California Global Warming Solutions Act of 2006

General Stationary Combustion Facility GHG Emissions Reporting Guidance

California Air Resources Board
December 5, 2008

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Participation Information

- Workshop materials:
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Regulation and Staff Report
  (includes Regulation and other materials):
  http://www.arb.ca.gov/regact/2007/GHG2007/GHG2007.htm
- Webinar and Dial-In Information
  - https://www2.gotomeeting.com/register/752141161
  - Phone Dial-In: 888-677-4199
    Access Code: 49578

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Agenda

- Introduction and Overview
  - Process and implementation
- General Reporting Requirements
  - Preparing for reporting
- Detailed Cement Plant Requirements and Examples
- Questions

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Mandatory Reporting Rulemaking Process

- Regulation approved by Board December 2007
- Modifications released for comment
- Final Statement of Reasons (FSOR) completed October 2008
- OAL approval December 2, 2008

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Coordination with Future Regulations

- ARB Scoping Plan
- U.S. EPA Mandatory Reporting
- WCI Regional Reporting

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ARB Instructional Guidance for Reporting

- Instructional guidance document available at: *http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm*
- Provides explanatory detail and examples, suggested best practices
- Not a substitute for the regulation

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ARB's GHG Reporting Tool

- ARB providing web-based platform for GHG reporting
  - Available January 2009
- Reporting tool demonstration workshop
  - December 19, 2008, 9:30 – 12:30

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Review of General GHG Reporting Requirements

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Who's Responsible for Reporting?

- At facilities, the entity with operational control
- For electricity transactions, a retail provider, marketer, or facility operator

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Exempt from Reporting

- Primary and secondary schools
- Hospitals
- Nuclear, hydroelectric, wind and solar power plant (except hybrids)
- Portable equipment
- Backup or emergency generators (permitted by air districts)

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What Sources Are Reported

- Stationary combustion
- Process and fugitive emissions when specified
- Mobile emissions optional

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What Gases Are Reported

- CO_2, CH_4, N_2O
- CO_2 from biomass fuels tracked separately
- HFCs, SF_6, PFCs where specified

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Preparing for 2009 Reports

- Must report 2008 emissions in 2009
- 2009 reports should be complete
- Emissions calculations may be based on best available data and methods
  - Regulation methods preferred
- Verification is optional for 2009 emissions reports

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Preparing for 2010 Reports

- 2010 emissions data report must meet full requirements of the regulation
- Monitoring equipment should be in place by January 1, 2009
- Everyone must verify their 2009 emissions data reports in 2010

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Reporting Schedules

- Power and cogen plants within larger facilities/entities are on the larger facility/entity schedule
- Other power and cogen plants and most general combustion facilities report by April 1
- Other facilities (including oil & gas) and entities report by June 1

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Fuel Analytical Data Capture

- Data collected to support calculations of GHG combustion emissions
  - Mass, volume, flow rate, heat content, carbon content
- Need 80% capture rate for source verification
- For <20% missing data:
  - Use 40 CFR Part 75/60 if applicable
  - Use mean of data captured if not

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Fuel Use Measurement Accuracy

- Measurement procedures must assure fuel use is quantified within ±5% accuracy
- Maintain and calibrate devices to achieve ±5% accuracy
- Quarterly calibrations of operators' solid fuel scales
- Keep records for verification

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Interim Data Collection Procedure

- ARB Executive Officer can approve interim procedure if fuel monitoring equipment breaks down
- When breakdown will result in >20% data loss for report year
- Limitations and procedure in section 95103

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Using CEMS

- CEMS may be used to calculate combustion and process CO_2 emissions in most cases
- Operators may install new CEMS prior to January 2011
  - Meet 40 CFR Part 75 requirements
- Operators must choose between CEMS and fuel-based options for consistent reporting

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Reporting *de minimis* Emissions

- Sources ≤3% of facility emissions, not to exceed 20,000 MT CO_2e
- Emissions still reported, but may be estimated using alternative methods

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Data Completeness, Record Keeping

- Retain documents on GHG inventory design, development and maintenance for five years
- Implement internal audit and QA for reporting program
- Log changes in accounting methods, instrumentation
- Specifications in sections 95104-95105

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Third Party Verification

- Optional for 2009 emissions reports
- Required beginning in 2010
- Verification opinion due 6 months after report submittal

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Verification: Key Steps

- Reporter contacts ARB-accredited verification body (VB)
- VB submits COI assessment to ARB
- Verification conducted following ARB OK
- Verification results discussed with reporter
- Reporter may revise report if time permits
- Verification body submits verification opinion to ARB and reporter

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Verification Oversight

- ARB will provide training and accredit verifiers and verification bodies in 2009
- Verification process will assist compliance efforts and assure quality data
- Targeted review of submitted data and verifiers
- ARB responsible for enforcing regulation

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Comments on general reporting requirements?

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What is a GSC?

- Not already included in another sector (refinery, cement, cogen, etc.)
- Emits ≥ 25,000 metric tonnes CO_2/year from stationary combustion sources
  - Facility-wide total CO_2 emissions
  - Single facility only, even if multiple facilities under common ownership
  - Do include biomass or biogas combustion
  - Do not include process, fugitive, mobile emissions in assessment

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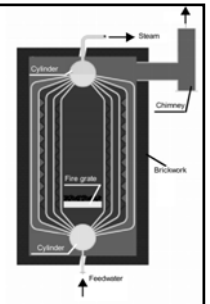
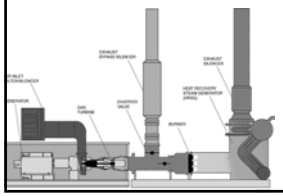
Mandatory GHG Emissions Reporting

General Stationary Combustion (GSC) Facilities

GHG Reporting Regulation §95115





Major GSC Sectors Affected

(only if ≥ 25,000 metric tonnes/yr CO_2 from combustion)

- Natural gas transmission
- Industrial gases
- Paperboard manufacture
- Colleges and universities
- Oil production
- Food processing
- Steel foundries
- Mineral processes
- Glass container
- Malt beverages

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How Will You Know If You Are a GSC Facility?

- ARB is working to inform all GSC facilities emitting ≥25,000 metric tonnes of CO_2 of requirements
- Mailing out letters
- Fuel usage can be used to quickly approximate CO_2 emissions
  - Appendix A provides fuel usage and emissions factors to estimate CO_2 emissions

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Example: Evaluating Facility Emissions

- This facility is subject to reporting
- We will attempt to notify, but the responsibility is yours to report

Example. Evaluating CO_2 Emissions

ACME Rockets has 4 pieces of stationary equipment: three boilers and an onsite cogeneration unit with over 1 MW generating capacity producing over 2,500 tonnes CO_2/year.

The boilers burned 411,830 MMBtu of natural gas with a heat content of 1060 Btu/Scf. This produces 22,000 metric tonnes CO_2. (Using an emission factor of 53.42 kg CO_2/MMBtu, provided in the regulation)

The cogen unit burned 93,597 MMBtu of natural gas. This produces 5,000 metric tonnes of CO_2. (Using same emission factor above.)

Total CO_2 from stationary combustion:

Boilers + Cogen = 22,000 + 5,000 = 27,000 metric tonnes of CO_2

The facility emissions exceed the 25,000 metric tonne CO_2 reporting threshold and so must submit a GHG emissions data report to the ARB.

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Is Your Facility a GSC?

- Regulation provides a look-up table to make *preliminary* assessment
- Compare annual fuel use to emissions

Fuel Type	*Fuel Units*	*Emission Factor Kg CO_2/Unit*	*Amount of fuel to produce 25,000 MT CO_2*
Natural Gas (unspecified)	scf	0.05	459,140,464
	MMBtu	53.02	471,520
Distillate Fuel (#1,2 &4)	Gal	10.14	2,466,011
Motor Gasoline	Gal	8.80	2,841,174
Coal (unspecified other industrial)	Short Ton	2,082.89	12,003
Petroleum Coke	MMBtu	102.04	244,996
	Short Ton	2530.70	9,879

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GSC Reporting

- First reports due by April 1, 2009, reporting on 2008 emissions
  - Verification optional
- May use "best available" data, for 2009
  - But reports must include all sources specified in reg.
- All 2010 reports must meet full requirements of regulation
  - Begin collecting fuel activity data by January 1, 2009
- Report emissions for GSC sources and gases by fuel type

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GSC Verification: 2010

- First verification opinion due by October 1, 2010 (on 2010 report)
  - Optional for 2009, but suggested
- Re-Verification of reports triennially
  - Exception:
    - GSCs with Electric Generating or Cogeneration Facilities with nameplate generating capacity ≥10 MW and burning fossil fuels (>3% of total fuel) must verify annually (interim-year data checks)

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GSC with Cogen or Electricity Generation

- If cogeneration or electricity generation ≥ 1 MW and emits ≥ 2,500 metric tonnes from these sources:
  - Additional reporting requirements apply
  - Refer to cogen and electricity generation reporting requirements
  - Descriptive flow chart in guidance
- If generation thresholds not met, report emissions as part of stationary combustion

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What to Report

- Fuel use, by fuel type for facility
- GHG combustion emissions by type (i.e., CO_2, CH_4, N_2O)
  - Emissions also for each fuel used
- Emissions from on-site electricity generation and cogeneration units as required
- Indirect energy use (electricity, heat, cooling)

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Reporting Fuel Consumption

Estimating Fuel Consumption for Complete Facility

- Report all fuel consumed (by type) for stationary combustion sources
  - Mobile or portable equipment excluded
- May use fuel purchase records or on-site fuel meters
- May use "stock method" for fuels stored on site:
  - Annual Use = (Purchases – Sales) + (Initial Stock – Final stock)

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Estimating Fuel Consumption by Process Unit

- If separately metered, report fuel use separately for each unit or group of units
  - Individual units could include boilers, driers, heaters, cogen systems, etc.
- Sum of unit-based fuel use may not necessarily equal facility-wide fuel totals

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Reporting Fuel Use

- Units for reporting
  - Million standard cubic feet for gases
  - Gallons for liquids
  - Short tons for non-biomass solids
  - Bone dry short tons for biomass-derived solid fuels
- See Appendix A of regulation for conversion factors

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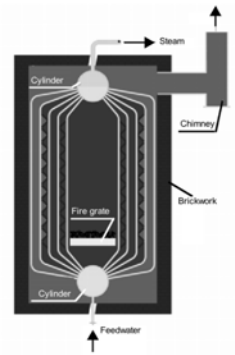
Stationary Combustion GHG Emissions



Estimating CO_2 Emissions

- Calculate and report CO_2 at two levels of detail
  - Overall facility CO_2 emissions
    - Including fossil fuel and biomass totals
  - Emissions of CO_2 for each fuel type used
    - Fossil fuels, by type
    - Biomass fuels, by type
    - Waste derived fuels, by type

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Example – CO_2 Reporting

- Facility Description
  - Natural gas boiler producing 20,000 metric tonnes of CO_2 per year
  - Oil-fired heater producing 5,000 tonnes of CO_2 per year
  - Cogeneration facility burning pure biomass producing 10,000 metric tonnes of CO_2 per year

Report	
Total Facility Fossil CO_2 Emissions	25,000 tonnes/year
Total Facility Biomass CO_2 Emissions	10,000 tonnes/year
Natural Gas CO_2 Emissions	20,000 tonnes/year
Fuel Oil CO_2 Emissions	5,000 tonnes/year
Biomass CO_2 Emissions	10,000 tonnes/year

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Methods for Computing CO_2 from Combustion

- Multiple options available
- Default emission factors (EF) in regulation (§95125(a))
  - Simple calculation and inputs
  - CO_2 = Fuel Use x ARB High Heat Value x ARB CO_2 EF for Fuel x 0.001
- Continuous Emissions Monitoring Systems (CEMS)
  - Real-time measurement of emissions
  - Must meet specifications in regulation (§95125(g))

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Example ARB Emission Factors

Fuel	Kg CO_2/MMBtu
Bituminous Coal	93.40
Natural Gas (unspec.)	53.02
Distillate Oil/Diesel	73.10
Gasoline	70.83
Wood Waste	93.90
Biogas (includes CO_2 pass-through)	104.06

Source: ARB GHG Regulation, 15-day review draft, May 15, 2008

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Methods for Computing CO_2 from Combustion (continued)

- Measure Heat Content
  - Measure fuel heat content as specified (§95125(c))
  - Must report heat content
- Measure Carbon Content
  - Measure fuel carbon content as specified (§95125(c))
  - Report measured carbon content
  - Like heat content approach, requires additional resources but may provide greater accuracy

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Methods for Computing CO_2 from Combustion (continued)

- Source Testing
  - Allowed for biomass or waste-derived fuels
  - Requires approval of source test plan by ARB
  - See 95115(b)(2), 95125(h) and guidance document Appendix B
- Additional options for biomass, municipal solid waste, or waste-derived fuels burned with biomass
  - See 95125(h)

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Source Testing for GHGs

- Regulation provides specific source test options
  - CH_4 and N_2O combustion emissions (§95125(b)(4))
  - CO_2 from the combustion of biomass solid fuels, waste-derived fuels, or municipal solid waste (§95125 (h)(3))
  - CO_2 from geothermal generating facilities (§95111(i)(2))
  - Sulfur recovery process emissions at refineries (§95113(b)(5)(B))

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GSC Facilities CO_2 from Crude Oil or Natural Gas Production

- These facilities are a special case
  - NAICS Code of 211111
- Cannot use default emission factors
  - Fuels more variable
- Measure fuel heat, carbon, etc.
- See regulation and guidance document

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Calculating CH_4 and N_2O Emissions

- Use default emission factors
  - Use ARB high heat value if available
  - Or measure high heat value
- Optional source testing
  - Requires preparation of source test plan and approval by ARB
  - Section 95125(b)(4) describes process
  - Appendix B of guidance includes methods and plan requirements

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Computing CH_4 and N_2O

- Compute emissions using EFs

Compute N_2O and CH_4 emissions from Natural Gas Combustion

--- Situation ---

500 MMScf of Natural Gas are burned per year at the facility

Question: How much N_2O and CH_4 does this produce?

Default heat content (HHV_D) : 1,027 Btu/scf {From fuel supplier

Default N_2O emission factor: 0.1g/ MMBtu {Values from regulation

Default CH_4 emission factor: 0.9 g/MMBtu

Equation from regulation Method 95125(b)(3):

CH_4 or N_2O= Fuel Use * HHV_D * EF_D* 0.001

Computing CH_4 and N_2O

- Step 1: Convert Units

Ensure all inputs are in the correct units.

The default emission factors are provided in *g*/MMBtu and not kg/MMBtu, as required for the emissions calculation equation

Convert the default emission factors from g/MMBtu to kg/MMBtu:

N_2O: 0.1 g/MMBtu * 0.001 kg/g MMBtu = 0.0001 kg/ MMBtu

CH_4: 0.9 g/MMBtu * 0.001 kg/g MMBtu = 0.0009 kg/MMBtu

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Computing CH_4 and N_2O

- Step 2: Apply the Emissions Equation

Step 2: Apply the equation:

N_2O = 500,000,000 scf * 0.001027 MMBtu/scf * 0.0001 kg N_2O/MMBtu *0.001 metric tonne/kg

CH_4 = 500,000,000 scf * 0.001027 MMBtu/scf * 0.0009 kg CH_4/MMBtu *0.001 metric tonne/kg

N_2O = 0.05 metric tonne

CH_4 = 0.46 metric tonne

Repeat this process for any other fuels burned

- Use similar approach for computing CO_2 emissions using EFs

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Other Reporting Requirements

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Additional Reporting

- Electricity generation or cogeneration under control of GSC
  - If facility has capacity of 1 MW or more and CO_2 from generation is 2,500 tonnes or more, report using detailed electricity and cogen regulation requirements
  - If thresholds not triggered, report emissions and fuel combustion as stationary combustion sources for plant
- Report indirect energy usage
  - Electricity, heat, cooling (kWh or Btu)
  - Emissions not required

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Other Data

- Mobile source emissions reporting is voluntary
  - Will be able to tag data as voluntarily in reporting tool
- Be very careful about unit conversions and maintaining consistent units during calculations

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Data Requirements Summary (Part 1)

General Stationary Combustion		
Field Name	Description	Notes
Facility Level Totals		
Total CO_2 Emissions (with biomass split out)	metric tons	
Total N_2O Emissions	metric tons	
Total CH_4 emissions	metric tons	
Stationary Combustion Emissions (CO_2, CH_4, N_2O)		
Fuel Type	name	
Fuel consumed annually	scf,gal, tons	
Annual Average Carbon Content (if measured)	facility specific	
Annual Average Heat Content (if measured)	facility specific	
facility specific emission factors (if applicable)	kg CO_2/unit	by fuel type (multiple)
CEMS if applicable	metric tons	
Total Stationary Combustion Emissions	**metric tons**	by gas CO_2,CH_4, N_2O

* Note: This table is provided for information only. If any conflict is found between this table and the regulation, the regulation always takes precedence.

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Data Requirements Summary (Part 2)

Indirect Energy Use		
Annual Electricity Purchases	kWh	
Electricity Provider	name	
Annual Energy Purchase (steam)	BTUs	
Energy Provider	name	
Direct Process Emissions		
not applicable		
Fugitive Emissions		
not applicable		
Electricity Generation		
Use electricity generation reporting requirements		
Cogeneration		
Use cogeneration reporting requirements		

* Note: This table is provided for information only. If any conflict is found between this table and the regulation, the regulation always takes precedence.

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What Can You Do Now?

- Become familiar with regulation
  - §95103, 95104, 95115, 95125, Appendix A
- Read appropriate guidance document chapters http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Set up systems for tracking fuel and energy use during 2009
- Confirm availability of default EFs for fuels (Appendix A) if using this approach
  - Evaluate need for fuel testing based on fuel types
- Participate in reporting tool demo (12/18/2008)
- Begin preparing 2008 emissions report

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Comments on GSC reporting requirements?

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ARB Contacts

General Email Address for Questions
ghgreport@arb.ca.gov

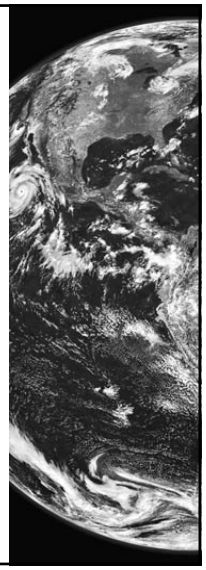
Richard Bode – Chief
Emissions Inventory Branch
rbode@arb.ca.gov
(916) 323-8413

Doug Thompson – Manager
Climate Change Reporting Section
dthompson@arb.ca.gov
(916) 322-7062

GHG Mandatory Reporting Website
http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm

Staff Contacts

General Reporting & GSCs, Patrick Gaffney
pgaffney@arb.ca.gov (916) 322-7303
Cogeneration, Renée Lawver
rlawver@arb.ca.gov (916) 323-0296
Cement, Patrick Gaffney
pgaffney@arb.ca.gov (916) 322-7303
Refineries & Hydrogen Plants, Byard Mosher
bmosher@arb.ca.gov (916) 323-1185
Electric Power Sector, Pamela Burmich
pburmich@arb.ca.gov (916) 323-8475
Verification Lead, Rajinder Sahota
rsahota@arb.ca.gov (916) 323-8503



Thanks for participating

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