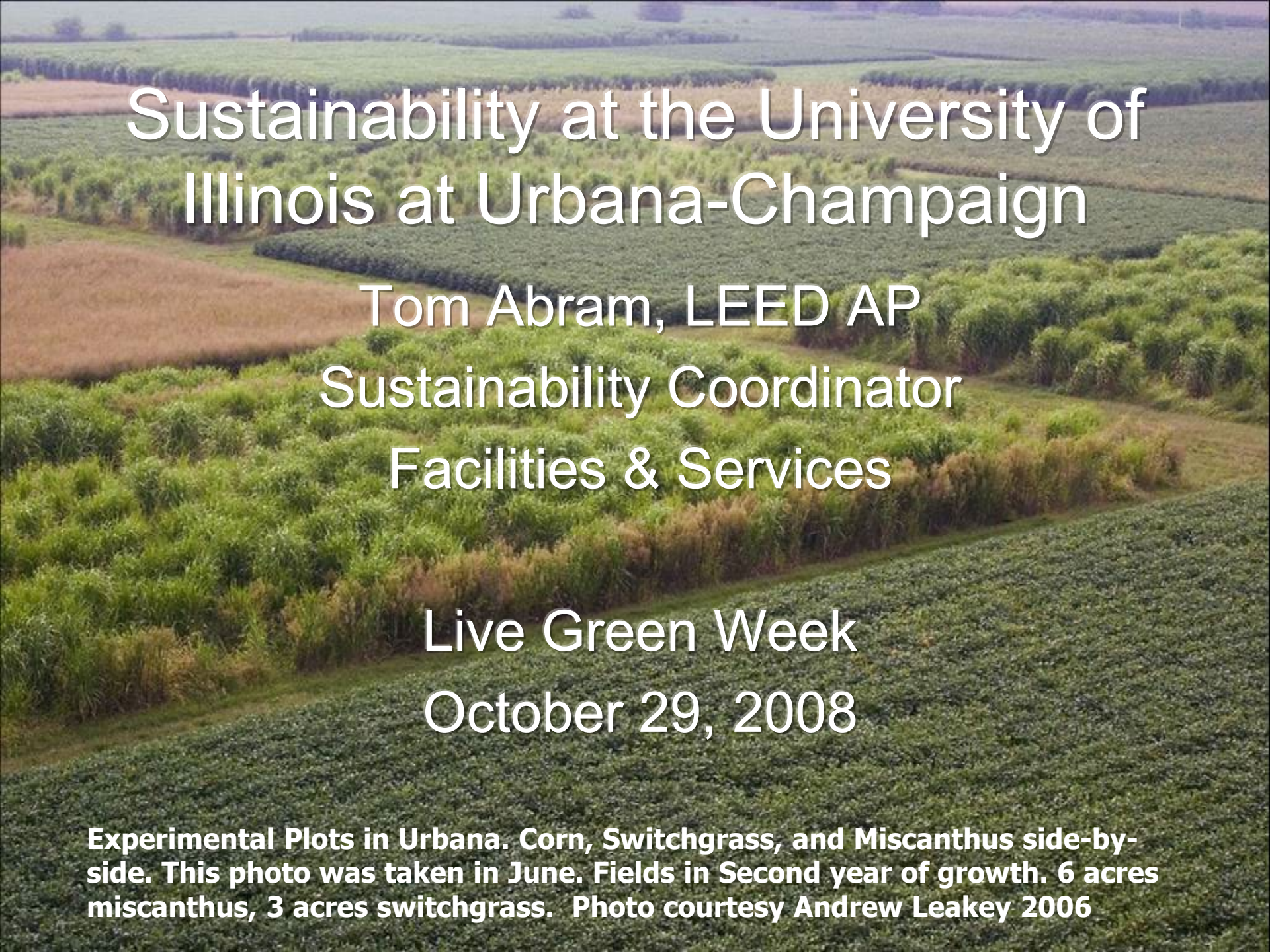
Sustainability at the University of Illinois at Urbana-Champaign

Tom Abram, LEED AP
Sustainability Coordinator
Facilities & Services

Live Green Week
October 29, 2008



Experimental Plots in Urbana. Corn, Switchgrass, and Miscanthus side-by-side. This photo was taken in June. Fields in Second year of growth. 6 acres miscanthus, 3 acres switchgrass. Photo courtesy Andrew Leakey 2006


Sustainability Policy and Goals

Sustainability Policy and Goals

- Energy reduction policy – 10% in 3 years
- Signatory to American College and University Presidents Climate Commitment
  - Required to develop plan to reach carbon neutrality
  - Several intermediate requirements
- All new construction or major renovations must be LEED Silver Certified at a minimum. Others should strive to meet Silver as much as possible.
  - Business Instructional Facility
  - Lincoln Hall Renovation
  - Huff Hall Addition
  - Petascale
  - Illinois Fire Service Institute
- Several aspects of sustainability in Campus Strategic Plan
- Previous committees developed plans that have not been enshrined
- Need for comprehensive sustainability policy

Benchmarking Importance

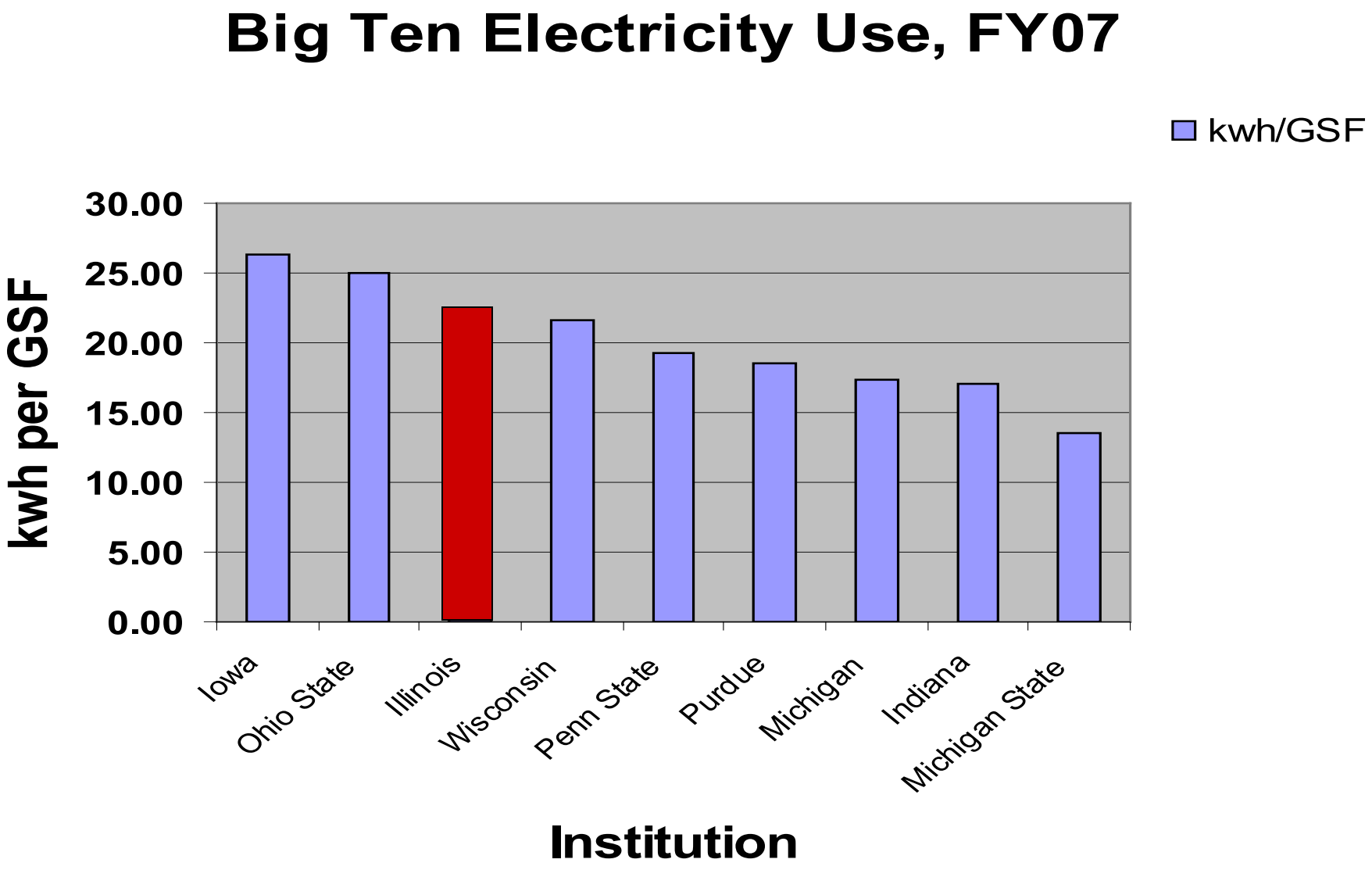
- Must know where we stand
- Regardless of how well we are performing in a certain area, it needs to be available to campus to provide impetus for change
- Necessary for setting goals
- Important to track progress and confirm we are making progress at an adequate pace


Energy Conservation Efforts

Urbana Campus Energy Costs:

FY 2003:	*$26,612,000*	
FY 2004:	*$35,684,000*	*(+34%)*
FY 2005:	*$52,282,000*	*(+47%)*
FY 2006:	*$70,778,000*	*(+35%)*
FY2007:	*$58,830,000*	*(-17%)*
FY2008:	*~$70,000,000*	*(+19%)*

How do we compare?



Urbana Campus Carbon Footprint, FY07

Abbott PP, nat. gas	*198,341 tons*	***37.5 %***
Abbott PP, coal	*204,126 tons*	***38.6 %***
Abbott PP, oil	*118 tons*	***0.0 %***
Other campus burn	*10,472 tons*	***2.0 %***
Purchased Electricity	*96,635 tons*	***18.3 %***
	Stationary sources	***96.4 %***
All UIUC vehicle emissions	*5,319 tons*	***1.0%***
Employee Commuting	*14,015 tons*	***2.6%***
Annual Air Travel	*na*	*?*
TOTAL	***529,027 tons***	

12 Highest Energy Consumers, FY08

1.	Roger Adams Lab	126,441 MMBtu
2.	Advanced Computation	126,321
3.	Beckman Institute	109,224
4.	Vet Med/Basic Science	107,520
5.	Veterinary Tch'g Hosp.	107,360
6.	Micro/Nano-electronics	105,541
7.	Institute for Genomic Biology	98,803
8.	Siebel Ctr for Comp.Sci.	91,974
9.	Chem/Life Sciences	84,128
10.	Madigan Laboratory	83,228
11.	Digital Computer Lab	70,370
12.	Illini Union	68,684

30% of campus consumption

Reduced consumption nets huge benefits

- Each 1% reduction is worth $500,000+ and 5,200 tons of annual carbon emissions
- 8.2% energy reduction returns CO2 emissions to 2000 levels
- 19.7% energy reduction returns emissions to 1990 levels

PROGRESS TO DATE …

- ✓ Developed a campus Energy Use Policy
- ✓ Installed new steam and/or chilled water meters in 80+ buildings (80/90%)
- ✓ Developed detailed energy statements for colleges and admin units showing their utility usage in the “Big Eighty”
- ✓ Implemented a retro-commissioning program *(averaged 21% reduction in 900,000GSF in FY08)*
- ✓ Began a major lighting retrofit/upgrade program

MORE …

- ✓ Implemented comprehensive steam trap maintenance program

  (Campus steam use reduced 12%+ FY06 to FY08)
- ✓ Adopted LEED standards for all major construction (>$5M – LEED Silver Certification)
- ✓ Approved wind generator for the South Farms
- ✓ Developed RFP for Performance Contracting (ESCOs)
- ✓ USEPA “Energy Star” partner
- ✓ Joined the Presidents’ Climate Commitment

Krannert Center Retro-commissioning

- Work done November- December 2007
- Presently seven months of metered results
  - Electricity reduction – 18%
  - Chilled water reduction – 19%
  - Steam reduction – 50%
- Annual Savings - $380,000
- Retro-commissioning cost - $188,000
- Simple Payback – 6 months

Photo by Dan O'Brien

Ten Year Energy Goals:

- *Reduce energy consumption from FY07 levels by 10% over the next 3 years*

- *Reduce energy consumption from FY11 levels by 15% over the following 2 to 6 yrs*

The ten year plan, in simplest form …

- **Improve systems**
- **Control growth**
- **Create incentives**
- **Facilitate behavioral change**
- **Stimulate investment**

Energy Program must address three key areas:

I Building/System Modifications & Upgrades

II Campus Culture shift

- Information and Awareness
- Incentives
- Policy changes

III Improved Communication/Coordination

e.g. Generation vs Consumption


Sustainability in Operations

Recycling Methods

- Collection: Individuals sort recycling into bins before collection. Results in highest percentage by weight of recyclables (~90% - mostly paper and cardboard).
- Sorting: Employees at Waste Transfer Station sort through waste stream and pick out recyclables

- Residence Hall exception: Waste stream in dorms has too much wet materials to sort.

Recycling Figures (FY 08)

- Recycled or diverted nearly 50% of waste (excluding construction and demolition)
- 2,074 tons of paper and cardboard
- 41 tons of aluminum cans
- 625 tons of scrap metal
- 1,300 tons of landscape waste
- 325 tons of pallets
- 21 tons of plastic (No. 1 and 2)

http://www.fs.uiuc.edu/maintenance/wastemanagement/wastemanagement.cfm

Grounds

- No-mow zones
- Leaves composted and reused at nursery
- Limbs chipped and reused; rest is mulched
- Irrigation is minimal – (~12-14 acres)
- Irrigation systems use timers, can be shut off with adequate precipitation
- Monitors for pest management; no pre-treatment
- Used organic pesticide like insect soaps, horticultural oils
- Reduced chemical usage by ~60% over last 5-7 year; spot treatment instead of spray
- Minimization of fertilizer
- Experimentation with native plantings – prairie dropseed, bluestem
- Most plant material is purchased nearby
- Very rarely planting in native soil
- Snow removal: salt brine spraying – better for plants, less corrosion

Printing Department

- Course packets are 100% post-consumer recycled and processed chlorine free
- Estimated 40% paper used is recycled (mostly 30%)
- Carries some Forest Stewardship Council certified paper
- Offset printing only uses vegetable inks (State of Illinois requirement)
- Purchases mostly from Wisconsin and Ohio
- Barrier – must be cost competitive with outside bidders
- Several units request recycled stock

Transportation

- CUMTD available to all students, staff, and faculty
- Parking Review Committee
- Car share (Zipcar)
- Possible bicycle programs
- Impounded/unclaimed bikes given to the Bike Project cooperative
- Several electric and fuel efficient gas-powered vehicles in F&S fleet
- Car Pool has a Prius, ordered three Ford Escape hybrid SUVs, and requested a proposal to purchase 24 hybrid sedans
- Idling and fuel consumption monitoring in 50-60 vehicles
- Some vehicles using E85

Dining/Housing

- Preference for locally processed or produced items ~20% of purchases
- Some organics – typically mixed greens and tofu. Additional products if available and meets budgetary requirements
- Leftovers deemed “safe to eat” donated to local food banks
- Trayless pilot at PAR – cuts food waste
- Project to convert waste oil to biodiesel
- Vegetarian dining hall – Field of Greens
- Dorm energy contest pilot in development
- No composting program

Composting

- Central composting facility in the works
- Would be located on the South Farms
- Feedstock:
  - Animal waste
  - Bedding
  - Straw
  - Leaves
  - Tree clippings
  - Sawdust
  - Some food waste

Business Instructional Facility

- First building on campus attempting LEED Certification
- Confident with Gold rating: slight chance of Platinum
- Opened in August, 2008. Final construction still in process

Business Instructional Facility

- Estimated to reduce energy costs by 50% - about $300,000 per year
- Triple pane windows
- High performance insulation
- Photovoltaic panels – (4,000 SF ~ 8% of electricity)
- Reflective zinc roofing
- Two extensive green roofs with monitoring
- Photosensor and occupancy controls for lighting
- Displacement ventilation system
- Carbon dioxide monitoring – demand control ventilation
- Sited near public transportation
- Diversion of construction waste
- Low-volume shower heads, toilets, and faucets reduce water consumption
- Bicycle changing and showering facilities

Additional Sustainability Projects

- Urban Prairie Theatre
  - Swath of prairie between 4th and 6th, north of Peabody
  - Stone council rings for performances, classes
- Miscanthus-fired Boiler
  - Would provide steam and electricity to Vet Med Basic Sciences Building
  - Received grant from Illinois Clean Energy Community Foundation


Campus Sustainability
Structure

Student Sustainability Committee

- Two fees passed by students unto themselves
- $2/sem. Cleaner Energy Technologies
  - Renewable energy and energy efficiency
- $5/sem. Sustainable Campus Environment
  - Broader: includes above categories plus additional initiatives, including education, sustainable resource purchasing, green buildings, sustainable campus development
- Students allocate funds via application process
- Previously funded projects
  - Wind turbine, Illini Union audit and retrofits, Biodiesel Initiative, PV Array and Green Roof on BIF, E-85 Tanks, WMRC Lighting Retrofit

Sustainability Related Positions

- Sustainability Coordinator (Tom Abram) –
  - Located under Facilities & Services
  - Focus on the sustainability of our physical operations
  - Benchmark and set goals on operations sustainability
  - Coordinate between F&S and rest of campus
  - Review LEED checklists and designs
  - Provide LEED AP training sessions
  - Perform energy analysis
  - Parking System Review Committee
  - Student Sustainability Committee
  - Sustainability related grants

Sustainability Related Positions

- Office of Sustainability (Director, Dick Warner)
  - Located under Vice Chancellor for Public Engagement
  - Will incorporate Environmental Council
  - Develop and implement a comprehensive plan to achieve the responsibilities associated with the **American College and University Presidents Climate Commitment**
  - Lead and coordinate **enhancements to campus infrastructure and policies** related to energy use and sustainability
  - Infuse sustainability into **teaching and learning through curriculum** enrichment, including incorporation of service learning opportunities
  - **Foster innovative research collaborations** focused on creating knowledge and technologies which will better enable society to achieve sustainability across social, environmental and economic domains
  - **Engage with external constituencies** to apply broadly lessons from campus sustainability operations and knowledge creation activities
  - Work towards **establishing reputation of Urbana campus** as a leader on sustainability issues
  - http://sustainability.illinois.edu/

Sustainability Related Positions

- Director of Energy Conservation (Terry Ruprecht)
  - Works with Facilities & Services and Provost
  - Structures conservation efforts
  - Ensures campus energy use is reduced
  - Leads behavioral and efficiency programs
  - Metering and shadow billing
  - Energy Service Company (ESCO)
  - http://www.energymanagement.uiuc.edu/
- Waste Management (Tim Hoss)
  - Oversees campus recycling program

Sustainability Related Positions

- Transportation Demand Manager (Morgan Johnston)
  - Represents and coordinates campus transportation needs, in cooperation with regional transportation planning partners
  - Reduce single-occupancy vehicles usage on campus
  - Educate and assist the campus community in the use of alternative transportation modes
  - Analyze, assess, and advocate campus transportation needs, including alternative modes, such as car sharing
  - Coordinate university road maintenance, markings and signage
  - Coordinate efforts to make the campus a safer and friendlier environment for pedestrians
  - Researches and coordinates improvements to bicycle infrastructure

Campus Sustainability Council

- Chancellor announced formation of the Campus Sustainability Council, which he will chair
- Director of the Office of Sustainability will be vice-chair
- Will provide strategic direction and oversight for sustainability initiatives on campus
- Foster campus initiatives to empower tomorrow's societal leaders
- Reengineer campus infrastructure and practices
- Create knowledge and technology
- Engage with external constituents
- Additional members:
  - Provost
  - Vice Chancellors
  - Executive Director of Facilities & Services
  - Executive Director of the Institute for Natural Sciences and Sustainability
  - Environmental Council
  - Council of Deans
  - Student groups
  - Local community


Sustainability in Academics
and Research

Sustainability in Curriculum

- Courses and majors devoted to issues of sustainability (estimate of 114 courses)
- Need to incorporate elements of sustainability into standard curriculum
  - Architecture – sustainable buildings
  - Engineering – renewable energy, efficiency, more sustainable materials
  - Economics/Business – incorporate externalities into market
  - Business - infuse social responsibility into business practices
  - Agriculture – sustainable food and fuel production

Sustainability in Research

- Institute for Natural Resources Sustainability
  - Illinois State Geological Survey
  - Illinois Natural History Survey
  - Illinois Waste Management Research Center (Institute for Sustainable Technology Center)
  - Illinois State Water Survey
- Smart Energy Design Assistance Center
  - No cost energy audits for small businesses, K-12 schools, municipalities, community colleges
  - Energy conservation advice to everyone

Sustainability in Research

- Renewable Energy Initiative
- Center for Advanced BioEnergy Research
- Energy Biosciences Institute
- Miscanthus Research
- LEAM project on modeling urban sprawl
- Energy and Sustainability Engineering graduate option in the works


Trends in Campus
Sustainabilty

Trends in Campus Sustainability

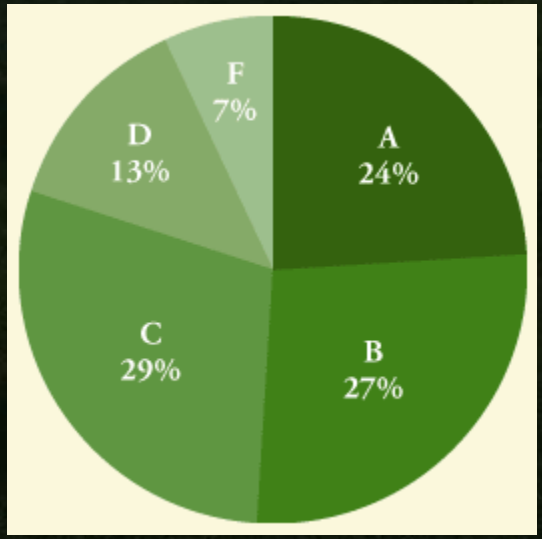
- Sustainability Officers
  - AASHE lists 142 full time, 7 part-time
- Peer-to-peer programs
- Degree Programs
- Carbon neutrality
  - Conservation
  - Renewable energy
  - Green tags/RECs

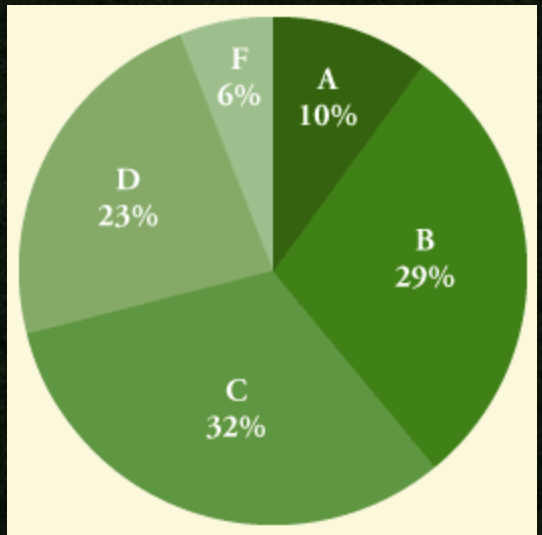
Trends in Campus Sustainability

- Association for the Advancement of Sustainability in Higher Education (AASHE)
  - ACUPCC
  - Resources for members
  - Biennial national conference
  - STARS
- Sustainability Tracking, Assessment, and Rating System (STARS)
  - Framework to gauge progress in sustainability
  - LEED : Buildings :: STARS : Campuses
  - Pilot program in progress
  - Education and Research, Operations, Administration and Finance
- Sustainable Endowments Institute
  - College Sustainability Report Card/Green Report Card

Trends in Campus Sustainability Green Report Card

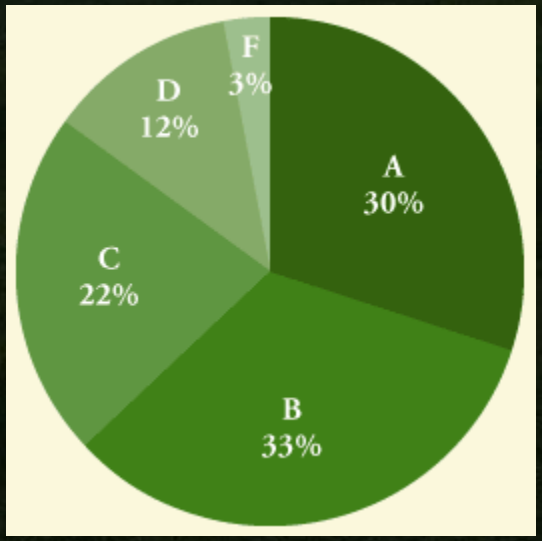
- Administration
  - Over 50% of schools have full-time staff dedicated to sustainability
  - Nearly one in four schools have a sustainability office
- Climate Change and Energy
  - Over 50% of schools have made a carbon reduction commitment

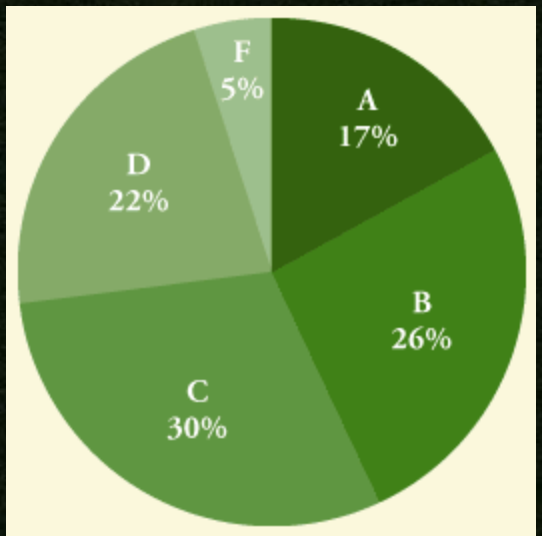




Trends in Campus Sustainability Green Report Card

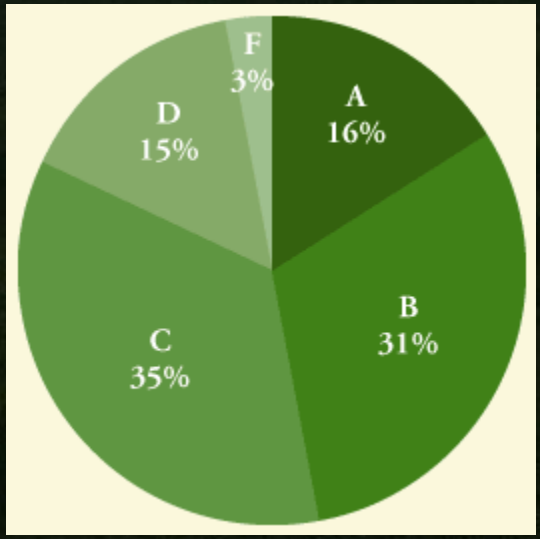
- Food and Recycling
  - 82% devote portion of food budget locally
  - 29% have campus community garden/farm
  - 74% have fair trade coffee or other items
  - Nearly 50% compost food or landscape
- Green Building
  - 14% have at least one green roof
  - 42% have at least one LEED certified building or are constructing one
  - 57% have policies requiring minimum performance levels, such as LEED Silver

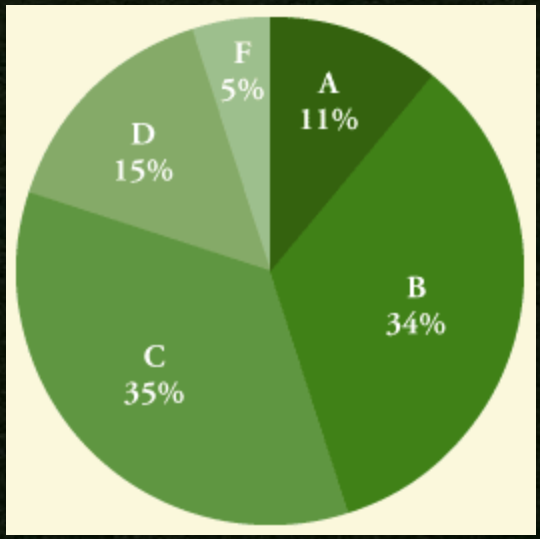




Trends in Campus Sustainability Green Report Card

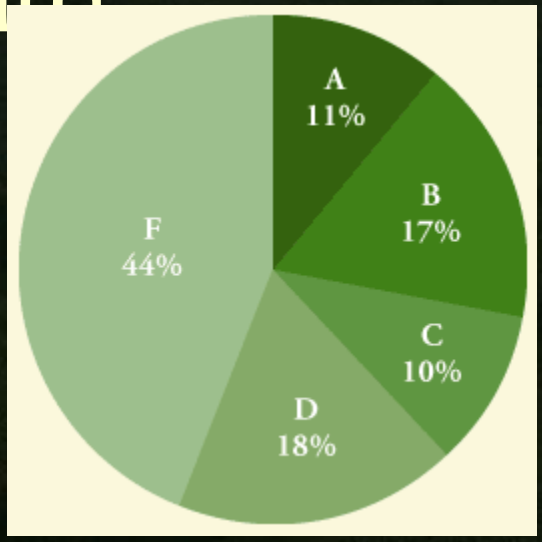
- Student Involvement
  - 27% have sustainability in orientation
  - 65% have paid sustainability opportunities for students
  - 42% have student representation on Board of Trustees
- Transportation
  - 31% have bicycle sharing program
  - 35% have car sharing program
  - 50% have reduced-fare public transit
  - 66% use hybrids or alternative-energy vehicles

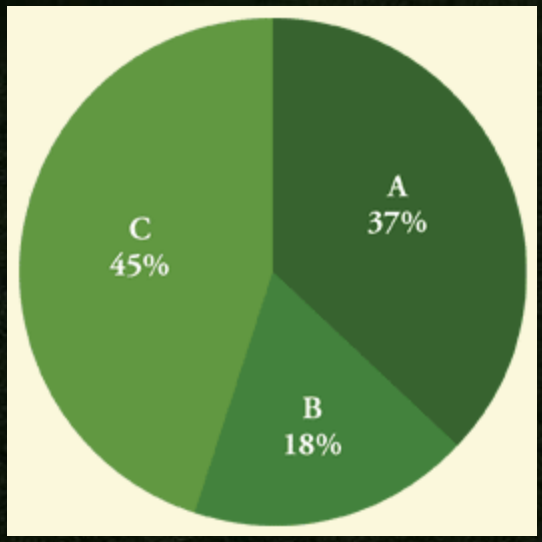




Trends in Campus Sustainability Green Report Card

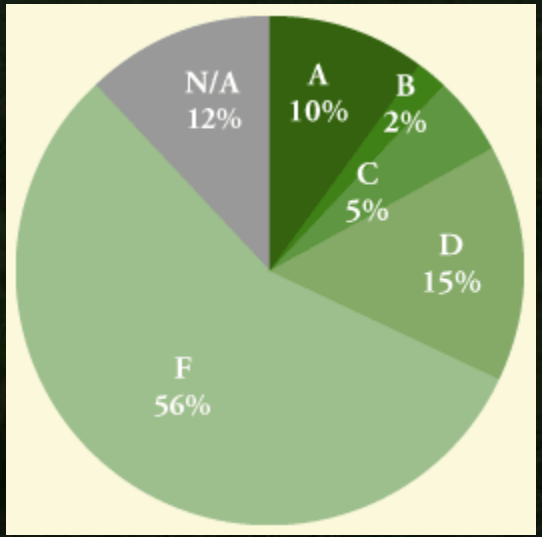
- Endowment Transparency
  - 33% make list of endowment holdings available to campus community/public
  - 23% make proxy voting records available to campus community/public
  - Average grade was D+
- Investment Priorities
  - 35% invest partly in renewable energy
  - 18% exploring this possibility
  - 10% invest partly in community development funds





Trends in Campus Sustainability Green Report Card

- Shareholder Engagement
  - 11% have committee to inform trustees' decisions on shareholder proxy resolutions
  - Average grade was D+



The College Sustainability Report Card

Trends in Campus Sustainability Green Report Card

- University of Illinois
  - Overall grade: B-
  - Administration: B
  - Climate Change & Energy: B
  - Food & Recycling: B
  - Green Building: A
  - Student Involvement: C
  - Transportation: B
  - Endowment Transparency: A (available upon request)
  - Investment Priorities: C
  - Shareholder Engagement: F

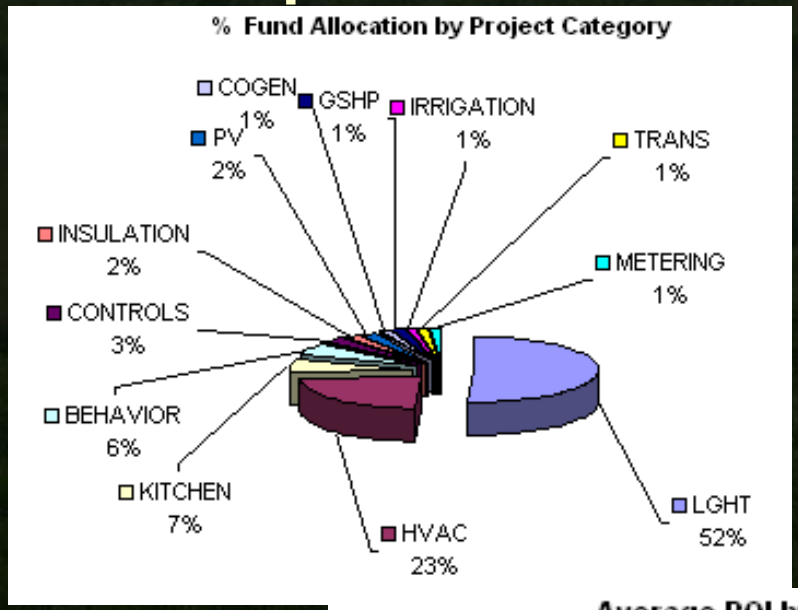
Examples in Campus Sustainability

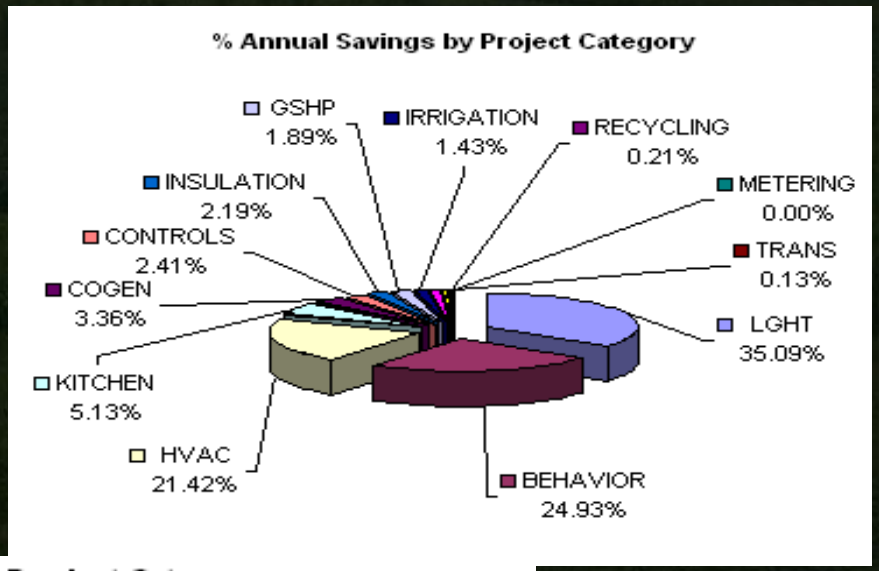
- University of Oklahoma
  - Will purchase 100% of electricity from nearby wind farm by 2013
- New York University
  - Purchases green power equivalent to 100% of their estimated energy usage (RECs)
- Colorado State University
  - Carbon neutral by 2020
  - Will not rely on carbon credits
- Michigan State
  - 2007 Campus Sustainability Leader (AASHE)
  - Lowest electricity consumption per square foot in Big Ten

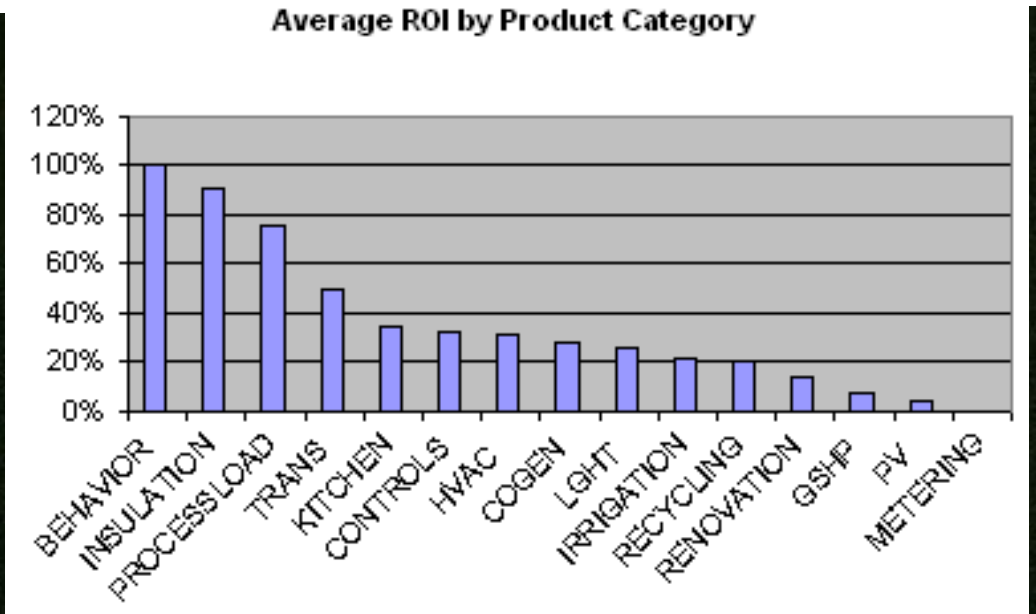
Examples in Campus Sustainability

- Harvard Green Campus Initiative
  - Generates savings exceeding its cost
  - Staffing rose from one to about twenty, plus student help
  - Provides loans for projects with a payback of 10 years or less (Green Campus Loan Fund)
  - Available loan fund of $12 million
  - Average ROI of 27% - great investment

Examples in Campus Sustainability








Final Thoughts

Future Plans

- Improved benchmarking and operations summaries
- Comprehensive sustainability plan
- Monitoring of progress towards goals
- Improved funding mechanisms
  - Revolving loan fund
  - Use of endowment (invest in conservation)
  - Request donations for sustainability
  - Name sustainable projects after donors
    - Wind turbine
    - Solar panel arrays
- Carbon neutrality
- STARS

Impediments to Progress

- Lack of stable funding mechanisms (particularly for quick payback projects)
- Communication problems
- Unclear division of responsibility
- Lack of incentives
- Structural constraints
- Slow moving bureaucracy

Take Action

- Energy conservation through behavioral change
  - Turn off lights and other equipment when not in use
  - Enable power management settings for computers
  - Utilize appropriate thermostat settings:
    - Occupied heating temperature of 68-70 °F
    - Non-occupied heating temperature of 62 °F
    - Occupied cooling temperature of 76-78 °F
    - Non-occupied cooling temperature of 84 °F
    - Temperature setbacks of 1 °F for 8 hours yields 1% in heating and cooling savings
  - Purchase efficient ENERGY STAR equipment
- Retrofit existing equipment, ie, lighting, HVAC, envelope (windows, walls, roofs, doors)

Take Action

- Reduce, reuse, recycle (in that order)
- Set printer defaults to double-sided
- Purchase recycled products
- Choose sustainable products, ie, fair trade coffee, organic and local foods
- Green your home too!
- Get to and around campus in a sustainable way
  - Bicycle - http://www.champaigncountybikes.org/ http://www.thebikeproject.org/
  - Walk
  - CUMTD - www.cumtd.com for trip planner, schedules, and maps
  - Carpool - http://www.union.uiuc.edu/rb/carpool.htm
- Get involved in organizations promoting sustainability

Questions? Discussion?

- Tom Abram
  - Sustainability Coordinator
  - tabram@illinois.edu
  - 217.244.1324