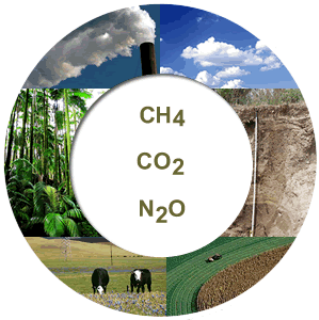


# ***GHG Tailoring Rule: A PSD Primer & Landfill BACT Example***

*Presented by:  
Tia Jeter, P.E.  
Lina Klein, P.E.*

*A&WMA Midwest Section  
Annual Environmental Conference  
January 19, 2011*

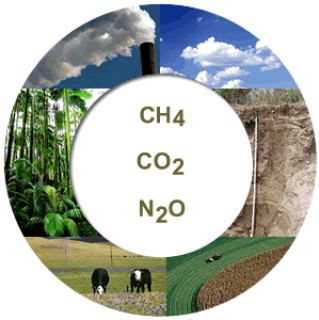




# Outline

- A Brief History of Greenhouse Gas (GHG) Regulation Under the Clean Air Act (CAA)
- Prevention of Significant Deterioration (PSD)
  - How it Used to Work
  - How it Works Today
- EPA's Recent Announcement
- Landfill Expansion Example

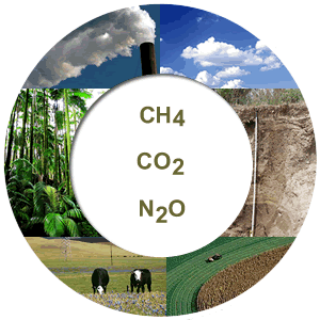




# History of GHG Regulation

- April 2, 2007
  - Supreme Court found that GHGs, including carbon dioxide (CO<sub>2</sub>), fit within the definition of air pollutant in the CAA
- December 15, 2009
  - **Endangerment Finding:** EPA found that current and projected concentrations of the 6 key GHGs threaten public health and welfare
  - **Cause or Contribute Finding:** EPA found that the emissions of GHGs from new motor vehicles contribute to GHG pollution which threatens public health and welfare

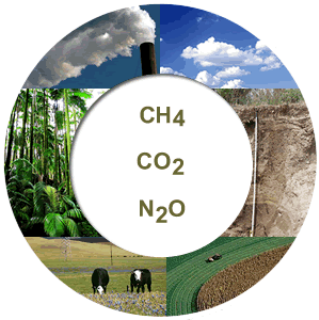




# History of GHG Regulation 2

- December 18, 2008
  - EPA issued a memorandum: interpretation of regulations that determine pollutants covered by the PSD program
    - Pollutant is “subject to regulation” only if it is subject to either a provision of the CAA or regulation adopted by EPA under the CAA that requires control of emissions of that pollutant

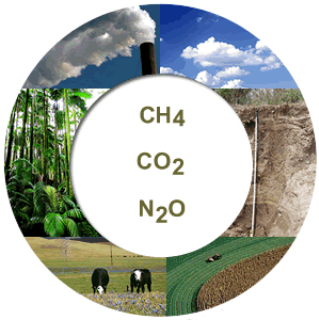




# History of GHG Regulation 3

- May 7, 2010
  - EPA issues the light-duty vehicle rule requiring control of GHG emissions.
    - Triggers CAA permitting requirements for stationary sources of GHG
- May 13, 2010
  - EPA issues the GHG Tailoring Rule
  - Effective date: January 2, 2011

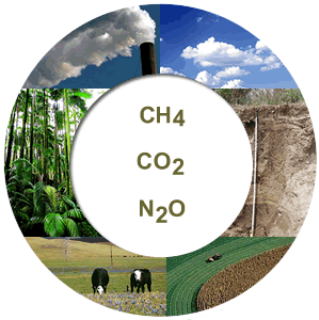




# PSD: Then

- A pre-construction review program for regulated NSR pollutants (NAAQS, NSPS, ozone-depleting substances, “otherwise subject”)
- Applicable To:
  - Stationary Sources with potential to emit (PTE)  $\geq$  250 tons per year (TPY) of any pollutant regulated under the CAA, or
  - Stationary Sources with PTE  $\geq$  100 TPY within 1 of 28 source categories (named source)

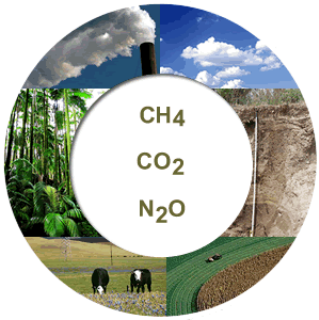




# PSD Applicability - Then

- For a greenfield project, use the thresholds from the previous page (250/100 TPY) – NEW SOURCE
- For an existing source not yet considered a major stationary source, again, 250/100 TPY thresholds – NEW SOURCE
- For an existing major stationary source, MAJOR MODIFICATIONS rely on Significance Levels

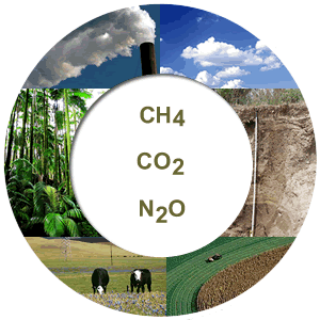




# Significance Levels - Then



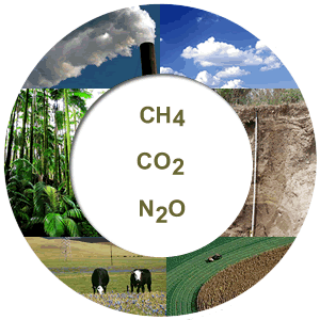
<b>PSD Pollutant</b>	<b>Significance Level (TPY)</b>
Particulate Matter (PM <sub>10</sub> /PM <sub>2.5</sub> )	15/10
Nitrogen Oxides (NO <sub>x</sub> )	40
Sulfur Dioxide (SO <sub>2</sub> )	40
Volatile Organic Compounds (VOC)	40
Carbon Monoxide (CO)	100



# A Few Side Notes So Far...

- Significance Levels - There are additional thresholds for lead, a few other criteria pollutants and other non-criteria pollutants that are regulated under the CAA
- Major Modification “Two Step”
  - PTE associated with modification must exceed significance threshold (“significant increase”), AND
  - “Significant Net Emissions Increase” must exceed significance threshold

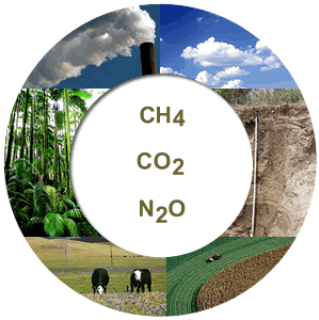




# One More Note – Fugitive Emissions

- Count fugitives toward PSD applicability only if a named source
- BUT, if PSD review is triggered for any pollutant, fugitives are counted toward major modification determination for ALL emission points
  - EPA revised PSD rule (12/2008) to include fugitives only from named sources
  - EPA stay expires October 2011

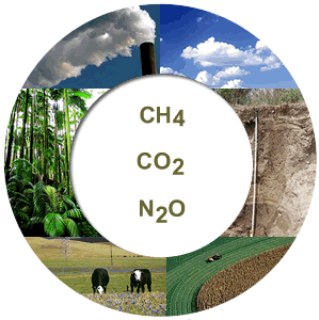




# Landfills and Fugitive Emissions



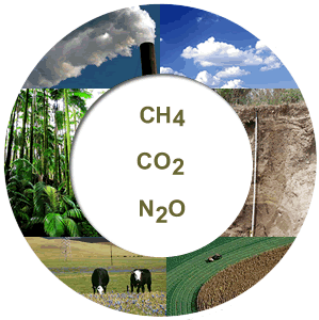
- October 1994 EPA policy memo states that a portion of landfill gas could “reasonably” be collected – regardless of whether currently collected
- That portion classified as non-fugitive considered in determining PSD applicability
- What portion of landfill gas is “reasonably” collectable?



# So, You're In! What Does PSD Review Include? - Then



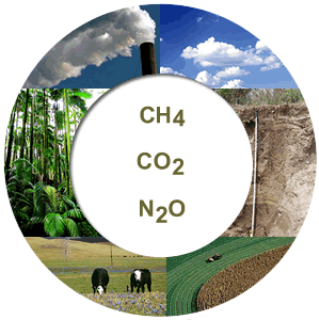
- Best Available Control Technology (BACT) analysis
- Air dispersion modeling (NAAQS and PSD Increment)
- Ambient monitoring, maybe
- Class I impact analysis, maybe
- Visibility, soils and vegetation impact analysis



# PSD – Now

- Tailoring Rule established PSD thresholds for GHGs
  - 100,000 TPY carbon dioxide equivalent (CO<sub>2</sub>e) major source threshold
  - 75,000 TPY CO<sub>2</sub>e significance level

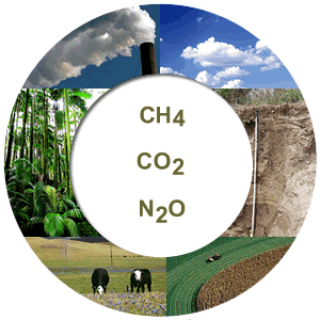




# A Twist on GHG PSD Applicability

- PSD applicability is based on both CO<sub>2</sub>e emissions and GHG mass emissions
  - Calculate sum of CO<sub>2</sub>e emissions of 6 GHGs to determine if NSR-regulated pollutant (75,000/100,000 TPY)
  - Calculate sum of mass emissions of 6 GHGs to determine if major source or major modification (0/100/250 TPY)





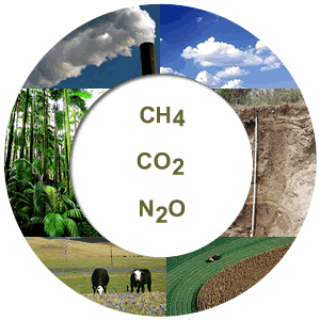
# CO<sub>2</sub>e and Mass Emissions Example



GHG	PTE (TPY)	GWP	CO <sub>2</sub> e Emissions (TPY)
Carbon Dioxide (CO <sub>2</sub> )	50,000	1	50,000
Methane (CH <sub>4</sub> )	60	21	1,260
Nitrous Oxide (N <sub>2</sub> O)	1	310	310
Sulfur Hexafluoride (SF <sub>6</sub> )	0	23,900	0
Hydrofluorocarbons (HFCs)	5	650	3,250
Perfluorocarbons (PFCs)	3	6,500	19,500
<b>Mass Emissions =</b>	<b>50,069</b>	<b>CO<sub>2</sub>e =</b>	<b>74,320</b>

> 0/100/250

< 75,000/  
100,000

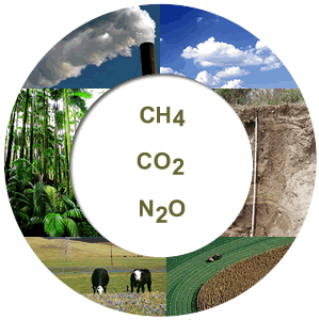


# Tailoring Rule

## Implementation: Step 1

- Permits issued between 1/2/2011-6/30/2011
- “Anyway” sources/modifications
  - PSD for another pollutant, AND
  - $\text{CO}_2\text{e} \geq 75,000$  TPY, AND
  - For major modifications, net emissions increase of GHGs  $> 0$  TPY, mass basis



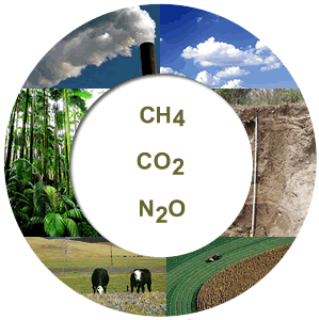


# Tailoring Rule

## Implementation: Step 2

- Permits issued on/after 7/1/2011
  - “Anyway” sources/modifications, OR
  - New Source CO<sub>2</sub>e  $\geq$  100,000 TPY **and** GHG  $\geq$  100/250 TPY, OR
  - Major Modification CO<sub>2</sub>e  $\geq$  75,000 TPY and net emissions increase of GHGs  $>$  0 TPY, mass basis

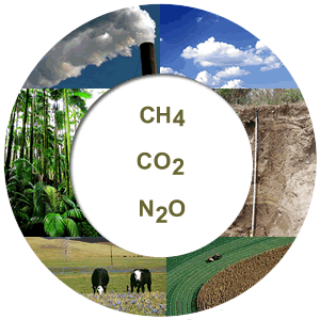




# EPA's 1/12/2011 Announcement

- EPA plans to defer, for 3 years, GHG permitting requirements for CO<sub>2</sub> emissions from biomass-fired and other biogenic sources
  - Rulemaking to be completed by July 1, 2011
  - Interim guidance to regulatory agencies that biomass as fuel = BACT is coming soon?
- Affected Sources
  - Facilities that emit CO<sub>2</sub> as a result of burning forest or agricultural products for energy
  - MSW Landfills
  - Ethanol production (fermentation)
  - Wastewater treatment
  - Livestock management facilities....

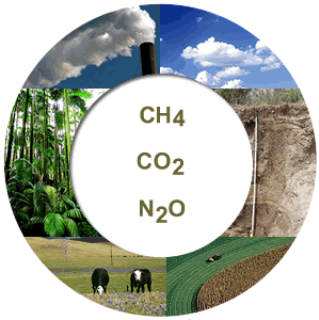




# So, What's Different About PSD for GHG?

- There's still BACT,
- There's still "netting", but
- There is NO NAAQS for GHG, SO:
  - No Air Dispersion Modeling
  - No Ambient monitoring
  - No Class I impact analysis
  - No visibility, soils and vegetation impact analysis

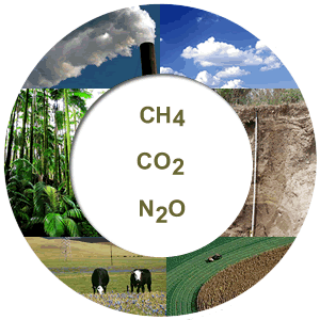




# Contemporaneous Netting

- Will have pre-Tailoring Rule time period for
  - “Contemporaneous period” for netting (5 yrs pre-construction), and
  - Baseline period (24-mth period w/in most recent 5/10-yr period)
- Negotiation with regulatory agencies on how to document those emissions “after the fact”

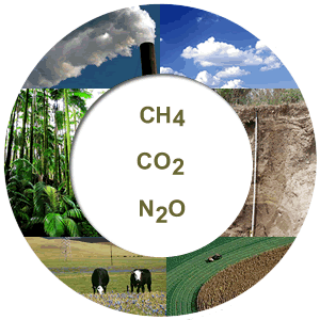




# BACT and GHGs Top-Down Approach



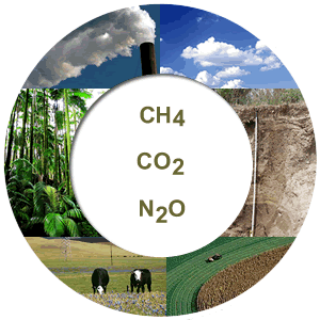
- Step 1: Identify all available control technologies – focus on:
- Energy Efficiency
  - Emission unit-specific efficiencies – don't redefine the source!
  - Facility-wide efficiencies – go for the big bang for the buck options; propose as a suite
- Carbon Capture and Storage



# BACT and GHGs Top-Down Approach

- Step 2: Eliminate technically infeasible options –
- Add-on controls fairly new for GHGs
- Commercial guarantees will initially be important

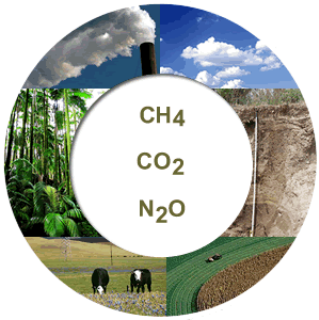




# BACT and GHGs Top-Down Approach

- Step 3: Rank remaining control technologies
- Rank the “suite” with the lowest net emissions from the facility at the top
- Ranking should be based on total CO<sub>2</sub>e, not mass of individual GHGs

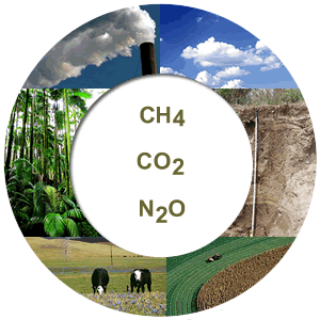




# BACT and GHGs Top-Down Approach



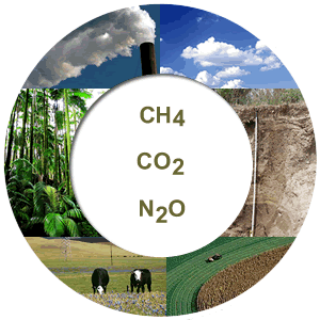
- Step 4: Evaluate most effective controls – hard to quantify effect of global warming
- Focus on level of collateral increase of other regulated NSR pollutants
- \$/ton for CO<sub>2</sub>e control << \$/ton for criteria pollutant control that have evolved over time
- Remember, biomass as fuel = BACT



# BACT and GHGs Top-Down Approach



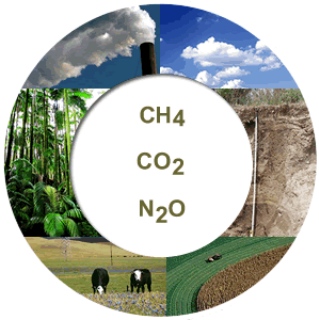
- Step 5: Select BACT – Energy Efficiency is King
- Consider output-based limits (lb/MWh generated) instead of heat input or pollutant concentration (ppm)
- Focus on long-term avgs – no 3-hr rolling avg. limits here!
- Could contain an Environmental Management System (EMS)



# Landfill Expansion BACT Example

- Existing MSW landfill
  - Not currently subject to New Source Performance Standards(NSPS) Subpart WWW gas collection requirements
  - Planned expansion after 7/1/2011
  - For this example, we presume that the expansion will be a Major Modification subject to PSD review and BACT analysis

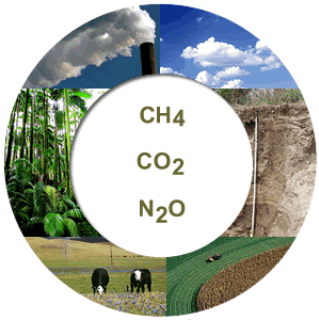




# BACT: Five Step Approach

- Step 1: Identify all available control technologies
  - Could include two elements at a landfill: capture and control
    - Capture System – designed to meet the standards for NSPS gas collection system
    - Control Options – Flare, internal combustion engine(s), gas turbines, conversion to high BTU fuel to pipeline

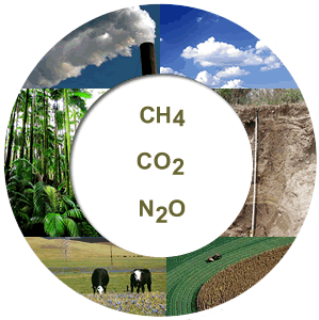




# BACT Example, Cont.

- Step 2: Eliminate technically infeasible options
  - Analysis demonstrated that the quantity of landfill gas generated would be too low to operate a commercially-available gas turbine – option was eliminated

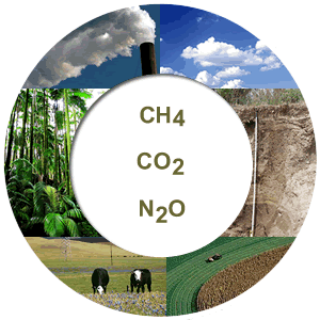




# BACT Example, Cont

- Step 3: Rank remaining options by emissions control effectiveness
  - Capture effectiveness assumed to remain constant (75%)
  - Control effectiveness varies
    - Conversion to pipeline quality gas found to be most effective control – gas goes off-site
    - Flaring and the use of engines are similar in over-all control of GHGs
  - So, for combination:
    - Capture + Off-site shipment = #1
    - Capture + Flaring or Engines = #2

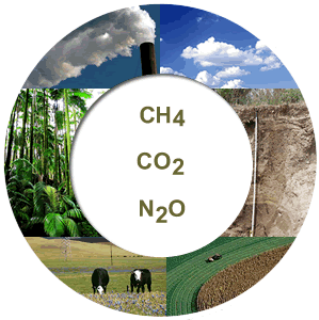




# BACT Example, Cont

- Step 4: Evaluate the economics, energy and other environmental impacts
  - Conversion to pipeline quality gas determined to not be cost effective - eliminated
  - Flaring determined to be more cost effective than engines as sale of energy from engines not enough to off-set higher capital costs for engines

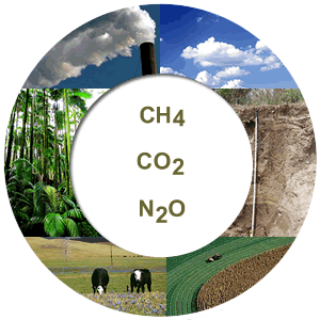




# BACT Example, Step 4: Cont.

- Engines determined to have more environmental benefit – electricity generated would displace other off-site energy generation

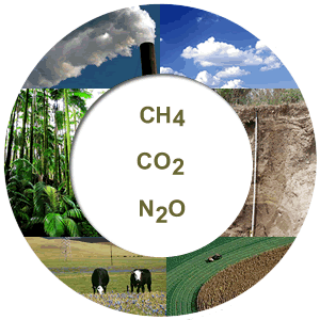




# BACT Example, Cont.

- Step 5: Select best option as BACT
  - For this example, we feel BACT consists of an NSPS-designed collection system and engines





# Information

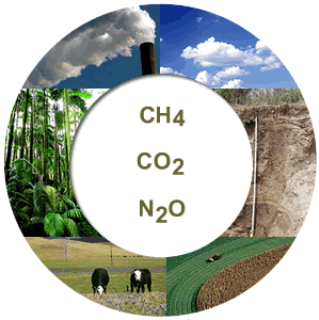
- Clean Air Act Permitting for Greenhouse Gases

<http://www.epa.gov/nsr/ghgpermitting.html>

- Guidance Document

*PSD and Title V Permitting Guidance for Greenhouse Gases.pdf*





# QUESTIONS?

*Contact:*

***Aquaterra Environmental Solutions, Inc.***

***Tia Jeter, P.E.***

***Lina Klein, P.E.***

***Project Manager***

***Air Practice Lead***

***7311 W. 130<sup>th</sup> Street, Suite 100***

***6301 E. Hwy AB***

***Overland Park, KS 66213***

***Columbia, MO 65201***

***913-681-0030***

***573-442-6391***

***tjeter@aquaterra-env.com***

***lklein@aquaterra-env.com***

