Sector-Based Workshop
Energy Sectors
(Electricity, Natural Gas, and Water)

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December 14, 2007
CPUC/CEC Joint Proceeding

• Public Utilities Commission and Energy Commission conducting joint proceeding to make recommendations to the Air Resources Board for AB32 policies in “scoping plan” for energy sectors (electricity and natural gas)

• Rulemaking R.06-04-009 at CPUC and Docket # 07-OIIP-01 at CEC
Electricity Background: Emissions Trends

Electricity Sector GHG Emissions

Source: For past years: CARB Inventory – November 16, 2007; for forecast data: CEC Scenarios Project, adjusted for recent CARB inventory methodology updates
Electricity-Related Emissions: Imports

- **2004 Electricity Sales (MWh)**
  - Imports: 23%
  - In-State Generation: 77%

- **Emissions (MMT CO₂e)**
  - Imports: 56%
  - In-State Generation: 44%

Source: CEC (for electricity sales); CARB (for emissions inventory)
Electricity-Related Emissions: Sources

Emissions from Electricity Generation Serving California Consumers (2004)

- Commercial Combined Heat & Power 1%
- Unspecified Imports from Southwest 15%
- Unspecified Imports from Northwest 7%
- Specified Imports from Southwest 26%
- Merchant Owned 28%
- Utility Owned (In-State)
- Industrial Combined Heat & Power 18%

Source: CARB Emissions Inventory, November 16, 2007
Overall Electricity Profile

- 3 large investor-owned utilities (IOUs) (PG&E, SCE, SDG&E) and several smaller ones (Pacificorp, Sierra Pacific)
- 2 large publicly-owned utilities (POUs) (SMUD, LADWP) and approximately 40 smaller ones
- More than 20 independent generation owners (not including self-generators), plus some independent transmission
- Mixture of fossil-fueled and renewable generation, plus energy efficiency investments
- ~$33 billion in annual revenue collected from utility bills alone; several billion more likely in economic benefits of energy efficiency, generation and transmission development, employment, etc.
California’s Market Structure

• For purposes of identifying imports into California, there are eight (8) balancing authorities -- some coincide with CA state boundaries and some do not
  – California Independent System Operator (CAISO)
  – Imperial Irrigation District
  – Los Angeles Department of Water and Power
  – Pacificorp – West
  – Sacramento Municipal Utility District
  – Sierra Pacific Power Company
  – Turlock Irrigation District
  – Western Area Power Administration, Lower Colorado Region

• Some retail providers participate in CAISO markets (about 70%) – not uniform across investor-owned or publicly-owned utilities
Existing Electric Sector Policies

...that affect greenhouse gas emissions
Energy Efficiency (EE)

• EE programs have been operating in California for almost 30 years for other environmental and cost saving reasons
• EE= most important tool (least-cost and zero emissions) for reducing emissions
• IOUs required by CPUC and POUs by AB2021 to invest in “cost-effective” EE
• CPUC has set goals through 2013 for IOUs
• CEC identified statewide potential and annual 10-year targets for POUs
• IOUs earn rewards/penalties for progress toward goals
• If successful, IOU programs will remove the need for about ten 500-MW power plants over next decade
• CEC building codes and State and federal appliance standards also contribute very low-cost reductions
Renewables

• California has long-standing policy for renewables, beginning with standard offer contracts in 1980s
• Renewables Portfolio Standard (RPS) in 2001
  – Key driver of emissions reductions
  – Currently 20% renewable requirement by 2010 for IOUs – will be close
  – Potential to go to 33% by 2020 (under consideration)
  – Renewable Energy Transmission Initiative (RETI) to identify California renewable energy zones
  – Currently no POU requirement, but some already voluntarily invest
• California Solar Initiative/New Solar Homes Partnership in 2006
  – 3000 MW of solar installations by 2016, both IOUs and POUs
Emissions Performance Standard

• Required by SB 1368 (2006)
• CEC adopted for POUs; CPUC adopted for IOUs in early 2007
• Limits emissions from long-term commitments by utilities (over five years) to 1100 pounds of CO2 per megawatt hour
• Essentially equivalent to emissions from a new combined cycle natural gas plant
• Permanently sequestered carbon emissions do not count towards total output
Key Policy Questions

• Magnitude of additional emissions reductions beyond existing policies
• Where do emissions reductions come from?
• At what cost?
• Can a cap and trade system facilitate additional emissions reductions at lower cost?
• If so, who should have the compliance obligation in the sector?
Potential Sources and Level of Emissions Reductions from Electricity

- Not much opportunity for incremental improvement to existing fossil-fueled generation
- Most reductions in electricity will come from investment in new infrastructure, which takes 3-10 years to plan, site, and build
- Many cost-effective options exist at end-user level (energy efficiency, new products, clean distributed generation)
- Preliminary analysis suggests we can get down to electricity sector 1990 levels with:
  - More aggressive energy efficiency levels (equivalent to 100% of economic potential)
    - This level of energy efficiency not yet attempted anywhere – ~30-50% higher than existing levels; delivery mechanisms and costs highly uncertain
  - Equivalent of 33% renewables statewide
  - Similar policies in other Western states
Costs

• Extremely preliminary analysis, but GHG policies will create upward pressure on electricity rates

• Assumed cost increases include costs for existing policies (such as 20% renewables) that have not yet been added to current electricity rates

• Key policy question for policymakers will be level of cost/rate increases acceptable/reasonable for additional emissions reductions from electricity sector
  – As compared to costs in other sectors
If cap and trade: Point of Regulation
Who has the compliance obligation?
4 options

Load based (LB)
• Load-serving entity or “retail provider” for all power sold in California

Source based
• Generators in California – does not capture imports

First seller (FS) (deliverer)
• Entity with ownership/title that first delivers power at a California point of delivery
• For in-state production, first seller = generator
• For imports, first seller = importer

In-state generator/Import retail provider
• Instate = generators
• Imports = load serving entity or retail provider
Point of Regulation - continued

- All four options have legal risks and policy pros and cons
- Most legal risks and policy drawbacks related to one state acting unilaterally
- If regional or national system developed, many vulnerabilities and challenges solved
- Thus emergence of 5th option: regional cap and trade system
- CPUC/CEC expect to issue policy decision by mid-late-February
Natural Gas Background

• Likely mostly natural gas (from end-user combustion)
  – Residential: 6%
  – Commercial: 3%
  – Some Industrial: 5-10%

Source: CARB Inventory – November 16, 2007
Overall Natural Gas Sector Profile

• IOU gas providers (local distribution companies) – PG&E, SDG&E, SoCalGas, Southwest Gas
• Small number of POUs
• Interstate pipelines
• Independent storage providers in California
• Marketers/aggregators
• Large component of electric generation from natural gas
• End-user combustion (not counting for electric generation) accounts for ~$12 billion in utility bill collections annually
Existing Natural Gas Sector Policies

• Energy Efficiency
  – As in electricity, the least expensive alternative for emissions reductions from end-user combustion
  – IOUs have mandatory goals

• Leak detection from pipelines and compressor stations
  – Though small, fugitive methane emissions have 21-23 times the global warming potential of CO2
  – Already in interest of utilities and pipelines to reduce leaks to increase revenues; may be able to do more
Key Natural Gas Policy Questions

• Should end-user emissions from natural gas combustion be capped or treated through mandatory/regulatory policies and programmatic strategies?
• Can we get more from the natural gas sector if we utilize cap and trade?
• Is there a relationship to electricity sector policy?
Potential Natural Gas Policies

• Staff preliminary recommendation for capping sector including end-user emissions
• Relationship to electricity sector important
  – If electric sector cap and trade were load-based, model transferrable to local distribution companies for natural gas
  – Approach would minimize incentives for fuel switching
• Options for renewable sources of natural gas – biogas
• CPUC/CEC policy decision in mid-late-February
Next Steps for Energy Sectors

• Mid-late-February decision from CPUC/CEC on type and point of regulation for electricity and natural gas, including preliminary recommendations on allowance allocation policy
• Additional modeling results available March-April 2008
  – Including refined cost estimates
  – Analysis of impacts by utility/retail provider
  – Further details of emissions reductions achievable by various strategies
• Final recommendation to CARB by August 2008
California’s Water-Energy Nexus

• Water generates energy.
  – In 2006, 19% of California’s in-state electricity was generated from clean hydropower.

• Water uses energy.
  – On average, 19% of electricity use in California is related to water use.
  – On average, 30% of the non-power plant natural gas use (i.e. natural gas not used to generate electricity) is also related to water use.

• The energy intensity of water is primarily in its end uses (i.e. at the customer level).
Where are the greatest near-term opportunities for significant energy benefits?
## Proposed Water-Energy Strategies

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