Energy Management

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Definitions

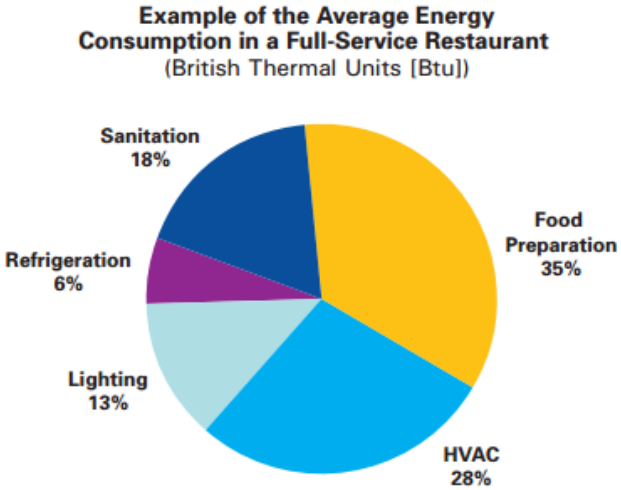
- HVAC: or Heating, Ventilation and Air Conditioning.
- LEED: Leadership in Energy a Environmental Design. A gree building certification system.
- Benchmarking: comparing your company's business processes to others in your industry (or your own metrics), to set best practice standards

What is Energy Management?

- A management system designed to monitor and decrease energy and water use
- The goal: using energy sparingly and efficiently, without affecting current use or increasing costs

Food Service and (Energy) Management

- Restaurants and grocery stores are the two most energy i commercial building types
- Extensive lighting
- Constant refrigeration
- Energy-intensive machiner
- High water use for cleanir g, sanitizing and hand-washing
- Long hours
- Quick-service and convenience labor and time, but higher ene



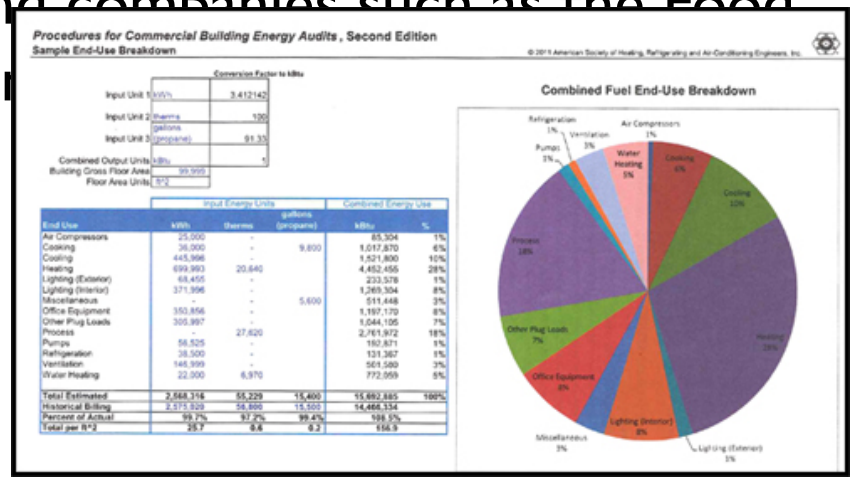
SAFEWAY™

Strategies for Energy Management

How can I use less, and more efficiently?

First, evaluate where the problems are:

- Comprehensive energy management (CEM) programs measure every watt of energy a facility uses, and makes changes accordingly
- Local utilities offices and companies such as the Food Service Technology Cen
energy audits



Procedures for Commercial Building Energy Audits, Second Edition
Sample End-Use Breakdown

© 2011 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

		Conversion Factor to kBtu
Input Unit 1	kWh	3.412142
Input Unit 2	therms	100
Input Unit 3	gallons (propane)	91.33
Combined Output Units	kBtu	1
Building Gross Floor Area	99,999	
Floor Area Units	ft^2	

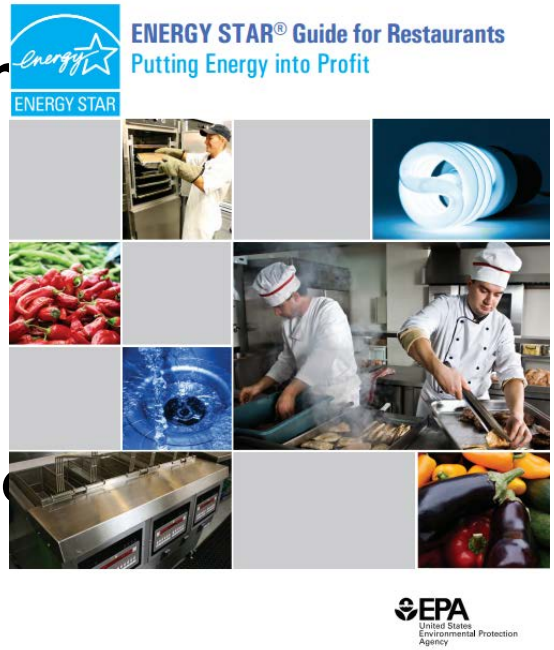
	Input Energy Units			Combined Energy Use	
End Use	kWh	therms	gallons (propane)	kBtu	%
Air Compressors	25,000	-	-	85,304	1%
Cooking	36,000	-	9,800	1,017,870	6%
Cooling	445,996			1,521,800	10%
Heating	699,993	20,640		4,452,455	28%
Lighting (Exterior)	68,455	-		233,578	1%
Lighting (Interior)	371,996	-		1,269,304	8%
Miscellaneous	-	-	5,600	511,448	3%
Office Equipment	350,856	-		1,197,170	8%
Other Plug Loads	305,997	-		1,044,105	7%
Process	-	27,620		2,761,972	18%
Pumps	58,525	-		199,871	1%
Refrigeration	38,500	-		131,367	1%
Ventilation	146,999	-		501,580	3%
Water Heating	22,300	6,970		772,959	5%
Total Estimated	2,568,316	55,229	15,400	15,692,885	100%
Historical Billing	2,575,520	56,990	15,500	14,466,334	
Percent of Actual	99.7%	97.2%	99.4%	108.5%	
Total per ft^2	25.7	0.6	0.2	156.9	

Combined Fuel End-Use Breakdown

Strategies for Energy Management

How do I implement char

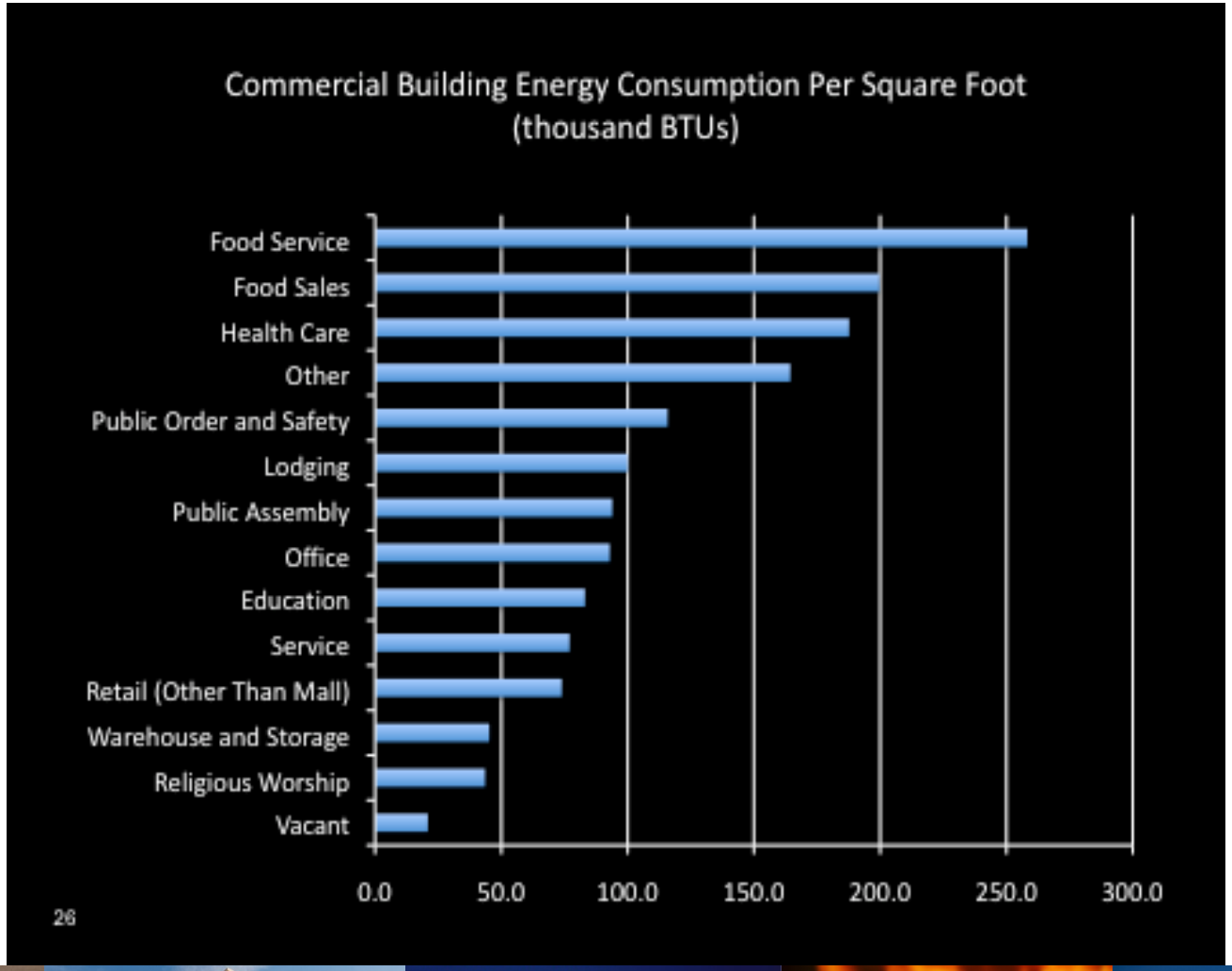
- In every aspect of business
  - Facilities: LEED
  - Equipment: Energy Star
  - **Preventative maintenanc** increases the efficiency and life of machines
  - Practices: how do employees behave?
- Then, establish benchmarks and goals, set up policies and alert staff



Strategies for Energy Management

How can I afford it?

- There is government funding available to reduce startup costs, as well as tax credits
- Utility companies and green organizations often provide general tips for free or low-cost


Commercial Building Energy Consumption Per Square Foot
(thousand BTUs)
Food Service
Food Sales
Health Care
Other
Public Order and Safety
Lodging
Public Assembly
Office
Education
Service
Retail (Other Than Mall)
Warehouse and Storage
Religious Worship
Vacant
0.0
50.0
100.0
150.0
200.0
250.0
300.0
26

COURTYARD
Marriott

UC Davis Mondavi Center for the Arts

EMERGENCY
Emergency
Patient Parking
Main Entrance
Physician
Parking

Restaurants

- National Restaurant Association
  - Energy represents one of the largest restaurant expenses and even a minimal effort to increase efficiencies can lead to significant cost savings and increased profits.
  - Conserve Initiative: helps companies implement conservation practices that are suitable for the environment and their bottom line.
  - *"By implementing steps from the Conserve program, we reduced our electrical and gas bill by about 4% - when you're paying $10,000/month, that's quite a sum."* - Greg Aardal, The Angus Barn ltd

Chipotle

- The nation's first ever Platinum LEED certified restaurant (Gurnee, IL)
  - Three fundamental strategies: reduce demand, increase efficiency, and harvest free energy
  - Low-emissivity glazing
  - LED lamps
  - Specified Energy Star rated kitchen equipment where available (ice machine, fryer, refrigerator and warmer)
  - 6kW wind turbine
  - Designed the building envelope and building systems to be as energy efficient as possible (HVAC, water heating, make up air and hood)
  - Energy Management System (EMS)

The Cheesecake Factory

Strategies being implemented:

- Lighting
- Energy efficient HVAC models
- Kitchen Ventilation
- Solar Thermal System
- Energy Saving Best Practices Guide

Hospitals

- Health care, as a whole, is an energy-intensive industry
- The largest contributor to wasted energy in a hospital: reheating of centrally-cooled air
- Combining energy-reduction design solutions to create a newly constructed, code-compliant hospital
  - Strategies include: sun and daylight shading controls, vacant room sensors, outdoor air supply with heat recovery systems, modified air delivery systems, thermal energy storage, and improved air-tightness and high insulation values in windows and walls
- Sustainability Roadmap:
  - General information for implementing and managing sustainability programs
  - Commonly framed around reductions in consumption of energy derived from fossil fuels

SUSTAINABILITY Roadmap for Hospitals
A guide to achieving your sustainability goals

- Sustainability Roadmap Strategies
  - LEED program
  - Installed LED or CFL light bulbs, saving both energy and maintenance costs
  - Rebates, grants, and incentives to help finance strategies
  - American Society for Healthcare Engineering (ASHE) Energy Efficiency Commitment (E^2C) Program for energy management

UC System and Policies

-The UC system is a pioneer in energy savings

-has saved $91 million in energy costs since 2004

-Different campuses are incorporating various technologies to help contribute to more energy savings as well as decreases in emissions of greenhouse gas

-ex) UCD is installing special lighting system that will cut electricity use by 60% by 2020

UC System con't

- The U of C has earned 119 LEED certificates
  - Leadership in Energy and Environmental Design-created by U.S. Green Building Council to rate and certify environmental impact/sustainability practices
- System also reached a goal to accumulate 10 megawats power just from renewable sources
  - Enough to power ~3,500 houses

Policy on Sustainable Practices

- Policy that helps direct campuses in 9 areas:
  - Green building
  - Clean energy
  - Sustainable transportation
  - Climate protection
  - Sustainable operations
  - Waste reduction/recycling
  - Environmentally conscious purchasing
  - Sustainable foodservice/water systems

Energy Costs

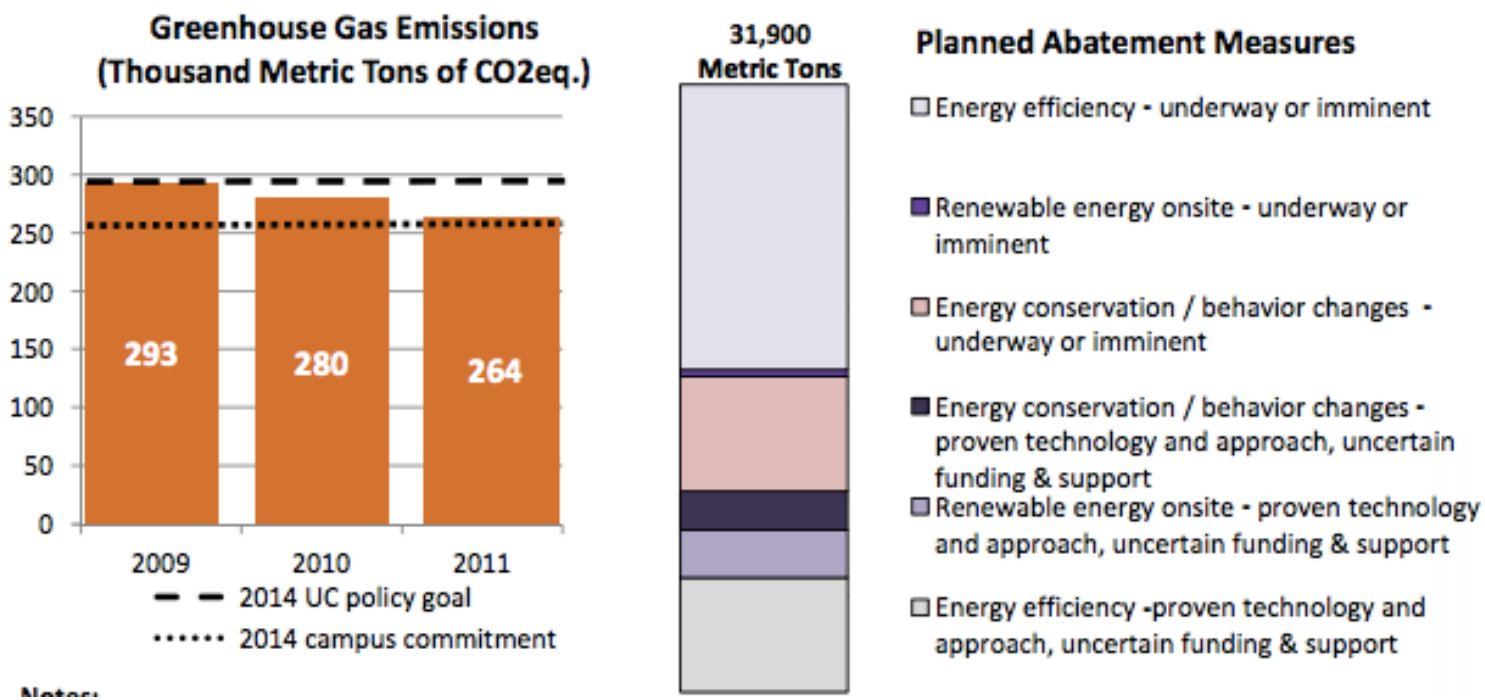
- UC power bill for all campuses combined does increase yearly
  - Due to increases in energy prices
- But system keeps working hard to find new practices to implement to improve energy efficiency
  - Ex) goal is by 2014 to decrease greenhouse gas emissions to 2000 levels

California Center for Sustainable Communities (CCSC)

- Supported/funded by Public Interest Energy Research Program of the California Energy Commission
- U of C collaboration
- Tries to help campuses incorporate more sustainable practices
  - Gives examples of policies, provides research and tools

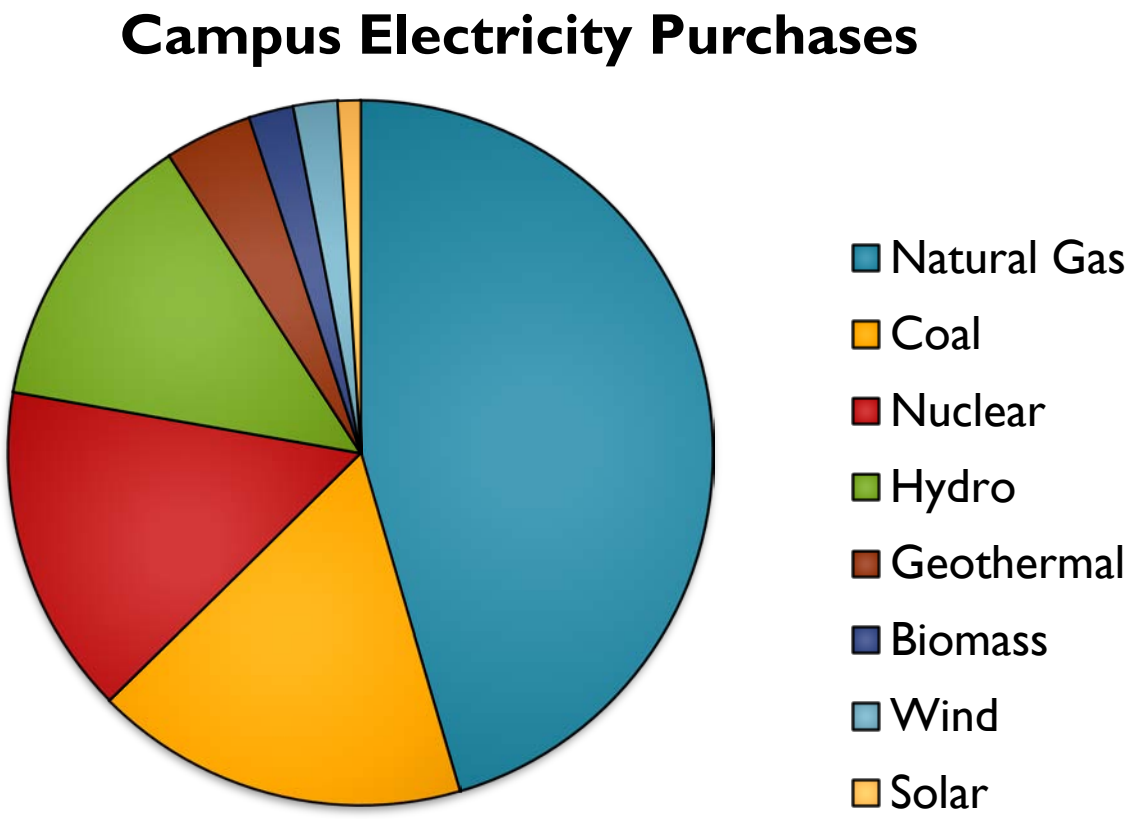
UC Davis Strategies for Energy Management

- Demand side energy management:
  - Decreasing the demand for energy and reducing associated costs
- Supply side energy management:
  - Decreasing the burden of energy procurement and related emissions



Supply Side UC Davis

- 2008



Supply Side UC Davis

- Sustainable solar photovoltaic energy is generated by campus cooperative housing
- Some buildings use solar heating
- Methane from campus landfill is used to power nearby research center boiler
- Additional solar panels are going to be installed
- West Village – net zero energy biogas

UC Davis – Demand side

- 2006-08: 35 campus infrastructure projects
- 8.5 million kilowatt hours per year
- 2.8 million therms of natural gas
- Cost savings: $3 million dollars per year
- Renovations included: air conditioning, monitoring systems, steam traps, central chilling plant conversions and lighting upgrades.

UC Davis - Demand Side

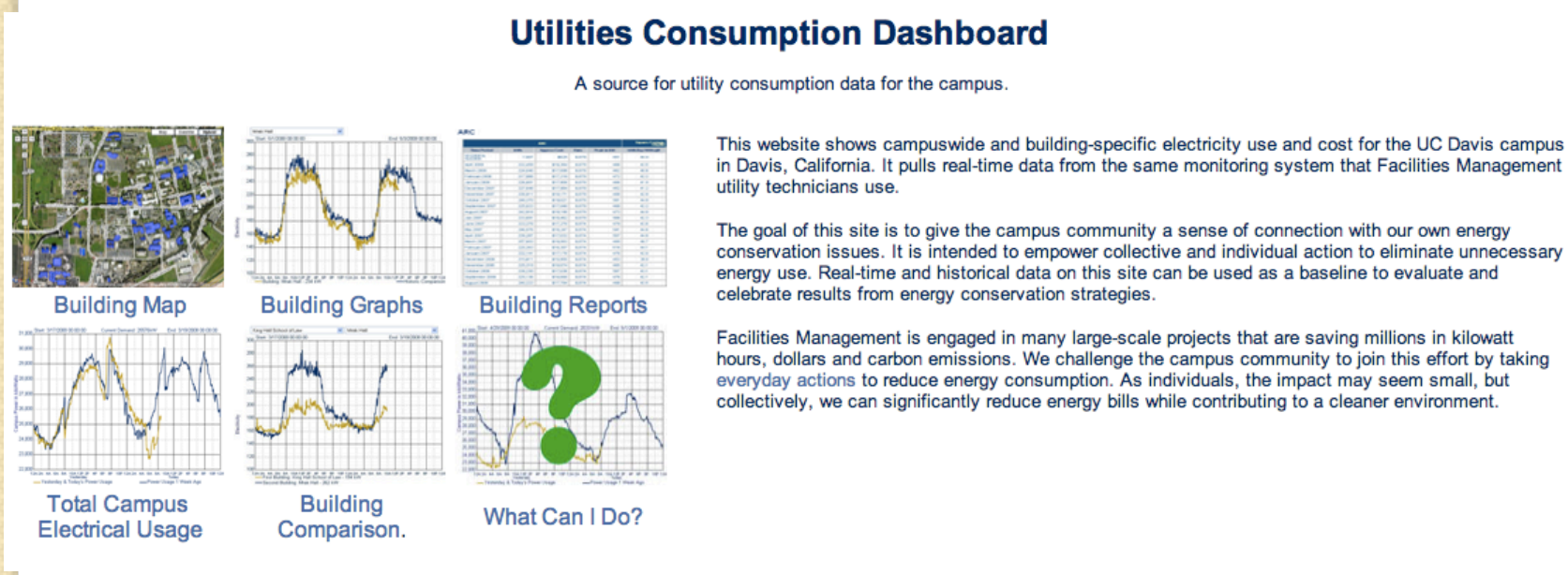
- 2009-11
- Strategic energy Partnership with PG&E helped continue these upgrades with over 160 projects on campus
- Annual savings:
  - 35 million kwh
  - 2.2 million therms
  - $5.1 million dollars

Lighting

- In 2010 UC Davis Announced it will reduce energy use related to campus lighting by 60% over 5 years
- Between 2007 and 2010 campus reduced lighting energy by 10%
- California Lighting Technology Center
  - Strategies
    - Parking structures – efficient LED or induction lighting with bi-level motion sensors (50% energy savings)
    - West entry $1.36 million kwh per year

Monitor Energy Usage at UC Davis

- Facilities.ucdavis.edu/dashboard
  - Monitor building usage and resources for decreasing energy consumption



Lighting continued – Demand side Energy Management Strategies UC Davis

- Shield's library: motion sensors in stairwells and book stacks
- Residence halls: vanity mirror lights make use of motion-sensor technology to turn off when residents are absent
  - Eliminate 3-4 hours of lighting each day

- Any Questions???

because we have questions for you!

- What are some ways you could implement energy management strategies in your house or apartment?

- You’re all UC Davis students – what do you see on campus, in restaurants, or other types of businesses that you would change to be more energy efficient?

- Imagine you are going to open a café and have a moderate budget to do so – how would you implement energy management strategies when planning your business?

- What are some factors that could hinder you from adopting energy management strategies in any situation?

Example

- A business does an energy audit and determines they are using a lot of energy during peak hours
- Further investigation uncovers that the thermostat is turned off at night, and morning staff blast the heater on chilly mornings
- All of the lights are turned on during the day
- One of the dishwashers has a water leak and the faucet won't turn off sometimes

As a manager, what are some ways you could change practices to reduce energy use?