Do your part to reduce your carbon footprint, invite your livestock to live under the same roof…..

2005 Executive Order Established Statewide GHG Targets

“I SAY THE DEBATE IS OVER. WE KNOW THE SCIENCE. WE SEE THE THREAT. AND WE KNOW THE TIME FOR ACTION IS NOW.”

Governor Arnold Schwarzenegger
June 2005

- AB 32 sets in statute emission target to reduce GHG emissions to 1990 levels by 2020
- ARB given authority to monitor and regulate GHG sources
- Cal/EPA and Climate Action Team coordinate statewide climate policy
- Coordinate with other states and countries to reduce emissions
Magnitude of the Challenge

ARB Emissions Inventory

1990 Emission Baseline

~173 MMT CO$_2$E Reduction

80% Reduction

~341 MMTCO$_2$E

Year

1990 2000 2004 2020 2050

Million Metric Tons

(MMT CO$_2$E Equivalent)

1990 Emission Baseline

2004 Agricultural GHG Emissions

(28 MMT CO$_2$e)

Manure Management (6.9)

Rice Cultivation (0.6)

Energy Use/Fuel Combustion (4.9)

Ag Residue Burning (0.08)

Ag Soil Management (8.3)

Enteric Fermentation (7)
Total Agricultural Emissions

- **1990 Baseline Emissions:**
  23.4 MMTCO₂E (5% of Statewide total)

- **2004 Baseline Emissions:**
  27.9 MMTCO₂E (6% of Statewide total)

- **2020 Preliminary Forecasted Emissions:** 31.9 MMTCO₂E

**AB 32 Timeline**

- **2007**
  - Publish list of early actions

- **2008**
  - Early action regulations enforceable
  - Mandator reporting & 1990 Baseline

- **2009**
  - GHG reduction measures enforceable
  - Adopt scoping plan

- **2010**
  - Adopt GHG reduction measures
  - Early action regulations enforceable

- **2011**
  - Reduce GHG emissions to 1990 levels

- **2012**
  - Identification/ implementation of further emission reduction strategies

- **2020**
  - Adopt enforceable early action regulations
Scoping Plan

- Describe how California will reduce GHG emission levels to 1990 levels by 2020
- Identify mix of strategies to achieve 2020 emission target
- Sector-based approach
- Provide a vision for a low carbon future between 2020 and 2050
- Complete by end of 2008

Tentative Scoping Plan Development Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 30, 2007</td>
<td>Scoping Plan Kick-Off Workshop</td>
</tr>
<tr>
<td>Dec 6 &amp; 7, 2007</td>
<td>Board Hearing - 1990 Baseline, Mandatory Reporting</td>
</tr>
<tr>
<td>Dec 14, 2007</td>
<td>Sector Summary Workshop (Sac)</td>
</tr>
<tr>
<td>Jan 16, 2008</td>
<td>Mechanisms Workshop (Oakland)</td>
</tr>
<tr>
<td>Mar 24, 2008</td>
<td>Scoping Plan Scenarios Workshop (Sac)</td>
</tr>
<tr>
<td>June 2008</td>
<td>Draft Scoping Plan released</td>
</tr>
<tr>
<td>July 2008</td>
<td>Workshops on draft plan (Statewide)</td>
</tr>
<tr>
<td>Oct 2008</td>
<td>Final Staff Proposal released</td>
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<tr>
<td>Nov 20-21, 2008</td>
<td>Board Hearing - Scoping Plan</td>
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</table>
California Agriculture and Climate Change

<table>
<thead>
<tr>
<th>Advisory Committees</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Environmental Justice</td>
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<tr>
<td>- Economic &amp; Technology Advancement</td>
<td></td>
</tr>
<tr>
<td>- Market Advisory</td>
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</tr>
</tbody>
</table>
ETAAC GOALS

• Advise ARB on activities that will facilitate investment in and implementation of technological research and development opportunities that will assist in the reduction of greenhouse gas emissions.

• Including, but not limited to, identifying new technologies, research, demonstration projects, funding opportunities, developing state, national, and international partnerships and technology transfer opportunities, and identifying and assessing research and advanced technology investment and incentive opportunities

• Advise the ARB on state, regional, national, and international economic and technological developments related to greenhouse gas emission reductions.

ETAAC SUBJECT AREAS

• MANURE MANAGEMENT/DIGESTER TECHNOLOGY: expand on the recently developed protocol and projects that can reduce methane from manure management and produce renewable energy.

• ORCHARD, VINEYARD & RANGELAND MANAGEMENT FOR CARBON STORAGE: explore management practices that could enhance above and below ground carbon sequestration

• REFORESTATION AND RIPARIAN RESTORATION ON FARMS AND RANCHES: restoration projects that have the potential to increase carbon storage and provide other environmental and wildlife benefits

• BIOMASS UTILIZATION AND BIOFUELS: Use of abundant agricultural byproducts including prunings, straws, processing wastes, etc. for production of biofuels using biochemical and thermo chemical technologies

• EFFICIENT FERTILIZER AND WATER USAGE/ENTERIC FERMENTATION: Evaluate methods to reduce emissions from fertilizer use and livestock feeding activities
### Summary of California Agricultural Programs to Reduce GHG Emissions

<table>
<thead>
<tr>
<th>Potential California Program Size</th>
<th>Estimated Reduction</th>
<th>Net Annual California Reduction Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gross (units/yr)</td>
<td>Technical (units/yr)</td>
</tr>
<tr>
<td>Manure-to-energy facilities</td>
<td>3,600,000</td>
<td>1,800,000</td>
</tr>
<tr>
<td>Enteric Fermentation</td>
<td>4,100,000</td>
<td>2,050,000</td>
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<tr>
<td>Ag Biomass Utilization</td>
<td>21,000,000</td>
<td>8,000,000</td>
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<tr>
<td>Dedicated Bio-Fuels Crops</td>
<td>1,000,000</td>
<td>500,000</td>
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<tr>
<td>Soil Carbon Sequestration</td>
<td>10,000,000</td>
<td>5,000,000</td>
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<tr>
<td>Farmscapes Sequestration</td>
<td>500,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Fertilizer Use Efficiency</td>
<td>10,000,000</td>
<td>5,000,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
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</tbody>
</table>

### Potential Agriculture Strategies

- Livestock emissions
- Energy (biomass/biofuels/renewable energy)
- Efficiency improvements
- Sequestration
- Research
Research

- Explore improved agricultural practices and their impacts
- Potential Approaches
  - Life Cycle Analysis
  - Best Practice Protocols
  - Fertilizer $\text{N}_2\text{O}$ Emissions

Resources

http://www.arb.ca.gov/cc/cc.htm

Chuck Rice, KSU
Louise Jackson, UCD
Richard Howitt, UCD
Jeff Mitchell, UCD
Johan Six, UCD
Dan Sperling, UCD
Bryan Jenkins, CA Biomass Collaborative/UCD
Paul Buttner, California Rice Commission
Paul Martin, Western United Dairymen
Justin Oldfield, CA Cattlemens Association
Allen Dusault, Sustainable Conservation
Amy Luers, Union of Concerned Scientists
Guido Franco, CEC
Sophia Curiel, CDFA

Charlie Walthall, ARS/USDA
Will Horwath, UCD
Steve Kaffka, UCD
Frank Mitloehner, UCD
David Smart, UCD
Steve Shaffer, CDFA
A New Conservation Market