

First Public Workshop

Concepts for Mitigating Greenhouse Gas (GHG) Emissions from High-Global Warming Potential (GWP) Stationary Sources

**California Air Resources Board
Sacramento, CA**

February 15, 2008

Agenda

- | | |
|-------------|---|
| 1:00 – 1:30 | Introduction and Background |
| 1:30 – 2:00 | Insulating Foam Recovery and Destruction Program |
| 2:00 – 2:30 | Specifications for Commercial Refrigeration |
| 2:30 – 3:00 | High-Global Warming Potential (GWP)
Tracking/Reporting/Repair/ Deposit Program |
| 3:00 – 3:30 | Residential Refrigeration Program |
| 3:30 – 3:40 | Break |
| 3:40 – 4:10 | Sulfur Hexafluoride (SF ₆) Reductions from the
Non-Electric and Non-Semiconductor Sector |
| 4:10 – 4:40 | Alternative Suppressants in Fire Protection
Systems |
| 4:40 – 5:00 | Discussion, Next Steps, and Final Comments |

Background

- **Climate Change Impacts on California**
- **California Global Warming Solutions Act of 2006 (AB 32)**
- **Board Approved Early Actions**
- **Stationary High-GWP Greenhouse Gas (GHG) “Sector” Overview**
- **Options**
- **Working Group Formation**

California Climate Impacts (over the past 100 years)



**1.3 °F higher
temperatures**

~7 inch sea level rise

**12% decrease in fraction
of runoff between
April and July**

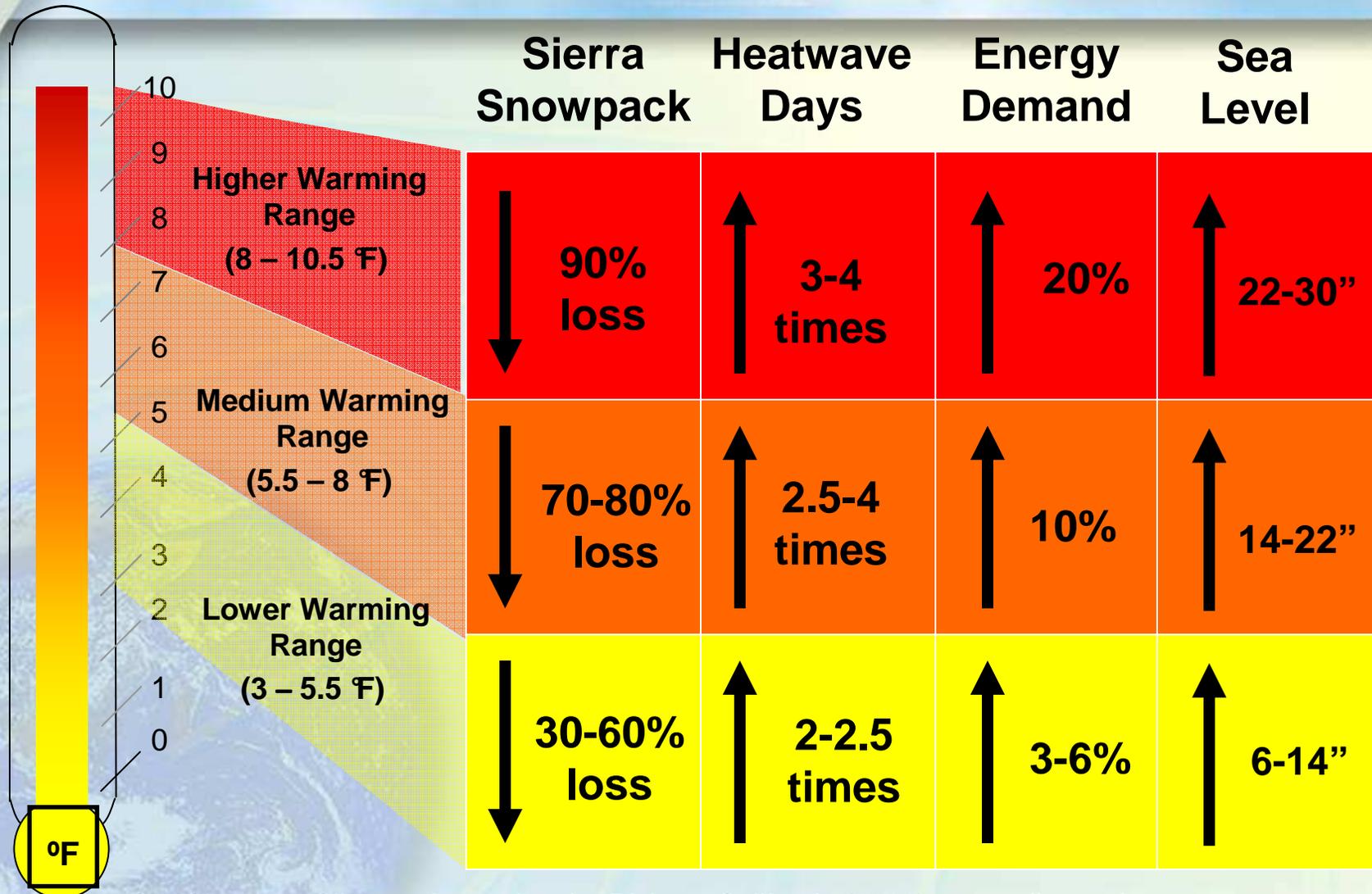
**Snowmelt and spring
blooms advanced 2
days/decade since 1955**

**4-fold increase in
wildfire frequency
(over 34 years)**

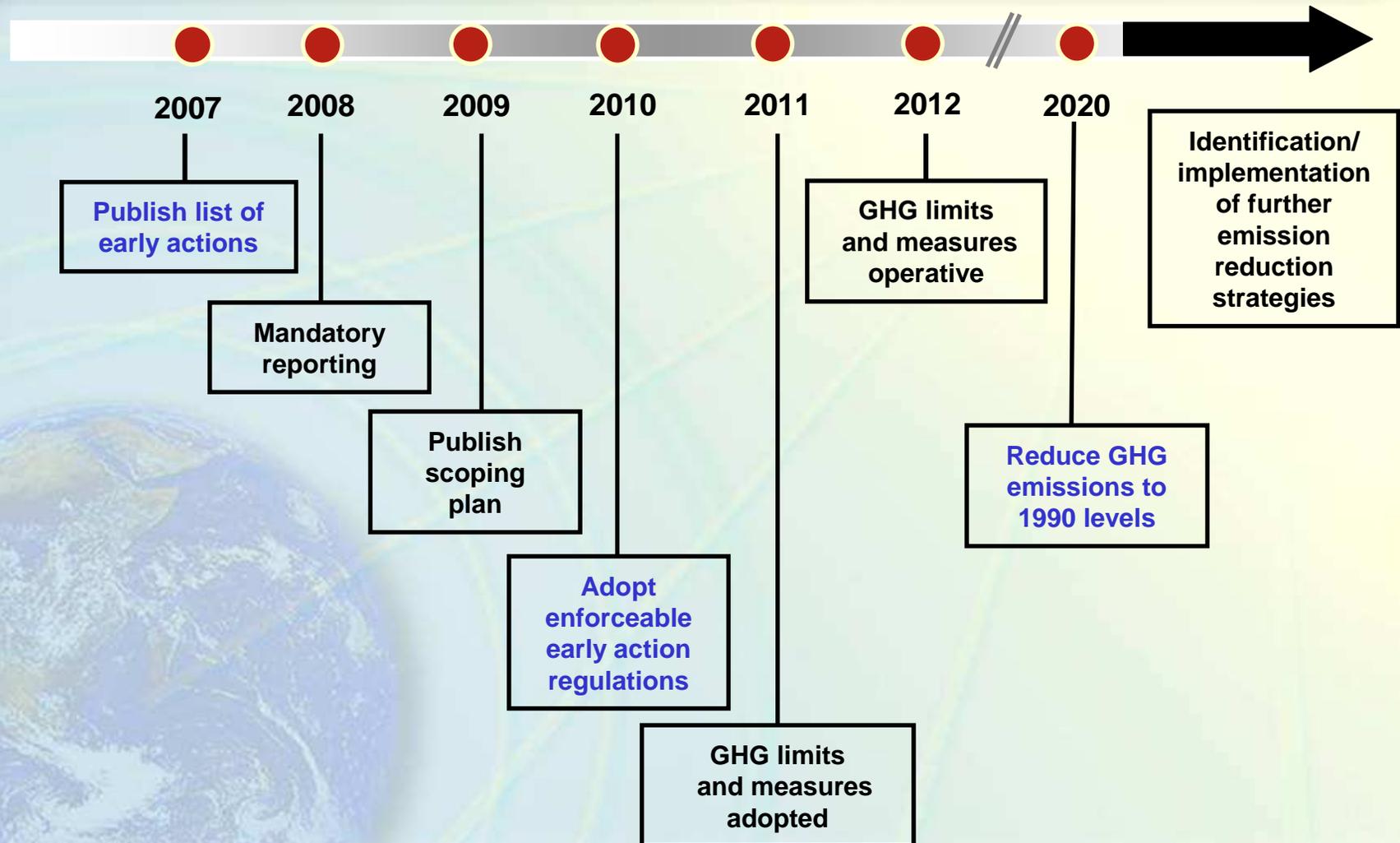
Cal/EPA-OEHHA, "Environmental Protection Indicators for California" (2002),
www.oehha.ca.gov/multimedia/epic/Epicreport.html

Westerling et al., "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity", *Science* (2006)

Projected Climate Impacts on California 2070-2099 (as compared with 1961-1990)



California Global Warming Solutions Act of 2006 (AB 32)



Reductions Required by AB32

- **~173 MMTCO₂E emission reductions by 2020**
- **1MMTCO₂E = Annual emissions from 216,000 passenger cars or electricity used by 193,000 average CA households**
- **44 Early action measures approved by board**
 - **9 Discrete early actions**

Board Approved Stationary Source High-GWP GHG Early Actions

Sector	Strategy Name	2020 Reduction (MMTCO ₂ E)	Board Hearing Date
Stationary	SF6 reductions from the non-electric & non-semiconductor sector	< 1	Jan 2009
Stationary	Specifications for commercial refrigeration	5+	Winter 2010
Stationary	High GWP refrigerants tracking, reporting, and recovery program	?	Spring 2010
Stationary	Foam recovery/destruction program	20+	Winter 2009
Stationary	Residential refrigeration program	< 1	Fall 2009
Stationary	Alternative suppressants in fire protection systems	< 1	Dec 2011

•Other High-GWP Stationary Sources including consumer products, semiconductor industry (PFCs), electricity generation (SF₆) are already being pursued in other efforts. 8

Stationary High-GWP GHG Sector Overview

- **What Are High-Global Warming Potential (GWP) Greenhouse Gases (GHGs)?**
 - Gases with global warming potential many times that of CO₂
 - HFCs, PFCs, SF₆
 - Kyoto Protocol Gases
 - Class I and II Ozone Depleting Substances (ODSs): CFCs, HCFCs, Halons, *et al.*
 - Montreal Protocol Gases
 - New Production, Imports, Exports Controlled
 - Emissions Not Controlled
 - Other High-GWP GHGs
 - NF₃, HFEs, PFPEs
 - Controlled neither by Montreal nor Kyoto Protocols

GWPs of Kyoto vs. Non-Kyoto* GHGs

GHG/Class	100-yr Direct GWP
CO ₂	1
CH ₄	21
N ₂ O	310
HFCs	140~11,700
PFCs	6,500~9,200
SF ₆	23,900
CFCs*	3,800~8,100
HCFCs*	90~1,800
Halons*	5,400

How Are High-GWP Gases Used?

High GWP Gases

Industrial Sources

Substitutes for Ozone-Depleting Substances

Produced as Byproduct

Technical Reasons

Technical Reasons

Primary Aluminum Production

HCFC-22 Production

Magnesium Production and Casting

Semiconductor Manufacturing

Electric Power Systems (Utilities)

Refrigeration and Air Conditioning

Fire Extinguishing

Technical Aerosols

Foam-Blowing Agents

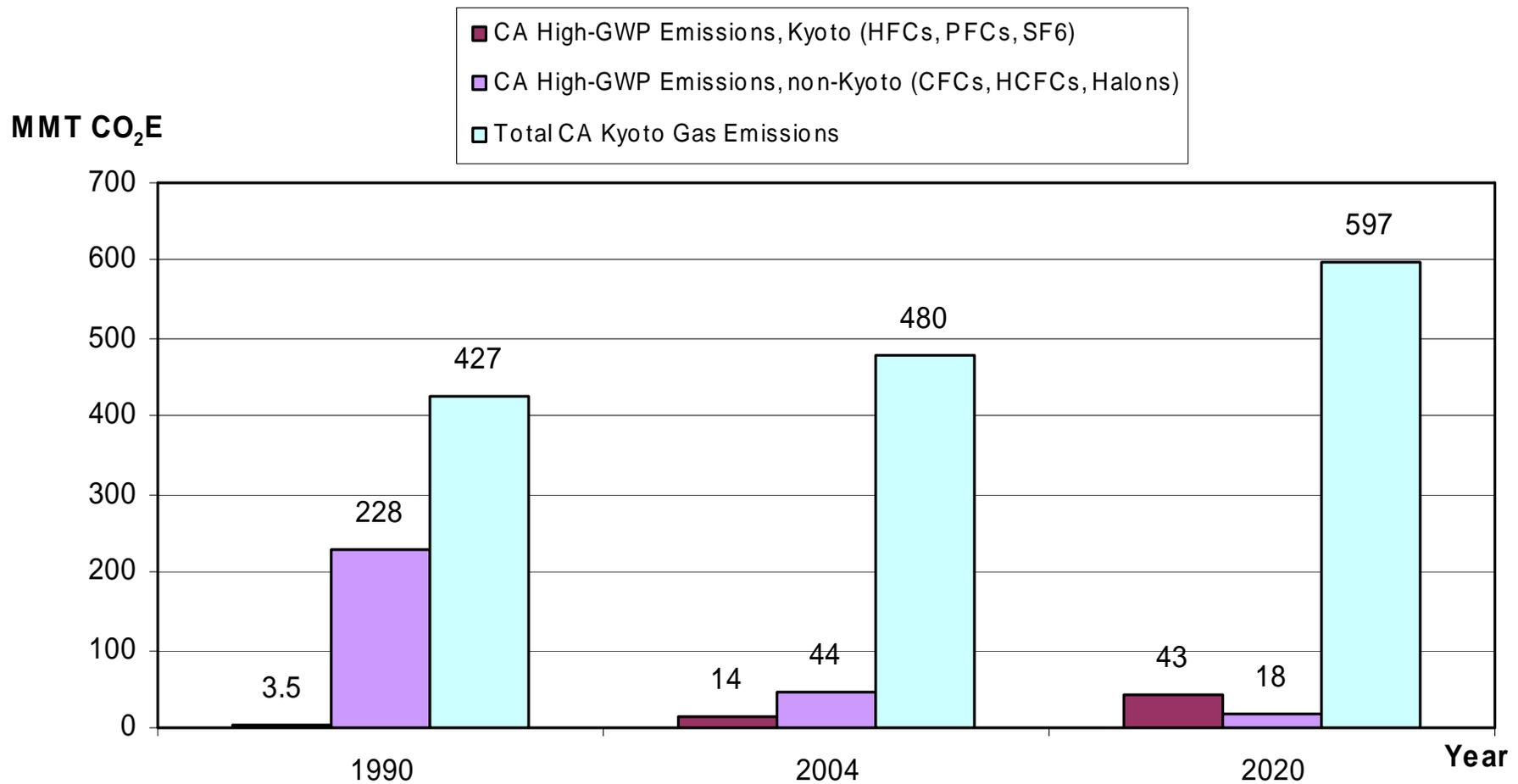
Cleaning Solvents

Metered-Dose Inhalers

How Are High-GWP GHGs Accounted For Under AB 32?

- **Kyoto Gases are Directly Included in 1990 Baseline and 2020 Target**
- **Several Non-Kyoto Gases With Climate Impacts Are Not In The Baseline**
 - **Are being evaluated for mitigation**

CA High-GWP Emissions vs. Total CA Kyoto Gas Emissions



Stationary High-GWP GHG Sector End-Users

- **What Are High-GWP GHG End-Use Categories?**
 - Mobile Sources
 - Motor Vehicle Air Conditioning (MVAC) Systems
 - **Stationary Sources**
 - Refrigeration and Air Conditioning (RAC), Foams, Fire Extinguishing, Solvent Cleaning, Industrial Applications, Electrical Transmission
 - Consumer Products
 - Propellants

Options

- Many possible approaches
 - **Direct Regulations**
 - Alternative Compliance Mechanisms
 - Market-Based Mechanisms
 - Cap & trade
 - Offsets
 - Other Mechanisms
 - Incentives
 - Fee-bates
 - Voluntary actions
 - Carbon fee

Regulatory/Non-Regulatory Process

- Identify Major Stakeholders
- Establish Working Group
- Stakeholder Consultation Meetings
- Develop Draft Proposal
- Conduct Public Workshops
- Release Staff Report (ISOR)
- *Hearing Notice
- *Board Hearing and Adoption
- *Post Board Adoption Efforts
- *Submitted to Office of Administrative Law

*Not Required for Non-Regulatory Process

Key Questions

- **Suggestions for participants in regulatory development process?**
- **Additional sources to consider?**
- **Emissions and cost information?**
- **Alternative regulatory options?**
- **Others?**

Working Group Formation

- **Objectives:**
 - Work collaboratively to develop cost-effective programs
 - Address data gaps
 - Explore policy options
- **Timeframe:** (some are forming much sooner)
 - Form working groups by Spring 2008
 - First meeting in Summer 2008 or sooner
 - Continue to meet as necessary
- **If interested, please provide contact information**

More Information

– For More Information

- Visit: <http://www.arb.ca.gov/cc/cc.htm>
- Join list serve at:
<http://www.arb.ca.gov/listserv/listserv.php>