivering solutions. Our team is made up of methane focused oil and gas operations and sustainability experts.

Carbon Connect's baseline quantification program managed 20,000 facility emission surveys through program-certified emission measurement vendors. These facility emissions surveys flow into CCI's technology implementation program and resulted in emission reduction projects with a lifetime impact which remove over 17 million tonnes of carbon dioxide equivalent (tCO2e) from oil and gas operations. CCI implements programs that address the complete range of emission mitigation solution categories. Additionally, Carbon Connect is an industry leading education and advisory company delivering energy transition, decarbonization, and methane measurement and mitigation training through for the International Society of Petroleum Engineers and is a key partner for on-going trade missions to international jurisdictions.

COUNTRIES EXPORTED TO

United States, United Arab Emirates, Algeria, Iraq (Kurdistan), Argentina, Ecuador, Columbia, Azerbaijan, Oman

INTERNATIONAL APPLICATIONS AND EXPERIENCE

International applications include: Emissions education, standards and policy advisory; Emissions planning and reduction including assessment, program design, quantification, technology implementation and verification. Carbon Connect offers complete end-to-end emissions management and reduction solutions that align with best practices including the OGMP 2.0 Framework and provide an accelerated path to near zero emissions within the oil and gas industry. Carbon Connect consultancy experience aids oil and gas companies to establish emissions measurement and reduction programs which benefit from carbon offset markets and other low carbon / environmental incentives.

TECHNICAL CAPABILITIES

Emission management and reduction program design and implementation. Baseline emissions determination, collection of field data, measurements, and interpretation. Programs to implement technologies which reduce methane emissions and achieve climate and GHG reduction goals. Managing LDAR (leak detection and repair) programs. Industry training for energy transition, decarbonization and methane emission measurement & mitigation.

enSift Corp.

www.ensift.com

LOCATION	PRIMARY CATEGORY
Calgary, Alberta	Management
CONTACT INFORMATION	**SECONDARY CATEGORIES**
Mark Proud, CEO mproud@ensift.com +1 (403) 835-8418	Detection, Measurement, Quantification, Monitoring, Reporting

COMPANY DESCRIPTION

enSift provides an automated compliance management engine for identifying likely methane emitting sites, including fugitive emissions in the upstream oil and gas infrastructure. It also provides formatted compliance and audit reporting within the system to ensure that all Leak Detection and Repair (LDAR) work is documented and correctly reported. Its AI assisted compliance management platform eliminates many inefficient manual procedures that are typical in methane LDAR. Additionally, the system provides a fully integrated data capture/analytics dashboard that allows upstream oil and gas producers to watch in real time as their inspections and related documentation is generated across the entirety of their asset base.

enSift cuts the cost of methane emissions management and reporting by more than half and makes field activity viewable in real time through its VitalSigns dashboard. Its customers realize immediate savings as enSift covers all implementation costs and this has resulted in implementation savings of more than 200%, with ongoing operational savings exceeding 50%. The platform is currently installed at customers that include large energy companies, and others, with its emissions management module available to cover more than 120,000 production sites in the Western Canadian Sedimentary Basin.

COUNTRIES EXPORTED TO

Croatia, France, Germany, Ireland, The Netherlands, Ukraine

INTERNATIONAL APPLICATIONS AND EXPERIENCE

enSift provides a rapidly deployable global standard for methane emissions reporting that, in effect, allows operators of global oil and gas assets to manage LDAR operations as though the assets were physically located in Canada. As Canada is considered the gold standard for upstream environmental compliance, being able to export this standard around the world provides an ESG springboard effect.

TECHNICAL CAPABILITIES

enSift's platform algorithms continually learn and provide prescriptive recommendations on continued operationalization of LDAR execution and reporting.

Highwood Emissions Management

www.highwoodemissions.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Management

CONTACT INFORMATION
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SECONDARY CATEGORIES
Research, Reporting, New Technology/Redesign

COMPANY DESCRIPTION
Highwood Emissions Management works with industry to develop and implement long-term methane reduction strategies. It helps clients with the following services: Baseline Assessments; Abatement Planning; Fugitive Planning, Top-Down Reconciliation; Reporting and Dissemination Frameworks; Voluntary Emissions Reduction Initiative Support; and Dynamic Learning; Artificial Intelligence, and Predictive Strategy. High Emissions Management also offers software solutions in the form of the Emissions Management toolkit. Current modules provide inventory management, emissions baselining, emission reduction scenario planning, MACC development, and LDAR-Sim modelling. Highwood Emissions Management offers a holistic approach that combines the most up to date, relevant solutions that are fit for purpose for individual clients.

Industry needs comprehensive emissions management services, including long-term plans and company policies. Having the right emissions management plan helps companies optimize their capital investments and reduce their operating costs, sometimes even generating a return on investment. Currently Highwood has over 10 clients who have engaged its services to review their assets, goals, and financial constraints to reveal the most cost-effective ways to reduce emissions.

COUNTRIES EXPORTED TO
N/A

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Industry needs comprehensive emissions management services including: long-term plans and company policies; understanding how to navigate regulations in different jurisdictions; developing and demonstrating cost-effective leak detection programs that use cutting edge technologies; analyzing abatement technologies; emissions reporting; and internal analytics. These problems are not unique to Canada.

TECHNICAL CAPABILITIES
Highwood offers vertically integrated methane management services. It combines optimization frameworks with the assets, goals, and financial constraints of each unique client to reveal the most cost-effective ways to reduce emissions. It offers methane management services, include ensuring compliance regulatory requirements, regulatory interpretation and reporting across many jurisdictions. It continually ensures that fugitive emissions are optimized to ensure both compliance and cost-effective emissions reduction, and provides technology analysis to ensure cost effective deployment of methane emissions technologies. Highwood also supports the writing and submission of grants to best utilize resources available for methane emission reduction.

Modern West Advisory, Inc.

www.modernwestadvisory.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Management

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SECONDARY CATEGORIES
Research, Reporting, New Technology/Redesign

COMPANY DESCRIPTION
Modern West Advisory is a strategic consulting firm working with oil and gas industry, government, and clean technology providers on emission reduction and management activities. It provides four core services: 1. Corporate emissions compliance; 2. Carbon offset project development; 3. Environment, Social, Governance (ESG) strategy and report writing; 4. Applied research. Its work identifies emission reduction projects and has resulted in over 400,000 tCO2e reduction over the past four years. Modern West's core clients are small-sized producers that do not have the resources to hire a full-time emissions management professional. It serves as the "general contractor" for all things emissions related and provides expertise on emissions quantification, reporting, and project identification. Furthermore, it has an exceptional network that small producers cannot access.

Modern West has been doing carbon emissions management and ESG reporting for almost 15 years in Canada's oil and gas industry. Its technical team has extensive industry and academic experience directly related to emissions quantification and project identification. Its network in this space is second to none. Its business model is unique and its strategic partnerships are unparalleled. Its client list includes more than 20 upstream producers, 3 midstream companies, more than 10 technology/service providers, and over a half dozen government or industry organizations. This represents 5-10% of the market. It directly employs 7 professionals and are responsible for extended employment growth with its partner organizations, and has executed over 15 offsets projects.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Carbon management practices, project identification, emissions research and ESG strategic guidance is required in any oil and gas producing jurisdiction, especially those in countries that are signatories to the Paris Climate Accord and/or are susceptible to ESG requirements from the investment community.

TECHNICAL CAPABILITIES
Modern West serves as a methane emissions regulatory compliance and project opportunity advisor that a company of any size can use, in part or in whole. It can complete specific regulatory reporting requirements or do a complete corporate emissions compliance assessment that evaluates a company's compliance liability over time and identify projects to ensure compliance or generate revenue (carbon offsets). It completes research for government or other agencies, and it works with technology and solution providers to build strong partnerships for inclusive service to producer companies. If it is contracted to do corporate emissions compliance assessment and determine that leak detection services are required, it will provide recommendations and seek multiple quotes from vendors on behalf of its client.

Click here to see their product on the innovation showcase!

Radicle

www.radiclebalance.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
Management

CONTACT INFORMATION
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+1 (403) 912-9132

SECONDARY CATEGORIES
Detection, Measurement, Quantification, Monitoring, Research, Reporting, Capital

COMPANY DESCRIPTION
Radicle offers advisory services, life cycle assessments, carbon credit generation, software to inventory methane emissions, and financing to replace high-emitting equipment. Its Methane Abatement Project Platform (MAPP) software helps upstream oil & gas facilities inventory their emissions and establish a plan to replace methane emitting equipment with non-emitting equipment profitably. Radicle helps execute the transition without interrupting production, and ensures the financial feasibility of these environmental upgrades by using emissions offsets to help pay down the equipment lease. Many companies do not have the information they need to measure vented emissions, identify opportunities to reduce them, and then take action to retrofit or replace equipment. Radicle's proprietary software suite is used to reduce emissions quickly and at scale. The access to financing helps make this transition more economical for producers, eliminating upfront costs.

Radicle's MAPP software is a secure and scalable cloud-based application that can operate offline in remote locations. The data collecting method makes it simple and reduces human error, while supporting 3rd party verification to generate carbon credits as permitted. We have a team of industry experts available to advise on emissions reduction projects. Radicle's services and products help producers comply with government regulations and generate carbon credits for additional revenue to those going beyond current regulatory obligations. Radicle Finance removes upfront costs to producers by leasing the new equipment and using its software to measure the reductions in emissions. After the data is collected, it helps generate and sell the carbon credits. MAPP has been used to inventory over 16,000 upstream oil & gas facilities for dozens of companies in Alberta. Radicle has also created over $17 million in carbon offset value for its clients.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Jurisdictions around the world have implemented, or committed to implementing, stringent regulations on methane and there are numerous avenues for methane reductions to generate carbon credits internationally. Radicle's MAPP enables both compliance & beyond-compliance (carbon credits) for the international oil & gas sector.

TECHNICAL CAPABILITIES
Radicle understands the emissions market, policies, government regulations, and actions that can be taken to reduce emissions profitably. It develops tailor-made strategies for organizations to get the most out of their reductions. While its clients hire it for its insight and experience, they're loyal because of its creativity, determination, and financial fluency. Radicle has partnered with many of them through multi-year projects because it is just as invested in their success as they are.

Click here to see their product on the innovation showcase!

Validere

www.validere.com

LOCATION
Calgary, Alberta
Toronto, Ontario
Houston, Texas

PRIMARY CATEGORY
Management, Measurement, Reporting, and Verification (MRV)

CONTACT INFORMATION
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SECONDARY CATEGORIES
Operations;
Carbon/Emissions

COMPANY DESCRIPTION
Validere is a measurement, reporting, and verification (MRV) SaaS company that helps energy organizations transform disconnected, incomplete data into clear and immediately actionable pathways to financial and environmental value.

Over 50 of North America's leading energy companies rely on Validere's technology and multidisciplinary experts to understand their physical and environmental commodities and navigate an increasingly complex environment with clarity and ease.

Validere is on a mission to better human prosperity by making the energy supply chain efficient and sustainable. The company has offices in Houston, Calgary, and Toronto.

COUNTRIES EXPORTED TO
Canada, United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
The Validere platform enables organizations within oil and gas and other hard-to-abate industries across North America to measure and validate operations and emissions data. In addition, Validere's technology and team of experts can help streamline processes for meeting requirements set by local, federal, and/or international regulations, as well as any voluntary initiatives.

TECHNICAL CAPABILITIES
Validere's MRV SaaS platform and team of experts help centralize operational and environmental data to scale carbon removal and abatement strategies. Through technology and expert guidance, Validere helps design a credible MRV program that enables organizations to quantify emissions, determine where to focus GHG reduction efforts, monitor abatement progress, as well as streamline regulatory and voluntary reporting processes.

New Technology/Redesign

Clearstone Engineering Ltd.

www.clearstone.ca

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
New Technology/Redesign

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SECONDARY CATEGORY
Detection, Measurement, Quantification, Monitoring, Research, Reporting, Management

COMPANY DESCRIPTION

Clearstone provides the following methane emissions reduction services to the natural gas, petroleum, petrochemical and energy industries: assessment of baseline emissions and emission reductions using state-of-the-art measurement techniques and engineering estimation tools; provision of ISO 14064 verification and validation services; development of emission factors and inventories; measurement of methane slip from stationary combustion sources; measurement of methane destruction and removal efficiencies of fares; performance of site-level measurements for OGMP 2.0 reporting level 5; development of source, facility, company, and national emissions mitigation strategies; and identification and evaluation of methane and other climate pollutant emission mitigation opportunities including the development of optimized solutions and performance of rigorous techn-economic and environmental evaluations.

Clearstone's goal is to help its clients address their methane emission management and reporting needs, access financing and develop their own in-house expertise. It offers our clients a full range of capabilities to evaluate and resolve methane-emission related issues. Moreover, it possesses recognized technical expertise, subject-matter knowledge and international experience. Clearstone has been actively engaged in methane emissions management initiatives both nationally and internationally for over 30 years. It provides expertise in the application of state-of-the art emission assessment techniques, in-depth knowledge of industry standards, facility operations, and regulatory requirements, and expertise in the design and implementation of practical solutions.

Clearstone provides objective third-party quantification and evaluation services that have enabled operators to access financing and grants. Many of the mitigation opportunities that it has identified, and operators have ultimately implemented, have resulted in attractive paybacks, often much less than 2 years. Clearstone has conducted work for UNFCCC, Global Methane Initiative (GMI), Climate and Clean Air Coalition (CCAC), World Bank's Global Gas Flaring Reduction (GGFR) Partnership, trade associations, government agencies, and industry. While most of work is related to the fossil fuel sector (including oil, natural gas, and coal), we also have experience with other sectors and sources including agriculture, landfills, and wastewatertreatment.

COUNTRIES EXPORTED TO

Azerbaijan, China, Colombia, Egypt, Japan, Kazakhstan, Mexico, The Netherlands, Nigeria, Qatar, Russia, Ukraine, United Kingdom, United States, and Uzbekistan.

INTERNATIONAL APPLICATIONS AND EXPERIENCE

The work Clearstone does is relevant to both developed and developing countries, government and industry, and large and small companies.

TECHNICAL CAPABILITIES

Clearstone has developed a proprietary tool, CSimOnline, for performing detailed techno-economic evaluations of opportunities to reduce methane emissions and improve energy efficiencies. Its functionality includes the following: baseline an opportunity against performance benchmarks; predict and account for production decline rates over the project life; evaluate different control options, while considering site-specific constraints and circumstances; size equipment and determine the optimum operating conditions, energy input requirements, and benefits achieved over the project life; assess the net impact on emissions over the project life; and determine the necessary capital and operating expenditures, overall economics.

Clearstone has also developed a mobile monitoring system to detect, quantify, and geolocate the origin of methane and other emissions in real time (i.e., including point, line, area, and volume sources), and a UAV-based solution for measuring the methane destruction and removal efficiency of flares. We also have a range of measurement solutions for the sources including fugitive equipment leaks, storage tanks, process vents, stationary combustion sources, surface impoundments, and landfills.

Durlon Sealing Solutions

www.durlon.com

LOCATION
Belleville, Ontario

PRIMARY CATEGORY
New Technology/Redesign

CONTACT INFORMATION
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SECONDARY CATEGORY
Alternative Cement Products, Research

COMPANY DESCRIPTION
Durlon 9000 PTFE is the most versatile product. It has exceptional tight sealing characteristics and has achieved numerous certifications. It is commonly used in process piping and equipment in chemical, pulp & paper, food & beverage, and other general industrial applications where resistance to highly aggressive chemicals is required. Durlon Durtec is made with a specially engineered machined metal core, bonded on both sides with facing material. Produced by proprietary technology that is ideally suited to fluctuating pressure and temperature conditions while being fire-safe and offering an unparalleled seal. When it comes to the hazardous and challenging conditions present in the oil & gas, chemical, and mining industries, to name a few, Durlon product specifications ensure, safety, reliability, and assurance of a significant reduction in overall fugitive emissions. Its compression-molded and skived manufacturing process allows for the best control of physical properties and performance characteristics compared to other manufacturing processes.

Through field measurements, continuous testing, and published data, it has been proven that Durlon products seal as tight, or tighter, under various applications than any other brand. In a low carbon world, tighter sealing is the difference between an unplanned release and zero emissions.

COUNTRIES EXPORTED TO
Durlon services the global market

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Durlon's commitment is to helping others achieve and exceed today's challenging emissions standards. Durlon has been and will continue to be dedicated to fugitive emissions containment.

TECHNICAL CAPABILITIES
As a manufacturer of fluid sealing products, Durlon is ideally qualified to resolve troublesome and costly leaks once detected through a leak detection and repair (LDAR) program. Closely monitoring regulatory requirements for methane emissions reductions in the USA, Canada, and around the world, Durlon provides several products that meet compliance requirements.

OilPro Oilfield Production Equipment Ltd.

www.oilpro.ca/product/powergen/

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
New Technology/Redesign

CONTACT INFORMATION
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SECONDARY CATEGORY
Emissions reductions, Combustion, Instrument Air, Chemical Pumps, Electricity Generation

COMPANY DESCRIPTION
OilPro provides the oil & gas industry with innovative, pre-engineered production and power equipment. Our CAP3 gas to power generator combines an ultra-efficient 5.56 kW PowerGen Stirling engine with an instrument air package. The 80,000 hr+ continuous duty-rated PowerGen runs on any combustible gas. The PowerGen can concurrently run: an instrument air package; a high-power battery charging system; up to 60,000 BTU's for glycol heat tracing or other on-site heating needs. PowerGen has 100x lower emissions than internal combustion engines, with no maintenance, zero lubrication, high efficiency and a 100% duty rating. For PowerGen, ROI is achieved by reduced maintenance, decreased downtime, increased reliability.

OilPro also designs systems to reduce or eliminate emissions by stripping condensate from waste gas and tank vent gas. We combine venturi and refrigeration technology to remove the valuable NGL's, thereby creating dry gas suitable for gas injection, power generation, or fuel gas. Our Venturi process designs are an excellent option as a vapor recovery unit when compared to conventional rotary screw or vane compressor technology. With 0 moving parts the system handles liquids and sour gas very efficiently with comparable capital costs and significantly lower operational cost.

COUNTRIES EXPORTED TO
Nigeria, United States, Gabon, Kazachstan, Qatar, Kuwait, Saudi Arabia, Ukraine, UK, Mexico, Chile, Argentina, Argentina, Brazil, New Zealand

INTERNATIONAL APPLICATIONS AND EXPERIENCE
OilPro has provided liquid removal systems, and production equipment on gas projects large and small throughout the globe. Canada has world-leading gas processing expertise, particularly in the 1-100 MMSCF/d scale range and we are able to help international clients obtain the best technology and equipment for their particular production. We have provided guidance, equipment and expertise to dozens of projects of varying size and scope.

TECHNICAL CAPABILITIES
OilPro provides the oil & gas industry with innovative, pre-engineered production and power equipment, faster, at a lower cost. OilPro is a trusted oilfield production equipment supplier since 1997. It is able to offer new, customized and re-manufactured products to get production on stream quickly and affordably. The key to its success is ensuring all its equipment meets or exceeds Canada's world-class technical and safety standards. OilPro specializes in combining standard equipment with innovative components.

SensorUp

www.sensorup.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
New Technology/Redesign

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SECONDARY CATEGORY
N/A

COMPANY DESCRIPTION

SensorUp has an Internet of Things (IoT)-enabled integrated methane emission management solution. It is designed specifically for managing and automating the end-to-end emission management workflow including: leak detection, sensor data aggregation, emission quantification, repair planning and dispatch, progress and safety tracking, and compliance report generation. The innovation will allow Oil & Gas companies to effectively manage emissions to meet regulatory compliances. It will help emission managers as well as field workers to achieve cheaper, better, safer, and faster methane emission management.

A big challenge today for companies is the ability to integrate, aggregate and fuse heterogeneous methane emissions data from disparate methane sensors into a coherent sensor web. As a result, fugitive leaks are not detected in a timely manner, repairs are not effectively prioritized, permit extensions are not applied on time, fugitive and vented emissions are not accurately quantified, and costs are unnecessarily incurred.

SensorUp's interoperable, scalable standard-based architecture aggregates high volume, high velocity disparate sensing datastreams into a coherent system of system. It extracts actionable insights with geospatial-AI and dispatch resources with a workflow engine. Companies can seamlessly integrate methane sensing technologies to ensure regulatory compliance using a cheaper, safer, and faster solution. Its product allows customers to report their methane emissions to their investors. This gives investors accurate information, as they prefer to invest in companies focused on cleaning their methane emissions. This has a significant impact on their stock price. SensorUp's product also allows customers to reduce their costs by better managing service contractors and reducing unnecessary repair trips.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE

Methane regulations differ in each market, and reliably integrating, calibrating and quantifying emissions from novel sensor sources is an increasingly important challenge to overcome. SensorUp's solution is based on an international methane data sharing standard. Thus, it is able to integrate data sensors from any existing technologies and from new technologies as they become available.

TECHNICAL CAPABILITIES

SensorUp's integrated methane emission management solution is designed specifically for managing and automating the end-to-end emission management workflow. This solution is based on the SensorUp IoT and connected worker platform. It is able to bring together heterogeneous sensing systems, geospatial information, artificial intelligence, and machine learning to allow companies to better understand their emissions and orchestrate workflow patterns that safely, efficiently and effectively address emissions.

Valence Natural Gas Solutions

www.valencengs.com

LOCATION
Calgary, Alberta

PRIMARY CATEGORY
New Technology/Redesign

CONTACT INFORMATION
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SECONDARY CATEGORY
Compress Methane

COMPANY DESCRIPTION
Valence currently supplies compressed natural gas, a cleaner burning fuel, to displace diesel in drilling and completions operations for producers. In addition, Valence specializes in flare gas capture technology to eliminate the flaring of natural gas from wells that flare up to 4.0 mmcf/d. Valence's flare gas capture equipment is completely mobile and in the process of capturing the flare gas, converts it into useable by products such as CNG and Natural Gas Liquids that can be marketed elsewhere. Estimated emissions reductions per system are between 80,000 - 100,000 tons per year. Valence's products and services help to address the flaring of natural gas into the atmosphere by creating a solution that results in near 100% capture rates while also making it economic to the producer. Valence's solution is the only flare gas capture technology that results in up to 100% flare capture rates. In addition, the technology is completely mobile and packaged in trailers, which results in significantly lower deployment costs than competing solutions.

The benefits to its customers begin with the immediate elimination/reduction in the volumes of gas flared. The second stream of returns to the producer are value received from the sale of the residue gas that is either compressed into CNG or separated out as NGLs. These are either used as a fuel for the Producer's operations in the area or marketed elsewhere. Valence has deployed various different generations of flare gas capture technology since 2013 in North Dakota.

COUNTRIES EXPORTED TO
United States

INTERNATIONAL APPLICATIONS AND EXPERIENCE
Flaring is a global problem, with large emitters in United States, Saudi Arabia, Mexico, etc. where Valence's system can be readily deployed.

TECHNICAL CAPABILITIES
Primary features and differentiators in Valence's flare gas capture solution include: Flare Capture Rates: ~100% flare elimination via NGL recovery and residue gas compression; NGL recovery rates are higher than current units in the market and are expected to yield 5-9 GPM based on the inlet gas composition. Completely self-contained: All metering, flare, water handling, ESD systems and power generation integral to the system; and Mobility: Entire package is deliverable on trailers, eliminating the need for cranes, welders and electricians required on site. Allows for flexible design in regard to site layout, allowing for multiple configurations for well pads.

Canadian Energy Export Guide

The Canadian Energy Export Guide is a searchable database that represents more than 1000 Canadian companies that export products and services in the area of oil & gas and related clean technologies, from grass roots exploration, pipeline construction and operation, to end of production decommissioning, reclamation and remediation. The Canadian Energy Export Guide uses 12 primary categories and 60 sub-categories to identify Canadian companies that are exporting to international markets. The companies listed in this Canadian Capabilities in Methane Emissions Reduction Guide and Directory can also be found online in the Canadian Energy Export Guide under the category of Clean Technology and Environmental Management/Methane Emissions Reduction.

Industry Partners

The following Canadian associations and organizations have members and/or are working in the area of methane emissions management and reduction.

Canadian Association of Petroleum Producers (CAPP) is an industry association that advocates for economic competitiveness and safe, environmentally and socially responsible performance from its members.

Canada's Oil Sands Innovation Alliance (COSIA) is an alliance of oil sands companies working with scientists, academics, and innovators to make Canadian energy part of a sustainable environment.

Canadian Emissions Reduction Innovation Consortium (CanERIC) was created by PTAC to respond to the oil and gas industry gap where there was a lack of streamlined support for critically needed, novel, high performance, and cost-effective technologies to address the global emissions reduction challenge.

Clean Resource Innovation Network (CRIN) was created to contribute to a future in which Canada is a global leader in producing clean hydrocarbon energy from source to end use.

Methane Emission Leadership Alliance (MELA) is Canada's most complete source of data, technologies and solution providers that monitor, measure and reduce methane emissions.

Natural Gas Innovation Fund (NGIF) was created by the Canadian Gas Association (CGA) to support the funding of cleantech innovation in the natural gas value chain.

Petroleum Services Association of Canada (PSAC) is the national trade association representing the service, supply and manufacturing sectors within the upstream petroleum industry. They also maintain the Canadian Energy Export Guide noted above.

Petroleum Technology Alliance Canada (PTAC) is an industry association with production, academia, government, regulator and technology vendor members. It leads the technology development of methane emission reduction devices, and research into many environmental areas. Of note is PTAC's Canadian Emission Reduction Innovation Consortium including 16 producers and 16 research organizations.