



# Greenhouse Gases: Regulatory Changes

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# Overview

- Greenhouse Gases (GHG)
  - What that includes...
  - Global Warming Potential (GWP) and Carbon Dioxide Equivalent (CO<sub>2</sub>e)
  - Evolution of GHG as Regulated Pollutant
- Colorado Air Programs
- GHG Implications for Colorado
  - Mandatory Reporting of GHG Rule
  - Prevention of Significant Deterioration and Title V GHG Tailoring Rule



# GHG – What that includes...

- Carbon dioxide (CO<sub>2</sub>):
  - *Source*: living organisms, burning of fossil fuels
  - 85% of US emissions
- Methane (CH<sub>4</sub>):
  - *Source*: coal formations, natural gas development, landfills, livestock digestive processes, decomposing waste
  - 12% of US emissions

*Source: [http://www.state.gov/www/global/oes/fs\\_sixgas\\_cop.html](http://www.state.gov/www/global/oes/fs_sixgas_cop.html)*



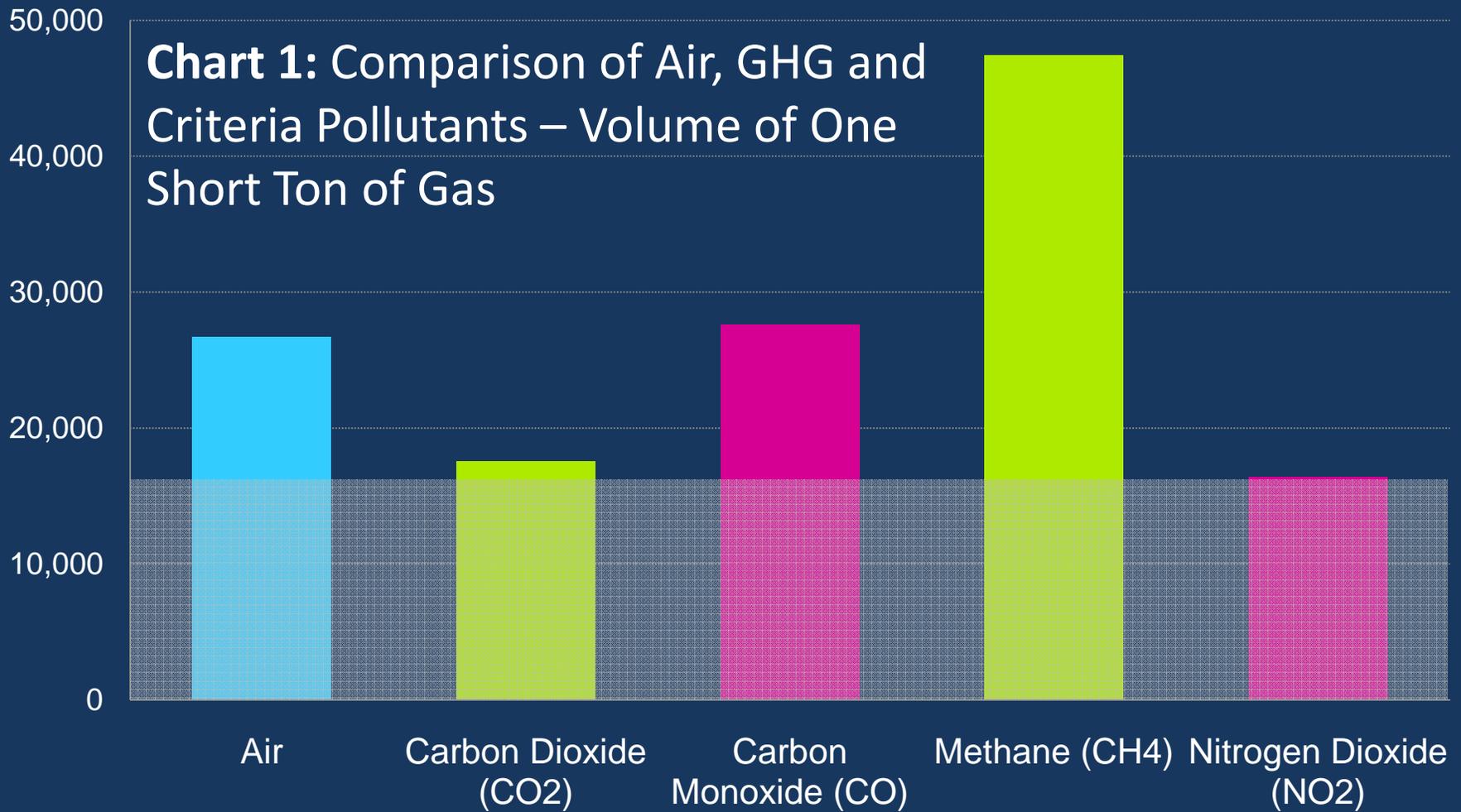
# GHG – What that includes...

- Nitrous Oxide (N<sub>2</sub>O):
  - *Source*: fuel burning, fertilizer manufacturing
  - 2.5% of US emissions
- Hydrofluorocarbon gases (HFC):
  - *Source*: refrigeration, semi-conductor manufacturing
- Perfluorocarbons (PFC):
  - *Source*: aluminum smelting, uranium enriching, semi-conductors
- Sulfur Hexafluoride (SF<sub>6</sub>):
  - *Source*: high-voltage equipment, insulation for manufacturing cable cooling systems

*Source: [http://www.state.gov/www/global/oes/fs\\_sixgas\\_cop.html](http://www.state.gov/www/global/oes/fs_sixgas_cop.html)*



# Volume\* Comparison



6/22/2011 \*Volume expressed in standard cubic feet (scf), assuming specific volume at 1 atmosphere (atm) and 70 degrees Fahrenheit (°F).



# GHG – GWP and CO<sub>2</sub>e

- Global Warming Potential (GWP)
  - 40 C.F.R. Part 98, Subpart A, Table A-1: Global Warming Potentials (74 FR 56395-56396)
  - <http://www.cdphe.state.co.us/climate/TableA-1.pdf>
- Carbon Dioxide Equivalent (CO<sub>2</sub>e)
  - Used to evaluate the global warming effects of different greenhouse gases
  - Calculated by multiplying GHG emissions by the respective GWP, and summing the CO<sub>2</sub>e from all GHG at a facility or source

*Source: <http://www.cdphe.state.co.us/climate/FinalTailoringRule75FR31513.pdf>*



# GHG – GWP

- Global Warming Potential (GWP)

GHG	GWP
Carbon Dioxide	1
Methane	21
Nitrous Oxide	310
HFCs	12 - 17,200
PFCs	350 - 17,340
Sulfur Hexafluoride	23,900

40 C.F.R. Part 98, Subpart A, Table A-1: Global Warming Potentials (74 FR 56395-56396)



# GHG – CO<sub>2</sub>e

- Carbon Dioxide Equivalent (CO<sub>2</sub>e)

CO <sub>2</sub> (tpy)	X	1	=	CO <sub>2</sub> (tpy CO <sub>2</sub> e)
CH <sub>4</sub> (tpy)	X	21	=	CH <sub>4</sub> (tpy CO <sub>2</sub> e)
N <sub>2</sub> O (tpy)	X	310	=	N <sub>2</sub> O (tpy CO <sub>2</sub> e)
HFC (tpy)	X	17,200	=	HFC (tpy CO <sub>2</sub> e)
PFC (tpy)	X	17,340	=	PFC (tpy CO <sub>2</sub> e)
SF <sub>6</sub> (tpy)	X	23,900	=	SF <sub>6</sub> (tpy CO <sub>2</sub> e)
<hr/>				
GHG (tpy)				GHG (tpy CO <sub>2</sub> e)



# GHG as Regulated Pollutant

- Evolution of GHG as a Regulated Pollutant
  - Mass v. EPA (2007)
  - EPA “Endangerment Finding” and “Cause and Contribute Finding” (December 2009)
  - “EPA’s Interpretation of Regulations that Determine Pollutants Covered by the Federal PSD Permit Program” (EPA reconsideration March 2010)
  - EPA and NHTSA’s Light-Duty Vehicle Rule (May 2010)
- GHG is “subject to regulation” as of January 2, 2011 under ALL federal Clean Air Act (CAA) programs



# Colorado Air Programs

- State Programs (Federally Enforceable)
  - Air Pollution Emission Notice (APEN) Reporting Requirements
  - Minor Source Construction Permits

VS.

- Federal CAA Programs (State administered)
  - Title V Operating Permits
  - Prevention of Significant Deterioration (PSD) and New Source Review (NSR) Permits



# Colorado Air Programs

- Terminology
  - Air Pollutant
    - Broad definition under Clean Air Act and Colorado statute
    - Narrower definition in Colorado regulations
  - Criteria Pollutant
    - Narrowly defined list of air pollutants
    - GHG is NOT a criteria pollutant
  - Potential to Emit (PTE)
    - Assume operation 24 hours/7 days/52 weeks
    - Typically use 8,760 hours/year
  - Actual Emissions



# Colorado Air Programs

- Air Pollution Emission Notice (APEN) Requirements
  - Applies to emission points with:
    - $\geq 1$  tpy of *criteria pollutants* in nonattainment areas
    - $\geq 2$  tpy of *criteria pollutants* in attainment areas
    - Source categorical exemptions
  - Based on uncontrolled actual emissions
  - Reporting requirements, submission required PRIOR to operation
  - AQCC Regulation No. 3, Part A



# Colorado Air Programs

- Minor Source Construction Permits
  - Applies to emission points with:
    - $\geq 2$  tpy of facility *criteria pollutants* in nonattainment areas
    - $\geq 5$  tpy of facility *criteria pollutants* in attainment areas
    - Source categorical exemptions
  - Permitting Potential to Emit (PTE)
  - Pre-construction permits, required to be issued PRIOR to commencing construction
  - AQCC Regulation No. 3, Part B



# Colorado Air Programs

- Title V Operating Permits
  - Applies to Major Sources
    - Any source with  $\geq 100$  tpy of any pollutant *subject to regulation*
  - Operating permits, application required within 1 year of becoming major
  - Permitting Potential to Emit (PTE)
  - AQCC Regulation No. 3, Part C
  - GHG is a pollutant *subject to regulation* in some situations (as of January 2, 2011)



# Colorado Air Programs

- Prevention of Significant Deterioration (PSD)  
Construction Permits
  - Applies to Major Stationary Sources
    - Any new source with  $\geq 100/250$  tpy of any *regulated NSR pollutant*
    - Any existing Major Stationary Source undergoing a Major Modification
  - Permitting Potential to Emit (PTE)
  - Pre-construction permits, required to be issued PRIOR to commencing construction
  - AQCC Regulation No. 3, Part D
  - GHG is a *regulated NSR pollutant* in some situations (as of January 2, 2011)



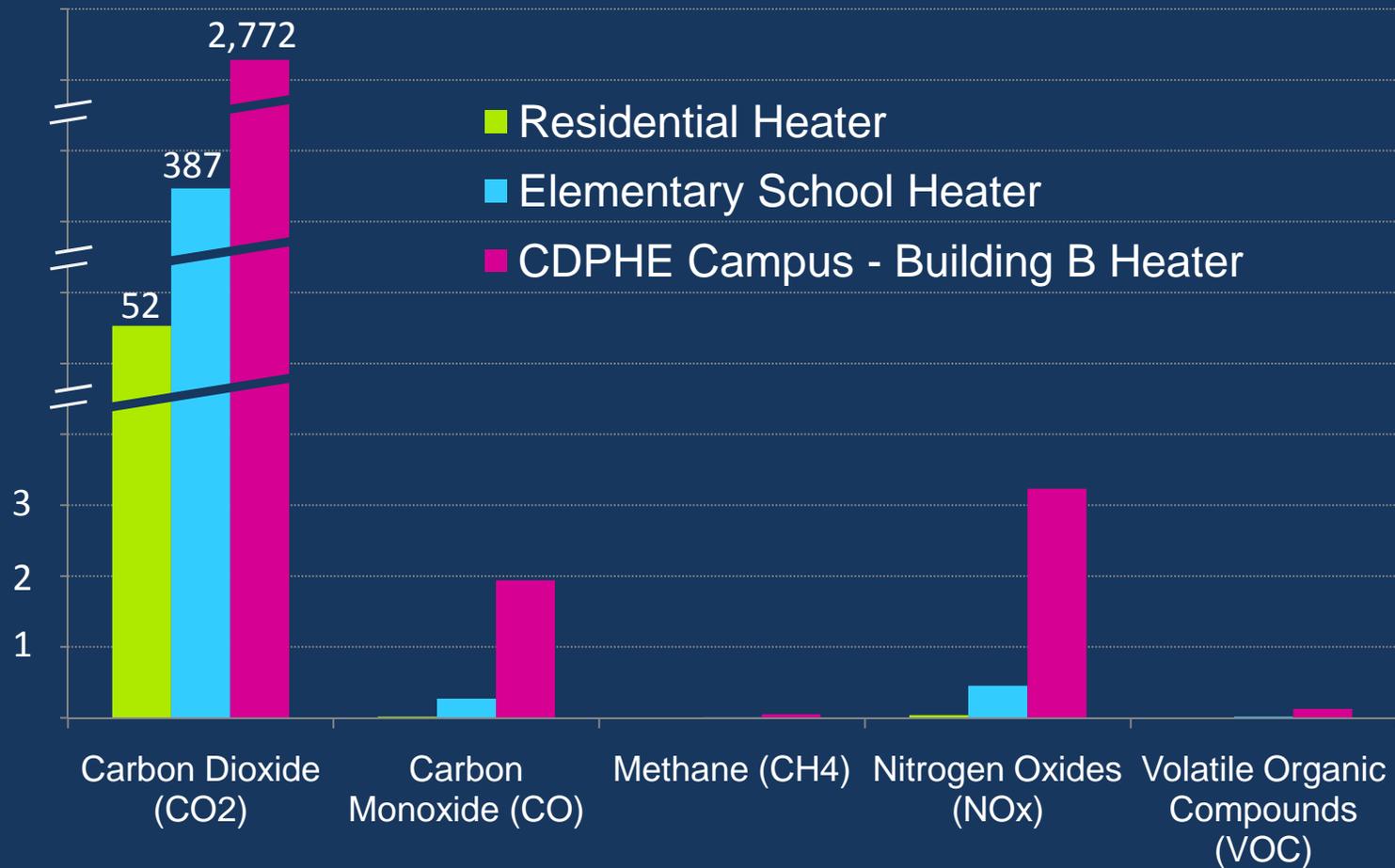
# GHG Implications for CO

- Without revision, permitting thresholds for GHG would have been:
  - Title V                      100 tpy of GHG
  - PSD                              100/250 tpy of GHG
- Federal Rulemakings
  - Mandatory Reporting of Greenhouse Gases Rule (MRR)
  - Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule



# GHG Impacts Comparison

Chart 2: Potential to Emit from Heater/Furnaces



6/22/2011 \*Emissions expressed in short tons per year (tpy), using AP-42 emission factors, assuming 0.1 MMBtu/hr furnace capacity per 1000 sq feet and 1020 Btu/scf heating capacity.



## **Mandatory Reporting Of GHG Rule**

**VS.**

## **Prevention Of Significant Deterioration And Title V GHG Tailoring Rule**



# MRR vs. Tailoring Rule

## SAME:

- Definition of GHG
- Use of GWP and CO<sub>2</sub>e

## DIFFERENT:

- Administrators
- Actual vs. Potential to Emit
- Requirements
- Units
- Source/facility definitions (grouping)
- Thresholds



40 C.F.R. Part 98

Federal Register, Volume 74, Number  
209, Pages 56374-56508

# Mandatory Reporting of Greenhouse Gas Rule (MRR)



# MRR – Overview

- Source categories are varied
- Reporting of **actual** GHG emissions directly to EPA
  - No control requirements
  - No emissions limitations
  - No applicable requirements
  - No permitting requirements
- MRR does NOT affect any Colorado permitting programs

*Source: <http://epa.gov/climatechange/emissions/ghgrulemaking.html>*



# MRR – Overview

- Electronic reporting (e-GGRT)
  - Annual calendar year reports (January – December)
  - Due by March 31 of the following year
- Units
  - Metric Ton per Year (mtpy)

*Source: <http://epa.gov/climatechange/emissions/ghgrulemaking.html>*



# MRR – Overview

- Affected facilities
  - Varies per the source category, definition of “facility”
- Thresholds
  - 25,000 mtpy of CO<sub>2</sub>e for certain source categories
  - All-in for others

*Source: <http://epa.gov/climatechange/emissions/ghgrulemaking.html>*



40 C.F.R. Parts 51, 52, 70, 71  
Federal Register, Volume 75,  
Number 106, Pages 31514-31608

AQCC Regulation Number 3  
Parts A, B, C, and D  
October 21, 2010

# Prevention of Significant Deterioration and Title V GHG Tailoring Rule



# EPA GHG Tailoring Rule

- EPA's GHG Tailoring Rule
  - Final Rule published June 3, 2010
  - Adjusts the threshold levels for GHG permitting
    - Title V
      - 100,000 tpy CO<sub>2</sub>e major threshold
      - 100 tpy GHG major threshold
    - PSD
      - 75,000 tpy CO<sub>2</sub>e significance level and 100,000 tpy CO<sub>2</sub>e major threshold
      - 0 tpy GHG significance level and 100/250 tpy GHG major threshold

Source: <http://www.cdph.state.co.us/climate/FinalTailoringRule75FR31513.pdf>



# EPA GHG Tailoring Rule

- Staged Approach – 3 steps
- Step 1
  - January 2, 2011 – June 30, 2011
  - “Anyway Sources”, emissions increase of 75,000 tpy CO<sub>2</sub>e
  - Result: Sources already subject to PSD review must apply for PSD permit if increase in GHG is 75,000 tpy CO<sub>2</sub>e or greater.

Source: <http://www.cdph.state.co.us/climate/FinalTailoringRule75FR31513.pdf>



# EPA GHG Tailoring Rule

- Step 2
  - July 1, 2011 – June 30, 2013
  - Threshold 100,000 tpy CO<sub>2</sub>e / modification of 75,000 tpy CO<sub>2</sub>e
  - Result: All sources that emit 100,000 tpy CO<sub>2</sub>e (or 75,000 tpy CO<sub>2</sub>e modification) must apply for PSD / Title V permit.

Source: <http://www.cdphe.state.co.us/climate/FinalTailoringRule75FR31513.pdf>



# EPA GHG Tailoring Rule

- Step 3
  - July 1, 2013 – April 30, 2016
  - Next EPA Rulemaking, no sources below 50,000 tpy CO<sub>2</sub>e
  - Proposed EPA rulemaking by July 2012
  - Colorado has NOT acted on Step 3

Source: <http://www.cdphe.state.co.us/climate/FinalTailoringRule75FR31513.pdf>



# Colorado GHG Tailoring Rule

- Consistent with EPA Tailoring Rule:
  - Thresholds
  - Timing
  - Definitions

*Source: <http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-5.pdf>*



# Colorado GHG Tailoring Rule

- Additional Components
  - Synthetic minor permitting (Part B, Sections II.A.4. and II.A.7.)
  - Fees clarification (Part A)
  - Rescission clause (Part A, Section I.B.44.f)

*Source: <http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-5.pdf>*



# Colorado GHG Tailoring Rule

- PSD Road Map
  - “Subject to regulation” Part A
    - GHG (CO<sub>2</sub>e threshold and significance level)
  - “Regulated NSR pollutant” Part D
    - all pollutants “subject to regulation”
  - “Major stationary source” Part D
    - emissions of “regulated NSR pollutants”  $\geq 100 / 250$  tpy (mass threshold)

Source: <http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-5.pdf>



# Colorado GHG Tailoring Rule

- PSD Road Map (cont.)
  - “Major modification” Part D
    - emissions of “regulated NSR pollutants”  $\geq$  the significance level (mass significance level)
  - Part D applies to new “major stationary sources” and existing “major stationary sources” undergoing “major modifications”

Source: <http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-5.pdf>



# Colorado GHG Tailoring Rule

- Title V Road Map
  - “Subject to regulation” Part A
    - GHG (CO<sub>2</sub>e threshold)
  - “Major source” Part A
    - emissions of “pollutants subject to regulation”  $\geq$  100 tpy (mass threshold)
  - Part C applies to “major sources”

*Source: <http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-5.pdf>*



# Conclusion



# Conclusion

- GHG Regulation – both federal and in Colorado
- Mandatory Reporting of GHG Rule
  - EPA administered program
  - No permitting requirements
- GHG Tailoring Rule
  - Prevented permitting of GHG at untenable levels



# First Things First

- Calculate GHG emissions (CO<sub>2</sub> and CH<sub>4</sub>)
  - Actual and Potential to Emit
- Determine whether MRR applies (actual emissions)
- Determine whether Source is “major” (potential to emit)
- Identify ANY upcoming changes to operation
  - Design capacity
  - New control device
  - Throughput or acceptance rate



# Current Issues



# Questions?

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