De Anza ES 69 Energy Reliability

Establishing an Energy Action Plan

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◆ Large Diverse Facility
  >> Research Labs, Classrooms, Residences, Office space, Athletic Facilities, Hospital
  >> 50 MW Cogen Plant – Central Steam and Chilled Water Production
  >> Several Buildings over $2 million/year (Med School and Clean Room Facility)

Elements of An Energy Plan

◆ All Elements Related
◆ Develop Consensus Early
◆ Consider Business “Culture”
◆ Establish Goals
◆ Benefits:
  >> Economic
  >> Environmental
  >> “Good Corporate Citizen”
Elements continued

- Partnership
- Education/Awareness
- Scheduling
- Maintenance
- Resourceful Design
- Capital Improvement
- Energy Retrofits
- Measurement

Partnership/Support

- Support from Upper Management
- Training and Support for Field Staff
- Projects Goals Communicated

Education/Awareness

- Training
- Audits
- Energy Balance
- Monthly Reports or Statements
- New Student/Employee Orientation
- Share Successes
Aggressive Scheduling

- "No Savings like off"
- Central Energy Management Systems
- Local Time Clocks

Vigorous Maintenance

- No Cost - Low Cost
- Preventive Maintenance
  - Filters, Fan Belts, Valves, Strainers
- Optimization
- Feedback
- Energy Projects with Maintenance Benefit

Resourceful Design

- Get it right the first time
- Design team on board early
- Specifications or Guidelines
- Competing First Costs
- Building Envelope
- Plans Review
Capital Improvement

- Infrastructure
  - Physical Plant
  - Outdoor Lighting
- Energy Production
  - Alternative Energy Sources
- Procurement
  - Energy Star Products

Energy Retrofits

- Building Specific and Generic Approach
- Reduce Waste and Improve performance
- Lighting Conversions
- Lighting Controls

Energy Retrofit Program (ERP)

- Modeled After Utility Rebate Programs
  - Departments Apply for Funding
  - Projects ranked on Cost Benefit ratio
- Advantages
  - Consistency with Products and Vendors
  - Special need of departments considered
- Help from Vendors
Non-stop Measurement

- Metering
  - Monthly
  - Real time
  - Trends
- Accounting/database
  - Patterns
  - Anomalies
- Justify Energy Programs

Sustainability

- Site Design and Planning
- Energy Use
- Water Management
- Materials and Resources
- Indoor Environmental Quality

“At Stanford, sustainability is to be considered at the same level as traditional competing priorities such as cost, quality, and schedule.”

http://cpm.stanford.edu/pdp.html
Guidelines for Sustainable Buildings 2002
Review Elements of Energy Action Plan

- Partnership
- Education/Awareness
- Scheduling
- Maintenance
- Resourceful Design
- Capital Improvement
- Energy Retrofits
- Measurement

Overview of Energy Economics

In Brief
- What are economic analyses?
- Types of economic analyses
- Reviewing assumptions
- Simple Payback
- Lifecycle cost

What are Economic Analyses?

- Decision Making Tools for Energy Projects
- Does not include non-economic benefits
  - Environment
  - Society
  - "Good Neighbor"
Types of Economic Analyses

- Rough order of Magnitude Estimates
- Simple Payback
- Internal Rate of Return
- Used on Both New Building Projects and Retrofits
  - Glazing, HVAC, Chiller & Boiler Selection

Assumptions are Key!

- First Cost
- Cost of Energy (Tariff rate)
- Cost of Labor
- Cost of Materials
- Cost of Maintenance
- Cost of Money, tax credits
- Inflation

Simple Payback

- Simple payback = Cost/Savings
- Measures how long it will take to recover a cost-saving investment
- Does not account for cost of money or length of project
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<tr>
<th>Life Cycle Cost</th>
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<td>- Total cost of owning, operating, and maintaining a system over its useful life.</td>
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<td>- Costs are adjusted for time value of money.</td>
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<td>- Alternative with the lowest life cycle cost is the best.</td>
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