Determining Adequate GHG Estimation Methods for Mandatory Reporting Under the Western Climate Initiative Cap-and-Trade Program

Presentation to the

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Presentation Overview

- **Background**
- **Policy**
- **Process**
- **Progress:**
  - Reporting Essential Requirements
  - GHG Quantification Methods
- **On-Going Work and Challenges**

Western Climate Initiative (WCI)

- Launched in February 2007 by the Governors of Arizona, California, New Mexico, Oregon and Washington to develop regional strategies to address climate change
- Montana, Utah, British Columbia, Manitoba, Quebec and Ontario have since joined as partners
- 6 U.S. states, 6 Mexican states & 1 Canadian province are official observers

WCI Goals and Organization

- **Regional GHG reduction goal consistent with state-by-state goals**
  - 15% below 2005 levels by 2020
- **Regional market-based multi-sector mechanism to achieve the regional GHG reduction goal**
  - Cap-and-trade
- **Participate in a multi-state GHG registry**
  - The Climate Registry (TCR)
- **Committees lead technical and policy decision making:**
  - Cap Setting and Allowances
  - Complementary Policies
  - Economic Modeling
  - Electricity
  - Markets
  - Offsets
  - Reporting

ERG

WCI Reporting Requirements: Purpose and Objectives

"Prior to the start of the mandatory reporting program, the WCI Partner jurisdictions will establish the essential requirements for reporting by all entities and facilities required to report in each of the WCI Partner jurisdictions."

(Design Recommendation for the WCI Regional Cap-and-Trade Program, September 23, 2008)

- **Purpose and Objectives of Mandatory Reporting:**
  - Is equitable, administratively simple for government and private participants, minimizes administrative costs, and has a clear compliance path;
  - Covers as many sources as is practical, while encouraging pollution reductions beyond the capped sources and sectors;
  - Provides appropriate recognition and incentives for early emissions reductions;
  - Assures a transparent and robust accounting system that will measure and report emissions rigorously and consistently across all sectors and throughout the region; and
  - Facilitates linkage to similarly rigorous regional and international greenhouse gas reduction markets and encourages other states, provinces, and countries to join the market.

(Draft Program Reporting Recommendations, March 31, 2008)

Differences in GHG vs. CAP Reporting

- **Inventory Purpose**
- **Source Types**
- **Level of Reporting for Industry**
- **Emission Estimation Methodologies**
- **Third-Party Verification**

WCI GHG Reporting: Policy Issues

- **Deadlines for Adoption by WCI Jurisdictions**
  - 2009 promulgation
  - 2011 reporting of 2010 emissions
- **Cap-and-Trade Reporting Threshold**
  - Cap: 25,000 metric tons CO_2e/year
  - Report: 10,000 metric tons CO_2e/year
- **Differences Between U.S. and Canada**
  - Units of measure
  - Definitions
  - Approach to enforcement
- **Proposed U.S. EPA Mandatory Reporting Rule (MRR)**
- **Point of Regulation (POR) for Fuel Suppliers**
- **Biomass and Biofuels**
  - Reported separately
  - Used to determine applicability
- **Enforcement and Compliance**
  - Defined violations in WCI
  - Enforced by jurisdictions
- **Stakeholder input on GHG quantification and monitoring methods**

WCI GHG Reporting Essential Requirements (ERs)

- **General Provisions:**
  - Applicability (§WCI.1)
  - General GHG Reporting Requirements and Schedule (§WCI.2)
  - Contents of GHG Emissions Report (§WCI.3)
  - Document Retention and Record Keeping (§WCI.4)
  - Confidentiality
  - Compliance and Enforcement (§WCI.5)
  - Incorporation by Reference (§WCI.6)
  - Designated Representative (§WCI.7)
  - Verification (§WCI.8)
  - Definitions (§WCI.9)
  - Pollutants and GWPs (§WCI.10)
- **Emissions Quantification and Monitoring (Sampling, Analysis, Measurements)**
  - By Source Category
  - §WCI.20 - §WCI.xx

WCI Source Categories

Group 1:		Group 4:
January 6, 2009	**April 2009**	**Future Date to be Determined**
General Stationary Combustion[a]	Cogeneration[a]	Electricity Importers[a]
Electric Generation[a]	Glass Production	Fuel Suppliers: Transportation, R/C/I Fuels[a]
Petroleum Refineries[a]	Soda Ash Manufacturing	Oil and Gas Production & Processing
Refinery Fuel Gas Combustion[a]	Ferroalloy Production	Natural Gas Distribution
Cement Manufacturing	Electronics Manufacturing	Carbon Dioxide Transfers
Hydrogen production	Petrochemical Production	Landfills
Iron and Steel Manufacturing	HCFC-22 Production	Municipal/Industrial WWT
Lime Manufacturing	Adipic Acid Manufacturing	
Primary Aluminum	Ammonia Manufacturing	
Lead Production	Magnesium Production	
Zinc Production	Nitric Acid Manufacturing	
Coal Mines	Phosphoric Acid Manufacturing	
Pulp and Paper	SF_6 from Electrical Equipment	
Coal Storage	Nonroad Equipment at Facilities	

[a] Stationary combustion sources (direct, upstream, or downstream); all others sources are non-combustion process emission sources.

Process to Identify Adequate Methods for WCI Reporting Requirements

- **Review Existing GHG Reporting Programs:**
  - CARB
  - IPCC
  - TCR
  - CCAR
  - EU ETS
  - RGGI
  - Various industry associations

- **Summarize Features:**
  - Voluntary, mandatory?
  - Fuel(s) covered
  - Coverage (GHGs)
  - Thresholds
  - Sources included, excluded
  - Protocols
  - Calculation and/or monitoring methods
    - Relative accuracy
    - Cost
    - Compatibility with industry expertise

Relative Accuracy of Various GHG Quantification Methods

Quantification Method type	Combustion Sources		Process Sources
	CO_2	**CH_4, N_2O (vary based on how burner is tuned)**	**CO_2, CH_4, N_2O**
CEMS	High	High	High
Fuel Flow (Continuous)	Intermediate	Very Low	Not Applicable
Material Balance	Not Applicable	Not Applicable	Intermediate
Periodic Monitoring (e.g., weekly or monthly, hand-held; assumes steady state)	Low	Low	Low
Non-fuel flow Parametric Monitoring (e.g., measuring something other than fuel flow, such as raw material feed rate or production output rate)	Low	Very Low	Low

Case Study: Pulp & Paper Industry

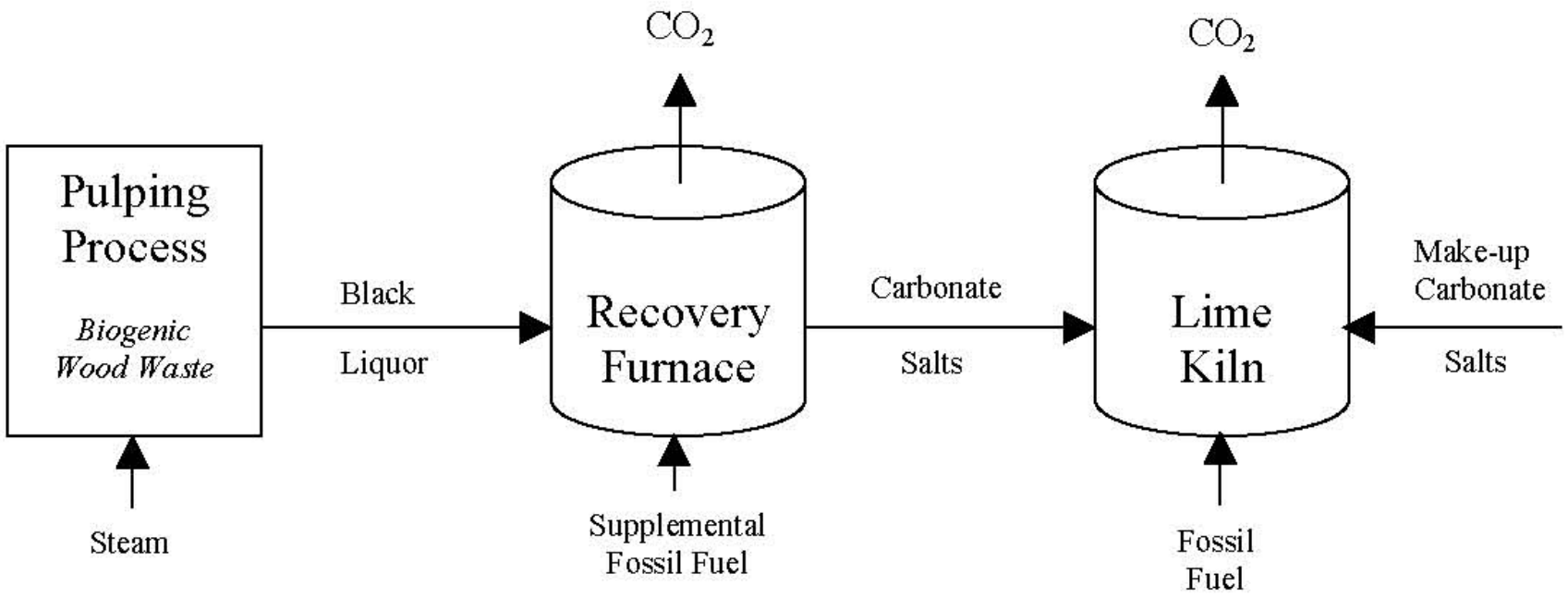
Sources of GHG Emissions:

- **CO_2, CH_4, N_2O emissions:**
  - Stationary combustion (fossil and biomass fuels)
  - Mobile combustion (harvesting equipment and trucks)
- **CO_2 emissions from make-up $CaCO_3$ or Na_2CO_3 used in the pulp mill**
- **CH_4 emissions from landfills and WWT**
- **CO_2 exports and imports**
- **GHG emissions attributed to power and steam exports**

Groups of GHG Emissions:

1. Stationary fuel combustion in boilers, kilns, incinerators
2. Transportation and mobile sources
3. CO_2 imports and exports
4. Electric power and steam imports and exports
5. Anaerobic decomposition in landfills and WWT
6. ***Process emissions from kilns and recovery furnaces***

Process CO_2 Emissions from Kilns and Recovery Furnaces



$$\text{Process } CO_2 = \text{Carbon}_{\text{Black Liquor}} + \text{Carbon}_{\text{Make-up Salts}}$$

Emission Estimation Methods for Process Emissions:

- Biogenic CO_2: $\text{Carbon}_{\text{Black Liquor}}$ from testing
- Fossil CO_2: $\text{Carbon}_{\text{Make-up Salts}}$ from Factors or Purchase Records

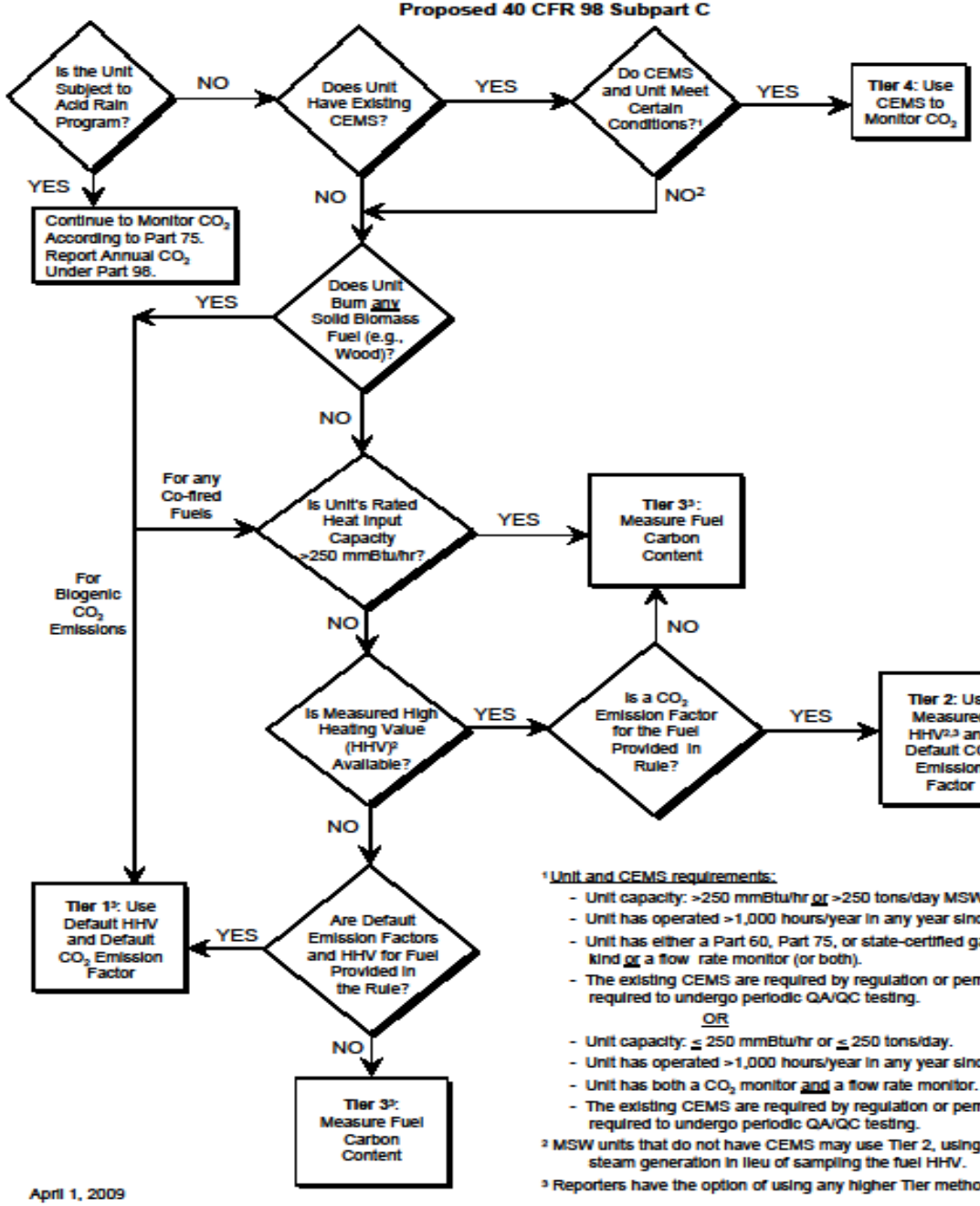
Fossil CO_2 for stationary combustion estimated with other WCI methods

WCI General Stationary Combustion Quantification Methods (CO_2)

- **WCI Method 1 (MRR Tier 1):**
  - Emission factor that is multiplied by annual fuel use and a default heating value for that fuel
- **Method 2 (MRR Tier 2):**
  - Emission factor that is multiplied by annual fuel use and a measured heating value of that fuel.
  - WCI: Separate equation based on steam generated for biomass and MSW combustion
- **Method 3 (MRR Tier 3):**
  - Annual fuel use and measured carbon content of that fuel.
- **Method 4 (MRR Tier 4):**
  - Continuous emissions monitoring system (CEMS)
- **Applicability of Methods**
  - WCI: Depends on Whether Subject to Verification (>25,000 MT CO_2e)
  - MRR: Depends on Capacity Limits and Other Restrictions

General Stationary Fuel Combustion Requirements for CO_2

Proposed 40 CFR 98 Subpart C



April 1, 2009

[1] Unit and CEMS requirements:

- Unit capacity: >250 mmBtu/hr or >250 tons/day MSW.
- Unit has operated >1,000 hours/year in any year since 2005.
- Unit has either a Part 60, Part 75, or state-certified gas monitor of any kind or a flow rate monitor (or both).
- The existing CEMS are required by regulation or permit, and are also required to undergo periodic QA/QC testing.

OR

- Unit capacity: ≤ 250 mmBtu/hr or ≤ 250 tons/day.
- Unit has operated >1,000 hours/year in any year since 2005.
- Unit has both a CO_2 monitor and a flow rate monitor.
- The existing CEMS are required by regulation or permit, and are also required to undergo periodic QA/QC testing.

[2] MSW units that do not have CEMS may use Tier 2, using measured annual steam generation in lieu of sampling the fuel HHV.

[3] Reporters have the option of using any higher Tier methodology.

On-Going Work and Remaining Challenges

- **Accuracy of GHG Estimation Methods**
- **Current Lack of Monitoring Methods**
- **Addressing Stakeholder Comments**
- **Develop Requirements for Remaining Source Categories in Time for Adoption by Jurisdictions**
- **Harmonization with Proposed Federal Mandatory Reporting Rule (MRR)**

For More Information

http://www.westernclimateinitiative.org