



Green Campuses



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CRSES Forum
Stellenbosch University
15h00 Friday 8 May 2009

Topics

- Introduction
- UCT green campus activities
- UCT student activities
- Calvin College green campus activities
- Summary
- Panel discussion
- Reception



Introduction



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Characteristics of Green Campuses

- Energy efficient
- Recycling
- Renewable energy
- Conserve water
- Low environmental impact
- **Sustainable (sustainability)**





What Should We Be Sustaining?

- Our existing “way of life”?
- Existing disparity between rich and poor?
- The environment?
- A livable planet?





Sustainability



Freedom



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Calvin College



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Centre for Renewable and Sustainable Energy Studies, Stellenbosch University
Engineering Department, Calvin College



Topics

National Context

Calvin College Context

Calvin College Initiatives

Conclusion: How to Make Institutional Change



National Context

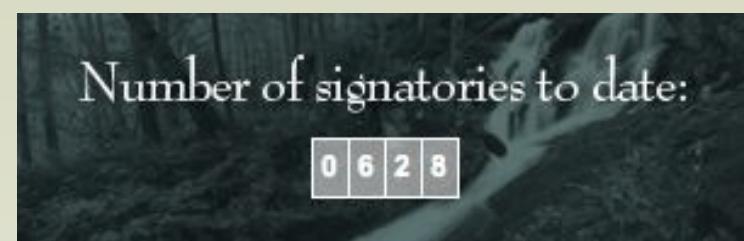


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National Context

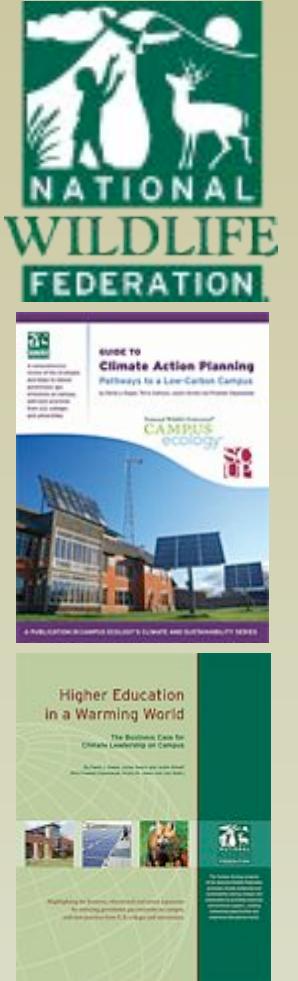
- Association for the Advancement of Sustainability in Higher Education
 - Extremely useful website (<http://www.aashe.org>)
 - Provides a community for campus sustainability actors
 - Holds bi-annual conferences
- American College and University Presidents Climate Commitment
 - Initiate planning process to become carbon neutral
 - Take concrete actions
 - Assess and report progress





National Context (2)

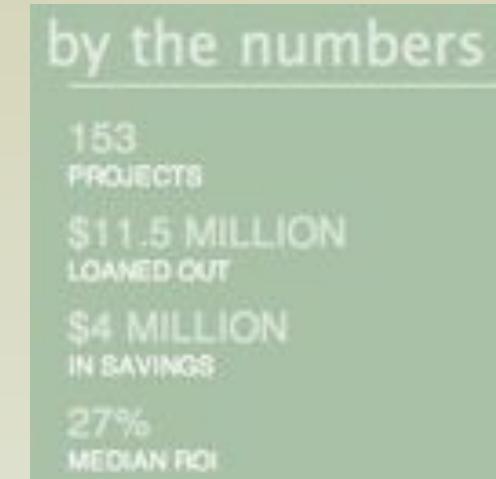
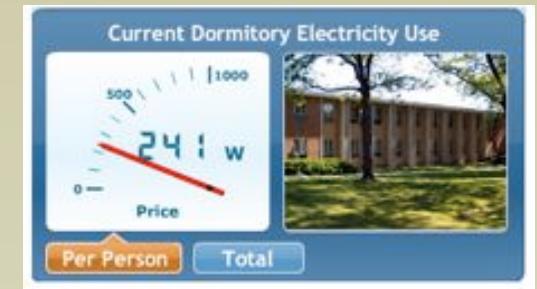
- National Wildlife Federation (NWF)
 - Resources for campus planning
 - Guide to climate action planning
 - Business case for climate change planning
 - Hiring a sustainability coordinator
 - Networking for students
 - Climate Champions program (2% annual GHG reductions)
- NAUCBO holds Smart and Sustainable Campuses Conferences annually





Exemplary Campuses

- Oberlin College 
 - Office of Environmental Sustainability
 - Campus Resource Monitoring System
- Harvard University 
 - Office for Sustainability
 - Greenhouse Gas Reduction Strategy
 - Energy Efficiency Fund





Calvin College Context



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Where in the World is Calvin College?





Community Context

- Grand Rapids, MI
 - 200k people in city, 1.3 M in metro area
 - Most LEED certified building area per capita
- Other Local Colleges and Universities
 - Aquinas College: Sustainability Institute
 - Grand Valley State Univ.: MAREC, LEED bldgs.



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Institutional Context

- Comprehensive **Liberal arts** institution (4-year)
- Founded 1876 by Calvinist immigrants
- 4000 students
- ENGR Department
- Phys. Plant

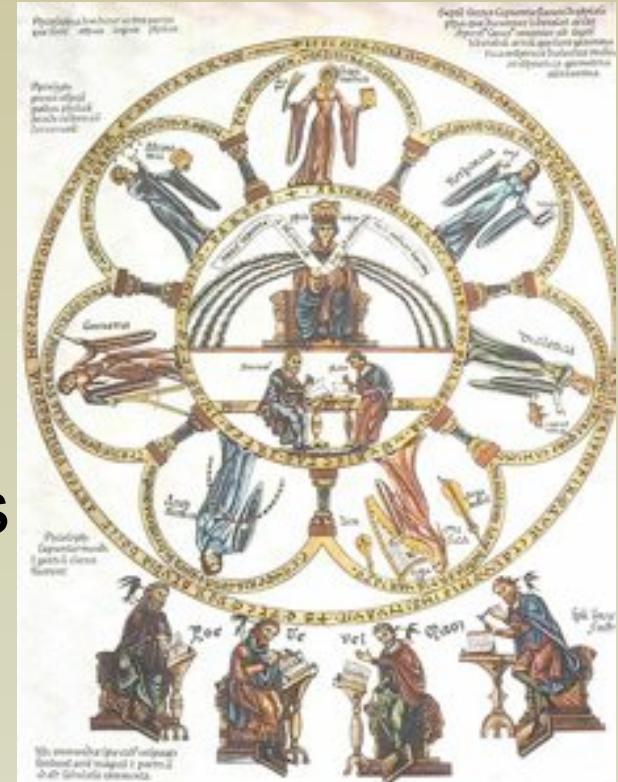




Liberal Arts Context

“Big questions are the lifeblood of liberal arts education with its emphasis ... [o]n the **connections** between the disciplines. Liberal arts education, at its best, goes beyond simply **knowing** ... and acquiring **competence** in some field.”

(Curry, Heffner, and Joldersma, 2007)



http://en.wikipedia.org/wiki/Image:Septem-artes-liberales_Herrad-von-Landsberg_Hortus-deliciarum_1180.jpg



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Organizational Context

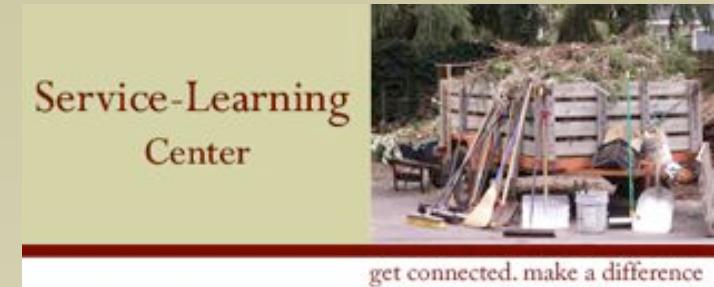
- Environmental Stewardship Faculty Committee
 - Advocates on behalf of the college on environmental matters
 - Sets standards and guidelines
 - Information conduit
- Sustainability Coordinator





Pedagogical Context

- Calvin Service Learning Center
- Sustainability commitments are a good fit for Service Learning
- Calvin Environmental Assessment Program (CEAP)





Calvin Environmental Assessment Program

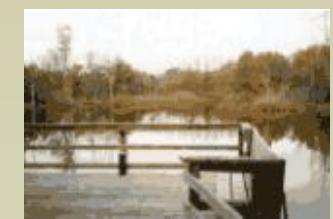
- Goals
 - Integrate sciences with service learning
 - Invigorate curriculum
 - Embrace multiple intelligences/learning styles
 - Provide service to institution
- By studying our particular place (campus, city, etc.) in classes through projects
- Requires willingness to focus on particularities rather than generalities





Example CEAP Projects

- Environmental Impact Assessment of East Campus Development on the Ecosystem Preserve
- Buckthorn Removal Strategies
- Campus Transportation Sustainability Analysis
- Wind Energy Demonstration Project
- A Study of the Retention Pond Near the Ecosystem Preserve
- A Geomorphic Assessment of the Physical Education Woodlots





Calvin College Initiatives



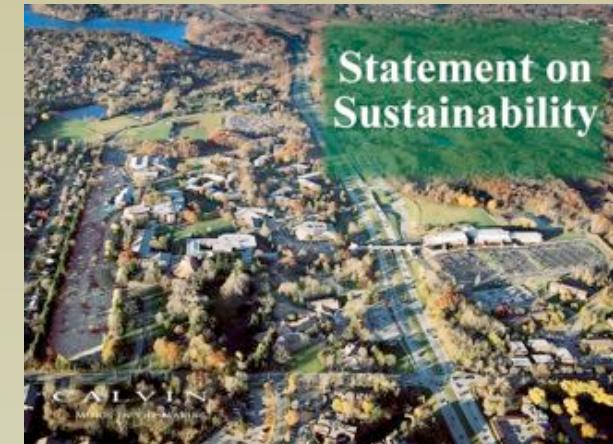
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Statement on Sustainability

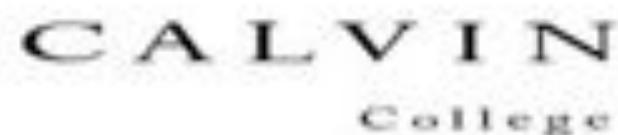
- Goal: “To raise the level of environmental and sustainability discussions in the campus community.”
- Nonbinding statement of aspiration
- Covers 13 areas of institutional/ community life

Teaching
Purchasing and Admin. Services
Solid Waste Reduction & Recycling
Energy Purchasing
Water & Wastewater



Hazardous Materials
Transportation
Food & Food Serv.
Grounds & Land Use
Building Construction
Site Planning
Investment Policies
Outreach





Calvin Sustainability Scorecard

February 2009

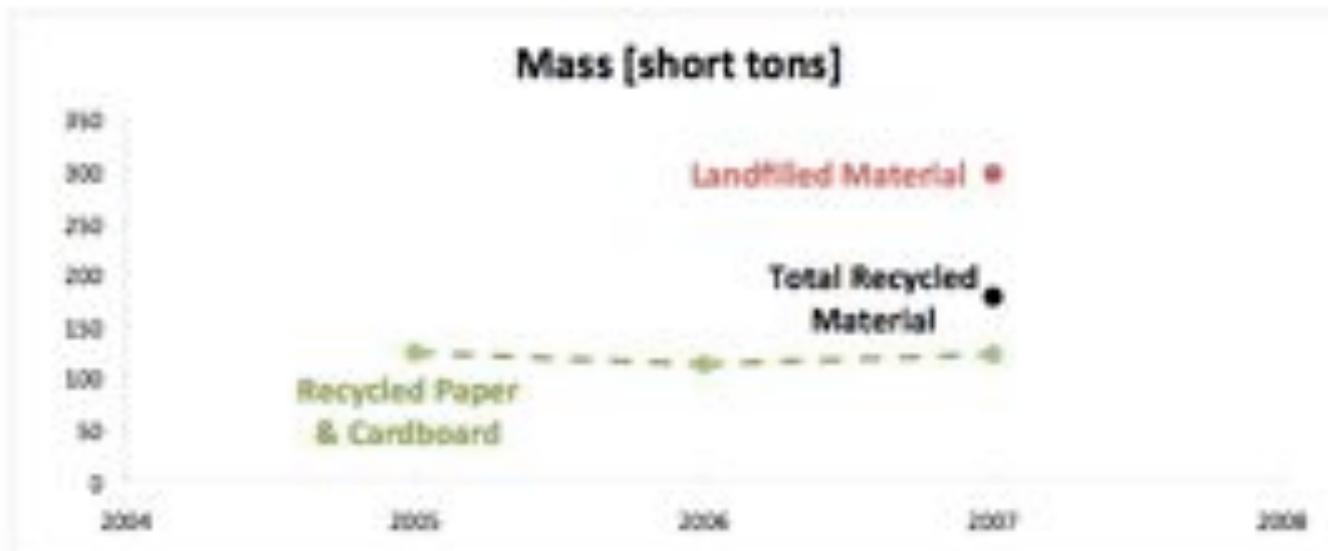


Sustainability Scorecard

- Linked to Statement on Sustainability topics
- Annual quantitative assessment
- Evolving process
 - More measures to be added
 - Data collection and analysis to be accomplished by CEAP classes



3 Solid Waste Reduction and Recycling

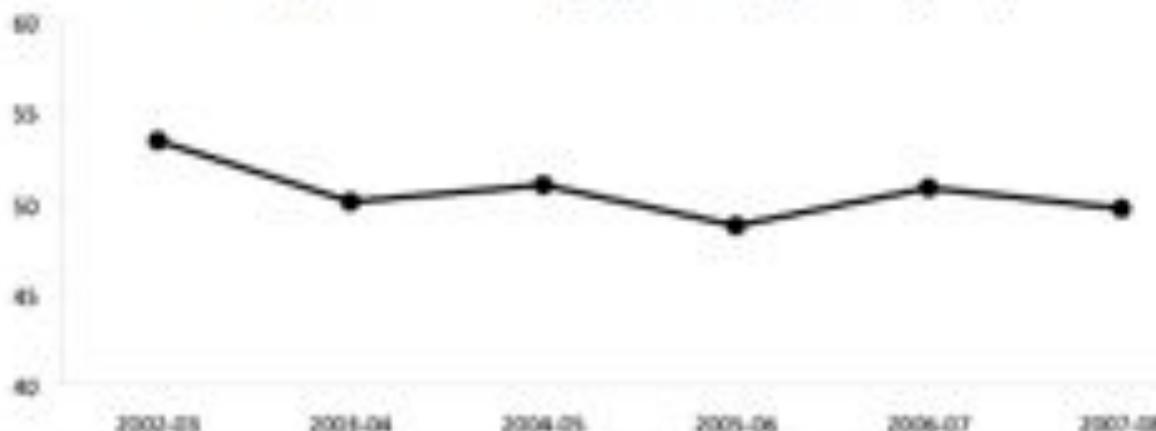


Calvin College has a wide-ranging recycling program. Currently we recycle office paper, paperboard, corrugated cardboard, books, glass, metal and plastic food and beverage containers, electronic devices, lamps and ballasts, batteries, polystyrene, scrap metal, concrete, used oil, and antifreeze. 2008 saw the beginning of efforts to compost organic waste generated from Grounds department activity. We seek to reduce the total amount of waste on campus and to increase the fraction of that waste that is recycled.

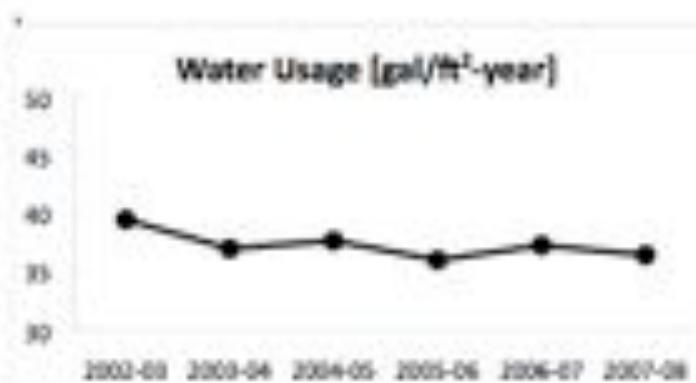
A note about the data: Data are collected in terms of both volume (e.g., 5-gallonsals of batteries) and mass (e.g., tons of cardboard). For this scorecard, all volume data was converted to mass using measured density values. Some of the recycling information is reported on a calendar-year basis. For the purposes of this scorecard, 2007-08 academic-year data is shown as year 2007 calendar-year data.

5 Water and Wastewater

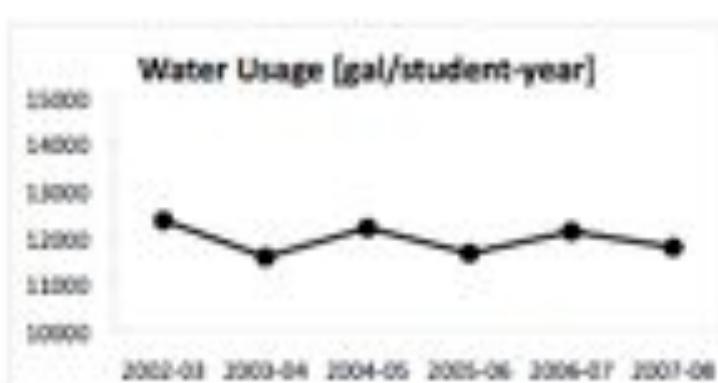
Campus Water Usage [Million gallons/year]



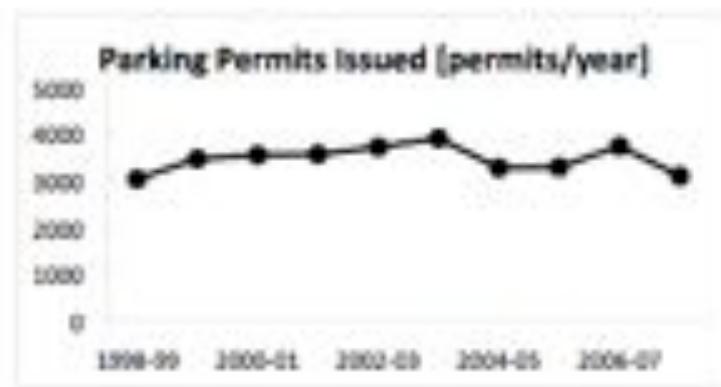
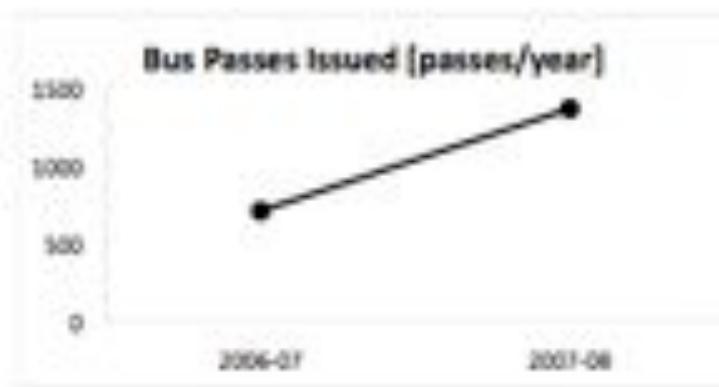
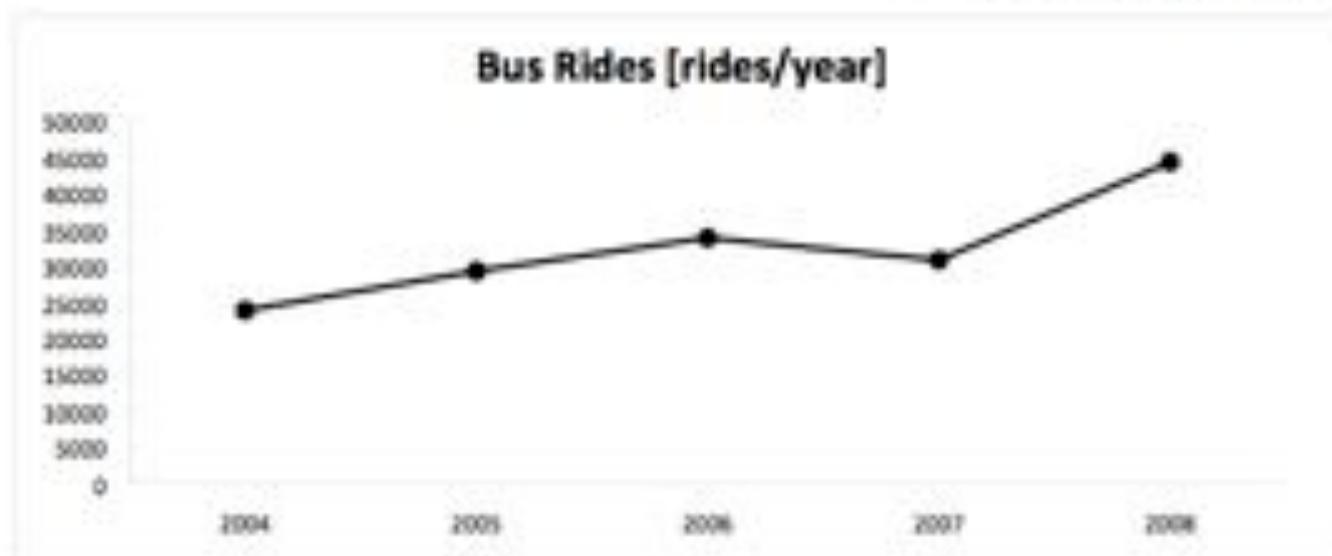
Water Usage [gal/ft²-year]



Water Usage [gal/student-year]



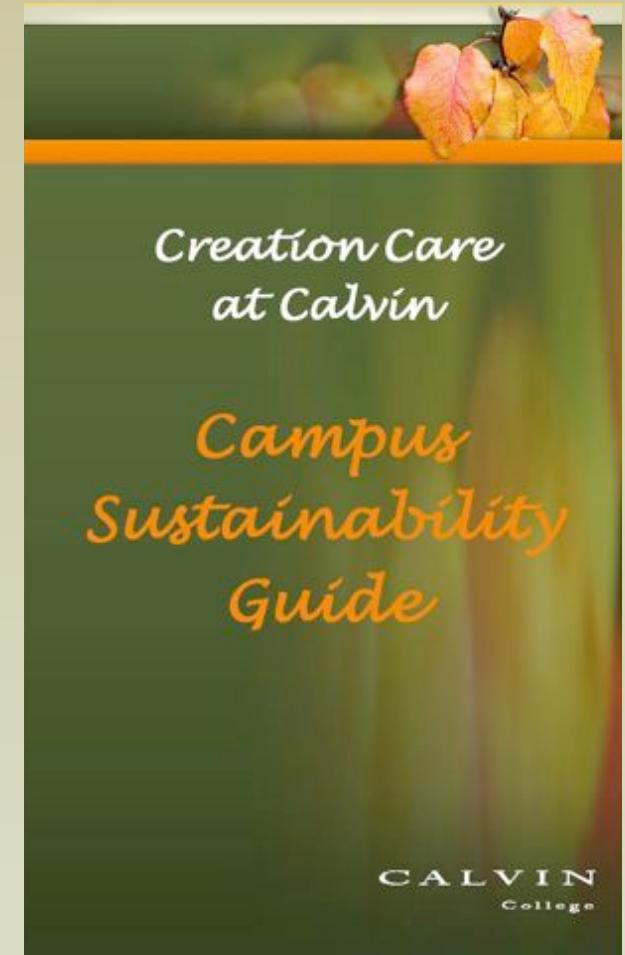
7 Transportation





Sustainability Guide

- Sections on ReTHINKing your waste, energy use, transportation, water, and food
- Practical suggestions for students and faculty
- External resources and campus green wiki links



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Sustainability Summit

- First summit: May 2008
- Staff participation (70 attendees)
- Agenda
 - Reviewed Statement on Sustainability
 - Met in functional units to map out sustainability actions for the next year
- Organized by interested (and unpaid) faculty and staff members





Carbon Footprint

- “What would it take to make Calvin College Carbon Neutral?”
- Assessed carbon footprint
- Developed carbon action plan
- Carbon emissions trading simulation



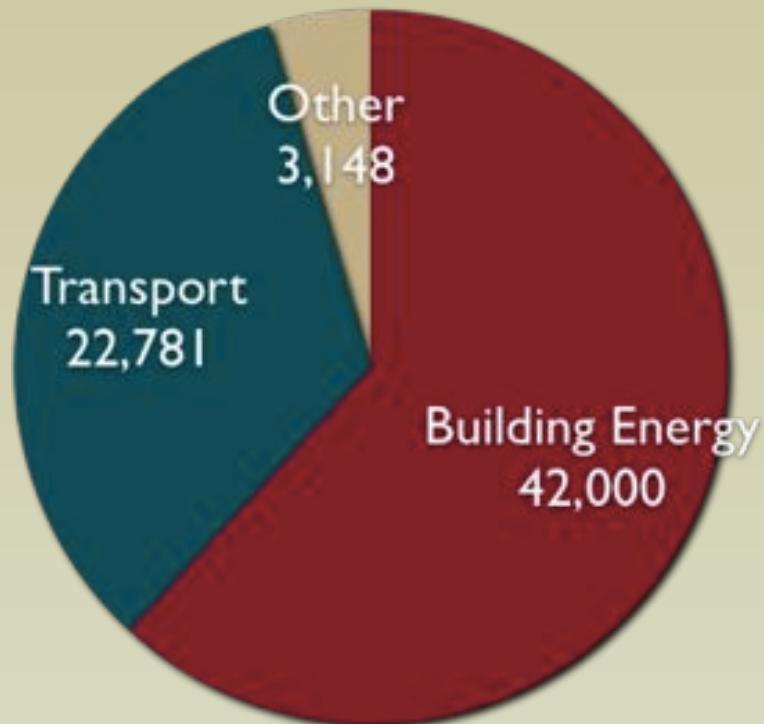
BIOL354/ENGR333
Fall 2007



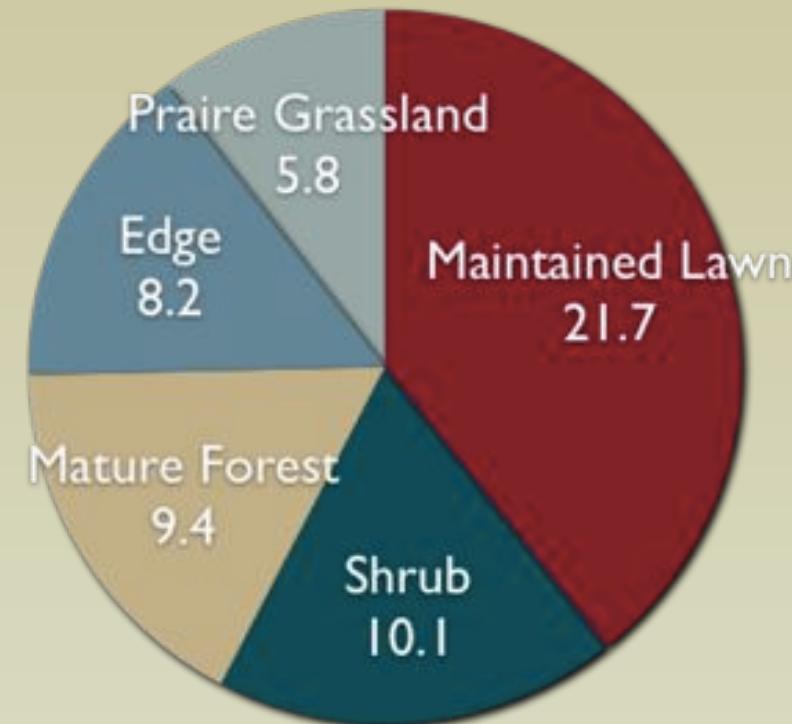
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Calvin College Carbon Footprint



Emission
67,929 tCO₂/year



Sequestration
55 tCO₂/year

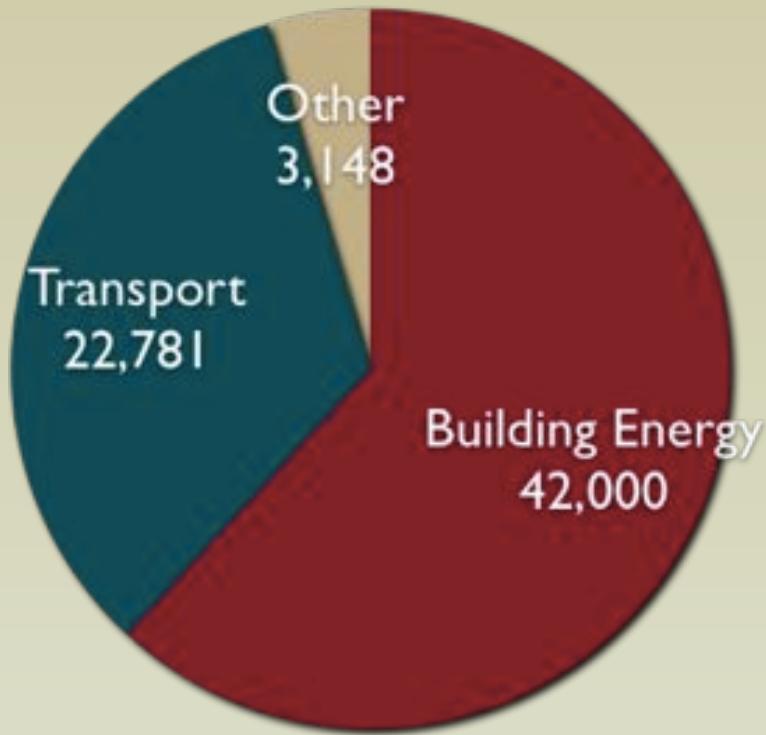
(Data from CCCN Project)



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Calvin's Carbon Footprint



Emission

67,929 tCO₂/year

(Data from CCCN Project)



Sequestration

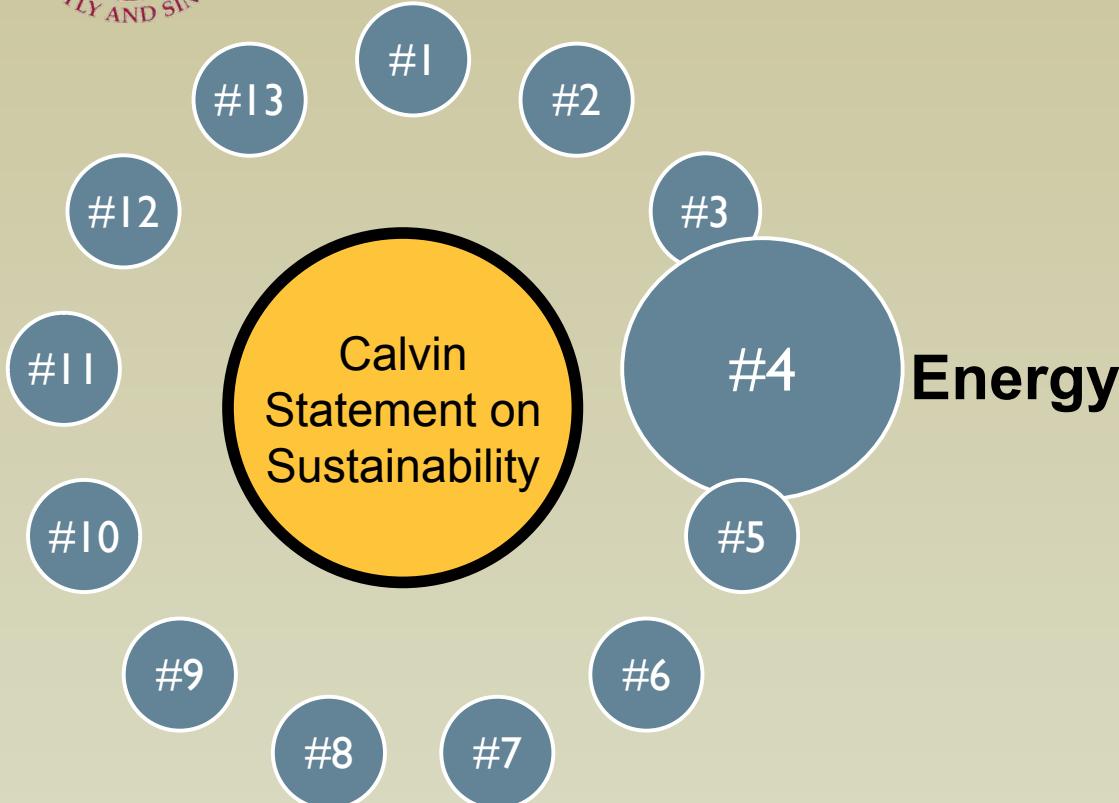
55 tCO₂/year



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Energy Efficiency



“We continually investigate new technologies for *improved energy systems* and *more efficient use of energy resources*.”

“Promote linkage between *energy conservation* efforts and programs to *reduce carbon dioxide emissions* and contributions to global warming.”





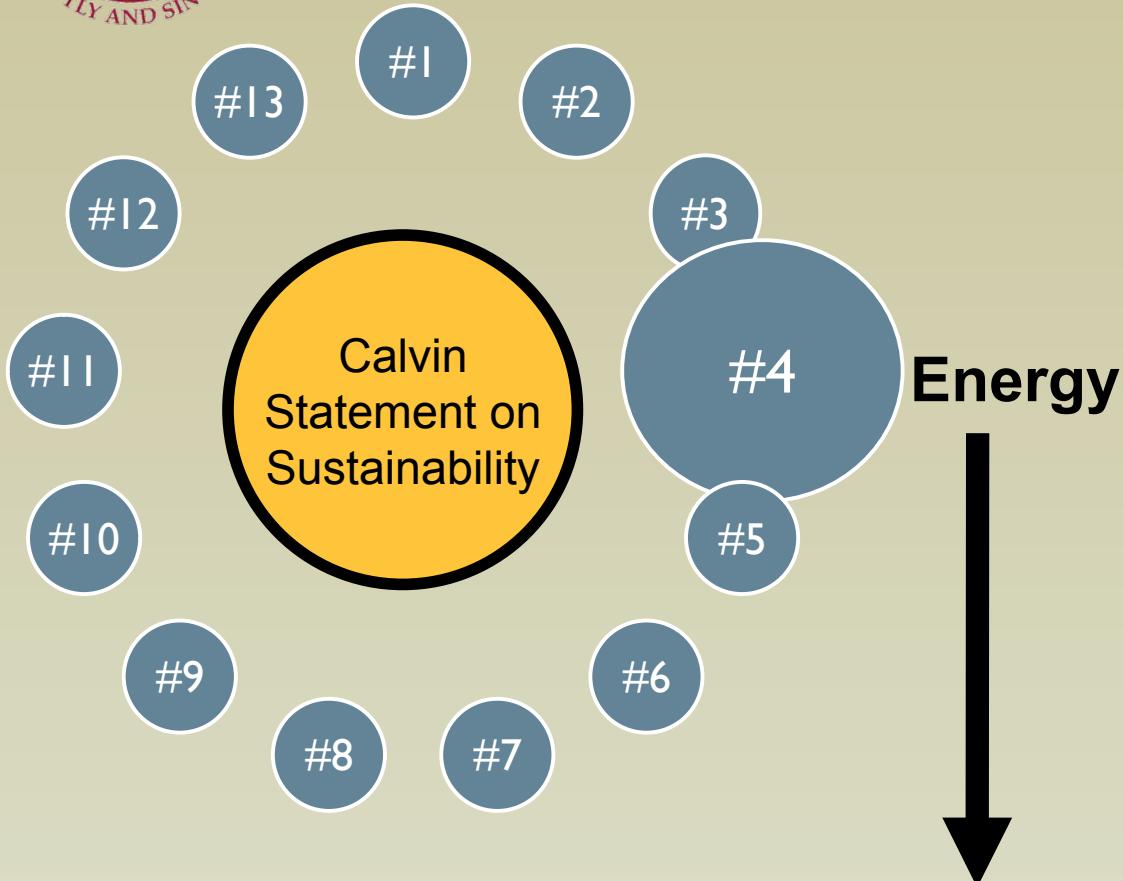
Challenges and Needs for Energy Efficiency

- Challenges
 - Organizational boundaries
 - High capital cost of many projects
 - Energy savings are “lost” in the general budget
- Needs
 - A way to streamline and consolidate projects
 - Funding mechanism
 - A way to promote and highlight cost savings to the administration and the community at large





Energy Efficiency



“We continually investigate new technologies for *improved energy systems* and *more efficient use of energy resources*.”

“Promote linkage between *energy conservation* efforts and programs to *reduce carbon dioxide emissions* and contributions to global warming.”

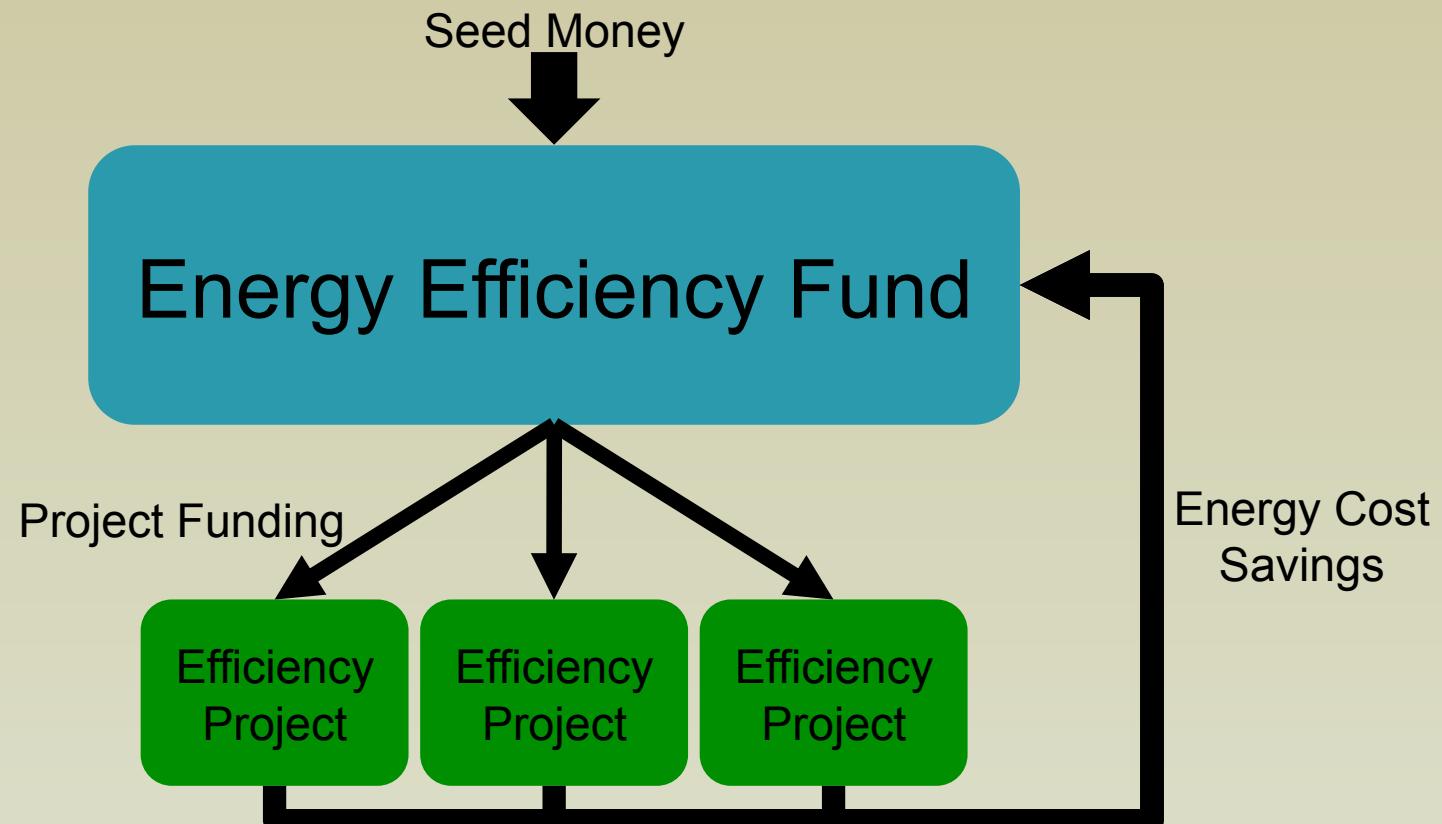
Calvin Energy
Efficiency Fund



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What is an Energy Efficiency Fund?





Energy Efficiency Fund Project

- “What would it take to implement an Energy Efficiency Fund at Calvin College?”
- Developed fund governance policies
- Evaluated 9 energy efficiency projects
- Projected fund balance



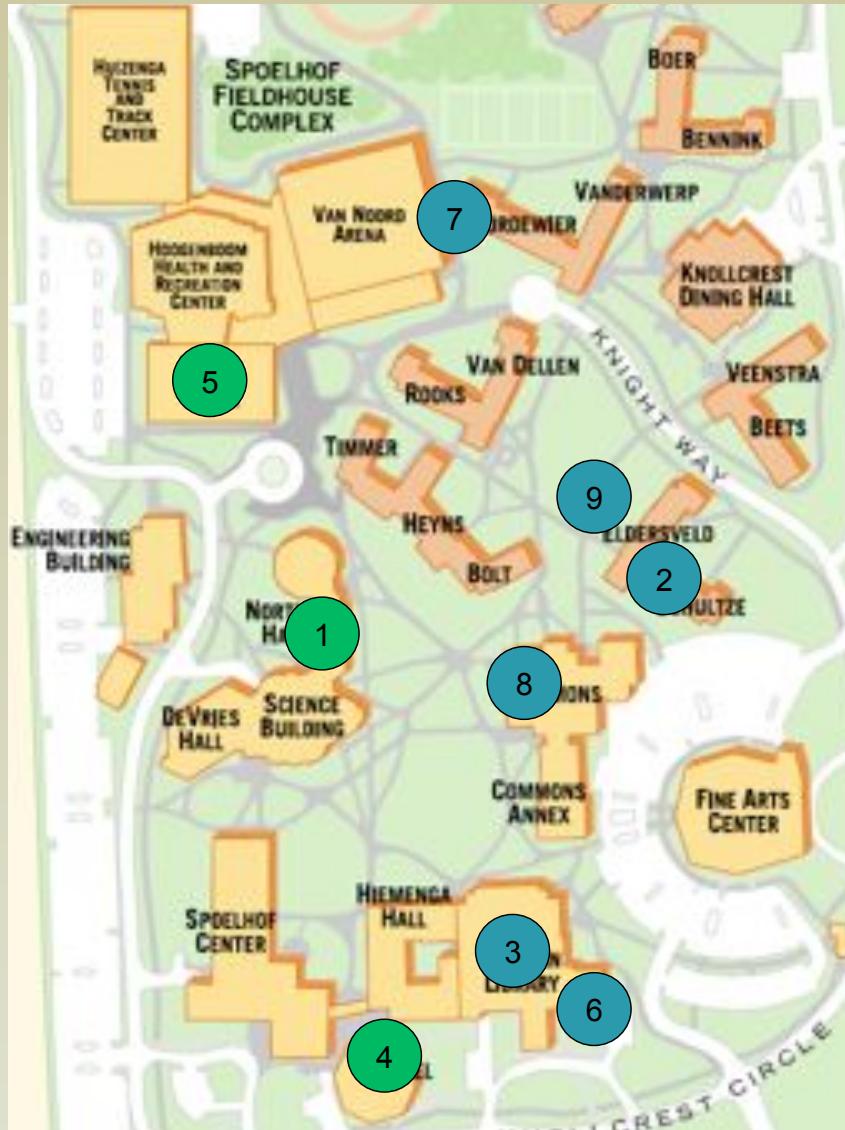
ENGR333
Fall 2008



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CEEF Project Analysis

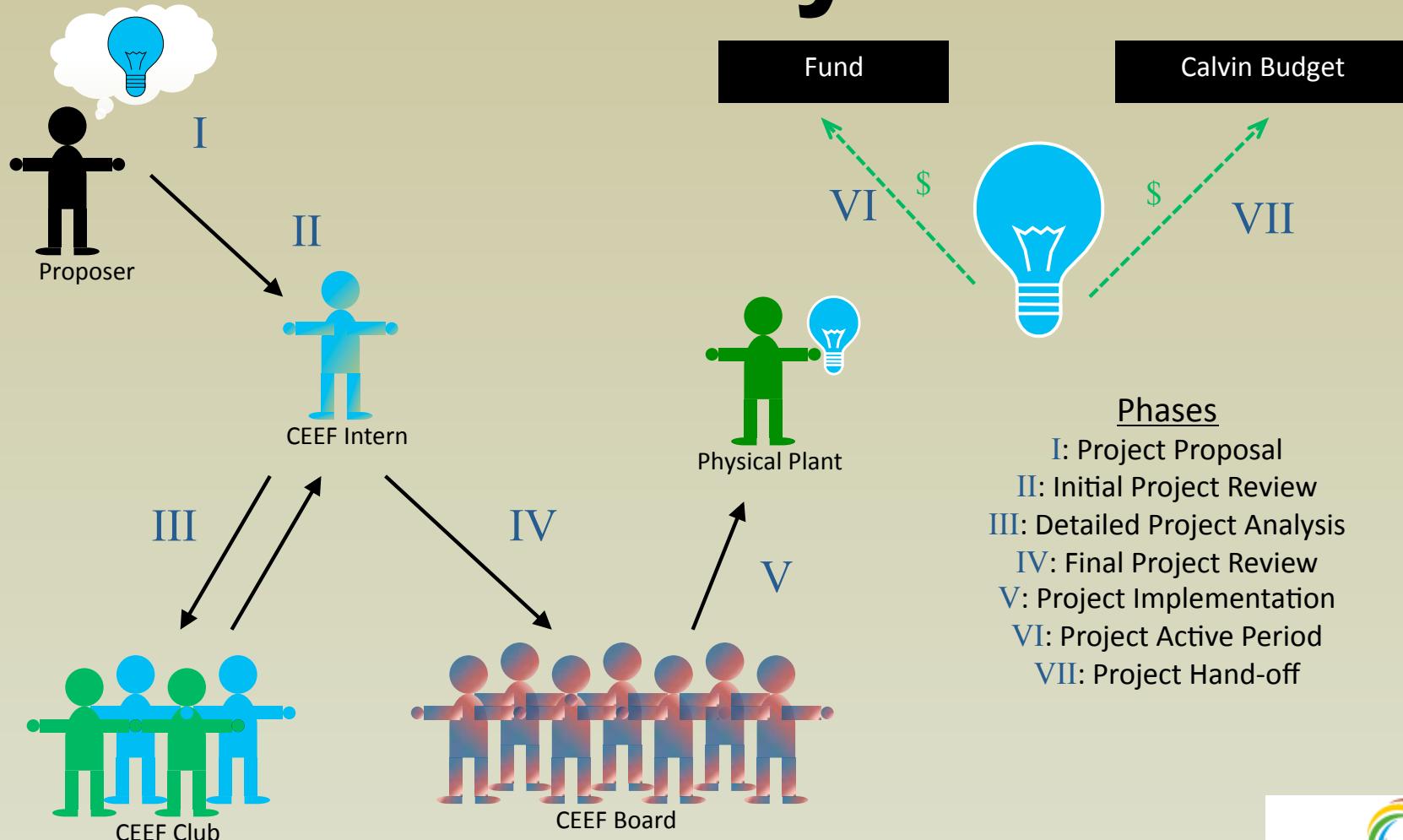


Tech Group 1	1 Light Replacement 2 Motion Sensors 3 Light Harvesting
Tech Group 2	4 Chapel Airlock 5 Solar Water Heating 6 Forced Computer Shutdown
Tech Group 3	7 Dorm Tunnel 8 CDH Windows 9 Dorm Hall Lights

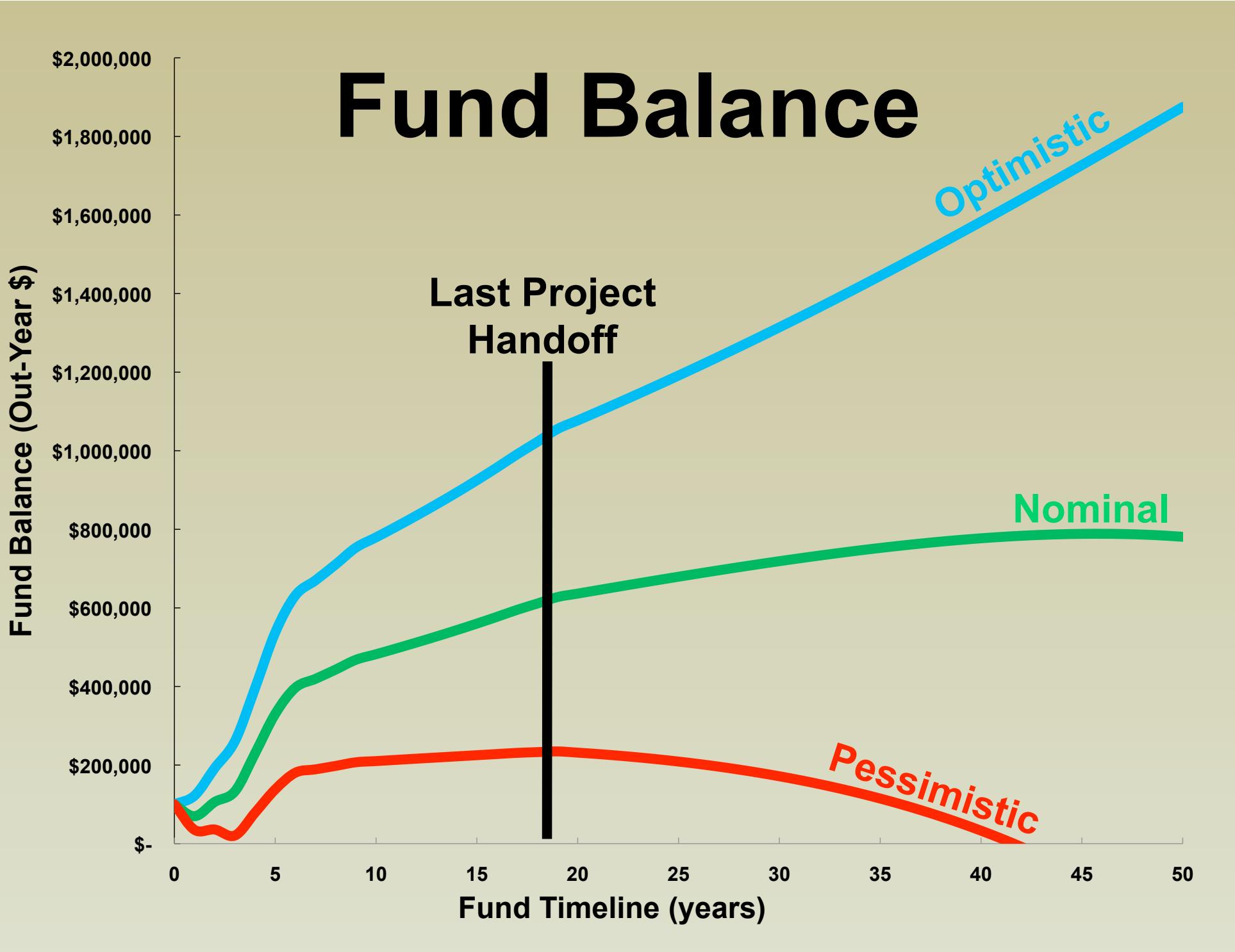




CEEF Project Life Cycle



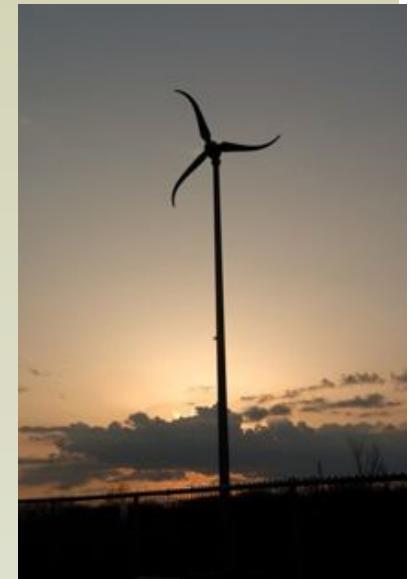
Fund Balance





Renewable Energy Demonstration Projects

- Bunker Interpretive Center (2004)
 - LEED Certified Silver
 - 20 kW solar photovoltaic array
 - Installed by Engineering Senior Design team
- Demonstration Wind Turbine (2007)
 - 1.8 kW Skystream turbine
 - Installed by Renewable Energy Organization (REO)





Woodlot Mitigation



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Community Garden





Timeline of Programmatic Milestones

- 1970s ENGR helps establish city-wide recycling program
- 1980s Service Learning Center (SLC)
- 1993 Environmental Stewardship Committee (ESC)
- 1995 Calvin Environmental Assessment Program (CEAP)
- 2004 First (and only) LEED certified building
- 2007 Statement on Sustainability. Carbon footprint analysis
- 2008 Sustainability Council. CEEF established
- 2009 Sustainability Scorecard





Conclusion



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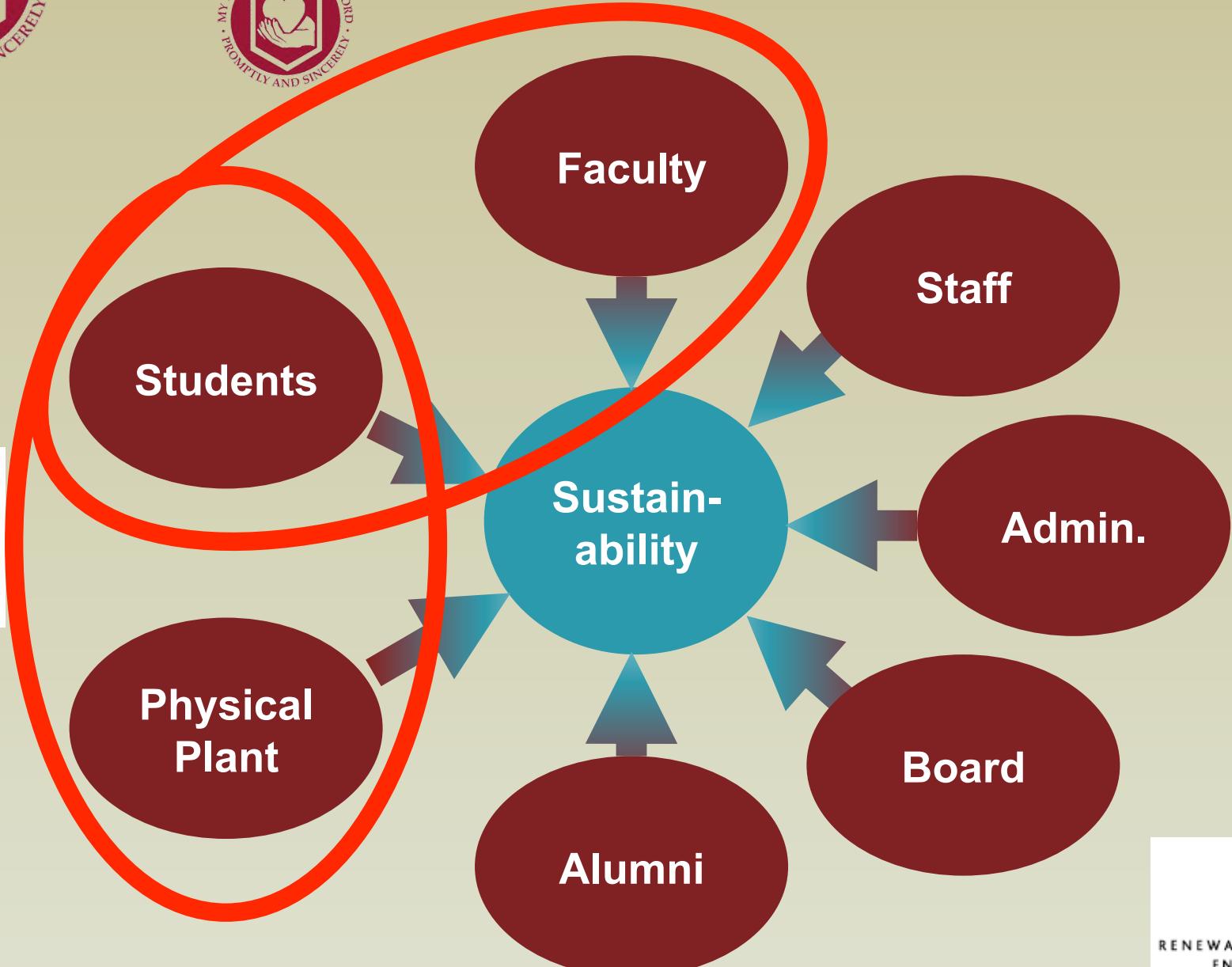


Greening the Campus

- Where should one start to make a campus more sustainable?
- How does one affect change in an organization?
- Many paths
- Depends on the type of organization



Many Paths





Multiple Identities

- Calvin College as an example
 - Religious tradition that values “the creation” and a sense of “calling”
 - Scholarly tradition that values research
 - Egalitarianism that values an effective faculty-run governance structure
 - High value on teaching and involving students in research
 - Situated within a city that itself has a robust sustainability agenda
 - Longstanding commitment to a broad liberal arts curriculum
- **“Successful institutional change towards sustainability occurs when the new practices resonate with aspects of the overlapping, multiple identities that shape the institution’s current structures and practices.”**

–Curry, Heffner, Joldersma (2007)

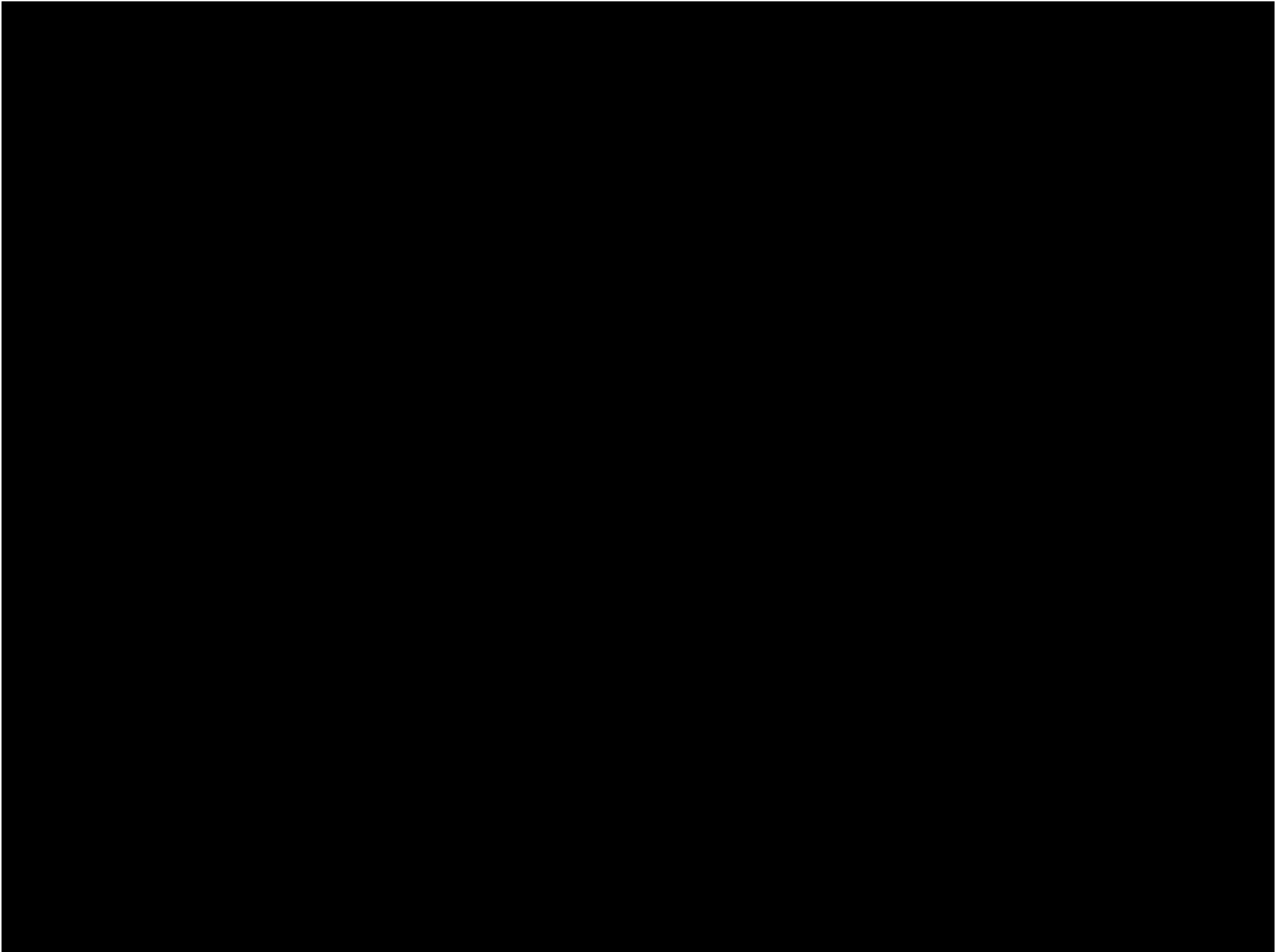




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Further Information

- AASHE: <http://www.aashe.org>
- American College and University Presidents Climate Commitment:
<http://www.presidentsclimatecommitment.org>
- Oberlin College
 - Office of Environmental Sustainability:
<http://www.oberlin.edu/sustainability/>
 - Campus Resource Monitoring System:
<http://www.oberlin.edu/dormenergy/>
 - Dashboard: <http://greeninc.blogs.nytimes.com/2009/05/08/an-energy-dashboard-for-buildings>



Further Information (2)

- Harvard University
 - Office for sustainability: <http://green.harvard.edu/>
 - Green campus loan fund:
<http://green.harvard.edu/loan-fund>
 - Greenhouse gas reduction commitment:
<http://green.harvard.edu/commitments/greenhouse-gas>
- National Wildlife Federation
 - Student networking: <http://www.nwf.org/campusecology/>
 - Resources: <http://www.nwf.org/campusEcology/resources/>





Further Information (3)

- Calvin College: <http://www.calvin.edu>
- Grand Rapids, MI
 - <http://www.grcity.us/>
 - <http://www.sustainablegr.com/?b1b7cb08>
 - <http://www.rapidgrowthmedia.com/features/sustain16.aspx>
 - http://www.ias.unu.edu/resource_centre/RCE%20Concept%20Paper.pdf
 - <http://www.gvsu.edu/cms3/assets/BCCBDF7C-D330-90F6-E6E276B6DF2BA28A/RCE%20Grand%20Rapids.pdf>





Further Information (4)

- Aquinas College: <http://www.aquinas.edu/>
 - Center for Sustainability:
<http://www.centerforsustainability.org/>
- Grand Valley State University: <http://www.gvsu.edu>
 - Sustainability: <http://www.gvsu.edu/sustainability/>





Further Information (5)

- Calvin College
 - Paper on environmental service learning:
<http://www.calvin.edu/admin/provost/ceap/publications/Environmental%20Service%20Learning%20article.pdf>
 - Paper on multiple institutional identities:
http://www.calvin.edu/admin/provost/ceap/publications/faculty/Curry%20Heffner%20Joldersma_1.pdf
 - Sustainability Summit 2008 report:
<http://www.calvin.edu/admin/provost/ceap/SustainabilitySummitSummaryReport2008.pdf>





Further Information (6)

- Calvin College
 - Calvin Environmental Assessment Program (CEAP):
<http://www.calvin.edu/admin/provost/ceap/>
 - Statement on Sustainability:
<http://www.calvin.edu/admin/provost/environmental/sustainabilitystatement.html>
 - Environmental Stewardship Committee (ESC):
<http://www.calvin.edu/admin/comm/envst/>
 - CEAP Projects:
<http://www.calvin.edu/admin/provost/ceap/documents/CEAP%20booklet.pdf>





Further Information (7)

- Carbon Neutrality Report:
http://www.calvin.edu/~mkh2/thermal-fluid_systems_desig/2007_carbon_neutrality_proj.pdf
- Energy Efficiency Fund Report:
http://www.calvin.edu/~mkh2/thermal-fluid_systems_desig/2008_ceef_final_report.pdf
- Solar Photovoltaic Project: <http://solar.calvin.edu>
- Demonstration Wind Turbine Project: <http://wind.calvin.edu>
- Woodlot Mitigation:
<http://www.calvin.edu/news/2008-09/mitigation/>





Further Information (8)

- NACUBO Goes Green:
<http://www.nacubo.org/x2153.xml?s>



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