

Freight Modal Shifting

Quantifying the GHG Impacts of Shifting
from Truck to Rail for Freight Shipping in
Alberta

Alberta Protocol Stakeholder Consultations
January 24 – 25, 2008

The Delphi Group on behalf of CN Rail

Process Overview

- Seed Materials / Key References
 - ▣ Initial draft protocol prepared by Baseline Emissions Management Inc.
 - ▣ Locomotive Emissions Monitoring Program annual reports (Railway Association of Canada)
 - ▣ Information provided by CN Rail
 - ▣ Emission factors from Environment Canada and Transport Canada
 - ▣ Note: *little good practice guidance was identified related to the core methodology*

- Technical Review
 - ▣ Limited external review conducted during draft preparation
 - ▣ Expert technical review session held in Nov 07 with participation by industry, government and GHG experts

Project and Baseline Condition

- Project Condition

- Shipping of freight from various origins to various destinations using rail and possibly truck transport, with an increased proportion of rail transportation than in the baseline.

- Baseline Condition

- Shipping of freight from various origins to various destinations using truck and possibly rail transport, but with an increased proportion of truck transport than in the project.

Basis for Reductions

- Functional Equivalence
 - ▣ The same tonne-kms (sum of tonnage X distance for each shipment) for project and baseline
 - ▣ To account for differences in amount of goods shipped over time (i.e. project vs. historic data), key baseline metric is the historic ratio of t-km shipped by truck versus rail, instead of total t-km shipped by each mode.
- Emission Reduction Mechanisms
 - ▣ Offset diesel fuel combustion
 - ▣ Offset diesel fuel extraction & refining emissions

Emission Factor Comparison

- Default trucking emission factor used in Protocol:
 - ▣ 114 grams CO₂e per tonne-km shipped
 - ▣ Value based on old Statistics Canada data, but still the most appropriate. New data expected shortly from Transport Canada study.

- Average rail emission factor 2004 – 2006:
 - ▣ 18.5 grams CO₂e per tonne-km shipped
 - ▣ This emission factor also includes emissions from non-revenue transport (e.g. moving unloaded train cars, maintenance-related transport, etc.)

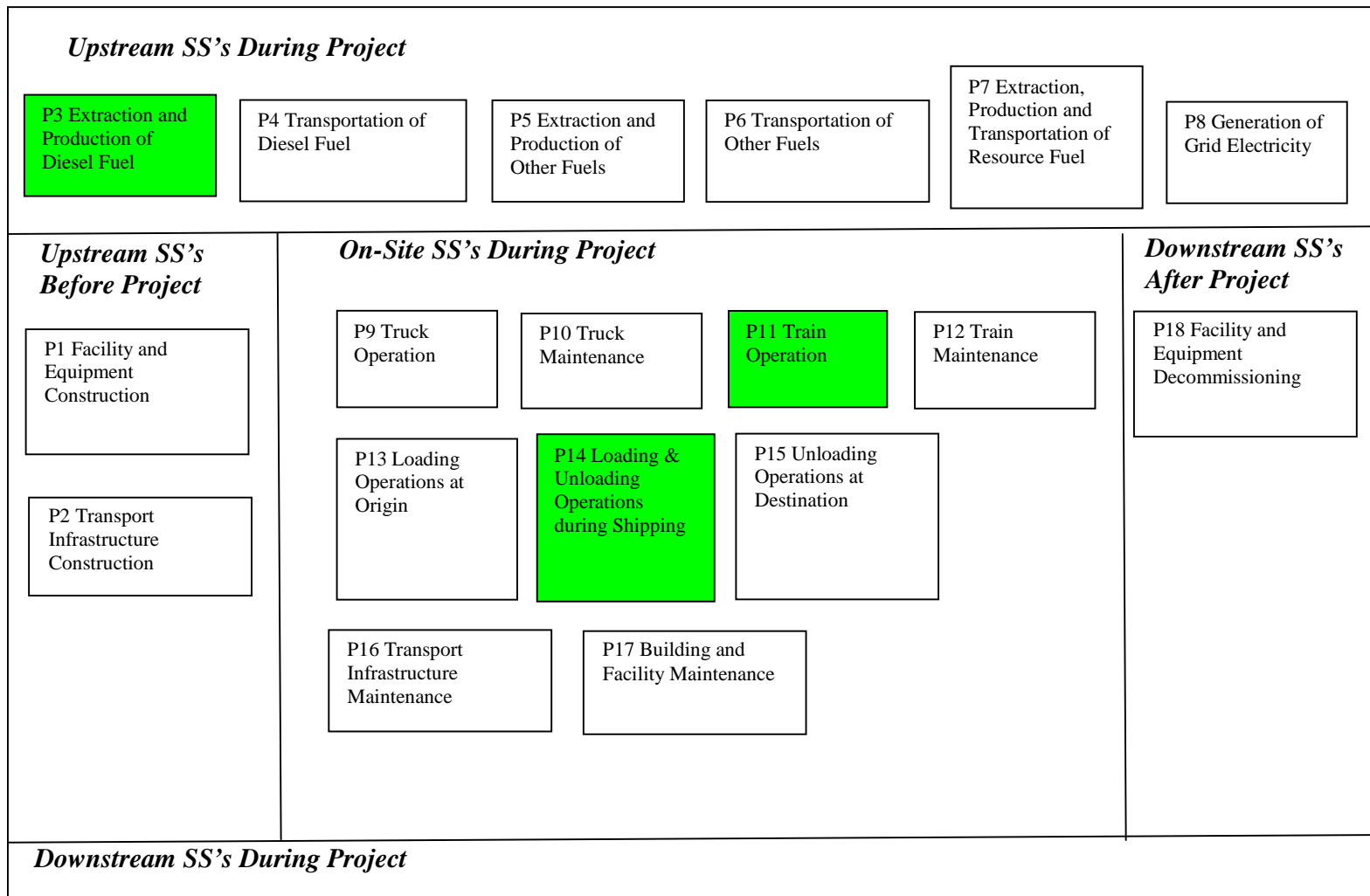
Applicability Criteria

- Protocol applies to:
 - project shipments by rail that would have otherwise been shipped by truck (rail that is part of the baseline would not be credited)
 - Shipments by a single producer of goods (or an aggregator of a particular type of good), not goods shipped by multiple companies
 - Companies that have shipped goods by truck for at least three years (for baseline data)
 - Projects that meet all applicable Alberta Offset System requirements

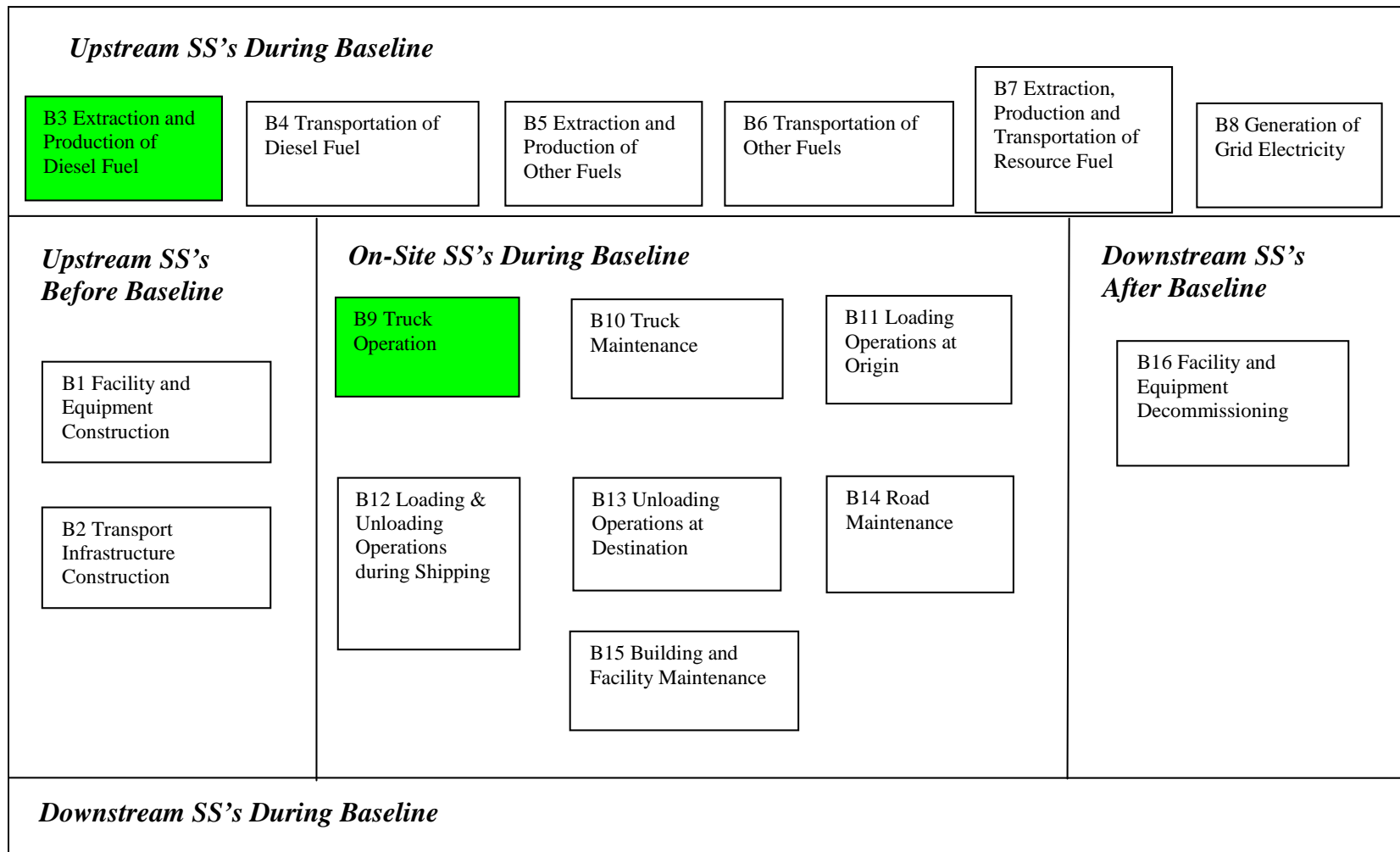
Flexibility Mechanisms

- Simplified approach to determining shipping distance (assume typical distance of 540km)
 - ▣ Applicable only to shipments that pass through Alberta east to west or west to east but that do not: originate, terminate, and/or switch modes within Alberta
- Project-specific trucking emission factor
 - ▣ Proponent may use a project-specific trucking emission factor (or factors) instead of the default value, as long as justification is provided

Project Lifecycle Diagram



Baseline Lifecycle Diagram



Emission Reduction Calculation

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

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Truck Operation}} + \text{Emissions}_{\text{Extraction and Production of Diesel Fuel}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Train Operation}} + \text{Emissions}_{\text{Extraction and Production of Diesel Fuel}} + \text{Emissions}_{\text{Loading \& Unloading Operations during Shipping}}$$

- Key data to be monitored:
 - ▣ Simplified approach: total tonnes shipped by truck and rail
 - ▣ Detailed approach: tonnage and distance shipped by truck and rail for each shipment

Sample Calculation

- Results for shifting 1,000 15-tonne east-west shipments from truck to rail:

SSR	GHG	Units
	CO2e	
P11 - Train Operation	149.463	Tonnes
P3 - Extraction and Production of Diesel Fuel	31.184	Tonnes
P14 - Loading & Unloading Operations during Shipping	20.925	Tonnes
Total Project Emissions	201.6	Tonnes
B9 - Truck Operation	923.400	Tonnes
B3 - Extraction and Production of Diesel Fuel	188.401	Tonnes
Total Baseline Emissions	1,111.8	Tonnes
Total Emission Reductions	910.2	Tonnes

Any Questions?

- E.g.:
 - ▣ Baseline approach?
 - ▣ Emission factors?
 - ▣ Data requirements?
 - ▣ Practical considerations?
 - ▣ Other?

