

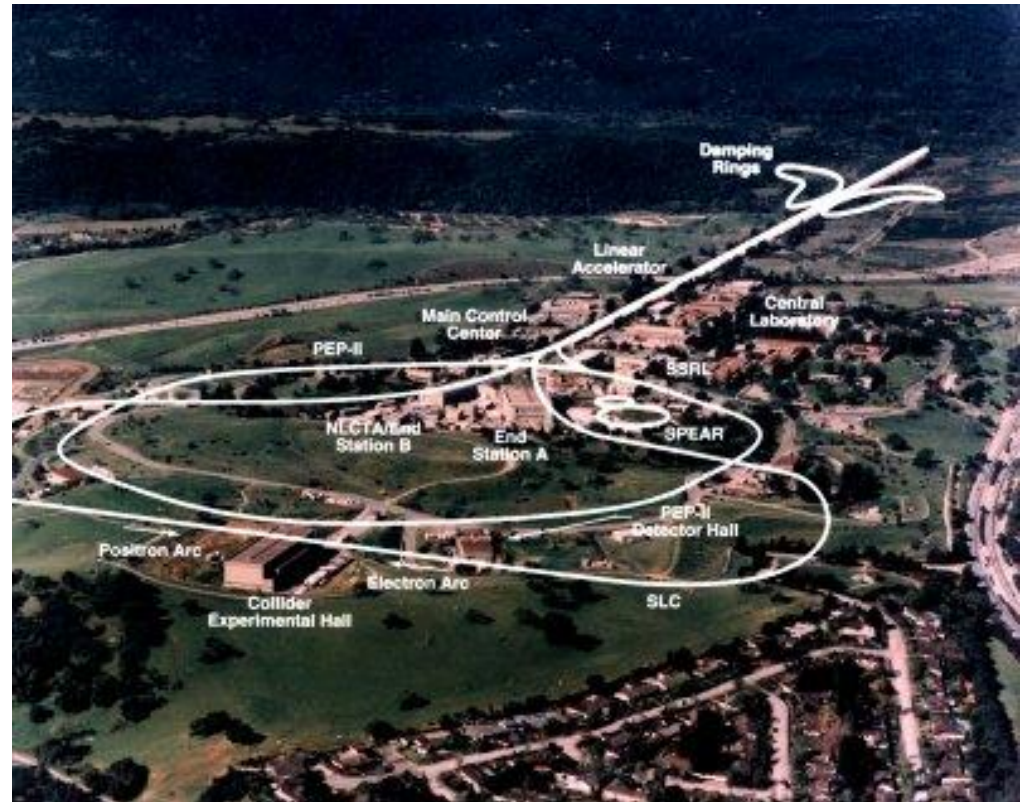
Reducing Greenhouse Gas Emissions at SLAC National Accelerator Laboratory

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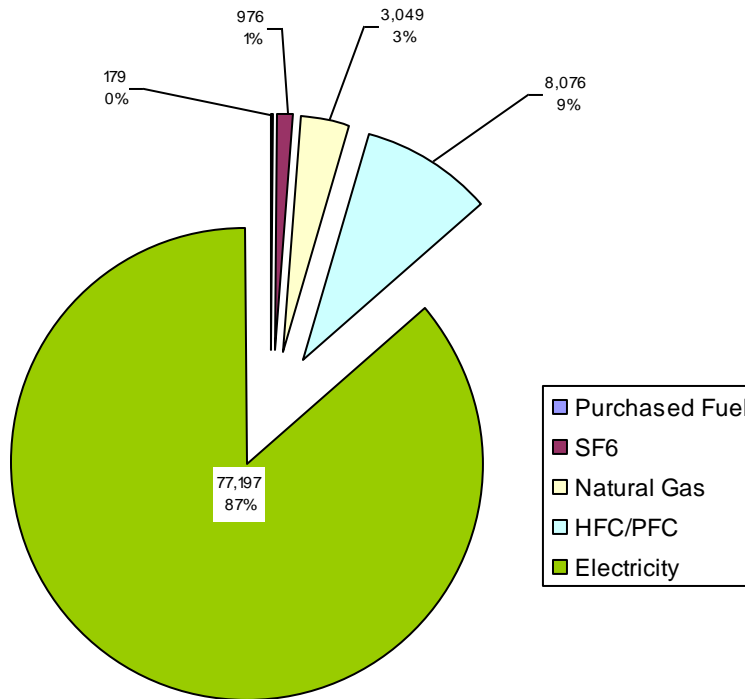
March 25, 2010

- Multi-purpose laboratory
 - Two-mile linear accelerator
 - Research in astrophysics, photon science, accelerator and particle physics
- High demand for electricity
 - Historical peak is ~50 MW
 - No onsite generation
 - Purchased electricity
 - Scope 2 emissions
 - 80% - 90% of total

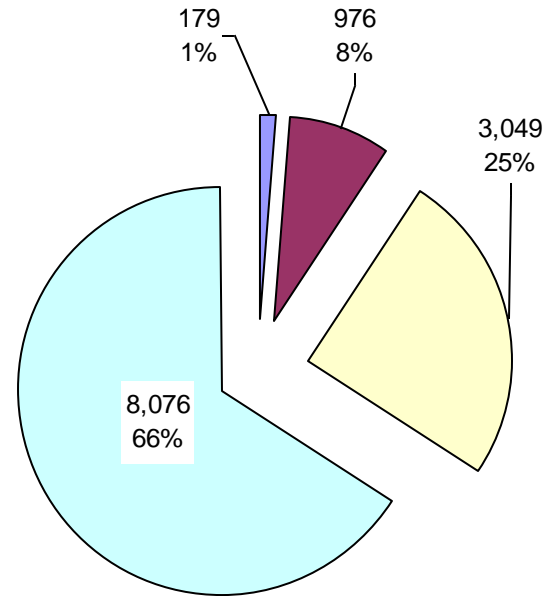


Calculated GHG Emissions for CY2008 (MTCO₂- e)

**Total GHG Emissions
(including electricity)**



**Direct GHG Emissions
(electricity excluded)**





SLAC Participation in Voluntary Reporting

California Climate Action Registry formed in 2002

- 2003-2004: SLAC compiled internal GHG inventory
- 2008: SLAC joined The Climate Registry
 - Reported data for 2007
 - Established baseline to compare future reductions

Expectations for Mandatory Reporting

- Mandatory Reporting Programs
 - 2006: CA Global Warming Solutions Act
 - Five-year implementation schedule: 2007-2012
 - 2009: California (CARB)
 - SLAC placed in Electrical Sector
 - 2009: Federal (EPA)
 - Reporting to begin as soon as 2010

Initial Outcome for Mandatory Reporting

- Exempt from Federal & State programs
 - Below reporting threshold for direct emissions (Scope 1)
 - 25,000 MTCO₂-e*
 - EPA Tailoring Rule
 - Thresholds raised for various industries

* Metric tons of Carbon Dioxide equivalents



Current and Pending Reporting Requirements

- Continued voluntary reporting to TCR
- CA Air Resources Board (CARB)
 - Diesel-powered vehicles & equipment
 - Sulfur Hexafluoride (SF₆)
- DOE – per EO 13514
 - Data format: similar to TCR (?)

Emissions Reduction: Natural Gas (Boilers)

- Proposed Improvements
 - Main boilers
 - Upgrade combustion controls
 - Replace entire units
 - New LCLS boiler
 - Innovative technology (pilot project)
 - Solicited by local utility

Emissions Reduction: Fleets and Fuels

- Reducing heavy equipment fleet size
 - State credits available
- Improving fleet efficiency
 - Eliminating low-use vehicles
 - Replacing with multi-fuel or electric vehicles
- Alternative fuels
 - E85: conversion pending for onsite GDF
 - CNG: available offsite, but not close
 - Biodiesel: tried, but not feasible

Emissions Reduction: HFCs and PFCs

- Reducing ODSs and GHGs
 - Replacement of chemicals (CMS)
 - Insulating gases for experiments
 - Replace / convert old chillers
 - Improve tracking of HVAC emissions
 - Expand existing database (FAMIS)

Emissions Reduction: Sulfur Hexafluoride (SF₆)

- Master Substation
 - Servicing main circuit breakers
 - Eliminating remaining leaks
- Research Areas
 - Purchased portable equipment
 - Gas recovery cart
 - Cylinder scale

Emissions Reduction: Energy Management

- Energy Conservation Measures (ECMs)
 - Managed through Facilities Department
 - Approved to start in FY10
 - Advanced utility meter installation
 - System-wide leak repair
 - Proposed projects
 - Lighting improvement
 - Water Conservation
 - HVAC duct sealing

Data Verification: Practical Tips

- Associated costs
 - Staff time to compile and input data
 - Contractor support as needed
 - Certified third-party verifier
- Cost management
 - Mandatory vs. optional verification
 - Self-verification (EPA)
 - Individual vs. Batch verification

Data Verification: Practical Tips

- Establish audit trails
 - ID and document original data sources
 - Reference sources on data summaries
 - Maintain calibration records
- Multiple data sources
 - Metered versus invoiced usage
 - In-house versus revenue meters
 - Comparison useful, but not sufficient

Data Verification: Practical Tips

- Offsite vehicle use
 - Potential separate facility
 - Scope 1 – under direct control
- Fugitive emissions from vehicle AC units
 - Onsite vs. offsite travel
 - Onsite vs. offsite servicing
- Supplier-specific fuel emissions factors