Mandatory Reporting of Greenhouse Gas Emissions for Refineries and Hydrogen Plants

California Global Warming Solutions Act of 2006 (AB 32)

December 3, 2008
Sacramento, California
California Air Resources Board

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Participation Information

- Workshop Materials and Guidance:
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Regulation and Final Statement of Reasons:
  http://www.arb.ca.gov/regact/2007/GHG2007/GHG2007.htm
- Webinar Information for Refineries:
  https://www2.gotomeeting.com/register/179383358
  Phone Dial-In: 888-677-4199 Access Code: 49578

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Agenda

- Mandatory Reporting Implementation
- Review of General Requirements
- Reporting for Refineries and Hydrogen Plants
  - Stationary Combustion
  - Process Emissions
  - Fugitive Emissions
  - Flares and Control Devices
- Reporting for Hydrogen Production Facilities

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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
- WCI Regional Reporting
- U.S. EPA Mandatory 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 Reporting Requirements

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Who's Responsible for Reporting?

- At facilities, the entity with operational control
- Facility includes reportable sources within contiguous boundaries under common control
- Operational control = introduces and implements environmental, health, safety and operating procedures within the facility

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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
- Indirect energy usage

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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
  - Not currently specified in the oil and gas sector

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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

- Refineries and hydrogen plants report by June 1
- Power and cogen plants within these larger facilities report on the same schedule
- Most general combustion facilities report by April 1
- Oil and gas production facilities 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 EO 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 CO2e
- 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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QUESTIONS?

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Reporting for Refineries

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Stationary Combustion – CO_2

- Refinery Fuel Gas – CO_2 emissions from each RFG system

1. Carbon content every 8 hours
2. Carbon and HHV content daily, calculate EF, use daily average HHV
3. CEMS

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Stationary Combustion – CO_2

- Natural Gas and Associated Gas – GHG emission calculation based on fuel HHV

1. HHV ≥975 and ≤1100 Btu/scf, use monthly HHV and ARB EF
2. Gas outside range, determine carbon content monthly
3. CEMS

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Stationary Combustion – CO_2

- Other Fuels

1. Default HHV and EF
2. Measure HHV and use default EF
3. Measure carbon content
4. CEMS

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Stationary Combustion – CO_2

- Low Btu Gases

1. Destroyed or used as supplementary fuel – treat as a fuel mixture – 95113(f)
2. Determine carbon content quarterly – 95113(d)(3)
3. Flexigas – carbon content daily - 95125(d)(3)(A)
4. Flared and reported to Air District – 95113(d)
5. CEMS

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Stationary Combustion – CO_2

- Fuel Mixtures

1. Determine CO_2 emissions for each fuel separately and sum
2. RFG and NG or low Btu gas – determine carbon content of mixture every 8 hours
3. Associated gas and NG – determine emissions based of HHV
4. CEMS

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Stationary Combustion – CH_4 and N_2O

1. Measure fuel HHV – use default EF
2. Default HHV and EF
3. Develop fuel specific EF with ARB approval (source testing…)

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Source Test Process

- Prepare source test plan
  - See ARB guidance for template
  - Include test methods, schedule, sampling locations, QA/QC, etc.
- Submit plan to ARB for approval
- On approval, perform testing, providing ARB and air district notification of test dates for possible agency participation
- Using valid test data, develop appropriate emission factor(s)

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Planning for Source Testing

- Schedule enough time for test plan preparation, approval, on-site testing, and data analysis
- GHG reporting deadlines cannot be delayed if source test data are not ready
  - Use other specified estimation methods in regulation if source test data not available
- ARB staff is providing written guidance and resources

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QUESTIONS?

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Process Emissions Catalyst Regeneration - CO_2

- Fluid Catalytic Cracking Unit
  - FCCU Based on EPA coke burn rate
- Other Catalyst Regeneration
  - Periodic regeneration
  - Continuous Regeneration (other than FCCU and Fluid cokers)

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Process Emissions
Process Vents - CO_2, CH_4 and N_2O

- Report emissions not reported elsewhere
- Determine
  - Vent rate (scf/time)
  - GHG molar fraction in vent stream
  - Time duration of venting
  - Number of venting events

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Process Emissions
Asphalt Production – CO_2 and CH_4

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Mass of asphalt blown
- Use default CH_4 EF
- Use default destruction efficiency

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Process Emissions
Sulfur Recovery – CO_2

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Flow of acid gas to SRU
- Use default molar fraction CO_2 in acid gas, OR
- Or, conduct ARB approved source test to determine CO_2 molar fraction

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Fugitive Emissions
Wastewater Treatment – CO_4 and N_2O

- Determine annual wastewater volume
- Measure effluent COD quarterly
- Measure effluent N content quarterly
- For CH_4 emissions choose appropriate methane conversion factor

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Fugitive Emissions Oil/Water Separators – CH_4

- Report emissions not reported elsewhere (e.g. Air District flaring reports)
- Determine
  - Volume of H_2O treated
- Use default EF based on system specifics – separator type and operating conditions

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Fugitive Emissions Storage Tanks – CH_4

- Use EPA TANKS Model (Version 4.09D)
- Enter storage tank parameters for crude oil, naphtha, distillate oil, asphalt, and gas oil storage tanks
- Enter ARB supplied product constants (Antoine's constants)
- Calculate VOC emissions
- Convert to CH_4 using default CF or headspace gas analysis

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Fugitive Emissions Equipment Fugitives – CH_4

- Extend LDAR program to gas system components (RFG, natural gas, PSA off-gas)
- Identify, count and screen components
- Calculate VOC emissions using CAPCOA EFs and correlation equations
- Use gas composition or CF to convert VOC to CH_4

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Flares and Control Devices CO_2, CH_4, and N_2O

- Calculate CO_2, CH_4, and N_2O emissions from combustion of pilot and purge gases
- Use Air District specific GHG emission method
- Use Air District flare destruction efficiencies
- If reporting not mandated by Air District use through-put based default EF and NMHC to carbon CF
- For "Other Destruction Devices" not included in Air District reporting
  - Measure volume of gas
  - Determine carbon and MW quarterly

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QUESTIONS?

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Reporting for Hydrogen Production Facilities

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Stationary Combustion and Process CO_2

1. CEMS

2. Fuel Stationary Combustion and Process Emissions
   - Calculate and report fuel and feedstock separately

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Stationary Combustion and Process CO_2 (cont'd.)

3. Fuel and Feedstock Mass Balance
   - Calculate stationary combustion CO_2 emissions for each fuel
   - Calculate each feedstock process CO_2 emissions
   - Correct feedstock emissions for carbon accounted for elsewhere
   - Sum stationary and feedstock

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Hydrogen Production

- Monitor and report total hydrogen produced (scf)
- Report separately amount sold as transportation fuel

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Transferred CO_2 and CO

- Calculate CO_2 and CO sold as transferred CO_2
- Transferred CO_2 and CO tracked separately, but not subtracted from total emissions reported

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Also Reported
(Methods Like Refineries)

- Fugitives
- Flaring
- Process Vents
- Sulfur Recovery

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Next Steps

- Examine ARB final regulation and Instructional Guidance
- Attend or monitor reporting tool workshop December 19
- Consult with ARB staff on questions
- Join e-mail list serves on reporting, verification, watch for additional training opportunities

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

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