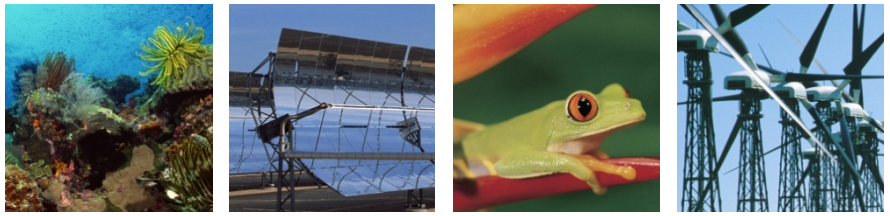

GHG Regulatory Update – March 2010

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CIBO Focus Group Meeting

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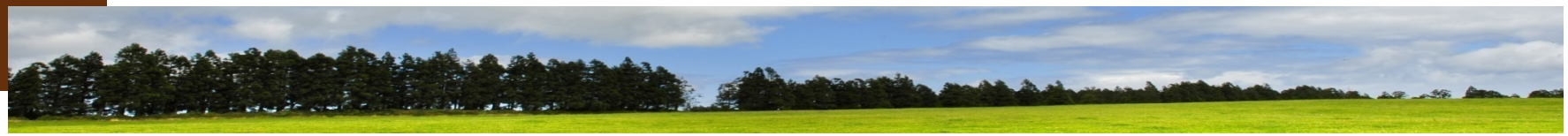

Discussion Topics

- EPA
  - Clean Air Act GHG Regulation/Tailoring
  - EPA BACT Workgroup
- Permitting Examples – CO_2
- Cap and Trade
- CEQ/NEPA
- State Developments
- Questions

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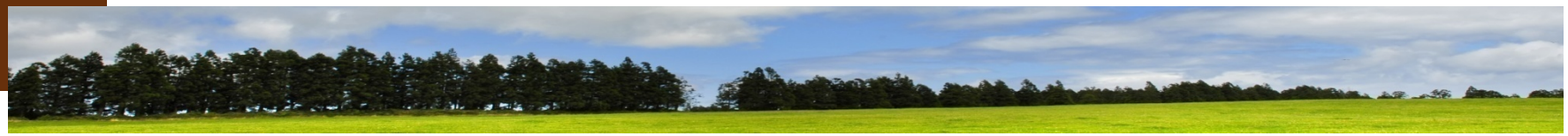
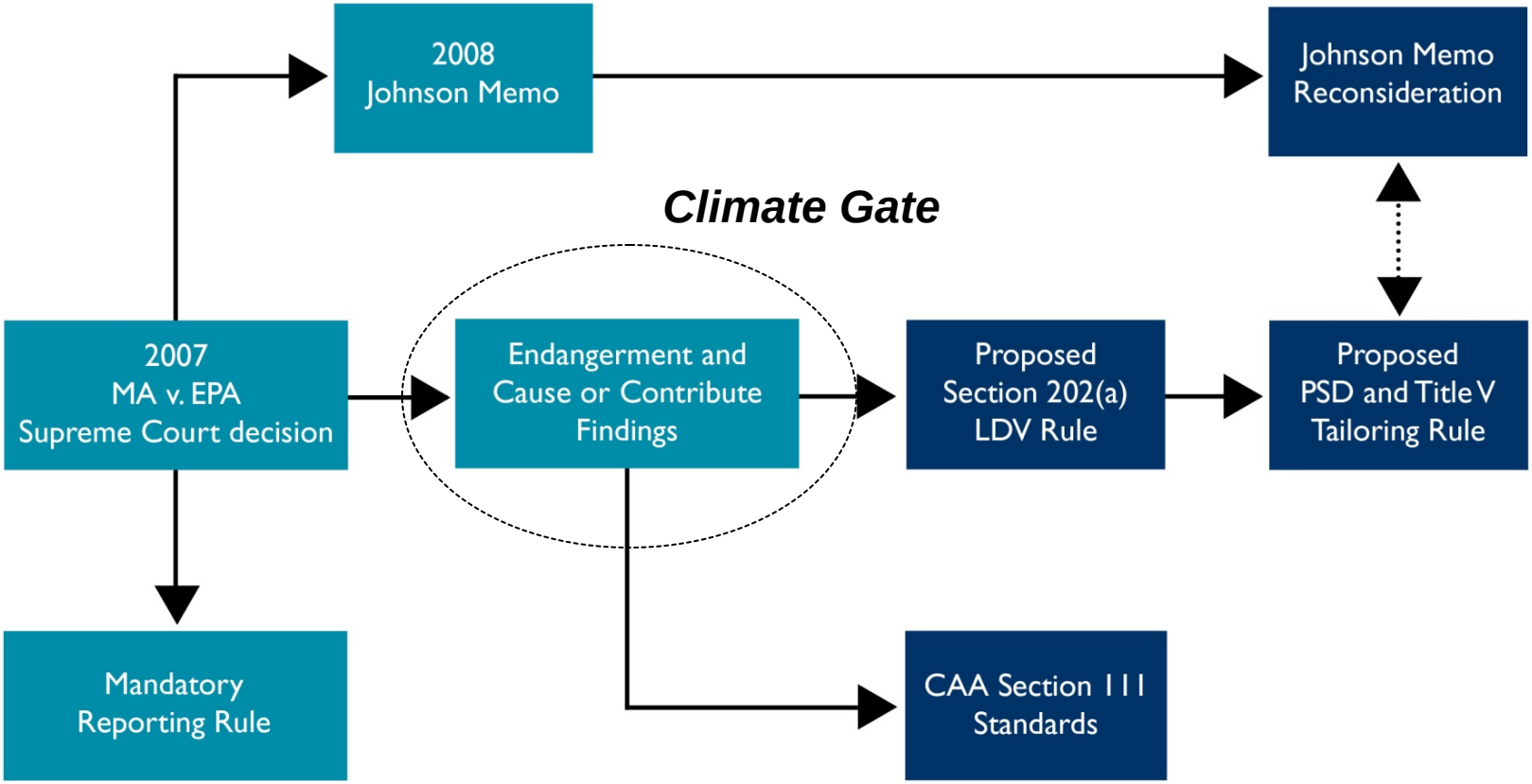
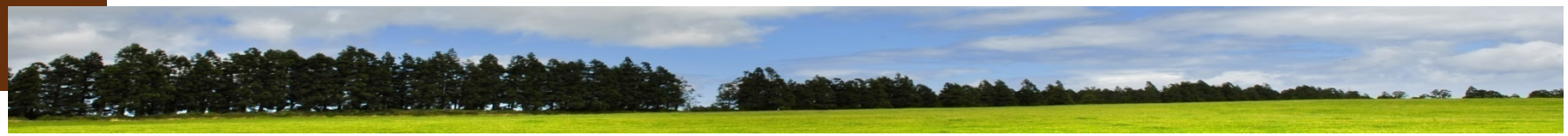


How Does This All Fit Together?

EPA GHG Regulatory Development





Proposed Tailoring Rule

- October 27, 2009, (74 FR 55292), Tailoring Rule proposed
  - LDV rule signing schedule – early April
  - GHG regulation under PSD would occur 60 days after issuance of the LDV GHG regulations (e.g., early June)
- Increase the major source thresholds for GHGs from the current 100/250 tpy thresholds to 25,000 tpy, *effectively* ***"tailoring"*** *the PSD and Title V permit programs to target only "major" GHG sources and major modifications*
  - Significant emission rate (SER) of between 10,000 and 25,000 tpy CO_2e
- Absent tailoring, permitting agencies would be overwhelmed with PSD and Title V applications
- Proposed regulation of 6 GHG compounds:
  - CO_2, CH_4, N_2O, HFCs, PFCs, & SF_6 a1

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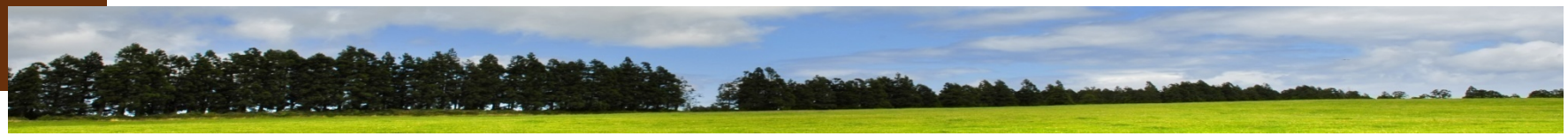
Slide 4

a1 May want to highlight that really only 4 of these could arguably be regulated since only CO2, CH4, N2O, and maybe HFCs are regulated in the LDV rule. PFCs and SF6 definitely not...
aandrews, 3/5/2010



2/22/2010 Lisa Jackson Letter

- Highlights…..
  - "***I expect to take actions to ensure that no stationary source will be required to get a CAA permit to cover its GHG emissions in calendar year 2010***"
  - PSD Majors, first half of 2011 – ***only those facilities that already must apply for CAA permits as a result of their non-GHG emissions will need to address GHG emissions in their permit applications….***less than 400 according to EPA's estimates
  - Latter half of 2011 to 2013, permitting threshold "***substantially higher than the 25,000-ton limit that EPA originally proposed***"
  - EPA does not intend to subject the "smallest sources" to CAA permitting for GHG emissions ***any sooner than 2016***.

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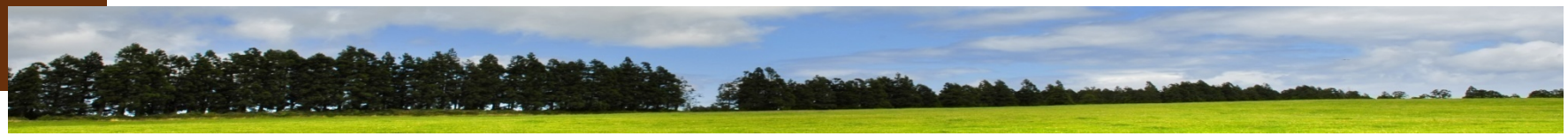
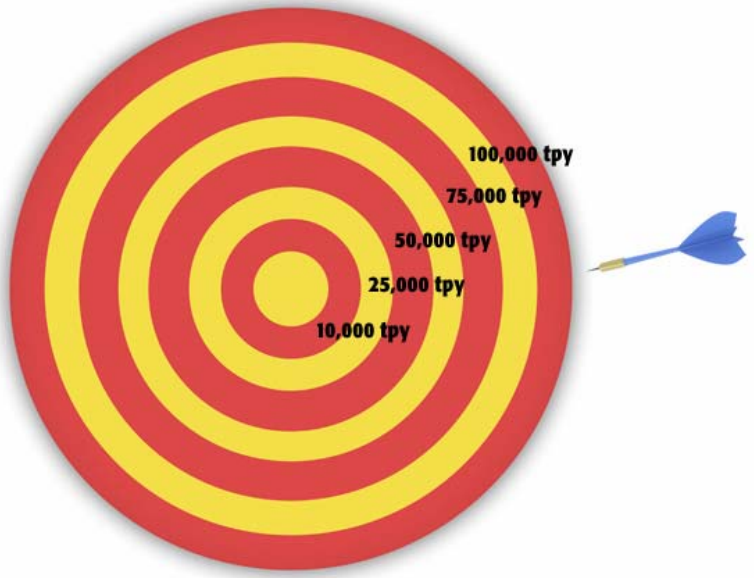


3/3/2010 Lisa Jackson Senate Appropriations Testimony

- EPA may set a threshold of 75,000 tpy of GHGs for permitting stationary sources prior to 2013
  - By the end of 2011, 1,700 permits would be required that would not be required in 2010
  - By the end of 2013 (threshold dependent) an additional 3,000 sources could need permits
- Potential GHG permits for 2009/2010 large emitting applicants?



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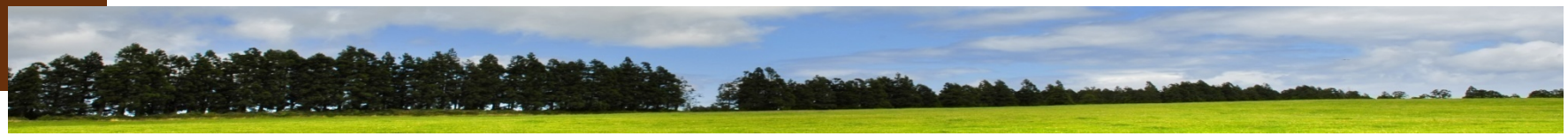

Potential Stoppage for CAA GHG Regulation?

- Rockefeller Bill – Introduced 3/4/2010; would delay stationary source GHG regulation under CAA (PSD and NSPS) for two years but would not prevent issuance of LDV regulations
- Murkowski Resolution – To be introduced in March, would reject the Endangerment Finding and ban EPA from issuing GHG regulations under CAA (LDV or stationary source)…under Congressional Review Act, needs only a simple majority to approve
- Numerous state lawsuits on Endangerment Finding

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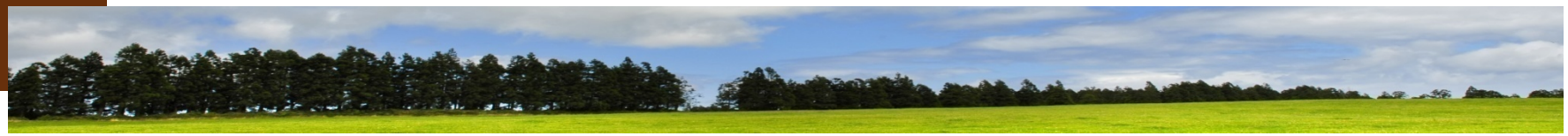

GHG BACT

- Phase I report issued on February 3, 2010. Phase I presumed a continuation of top-down approach.
- Phase II report due on March 30, 2010. Phase II work to address:
  - Scope of applicability of PSD and BACT to GHG sources
  - Appropriateness of "presumptive" BACT
  - Appropriateness of the use of averaging or trading as BACT
  - Appropriateness to use broader supply chain reductions as BACT (reduced carbon intensity, increased efficiency and/or demand reduction)
  - Methods (reviews and permit conditions) to encourage innovative GHG controls
  - Evaluating energy efficient processes and practices. Potential for output based limitations, etc.

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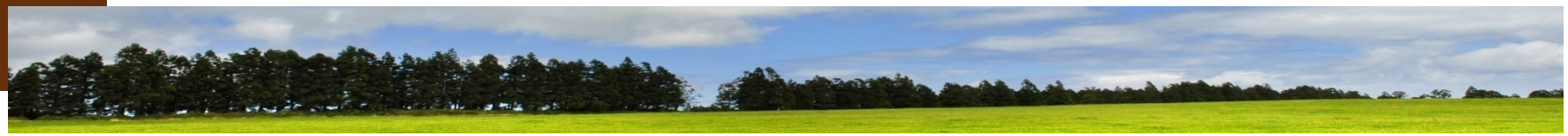

GHG BACT (cont.)

- The workgroup agreed that GHG BACT should apply to new and modified emission units (undergoing PSD review and triggering for GHGs).
- The workgroup did not agree on whether BACT can (or should consider) changes to the basic design of a proposed project (alternative manufacturing processes, etc.).
- There was general consensus on the process for which technical feasibility would be addressed. However, the value of commercial guarantees (or lack thereof) in determining whether a BACT option is feasible remains contentious.

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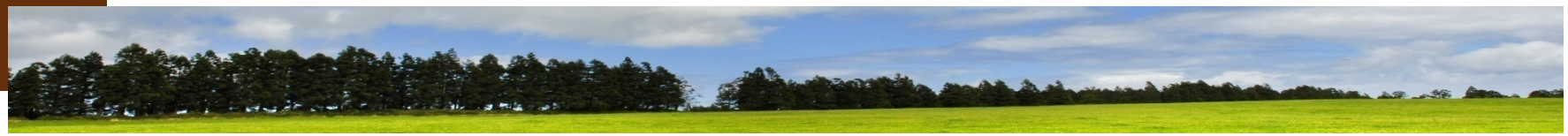

GHG BACT (cont.)

- Carbon Capture and Sequestration (CCS)
  - General consensus among the committee concerning the details of feasibility
  - No consensus on whether a site should be forced to consider alternative locations (availability of sequestration capacity)
  - No consensus on the extent or degree of availability before CCS is considered "demonstrated"
  - No consensus on the degree to which CCS technology can be transferred from one source type to another

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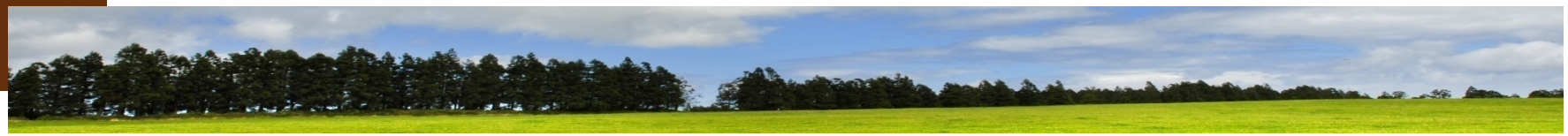

GHG BACT (cont.)

- Energy Efficiency
  - Should be considered in the BACT analysis as a factor in evaluating BACT alternatives and setting emission limits
  - Specific energy efficiency limits may be difficult to quantify continuously
  - There was no consensus on scope of the energy efficiency considerations

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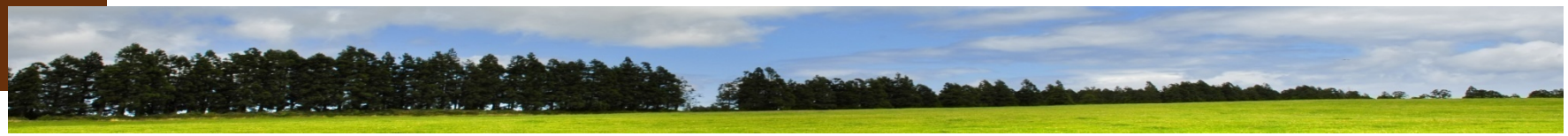

Calpine Russell City Energy Center

- Calpine 612 MW natural gas fired combined cycle power plant in Hayward, CA - two combustion turbines and two HRSGs
- Calpine requested CO_2 BACT determination and a CO_2 limitation from Bay Area AQMD (BAAQMD)

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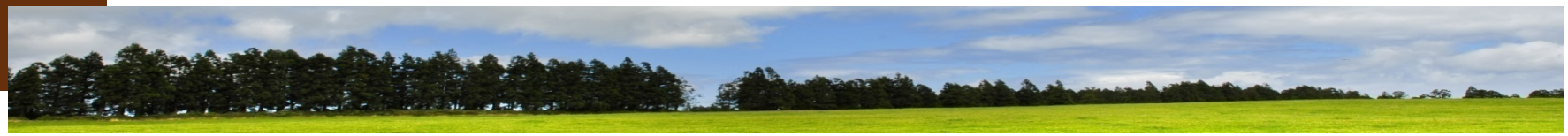

Calpine Russell City Energy Center

- BACT Review
  - Feasible technologies
    - Subterranean or bio-sequestration not feasible options
  - Non fossil alternatives
    - Energy commission (not the Air District) determines type of generation (NG combined cycle)
    - Wind and solar cited as requiring 3,000 (solar) to 10,000 (wind) acres, biomass fuel source not available in vicinity
    - Noted that EPA has made clear that BACT should not include alternative technologies that alter the project's fundamental scope

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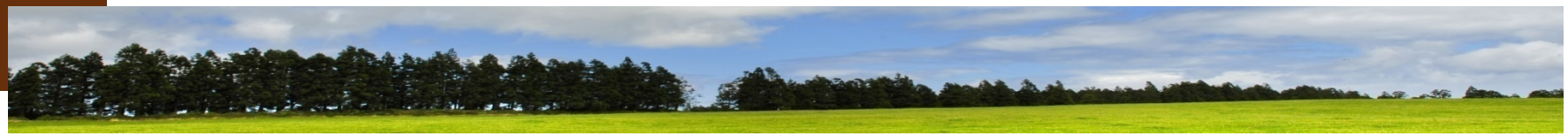

Calpine Russell City Energy Center

- Most Efficient Combined Cycle
  - Comments around G and H class turbines achieving 58-60% versus the proposed turbines
  - BAAQMD noted that a gross efficiency of 56.45% is the basis for the GHG BACT
- BACT Emissions Standard
  - BAAQMD initially proposed 1,100 lb/MW-hr (but the link to thermal efficiency was questioned by commenters)

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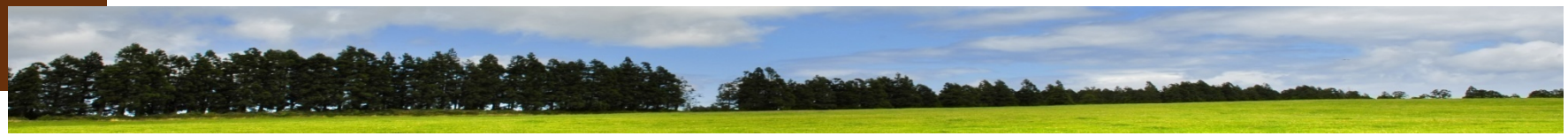

Calpine Russell City Energy Center

- BACT Emissions Standard (ctd.)
  - Output-based Efficiency Limit - 7,730 Btu/kW-hr (HHV), design base heat rate was 6,852 Btu/kW-hr
    - Factored in degradation on heat rate (normal wear and tear) plus a margin for other items (NG variability, cooling water variability, etc.)
  - Input-based Limit - mass emissions limits in metric tons (1-hr, 24-hr, annual) and heat input limits (MMBtu) based on max rated heat input capacity of turbines

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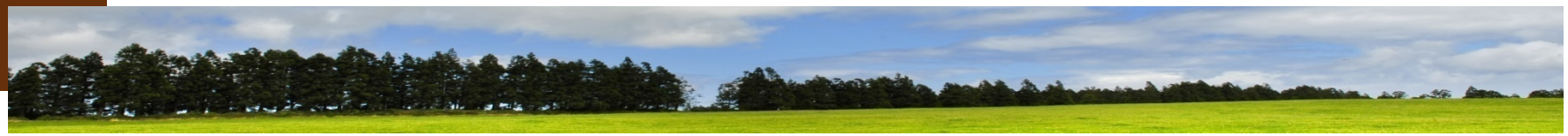

Calpine Russell City Energy Center

		GHG Emission Limits (metric tons CO_2e)			
Avg. Period	Heat Input Limit (MMBtu)	CO_2	CH_4	N_2O	CO_2e
1-Hour	4,477.2	242	0.08	0.14	242
24-Hour	107,452	5,797	2.03	3.33	5,802
Annual	35,708,858	1,926,399	675	1,107.48	1,928,182

Other Notes on Thermodynamics and Efficiency (will be key in GHG CAA world)

- HHV (gross), LHV (net)
- Efficiency – gross v. net (where is it measured?)
- e.g., “Net HHV” can refer to net across plant on HHV basis

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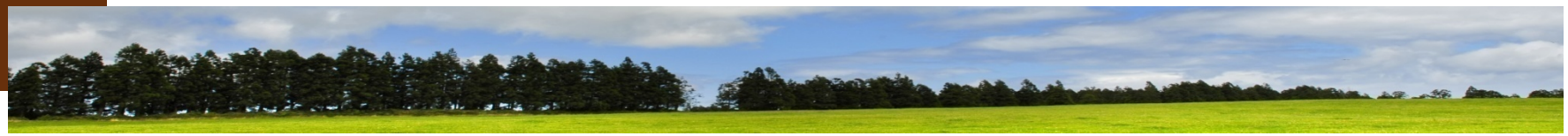

SE Idaho Energy – Advanced Energy Center

- Permit for coal gasification facility issued November 30, 2009
- Sierra Club and Idaho Conservation League petition IDEQ to include CO_2 emission limit for a vent stream (756,000 tpy CO_2 – rolling 12-month)
  - Limit based on capture and sequestration of 58 percent of the plant's CO_2 output
  - Take effect 5 years after mechanical completion
- For an interim period before the compliance date, GHG offsets may be required for a portion of the emissions stream - federal, state or regional (or Climate Action Reserve, VCS, etc.) – could be up to 1.1 MM tons CO_2/year

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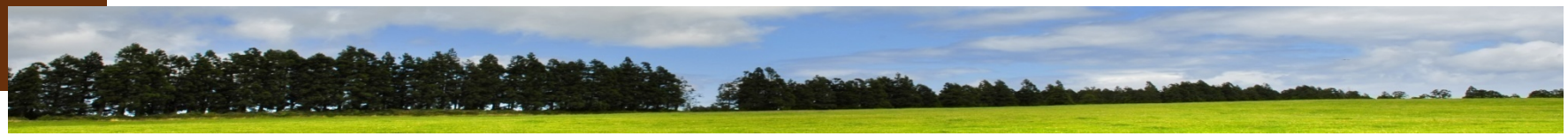

Carbon Cap and Trade

- Cap and trade has lost momentum at present (jobs, health care)
- Waxman Markey (economy wide cap and trade) likely a no-go in 2010
- Hybrid bill with C&T elements (utility cap, phased treatment of manufacturing, carbon pricing for fuels)

http://www.capanddividend.org/

- No shortage of bills or "angles" on cap and trade

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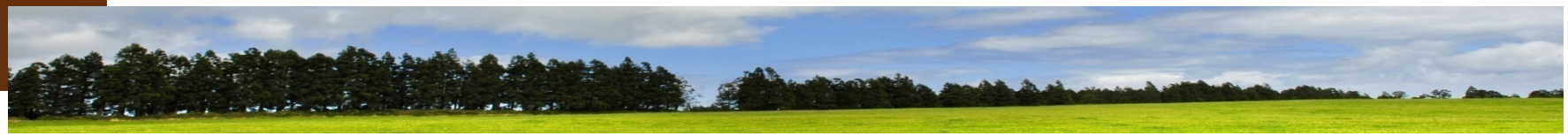

NEPA/CEQ GHG Guidance

- Draft guidance memorandum published in the Federal Register on February 23, 2010 (90 day comment period ends May 24, 2010)
- Covers all agency actions requiring NEPA review, except federal land and resource management activities
- Requires estimation of potential GHG emissions from the proposed action over the life of the project – mentions 25,000 metric ton CO_2e as significant (direct emissions) and an evaluation of mitigation measures
- Sensitivity, location and timeframe are also factors
- Climate modeling limitations acknowledged

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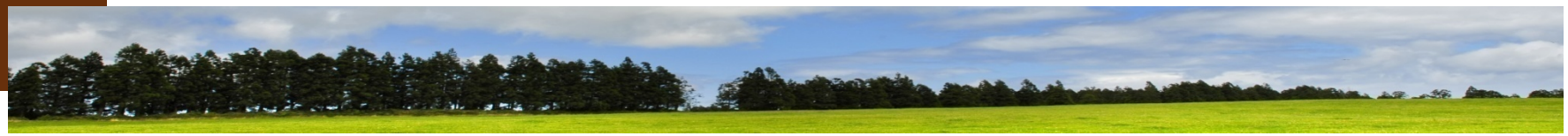

Significant State Developments

- Mandatory reporting has proliferated (CA, NM, NV, WA, etc.)
- AB-32's fate lies with governorship (AB-32 moratorium and death of CA cap and trade?)
  - CARB recently rescinded 4 Climate Action Reserve (CAR) protocols due to CEQA challenge
- Defections from Western Climate Initiative (Arizona, Utah) – is there a potential for a 2012 launch with only one state participating (CA)? Or none?
- WY Supreme Court rule on 3/5/2010 that CO2 limit cannot be imposed on power plant (Basin Electric Power Coop-Dry Fork Station)

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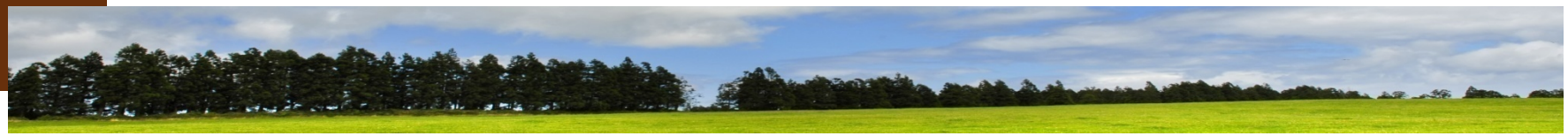

Questions?

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