FEDERSPIEL CONTROLS

Active Energy Management and Control of Data Center Cooling Systems

Overview

Active Management of Cooling Systems to Reduce Energy Consumption for the Data Center Market

- Federspiel Controls
- Principal Investigator: Cliff Federspiel
- January 31, 2010 to March 31, 2011
- Energy efficiency demonstration

Partners

- California Energy Commission PIER, matching funds
- Data Center hosts at State of California Departments
  - Department of General Services
  - Caltrans
  - Employment Development Division
  - Franchise Tax Board
  - Otech / Gold Camp
  - Secretary of State
  - Water Resources Board
- Supplier cost share provider
  - Air Treatment Corporation
  - Metropolitan Electrical Construction

Project Objectives

- Demonstrate viability of intelligent control and sensing system
- Commission large and small data centers
- Prove system works with varying types of equipment

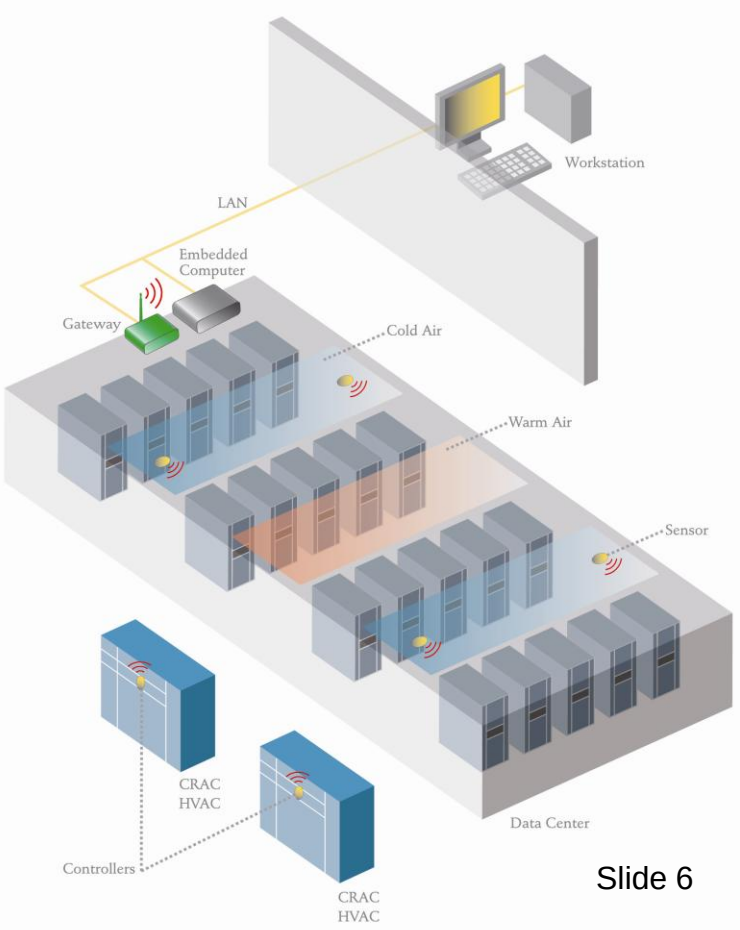
The Issues

- 20M metric tons unnecessary CO_2/year
- $5 Billion wasted per year
- Most data centers overly or inefficiently cooled
- Growing 15-25% per year

Project Approach

- Predictive, adaptive control software
- Wireless sensors
- VFDs in some cases

- Simple installation
- Non-disruptive
- Large energy savings
- Non-energy benefits



Expected Results

- Create energy savings of **4.7 million kWh** per year
- Provide each data center energy savings **26%** of baseline energy consumption
- Deliver increased reliability and resiliency at eight State of California data centers

Real-World Results

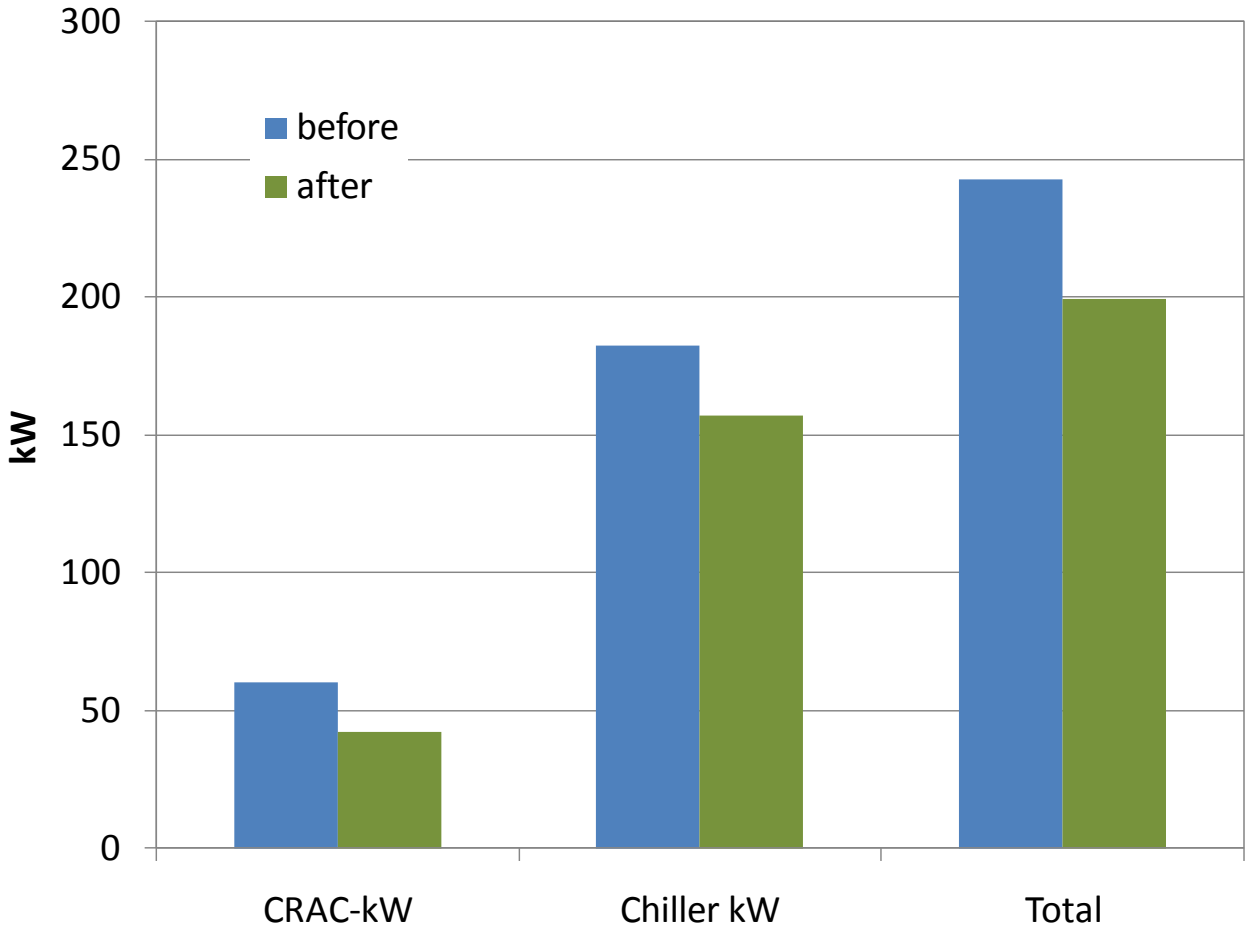
Gold Camp, Secretary of State and Water Resources Board

Gold Camp, SOS, WRB

- Gold Camp
  - 40,000 square feet, 23 CRACs, expanding
- Secretary of State
  - 2,700 square feet, 5 CRACs
- Water Resources Board
  - 4,000 square feet, 6 CRACs, chilled water and DX

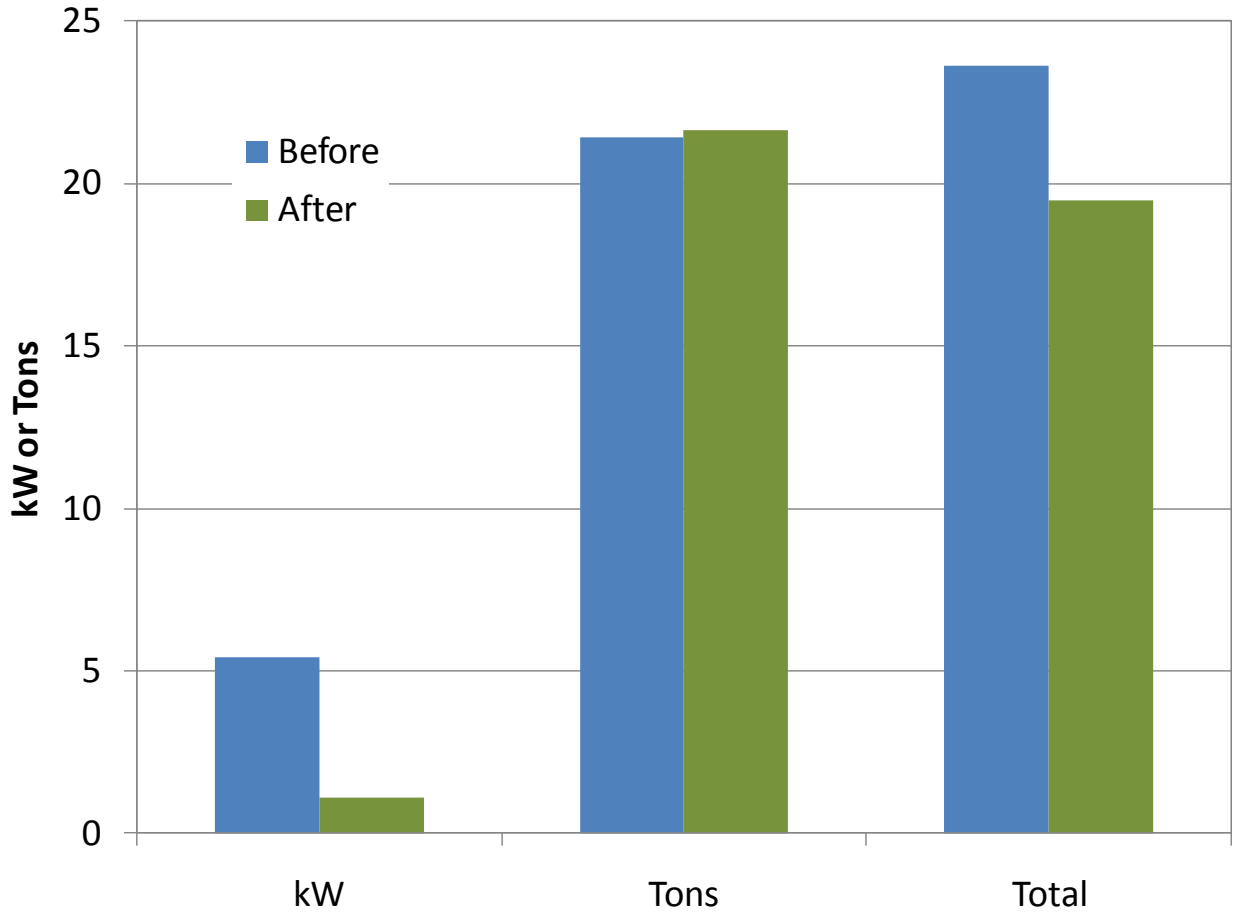
Gold Camp Energy Savings

- 18% reduction in total cooling energy



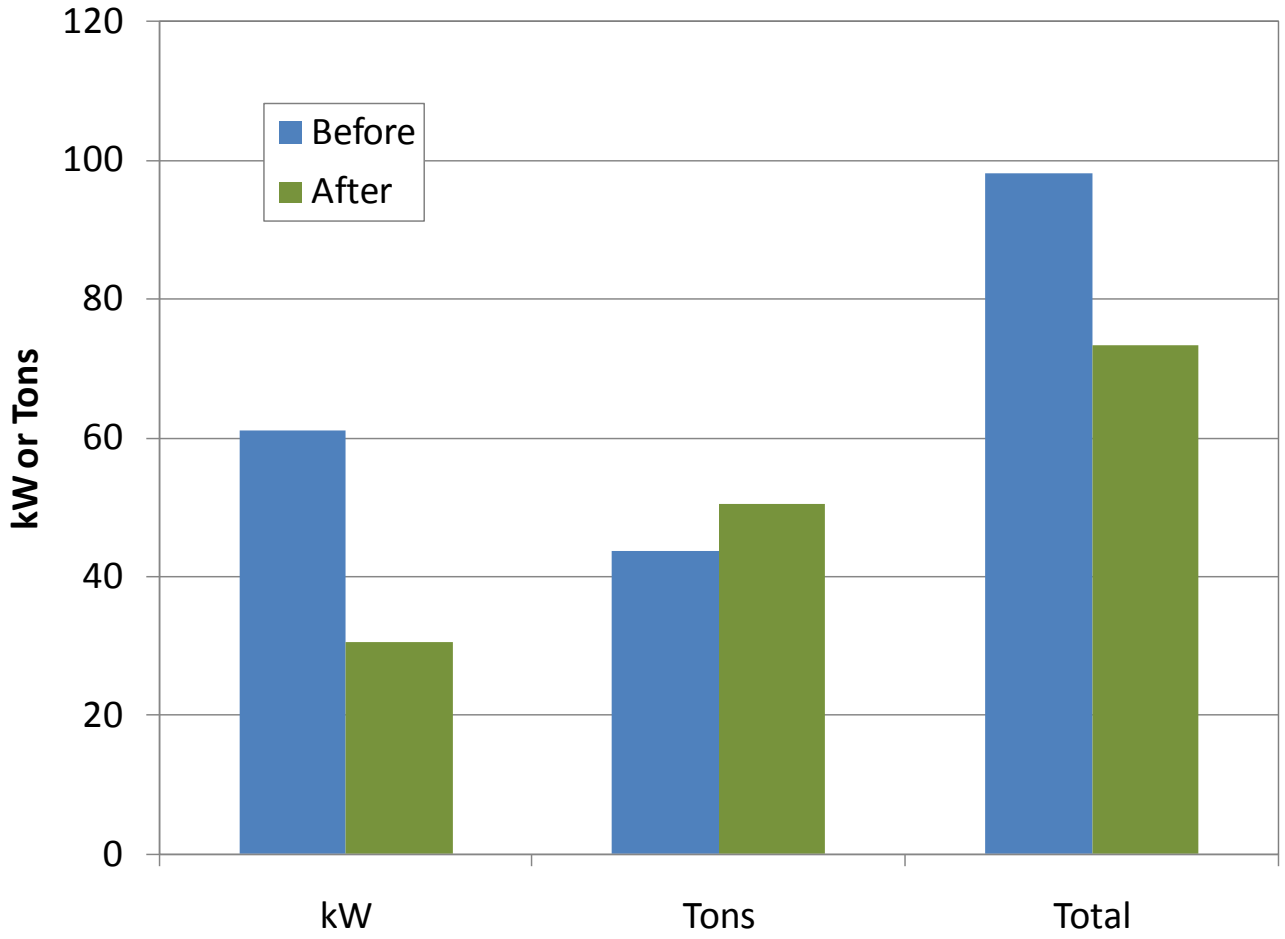
SOS Energy Savings

- 17% reduction in total cooling energy



WRB Energy Savings

- 25% reduction in total cooling energy



Jobs / Employment

- Doubled FC staff since the start of the project
- Two key suppliers added 13 full-time and two-part time employees to support FC
- We are hiring!

www.federspielcontrols.com/careers.php

Project Status

- Five sites live
- Department of General Services and California Energy Commission fully committed
- Utility rebates committed for more than half of the projects

Ongoing Steps

Two Caltrans sites

- Installation under way
- Analyze results
- Finalize rebate commitments
- Submit results for utility rebate

EDD

- Installation under way
- Analyze results and submit to utility

DGS Ziggurat and FTB

- Analyze results
- Submit results for utility rebate

Technology transfer

After ITP-Sponsorship

Worldwide distribution agreement with NTT Facilities announced in January

Nearly **one billion kWh** of site electrical energy will be eliminated from data center consumption in the next **two years**

Like removing nearly
60,000 single family homes
from the grid

Value to Data Centers

- Significant energy savings and carbon reduction
- Improved thermal management (SLAs)
- Cooling capacity increases (CapEx)
- Improved resilience and risk management from predictive model
- System learns and adjusts to new equipment configurations (self-maintaining)
- Payback in under two years

Summary

- Major energy savings
- Quick payback and ROI
- Works with varying
  - Capacity
  - Floorplan
  - Equipment type and age
- Quick installation