Oil & Gas / Petroleum Refining Sector

AB 32 Scoping Plan Development Public Workshop

California Air Resources Board Sacramento, CA April 11, 2008
Purpose of Workshop

- Present background information on the sector
- Propose potential options to reduce GHG emissions
- Solicit public comments
Agenda

10:00-12:00am  Oil & Gas Systems: Extraction, Processing, Transmission & Storage
12:00-1:00pm    Lunch Break
1:00-3:00pm     Petroleum Refining
AB 32: The California Global Warming Solutions Act of 2006

Overview & Implementation Status
What Is AB 32?

• Assembly Bill 32 sets in statute 2020 GHG emissions target to roll back to 1990 levels

• ARB to monitor/regulate GHG sources
  – GHG come from: 89% CO\(_2\), 6% CH\(_4\), 5% other

• Air Resources Board lead, but:
  – Cal/EPA and Climate Action Team continue coordinating statewide climate policy
  – Other agency authorities preserved
Sectors

- Agriculture
- Forests
- Business/Industry
  - Cement
  - Semiconductor Manufacturing
  - Oil and Gas/Refining
  - General Combustion
- Energy
  (Electricity/Natural Gas)
- Water
- Transportation
  - Land Use/VMT
  - Vehicles
  - Fuels
- High GWP Gases
- Recycling and Waste Management
- State Government
  - Green buildings
  - State fleet
California GHG Emissions

2004 GHG Emissions
(480 MMTCO$_2$E)

- Transportation: 38%
- Industrial: 20%
- Residential: 6%
- Agriculture: 6%
- Commercial: 3%
- Electricity Generation (Imports): 13%
- Electricity Generation (In State): 12%

2004 Inventory by Subsector
(Total = 125 MMTCO₂E)

- Refineries: 28%
- Other: 32%
- High-GWP: 11%
- Semiconductor: 1%
- Waste: 8%
- Cement: 8%
- Oil & Gas Systems: 12%
Magnitude of the Challenge

ARB Emissions Inventory

- 1990 Emission Baseline
- ~173 MMT CO₂e Reduction
- 80% Reduction ~341 MMT CO₂e

Year
- 1990
- 2000
- 2004
- 2020
- 2050
ARB 2020 Emission Reductions Needed

(AT LEAST 72 of 173 MMTCO$_2$E)

- Adopted Strategies (AB 1493, Anti-Idling)
- Discrete Early Action Measures
- Other Early Actions
- Remaining Reductions (scoping plan, CAT)
What Is the Scoping Plan?

• Tell how CA meets GHG level by 2020
• Provide vision for low carbon future 2050+
  – Reduction goal of 80% below 1990 levels
• Establish CA leadership on addressing climate change
• Maximize benefits to CA
  – Criteria and toxic air pollutant co-benefits
  – Economic development (green technologies)
How Will the Scoping Plan Be Developed?

- Identify maximum technologically feasible and cost-effective measures
- Assess possible mechanisms to achieve reductions
  - Market-based, direct regs, incentives, etc.
- Evaluate scenarios to meet 2020 limit
- ARB is responsible for Scoping Plan
  - ARB working closely with Cal/EPA & Climate Action Team Subgroups & workshops
<table>
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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>May 5, ‘08</td>
<td>Scoping Plan Scenarios Workshop (Sac)</td>
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<td>June 26, ‘08</td>
<td>Draft Scoping Plan released</td>
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<td>July ‘08</td>
<td>Workshops on draft plan (Statewide)</td>
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<td>Oct ‘08</td>
<td>Final Staff Proposal Released</td>
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<td>Nov 20-21, ’08</td>
<td>Board Hearing – Scoping Plan</td>
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Contacts

• Bill Blackburn (916) 322-7154
  bblackbu@arb.ca.gov
• Bruce Tuter (916) 324-5932
  btuter@arb.ca.gov
• Climate Change website
  www.arb.ca.gov/cc/cc.htm
• Program Design workshop
  www.arb.ca.gov/cc/scopingplan/pgmdesign-sp/meetings/2008_Meeting_Schedule.pdf
Oil & Gas Systems

Extraction, Processing, Transmission, and Storage
Outline

• Background
• Potential Options to Reduce GHG Emissions
• Recent & Future Activities
• Questions & Comments
Oil and Gas Systems in California

- 50,000 oil and 1,500 gas wells, including off-shore platforms
- Most oil wells located in the south, while most gas fields located in the north
- 250 million barrels of crude oil and 325 billion cubic feet of natural gas in 2005
- Over 3,000 miles of pipelines used for crude oil and 12,000 miles for natural gas
- Provides more than 20,000 direct and about 75,000 indirect jobs (CIPA and WSPA)
GHG Emission Sources

• Combustion Emissions (mainly CO$_2$):
  – Boilers
  – ICEs (pumps, compressors)
  – Steam generators
  – Dehydrators
  – Flaring

• Fugitive Emissions (mainly CH$_4$):
  – Leaks (valves, flanges, seals)
  – Venting (dehydrators, compressors)
Current Requirements

• District Rules
  – Vary by district
  – Combustion and fugitive emissions
  – Criteria pollutants and toxics
  – Permit requirements
Two Proposed Measures

• ‘Reduced Venting/Leaks from Oil and Gas Systems’
  – Approved by the Board October 25, 2007
  – Early action measure
  – Transmission and storage activities
  – Adopt by December 2010

• Propose second measure
  – AB 32 Scoping Plan development
  – Extraction and processing activities
  – Adopt in 2011
Potential Options to Reduce GHG Emissions

• Fugitive Emissions
  – U.S. EPA Natural Gas STAR Program
    ✓ Deploy cost-effective technologies
      (e.g., replace high-bleed pneumatics with low-bleed pneumatics, replace glycol dehydrators with desiccant dehydrators)
    ✓ Implement best management practices
      (e.g., practice enhanced directed inspection and maintenance at various facilities)
Potential Options to Reduce GHG Emissions

• Combustion Emissions
  – Repair
    ✓ Perform routine maintenance
  – Retrofit
    ✓ Add components to existing equipment
  – Repower
    ✓ Substitute parts without replacing the entire equipment
  – Replace
    ✓ Install new equipment or use new fuels
### 1990-2020 GHG Emissions Transmission and Storage Activities

(in MMTCO$_2$E)

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*Revised values (February 28, 2008)
## 1990-2020 GHG Emissions Extraction and Processing Activities

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Recent Activities

• Literature study
  – API, U.S. EPA, DOE, IPCC, etc.
• Emissions inventory research
• Discussions with CEC, CPUC, DOGGR, and Air Districts
• Begin site visits
Future Activities

• More site visits
• Form a working group
• Conduct a survey
  – A snapshot of Oil & Gas Systems in California
  – Activity factors (equipment types & counts, fuel use)
• Improve emissions inventory
• Possible workshop: Fall 2008
• Develop regulations
• Board hearings
  – Transmission & Storage: December 2010
  – Extraction & Processing: 2011
For Further Information

- Oil & Gas/Refining Scoping Plan Development Website: http://www.arb.ca.gov/cc/scopingplan/oil-gas-sp/oil-gas-sp.htm

- Oil & Gas Systems Website: http://www.arb.ca.gov/cc/venting-leaks/venting-leaks.htm

- Subscribe to ARB List Serves: http://www.arb.ca.gov/listserv/listserv.php
  (Choose: “oil-gas-sp” and/or “venting-leaks”)
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Questions & Comments

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