

# **U.S. Department of Energy**

## **Clean Air Work Group**

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# GHG Combustion - Exemptions

- GHG emissions are reported for each unit, but similar units may be aggregated if  $\leq 250$  MMBTU/hour
- The following are exempt from the GHG reporting rule:
  1. Portable equipment (*capable of being moved from one location to another, not attached to a foundation*)
  2. Emergency generators or equipment (*only used during power outages, no peak shaving*)
  3. Irrigation pumps at agricultural operations;
  4. Flares (*unless in another subpart*); and
  5. Electricity generating units (Subpart D).



# GHG Combustion - Tier Applicability

	Tier 1	Tier 2	Tier 3	Tier 4
Natural Gas	Any size if using fuel heat value from fuel bills	No restrictions	No restrictions	No restrictions
Fuel Oil	Any size if no heat value analysis provided	No restrictions	No restrictions	No restrictions
Biomass Fuels in Table C-1	Any size if no heat value analysis provided	No restrictions	No restrictions	No restrictions
MSW (no steam)	Any size if no CEMS	No restrictions	No restrictions	No restrictions
MSW	≤1,000 tpy MSW	Any size if no CEMS	No restrictions	No restrictions
Fuel in Table C-1	≤250 MMBTU/hr	≤250 MMBTU/hr	No restrictions	No restrictions
Other Fuels	MSW & Tires <10% of total heat input	N/A	≤250 MMBTU/hr	No restrictions

# GHG Combustion - Tier 1

## 1. CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O Calculation

**Fuel Usage × Default Heat Factor × GHG Factor**

*CO<sub>2</sub> factor and Default Heat Factor: Table C-1; CH<sub>4</sub> & N<sub>2</sub>O factors: Table C-2*

## 2. Natural Gas with Heat Factor on Billing Record:

**Fuel Usage × Billing Record Heat Factor × GHG Factor**

*CO<sub>2</sub> factor: Table C-1; CH<sub>4</sub> & N<sub>2</sub>O factors: Table C-2; Heat Factor: Billing Record*

### **Note:**

- Do not use Tier 1 if you perform or receive fuel sampling for high heat value (BTU) - *does not apply to natural gas*



# GHG Combustion - Tier 2

## 1. CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O Calculation

**Fuel Usage × Measured Heat Factor × GHG Factor**

*CO<sub>2</sub> factor: Table C-1; CH<sub>4</sub> & N<sub>2</sub>O factors: Table C-2;  
measured Heat Factor from analysis (supplier / laboratory)*

### **Note:**

- If you burn a fuel and have an air permit that requires you to track BTU content, use Tier 2 and calculate GHG emissions using the BTU content from supplier or a laboratory analysis of fuel



# GHG Combustion - Tier 2: Steam

## 1. Both Calculations

### **0.001 × Steam × B × GHG Factor**

*GHG factor: Table C-1 (CO<sub>2</sub>) and Table C-2 (CH<sub>4</sub> & N<sub>2</sub>O);*

*B: ratio of maximum heat input capacity to design rated steam output capacity; Steam: total mass of steam generated throughout the year*

### **Note:**

- Use only for units in which MSW or any other solid fuel is combusted to generate steam



# GHG Combustion - Tier 2 Data

- Fuel samples must be representative
- Analysis follows industry standards (e.g. ASTM, ANSI)
- Sample fuels at the following minimum frequencies:

Fuel	Minimum Sampling Frequency
Natural Gas	Semi-annual (2× calendar year), >4 months apart
Coal	Once per each lot delivered
Fuel Oil	Once per each lot delivered; or Sample of each addition to tank
Liquid / Gaseous Fuels	Sample once per calendar quarter
Other Solid Fuels	Weekly sampling with composite monthly analysis

# GHG Combustion - Tier 3

## 1. Solid Fuel:

$$44/12 \times \text{Fuel Usage} \times \text{Carbon}_{\text{AVG}} \times 0.91$$

## 2. Liquid Fuel:

$$44/12 \times \text{Fuel Usage} \times \text{Carbon}_{\text{AVG}} \times 0.001$$

## 3. Gaseous Fuel:

$$44/12 \times \text{Fuel Usage} \times \text{Carbon}_{\text{AVG}} \times \text{MW/MVC} \times 0.001$$

*MW = molecular weight & MVC = 849.5 standard cubic feet (scf) /kg-mole @68°F or 836.6 scf/kg-mole @60°F*

## 4. For CH<sub>4</sub> and N<sub>2</sub>O, use Tier 1 Calculation Methods

### **Note:**

- Can use published density for Fuel Oils: 6.8 lb/gal (No. 1 oil); 7.2 lb/gal (No. 2 oil); and 8.1 lb/gal (No. 6 oil)



# GHG Combustion - Tier 3 Data

- Fuel samples must be representative
- Sample fuels at the minimum frequencies for Tier 2, with the following exceptions:

Fuel	Minimum Sampling Frequency
Gaseous Fuels (Not natural gas / biogas)	Daily sampling if equipped with a continuous analyzer, else weekly

# GHG Combustion - MSW & Biomass

- There are specific requirements for biomass and MSW combustion. EPA provides emissions factors in Tier 1 or 2

Biomass in Table C-1 & C-2	Municipal Solid Waste in Table C-1 & C-2
Wood and Wood Residuals	Municipal Solid Waste
Agricultural Byproducts	Tires
Peat	Plastics
Solid Byproducts	
Biogas (Captured Methane)	
Ethanol	
Biodiesel	
Rendered Animal Fat	
Vegetable Oil	

# GHG Combustion - Reporting

The following information is required for the GHG report:

1. Unit ID number, (if reporting individually)
  2. Code representing the type of unit, (e.g. B001)
  3. Maximum rated heat input capacity of the unit, (e.g. MMBTU/hr or horsepower-hour)
  4. Each type of fuel combusted during the report year
  5. Tier used to calculate CO<sub>2</sub> emissions for each fuel combusted and start and end date for using the tier
  6. Annual unit emissions of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub>e
- *Units ≤250 MMBTU/hr and not Tier 4 can be combined*
  - *Subpart C sources can submit an abbreviated 2010 report*



# GHG Combustion - Aggregation

- Aggregation allows you to report fuel combustion for a group, rather than for each unit individually
  - Includes exempt sources if on the same pipeline
- Cannot be used for units >250 MMBTU/hour
  - Natural gas with common pipe can be unit of any size
- Cannot be used for Tier 4 units, (see common CEMS)
- Treat all aggregated units as one “super-unit”
- Report the highest maximum rated heat input capacity of the group, NOT aggregated input capacity of unit group
- If 95% (mass or volume) of fuel is combusted in large combustion units, all GHG emissions can be attributed to the large sources

# GHG Combustion - Missing Data

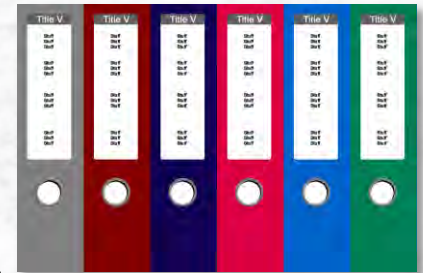
1. Missing fuel analysis (carbon content, HHV)
    - Use the arithmetic average of the “before” and “after” values of the missing data
    - If there is no “after” value, use best available estimate for the missing parameter based on all available data
  2. Fuel Usage
    - Best available estimate, based on all available data
  3. CEMS Data
    - Use the missing data substitution procedures in part 75
- You must report the substituted data and procedure for developing the substituted values in the GHG report



# GHG Combustion - Recordkeeping

The following records must be kept:

- Quantity of fuel combusted for each type of fuel
- Frequency of HHV determinations and HHV(Tier 2)
- Quantity of steam generated by a unit, (if applicable)
- Frequency of carbon content sampling and carbon content value (Tier 3)
- Biogenic fuel consumption and HHV
- Mass of biomass combusted, (if applicable)
- Monitoring equipment maintenance records
- Copy of the GHG monitoring plan, report and calculations



**These records can be kept in electronic or paper forms.**

# GHG Combustion - Assistance



[epa.gov/climatechange/emissions/GHG-calculator/stationary-fuel.html](http://epa.gov/climatechange/emissions/GHG-calculator/stationary-fuel.html)  
United States Environmental Protection Agency

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## Applicability Tool

### ▶ Calculation Worksheet for Stationary Fuel Combustion Sources

**Instructions.** The fuel-feed types you selected for the facility are presented below. Input the annual amounts combusted for each type.

Selected Stationary Source Combustion Fuels for Facility*	Annual Amount Combusted	Unit of Measure	CO <sub>2</sub> ** (metric tons/yr)	CH <sub>4</sub> (metric tons/yr)	N <sub>2</sub> O (metric tons/yr)
Natural Gas (weighted U.S. average)	<input type="text" value="87654321"/>	Standard cubic feet	4778	0	0
Distillate Fuel Oil No. 2	<input type="text" value="1234567"/>	Gallon	12601	1	0
<b>Emissions</b>			17379	1	0
<b>Global Warming Potential (GWP)</b>			1	21	310
<b>CO<sub>2</sub>e Emissions</b>			17379	21	0
<b>Annual CO<sub>2</sub>e Emissions for Selected Fuels (metric tons/year)</b>					<b>17400</b>

\* Emissions from fuels combusted in emergency generators and portable equipment should not be counted toward the Applicability.

\*\* CO<sub>2</sub> emissions from biomass-derived fuels are not counted toward the Applicability.

Calculate

Next >>

# GHG Combustion - e-GGRT

- The electronic GHG reporting tool (e-GGRT) is the only method for submitting GHG information to U.S. EPA
- e-GGRT will have calculators for data entry (similar to the applicability tool) or direct entry of GHG emissions
- e-GGRT has different data entry requirements and options depending on the “configuration” selected, (e.g. aggregated, shared CEMS, etc.)
- You can report different “configurations” at the same facility





# Boiler NESHAP – Reconsideration I

- On March 21, 2011, EPA issued notice of reconsideration for the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Industrial, Commercial, and Institutional Boilers at major (*Subpart DDDDD*) and area sources (*Subpart JJJJJ*)
- On May 18, 2011, EPA delayed the effective date of the major source boiler NESHAP until EPA the judicial review or reconsideration is complete – whichever is earlier
- EPA has not stated if the change in effective dates will affect the compliance dates
- EPA may issue a public notice for comment on the rule aspects under reconsideration



# Boiler NESHAP – Reconsideration II

- The area source boiler NESHAP became effective on May 20, 2011 and is not affected by the delay
  - New area sources must comply upon installation
  - Existing area source with no emissions limitations (work or management practice standard) in the NESHAP must comply by March 21, 2012
  - Existing area sources with emissions limitations or energy assessment requirements in the NESHAP must comply by March 21, 2014



# Synthetic Minor Boilers

- EPA has “once-in, always-in” MACT policy
- Major MACT - potential or actual HAP emissions  $\geq 10$  tpy 1 HAP,  $\geq 25$  tpy +1 HAP
- If actual HAP is less than major MACT thresholds, you can apply for a synthetic minor permit subjecting you to the boiler MACT for area sources (permit must be issued by March 21, 2014)
- Review requirements for major and area boilers
- **Example:**  
Potential HAP emissions: 40 tpy +1 HAP, 15 tpy benzene  
Actual HAP emissions: 20 tpy +1 HAP, 7.5 tpy benzene  
*Synthetic minor permit with HAP limits of 24.9 & 9.9 tpy*



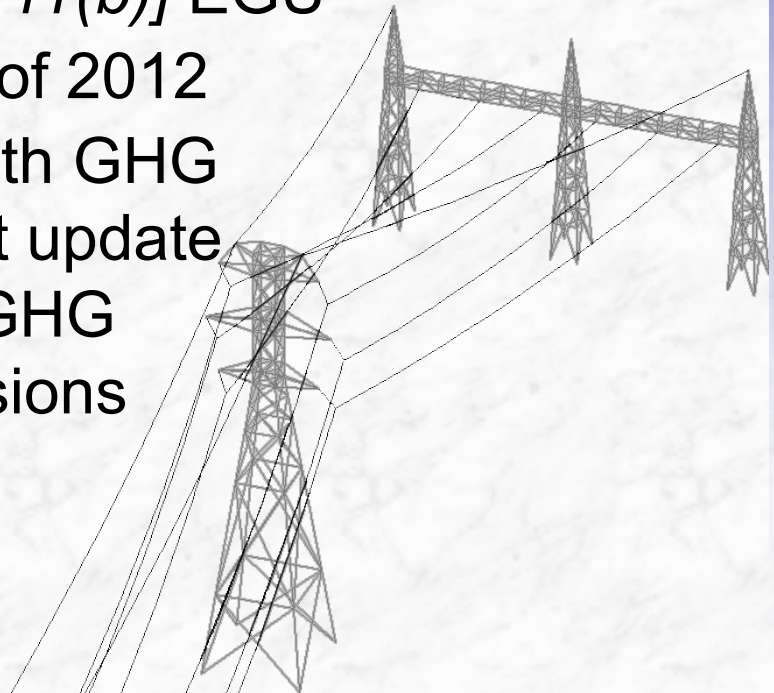
# CISWI NSPS – Reconsideration

- The Commercial and Industrial Solid Waste Incineration (CISWI) Unit New Source Performance Standard (NSPS) is included in the March 21, 2011 reconsideration notice and the May 18, 2011 delay of effective dates
- The CISWI NSPS is delayed until EPA the judicial review or reconsideration is complete – whichever is earlier
- EPA has not stated if the change in effective dates will affect the compliance dates
- EPA may issue a public notice for comment on the rule aspects under reconsideration




# EGU NSPS – Update

- EPA is continuing work on the Electricity Generating Unit (EGU) NSPS
- Expected publication of a proposed rule in August, 2011
- Proposed rule expected to include greenhouse gas (GHG) limitations for both existing [*Clean Air Act Section 111(d)*] and new [*CAA Section 111(b)*] EGU
- Final rule expected in Summer of 2012
- When a final NSPS is issued with GHG limitations, Title V facilities must update their permit applications to list GHG emissions from individual emissions units and re-classify exempt or insignificant emissions units



# PM<sub>2.5</sub> NSR Implementation

- 
- Final rule implementing the PM<sub>2.5</sub> new source review program was submitted to the *Federal Register*
  - The rule will repeal the “grandfather” provision of considering PM<sub>10</sub> as a surrogate for PM<sub>2.5</sub>
  - Policy is effective May 16, 2011
  - Applicable to facilities installing new or modifying existing sources subject to the Prevention of Significant Deterioration (PSD) or New Source Review (NSR) permit programs

# GHG & Title V/PSD: Requirements – I

- On July 1, 2011, the second phase of the “Prevention of Significant Deterioration (PSD) / Title V Greenhouse Gas (GHG) Tailoring Rule” take effect
- **Phase 1 (January 2, 2011):**
  - Existing Title V sources with a facility-wide potential-to-emit of  $\geq 100,000$  tpy CO<sub>2</sub>e and  $\geq 100$  tpy of all six GHG (by mass) must include actual and potential facility-wide GHG emissions in the next **renewal or modification**
  - Pending PSD permit applications must include best available control technology (BACT) for GHG if the emissions unit’s potential-to-emit for GHG is  $\geq 75,000$  tpy CO<sub>2</sub>e and  $>0$  tpy for all six GHG (by mass)

# GHG & Title V/PSD: Requirements – II

## • **Phase 2 (July 1, 2011):**

- Non-Title V sources with the potential-to-emit of  $\geq 100,000$  tpy CO<sub>2</sub>e and  $\geq 100$  tpy of all six GHGs (by mass) are now subject to Title V permitting requirements
- Applicability thresholds for minor PSD sources:
  - $\geq 100,000$  tpy of CO<sub>2</sub>e; and
  - $\geq 250$  tpy /  $\geq 100$  tpy of all six GHGs (by mass)
- Applicability thresholds for major PSD sources:
  - 75,000 tpy of CO<sub>2</sub>e; and
  - $>0$  tpy of all six GHGs (by mass)



# GHG & Title V: Existing Title V

## Applicability

- Existing Title V applicants and permit holders
- Actual or potential GHG emissions:
  - $\geq 100$  tpy GHG by weight; **AND**
  - $\geq 100,000$  tpy CO<sub>2</sub>e



## Requirements

- Include facility-wide GHG emissions in application
  - List all pollutants for which facility is major - §70.5(c)(3)(i)*
- No deadline for application with GHG emissions
  - Include GHG in renewal or modification application
  - Any application submitted after January 2, 2011

# GHG & Title V: Synthetic Minor

## Applicability

- Existing Synthetic Minor Title V permit holders
- Actual or potential GHG emissions:
  - $\geq 100$  tpy GHG by weight; **AND**
  - $\geq 100,000$  tpy CO<sub>2</sub>e

EMISSIONS LIMIT
10 TPY
25 TPY
100 TPY

## Options

- Submit a revised Synthetic Minor permit application with GHG emissions limitations (both weight GHG and CO<sub>2</sub>e)
  - Final Synthetic Minor Permit **issued** before **7/1/12**
  - Submit permit application well before issue date
- Submit a Title V permit application
  - **Submit** Title V permit application before **7/1/12**

# GHG & Title V: Non-Title V

## Applicability

- Facilities not subject to Title V
- Actual or potential GHG emissions:
  - $\geq 100$  tpy GHG by weight; **AND**
  - $\geq 100,000$  tpy CO<sub>2</sub>e

## Options

- Submit a Synthetic Minor permit application with GHG emissions limitations (both weight GHG and CO<sub>2</sub>e)
  - Final Synthetic Minor Permit **issued** before **7/1/12**
  - Submit permit application well before issue date
- Submit a Title V permit application
  - **Submit** Title V permit application before **7/1/12**



# GHG & PSD: Existing PSD Major

## Applicability

- Existing facilities with actual or potential emissions greater than PSD applicability threshold (100 / 250 tpy)
- Actual or potential GHG emissions from project:
  - $\geq 0$  tpy GHG by weight; **AND**
  - $\geq 75,000$  tpy CO<sub>2</sub>e

## Requirements

- GHG must be included as a pollutant subject to Best Available Control Technology (BACT)



# GHG & PSD: New PSD Major Sources

## Applicability

- Facilities with actual and potential emissions below PSD applicability threshold (100 / 250 tpy)
- Actual or potential GHG emissions from project:
  - $\geq 100$  tpy GHG by weight; **AND**
  - $\geq 100,000$  tpy CO<sub>2</sub>e

## Options:

- For new installations or modifications, submit a synthetic minor permit limiting new emissions
- Submit a PSD permit application with GHG BACT



# Clean Air Interstate Rule (CAIR)

- The revised CAIR (Transport Rule) is at OMB for review
- It will consist of a budget trading program
- Reduce **power plant** emissions of SO<sub>2</sub> and NO<sub>x</sub> – which form PM<sub>2.5</sub> and O<sub>3</sub>
- Will replace CAIR with information from 2008 case
- Likely to focus on intrastate trading
- Limited interstate trading
- Coordinated with the NAAQS

