



# **California's Approach to Sulfur Hexafluoride in Magnesium Casting**

Elizabeth Scheehle

California Air Resources Board

May 31, 2009

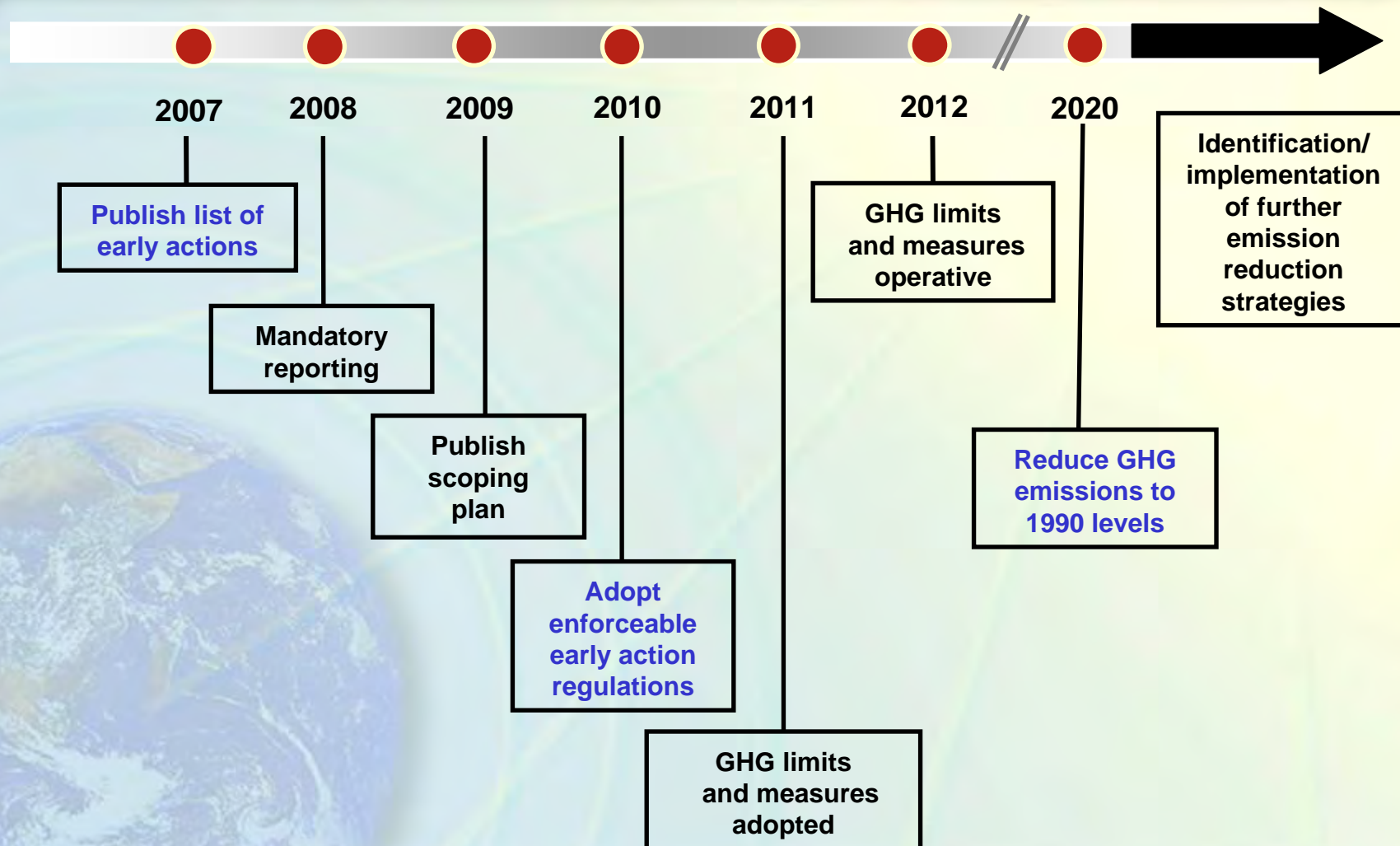
# California's Commitment to Climate Protection

*Global climate change is one of the most critical environmental and political challenges of our time. The debate is over, the science is in, and the time to act is now.*

- Gov. Schwarzenegger

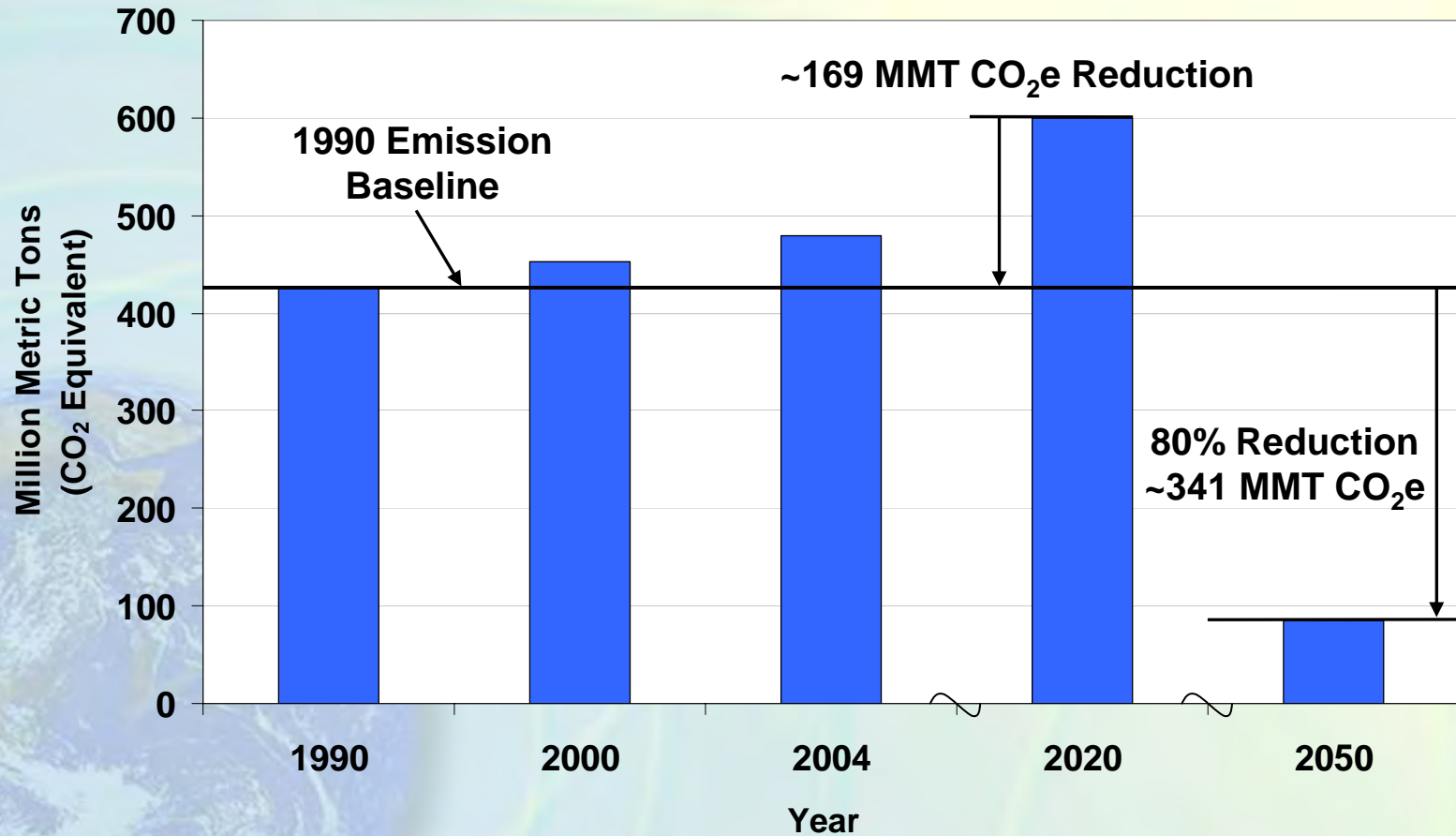
- Governor's Executive Order
- 2006 Global Warming Solutions Act (AB32)

# California Global Warming Solutions Act of 2006 (AB 32)



# The Challenge

ARB Emissions Inventory



# Reductions Required by AB32

- **169 MMTCO<sub>2</sub>E emission reductions in 2020**
  - Reductions of 20.2 MMTCO<sub>2</sub>E from High GWP sector
  - Cap and Trade expected to achieve 34.4 MMTCO<sub>2</sub>E of Reductions

**1MMTCO<sub>2</sub>E =**

**Annual emissions from 216,000 passenger cars or  
Electricity used by 193,000 average CA households**

# AB 32 Scoping Plan Measures for the High-GWP GHG Sector

- **Stationary Source Strategies**

- Limit high-GWP use in consumer products (adopted 6/2008)
- SF<sub>6</sub> in non-electricity and non-semiconductor manufacturing (adopted 2/2009)
- Fluorinated gas reduction in semiconductor manufacturing (adopted 2/2009)
- Refrigerant management program (2009)
- SF<sub>6</sub> in electricity (2010)
- Alternative suppressant in fire protection systems
- Foam recovery and destruction program
- Residential refrigeration early retirement program

- **Mobile Source Strategies**

- Small cans of HFC (adopted 1/2009)
- Refrigerant recovery at end of equipment/vehicle life (2009)
- Pavley II: Improve system efficiency and use of low-GWP refrigerant alternatives
- Vehicle AC system leak check and repair

- **Mitigation fee on high-GWP GHGs**

# Importance of Regulating SF<sub>6</sub>

- SF<sub>6</sub> is the most potent greenhouse gas the IPCC has identified
- Increasing at 5% per year
- Many uses are emissive (capture and recycling not feasible)
- Lifetime of over 3,200 years

**1 lb of SF<sub>6</sub> is equivalent to:  
10 metric tons of CO<sub>2</sub>**

**1 oz of SF<sub>6</sub> is equivalent to:  
1.5 barrels of oil**

# Sulfur Hexafluoride Regulations

- Fluorinated gases in semiconductor manufacturing
- SF<sub>6</sub> in electric utilities
- This regulation: SF<sub>6</sub> in non-utility and non-semiconductor manufacturing



# Emissions and Sources

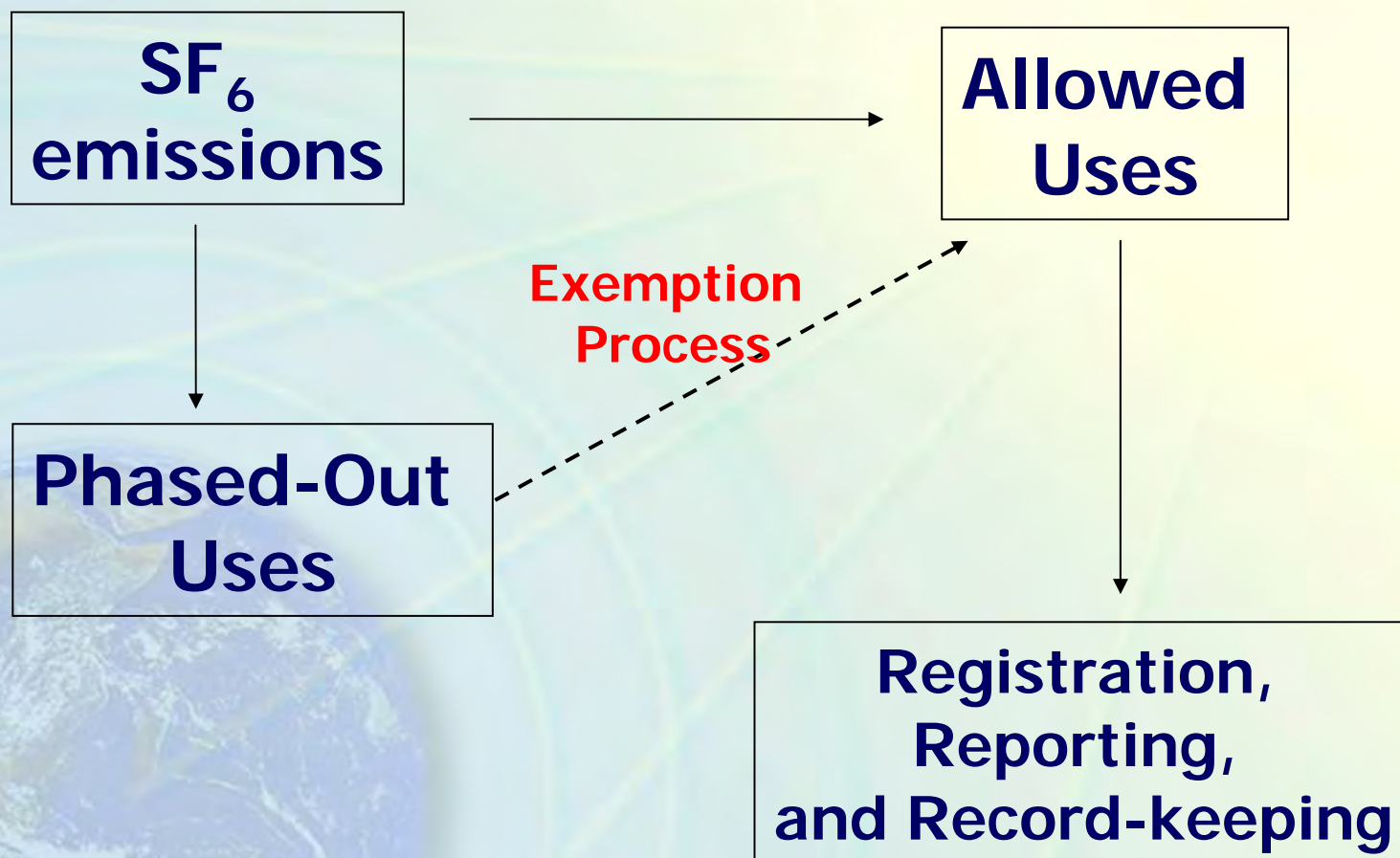
- **Tracer Gas Testing**
- **Magnesium Casting**
- **Other uses (military, research, consumer products, medical)**
- **Total emissions are 0.15 MMTCO<sub>2</sub>E**

# Proposed Regulation

## Reduce emissions of SF<sub>6</sub> from non-semiconductor and non-electricity applications

- Reduction of 0.1 MMTCO<sub>2</sub>E annually
- Low Cost
- Blocks new uses
- Could serve as model for other states

# Components of Regulation



# Phase-Out Dates

<b>Applications</b>	<b>Phase-Out Dates</b>
All uses except those listed below*	January 1, 2011
Tracer Gas Testing	January 1, 2013
Magnesium Sand Casting	
Magnesium Investment Casting	
Military Applications	

\*This regulation does not apply to semiconductor manufacturing or electric utilities as separate focused regulations will address these source categories

# Magnesium Casting

- $\text{SF}_6$  used to prevent oxidation during magnesium casting
- Timing allows for testing results and re-certification of methods
- Alternatives
- Economic and Environmental Assessments
- Status



Magnesium Casting

# Exemption Process

- One of two criteria for an exemption:
  - Uses that result in reduced GHG emissions
  - Uses with no alternatives
- Flexible enough to allow variety of applications
- Applications must include mitigation plan

# Registration, Record keeping and Reporting

- Distributors (<30 firms)
  - Register
  - Keep records of sales for 3 years
  - Provide an annual report of each sale (quantity and date)
- Purchasers (40-70 users)
  - Keep records of annual quantity of SF<sub>6</sub> purchased and used

# Regulation Status

- Approved by Board
- Board directed changes
- 15 day comment Period
- Office of Administrative Law
- Goes into force by 2010



# Research

- ARB is considering funding research into alternatives for investment and sand casting
  - Dependent on funding availability
  - Work with 3 casters in CA and CSU-Pomona

# Interest by Other States

- Several other states are looking at direct regulations for HGWP sector
- Have shown interest in our regulations

# Contact Information

Elizabeth Scheehle

916-324-0621

escheehl@arb.ca.gov

Background material:

<http://www.arb.ca.gov/cc/sf6nonelec/sf6nonelec.htm>

<http://www.arb.ca.gov/regact/2009/nonsemi09/nonsemi09.htm>