

Quantification Protocol for Fly Ash Use in Concrete and Cement Based Products

Alberta Offset System Protocol Review

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Presentation Outline

- Process Overview
- Applicability Criteria
- Project and Baseline Conditions
 - Process Flow Diagrams
- Consistency With Alberta Offset System Criteria
- Flexibility Mechanisms
- Quantification Approach & Sample Calculation
- Questions

Process Overview

Seed Documents:

- CCAR Cement Reporting Protocol
- CDM Methodology for Increasing the Blend in Cement Production (ACM0005) ^{j1}
- WRI/WBCSD Cement Protocol

Technical Review:

- Limited technical review conducted during draft preparation
- Technical Stakeholder Review Session held October 20, 2008

j1

add CCAR

jamie, 08/12/2008

Applicability Criteria

The protocol applies to:

- Mixing or blending facilities that use fly ash to replace a portion of the raw materials in concrete or other cement based products.
- Projects that can show an incremental use of fly ash after Jan 2002.

The protocol **does not** apply to:

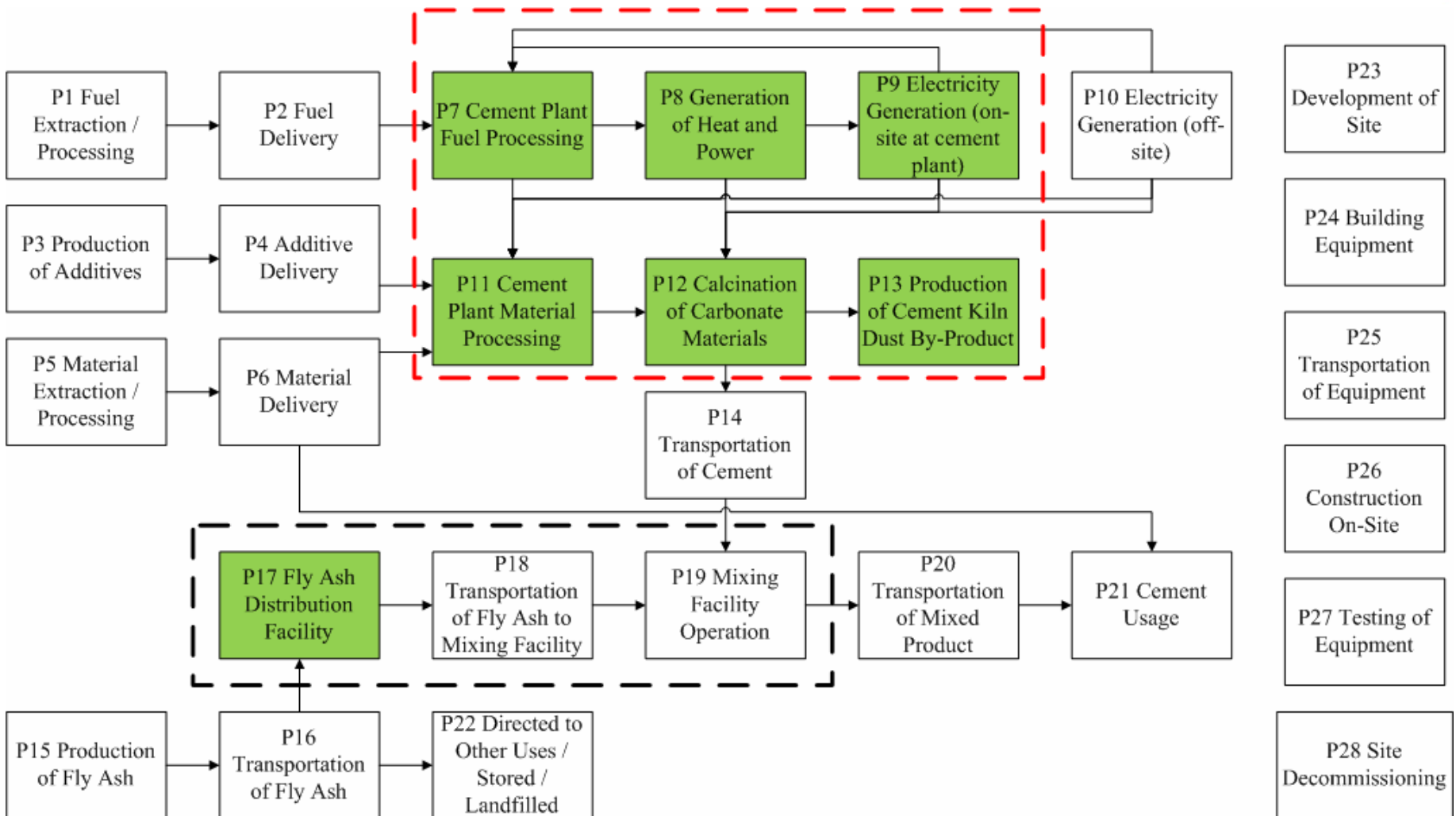
- Fly ash blended at cement plants regulated by SGER.
 - E.g. the regulated entity would have already received the GHG benefit

Project Condition

Project Condition:

- The incremental use of fly ash as a substitute for cement.
 - No limitations on the end use of fly ash, provided that it displaces cement.
- Quantification of GHG emissions is based on the tonnes of cement displaced by fly ash.
- Fly ash may enter the supply chain at a variety of points and multiple proponents may be interested in obtaining offsets
 - Tracking of fly ash throughout the supply chain is required to ensure no double counting of fly ash used/handled at an LFE site

Process Flow Diagram for the Project Condition

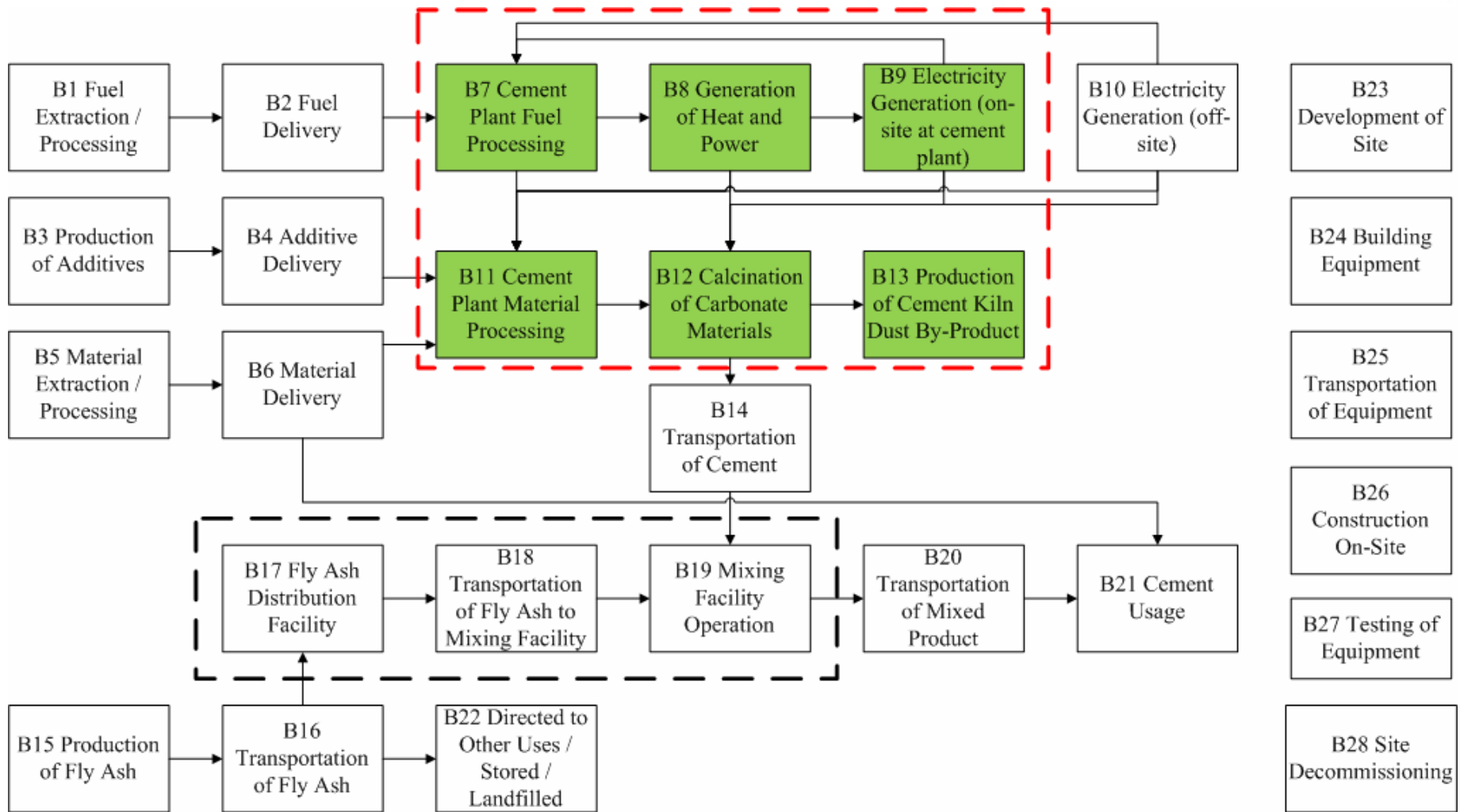


Baseline Condition

Baseline Condition:

- GHG emissions from the production of an equivalent mass of cement from raw materials now displaced by fly ash
- Functional equivalence ensured through use of NRCan displacement ratio
 - E.g. 0.88 tonnes cement displaced by 1 tonne fly ash
- Historic Benchmark Baseline using 3 years of data
 - Project Proponent- 3 years of fly ash usage data 1999-2001
 - GHG intensity of cement production in Alberta 2003-2006
 - Cement Plant SGER GHG reporting per unit of production

Process Flow Diagram for the Baseline Condition



AB Offset System Eligibility Criteria

Real:

- Only incremental fly ash use above BAU is considered.
- Cement production is known to be GHG intensive and the use of fly ash reduces the amount of cement required.

Quantifiable:

- Quantification based on the tonnes of fly ash used and the average emissions intensity of cement production in Alberta.

Not Required By Law/ Counted Once:

- Fly Ash mixed at cement plant site (LFE) ineligible for offsets
- Project Proponent must track fly ash through supply chain

Flexibility Mechanisms

Primary Flexibility Mechanisms:

- Use of a project-specific baseline cement production GHG intensity factor (tCO₂e/tonne cement)
 - Use fossil fuel consumption and process emissions data from one or more cement production plants per unit output.
 - Quantification approach adapted from WRI/WBCSD and CCAR.
- Project specific fly ash to cement replacement ratio based on measured fly ash and cement usage data from at least one year of operation for the specific application of fly ash.

Quantification Approach

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\text{GHG Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Cement Plant Operation}}$$

$$\text{GHG Emissions}_{\text{Project}} = \text{Emissions}_{\text{Fly Ash Distribution Facility}}$$

$$\text{Emissions}_{\text{Cement Plant Operation}} = [\text{Cement}_{\text{Displaced Project}} - \text{Cement}_{\text{Displaced Business as Usual}}] * \text{EF}_{\text{Cement Production Intensity}}$$

$$\text{Mass. Cement}_{\text{Displaced Project}} = \text{Mass. Fly Ash Mixed}_{\text{Project}} * \text{Equivalence Factor}$$

$$\text{Mass. Cement}_{\text{Displaced BAU}} = \text{Avg. Mass. Fly Ash Mixed}_{1999-2001} * \text{Equivalence Factor}$$

Sample Calculation

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

GHG Emissions_{Baseline} = Emissions_{Cement Plant Operation}

GHG Emissions_{Project} = Emissions_{Fly Ash Distribution Facility}

SSR	Activity Data	GHG Emissions
Baseline Condition	10,000 tonnes fly ash mixed in Project Condition	3520 tonnes CO ₂ e
	5000 tonnes fly ash mixed on average from 1999-2001	
	Equivalence Factor of 0.88	
Project Condition	5000 litres diesel	-14.28 tonnes CO ₂ e
Net GHG Reduction		3505.72 tonnes CO ₂ e

Questions?

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