



How will AB 32 -Global Warming Solutions Act - Affect California Agriculture?

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Selected Slides Courtesy of:

CA Air Resources Board

CA Environmental Protection Agency

California Energy Commission

Steve Shaffer

CA Farm Bureau Federation

Presentation Overview

- **Climate Change and impacts on CA agriculture**
- **AB 32 – Global Warming Solutions Act**
- **California Agriculture and AB 32**
- **Climate Change Adaptation Strategies**
- **Conclusions**

Threats of Global Warming

- Slow-moving environmental disaster
- 2.5-4 times as many heat wave days
- Increased temperatures (5.5-8° F)
- 70-80% Loss of snowpack
- Rising sea levels (14-22")



California Agriculture - Threats

- Water-Shortages/Reliability
- Flooding
- Levee failure
- Drought
- Fire
- Increased temperatures & duration & frequency of extreme heat events
- Reduced pollination
- Loss of chill hours

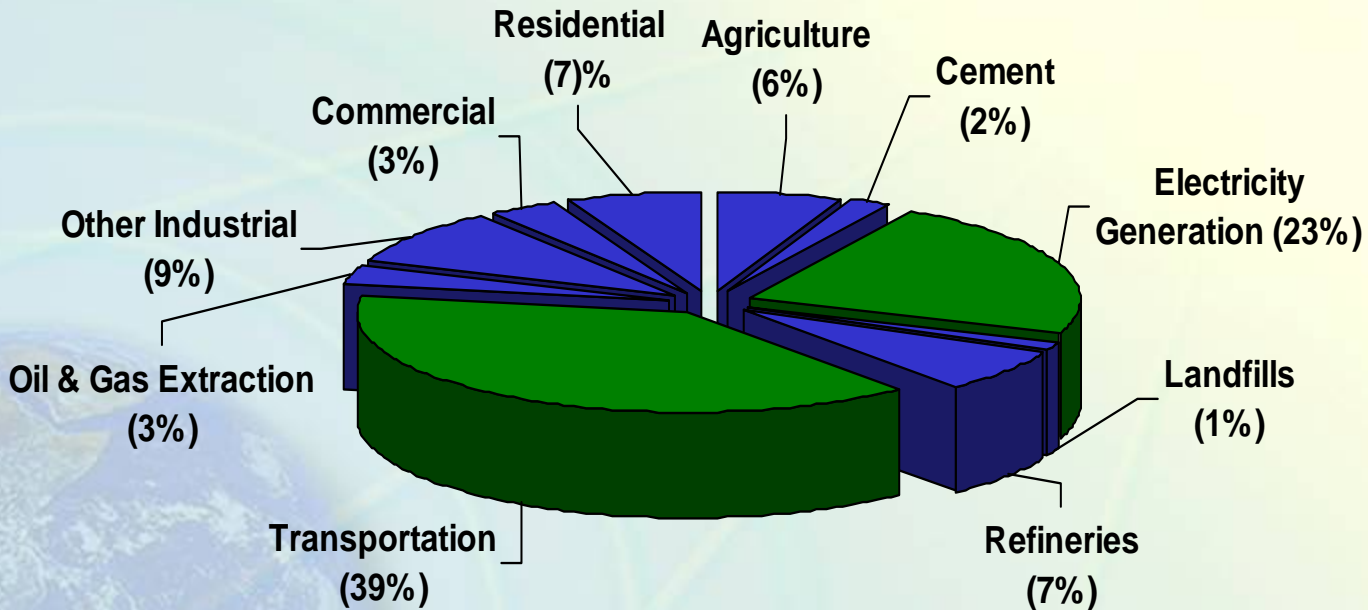


California Agriculture – Threats (cont.)

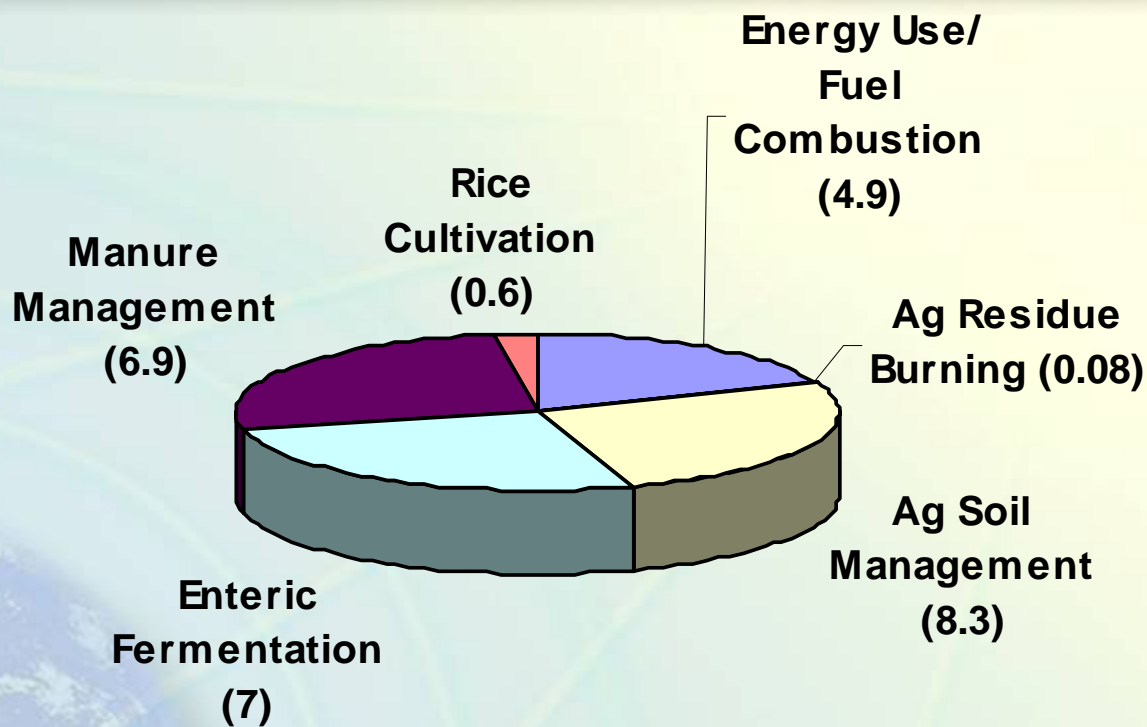
- Degradation of air quality
- Invasive species & diseases-Expanded Ranges
- Worker health and productivity
- Loss of micro-climates
- Cost of inputs and regulations
- Increased plant/animal stress
- yield & variety losses

California's Emissions

Courtesy California Environmental Protection Agency

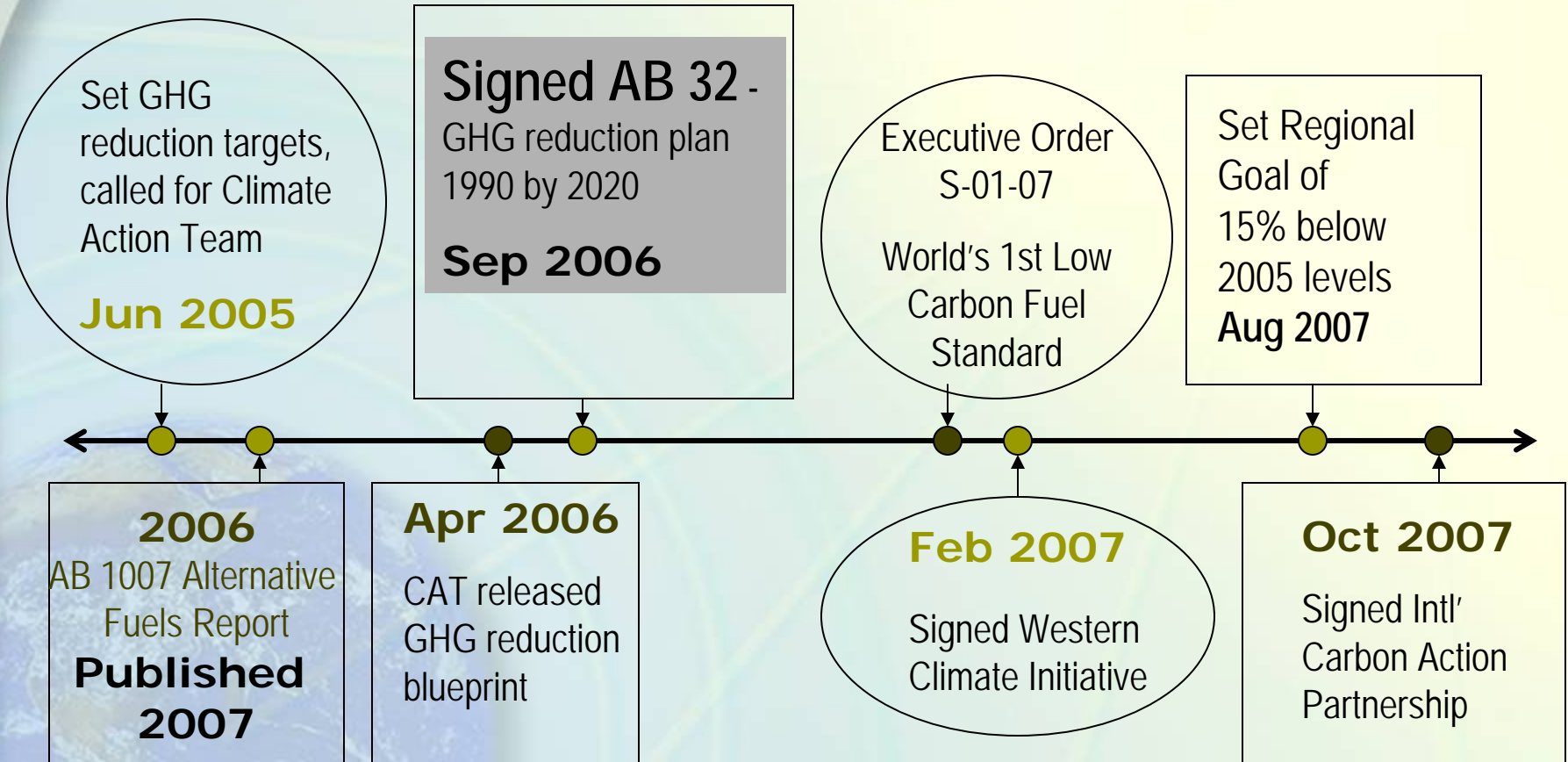


2004 CA Ag GHG Emissions=28 MMTCO₂



Courtesy: CA Air Resources Board

Climate Change Policies and Initiatives



GLOBAL WARMING SOLUTIONS ACT OF 2006

BY 2020, 30% REDUCTION TO 1990 LEVELS

BY 2050, 80% REDUCTION TO 1990 LEVELS

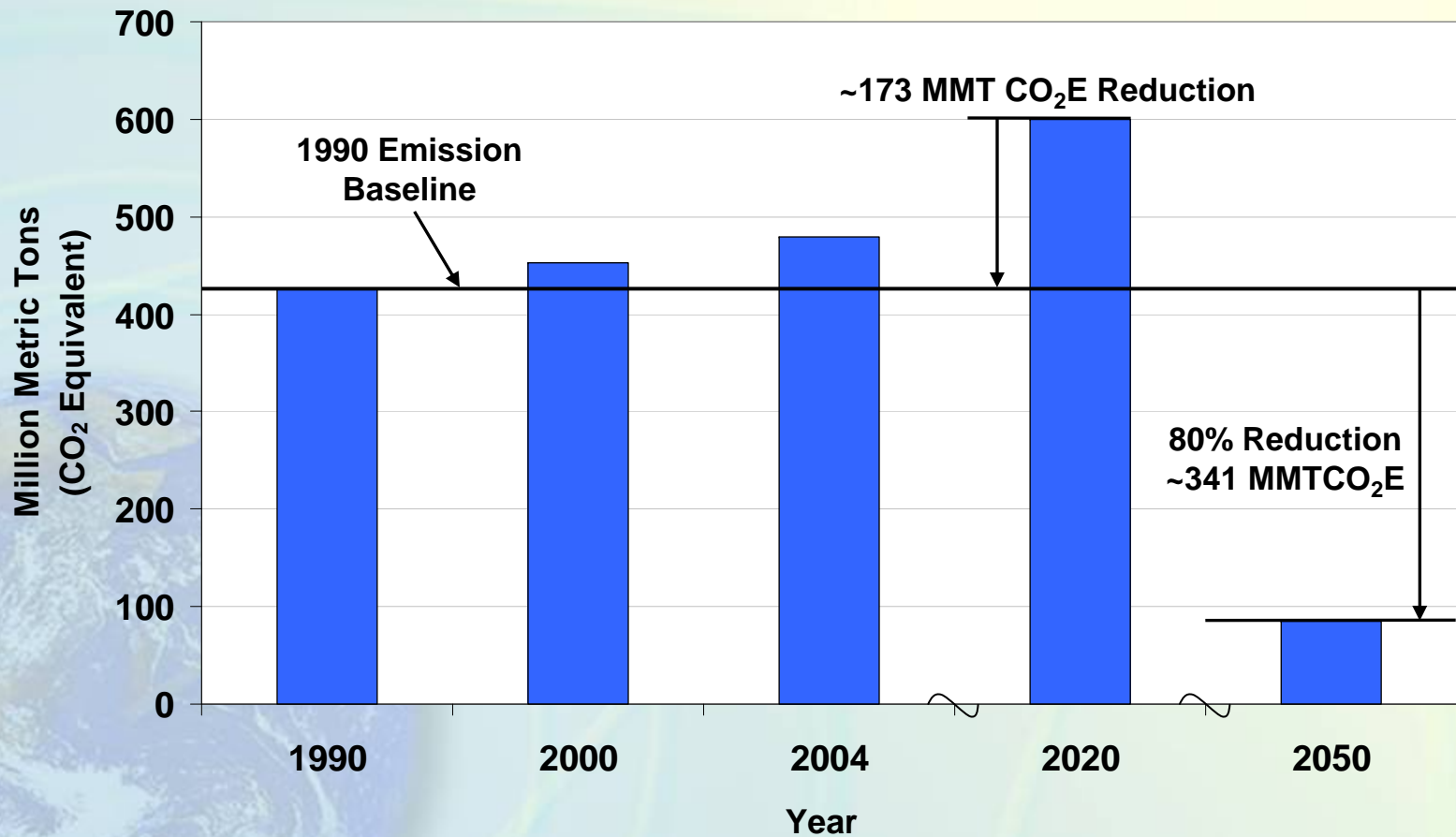
“I SAY THE DEBATE IS OVER! “



Magnitude of the Challenge

Courtesy Air Resources Board

ARB Emissions Inventory



What is 1 Million Metric Tons (Mmt) CO₂?

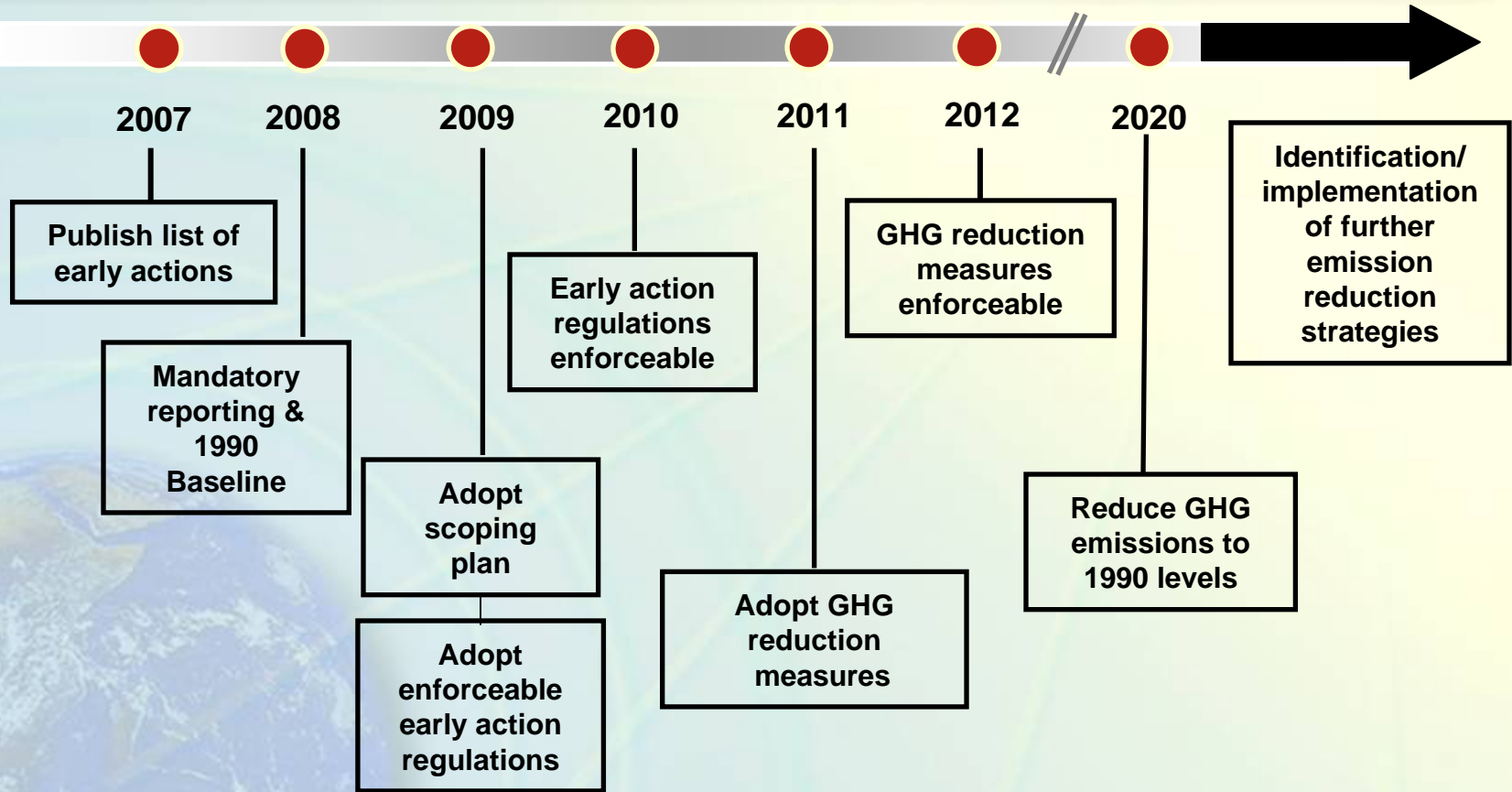
- CA – 2020 goal – reduce to 1990 levels – 174 Mmt.
- 179,000 cars and light truck.
- Electricity for 193,000 CA homes.
- 833,000 ac of conifer forest absorbing CO₂.
- 13 million light bulbs replaced by CFLs.
- Everyone in CA walking up 1 flight of stairs each day.

What Is The California Global Warming Solutions Act of 2006 (AB 32)?

- **Sets in statute 2020 GHG emissions limit at 1990 level**
 - Acknowledges that 2020 is not the endpoint
- **Air Resources Board to monitor/regulate GHG sources**
- **In collaboration with other state agencies, ARB developed Scoping Plan adopted by ARB December 11, 2008.**

Courtesy Air Resources Board

AB 32 Timeline



Scoping Plan

- **Describes how California will reduce GHG emission levels to 1990 levels by 2020**
- **Not a regulation, but basis for regs.**
- **Identifies measures for future adoption or implementation**
- **Uses sector based approach**

Scoping Plan Sectors

- **Agriculture**
- **Electricity**
- **Forest**
- **High Global Warming Potential Gases**
- **Land Use & Local Government**
- **Manufacturing**
- **Oil & Gas/Refining**
- **Transportation**
- **Waste Management & Landfills**
- **Water**

GHG Reduction Measures and the Scoping Plan

- Scoping plan will identify mix of measures and approaches to achieve 2020 target
- Every sector is was examined for potential areas for reductions
- Regulations, voluntary approaches and incentives included.
- Some sectors are viewed primarily as source of voluntary reductions for use in emission trading

Defining the Agriculture Sector for the Scoping Plan

- **Energy crops**
- **Management of on-farm residual biomass such as prunings, straw, or manure**
- **Animal Agriculture: Production of meat, eggs, and milk**

Defining Agriculture for the Scoping Plan – Most Pertinent to Veg. Crops

- **Application and management of water**
- **Use of fertilizers and crop protection materials**
- **Field Tillage and Harvesting Operations**
- **Fuel efficiency of on-farm equipment**
- **Carbon sequestration in soils and crops**

Strategy Prioritization

Near-term and longer-term strategy development prioritization based on the following elements:

- Availability of data for quantifiable reductions**
- Estimated reduction potential**
- Co-benefits**
- Voluntary win-win opportunities offering cost savings for agricultural producers**

Near-Term Focus

- **Livestock and Confined Animal Facilities**
 - Reduction of methane production at source
 - Energy recovery from methane capture
- **Agricultural Biomass Utilization**
- **Voluntary win-win strategies offering cost savings to the producer**
 - Tractor tire inflation program
 - Agricultural irrigation pump efficiency program

Longer-Term Focus

- **Enteric fermentation**
- **Dedicated bio-fuel crops**
- **Composting**

Longer-Term Focus: Of Interest to Vegetable Crops

- **Fertilizer (Nitrogen) use efficiency**
- **Water Use Efficiency**
- **Use of renewable energy; e.g. solar**
- **Farmscape and soil carbon sequestration (food safety?)**
- **Restrictions on fuel emissions/efficiency**
- **Reduction of refrigerant emissions**

Agricultural Sector Reponse: Efficiency Improvements

- **Reduce GHG emissions through more efficient agricultural practices**
- **Potential Approaches**
 - **Crop Management**
 - **Water Management**
 - **Pump Efficiency and Electrification**
 - **Conservation Tillage**
 - **Fertilizer Use Efficiency**




Agricultural Sector Respons Research



- **Explore improved agricultural practices and their impacts**
- **Potential Approaches**
 - **Life Cycle Analysis**
 - **Best Practice Protocols**
 - **Fertilizer N₂O Emissions**



Research on GHG Emissions from Nitrogen Fertilizers



ARB wants to better understand nitrous oxide (N₂O) emissions from agricultural ecosystems under California specific conditions

Two phase research project- 1st phase data used to develop CA specific baseline emissions & validate N₂O emission models

Second phase will look at improved fertilizer management practices



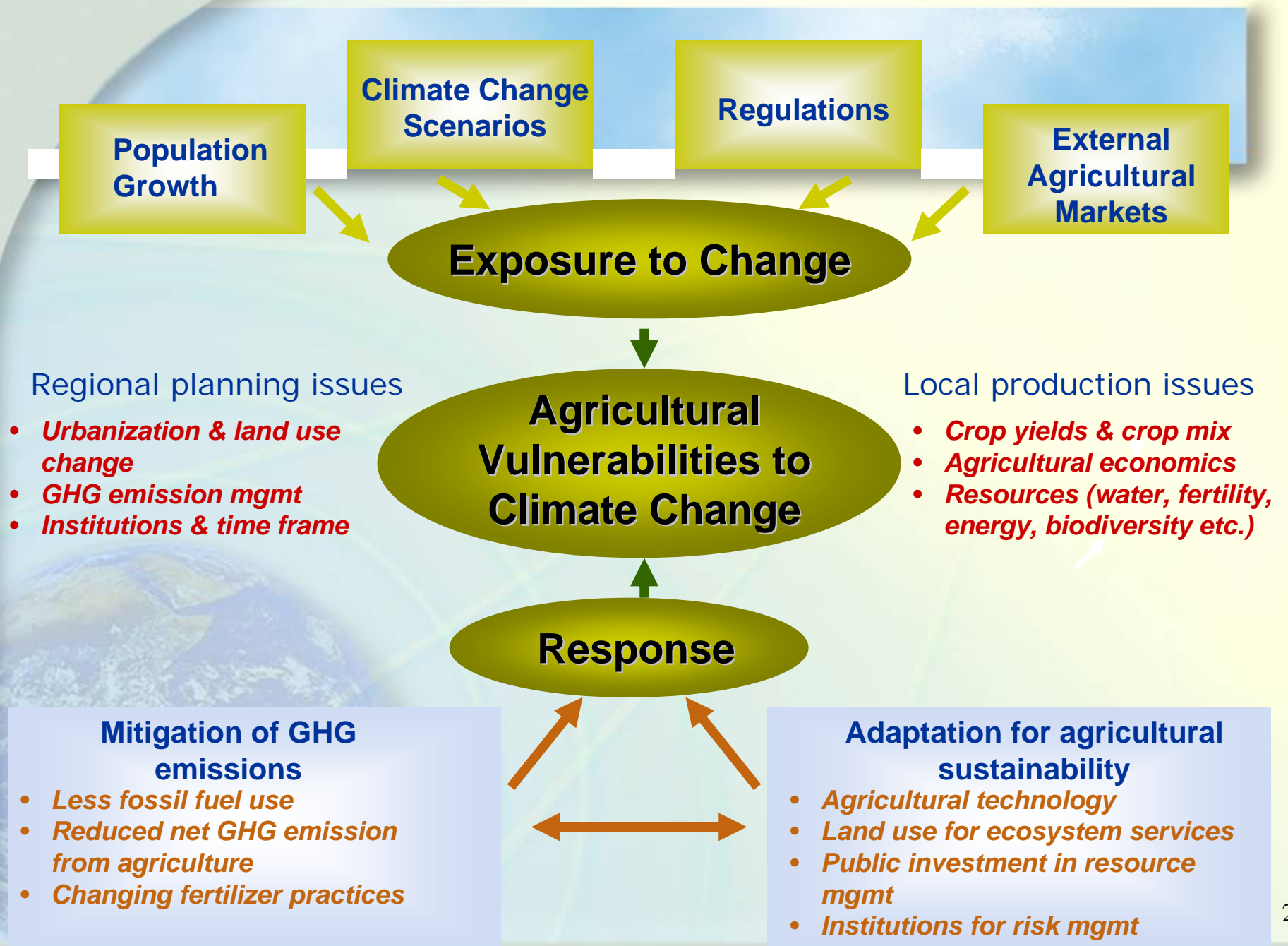
ARBs estimates N₂O at 15.6 MMTCO₂E, 2.8 % of CA total GHG emissions. Ag soil is 50 % of that total

4.9 MMTCO₂E of N₂O emissions from ag soil results from application of organic and synthetic fertilizers

Joint research by ARB/CEC/CDFRA with research teams from CSUF/UCD w/ multiple crops in dif climates to begin early 2009

Agricultural Sector Response

- Farm GHG assessments and audits
 - Winegrape grower's energy audits; solar installations; GHG footprint calculation; development of industry GHG protocol and calculator.
 - Rice Industry research to ID GHG emissions and develop reduction practices.



Conclusions

- AB 32 addresses agriculture. In the near term it is focused on:
- Vehicle efficiency standards; water use efficiency; renewable energy; and, methane capture at large dairies.
- Future GHG reduction opportunities: N₂O emissions and farm-level efficiency improvements.

For More information:

- AB 32 Scoping Plan:

[http://www.arb.ca.gov/cc/scopingplan/
document/scopingplandocument.htm](http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm)