



California Environmental Protection Agency

AIR RESOURCES BOARD

Proposed Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear

California Air Resources Board

February 25, 2010

Overview

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 - Environmental Impacts
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 - Economic Impacts
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BACKGROUND



Sulfur Hexafluoride (SF₆)

- ◆ Sulfur hexafluoride (SF₆) is a potent greenhouse gas
- ◆ The Scoping Plan identifies three SF₆ reduction measures
 - Non-electric and non-semiconductor applications (effective 1/1/2010)
 - Semiconductor operations (effective 1/1/2010)
 - Electricity sector (today's proposal)

SF₆ in Electrical Equipment

- ◆ SF₆ is used extensively in gas insulated switchgear (GIS)
- ◆ Including:
 - Gas-insulated substations
 - Circuit breakers
 - Electrical transformers
 - Gas insulated transmission lines
- ◆ No current substitute in HV equipment



Photo credit: California Energy Commission

PROPOSED REGULATION



Affected Entities

- ◆ Approximately 75 affected entities
 - Investor-owned utilities
 - Publically-owned utilities
 - Co-generating industries
 - Military
 - Universities
 - State government

Regulation Development and Public Outreach

- ◆ Survey
- ◆ Website and List Serve
- ◆ Technical Working Group
- ◆ Participation and Coordination with U.S. EPA
- ◆ Meetings and Tours
- ◆ Public Workshop

Key Elements of the Proposal

- ◆ Establishes an annual maximum emission rate
- ◆ Sets initial emission rate at 10% of nameplate capacity
- ◆ Requires GIS owners to reduce their SF₆ emission rate by 1% per year over a ten year period from 2011 to 2020
- ◆ Beginning in 2020, sets maximum emission rate not to exceed 1%

SF₆ Gas Management Techniques

◆ Reductions achieved by least cost gas management techniques

- Leak Detection and Repair (LDAR)
- SF₆ Recycling
- Equipment Refurbishment
- Equipment Replacement



Recordkeeping and Reporting Requirements

- ◆ Demonstrate compliance through recordkeeping and reporting requirements
- ◆ Annual reports would include:
 - ◆ SF₆ emissions
 - ◆ SF₆ emission rate
- ◆ GIS owners must have available upon ARB request:
 - ◆ Current SF₆ inventories
 - ◆ GIS SF₆ nameplate capacity

Environmental Impacts

- ◆ Decreases GHG emissions by an annual average 25,300 MTCO₂e
- ◆ Cumulatively reduce emissions by 253,000 MTCO₂e over the ten year regulatory period
- ◆ Achieve 70% reduction from baseline by 2020

Estimated Costs and Cost Effectiveness

- ♦ Total cost over ten year regulatory period:
 - \$4.5 to \$7 million
- ♦ Cost effectiveness:
 - \$18 to \$28 per metric ton of carbon dioxide equivalent emissions reduced

Economic Impacts

- ◆ May result in minimally-increased electricity costs
- ◆ Costs may be absorbed or passed forward
 - 0.002% increase in utility bills
 - An average of one to two cents per residential customer per year

Enforcement

- ◆ Enforced by ARB
- ◆ Consistent with other regulations adopted pursuant to AB 32
- ◆ Ensures fair and appropriate penalties for violations while encouraging compliance

Proposed 15-Day Changes

- ◆ Delay first report from 2011 to 2012
- ◆ Revise “active equipment” definition to include connected and fully-charged backup GIS
- ◆ Revise “emergency event” definition to address all disasters
- ◆ Revise “emergency event” exemption to begin at onset of regulation

Staff Recommendation

- ◆ Approve staff's recommendation with proposed changes.