Quantification Protocol for the Reduction of Methane Emissions from Oil and Gas Facilities

Alberta Offset System Protocol Review

October 29-30, 2009

Kelly B. Campbell

Blue Source Canada

Presentation Outline

- Process Overview
- Scope & Applicability Criteria
- Project and Baseline Conditions
- Flexibility Mechanisms
- Consistency With Alberta Offset System Criteria
- Potential Project Barriers
- Existing Projects
- Quantification Approach
- Sample Calculation
- Questions

Process Overview

- Collaborative Members: Keyera, Husky, EnCana, Shell, Nexen, & TransCanada

Protocol Development:	Seed Documents:	Technical Review
• Industry TSD • Industry working group • Iterative process	• TSD titled "A Protocol for Methane Emission Reductions for GHG Credits" October 2008 • ACM0023: Leak Reduction from Natural Gas Pipeline Compressor or Gate Stations, *Version 02* • CAPP: Guide to Calculating GHG Emissions, Fugitive Emissions BMP	• Technical review – Feb 2009 • Additional analysis • Meeting with AENV – Sept 2009

Blue Source Canada

Project Type Description / Scope

- Reduction of methane emissions from venting and other fugitive emissions at oil and gas facilities.

- Fugitive Emissions Sources may include:
  - Planned emissions
  - Unplanned emissions

- Challenges of quantifying fugitives
- Protocol Requirements
  - Direct measurement
  - Complete site coverage
  - Virtually continuous monitoring

Scope & Applicability Criteria

To Demonstrate that a project meets the requirements under this protocol, the following applicability criteria must be met:

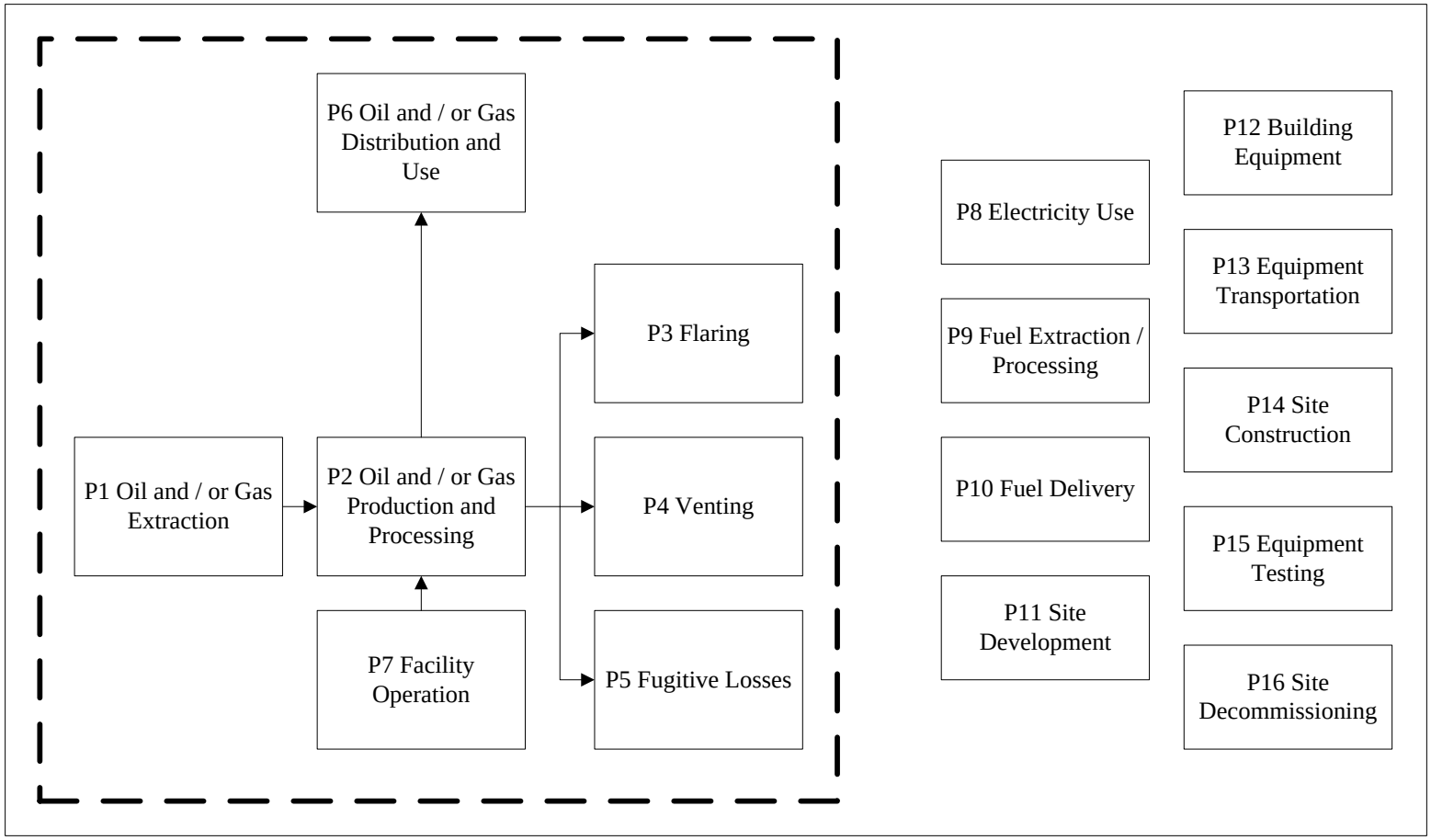
- Use of an applicable monitoring methodology (Appendix A)
- To ensure functional equivalence between the project and baseline there must be no facility re-permitting
- No double counting under other applicable protocols
- Provide complete list of changes / actions taken to the verifier

Scope & Applicability Criteria

To Demonstrate that a project meets the requirements under this protocol, the following applicability criteria must be met:

- Must re-evaluate baseline to account for business as usual activities (i.e. old equipment being switched out, etc.)
- Must quantify large unplanned leaks before / after repair
- Additional to Alberta regulations; ERCB Directive 060.
  - Use of improvement factor

Process Flow Diagram for the Project Condition



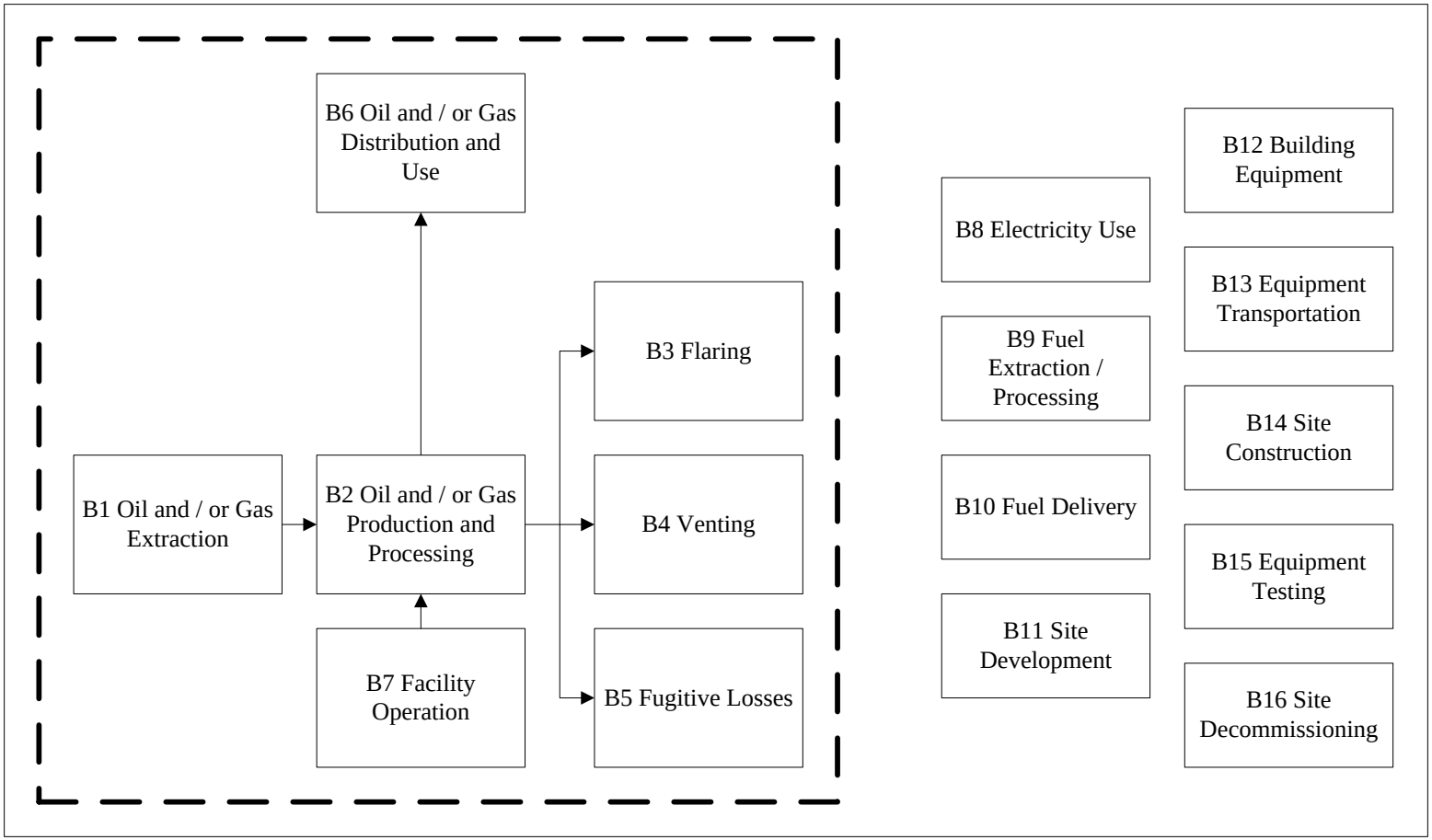
Blue Source Canada

Project Condition

Project Condition

- Facility's methane emissions during operation of the facility following project implementation
- Project activities to reduce methane emissions may include
  - reduced venting
  - detection and repair of fugitive equipment leaks
  - facility consolidation activities
- Monitored continuously using an applicable technology

Process Flow Diagram for the Baseline Condition



Blue Source Canada

Baseline Condition

Baseline Condition:

Facility's emissions and operating conditions prior to the project. Reevaluation following material changes that would have occurred as business as usual.

Performance Standard Approach

Justification:

- Historical data not available
- Partial monitoring period not accurate
- Calculated by referencing published best practice guidance from CAPP

Baseline Condition Continued…

- Two approaches to calculating an industry standard baseline are identified in the Technical Seed Document / CAPP

1. ***Short-Form Method*** based on production throughput
2. ***Generic Fitting Count (GFC)*** based on the equipment / processes at a given facility

GFC method is selected in the protocol due to increased accuracy

Protocol Flexibility

- May demonstrate that methane avoided at facilities that do not sell methane as an end product is not flared.
- May propose a monitoring plan that does not provide complete site coverage
  - Limited number of processes / equipment
- May propose a measurement and monitoring frequency that is not virtually continuous
  - Limited number of processes / equipment

Alberta Offset System Criteria

Real	• Project proponent must establish an industry standard baseline for the facility; • Large unplanned sources of fugitive methane emissions are also quantified.
Demonstrable, Quantifiable	• Project emissions determined using actual measurement and monitoring. • Baseline approach derived from consensus-based good practice guidance documents – best available
Not Required by Law	• ERCB Directive 060 impacts oil and gas facilities • From January 2010 onwards, emission reductions must be discounted by an improvement factor to account for the impacts of implementing a DI&M program at the facility.
Verifiable	•Retention of records •Data should be of sufficient quality to fulfill quantification requirements and be substantiated by company records for the purpose of verification.

Barriers to Project Implementation and Co-Benefits

- Costs associated with implementing a higher level of monitoring
- Use of emerging technologies (i.e. AIRDAR, LIDAR)
- Accurate quantification of methane emissions
  - Labour / resource intensive
- Achieving certainty of the reductions achieved
  - Related to the characteristics of the fugitive emissions (i.e. locations, sizes, variability, and frequencies generally unknown).

Review of Existing Projects

Example Project:

- Keyera Energy explored the effectiveness of a number of innovative technologies at a large gas plant

Step 1: “DIAL” survey discovers fugitive emissions plume but can not localize source

Step 2: “AIRDAR” equipment was deployed to improve the understanding of transient hydrocarbon tank vapours

Step 3: “Sniff Test” was unsuccessful in localizing leaks

Step 4: “Bag and Stopwatch” technique facilitated the measurement of the volume of fugitive emissions.

Quantification Approach

$$\text{Emission Reduction} = (\text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}) * (1 - \text{Improvement Factor})$$

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Methane (Baseline)}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Flaring}} + \text{Emissions}_{\text{Methane (Project)}}$$

$\text{Emissions}_{\text{Baseline}}$ = sum of the emissions under the baseline condition

$\text{Emissions}_{\text{Methane (Baseline)}}$ = emissions under SS B4 Venting and SS B5 Fugitive Losses

$\text{Emissions}_{\text{Project}}$ = sum of the emissions under the project condition

$\text{Emissions}_{\text{Flaring}}$ = emissions under SS P3 Flaring

$\text{Emissions}_{\text{Methane (Project)}}$ = emissions under SS P4 Venting and SS P5 Fugitive Losses

Blue Source Canada

Sample Calculation

SSR	Activity Data	Emissions
Baseline Condition	See table below	1,123 tCO2E

Heavy Oil Facility			
Equipment	**Connectors**	**Valves**	**Open-ended Lines**
10 Wells	440	80	30
10 Headers	1080	170	30
10 Separators	410	100	20
EF (kg/hr/fitting)	0.00079	0.01417	0.00373
Emissions (kg)	13,356.4	43,445.2	2,614.0
Gas composition (% CH4)	90%	90%	90%
Emissions (tCH4)	12.0	39.1	2.4
Emissions (tCO2E)	252.4	821.1	49.4
Total Emissions (tCO2E)		**1,123.0**	

Sample Calculation

SSR	Activity Data	GHG Emissions
Project Condition	Facility that sells natural gas (no emissions from flaring) Emissions measured using an applicable technology	23.8 tonnes CH4 500 tonnes CO_2e
Net GHG Reduction		623 tonnes CO_2e

Blue Source Canada

Questions?

www.bluesource.com

Kelly B. Campbell
Blue Source Canada (Calgary)
kellyb@bluesourcecan.com

Blue Source Canada