Southern California Edison SF6 Gas Management Program Update

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Overview

- Goals and objectives of "Gas Management Program"
- Gas Management process
- Program Implementation
- Program results
- Program Challenges
- Future Goals and Objectives

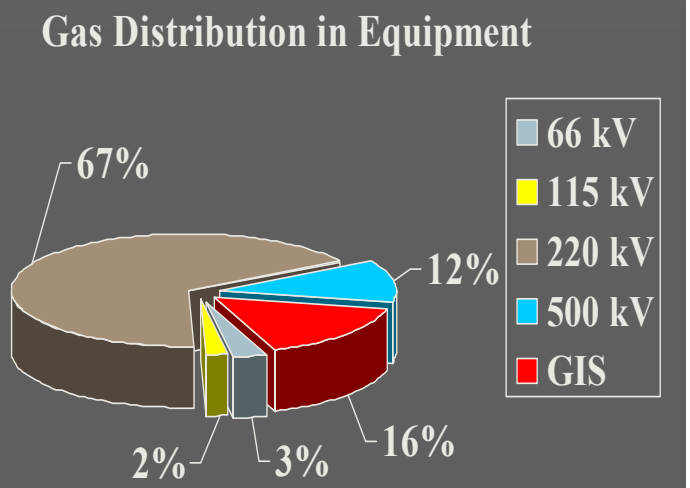
Goals and Objectives

Gas Management Program

- Conform with EPA/MOU
- Reduce overall emissions
- Reduce O & M costs
- Improve productivity
- Increase data collection accuracy
- Enhance asset management decisions

Gas Management Process

- Total Gas in Equipment
  - 2361 Gas Circuit Breakers
  - Four GIS Facilities
  - ~ 540,000 lbs. SF_6 Total
    - Net increase of ~ 40,000 lbs since 2000



- Inventory
  - Cylinders ~ 34,000 lbs. annually

Gas Management Process (cont)

- Tracking Method
  - Weigh cylinders before returning to supplier
  - Log and report quarterly
    - Cylinders returned to supplier
      - Residual
    - Gas purchases
  - Annually reporting – “Mass Balance Approach”
    - Total residual
    - Used gas removed from retired equipment
    - Recycled
    - New equipment

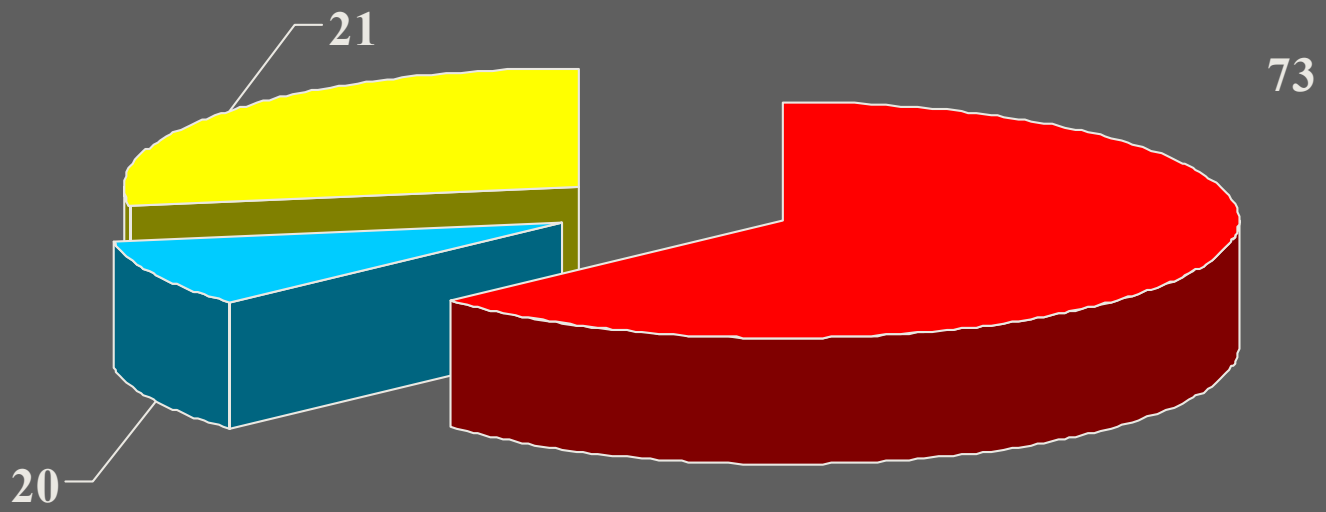
Program Implementation

- Identify leaks using asset management tools
  - Work management system
    - Frequency of gas added
    - Type of equipment
  - Equipment history
    - Dual pressure systems et al
- Leak detection methods
  - C02 laser leak detection technology
  - Conventional (soap bubbles, halogen)

Program Implementation (cont.)

- Develop priority list leak detection
  - Worst leaks “low hanging fruit”
  - Station with most leaking equipment
  - Scheduled internal inspections
- Incorporate priority list in PMA process
  - Specialist surveys equipment using laser leak detection equipment
  - Process initiates report
  - Enables better asset management decisions
    - Repair vs replace

Leak Detection Results



Number of leaks identified by location on equipment

Program Challenges

- Tension between priorities
  - Required scheduled maintenance vs. repairing leaking equipment
  - Resource constraints
- Data Gathering
  - Accuracy in documentation
  - Consistency in following the established process
- Year End Data Analysis
  - Cumbersome and time consuming

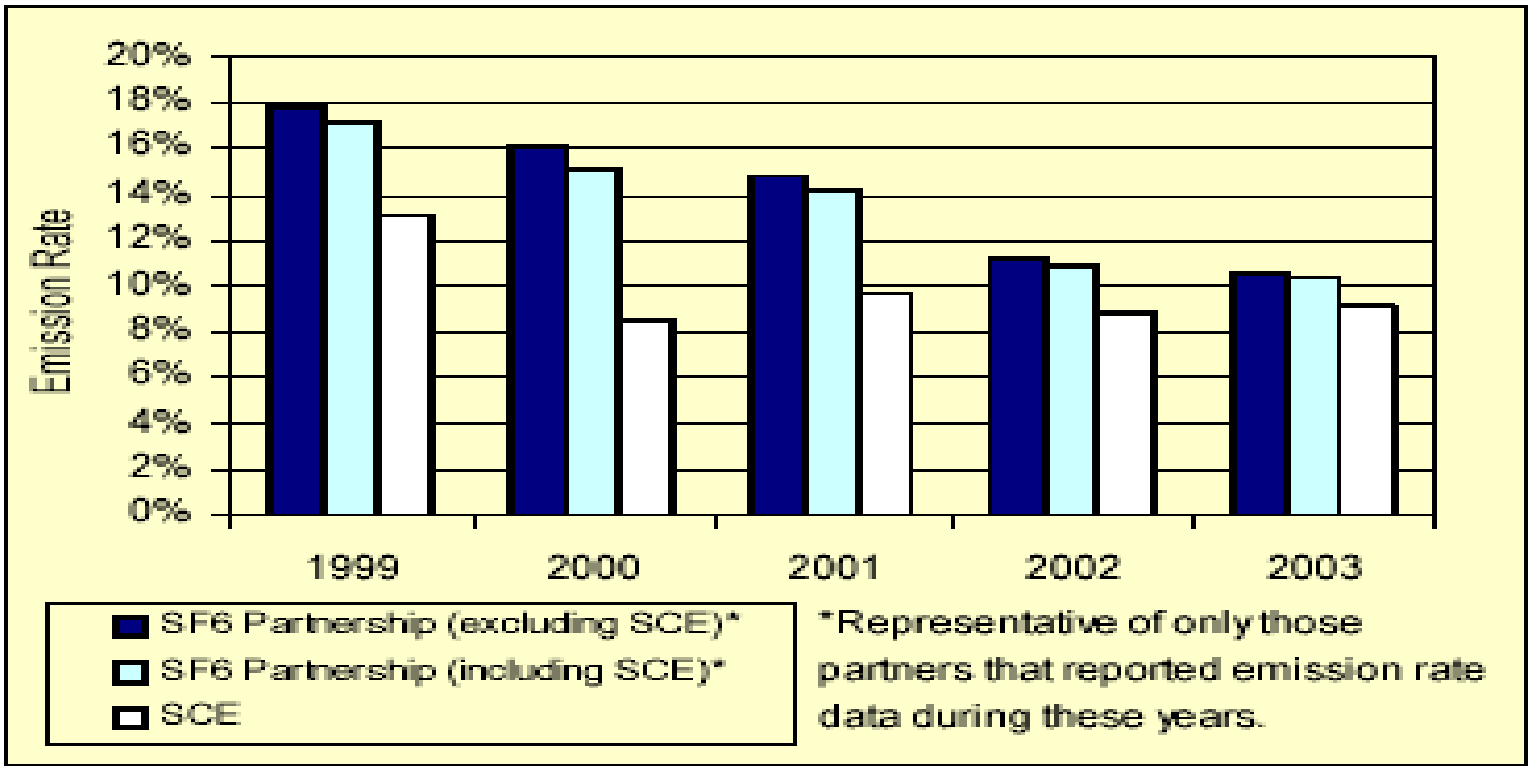
Program Challenges (cont.)

- Buy in to program
  - Culture change with supervisors and maintenance personnel
  - Completing repairs
  - Cylinder consolidation
  - Emptying cylinders
- Large Projects
  - Outage constraints
  - Handling large quantities

Program Challenges (cont.)

- Equipment Repairs
  - Bushings
  - Leak sealing
  - Parts issues, tubing, manifolds etc.
- Facility Service Agreements
  - Third party equipment ownership
  - Limited authorization to make repairs
  - Case justification for equipment replacement

Program Results



SF6 Emission Rate – Comparison of SCE and Partners of the SF6 Emission Reduction Partnership

Lessons Learned

- "Mass Balance Approach" can be effective when guidelines are followed
  - Checks and balances
    - Control in data reporting
  - Effective allocation of resources
- Closer oversight would be resource depleting
  - Weighing cylinders
  - Centralization
- Reducing emissions on older equipment is not as easy as it appears

Future Goals and Objectives

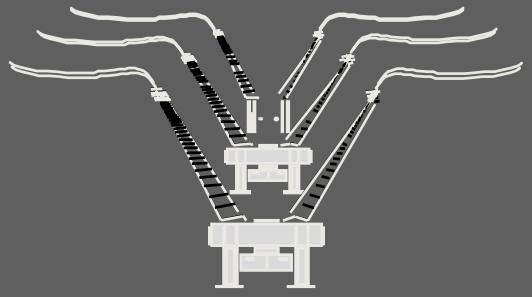
- Develop equipment criteria rating
  - Cost benefit analysis for repairs
  - Establish equipment criticality to the “grid”
  - Technical benefits for replacement
- Realize program benefits
  - Quantifying financial results
  - Emission reduction goals

Future Goals and Objectives (cont.)

- Develop automated data collection process
  - Data collection would migrate into dedicated database
  - Database can generate emission reports
  - Populate annual reporting form
  - Process would improve data accuracy

CONCLUSION

- Making progress for emission reduction goals despite setbacks
- Laser leak detection equipment demonstrates benefits and strong potential
- Closed loop and automated process is essential moving forward
- Programs must allow for process improvement



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