

Climate Change Developments and Proposed EPA Greenhouse Gas Reporting Rule

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Outline of Presentation

- Climate Change Developments
 - *Massachusetts v. EPA*
 - Endangerment Finding
 - Legislative Status
- EPA's Proposed GHG Reporting Rule
 - Background
 - Reporting Emissions
 - Reporting for Specific Industries
 - Odds and Ends
- Questions

Climate Change Developments

Massachusetts v. EPA

- Apr. 4, 2007 Supreme Court decision
- Held: CO₂ is a “pollutant” under the Clean Air Act
- EPA must determine if GHG from motor vehicles either:
 - Causes or contributes to air pollution that endangers public health or welfare
 - Does not cause or contribute to air pollution endangerment
 - Science is too uncertain to make a reasoned judgment

EPA Response to *Massachusetts v. EPA*

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- Initially, postponed decision in response to Energy Independence and Security Act of 2007's renewable fuels mandate
- Released ANPR on July 11, 2008
 - Discussed issues/approach for regulating GHGs under CAA
 - Did not propose any specific regulatory program nor propose action on endangerment mandate from Supreme Court
 - “Parade of horrors” if GHGs regulated under CAA
 - Invitation for Congressional action

EPA Proposed Endangerment Finding

- April 17, 2009: GHG emissions can “reasonably be anticipated to endanger” public health and welfare
 - Higher ground level ozone concentrations
 - Increased drought
 - More heavy downpours and flooding
 - More frequent and intense heat waves and wildfires
 - Greater sea level rise
 - More intense storms
 - Harm to water resources, agriculture, wildlife and ecosystems
 - National security challenges from increased resource scarcity
- Emissions from mobile sources cause or contribute
- In FR on April 24, 2009; comments due by June 23, 2009
- No regulations proposed but new mobile source rule implied

Legislative Action

- House of Representatives
 - Waxman/Markey bill: American Clean Energy and Security Act of 2009
 - Economy-wide cap and trade program
 - Many allowances will be given away to trade sensitive industries through 2026
- Senate
 - Nothing planned this year except energy, renewable fuels initiatives

Rule Overview

- Required by FY2008 Consolidated Appropriations Act signed by President Bush in December 2007
- Extensive stakeholder consultation by EPA
- Rule promulgated pursuant to general rulemaking authority under Clean Air Act
- Specifically, authorized by information-gathering authority under Section 114 of Clean Air Act

How Will Information Be Used?

- Create more robust national GHG registry
- Inform GHG policy development
- Improve understanding of factors influencing GHG emission rates at facility level
- Improve data on sources not currently well understood
 - Landfills
 - Manure management
- Track GHG emission trends
- Raise awareness of GHG emissions among reporters

Who Is Regulated?

- Direct emitters of GHGs, generally at rates > 25,000 metric tons CO₂e/yr (tCO₂e/yr)
- Fossil fuel suppliers
- Industrial gas suppliers
- Vehicle manufacturers
- A facility may have to report as both emitter and supplier (e.g., a refinery)

How Big Is 25,000 metric tons/yr CO₂e?

- Roughly equivalent to:
 - 131 rail cars of coal
 - 58,000 bbl oil
 - Energy used by 2,200 homes
- Most office buildings will fall below threshold
- But threshold is likely to pick up some:
 - Large commercial buildings
 - Hospitals
 - Universities or office campuses
 - Warehouses

Reach of Rule

- Estimated number of potential reporters who will have to determine applicability: 30,000
- Estimated number of reporters: 13,000
- Estimated % of United States GHG emissions: 85 – 90

Which GHGs Are Included?

<u>GHG</u>	<u>CO₂e (GWP)</u>
CO ₂	1
Methane CH ₄	21
Nitrous oxide N ₂ O	310
Sulfur hexafluoride SF ₆	23,900
Hydrofluorocarbons (HFCs)	12 – 17,400 (varies)
Perfluorocarbons (PFCs)	6,500 – 17,340 (varies)
Other fluorinated gases NF ₃ , (HFEs)	11 – 17,200 (varies)

When Would Reporting Begin?

- Facilities and suppliers:
 - Begin collecting data on January 1, 2010
 - Reporting for CY2010 by March 31, 2011
- EGUs in Acid Rain Program: continue to report quarterly
- Vehicle manufacturers: Begin reporting with model year 2011
- New facilities or facilities newly subject to rule (new “all in” source or emissions > threshold) as a result of a physical or operational change:
 - Report for partial CY containing first month of operation
 - Each full CY thereafter

Reporting Emissions

What Is a Facility?

- Any physical property, plant, building, structure, source or stationary equipment
- Located on one or more contiguous or adjacent properties in actual physical contact or separated solely by a public roadway or other public ROW
- Under common ownership or control
- That emits or may emit a GHG

Classes of Facility Reporters

- Categorical reporters (“all in”)
- Threshold reporters
 - > 25,000 tCO₂e/yr
 - In source category for which measurement rules established
 - In evaluating emissions, must include emissions from:
 - Stationary fuel combustion
 - Any other source category for which measurement rules established
- Capacity reporters: Manufacturing rate > threshold
- Once in, always in

Exceptions to Facility Reporting

- Importers, suppliers of fuels
- Importers, suppliers of industrial GHGs
- Manufacturers of motor vehicles
- Manufacturers of engines
- Generally, reporting for these categories will be at corporate level

Categorical Reporters (“all in”)

- EGUs in the Acid Rain Program
- Adipic acid production
- Primary aluminum production
- Ammonia manufacturing
- Cement production
- HCFC-22 production
- Lime production
- Nitric acid production

Categorical Reporters (“all in”)

- Petrochemical production
- Petroleum refineries
- Phosphoric acid production
- Silicon carbide production
- Soda ash manufacturing
- Titanium dioxide production
- Active underground coal mines (with quarterly CH₄ sampling of ventilation systems by MSHA)
- Production of industrial GHGs (N₂O, fluorinated GHGs)

Categorical Reporters (“all in”): Fuel etc. Suppliers

- Coal suppliers
 - Active underground and surface coal mines
 - Coal importers, exporters
 - Reclaimers of waste coal
- Producers, importers, exporters of coal-based liquids
- Refiners, importers, exporters of petroleum products*
- Suppliers of natural gas (LDCs)
- NGL suppliers (gas processing plants that separate NGLs)
- Suppliers of CO₂

Threshold Reporters (If GHG > 25,000 tCO₂e/yr)

- EGUs (other than in Acid Rain Program)
- Electronics (photovoltaic) manufacturing
- Ethanol production
- Ferroalloy production
- Fluorinated GHG production
- Food processing
- Glass production
- Hydrogen production (merchant)
- Iron and steel production
- Industrial wastewater treatment

Threshold Reporters (If GHG > 25,000 tCO₂e/yr)

- Lead production
- Magnesium production
- Pulp and paper manufacturing
- Stationary fuel combustion
- Zinc production
- MSW and some industrial waste landfills
- Manure management systems
- Importers, exporters of industrial GHGs (N₂O, fluorinated GHGs)
- Importers, exporters of bulk CO₂

Capacity Reporters

- Electronics manufacturing with production capacity of:
 - Semiconductors: 1,080 m² silicon
 - Microelectromechanical systems: 1,020 m² silicon
 - LCD: 235,700 m² LCD
- Electric power systems: nameplate capacity of SF₆ or perfluorocarbons (PFCs) > 17,820 lb
- Facilities that do not produce HCFC-22 but destroy > 2.14 metric tons/yr HFC-23

How Are Emissions Determined?

- Combination of
 - Measurement with CEMs if present
 - Facility-specific calculations
- Specific techniques identified in subpart applicable to each source category
- Includes SSM emissions for some sources
- Can exclude emissions from combustion of biomass fuels
- No third-party verification required

What Records Have to Be Kept?

- Units, etc. for which GHG emissions calculated
- All data used to calculate emissions
- Documentation of the data collection process
- Emissions calculations and methods used
- Emission factors
- Facility operating data used to calculate emissions
- Names and responsibilities of key facility personnel involved in calculating and reporting emissions

What Records Have to Be Kept?

- Annual GHG emissions reports
- Log book documenting changes in GHG accounting methods and changes to instrumentation used for calculations
- Missing data computations
- Written quality assurance performance plan (QAPP)
 - Includes procedures for maintenance and repair of all instrumentation, maintenance log, calibrations and other QA tests
- Records retained for 5 years

Reporting Mechanics

- Reports submitted electronically
- New facility numbers to be provided by EPA
- Emissions to be reported in metric units (generally, kg or metric tons per year)
- Reported as both GHG and CO₂e per time

Reporting Mechanics

- Report certified by “Designated Representative”
 - Prepared in accordance with Part 98 requirements
 - Information is true and accurate
 - Based on reasonable inquiry of persons responsible for obtaining information
- DR is person having overall responsibility for operation of reporting facility or for environmental matters “for the company”
- DR may appoint alternate but retains liability for submission and accuracy

Reporting Liability

- Facility must submit certificate listing all owners and operators of facility before submitting any GHG reports
- A submitted GHG report is legally binding on all owners and operators without regard to any agreements between them
- An order issued to the DR binds all owners and operators for whom the DR is acting
- Reported data (except CBI) will be available to public on EPA website

Reporting for Specific Industries

Typical Source Category Rule Structure

- Source category applicability
- Reporting threshold
- Which emissions are covered?
- How are emissions calculated?
- Protocol for estimating missing data
- Reporting and recordkeeping requirements

Stationary Fuel Combustion

Source Category Applicability

- Devices that burn solid, liquid or gaseous fuel
- Produce electricity, generate steam, provide useful heat or energy for commercial, industrial, or institutional use, or
- Reduce waste volume by burning combustible matter
- Includes boilers, combustion turbines, engines, incinerators, and process heaters
- ***Does not include*** portable equipment or generators designated for emergency use in a state air permit

Reporting Threshold

- Facility contains one or more stationary combustion sources and either:
 - Facility also contains an “all in” source
 - Facility emits $> 25,000$ tCO₂e/yr per year from stationary fuel combustion and all other threshold reporter categories combined
 - Facility has no other source categories but has more than 30 MMBtu/hr heat input capacity and emits $> 25,000$ tCO₂e/yr from stationary fuel combustion

Which Emissions Are Covered?

- CO_2
- CH_4
- N_2O
- From each stationary combustion unit

How Are CO₂ Emissions Calculated?

- Tier 1 – 4 methods according to combustion unit size and fuel used
- Tier 4: Coal-fired units > 250MMBTU/hr with > 1000 hr/yr operation and existing monitoring infrastructure
- Tier 1: Coal-, gas-, or diesel-fired units < 250MMBTU/hr without monitoring infrastructure and no monthly measured HHV

How Are CO₂ Emissions Calculated?

- Tier 4: Concentration, flowrate measured by CEMS
- Tier 3: Fuel C content, related fuel quantities
- Tier 2: Measured HHVs, related fuel quantities, default CO₂ emission factors
- Tier 1: Annual fuel quantities, default CO₂ emission factors, default HHVs

How Are CH₄ and N₂O Emissions Calculated?

- Default emission factors
- Default or measured high heat values or calculated heat input required under Acid Rain Program
- Performed at unit or facility level, depending on Tier

Reporting and Recordkeeping Requirements

- Facility *and* unit-level reporting required
- Aggregation of unit emissions allowed if:
 - Combined heat input < 250 MMBTU/hr
 - When monitored in common stack
 - When fuel fed to units by common supply line
 - But amount of each type of fuel combusted must be quantified

Petroleum Refineries

Source Category Applicability

- Any facility producing products by distillation of petroleum or redistillation, cracking or reforming of unfinished derivatives
- Rule applies to wide range of units, including:
 - Cat crackers
 - Fluid and delayed cokers
 - Catalytic reformers
 - Storage tanks
 - Compressors, pumps, valves, PRVs, flanges, connectors in gas service
 - Vessel, barge, truck loading operations
 - Flares
 - Land disposal units
 - SRUs
 - Non-merchant hydrogen plants

Reporting Threshold

- No threshold, all in
- Refiners also need to report as petroleum product suppliers

Which Emissions Are Covered?

- CO₂, CH₄, and N₂O from each stationary combustion device and flare
- CO₂, CH₄, and N₂O coke burnoff emissions from each cat cracker, fluid coker, and catalytic reformer
- CO₂ from sour gas sent off-site for sulfur recovery
- CO₂ from process emissions for each on-site SRU
- CO₂, CH₄, and N₂O from each coke calcining unit
- CO₂ from asphalt blowing operations controlled with a combustion device, CH₄ if not controlled

Which Emissions Are Covered?

- CH₄ fugitives from equipment leaks, storage tanks, loading operations, delayed cokers, and uncontrolled blowdown emissions
- CO₂, CH₄, and N₂O from each process vent not otherwise covered
- CH₄ from on-site landfills
- CO₂ and CH₄ from on-site wastewater treatment
- CO₂ and CH₄ from non-merchant hydrogen production

How Are Emissions Calculated?

- Different method specified for each refinery source type
- Example 1: CO₂ emissions from flares
 - If flow monitor, use measured flowrate; otherwise, use engineering calculations, records, or estimates
 - If monitor for HHV or C content continuously or daily, use those values
 - If HHV or C content not monitored at least daily, do separate calculations for normal operations and SSM
 - SSM: engineering calculations to estimate C content for each SSM event
 - Normal operations: use average heating value for fuel gas
 - Add calculated CO₂ amounts from normal operations using default value of 60 kg CO₂/MMBtu and amounts from SSM

How Are Emissions Calculated?

- Example 2: CH₄ from equipment leaks
 - Method A: Process-specific CH₄ data and EPA protocol for equipment leak emission estimates, or
 - Method B: Calculate using simple default factors
 - 0.4 metric ton/yr for each crude distillation column
 - 0.2 metric ton/yr for each cat cracker, coker, hydrocracker, distillation column (incl. each depropanizer, debutanizer)
 - 0.1 metric ton/yr for each hydrotreater, catalytic reformer, viscosity breaker
 - 4.3 metric ton/yr for each hydrogen unit
 - 6 metric ton/yr for each fuel gas system

How Are Emissions Calculated?

- Example 3: CH₄ from storage tanks (other than unstabilized crude oil, with vapor-phase CH₄ concentration > 0.5 % by volume)
 - Method A: Tank-specific CH₄ composition data and TANKS
 - Determine tank-specific CH₄ composition data from measurement or process knowledge
 - Method B: Calculate using simple default factor
 - 0.1 metric ton/yr per MMbbl of crude oil or intermediates received from off-site that are processed at the refinery

Reporting and Recordkeeping Requirements

- Incorporates additional reporting requirements for combustion sources, hydrogen plants, petrochemical production, on-site landfills, on-site wastewater treatment systems
- Additional detailed reporting information for
 - Cat crackers, fluid cokers, catalytic reformers, SRUs, coke calcining units
 - Fluid cokers (flexicoking type)
 - Asphalt blowing operations
 - Process vents
 - Equipment leaks, storage tanks, uncontrolled blowdown systems, delayed cokers, loading operations

Petrochemical Production

Source Category Applicability

- Facility that produces:
 - Acrylonitrile
 - Carbon black
 - Ethylene
 - Ethylene dichloride
 - Ethylene oxide
 - Methanol
- If petrochemical is produced by an integrated process at a facility, it must be the primary product of the process for reporting to be required

Reporting Threshold

V&E

- No threshold, all in

Which Emissions Are Covered?

- CO₂ from each petrochemical process unit
- Include CO₂ captured from process off-gas
- CO₂, CH₄, and N₂O from each stationary combustion unit
- CH₄ (but not CO₂) from each on-site wastewater treatment system

How Are Emissions Calculated?

- CO₂ from process vents, combustion sources:
 - CEMs if CEMs is installed
 - If no CEMs, use mass balance for each unit
 - Use continuous flow meter to measure each feedstock
 - Sample C content of each feedstock, product on weekly basis
 - Calculate C emissions as difference between feedstocks and products for each gaseous, liquid, and solid feedstock, product
 - For integrated processes, include emissions attributable to other products similarly
- Flares: Estimate CO₂, CH₄, and N₂O using refinery flare rules
- Other combustion sources: Use combustion source rules
- CH₄ from wastewater treatment: Use wastewater treatment rules

Reporting and Recordkeeping Requirements

- Report by facility and for each petrochemical, by process unit
- Also report:
 - Methods used to determine feedstock and product flows, C content
 - Number of actual and substitute data points for each parameter
 - Annual quantities of each feedstock consumed, product and by-product produced
 - Each C content measurement for each feedstock, product and by-product
 - All calculations, measurements, calibrations, etc.
 - Identify units that burned process off-gas
 - CEMs verification data

Suppliers of Petroleum Products

Source Category Applicability

- Petroleum refiners
- Importers and exporters of petroleum products
- ***But not*** terminal operators, pipelines, oxygenate or blendstock blenders, or transmix processors

Reporting Threshold

V&E

- No threshold, all in

Which Emissions Are Covered?

- CO₂ only
- CO₂ from the complete combustion of each petroleum product and NGL
 - Produced
 - Used as feedstock
 - Imported or exported
 - Import/export petroleum product definition excludes asphalt, waxes, lubricants, plastics
- Also, CO₂ from complete combustion of any co-produced biomass fuel

How Are CO₂ Emissions Calculated?

- Volume of each petroleum product or NGL x product-specific CO₂ emission factor
- CO₂ emission factor determined from:
 - EPA default factors for each product type
 - Direct measurement of density and C content (sampled monthly, composited at end of year or end of gasoline season)
- Refiners calculate annual CO₂ from combustion of:
 - Petroleum products and NGLs leaving refinery
 - **Minus** CO₂ from combustion of non-crude feedstocks (NGLs, H₂ and other hydrocarbons, products)
 - **Minus** CO₂ from combustion of biomass fuels
- Importers and exporters calculate CO₂ from combustion of all products

Reporting and Recordkeeping Requirements

- Refiners
 - Report refinery production at facility level
 - Report imports and exports at corporate level
- Refineries
 - Volume of each product, associated CO₂ emissions
 - Measured density and C content if not using default factors
 - API gravity, S content, volume, country of origin of each crude feedstock
 - Diesel volume intended for highway use (<15 ppm sulfur, no dyes), associated CO₂ emissions
- Importers, exporters
 - Volume of each product, associated CO₂ emissions
 - Measured density and C content if not using default factors
 - Diesel volume intended for highway use (<15 ppm sulfur, no dyes), associated CO₂ emissions

Odds and Ends

Compliance and Enforcement

- Violations subject to Clean Air Act enforcement
- Administrative and civil penalties up to \$37,500 per day per violation
- Each day of violation is a separate violation
- Criminal penalties and citizen suits

Compliance and Enforcement

- EPA has identified the following as potential non-compliances:
 - Failure to report
 - Failure to collect data to estimate emissions
 - Failure to continuously monitor and test as required
 - Failure to keep records
 - Failure to estimate emissions using the specified methods
 - Falsification of reports

Is CO₂ Now “Subject to Regulation”?

- *In re Deseret Power* (EAB Nov. 13, 2008): EPA Region 8 must consider whether to impose a BACT limit for CO₂
 - EPA must consider whether CO₂ is a pollutant “subject to regulation” under the Clean Air Act
- EPA December 18, 2008 memo: Pollutants covered by PSD program do not include CO₂
- Proposed rule states that at this time, reporting rule for GHG emissions does not trigger PSD review of CO₂ emissions
- December memo is under review
 - Proposal says that proceeding is forum to consider whether monitoring regulations should now trigger PSD review for CO₂

Regulatory Development Schedule

V&E

- Published in Federal Register on April 10
- Public hearings
 - April 6 – 7: Arlington VA
 - April 16: Sacramento, CA
- Comment period closes on June 9
- Promulgation of final rule expected late summer

Selected Issues for which Comment Sought

- Should onshore oil and gas production be included as source category?
- Numerous fugitive emission measurement/estimation issues for oil and natural gas production category
- Report electricity purchases?
- How can non-emissive end uses of petroleum products (e.g., plastics) be tracked?
- Should data collection authority be delegated to states?
- Should suppliers of fuels have to account for CH₄, N₂O emissions from combustion as they have to for CO₂?

Questions