EPA's Mandatory Reporting of Greenhouse Gases – Final Rule

An Overview

December 15th, 2009

Presenter

Eugene Taylor, PE

Managing Consultant

319/758-0758

etaylor@trinityconsultants.com

www.trinityconsultants.com/ghg

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Agenda

- Details of the Mandatory Reporting of Greenhouse Gas Emissions – Final Rule
  - Reporting Requirements and Applicability
  - Emissions Calculation Methodologies
  - Monitoring & Recordkeeping Requirements
- Compliance Strategies

Details of the Mandatory Reporting of Greenhouse Gas Emissions - Final Rule (40 CFR 98)

Useful Reference Documents

- Mandatory Reporting of Greenhouse Gases – Preamble and Final Rule
- Regulatory Impact Analysis (RIA) for Final Rule
- Technical Support Document (TSD) for Stationary Fuel Combustion Emissions (supporting the Proposed Rule)

All documents can be accessed at
http://www.epa.gov/climatechange/emissions/ghgrulemaking.html

Trinity rule information available on our Climate Change Corner at:
http://www.trinityconsultants.com/

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EPA GHG MRR Timeline

- October 30, 2009 – Final rule published in Federal Register
- December 29, 2009 – Effective date of MRR
- January 1, 2010 – Monitoring and recordkeeping required under MRR
- January 28, 2010 – Due date for extension requests for use of "Best Available Monitoring Method"
- April 1, 2010 – Must use required monitoring method, unless extension request approved
- March 31, 2011 – First GHG Report due for 2010 emissions

Note: Since this rule is a "major rule" under the Congressional Review Act (CRA), a concurrent 60 day Congressional Review will be applicable to the rule

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Organization of the Final Rule

- Subpart A establishes the general provisions of the rule, including:
  - General monitoring, reporting, and recordkeeping requirements
  - Authorization and responsibilities of the Designated Representative
  - Standardized methods incorporated by reference
  - Enforcement provisions
- Subpart C establishes requirements for stationary combustion sources
- Subparts D - JJ establish sector-specific requirements for direct emitters
  - 24 source categories regulated (not including 'RESERVED' subparts)
- Subparts LL - PP establish sector-specific requirements for suppliers in 5 categories

Subparts to Final MRR

- Subpart A – General Provisions
- Subpart C – General Stationary Fuel Combustion Sources
- Subpart D – Electricity Generation
- Subpart E – Adipic Acid Production
- Subpart F – Aluminum Production
- Subpart G – Ammonia Manufacturing
- Subpart H – Cement Production
- Subpart I – Electronics Manufacturing
- Subpart J – Ethanol Production
- Subpart K – Ferroalloy Production
- Subpart L – Fluorinated Greenhouse Gas Production
- Subpart M – Food Processing
- Subpart N – Glass Production
- Subpart O – HCFC-22 Production and HFC-23 Destruction
- Subpart P – Hydrogen Production
- Subpart Q – Iron and Steel Production
- Subpart R – Lead Production
- Subpart S – Lime Manufacturing
- Subpart T – Magnesium Production
- Subpart U – Miscellaneous Uses of Carbonate
- Subpart V – Nitric Acid Production
- Subpart W – Oil and Natural Gas Systems
- Subpart X – Petrochemical Production
- Subpart Y – Petroleum Refineries
- Subpart Z – Phosphoric Acid Production

*****Gray-shaded cells are marked "RESERVED" in final rule; EPA plans to further review public comments and other information before finalizing these subparts***

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Subparts to Final MRR (Cont'd)

- Subpart AA—Pulp and Paper Manufacturing
- Subpart BB—Silicon Carbide Production
- Subpart CC—Soda Ash Manufacturing
- Subpart DD—Sulfur Hexafluoride (SF_6) from Electrical Equipment
- Subpart EE—Titanium Dioxide Production
- Subpart FF—Underground Coal Mines
- Subpart GG—Zinc Production
- Subpart HH—Municipal Solid Waste Landfills
- Subpart II—Wastewater Treatment
- Subpart JJ—Manure Management
- Subpart KK—Suppliers of Coal
- Subpart LL—Suppliers of Coal-based Liquid Fuels
- Subpart MM—Suppliers of Petroleum Products
- Subpart NN—Suppliers of Natural Gas and Natural Gas Liquids
- Subpart OO—Suppliers of Industrial Greenhouse Gases
- Subpart PP—Suppliers of Carbon Dioxide

*****Gray-shaded cells are marked RESERVED in final rule***

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Subpart A - General Provisions (§98.1 - §98.9)

Subpart A – General Provisions (§98.1)

- Establishes mandatory emissions reporting requirements for certain subject facilities that directly emit GHGs ("downstream" regulation) as well as for fossil fuel suppliers and industrial GHG suppliers ("upstream" regulation)
- Reporting is at the facility level, not corporate (with the exception of suppliers)
- If a conflict exists between a provision in Subpart A and any other applicable subpart, the requirements of Subparts B through PP take precedence
- Calendar year 2010 emissions are the basis for the initial applicability determination

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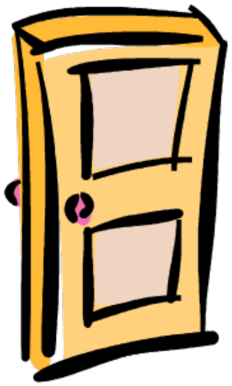
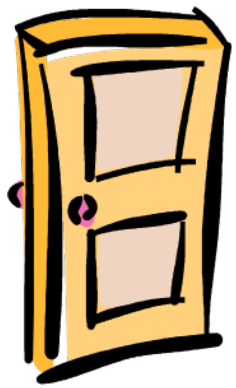
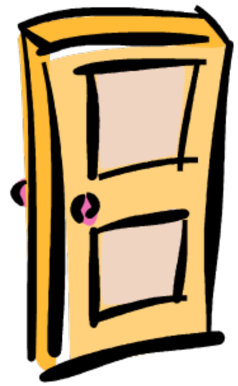
Four doors into the GHG reporting program…



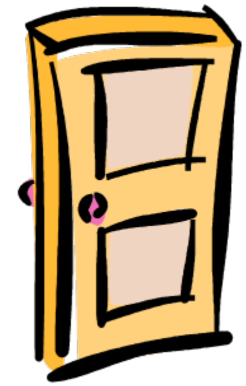
98.2(a)(1)



98.2(a)(2)



98.2(a)(3)



98.2(a)(4)

“Downstream”

“Upstream”

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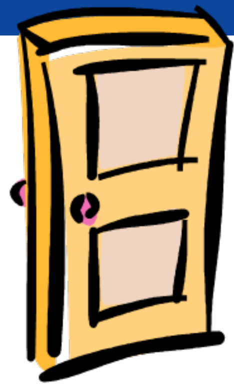

Door #1
98.2(a)(1)

- A facility that contains **<u>one or more</u>** of 17 identified source categories triggers reporting, regardless of annual emissions
- A specific emission/production rate associated with some source categories
- If reporting triggered, include all sources for which calculation methods are provided in Subparts C - JJ

Door #1 – All-In Source Categories

Table 1: Will your facility contain any of the source categories listed in this table in any calendar year starting in 2010?

- ✓ Electricity generation (units that report CO_2 emissions year-round per 40 CFR part 75)
- ✓ Adipic Acid Production
- ✓ Aluminum Production
- ✓ Ammonia Manufacturing
- ✓ Cement Production
- ✓ HCFC-22 Production
- ✓ HFC-23 Destruction Processes that are not located at an HCFC-22 production facility and that destroy more than 2.14 metric tons of HFC-23 per year.
- ✓ Lime Manufacturing
- ✓ Nitric Acid Production
- ✓ Petrochemical Production
- ✓ Petroleum Refineries
- ✓ Phosphoric Acid Production
- ✓ Silicon Carbide Production
- ✓ Soda Ash Production
- ✓ Titanium Dioxide Production

- ✓ Municipal Solid Waste Landfills that generate CH_4 in amounts equivalent to 25,000 metric tons of CO_2e per year or more (Subpart HH).
- ✓ Manure Management Systems that emit, in aggregate, CH_4 and N_2O in amounts equivalent to 25,000 metric tons of CO_2e per year or more (Subpart JJ).
- – Electric Power Systems that include electrical equipment with a total nameplate capacity that exceeds 17,820 pounds (7,838 kilograms) of SF_6 or PFCs.
- – Electronics Manufacturing Facilities with an annual production capacity that exceeds:
  - – 1. Semiconductors: 1,080 square meters (m^2) silicon
  - – 2. Microelectricomechanical system: 1,020 m^2
  - – 3. Liquid crystal display (LCD): 235,700 m^2 LCD
- – Underground Coal Mines that are subject to quarterly or more frequent sampling of ventilation systems by the Mine Safety & Health Administration

Items listed in grey and italics were RESERVED in the final rule.

Source: EPA Information Sheet for Subpart A – General Provisions

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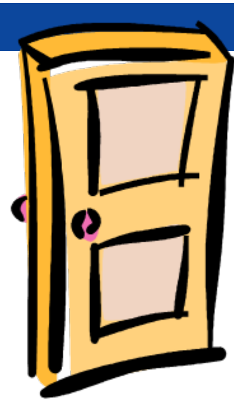

Door #2
98.2(a)(2)

- If a facility does not operate any source categories listed in Table 1, reporting through Door #2 is triggered for any facility emitting at least 25,000 Metric Tons (MT) CO_2e from the combined operation of:
  - Stationary fuel combustion equipment, AND
  - Misc. uses of carbonate (e.g., limestone), AND
  - All source categories listed in Table 2
- If reporting triggered, include all sources for which calculation methods are provided in Subparts C - JJ

Door #2 – Limited Applicability Source Categories

Table 2: In 2010, will your facility emit 25,000 metric tons of CO_2e in aggregate from listed source categories + stat. combustion sources + carbonate usage

✓ Ferroalloy Production (Subpart K)	– Electricity Generation
✓ Glass Production (Subpart N)	– Electronics - Photovoltaic Manufacturing
✓ Hydrogen Production (Subpart P)	– Ethanol Production
✓ Iron and Steel Production (Subpart Q)	– Fluorinated Greenhouse Gas Production
✓ Lead Production (Subpart R)	– Food Processing
✓ Pulp and Paper Manufacturing (Subpart AA)	– Industrial Landfills
✓ Zinc Production (Subpart GG)	– Magnesium Production
	– Oil and Natural Gas Systems
	– Industrial Wastewater
	Items listed in grey and italics were RESERVED in the final rule.

Note: Biogenic emissions not included for applicability determination.

Source: EPA Information Sheet for Subpart A – General Provisions

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What Constitutes 25,000 Metric Tons?

	Table C-1 kg CO_2 / MMBtu	Table C-3 kg CH_4 / MMBtu	kg N_2O / MMBtu	kg CO_2e/MMBtu CO_2	CH_4	N_2O	Total	MMBtu / Ton CO_2e	Trigger size At 100% Capacity factor (MMBtu/hr)
GWP	1	21	310						
Bit Coal	93.40	1.00E-02	1.50E-03	93.40	0.21	0.465	94.08	10.63	30.3
Sub-bit Coal	97.02	1.00E-02	1.50E-03	97.02	0.21	0.465	97.70	10.24	29.2
Lignite Coal	96.36	1.00E-02	1.50E-03	96.36	0.21	0.465	97.04	10.31	29.4
Natural Gas	53.02	9.00E-04	1.00E-04	53.02	0.0189	0.031	53.07	18.84	53.8
Nos. 1-4 oil	73.10	3.00E-03	6.00E-04	73.10	0.063	0.186	73.35	13.63	38.9
Nos. 5-6 oil	78.74	3.00E-03	6.00E-04	78.74	0.063	0.186	78.99	12.66	36.1
Wood	93.8	3.20E-02	4.20E-03	93.80	0.672	1.302	95.77	10.44	29.8

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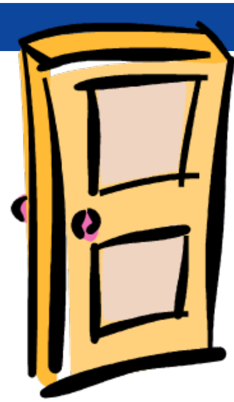

Door #3
98.2(a)(3)

- Any facility that meets ALL THREE of the following criteria triggers reporting through Door #3:
  - Reporting not triggered through Door #1 or #2 – AND –
  - The aggregate maximum rated heat input capacity for stationary combustion equipment is 30 mmBtu/hr or greater – AND –
  - The facility emits at least 25,000 MT CO_2e/yr
- For these facilities, the annual GHG report must cover emissions from stationary fuel combustion sources only
  - Rule allows for simplified reporting methods for 2010 for those who ONLY report stationary combustion emissions.
- *Note: Emergency generators exempted from 30 mmBtu/hr total; biogenic emissions not included in 25,000 MT applicability determination*

Door #3 – Stationary Combustion Sources

Table 3: Does your facility emit 25,000 MT CO_2e from any of the stationary fuel combustion devices listed below?
Boilers Simple and Combined-Cycle Combustion Turbines Stationary Engines Incinerators Process Heaters Other devices that combust solid, liquid, or gaseous fuel, generally for the purposes of producing electricity, generating steam, or providing useful heat or energy for industrial, commercial, or institutional use, or reducing the volume of waste by removing combustible matter.
Note: The Subpart C stationary combustion source category does not include portable equipment, emergency generators and emergency equipment, irrigation pumps at agricultural operations, flares (unless required to use Subpart C by another subpart), or EGUs that are subject to Subpart D. *Note: If the maximum rated heat input capacity for all stationary fuel combustion equipment is less than 30 mmBtu/hr, then the facility is presumed to emit less than 25,000 metric tons of CO_2e and the facility is not required to calculate or report emissions.*

Source: EPA Information Sheet for Subpart A – General Provisions

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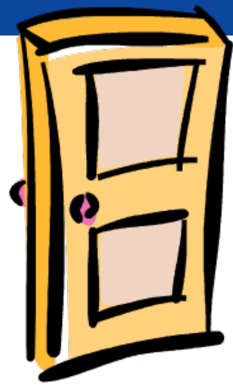

Door #4
98.2(a)(4)

- A supplier in ANY of the listed supplier categories:
  - Coal-based liquid fuel suppliers
  - Petroleum product suppliers
  - Natural gas and NGL suppliers
  - Industrial GHG suppliers
  - Carbon dioxide suppliers
- Emissions must be reported for all products with calculation methodologies established in Subparts KK through PP

Door #4 – Supplier Categories

Table 4: Is your facility a supplier of listed fossil fuels?
<u>Fossil Fuels</u> Coal-to-Liquid Products Natural Gas and Natural Gas Liquids Petroleum Products

Table 5: Is your facility a supplier of listed industrial GHGs?
<u>Industrial GHGs</u> Fluorinated Gases Nitrous Oxide Carbon Dioxide

Note: The scope of the term "supplier" is established in 98.2(a)(4) for each fossil fuel and industrial GHG. Suppliers typically include (1) all producers, (2) importers of an annual quantity equivalent to 25,000 MT CO_2e or more, and (3) exporters of an annual quantity equivalent to 25,000 MT CO_2e or more

Source: EPA Information Sheet for Subpart A – General Provisions

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Summary of Applicability

- **Door #1**: A facility that contains one or more of 17 identified source categories, regardless of annual emissions
- **Door #2**: Not under Door #1 AND facility emits 25,000 metric tons or more CO_2e (from the sum of emissions from 7 specifically named source categories AND stationary fuel combustion AND misc. uses of carbonate)
- **Door #3**: Not under Door #1 or #2 AND has aggregate maximum rated heat input capacity of ≥ 30 MMBtu/hr AND the facility emits 25,000 or more metric tons CO_2e/yr
- **Door #4**: Coal-based liquid fuel suppliers, petroleum product suppliers, natural gas and NGL suppliers, industrial GHG suppliers, carbon dioxide suppliers

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Exit Ramp from GHG Reporting

- Exit ramp for GHG reporting if annual emissions less than
  - 25,000 MT CO_2e for 5 years; or
  - 15,000 MT CO_2e for 3 years
- Exit ramp thresholds apply to "all-in" categories as well
- Must notify EPA that you will cease reporting and state the reason for the reduction
  - If emissions exceed 25,000 MT in future, immediately resume reporting
- For closures
  - Certify that all GHG emitting equipment has ceased operation;
  - If you restart equipment, must report emissions regardless of proximity to 25,000 MT threshold
  - Flexibility not intended for seasonal closures, longer temporary cessation of operations, or MSW landfills

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Subpart C – General Stationary Fuel Combustion Sources

Calculation Methodologies

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Scope of Subpart C

- Subpart C applies to general stationary combustion sources not addressed under another subpart
- Subpart C source category does not include:
  - Emergency generators and other emergency equipment, regardless of permit status
  - Flares (may be covered under other Subparts)
  - Portable equipment, irrigation pumps at agricultural sites
  - Combustion of hazardous waste, unless CEMS used to quantify CO_2 emissions
    - If co-fired unit, must report GHG emissions from combustion of fuels listed in Table C-1
  - Thermal oxidizers and pollution control devices would report only GHG emissions from the firing of supplemental fossil fuels, not process emissions (except as specified in other Subparts)

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Scope of Subpart C (Cont.)

- Unconventional fuel exemptions
  - Only required to calculate emissions for fuels used in Table C-1
  - Exception noted in preamble: Units larger than 250 mmBtu/hr must calculate GHG emissions for fuels that provide, on average, greater than 10% of the annual heat input to the unit
    - Does this exception apply to biofuels?

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Combustion Emission Calculations

INCREASED STRINGENCY

- **Four-Tiered Approach for CO_2**
  - **Tier 4** – Use only for combustion units that have certain types of existing CEMS in place and that meet several other specific criteria, such as fuel type and hours of operation.
  - **Tier 3** – Use annual fuel consumption, either from company records (for solid fuels) or directly measured with fuel flow meters (for liquid and gaseous fuels) together with periodic measurements of fuel carbon content. *Fuel meter readings required.*
  - **Tier 2** – Use annual fuel consumption (from company records) together with measured fuel-specific high heat values and default CO_2 emission factors.
  - **Tier 1** – Use annual fuel consumption (from company records) together with fuel-specific default high heat values and default CO_2 emission factors.

Tier 1 – CO_2 from Combustion

- Can use Tier 1 for any type of fuel combusted if:
  - Unit's rated heat input capacity ≤ 250 MMBtu/hr, AND
  - There is an applicable default CO_2 emission factor (EF) and an applicable default high heat value (HHV) for the fuel in Table C-1, AND
  - Owner or operator <u>does not perform</u> (<u>or does not receive data</u> containing the results of) fuel sampling and analysis at the minimum frequency specified for the fuel type that includes measurements of the HHV
- May be used for solid, gaseous, or liquid biomass fuels in a unit of any size provided that the fuel is listed in Table C-1 of this subpart.
- May be used for MSW in a unit of any size that does not produce steam, if the use of Tier 4 is not required.
- General approach – Default emission factor is multiplied by annual fuel use and a default HHV for that fuel:

$$CO_2 = 1 \times 10^{-3} * \mathit{Fuel\ Use} * \mathit{HHV} * \mathit{EF}$$

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Example Tier 1 Calculation Stationary Combustion Sources

- **Example:** Natural gas-fired boiler, rated heat input capacity = 100 MMBtu/hr, annual HHV records available
- **Step 1**: Determine appropriate calculation methodology
  - Neither solid fuel nor MSW fired in unit – Tier 4 not required
  - Unit capacity less than 250 mmBtu/hr – Tier 3 not required
  - Natural gas HHV data not available at semiannual frequency – Tier 2 not required
  - Therefore, Tier 1 should be used to calculate CO_2 emissions (and Eq. C-8 to calculate CH_4/N_2O)

Example Tier 1 Calculation Stationary Combustion Sources

- **Step 2**: Determine data required to calculate emissions
  - Tier 1 – Only annual fuel consumption from company records needed to calculate emissions
    - Annual consumption from natural gas bills = 389 mmscf/yr
- **Step 3**: Select appropriate emission factors and HHV
  - CO_2 = 53.02 kg CO_2/mmBtu
  - HHV = 1.028 x 10^{-3} mmBtu/scf

  From Tables C-1 of Subpart C

  - CH_4 = 0.001 kg CH_4/mmBtu
  - N_2O = 0.0001 kg N_2O/mmBtu

  From Tables C-2 of Subpart C

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Example Tier 1 Calculation Stationary Combustion Sources

- **Step 4**: Calculate CO_2 emissions

$$389 \text{ mmscf/yr} \times 1{,}028 \text{ mmBtu/mmscf} \times 53.02 \frac{\text{kg } CO_2}{\text{mmBtu}} \times \frac{\text{MT}}{1{,}000 \text{ kg}} = 21{,}202 \text{ MT } CO_2 / yr$$

- **Step 5**: Calculate CH_4 and N_2O emissions

$$389 \text{ mmscf/yr} \times 1{,}028 \text{ mmBtu/mmscf} \times 0.001 \frac{\text{kg } CH_4}{\text{MMBtu}} \times \frac{\text{MT}}{1{,}000 \text{ kg}} = 0.40 \text{ MT } CH_4 / yr$$

$$389 \text{ mmscf/yr} \times 1{,}028 \text{ mmBtu/mmscf} \times 0.0001 \frac{\text{kg } N_2O}{\text{MMBtu}} \times \frac{\text{MT}}{1{,}000 \text{ kg}} = 0.04 \text{ MT } N_2O\text{/yr}$$

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Example Tier 1 Calculation Stationary Combustion Sources

- **Step 6**: Convert to CO_2e and sum all GHG emissions

$$0.40 \text{ MT } CH_4 \times 21 \text{ (GWP of } CH_4) = 8.4 \text{ MT } CO_2\text{e/yr}$$

$$0.04 \text{ MT } N_2O \times 310 \text{ (GWP of } N_2O) = 12.4 \text{ MT } CO_2\text{e/yr}$$

$$21{,}202 \text{ MT } CO_2 + 8.4 \text{ MT } CO_2\text{e} + 12.4 \text{ MT } CO_2\text{e} = 21{,}223 \text{ MT } CO_2\text{e}$$

Global Warming Potential (GWP) values found in Table A-1 of Subpart A

Tier 2 – CO_2 from Combustion

- Can use Tier 2 for any type of fuel combusted if:
  - Unit's rated heat input capacity ≤ 250 MMBtu/hr, AND
  - There is an applicable default CO_2 emission factor in Table C-1 AND
  - Have measured HHVs at minimum frequency specified
  - *Exception: Tier 2 can be used for units greater than 250 MMBtu/hr that combust only pipeline natural gas and/or distillate oil*
- General approach – Default CO_2 emission factor is multiplied by annual fuel use and a measured HHV for that fuel (not for MSW)

$$CO_2 = \sum_{p=1}^{n} 1 \times 10^{-3} \; (Fuel)_p * (HHV)_p * (EF)$$

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Example Tier 2 Calculation Stationary Combustion Sources

- **Example:** Natural gas-fired boiler, rated heat input capacity = 300 MMBtu/hr, semiannual HHV records available
- **Step 1**: Determine appropriate calculation methodology
  - Neither solid fuel nor MSW fired in unit – Tier 4 not required
  - Although unit capacity greater than 250 MMBtu/hr, natural gas not subject to Tier 3 requirements – Tier 3 not required
  - Tier 2 may be used for the combustion of natural gas or distillate fuel oil in large units – Tier 2 may be used
  - Because capacity greater than 250 MMBtu/hr, use of Tier 1 not permitted
    - *Note: Even if unit capacity less than 250 MMBtu/hr, availability of semiannual HHV records for natural gas would have eliminated Tier 1 as an option*
  - Therefore, Tier 2 should be used to calculate CO_2 emissions (and Eq. C-9a to calculate CH_4/N_2O)

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Example Tier 2 Calculation Stationary Combustion Sources

- **Step 2**: Determine data required to calculate emissions
  - Tier 2 – Fuel consumption from company records and semiannual HHV data needed to calculate emissions
    - Annual consumption from natural gas bills = 1,167 mmscf/yr
    - Jan-Jun HHV = 1,025 Btu/scf
    - Jul-Dec HHV = 1,075 Btu/scf

Annual average HHV = 1,050 Btu/scf

- **Step 3**: Select appropriate emission factors
  - CO_2 = 53.02 kg CO_2/mmBtu
  - CH_4 = 0.001 kg CH_4/mmBtu
  - N_2O = 0.0001 kg N_2O/mmBtu

From Table C-1 of Subpart C

From Table C-2 of Subpart C

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Example Tier 2 Calculation Stationary Combustion Sources

- **Step 4**: Calculate CO_2 emissions

$$1{,}167\ \text{mmscf/yr} \times 1{,}050\ \text{mmBtu/mmscf} \times 53.02\ \frac{\text{kg } CO_2}{\text{mmBtu}} \times \frac{\text{MT}}{1{,}000\ \text{kg}} = 64{,}968\ \text{MT } CO_2\ /\ yr$$

- **Step 5**: Calculate CH_4 and N_2O emissions

$$1{,}167\ \text{mmscf/yr} \times 1{,}050\ \text{mmBtu/mmscf} \times 0.001\ \frac{\text{kg } CH_4}{\text{MMBtu}} \times \frac{\text{MT}}{1{,}000\ \text{kg}} = 1.23\ \text{MT } CH_4\ /\ yr$$

$$1{,}167\ \text{mmscf/yr} \times 1{,}050\ \text{mmBtu/mmscf} \times 0.0001\ \frac{\text{kg } N_2O}{\text{MMBtu}} \times \frac{\text{MT}}{1{,}000\ \text{kg}} = 0.12\ \text{MT } N_2O\text{/yr}$$

- **Step 6**: Convert to CO_2e and sum all GHG emissions

$$64{,}968\ \text{MT } CO_2 + 25.83\ \text{MT } CO_2e + 37.20\ \text{MT } CO_2e = 65{,}031\ \text{MT } CO_2e$$

$$1.23\ \text{MT } CH_4 \times 21\ (\text{GWP of } CH_4) = 25.83\ \text{MT } CO_2\text{e/yr}$$

$$0.12\ \text{MT } N_2O \times 310\ (\text{GWP of } N_2O) = 37.20\ \text{MT } CO_2\text{e/yr}$$

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Tier 3 – CO_2 from Combustion

- Tier 3 must be used in 2 situations:
  - Unit > 250 MMBtu/hour for any fuel listed in Table C-1, except:
    - Pipeline natural gas and distillate fuel oil
    - MSW
    - If Tier 4 is required
  - Unit > 250 MMBtu/hr and a fuel is NOT listed in Table C-1, only if the fuel provides 10% or more of annual heat input to the unit
- Calculation based on annual fuel use and measured carbon content of each fuel

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Tier 4 – CO_2 from Combustion

- CEMS-based methodology
- All six of the following must be met for Tier 4 to be required for units with **greater than 250 MMBtu/hr** heat input capacity

1. Maximum rated heat input capacity greater than 250 MMBtu/hr (or greater than 250 tons per day of MSW)
2. Combusts solid fossil fuel or MSW, either as a primary or secondary fuel
3. Operated for more than 1,000 hours in any calendar year since 2005
4. Installed CEMS required either by an applicable Federal or State regulation or the unit's operating permit.
5. Installed CEMS include a gas monitor of any kind or a stack gas volumetric flow rate monitor (or both) certified to 40 CFR 60/75 or state requirement
6. Gas or stack gas volumetric flow rate monitors are required, either by an applicable Federal/State regulation or operating permit, to undergo periodic QA testing to 40 CFR 60/75 or state requirement

An oxygen (O_2) concentration monitor may be used in lieu of a CO_2 concentration monitor to determine the hourly CO_2 concentrations

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Tier 4 – CO_2 from Combustion

- CEMS Based Methodology
- All six of the following must be met for Tier 4 to be required for units with **less than 250 MMBtu/hr** heat input capacity

1. Maximum rated heat input capacity less than 250 MMBtu/hr (or less than 250 tons per day of MSW)
2. The unit has both a stack gas volumetric flow rate monitor and a CO_2 concentration monitor
3. Combusts solid fossil fuel or MSW, either as a primary or secondary fuel
4. Operated for more than 1,000 hours in any calendar year since 2005
5. Installed CEMS required either by an applicable Federal or State regulation or the unit's operating permit
6. The CO_2 concentration and stack gas volumetric flow rate monitors are certified and are required to undergo periodic QA testing to 40 CFR 60/75 or state requirements

An oxygen (O_2) concentration monitor may be used in lieu of a CO_2 concentration monitor to determine the hourly CO_2 concentrations

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CH_4 and N_2O Calculations

- Only required for fuels listed in Table C-2 of regulation (default emissions factors established in Subpart C)
- Only required for combustion units reporting under Subpart C
- No longer free to use site specific factors (to ensure reporting consistency across all reporters)

Source Aggregation

- The following reporting alternatives may be used to simplify the unit-level reporting (specified in §98.36(b)):
  - **Aggregation of units –** Group two or more units (e.g., boilers or combustion turbines), **each having** a maximum rated heat input capacity of 250 MMBtu/hr or less, provided that
    - The use of Tier 4 is not required or elected for any of the units
    - The units use the same tier for any common fuels combusted
  - **Monitored common stack configurations –** Report the combined emissions from the units sharing the common stack or duct if continuously monitor CO2 emissions according to the Tier 4 Methodology (CEMS)
  - **Common pipe configurations –** When two or more liquid-fired or gaseous-fired units combust the same type of fuel and the fuel is fed to the individual units through a common supply line or pipe. Total amount of fuel combusted by the units is accurately measured at the common pipe or supply line using a calibrated fuel flow meter.

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Multiple Fuel Firing Calculation Methods

- Calculation method evaluated on a unit-by-unit, fuel-by-fuel basis
- May elect to use higher tier method for one or more of the fuels
  - e.g., Although Tier 1 required, may use Tier 1 for natural gas and Tier 3 for fuel oil on a 100 mmBtu/hr unit
- Exception: If Tier 4 (or alternative calculation method using 40 CFR 75 heat input data) is required, must use CEMS measurements only to calculate CO_2 emissions

Monitoring Requirements

Subpart C Monitoring

Tier	For this fuel…	Measure these parameters…	And use a default factor for …
1	All[1]	**Annual fuel use**	HHV CO_2 emission factor
2	All	**Annual fuel use** **HHV**	CO_2 emission factor
	MSW	**Steam generation**	CO_2 emission factor
3	Solid/Liquid	**Annual fuel use** **Carbon content**	--
	Gas	**Annual fuel use** **Carbon content** **Molecular weight**	--
4	All	**CO_2**	--

[1] Any fuel listed in Table C-1 of subpart C, except MSW units that generate steam.

Source: EPA Detailed Training Webinar

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Subpart C Monitoring – Tier 1

- Amount of fuel consumed by a stationary combustion unit (or by a group of such units)
  - Use ***Company Records***:
    - Direct measurements of fuel consumption by gravimetric or volumetric means
    - Tank drop measurements
    - Calculated values of fuel usage obtained by measuring auxiliary parameters such as steam generation or unit operating hours.
    - Fuel billing records obtained from the fuel supplier qualify as company records.
  - Maintain records of methods used

Subpart C Monitoring – Tier 2

- Company records for amount of fuel consumed by a stationary combustion unit (or by a group of such units)
- Sample fuel for High Heating Value (HHV)

Fuel	**Minimum Sampling Frequency**
Natural Gas	Semiannual
Coal and fuel oil	Each shipment or delivery
Other liquid fuels and biogas	Quarterly
Other solid fuels and MSW	Weekly sample and monthly analysis
Other gaseous fuels	Daily (if equipment in place) or weekly

Note: Annual averaging of HHV permitted if sampling occurs less than monthly

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Subpart C Monitoring – Tier 3

- Fuel use data source:

Fuel	Data Source
Solid Fuel	Company records (e.g., billing records)
Liquid Fuel	Flow meter, billing meter, or tank drop measurement
Gaseous Fuel	Flow meter or billing meter

- Carbon content/molecular weight of fuel sample frequency:

Fuel	Minimum Sampling Frequency
Natural Gas	Semiannual
Coal and fuel oil	Each shipment or delivery
Other liquid fuels and biogas	Quarterly
Other solid fuels and MSW	Weekly sample and monthly analysis
Other gaseous fuels	Daily (if equipment in place) or weekly

Note: Not required to submit results of each individual determination. Molecular weight sampling only required for gaseous fuels.

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Subpart C Monitoring – Tier 3

- Calibrate oil and gas flow meter using
  - Approved applicable flow meter test method in rule
  - Calibration procedures specified by the flow meter manufacturer
  - An industry-accepted or industry standard calibration
- Recalibrate each fuel flow meter either
  - Annually
  - Minimum frequency specified by manufacturer
  - Internal specified by industry consensus standard practice
- Fuel billing meters are exempted from initial and ongoing calibration requirements.
- Oil tank drop measurements (determine liquid fuel use) done according to any an appropriate method published by a consensus-based standards organization (e.g., API).

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Subpart C Monitoring – Tier 4

- For CO_2/O_2 and flow rate monitors, perform initial certification and ongoing QA testing in accordance with one of these procedures:
  - 40 CFR 75
  - 40 CFR 60
  - Provisions of applicable state continuous monitoring program
- Must use the Tier 4 calculation methodology beginning on:
  - January 1, 2010, if all of the monitors needed to measure CO_2 have been installed and certified by that date
  - January 1, 2011, if all of the monitors needed to measure CO_2 have not been installed and certified by January 1, 2010
    - In this case, may use Tier 2 or Tier 3 to report 2010 emissions

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Missing Data Clarifications

- Applicable for Tiers 1-4
- For missing HHV, carbon content, or molecular weight of the fuel:
  - Substitute arithmetic average of the quality-assured values of preceding and following parameter bounding the missing data
  - Can be based on available operating and process data (e.g., electrical load, steam production, operating hours)
- For missing CO_2 concentration, stack gas flow rate, percent moisture, fuel usage, and sorbent usage, estimate best value based on operating and process data

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Measurement Device Calibration

- Measurement Device Calibration
  - EPA added a 5% accuracy requirement for flow meters and other devices that measure data used to calculate GHG emissions (belt scales, etc.) – prior to April 1, 2010
  - Fuel billing meters are exempted from the calibration requirements (provided fuel supplier and any unit combusting the fuel do not have common owners and are not owned by subsidiaries or affiliates of the same company)
  - Guidance in the rule is provided for initial quality assurance (e.g., calculating calibration error) for orifice, nozzle, and venturi flow meters
  - Flexibility added for facilities that operate continuously to delay calibration to the next scheduled outage

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Monitoring Plan (formerly QAPP)

- Required for all facilities
- May reference existing procedures (facility SOPs, Part 60/75 QA, etc)
- No deadline, however must have in place if you are audited – generally expected to have by April 1, 2010
- Must be revised as necessary to improve monitoring strategy and to accommodate changes to production processes, monitoring instrumentation, QA procedures, etc.
- Required content of Monitoring Plan:
  - Identification of persons responsible for collecting emissions data
  - Explanation of the processes and methods used to collect the GHG data
  - Description of procedures used for QA, maintenance, and repair of CEMS, flow meters, and other instrumentation used to provide data for GHG reporting

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"Best Available Monitoring Method" Flexibility

- Allows use of best available monitoring methods in lieu of required monitoring methods for 1st Quarter 2010 (Jan-March)
  - This is only allowed if not "reasonably feasible" to acquire, install, and operate a required piece of monitoring equipment by January 1, 2010
- Must still use prescribed emissions calculation methodologies in each applicable subpart
  - Outline use of these methods in the report filing
- Best available methods include: interim monitoring methods currently used by the facility, supplier data, engineering calculations, other company records
- May request extension to use best available method beyond March 31, 2010, but use of best available method will not be approved beyond December 31, 2010

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“Best Available Monitoring Method” Extension Request

- Extension request for use of best available monitoring methods
  - Reserved for situations where facilities cannot reasonably install monitoring equipment by April 1, 2010 due to shutdown schedules or monitoring equipment vendor issues
  - Extension request must include sufficient justification for delay
  - Must be submitted to EPA no later than 30 days after effective date of rule - January 28, 2010
  - If extension request rejected by EPA, must start monitoring as required by rule on April 1, 2010

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Required Content of Extension Request

- List of monitoring instrumentation and installation locations
- Identification of the specific rule requirements (subpart, rule, section number) that require additional instrumentation
- Detailed description of why the monitoring equipment cannot be in place by April 1, 2010 – e.g., limited supply, shutdown constraints, etc.
- Description of plan to obtain and install monitoring equipment "as soon as reasonably feasible," projected date of installation
- Extensions likely not granted for periodic sampling and analysis or for design of electronic recordkeeping systems

Reporting & Recordkeeping Requirements

Annual GHG Report Content

- Facility name or supplier name (as appropriate) and physical street address including the city, state, and zip code
- Year and months covered by the report
- Date of submittal
- Annual emissions of CO_2, CH_4, N_2O, and each fluorinated GHG
- A written explanation if you change emission calculation methodologies during the reporting period
- A brief description of each “best available monitoring method” used, the parameter measured using the method, and the time period during which the “best available monitoring method” was used
- Each data element for which a missing data procedure was used and the total number of hours in the year that a missing data procedure was used for each data element
- A signed and dated certification statement provided by the designated representative of the owner or operator
- Other information required by individual subparts

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Recordkeeping & Document Retention Requirements

- Operators must retain all required records for at least **3** years
  - Records should be kept in an electronic or hard-copy format (as appropriate) and recorded in a form that facilitates expeditious inspection and review
- Records must be made available upon request by EPA
  - For records that are electronically generated or maintained, the equipment or software necessary to read the records should also be made available
- Report Revision
  - If reporter discovers an error in an annual GHG report (or if EPA notifies reporter of an error), must submit a revised GHG report within 45 days

Compliance Strategies

Compliance Strategies

- Calculations and emissions data – gap analysis
  - Estimate 2010 actual emissions if you are on the cusp
  - If you need to report, must develop a plan:
    - What Tiers will I be using and for which equipment?
    - Which equipment should I aggregate? Which ones qualify for common pipe configuration?
    - What fuel and equipment records do I need to keep?
    - How will I calculate emissions (internal spreadsheet, EMIS, etc.) and to what frequency?

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Compliance Strategies

- Monitoring requirements – gap analysis
  - What do I need to install?
  - What is the cost?
  - Can I install the equipment by April 1, 2010?
  - Time sensitive: Do I need to file an extension?
  - If so, prepare extension letter and backup information required for the letter to submit to EPA within 30 days of effective date of the rule (January 28, 2010).
- Develop monitoring plan or template
  - Evaluate using a template across corporate facilities, where appropriate, to ensure consistency and save time/$

Compliance Strategies

- Calibration requirements – gap analysis
  - Plan for initial calibration (by April 1, 2010) and recurring calibration of flow meters, scales, etc. used to gather GHG data (fuel billing meters excluded)
  - Evaluate compliance with 5% accuracy requirements in the rule
  - Establish calibration procedures where required (based on applicable flow meter test method in rule, manufacturer's procedure or industry standard)