NEXT SHALE 2017

Organized by: dmg::events

Navigating the Future of Unconventional Resources

EMISSIONS REGULATIONS AND REDUCTIONS TECHNOLOGY IN WESTERN CANADA'S OIL AND GAS SECTOR

PROCESS ECOLOGY INC.

AIR EMISSIONS – OIL AND GAS

- Process Ecology Introduction
- What Regulations are there?
- What is Canada doing about it?
  - Air Quality Management System (AQMS)
  - Global Commitments
- Oil and Gas – How Big Is the Problem and What can we do about it?

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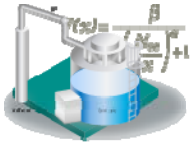
PROCESS ECOLOGY INC.

CORE COMPETENCIES

Process Engineering and Optimization

Emissions Estimation and Management



Advanced Modeling and Simulation

Software development

Founded 2003, Calgary, AB

- Engineering consulting
- Process simulation & Optimization
- Software development
- Air emissions Estimation and Management

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AIR EMISSIONS - DEFINITIONS

- Methane – CH_4
- Greenhouse Gases – CO_2, N_2O, HCs, CH_4
- Risks to Human Health
  - Short Lived Climate Pollutants: Black Carbon, Ozone, Particulate Matter and others (VOCs, NOx – smog)
  - Benzene

AIR EMISSIONS REGULATIONS BY TYPE

METHANE

- Alberta – reduce 45% from 2012 by 2025
  - New facility standards Directive (mid 2018?)
  - Measurement Monitoring and Reporting(MMR) (2018?)
  - Leak Detection and Repair (LDAR) (2018?) – already in US
  - Voluntary Joint Initiative – reduction and verification
  - DRAFT DIRECTIVE – MELA CONFERENCE JUNE 23
- BC – reduce 45% by 2025
  - Target fugitive and vented emissions – legacy facilities
  - Offset protocol/clean infrastructure royalty credits – new facilities
  - Mandatory LDAR & others – post 2018
  - Supporting Efficient Engines, supplying clean LNG

AIR EMISSIONS REGULATIONS BY TYPE

METHANE

- Saskatchewan
  - No specific provincial regulation – will likely follow Alberta
- Federal – reduce 40-45% below 2012 by 2025
  - Draft Regulation and RIAS Released May 27, 2017 (Gazette)
    - Fugitives – LDAR – 2020 – larger facilities
    - Venting – reduce by 95% at larger facilities, dehy capture requirements - 2023
    - Pneumatics – Pumps and Controllers – low or no emissions - 2023
    - Compressors – seals and rod packing vents - 2020
    - Well Completions – prohibit venting - 2020

AIR EMISSIONS REGULATIONS BY TYPE

GHG

- Alberta
  - SGRR: >50,000 tonnes/yr CO2e, must report
  - SGER: >100,000 tonnes/yr CO2e:
    - Reduce Emissions Intensity 20% per year by:
      - Improvements
      - Purchase Offsets - $30/tonne in 2017
      - Performance Credits
    - Replaced by Carbon Competitiveness Regulation by 2018
  - Carbon Tax: $20/tonne CO2e in 2017; $30/tonne in 2018
    - Charged on fuel imported, sold, flared and vented in Alberta
    - Natural Gas produced and consumed ON SITE - exempt

AIR EMISSIONS REGULATIONS BY TYPE

GHG

- BC
  - GHG Industrial Reporting and Control Act – Climate Action Secretariat
    - GHG Emission Reporting Regulation
      - >10,000 tonnes/yr CO2e must report
    - GHG Emission Control Regulation
      - > 25,000 tonnes/yr CO2e must report and verify
    - GHG Emission Penalties and Appeals
    - Use Western Climate Initiative (WCI) rules to calculate
    - Concept of Linear Facilities
  - Carbon Tax
    - Oil and Gas pay on all combustion of ALL fuels

AIR EMISSIONS REGULATIONS BY TYPE

GHG

- Saskatchewan
  - No specific regulation
  - Focus on
    - Carbon Capture and storage
    - Decarbonizing Power System
- Federal
  - Greenhouse Gas Reporting Program (GHGRP) – since 2004
    - >50,000 tonnes/yr CO2e must report – may change to >10,000 tonnes/yr CO2e in 2018 or 2019 – MANY more facilities will report
    - Carbon Tax – minimum $10/tonne CO2e, currently in negotiations with provinces.

AIR EMISSIONS REGULATIONS BY TYPE

Other Air Emissions

- Federal – NPRI (National Pollutant Release Inventory)
  - Air, Water and Ground
  - Full reporting only at > 20,000 man-hours/yr (Under Review)
  - Smaller facility reporting: Part 4 and 5 only
    - Particulate Matter, SOx, NOx, VOCs, CO, NH3

- Alberta/BC/Saskatchewan – Benzene Reporting
  - Type I Carcinogen
  - From Dehydrators: Alberta Directive 39, BC Oil and Gas Operations Manual Appendix J; Saskatchewan Directive S-18

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AIR EMISSIONS REGULATIONS BY TYPE

Flaring and Venting (F&V)

- Source of GHG, Methane and Other Gases
- Alberta
  - Directive 60 – rules about F&V, especially conservation of solution gas
  - Also reported in various ways through Petrinex according to rules in Directives 7, 17 and 76
- BC Oil and Gas Commission (OGC)
  - Flaring and Venting reduction guideline – eliminate all routine flaring by 2016 (?)
- Saskatchewan
  - Directives R01, S-10, PNG017 and S-20

AIR QUALITY MGMT SYSTEM (AQMS)

AQMS – Federal Initiative (Except Quebec)

- Canadian Council of Ministers of the Environment – 2012
- Comprehensive approach to reducing air pollution

- Canadian Ambient Air Quality Standards (CAAQS)
  - Canadian Environmental Protection Act (1999)
  - Newly reduced limits on PM2.5 and Ozone
    - Human health impacts – respiratory (Particulates and Smog)
  - Aspirational Targets to Drive Improvements -
    - Benzene Targets
    - SO2 at ground level from flaring of acid gas

AIR QUALITY MGMT SYSTEM (AQMS)

- BLIERs – Base Level Industrial Emission Requirements
  - Major Industrial Emitters
  - Ensure Good Base-Level Environmental Performance
  - Minimum Performance Standards
  - Oil and Gas must follow the **MSAPR – Multi-Sector Air Pollutant Regulations**
    - Limits on NOx from large combustion sources (Boilers, heaters, stationary spark-engines)
    - Regulation in Force from June 2016.
    - July 1, 2017 Reporting Deadline for Modern Engines

AIR QUALITY MGMT SYSTEM (AQMS)

- Provincial and Regional
  - Directives as indicated above
  - Special Air quality management areas – e.g. Peace River
    - AER Directive 84 – HC Emission Controls and Gas Conservation Peace River Area – effective April 1, 2017
  - Provincial Guidelines:
    - Alberta
      - Substance Release and reporting Regulations under EPEA (Environmental Protection and Enhancement Act
      - Alberta Ambient Air Quality Objectives (AAAQO)
    - BC
      - Oil and Gas Waste Regulation
      - Air Quality Objectives (BC AQO):
        - PM10, PM2.5, Ozone, SO2, NO2, Formaldehyde, TSP (total Suspended particulate)
    - Saskatchewan
      - Environmental Management and Protection Act and Regulations
        - Focus on SO2, NO2, PM2.5, PM10, CO and VOCs

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AIR EMISSIONS GLOBAL FACTORS

- AIR doesn't respect BORDERS – Canada a member of:
  - Conference of the Parties - recently COP21 (Paris, 2015) and COP22 (Marrakech, 2016)
  - United Nations Environment Programme:
    - Canada a founder of CCAC – Climate and Clean Air Coalition
  - Global Methane Initiative (GMI)
  - Global Gas Flaring Reduction Partnership (World Bank) (Alberta)
  - United Nations Economic Commission for Europe
  - Arctic Council

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AIR EMISSIONS – OIL AND GAS NUMBERS

- Federal Estimates
  - 2015 (most Recent): 189 Mt CO2e - 26% of national emissions (NIR to UNFCCC)
  - GHGRP – reports only 81 Mt CO2e (only facilities that are large)
- Alberta:
  - Methane: 31.4 Mt CO2e as Methane, 70% of provincial CH4 emissions
- REFERENCE:
  - 722 Mt CO2e – Canada's Total GHG Emissions in 2015
  - ~50,000 Mt CO2e – Worldwide Total

AIR EMISSIONS – OIL AND GAS NUMBERS

GHG Source	% of Total (Clearstone 2011)
Fuel Combustion	59.8%
Fugitive Equipment Leaks	11.9%
Reported Venting	10.4%
Unreported Venting	9.2%

Methane Source	% of Total (ECCC)	% of Total (AB Govt)
Fugitive Equipment Leaks	34%	46%
Pneumatic Devices	20%	
Venting	23%	48%
Compressors	9%	
Well Completions	1%	6% (Other)

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AIR EMISSIONS – OIL AND GAS NUMBERS

- New Data (2017):
  - Many studies – generally measurements are higher than estimates have been, especially venting and fugitives
- Baseline
  - Hard to capture
  - Factored estimates increasingly inaccurate
  - Can't measure it all – 100,000+ sources in Alberta alone
  - NEED BETTER MODELS!

AIR EMISSIONS – OIL AND GAS REDUCTIONS

- First Targets?
  - Fugitives
  - Venting
- Protocols
  - Existing
    - Pneumatics
    - Solution Gas Conservation
  - Upcoming
    - LDAR (Leak Detection and Repair) ?
- Best Practices
  - CAPP Documents
  - CSA Z620.1
  - API Compendium
  - EPA's AP-42

AIR EMISSIONS REGULATIONS

- WHAT are the Regulations?
  - It's convulted!
- WHAT are we DOING about it?
  - Federal initiatives, Alberta soon
- WHAT is our place in the Global Picture?
  - World leader
- HOW Big is the Problem?
  - Numbers vary, hard to estimate
- WHERE to reduce?
  - Fugitives and Venting

THANK YOU

QUESTIONS?

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