Global Methane Initiative

GLOBAL METHANE INITIATIVE EXPO
Vancouver, Canada
12 - 15 March 2013

Vancouver, Canada

12–15 March 2013

PROJECT GUIDE

Hosted by:

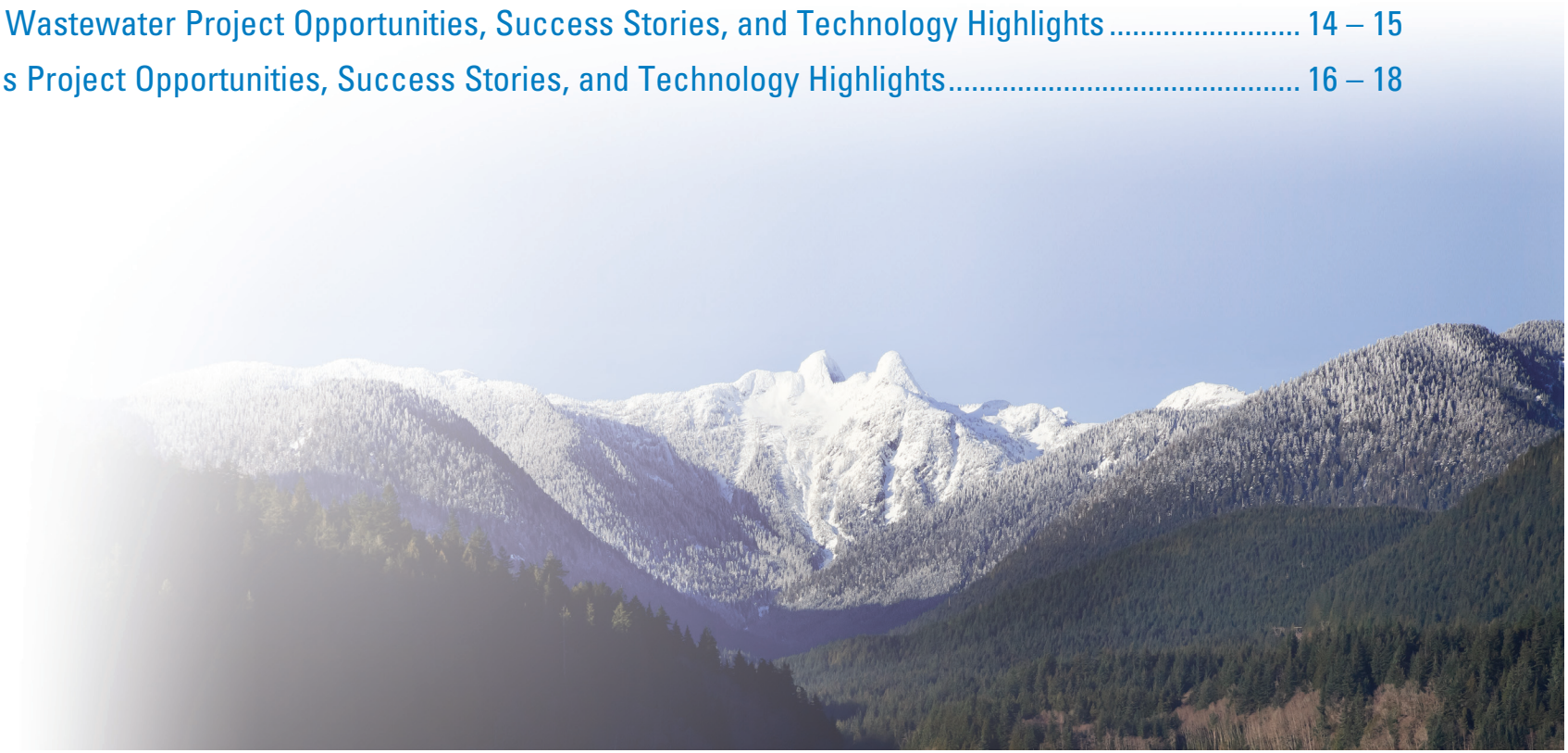
Canada

EPA United States Environmental Protection Agency

This guide contains descriptions of potential methane emissions reduction project opportunities as well as successful project updates and technologies displayed at the Global Methane Initiative (GMI) Methane Expo 2013 held in Vancouver, Canada on 12–15 March 2013.

Global Methane Initiative

Methane Expo 2013 Project Guide



The project opportunities, success stories, and technology highlights contained herein represent methane abatement, recovery, and use activities in 26 countries: Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Dominican Republic, Ecuador, Finland, Guatemala, India, Kazakhstan, Mexico, Mongolia, Nigeria, Pakistan, Russia, Serbia, South Africa, Thailand, Turkey, Ukraine, United Kingdom, United States, and Vietnam.

This guide features nearly 100 posters from all five GMI targeted sectors: Agriculture, Coal Mines, Municipal Solid Waste, Municipal Wastewater, and Oil and Gas.

Sector	Number of Posters	Average Annual Emission Reductions ($MTCO_2E$)
Agriculture	9	127,302
Coal Mines	31	110,031,563
Municipal Solid Waste	31	10,508,404
Municipal Wastewater	9	9,048,145
Oil and Gas	13	1,258,404
TOTALS	**93**	**130,973,618**

These ongoing activities and project opportunities—if fully implemented—would yield nearly 131 million metric tons of carbon dioxide equivalent.

AGRICULTURE CASE STUDIES AND SUCCESS STORIES

Type	Name of Project (Location)	Description	Emissions Reductions ($MTCO_2E$)*	Contact
BRAZIL				
Case Study	Biogas Agro-Energy Cooperative for Family Farming (Ajuricaba, Brazil)	This demonstration project consists of a cooperative of 33 small family dairy farms that produce 16 thousand tons per year of animal manure. A series of small biodigesters collect and process the manure. The produced biogas is piped to a thermoelectric power plant owned by the cooperative and used to generate heat and electricity, including the operation of biogas grain dryers.	2,650	• Cícero Bley, ITAIPU Binacional, **cbley@itaipu.gov.br**
ECUADOR				
Case Study	Soderal Biogas Project (Marcelino Maridueña, Ecuador)	The Soderal distillery currently uses lagoons to treat vinasse. The Soderal Biogas Project (SBP) will replace these lagoons with biogas recovery anaerobic digesters. The biogas produced will replace fuel oil currently used to power the distillery process.	30,000	• Camilo Molina Betancourt, Soderal, **cmolina@soderal.com.ec**
INDIA				
Case Study	One-MW High-Rate Biomethanation Plant (Ludhiana, Punjab, India)	This project at Haebowal was set up as the first project to demonstrate large-scale power generation from cattle manure. The project has proven the technical feasibility of developing such projects for energy recovery as well as producing large quantities of enriched organic fertilizer and reducing GHG emissions.	4,800	• Anil Dhussa, Ministry of New and Renewable Energy, **akdhussa@nic.in**
MEXICO				
Success	Anaerobic Biodigesters in the Yucatan Peninsula (Mexico)	This project consists of 13 wastewater management systems for 44 swine farms. These systems capture methane and improve air quality. The effluent is used to provide forest plantations with nutrients and water. Each system includes an anaerobic biodigester, enclosed flare, solid separator, storage lagoon, and forest plantation.	62,000	• Ramiro Caballero, Grupo Porcicola Mexicano (GPM), **ramiro.caballero@keken.com.mx** • Rodrigo Munoz, POCH, **rodrigo.munoz@poch.cl**
PAKISTAN				
Case Study	Electricity Generation from Dairy Farm Biogas (Province of Punjab, Pakistan)	Under this project, biogas plant construction companies and dairy farmers mobilized to use cow manure for biogas production to meet on-farm electricity requirements. Construction companies were trained to design, construct, and monitor quality construction of biogas plants. Farmers were trained to use the biogas for electricity generation, identify load management, and operate/maintain the biogas plants.	294	• Qamaruddin, Winrock International, **quddin@winrockpk.org**

*Estimated/actual average annual emissions reductions resulting from proposed or implemented project.
Posters available online at: globalmethane.org/expo/posters.html

Type	Name of Project (Location)	Description	Emissions Reductions ($MTCO_2E$)*	Contact
SOUTH AFRICA				
Success	Small-Scale Anaerobic Digestion (Jan Kempdorp, Northern Cape, South Africa)	An abattoir concentrating on cattle and bovine products had an audit conducted to determine a green and economically viable proposal to improve the elimination of animal by-products. A biogas generation system was identified as a method to produce energy from the waste for electricity, heating, and cooling. The potential energy savings equal 760 MWh electricity and 1,250 MWh heat per year.	19,899	• Thomas Dory, Bio4Gas Express GmbH, **dory@bio4gas.eu** • Dr. Kevin Monson, WYG, **kevin.monson@wyg.com**
THAILAND				
Success	K.O.S. Farm (Ratchaburi Province, Thailand)	Over time, this activity at the K.O.S. farm in the Ratchaburi province of Thailand will reduce GHG emissions from swine manure. It will convert open anaerobic lagoons to continuous flow closed anaerobic treatment digesters (Channel Digester Plus or "CDP") and capture biogas to generate power.	3,394	• Arux Chaiyakul, Thailand Department of Livestock Development, **aruxch@yahoo.com**
UNITED KINGDOM				
Case Study	Community Owned/Operated, Small-Scale Anaerobic Digestion (North Kilworth, Leicestershire, United Kingdom)	The project involves developing a community led joint-venture (JV) company to set up and run a community AD plant. Potential partners would be local food producers (including abattoir and brewery), and local farmer(s). This innovative JV model will benefit both local food and beverage companies, local farmers, and the local community.	Not available	• Dr. Kevin Monson, WYG, **kevin.monson@wyg.com**
UNITED STATES				
Case Study	Ringler Energy Anaerobic Digestion/Electricity Generation (Ashley, Ohio, United States)	The AD system will enable responsible manure management, while providing on-site radiant heat as well as electricity that will be sold to the public utility grid. A CNG fueling station is phase two of the project, and will provide cleaner burning fuel to the farm's fleet. The AD process also generates a nutrient-rich byproduct that can replace chemical fertilizers and improve soil quality.	4,265	• Caroline Henry, quasar energy group, **chenry@quasarenergygroup.com** • Alex Ringler, Ringler Energy, 491-253-0637

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AUSTRALIA				
Project	First Safe Direct Coupling of a Commercial-Scale RTO to Working Coal Mine (Mandalong, NSW, Australia)	Centennial Coal and Corky's propose a commercial-scale "hard connection" and RTO that will be designed, installed and demonstrated at Mandalong Mine. The major aims from this project are to add no safety risk and provide no back pressure to the underground coal mine, manage the variable flow of methane released from one ventilation fan and to significantly drive down delivery cost for subsequent projects.	360,500	• Donna Dryden, Centennial Coal, **Donna.Dryden@centennialcoal.com.au**
Success	Demonstration-Scale RTO, with Partial Connection to Working Coal Mine (Mandalong, NSW, Australia)	A demonstration-scale RTO, which processes 12.5 m^3/s (45,000 m^3/h) of VAM, has been constructed at Centennial's Mandalong mine site, with increased safety and operability in mind. This RTO has been designed and installed as if it was to be hard connected to the ventilation fan, which allows for a repeatable design to scale up to commercial scale (10 times the capacity).	36,050	• Donna Dryden, Centennial Coal, **Donna.Dryden@centennialcoal.com.au**
CHINA				
Project	Alashan Methane Recovery and Utilization Project (Xintai Industrial District, Inner Mongolia Autonomous Region, China)	The Inner Mongolia Tai Xi Coal Group owns thirteen small closely spaced inactive underground mines in this area. The goal of this project is to consistently produce high-quality CMM through advanced CMM drainage technology that will be usable in power generation equipment (up to 5 MWe) as well as for town gas, boiler fuel, and ventilation air heating.	90,000	• Zhao Yu Fu, Inner Mongolia Tai Xi Coal Group, **zhaoyufu@sohu.com**
Project	In-Mine Drainage and Power Production Project at the Fu Hong Underground Coal Mine (Guizhou Province, China)	The Fu Hong Mine has a methane drainage station operating at a rate of 140 m^3/min with 20% methane, while gas resources at the mine are estimated at 122.7 Mm^3. Two options exist for methane utilization at the mine: power generation only, with on-site use of power and remaining power sold to the grid, and coal drying with power generation.	246,200	• Li Xiaowei, Fu Hong Coal Mine, +86 139 8564 9988
Project	Guizhou Qinglong Coal Mine CMM Comprehensive Utilization Project (Qianxi County, Guizhou Province, China)	In 2012, 31.95 Mm^3 CMM was drained underground and 6.25 Mm^3 was utilized to feed six low-concentration CMM gas engines (3.2 MW total). Starting in 2013, the mine will drain 40 Mm^3 methane annually, with more than 30 Mm^3 of CMM to be utilized. Qinglong Mine plans to add six more 600-kW gas engines to the power station, and is evaluating the technical feasibility of purifying CMM to CNG.	171,360	• Zheng Mingjie, Guizhou International Cooperation Centre for Environmental Protection, **epbfaec@163.com**
Project	Guizhou Zhongling Coal Mine CMM To LNG Project (Nayong County, Bijie Prefecture, Guizhou, China)	Zhongling Mine is one of the earliest coal mines in Guizhou that uses CMM for power generation. Currently, there are 15 500-kW low concentration gas engines installed in three mining areas. Due to its remote location, Zhongling Mine is considering a CMM purification project for LNG. The gas processing capacity is estimated at 15 Mm^3 per year (11,300 tonnes LNG).	218,427	• Zheng Mingjie, Guizhou International Cooperation Centre for Environmental Protection, **epbfaec@163.com**

*Estimated/actual average annual emissions reductions resulting from proposed or implemented project.

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Type	Name of Project (Location)	Description	Emissions Reductions ($MTCO_2E$)*	Contact
Project	Comprehensive Utilization Project of VAM and CMM at Xiaodongshan Shaft of Sihe Mine (Jincheng Mining Area, Shanxi Province, China)	There is a low-quality CMM drainage station besides the Xiaodongshan Shaft, with the methane concentration between 20 - 28% and flow rate of 97.7 m^3/min. The project plans to add the low-quality CMM into VAM and increase the methane concentration by 1 - 2%. The mixed gas will be oxidized and used for power generation (24 MW) through steam turbines.	735,920	• Yu Lei, China Coal Information Institute (CCII), **yulei@coalinfo.net.cn**
Project	Surface Degasification and Use Project at Yanjing #1 Underground Coal Mine (Chongqing Municipality, China)	Construction of the Yanjing #1 Mine began in 2006 and commercial mining is expected to begin in 2013. Gas resources are estimated at 608 Mm^3, which will be sold to the to the local gas distribution system. The project has already installed a 3 x 1 MW gas drainage station and an accompanying 10,000 m^3 storage tank is under construction.	520,000	• Li Xiao Ling, Chongqing Energy Investment Group, **yulei@coalinfo.net.cn**
Success	Zhongliangshan CMM Utilization Project (Zhongliangshan, Chongqing, China)	In the 1980s, Zhongliangshan Coal Mine began to utilize CMM within the mining areas as town gas. Drained gas with a methane concentration around 40% is sent to a central storage tank, where CMM is mixed with natural gas (if necessary) to maintain a methane concentration of 50%. CMM is then delivered to residential, industrial, and commercial users through a pipeline network.	260,000	• Zheng Mingjie, Guizhou International Cooperation Centre for Environmental Protection, **epbfaec@163.com**
INDIA				
Project	Asnapani Jarandih Shaft VAM Project Opportunity (East Bokaro Basin, India)	Details unavailable at time of printing		
Project	CIMFR Data for Coal Mines in the Damodar Valley Coalfields (India)	Details unavailable at time of printing		
Project	Korba Basin Surface Mine Project Opportunity (India)	Details unavailable at time of printing		
Project	Mahuda Sub-Basin CMM Project Opportunity (Jharia Basin, India)	Details unavailable at time of printing		
Project	Mohar Sub-Basin Surface Mine Project Opportunity (Singrauli Basin, India)	Details unavailable at time of printing		
Project	Moonidh Mine CMM Project Opportunity (Jharia Basin, India)	Details unavailable at time of printing		

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Project	North Kathara Phase I.II.II & Uchitdih CMM Project Opportunity (East Bokara Basin, India)	Details unavailable at time of printing		
Project	Putkee-Bulliary Comm. Project Opportunity (Jharia Basin, India)	Details unavailable at time of printing		
KAZAKHSTAN				
Project	ArcelorMittal CMM Capture and Utilization Project (Karaganda Coal Basin, Republic of Kazakhstan)	The current CMM capture and utilization is limited to a single pilot power plant, with some process heating but still a large portion of CMM vented to the atmosphere. The proposed activity requires the installation of gas grid infrastructure, power grid distribution systems and containerized generating plant to enable the comprehensive capture and utilization of drained CMM for power generation.	1,200,000	• Sergazy Baimukhametov, JSC ArcelorMittal Temirtau, **Sergazy.Baimuhametov@arcelormittal.com**
Project	Kazakhstanskaya CMM-to-Power Project (Karaganda Coal Basin, Republic of Kazakhstan)	Existing ventilation and degasification infrastructure includes eight vertical shafts and 74.9 km of existing roadways. The mine plans to expand the current degasification by 8.5 km. The production plan in 2009 was 1.4 Mt, but the mine increased production to 1.6 Mt in 2010 and 1.8 Mt in 2012 (with 1.8 Mt planned for 2013).	111,000	• Tursyn Baimukhametov, Kazakh Scientific Institute of Safety in Mining Industry, +7 (7212) 492-842 • Alexander A. Shipulin, JSC ArcelorMittal Temirtau, +7 (7212) 497-115
Sucess	Lenina Mine Pilot CMM Power Plant (Karaganda Coal Basin, Republic of Kazakhstan)	The project consists of a single containerized high efficiency, spark ignition, lean burn gas generator set which is fueled from CMM drained from the Lenina Mine. Continuous improvement of the methane drainage system and operation of the generation plant means that the project now operates at full load of 1,415 kWe and achieves an operational availability over 95%.	32,800	• Sergazy Baimukhametov, JSC ArcelorMittal Temirtau, **Sergazy.Baimuhametov@arcelormittal.com**
MEXICO				
Project	MIMOSA CMM Project (Sabinas Basin, Coahuila, Mexico)	This project activity involves four active mines and will involve four additional mines in the future. The mine will use power generation for self-consumption, which will offset 7 MW of electricity consumed by the mine and improve overall operating costs.	52,500,000	• Mario Alberto Santillan Gonzalez, MIMOSA, **msantillang@gan.com.mx**
Success	MIMOSA VAM Destruction Project (Sabinas Basin, Coahuila, Mexico)	The principal lesson learned from this project was that the flares are insufficient for the large amount of gas in the mines, so the mine had to acquire the equipment to generate electricity (VAM technology).	52,500,000	• Mario Alberto Santillan Gonzalez, MIMOSA, **msantillang@gan.com.mx**

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MONGOLIA				
Project	Nalaikh Mine Power Generation and Heating Project (Nalaikh District, Mongolia)	No CMM is currently being used at the Nalaikh mine, nor does the mine have a drainage system in place. Following a reserve estimate and trial methane production using test boreholes, the project would include installation of a drainage system and utilization of methane for electricity generation to support mine power supply. A 3.6 MW power plant is anticipated.	96,390	• Dr. Mendbayar Badarch, Mongolian Nature and Environment Consortium (MNEC), **mnec@magicnet.mn**
Project	Pre-Mine Degasification and Use at Naryn Sukhait Surface Mine (Ömnögovi Province, Mongolia)	Naryn Sukhait is a surface mine in southwest Mongolia. The mine produces 7 to 10 million metric tons of coal per year with mineable reserves of 260 million metric tons. Preliminary studies of gas resources show that production of power for on-site use or installation of compressed natural gas facilities to run mine vehicles may be feasible.	Not available	• Geendeekhuu Davaatsuren, Mongolyn Alt Corporation (MAK), **gedavaa@mak.mn**
RUSSIA				
Project	CMM Utilization in Generating Plant at Alardinskaya Mine (Kemerovo Region, Kemerovo Oblast, Russia)	The project at the Alardinskaya Mine will reduce methane emissions through combustion in a CMM-fired, 5-MW capacity generating plant. The efficiency of coal seam gas drainage will be increased by introducing modern techniques of drilling methane drainage wells. Financing is also required to acquire internal combustion engine driven power generators by the coal company on a co-financed basis.	135,000	• Oleg V. Tailakov, NPO Uglemetan, **tailakov@uglemetan.ru**
TURKEY				
Project	VAM Mitigation/Utilization Opportunities at Kozlu Mine (Zonguldak Basin, Zonguldak, Turkey)	Currently, there is no CMM being collected/utilized at the mine. Technically, most commercially available VAM mitigation/utilization technologies can be applicable for the mine site (e.g., TFRR and CFRR). Carbon credit is needed to implement such a project in Turkey since VAM is not regarded as a renewable energy source, and other tax exemptions/incentives could significantly affect project economics.	169,000	• Dr. Kemal Baris, Virginia Center for Coal and Energy Research, **kemal@vt.edu**
UKRAINE				
Project	VAM Oxidation Project using Biothermica's VAMOX® technology at coal mine # 22 "Kommunarskaya" (Donetsk, Ukraine)	The VAM Project on coal mine # 22 "Kommunarskaya" of Public Joint Stock Company (PJSC) Colliery Group Donbas consists in the following: install at one shaft a total of three (3) Biothermica VAMOX® units with total VAM capacity of 9,300 m^3/min, make special considerations for dust, and production of hot water (70 degrees Celsius) for the mine's needs	450,000	• Orlov Viktor Ivanovich, PJSC Colliery Group Donbas **donbassmine@mail.ints.ua**

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Type	Name of Project (Location)	Description	Emissions Reductions ($MTCO_2E$)*	Contact
Project	On-Site Heat Generation and Flaring at Yuzhno-Donbasskaya No.3 Mine (Vugledar, Donetsk, Ukraine)	The mine's central suction system could potentially produce 35.6 to 57.7 m^3/min of usable methane, that is currently being vented to the atmosphere. The project envisions to improve the suction system, so that more methane is recovered rather than diluted in ventilation, and then to utilize CMM for on-site heat generation and flaring.	147,000	• Alexander Didenko, Eco-Alliance LLC, **ecoalliance@ukr.net**
Project	On-Site Heat Generation Using CMM (Donetsk Oblast, Ukraine)	The Zhdanovskaya Mine seeks to utilize CMM for on-site heat generation. The project would reduce coal use by 37,826 tonnes and avoid 34.6 Mm^3 of methane emissions over 16 years. The mine seeks financing to install two vacuum pumps and a pipeline between the degasification facility, the pump station, and the boiler-houses, as well as an installation to house the instrumentation and control system.	31,416	• Mikhail Dronov, Zhdanovskaya Coal Mine, **shahta@3-4.com.ua**
UNITED STATES				
Success	VAMOX® Project at Walter Energy Mine No. 4 (Brookwood, Alabama, United States)	Based on its proprietary VAMOX® technology for the destruction of underground coal mine VAM emissions, Biothermica developed the first VAM destruction project at an active coal mine in North America. A 30,000 ft^3/min VAMOX® demonstration system was deployed in 2009. Over the first 4 years of operation, the effective availability of the system was 93%.	20,500	• Raphaël Bruneau, Biothermica, **raphael.bruneau@biothermica.com**
VIETNAM				
Success	Cross Measure Degasification Pilot Project at the Khe Cham 1 Underground Mine (Quang Ninh Province, Vietnam)	Khe Cham is one of the gassiest mines in Vietnam and an explosion causing 11 fatalities occurred in 2009. Installation of a gas drainage system as proposed by Vinacomin - Institute of Mining Science and Technology (IMSAT) has reduced methane concentration in VAM from 1.0-1.3% without degasification to 0.2-0.6% after drainage installation.	Not available	• Dr. Tran Tu Ba, Vinacomin, **trantuba2003@yahoo.com**

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Type	Name of Project (Location)	Description	Emissions Reductions ($MTCO_2E$)*	Contact
ARGENTINA				
Project	San Nicholas Sanitary Landfill (San Nicolas, Buenos Aires Province, Argentina)	Assuming start-up of a power plant in 2015, sufficient gas is assumed to be available to support a power plant of 500 kW from 2015 to 2040, and power plant of 1MW from 2041 to 2055. An option for the direct utilization of the LFG could be to use it at the nearby steel manufacturing center.	25,747	• Juan C. Gasparini, Entre S.R.L., **gasparini@entresrl.com.ar** • Nazareno Castillo, Secretariat of Environment and Sustainable Development, **ncastillo@ambiente.gov.ar** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
BRAZIL				
Project	"Central de Residuos Vale do Aco" Landfill (Santana Do Paraiso, Minas Gerais, Brazil)	Assuming start-up of a power plant in 2015, sufficient gas is assumed to be available to support a power plant of about 1.1 MW in 2015, 1.9 MW in 2020, and 1.8 MW (maximum value) in 2025. A direct use project is possible depending on the availability of potential LFG end-users near the landfill (e.g., different industrial centers within 5-km radius).	56,708	• Alex Sandro Gomes, Vital Engenharia Ambiental S.A., **mmaria@vitalambiental.com.br** • Felipe Nunes, Environment State Foundation (FEAM), **felipe.nunes@meioambiente.mg.gov.br** • Chris Godlove, GMI, **godlove.chris@epa.gov**
Project	Contagem Sanitary Landfill (Contagem, Minas Gerais, Brazil)	Assuming start-up of a power plant in 2014, sufficient gas is assumed to be available to support a power plant of at least 2 MW from 2014 to 2025. This landfill is located adjacent to several industrial centers in Contagem and in the nearby city of Betim that could be potential end-users of the LFG.	105,947	• Alan da Cruz, Municipality of Contagem, **alan.mina@yahoo.com.br** • Felipe Nunes, Environment State Foundation (FEAM), **felipe.nunes@meioambiente.mg.gov.br** • Chris Godlove, GMI, **godlove.chris@epa.gov**
Project	Gerincino Landfill (Rio de Janeiro, RJ, Brazil)	Assuming start-up of a power plant in 2016, sufficient gas is assumed to be available to support a power plant of 5 MW from 2016 to 2023. A power plant of up 7 MW can be supported for the following 10 years. LFG utilization either directly at nearby prison or by injection into natural gas pipeline are two potential direct uses.	210,200	• Jose Henrique Penido, Compahnia Municipal de Limpeza Urbana (COMLURB), **jpenido@web-resol.org** • Chris Godlove, GMI, **godlove.chris@epa.gov**
Success	LFG Purification and Energy Recovery at Gramacho Landfill (Duque de Caxais, RJ, Brazil)	A collection system was installed to capture LFG and send it to a upgrading facility prior to injection into Petrobras 's national grid. The collected LFG is piped to an upgrading facility, which treats the gas using PSA to remove non-methane gases and concentrate the methane content to at least 92 - 95% methane. Upgraded gas is transported via a 6 km pipeline to the injection point. A backup emergency flaring system also has been installed.	311,337	• Eduardo Levenhagen, Novo Gramacho Energia Ambiental S.A., **eduardo@novogrmacho.com.br** • Jose Henrique Penido, Compahnia Municipal de Limpeza Urbana (COMLURB), **jpenido@web-resol.org** • Chris Godlove, GMI, **godlove.chris@epa.gov**
Project	Santa Rosa Landfill (Seropedica, RJ, Brazil)	Assuming start-up of a power plant in 2016, sufficient gas is assumed to be available to support a power plant of up to: 20 MW from 2016 to 2018, 40 MW the following 9 years, and 50 MW 4 years thereafter.	1,102,050	• Paulo Drutra, Ciclus Ambiental, **paulo.drutra@ciclusambiental.com.br** • Jose Henrique Penido, Compahnia Municipal de Limpeza Urbana (COMLURB), **jpenido@web-resol.org** • Chris Godlove, GMI, **godlove.chris@epa.gov**

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Project	Uberaba Sanitary Landfill (Uberaba, Minas Gerais, Brazil)	Assuming start-up of a power plant in 2017, sufficient gas is assumed to be available to support a power plant of up to 1 MW from 2017 to 2031. A potential direct end-user could be the chemical complex, centered around the production of fertilizer, that is adjacent to the Landfill.	53,335	• Jose Donizete, Municipality of Uberaba, **meloworld@hotmail.com** • Felipe Nunes, Environment State Foundation (FEAM), **felipe.nunes@meioambiente.mg.gov.br** • Chris Godlove, GMI, **godlove.chris@epa.gov**
CANADA				
Project	Harvest Energy Garden (Richmond, British Columbia, Canada)	The Harvest Energy Garden will divert nearly 30,000 metric tons of food and yard waste from landfills and convert it to biogas. The biogas will be combusted to produce 7 million kWh/year of renewable electricity. Residuals from the anaerobic digestion step will be further processed, yielding over 17,000 metric tons/yr of high-quality marketable compost.	173,000	• Jan Allen, Harvest Power, **jallen@harvestpower.com** • Elizabeth Powell, Harvest Power, **Elowell@harvestpower.com**
Success	Nanaimo Bioenergy Centre - Maximizing LFG Efficiency through Gas Storage Buffer (British Columbia, Canada)	The Nanaimo Bioenergy Centre LFG utilization facility is the first to target small- to medium-sized municipalities in British Columbia, Canada. The site comprises gas conditioning and two 633 kW gensets, for a total generating capacity of 1.4 MW, gas and electrical storage. Future phases will include transportation fuels and thermal heat recovery.	30,000	• Paul Liddy, Cedar Road Bioenergy Inc., **www.suncurrent.ca** • Carey McIver, Regional District of Nanaimo, **www.rdn.ca** • Michael Weedon, BC Bioenergy Network, **www.bcbioenergy.ca**
Success	Capture and Beneficial Use of LFG/Leachate at the Salmon Arm Landfill (Salmon Arm, British Columbia, Canada)	The project has been developed in two stages: LFG flaring commenced in February 2010 and converting from flaring to a system that upgrades the biogas to pipeline quality commenced in September 2012.	8,700	• Ben Van Nostrand, Columbia Shuswap Regional District (CSRD), **bvannostrand@csrd.bc.ca** • Darcy Mooney (CSRD), **dmooney@csrd.bc.ca** • Scott Gramm, FortisBC, **scott.gramm@fortisbc.com**
CHILE				
Project	Cerro Colorado Landfill (Calama, Chile)	Assuming start-up and testing of a power plant in 2014, sufficient gas is assumed to be available to support a power plant of at least 200 kW from 2015 to 2050. The Landfill is located in a remote area outside of Calama so the implementation of a direct use project may be limited as very few potential end-users are located near the landfill.	12,539	• Alberto Vasquez Albornoz, Municipality of Calama, **avasquez@municipalidadcalama.cl** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**

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Project	Colihues-La Yesca Landfill (Requinoa, Chile)	Assuming start-up and testing of a power plant in 2015, sufficient gas is assumed to be available to support a power plant of at least: 2MW from 2018 to 2026, 1 MW from 2027 to 2032, and 0.5 MW from 2033 to 2042. The Landfill is located in a rural area outside of Requinoa, where there are diverse types of industries that might have thermal energy needs or can use LFG directly.	79,134	• Enrique Nuñez, Municipality of Rancagua, **rellenosanitario.dga@rancagua.cl** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
CHINA				
Project	Beiyangqiao Landfill (Wuhan, China)	The Beiyangqiao Landfill is closing in 2013 and is ready to integrate gas collection infrastructure with its capping and closure site work. Waste depths of greater than 10 meters allow for anaerobic conditions.	58,462	• Mi Xin Qiao, China Wuhan Urban Administration Bureau, +86 27 82723815 • Xu Haiyun, Ministry of Construction, **xuhaiyun@263.ne** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
Project	Capacity Building, Technology Transfer and Demonstration Project of Landfill Gas to Energy (LFGTE) Program (country-wide)	This poster presents preliminary survey results for 372 centralized landfills for domestic waste disposal currently in operation in 297 Chinese cities. To date, China's 661 large/medium cities collect more than 16 million tons of MSW per year, of which about 79% is disposed of in sanitary landfills and/or unsecured dump-sites.	6,033,000	• Jiming Hao, Ph.D., Institute of Environmental Science and Engineering, Tsinghua University, **hjm-den@mail.tsinghua.edu.cn** • Hong Sima, Ph.D., EarthRes Group, Inc., **hsima@earthres.com** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
Project	Changshankou Landfill (Wuhan City, Hubei Province, China)	An advanced leachate treatment system reduces leachate levels in the waste mass, promoting more efficient gas collection. Assuming that a gas collection and flaring or energy system is installed in 2013, this landfill capture project has the opportunity to collect and destroy an average of 12.2 Mm^3 of methane annually over the next 15 years.	184,094	• Mi Xin Qiao, China Wuhan Urban Administration Bureau, +86 27 82723815 • Xu Haiyun, Ministry of Construction, **xuhaiyun@263.ne** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
COLOMBIA				
NAMA	GHG Mitigation Activities in the MSW Sector (Santiago de Cali, Colombia)	In partnership with the Government of Colombia and supported by Environment Canada, the Colombia Solid Waste NAMA Project has focused on developing solid waste policies at the national level and feasibility analysis of next generation waste management projects in various Colombian municipalities. The project is aimed at developing an evaluation and development framework for NAMA implementation throughout Colombia.	Not applicable	• Franck Portalupi, Environment Canada, **franck.portalupi@ec.gc.ca** • Michael Lagiglia, Center for Clean Air Policy (CCAP), **mlagiglia@ccap.org**

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Project	San Juan del Barro Landfill (Florencia, Caqueta, Colombia)	Assuming start-up of a power plant in 2014, sufficient gas is estimated to be available to support an electricity project with a modest capacity that would gradually grow from 300 to 800 kW over a 41-year period. The electricity generated by an LFG energy project at the San Juan del Barro Landfill could be used by the site itself for its own energy needs and the excess could potentially be sold to the nearby prison.	15,370	• Leonardo Trujillo Castrillon, Servintegral S.A. E.S.P, **letrucas1@yahoo.com** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**
GUATEMALA				
Project	LFG Use for Waste Incineration at San Pedro Municipal Landfill (San Pedro Sacatepéquez, San Marcos, Guatemala)	This project has overcome the main obstacle to develop LFG recovery projects, which is local government and/or site operator understanding of the social and environmental benefits that may result from the project development, due to previous training and involvement from the authorities in a LFG monitoring project carried out by a local NGO, from which the data was obtained.	4,407	• Silvia Tul De Leon, Municipalidad de san Pedro Sacatepequez, **silviatul_29@yahoo.com** • Christian Siliezar Montoya, Servicios Carvel, **csm@servicarvel.com** • Virginia Rodas, Fundacion Solar, **vrodas@fundacionsolar.org.gt**
MEXICO				
Project	1113 Landfill (Cancun, Quintana Roo, Mexico)	Assuming start-up of a power plant in 2014, sufficient gas is assumed to be available to support a power plant of 1.6 MW in 2014, decline to 1.0 MW by 2019, and 0.5 MW by 2028. The closed Norte Landfill is located 4 km away and has an active LFG system so one possible project would be to combine the LFG from both landfills.	40,291	• Oscar Ramirez, Solucion Integral de Residuos Sólidos (SIRESOL), **oscar.frm@yahoo.com.mx** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**
Project	Altas Montanas Regional Landfill (Nogales, Veracruz, Mexico)	Assuming start-up of a power plant in 2015, sufficient gas is estimated to be available to support a power plant of: 2 MW until 2017, 3 MW from 2018 to 2023, and 4 MW from 2024 to 2033. The electricity generated by an LFG energy project could be used by the landfill for its own energy needs or it could be wheeled to any company in Mexico that is seeking to use renewable energy.	133,315	• E. Gil Aranda, Cappy and Associates, S.A. de C.V., **egar@cappymex.com** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**
Success	Ciudad Juarez LFG Project (Juarez City, Chihuahua, Mexico)	During Phase I, eight horizontal extraction wells, a condensate management system, and leachate de-watering pumps in selected extraction wells were installed. An electricity generation plant of 6.4-MW installed capacity was installed and connected via transmission lines to the local grid. In Phase II, two additional horizontal extraction wells and a new gen-set of 14.4 MW were put into action.	117,108	• Ezequiel Quiroz, Biogas de Juarez, S.A. de C.V., **ezequiel.quiroz@gmail.com** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**

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Project	Ojos Negros Landfill (Ensenada, Baja California, Mexico)	Assuming start-up of a power plant in 2014, sufficient gas is assumed to be available to support a power plant of 0.63 MW, and an additional 0.63 MW in 2021 until 2028. In 2028 the plant capacity will decrease back to 0.63 MW until 2038. One possible project would be to combine LFG from the Ojos Negros Landfill and the closed Ensenada Landfill (6 km away), which may make project economics more favorable.	44,145	• Alfonso Martinez Muñoz, Promotora Ambiental SAB de CV, **amartinezmu@pasa.mx** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**
Project	Xalapa Landfill (Xalapa, Veracruz, Mexico)	Assuming start-up of a power plant in 2014, sufficient gas is assumed to be available to support a power plant of 0.9 MW in 2014, increase to 1.3 MW by 2017, and then start to decline in 2020. The electricity generated by an LFG energy project could be used by the landfill for its own energy needs or it could be wheeled to any company in Mexico that is seeking to use renewable energy.	39,725	• Veronica Norma Rodriguez, Municipality of Xalapa, **veroavila007@hotmail.com** • Victoria Ludwig, GMI, **ludwig.victoria@epa.gov**
Project	Zacatecas Municipal LFG Pilot Project (Zacatecas, Mexico)	This project, the first of its kind to serve a medium-size municipality in the country, comprises the development of a 1–3 MW LFG collection and power generation pilot facility. With much greater numbers of smaller landfills, this project can be a valuable proof of concept leading to hundreds of similar LFG beneficial projects throughout Mexico and thousands more in other developing countries.	55,882	• Kattia Trejo Cardenas, Gobierno Municipal de Zacatecas, **ktrejo@municipiozacatecas.gob.mx** • Hong Sima, EarthRes Group, Inc., **hsima@earthres.com**
NIGERIA				
Project	LFG Flaring and Energy Recovery at Olusosun, Abule Egba, and Solous Landfill Sites (Lagos, Nigeria)	The project activity is to build, operate and maintain a LFG recovery and utilization system on the three landfill sites in Lagos, Nigeria. The 1st phase will consist of a gas collection network as well as an extraction and flaring system. The 2nd phase will comprise an electricity generation plant interconnected to the national grid at the largest landfill site.	129,932	• Yemisi Ogunlola, Lagos Waste Management Authority (LAWMA), **y.ogunlola@lawma.gov.ng** • Ola Oresanya, LAWMA, **o.oresanya@lawma.gov.ng**
SERBIA				
Project	Novi Sad Landfill LFG Project (Novi Sad, Serbia)	Based on U.S. EPA's projections, a maximum flow of approximately 700 m^3/hr of LFG at 50 percent methane could potentially be collected – enough to produce approximately 1.1 MW of electricity. There are also some industries located near the Landfill that could potentially use the LFG as a fuel source in their operations.	35,494	• Dragon Bozic, Public Utility Company "Cistoca" Novi Sad, **office@cistocans.co.rs** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**
Project	Vinca Landfill (Belgrade, Serbia)	Based on U.S. EPA's projections, a maximum flow of approximately 2,000 m^3/hr of LFG at 50 percent methane could potentially be collected – enough to produce approximately 3,000 kW of electricity. There are also some industries located near the Landfill that could potentially use the LFG as a fuel source in their operations.	111,808	• Radovan Draskic, Public Utility Company "Gradska Cistoca" Beogard, **infocentar@gradskacistoca.rs** • Tom Frankiewicz, GMI, **frankiewicz.thomas@epa.gov**

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TURKEY				
Success	Odayeri Sanitary Landfill (Odayeri Village, Istanbul, Turkey)	In 2008, Ortadogu Enerji developed and installed an LFG energy project that utilizes over 200 LFG vertical wells to collect approximately 10,800 m^3/hr of LFG to generate 23 MW of energy. A total of 15 Jenbacher engine/generator sets and three MWM engine/generator sets (approximately 1.4 MW each) are operating and an additional two engines will be installed in 2013 to increase electricity generation to 28.3 MW.	780,183	• Murat Cetindemir, Ortadogu Enerji A.S., **murat.cetindemir@ortadogugrup.com.tr** • Swarupa Ganguli, GMI, **ganguli.swarupa@epa.gov**
Success	Komurcuoda Sanitary Landfill (Komurcuoda Village, Istanbul, Turkey)	In 2009, Ortadogu Enerji developed, designed, and installed an LFG energy project that utilizes over 120 LFG vertical wells to collect approximately 4,500 m^3/hr of LFG to generate 8.2 MW of energy. A total of six Jenbacher engine/generator sets (1.4 MW each) are operating and an additional four more engines will be installed to increase electricity generation to 14.2 MW.	395,588	• Ilker Sel, Ortadogu Enerji A.S., **ilker.sel@ortadogugrup.com.tr** • Swarupa Ganguli, GMI, **ganguli.swarupa@epa.gov**
UKRAINE				
Project	Dergachi Landfill LFG Utilization (Kharkiv Oblast, Ukraine)	Assuming start-up of a power plant in 2014, sufficient LFG is assumed to be available to support a power plant of 2.2 MW in 2014 that will increase to 3.8 MW by 2026, and then decline to 1.5 MW by 2040.	88,103	• Fedor Luchenko, City of Kharkiv, **luchenko.f@gmail.com** • Swarupa Ganguli, GMI, **ganguli.swarupa@epa.gov**
Success	Kiev #5 Landfill (Kiev Oblast, Ukraine)	In 2011, LNK, LLC worked with a team of Ukrainian researchers to develop, design, and install the largest LFG energy project in Ukraine at the Kiev #5 Landfill. LNK utilizes 44 LFG vertical wells to collect approximately 500 m^3/hr of LFG to generate 900 kW of energy. A total of five Tedom engine/generator sets (180 kW each) have been operating since April 2012. LNK plans to add an additional 30 vertical LFG wells and a Jenbacher engine to generate an additional 1 MW in 2014.	72,797	• Vladmir Bannov, LNK, LLC, **info@lnkenergy.com** • Swarupa Ganguli, GMI, **ganguli.swarupa@epa.gov**

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CANADA				
Tech	MicroSludge® Treatment of Waste Activated Sludge (WAS) from Industrial and Municipal Wastewater Treatment Plants (global applications)	MicroSludge® is Paradigm's patented WAS pre-treatment process that increases both rate and extent of WAS anaerobic digestion to increase biogas production and decrease sludge for disposal. MicroSludge® and anaerobic digestion result in: faster WAS digestion, increased biogas, no or minimal polymer for WAS thickening, less polymer for sludge dewatering, and less WAS for disposal.	15,000	• Gordon Skene, Paradigm Environmental Technologies Inc., **gskene@microsludge.com**
CHILE				
Success	La Farfana Wastewater Treatment Plant Biogas Upgrade (Santiago, Chile)	This project upgraded biogas from the anaerobic digesters to town gas quality. Town gas quality (average 96% methane) is achieved using a treatment train consisting of compression and dehydration to eliminate humidity, a bioreactor and a scrubber that removes 95% of the H_2S, and a thermal oxidizer that removes CO_2 and traces of oxygen and nitrogen in the gas. Treated gas is sent to Metrogas Town Gas Plant.	26,000	• Sebastian Bernstein Llona, Metrogas S.A., **sbernste@metrogas.cl**
CHINA				
Project	Household-Scale Biogas Digesters: Opportunities for Methane Emissions Reductions from Latrines in Rural Areas of China (country-wide)	Household-scale biogas digesters in rural China are an effective means of reducing methane emissions while also enhancing rural energy security and improving indoor air quality. There are currently ~38 million household digesters in China, for which methane emission reductions could be enhanced by low-cost initiatives such as improving digester maintenance and constructing new digesters.	9,000,000	• Matthew C. Reid, Princeton University Department of Civil and Environmental Engineering, **mcreid@princeton.edu**
DOMINICAN REPUBLIC				
Project	Rafey Wastewater Treatment Plant Biogas Electricity Generation (Santiago, Dominican Republic)	The Rafey WWTP serves approximately 490,000 people and has design and operating influent flow rates of 1.2 m^3/sec and 0.5 m^3/sec, respectively. The proposed project involves capturing the wastewater biogas, treating it (i.e., removing siloxanes and H_2S), and generating electricity in a 1-MW engine. The electricity will be used onsite.	1,100	• Rufidalsy Gomez, Coraasan, **rufidalsy@gmail.com** • Vladimir Rodriguez, Coraasan, **vladimir.rn@hotmail.com**

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Project	Tamboril Wastewater Treatment Plant Biogas Electricity Generation (Santiago, Dominican Republic)	The Tamboril WWTP serves approximately 37,250 people and has design and operating influent flow rates of 0.629 m^3/sec and 0.085 m^3/sec, respectively. The proposed project involves capturing the wastewater biogas, treating it (i.e., removing siloxanes and H_2S), and generating electricity in a 750-kW engine. The electricity will be used onsite.	825	• Rufidalsy Gomez, Coraasan, **rufidalsy@gmail.com** • Vladimir Rodriguez, Coraasan, **vladimir.rn@hotmail.com**
FINLAND				
Success	Vehicle Fuel from Wastewater at Suomenoja Wastewater Treatment Plant (Espoo, Finland)	The Suomenoja WWTP sludge treatment process is based on mesophilic digestion, for which retention time is 14 days, followed by a dewatering procedure using three centrifuges. The Suomenoja facility annually produces about 23,000 tons of dewatered sludge (average value of dry solids content is 32%), and the sludge is further composted for green building and agricultural purposes.	900	• Mari Heinonen, Helsinki Regions Environmental Services Authority HSY, **mari.heinonen@hsy.fi**
Success	Vision of Energy Neural Wastewater Treatment at Viikinmäki Wastewater Treatment Plant (Helsinki, Finland)	The Viikinmäki WWTP sludge treatment process is based on mesophilic digestion, for which retention time is 16 days, followed by a dewatering procedure using four centrifuges. The Viikinmäki facility annually produces about 65,000 tons of dewatered sludge (average value of dry solids content is 29%), and the sludge is further composted for green building and agricultural purposes.	2,100	• Mari Heinonen, Helsinki Regions Environmental Services Authority HSY, **mari.heinonen@hsy.fi**
TURKEY				
Project	Biogas Production from Domestic Wastewater Treatment Sludge (multiple sites in Turkey)	The organic load method is the most commonly utilized method in biochemical treatment of wastewater, which results in the production of sludge. Industries and local governments confronted with the challenge of sludge management should seek to find ways to turn this problem to their economic advantage. One of these solutions involves the utilization of biogas resulting from sludge processing as a fuel source.	2,200	• Ergün Pehlivan, Cumhuriyet University, **epehlivan183@hotmail.com**
VIETNAM				
Project	Constructing/Operating a Waste Treatment Plant (Hanoi, Vietnam)	The proposed project aims at constructing/operating a WWTP that would: consume less electricity, avoid use of coagulant chemicals for sludge removal, and provide possible direct sludge digestion for biogas production. This would be achieved by constructing two patented energy reducible solutions: an adjustable tank for biological treatment and a fluidization aeration mixing apparatus.	20	• Nguyen Van Cach, Hanoi University of Science and Technology, **ngvcach@yahoo.com**

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CANADA				
Success	Pneumatic Controller Retrofit Project (various locations in British Columbia, Canada)	Devon has approximately 250 pneumatic controllers in BC that vent gas to the atmosphere. Emission reductions are achieved through the conversion of high bleed controllers to low or no-bleed (e.g., Mizer valve retrofit or installation of a new low bleed controller). Gas that is not vented as a result of the project is fuel gas consumed on-site or sales gas.	9,800	• Lance Miller, Devon Corporation Canada, **Lance.Miller@dvn.com**
Success	Reduction of Methane Venting from a Gas Transmission Pipeline System (Prince George, British Columbia, Canada)	When sections of pipeline are disconnected for inspection or servicing (a planned depressurization process known as "blowdown"), a small amount of natural gas is released into the atmosphere. Spectra Energy has employed various methods to recover or combust natural gas that allow the company to significantly reduce the amount of pressurized natural gas that is released to the atmosphere.	41,784	• Bill Tubbs, Spectra Energy, **btubbs@spectraenergy.com**
Success	Unlocking the Value of Energy Efficiency in the Oil & Gas Sector (various facilities across British Columbia and Alberta, Canada)	Cap-Op is pioneering the development of the Distributed Energy Efficiency Project Platform (DEEPP) that enables: reduced risk and effort with standardized quantification methods and aggregation; viable energy efficiency projects with reduced cost of GHG offset quantification by up to 50%; and certainty of project financial returns due to a disruptive pricing model.	1,000,000	• Adam Winter, Cap-Op Energy Ltd., **awinter@capopenergy.com**
Success	Low Emission Wellsites – Venting and Combustion Reduction (Dawson Creek, British Columbia, Canada)	Under the ARC Resources low emission wellsite program, wellsites are electrified and gas-driven instruments are replaced with an instrument air system, and gas-driven pumps are replaced with electric-driven pumps. The program has been expanded so that ARC oil wells in BC have electric pumpjack motors rather than gas fired motors.	10,000	• Jackson Hegland, ARC Resources, **jhegland@arcresources.com**
Success	Zero Emissions Technology (various facilities in Western Canada)	Blair Air Systems' Zero Emissions Technology, which eliminates methane emissions at well sites, has applications in the oil and natural gas production sector and is currently being used at facilities in Western Canada. The technology can be scaled for use at production facilities worldwide.	387 per installation	• Jim Blair, Blair Air Systems Inc., **info@blairair.com**

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Project	Heat String Pump Retrofit (Calgary, Canada)	In the process of doing field sampling, Greenpath Energy of Calgary found gas-driven versamatic heat pumps with high vented methane rates, some pumps exceeding 200,000 m^3. CNRL has evaluated a number of different options to address the methane venting issue and has elected to take the vented gas from the gas driven pumps and use that formerly vented gas as supplemental fuel in the line heaters.	9,020	• Chris Vander Pyl, Canadian Natural Resources Ltd (CNRL), **chris.vanderpyl@cnrl.com**
Project	Heat String Pump Retrofit (North East British Columbia, Canada)	Gas-driven pumps and high bleed gas-driven pneumatic controllers as well as low bleed gas-driven controllers, solar chemical pumps, and gas-driven pumps have been modified to not emit to atmosphere (Linc Pump Solution). The conserved natural gas is produced to pipeline. Data from TAQA will be aggregated with other operators to produce a better understanding of emissions from these activities.	22,600	• Robert Martens, TAQA North, **robert.martens@taqa.ca**
CHINA				
Demo	International Collaboration to Advance Emissions Reductions (Shaanxi Province, China)	The demonstration involved installing synchronal rotary compressors and walking beam compressors at wellpad sites, injecting casing gas into oil pipes, and building light hydrocarbon recovery plant. The gas gathered was used to generate power and produce LPG and light oil for sales. Use of this technology is possible at production and processing facilities.	15,000	• Zhang Jianxiao, Xi'an Changqing Technology Engineering Co., Ltd, **ctec-zjx@cnpc.com.cn** • Cui Xiangyu, CNPC, **cuixiangyu@cnpc.com.cn** • Roger Fernandez, GMI, **fernandez.roger@epa.gov**
Case Study	Quantifying Future Benefits of Implementing Cost-Effective Emissions Reduction Technologies in Natural Gas Production (country-wide)	Cost effective measures in natural gas production/distribution can reduce emissions by up to 90%. A high price of natural gas would make emissions control technology highly cost-effective and profitable in China. However, the high level of uncertainty is a limiting factor in quantifying benefits. To address this, emissions monitoring and reporting programs catered to methane emissions reduction are proposed.	Not applicable	• Mary Kang, Princeton University Department of Civil and Environmental Engineering, **marykang@princeton.edu** • Joseph Majkut, Princeton University, **jmajkut@princeton.edu**

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INDIA				
Success	International Collaboration to Advance Sustainable Oil & Natural Gas Production and Climate Protection (country-wide)	ONGC joined U.S. EPA's Natural Gas STAR International Partnership in 2007. U.S. EPA and ONGC have worked together closely to identify and implement several economically attractive opportunities to minimize methane emissions. The Partnership introduced new techniques and technologies for finding, measuring, and evaluating methane mitigation projects. ONGC has fully adopted these techniques, significantly reduced its own emissions and is now advancing the Partnership across India and around the world. ONGC has achieved methane reductions equal to more than 150,000 tons of CO_2 and its dedicated team continues to build upon its early success.	150,000	• Ashok B. Chakraborty, ONGC, **Chakraborty_ab@ongc.co.in** • Scott C. Bartos, GMI, **Bartos.Scott@epa.gov**
NORWAY				
Case Study	The Norwegian Way of Developing and Cooperating for Solutions in the Oil and Gas Industry (country-wide)	The Norwegian oil and gas industry has among the lowest CO_2 emissions in the world. Norway has not had a specific focus on reduction of methane emissions for environmental reasons, but due to strict safety regulations and the use of high quality equipment, methane emissions from the oil and gas industry in Norway are estimated (and measured) to be low.	Not applicable	• Jørn Paus, Statoil Petroleum AS, **jorpa@statoil.com** • Tuva Grytli, Statoil ASA, **tug@statoil.com**
UNITED STATES				
Success	Centrifugal Compressor Seal Oil De-Gassing Emissions Recovery (Prudhoe Bay, Alaska, United States)	On Alaska's North Slope in the United States, BP's Prudhoe Bay facilities operate wet seal centrifugal compressors with seal-oil/gas separation systems that route the separated gas to recycle, high and low pressure fuel gas use, and/or flare purge. These systems reduce emissions from seal-oil degassing and are an alternative to using/installing dry seals.	45,900 per compressor	• Gordon-Reid Smith, BP, **gordon-reid.smith@bp.com**
Success	Detection & Monitoring of Fugitive Methane Emissions using Passive and Active Infrared Advanced Technologies (Texas, United States)	Using state of the art infrared technologies, like the Opgal EyeCGas Imaging Camera and Heath Consultants' Remote Methane Leak Detector (RMLD), specialists are now screening gas wells and booster stations rapidly and performing routine facility monitoring of key components. An advanced leak detection approach has also been initiated.	10,000 per compressor	• Milton W. Heath III, Heath Consultants Incorporated, **milt.heath3@heathus.com**

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