

Waste Management

Landfill Gas Capture and Combustion
Composting

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LFG Capture and Combustion

- Seed Materials

- *Draft Quantification Protocol for Landfill Gas Capture and Combustion (April, 2006)*
 - Prepared for: NOQT
 - Prepared by: Enviro-Access Inc.
- Other Good Practice Guidance
 - CDM protocols
 - Project evaluations

- Technical Review

- NOQT review
- Environment Canada review
- Alberta process with gov't and industry stakeholders

LFG Capture and Combustion

- Project Condition
 - Collection and use of landfill gas under controlled conditions:
 - Combustion for heat/power generation
 - Combustion for electricity generation
 - Controlled flaring
 - Pipeline distribution
- Baseline Condition
 - Volume of methane captured that would otherwise have been released to the atmosphere
 - Includes conversion from open flare to controlled combustion

LFG Capture and Combustion

- Functional Equivalence
 - Inputs and Outputs
- Emission Reduction Mechanisms
 - Offset fossil fuel consumption
 - Offset non-renewable electricity production
 - Avoidance of methane emissions

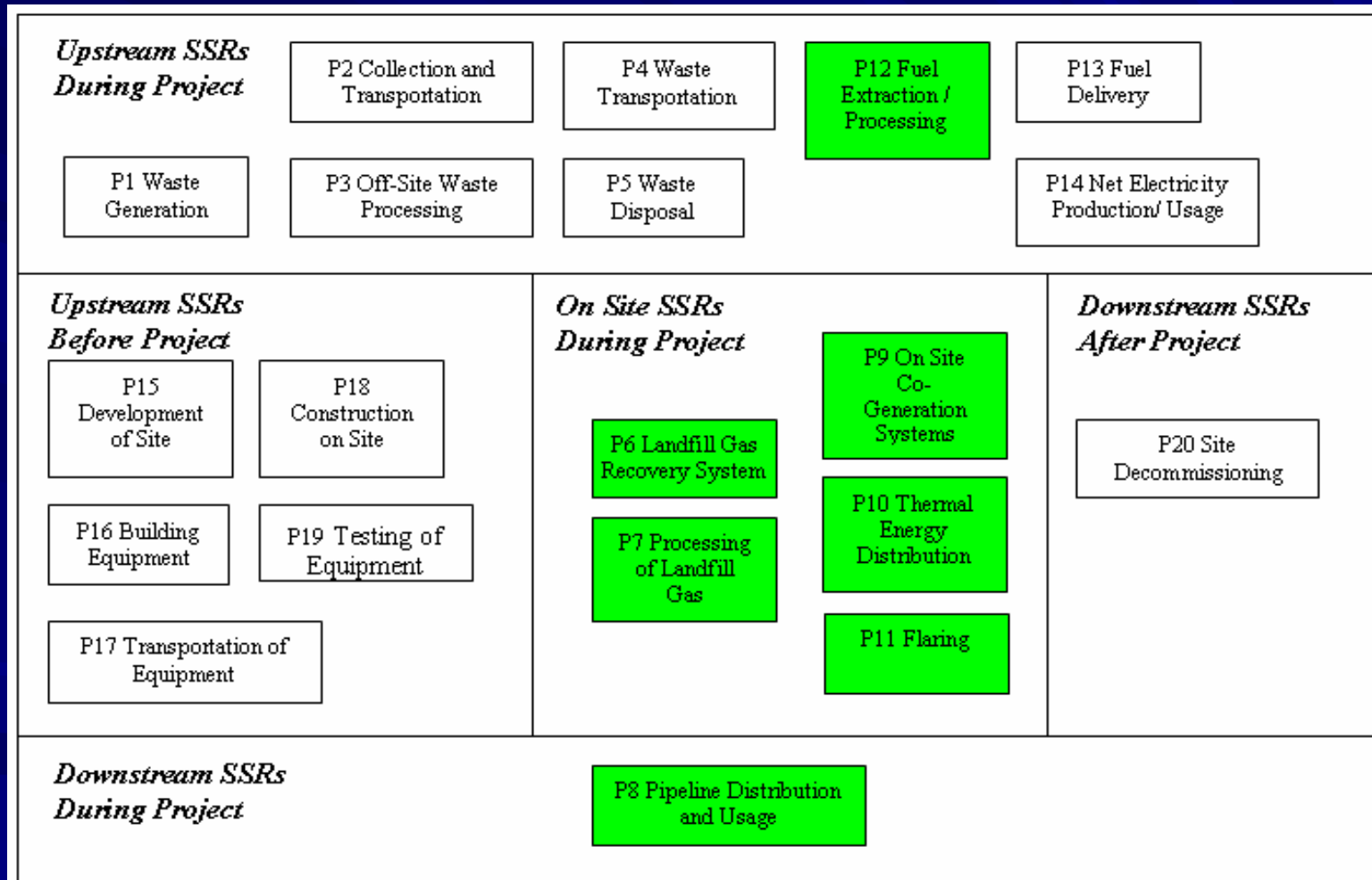
LFG Capture and Combustion

- Applicability criteria
 - Combustion is carried out under controlled conditions
 - LFG not vented directly to atmosphere
 - Metering of gas:
 - Upstream of combustion or pipeline inclusion
 - Within a reasonable distance so fugitive emissions are accounted for
 - Based on actual measurement and monitoring

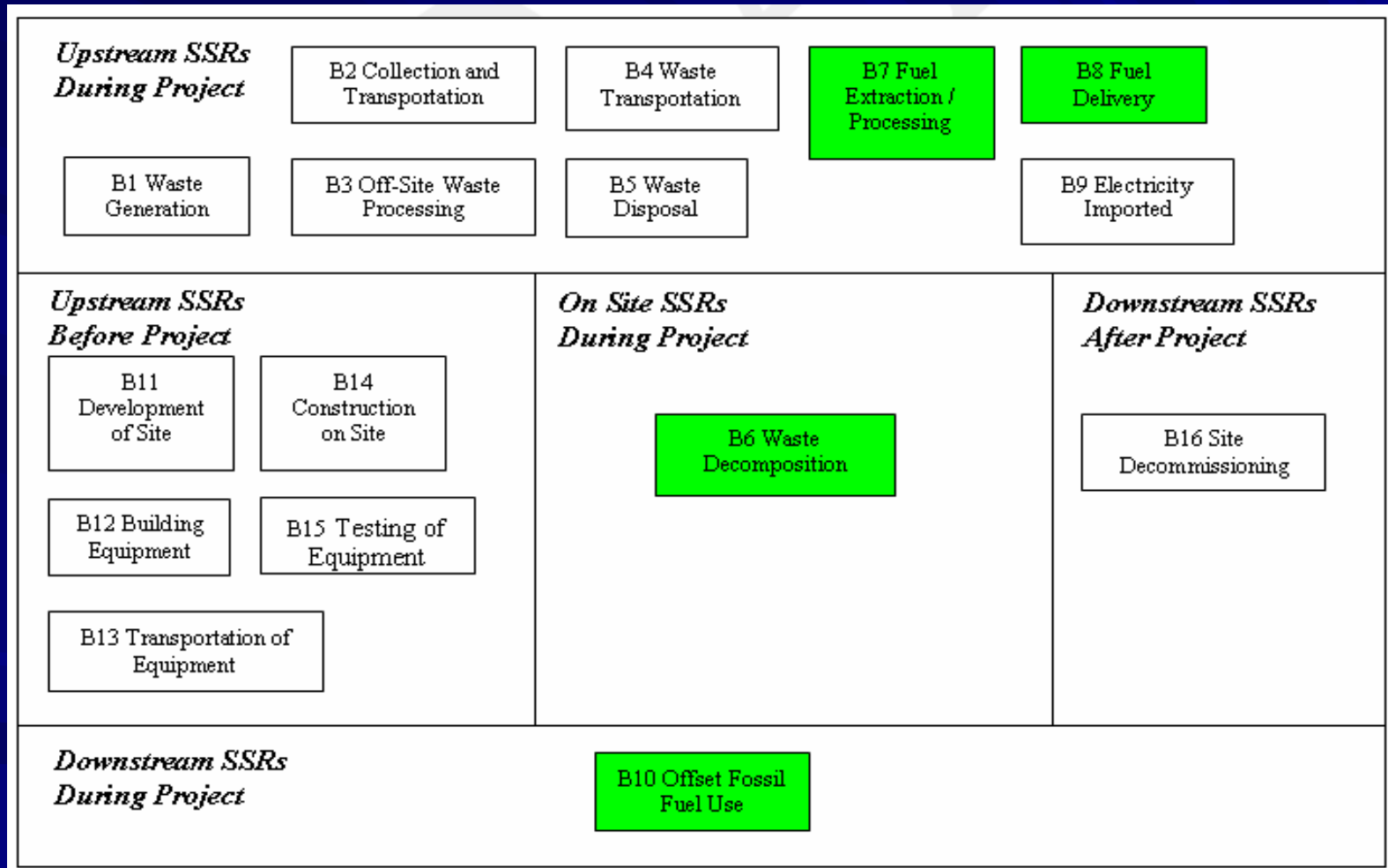
LFG Capture and Combustion

- Flexibility mechanisms
 - Alternative monitoring methodologies and/or equipment
 - In shared pipeline situations:
 - End-use can be assumed to be combustion
 - Most conservative emissions factors should be used
 - Site specific emission factor usage

LFG Capture and Combustion



LFG Capture and Combustion



LFG Capture and Combustion

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

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Fuel Extraction / Processing}} + \text{Emissions}_{\text{Electricity Production}} + \text{Emissions}_{\text{Waste Decomposition}} + \text{Emissions}_{\text{Offset Fossil Fuel Use}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Fuel Extraction / Processing}} + \text{Emissions}_{\text{Recovery System}} + \text{Emissions}_{\text{Processing of Landfill Gas}} + \text{Emissions}_{\text{Onsite Co-generation}} + \text{Emissions}_{\text{Thermal Energy}} + \text{Emissions}_{\text{Flaring}} + \text{Emissions}_{\text{Pipeline distribution}}$$

- Data Capture

- Volume of fossil fuel consumed
- Volume of LFG combusted or distributed
- Net electricity consumption/generation

LFG Capture and Combustion

- Questions and Comments
 - Technical issues?
 - Policy concerns?
 - Customization questions?
 - Linkage issues?

Composting

- Seed Materials
 - City of Edmonton project
 - Completed by Nodelcorp Consulting Inc.
 - Other Good Practice Guidance
 - CDM protocols
 - Project evaluations
- Technical Review
 - City of Edmonton project
 - Alberta process with gov't and industry stakeholders

Composting

- Project Condition
 - Implementation of aerobic composting operation:
 - Biological decomposition of organics
 - Stability ~ safe storage and land application
- Baseline Condition
 - Volume of methane captured that would otherwise have been released to the atmosphere
 - Includes conversion from open flare to controlled combustion

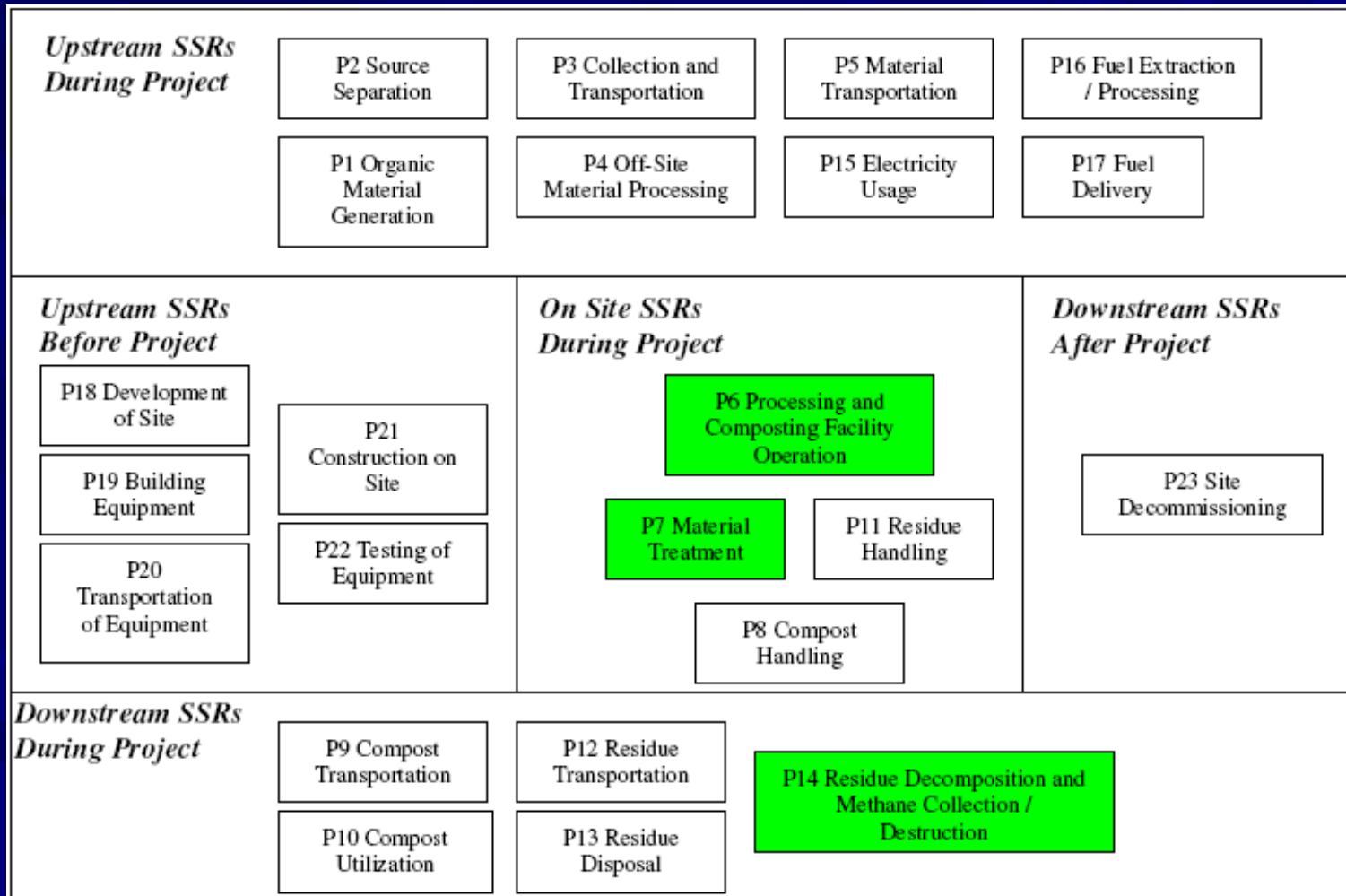
Composting

- Functional Equivalence
 - Inputs and Outputs
- Emission Reduction Mechanisms
 - Offset fossil fuel consumption
 - Offset non-renewable electricity production
 - Avoidance of methane emissions

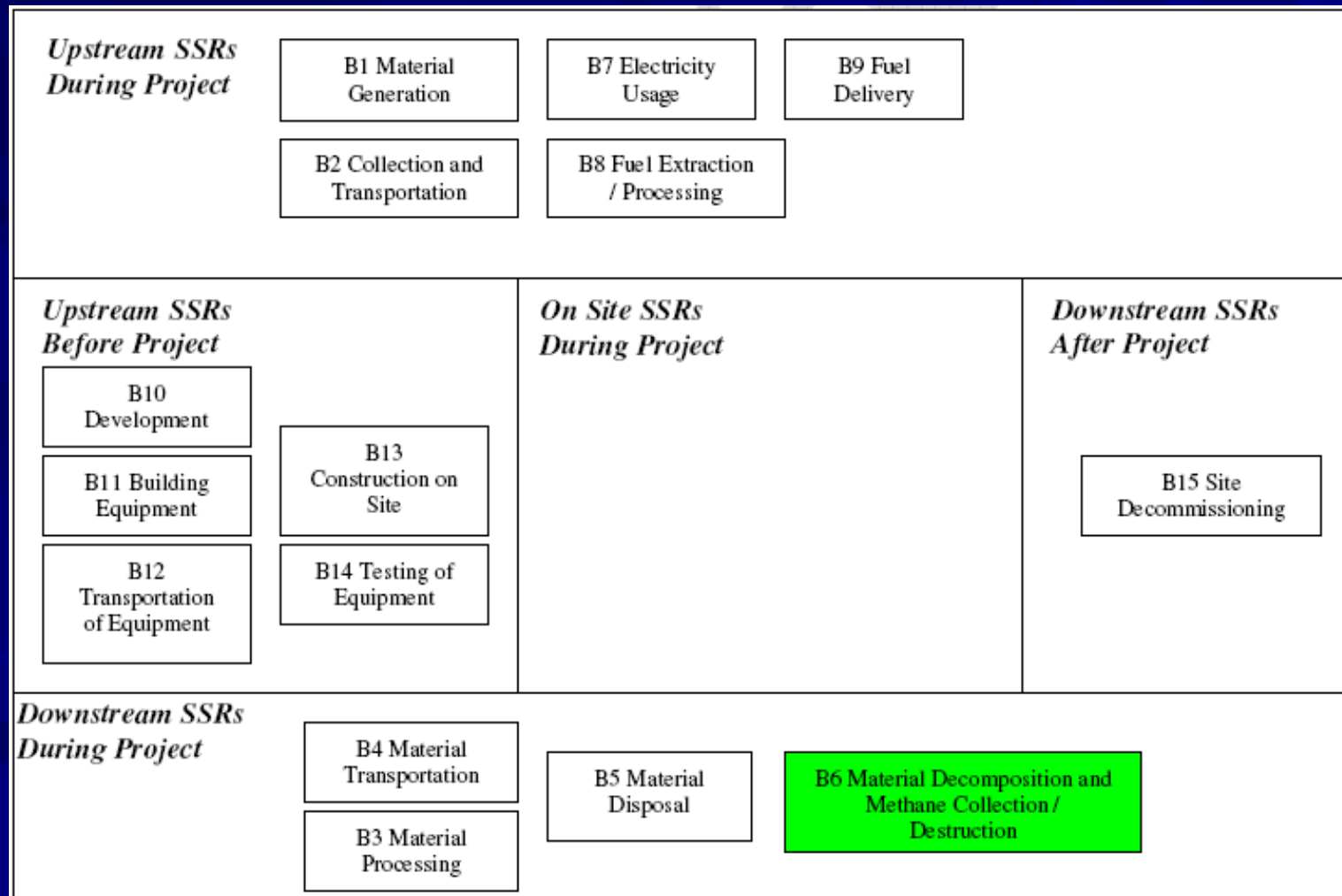
Composting

- **Applicability criteria**
 - Composting of manure is excluded
 - Material would otherwise be landfilled
 - Maturity requirement
 - Seeking definitive definition
 - CCME criteria restrictive
- **Flexibility mechanisms**
 - Measurement at site possible
 - nitrous oxide, methane, carbon sequestration
 - Alternative definitions of maturity
 - Manage agricultural value of feedstock
 - Site specific emission factor usage

Composting



Composting



Composting

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

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Decomposition and Methane Collection / Destruction}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Facility Operation}} + \text{Emissions}_{\text{Material Treatment}} + \text{Emissions}_{\text{Decomposition and Methane Collection / Destruction}}$$

- Data Capture

- Volume of fossil fuel consumed
- Mass of material to landfill (project and baseline)
- Mass of material composted

Composting

- Questions and Comments
 - Technical issues?
 - Policy concerns?
 - Customization questions?
 - Linkage issues?