New Federal and Alberta Methane Regulations – Assessing Compliance Options for Regulated Facilities

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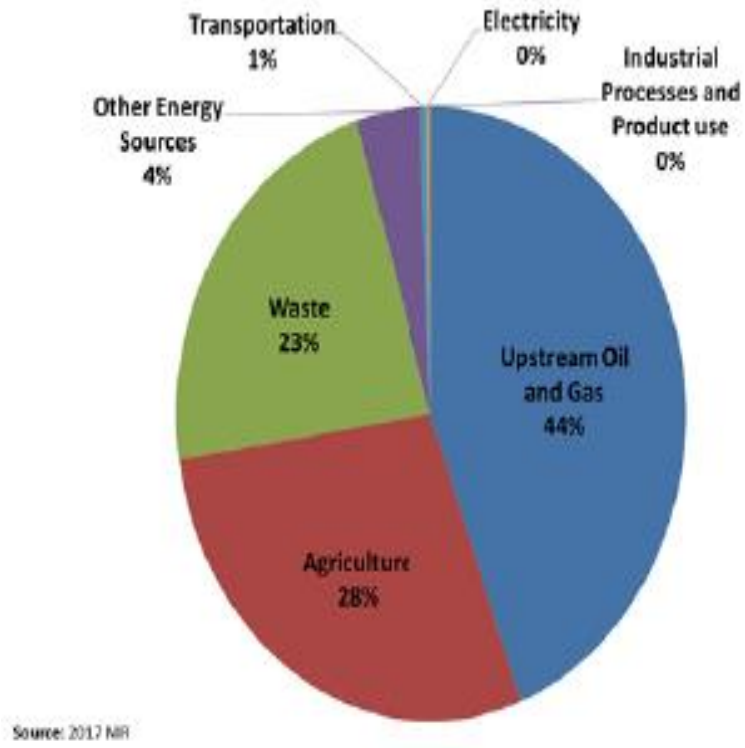
AGENDA

- Background
- Overview of Federal and Provincial Methane Regulations
- Compliance Issues and Options
- Accelerating Emissions Reductions

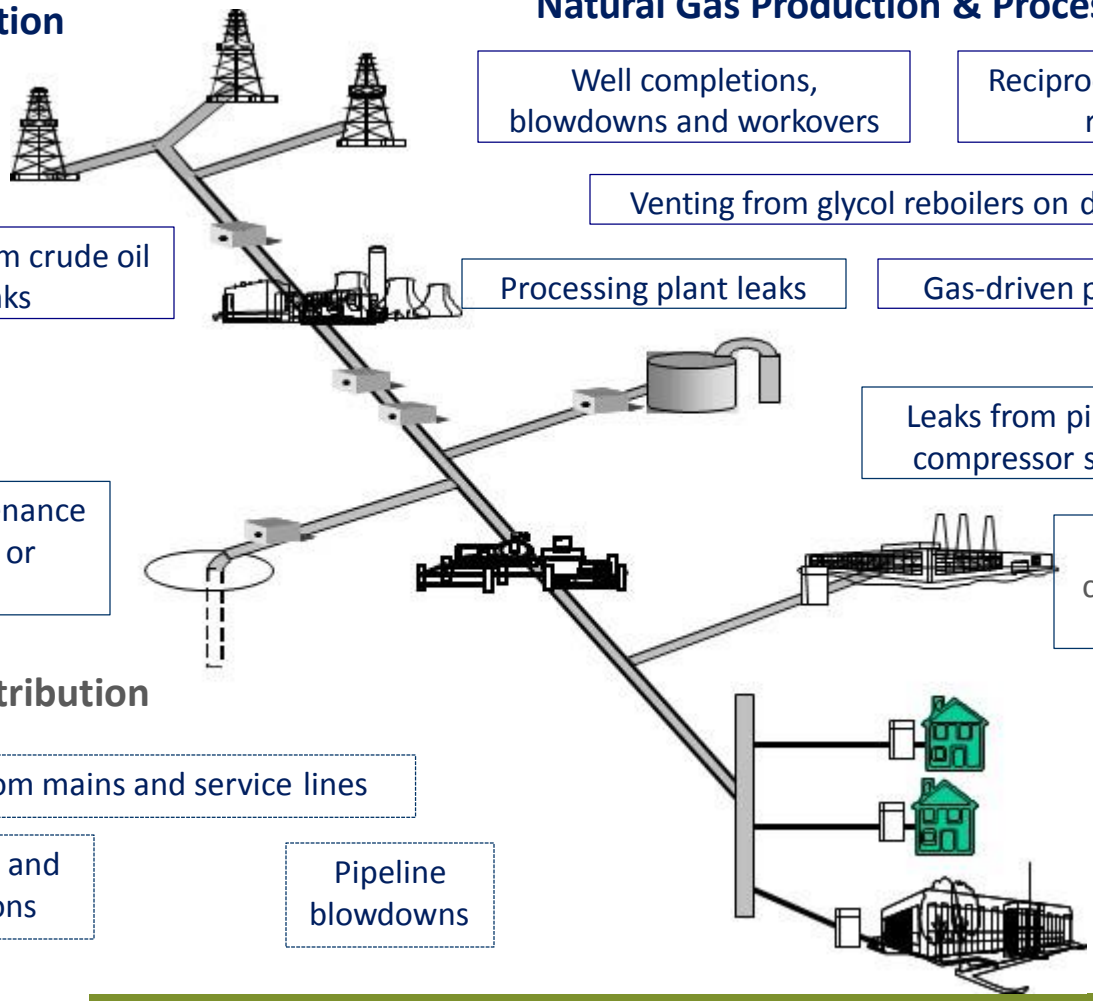
Why Methane ?

- Methane – major component of natural gas
- Potent gas with a GWP 25 x that of CO_2 over a 100-year period
- O&G industry is responsible for ~44% of Canada's total methane emissions (2012 data)
  - [Oil and gas facilities account for 26% of Canada's total GHG emissions]
- In Alberta, the O&G industry contributes over 70% of methane emissions
- The majority of emissions are released by fugitive (unintentional release) and venting (intentional release) sources



Canada's 2012 Total Methane Emissions (110 Mt CO2e)

Methane Emissions Sources – O&G Operations



Courtesy: American Gas Association

Methane Policy & Regulatory Drivers

- Canada and Alberta have committed to reducing methane emissions as part of their climate change plans
- Pan-Canadian Framework on Clean Growth and Climate Change
  - Reduction of methane emissions by 40 – 45% from 2012 levels by 2025
- Alberta Climate Leadership Plan
  - Same, except using 2014 as baseline year
- Focused on regulatory approaches to achieve reductions
- Regulations target methane emissions from fugitive and venting sources

Methane Mitigation - Regulatory Best Practices Framework

- Targets emissions from across multiple segments and targets new and existing sources
- Reducing designed and unintentional equipment venting (compressors, pneumatics, etc.)
- Reduce venting of associated gas from oil wells
- Implement a fugitive emissions/LDAR program
- Measurement, testing, record keeping and reporting

Federal Methane Regulations

- *"Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector)"*
- Under the Canadian Environmental Protection Act (CEPA) 1999
- Regulations cover upstream oil and gas facilities – used in the extraction, production and transportation of crude oil and natural gas
- The total compliance costs from regulations over 18 year period is ~$2.9 billion over the 18-year period ($3.9 billion - $1 billion offset by NG savings

Summary of federal methane regulations

Emission source	Requirements
Venting from compressors	• Measurements emissions from compressor vents annually • Take corrective action when emissions are higher than applicable limit • Implementation date: January 1, 2020
Fugitive (leaks)	• Implement LDAR program to stop leaks • Inspect for leaks three times a year • Repair leaks if found • Implementation date: January 1, 2020
General facility production venting	• Limit venting to 1,250 m^3 a month (15,000 m^3 a year) • Conserve gas for reuse on site, sale, or flaring or clean incineration • Implementation date: January 1, 2023
Venting from pneumatic devices	• Limit venting to 0.17 m^3 per hour for pneumatic controllers • Conserve gas for reuse on site or sale, or replace with non-emitting or low-bleed pneumatic device • Implementation date: January 1, 2023
Venting from well completions involving hydraulic fracturing	• No venting • Conserve gas for reuse on site, sale, or flaring or clean incineration • Implementation date: January 1, 2020

Federal Regulatory Flexibilities

- Alternative LDAR program limiting emissions equally
- Delay of repair – 30 days
- Extensions of up to six months possible
- Very small sites exempted from LDAR requirements
- Numerous ways to limit venting: capture and reuse gas, sell it, inject it underground, or destroy it
- Emission limit range for different compressor sizes, types, and installation dates
- Until December 31 2025, permits for pneumatic pumps can be requested if compliance by deadline isn't feasible

Record keeping and reporting

- Requirements for record-keeping and reporting
  - Records: flow rates, measurement-device make/model/serial no., calibration results, repair records…
  - Training: name of LDAR technician, employer name and address, training provider and dates…
- Records must be kept for five years and produced within 60 days if requested

Alberta Methane Regulations

- Emission reductions via AER updates to:
  - Directive 60 (*Upstream Petroleum Industry Flaring, Incinerating, and Venting*), effective January 1, 2020
  - Directive 17 (*Measurement Requirements for Upstream Oil and Gas Operations*), effective December 13, 2018
- Additional guidance: AER manuals 015 (*Estimating Methane Emissions* and 016 (*How to Develop a Fugitive Emissions Management Program*)
- Regulations cover all upstream oil and gas wells and facilities:
  - Includes pipeline installations licensed by the AER
  - Includes all oil sands in-situ schemes and operations under OSCA
  - Excludes oil sands mining schemes and operations

Alberta Methane Regulations

Source	Category	Requirement
All venting sources	Overall vent gas limit	• 15.0 10^3 m^3/month/site or 9.0 10^3 kg of methane/month/site • January 1, 2020; specified exemptions until 2023
Venting	Defined vent gas limit for new sites	• <3.0 10^3 m^3/month/site or <1.8 10^3 kg of methane/month/site • January 1, 2022
	Defined vent gas limit for existing sites	• Subject to overall vent gas limit
	Vent gas limits for new and existing crude bitumen batteries	• Defined vent gas limit for each site or crude bitumen fleet average in each month of 3.0 10^3 m^3/facility ID • January 1, 2022
Pneumatic devices	Vent gas limits for new pneumatic devices	• Control vent gas - > 90 % of instruments/year installed Pumps operating more than 750 hours/year • January 1, 2022
	Vent gas limits for existing pneumatic devices	• Variable • January 1, 2023
Compressors seals	Vent gas limits for new reciprocating compressors	• Variable; depends on number of throws • January 1, 2022; Jan 1st 2023
	Vent gas limits for existing reciprocating compressors	• Reciprocating-compressor-seal fleet: <0.83 m^3/hr/throw, with no compressor venting gas over 5.00 m^3/hr/throw • January 1, 2023
	Vent gas limits for new centrifugal compressors	• <3.40 m^3/hr/compressor • January 1, 2022
	Vent gas limits for existing centrifugal compressors	• <10.20 m^3/hr/compressor • January 1, 2023
Glycol dehydrators	Vent gas limits for new glycol dehydrators	• <68 kg of methane/day/glycol dehydrator • January 1, 2022
	Vent gas limits for existing glycol dehydrators	• Glycol dehydrator fleet: <136 kg of methane/day • January 1, 2023
Fugitive emissions	Facilities (gas plants, compressor stations, tanks, batteries, terminals, disposal sites, etc.)	• Triannual or annual fugitive emissions surveys

Alberta Regulatory Requirements & Flexibilities

- Operators must submit a Methane Retrofit Compliance Program with costs (with $$, resources; signed by an executive)
- Operators must submit a Fugitives Emissions Management Plan
- Regulations give operators some flexibility in meeting regulatory requirements. Examples:
  - Use of fleet averages when setting vent limits for crude bitumen batteries, compressors, glycol dehydrators
  - Delayed leak repair
  - Alternative LDAR programs

Measurement, testing, reporting, recordkeeping

- Measurement and reporting requirements are as per AER Directive 017
- Annual vent gas and methane emissions reporting required
  - First methane emissions report due June 1st 2020 (for 2019 compliance year)
- Detailed records of all venting and fugitives activities must be kept for 4 years
- Records must be provided in electronic format within 30 days of a request from the AER

Compliance: Issues, Options & Challenges

- Economic impact on industry ?
  - Hitting the right balance
- In-built regulatory flexibilities offer some compliance options
- Driving methane mitigation technologies and services (174 service companies in Alberta)
- Provincial-federal equivalency
- Adaptive management approach/check-in period to allow for updates to regulations (based on R&D; new data, etc.)
- Monitoring, measurement and reporting

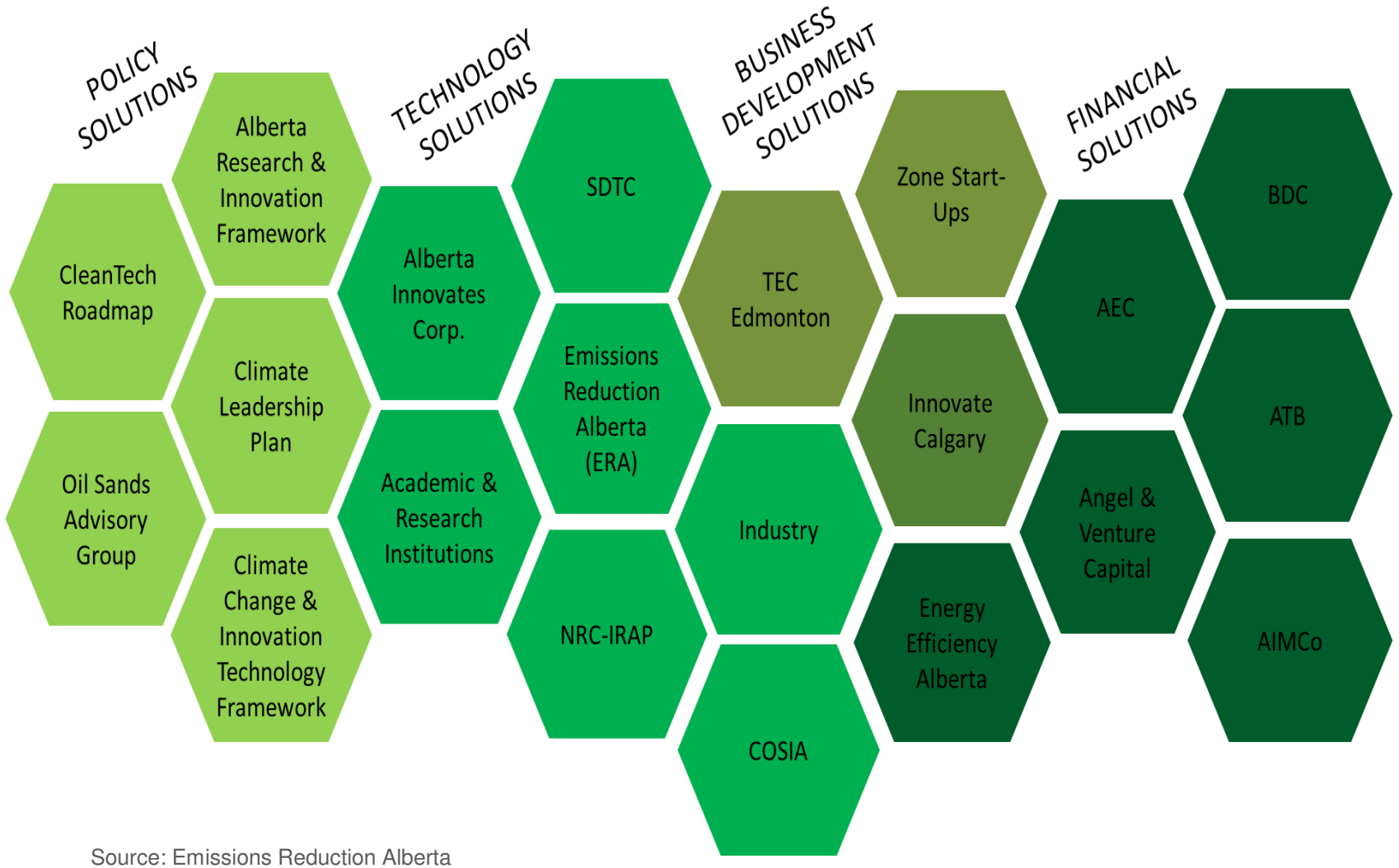
Example Compliance Options for Pneumatics/Controls for NG (USEPA)

Document Title	Capital Cost (USD)	Estimated Payback	Production	Gathering and Processing	Transmission	Distribution
Convert Gas Pneumatic Controls to Instrument Air	> $50,000	0-1 year	Production	Gathering and Processing	Transmission	Distribution
Retrofitting pneumatics (high bleed to low bleed)	< $1,000	1-3 years	Production	Gathering and Processing	Transmission	Distribution
Convert Pneumatics to Mechanical Controls	$1,000-$10,000	1-3 years	Production	Gathering and Processing	Transmission	Distribution
Convert Natural Gas-Driven Chemical Pumps	$1,000-$10,000	1-3 years	Production	Gathering and Processing	Transmission	
Replacing Gas-Assisted Glycol Pumps with Electric Pumps	$1,000-$10,000	1-3 years	Production	Gathering and Processing		

Accelerating Reductions Towards 2025 Targets

- Implement "low hanging fruit" technologies and best practices (0-3 year payback periods) for short-term reduction gains
- Focus medium- to longer-term research efforts toward potentially "high impact" technologies, while keeping O&G sector economic
- Need to progress innovations efforts so technologies move into the field more quickly and efficiently if we are to meet 45 % reduction target
- Achieving longer-term GHG targets requires new breakthrough technology options
  - Investment in higher-risk, high-potential technology development needed
- Collaboration and partnerships key in accelerating innovation for emissions reductions

Alberta's Innovation Ecosystem



Source: Emissions Reduction Alberta

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