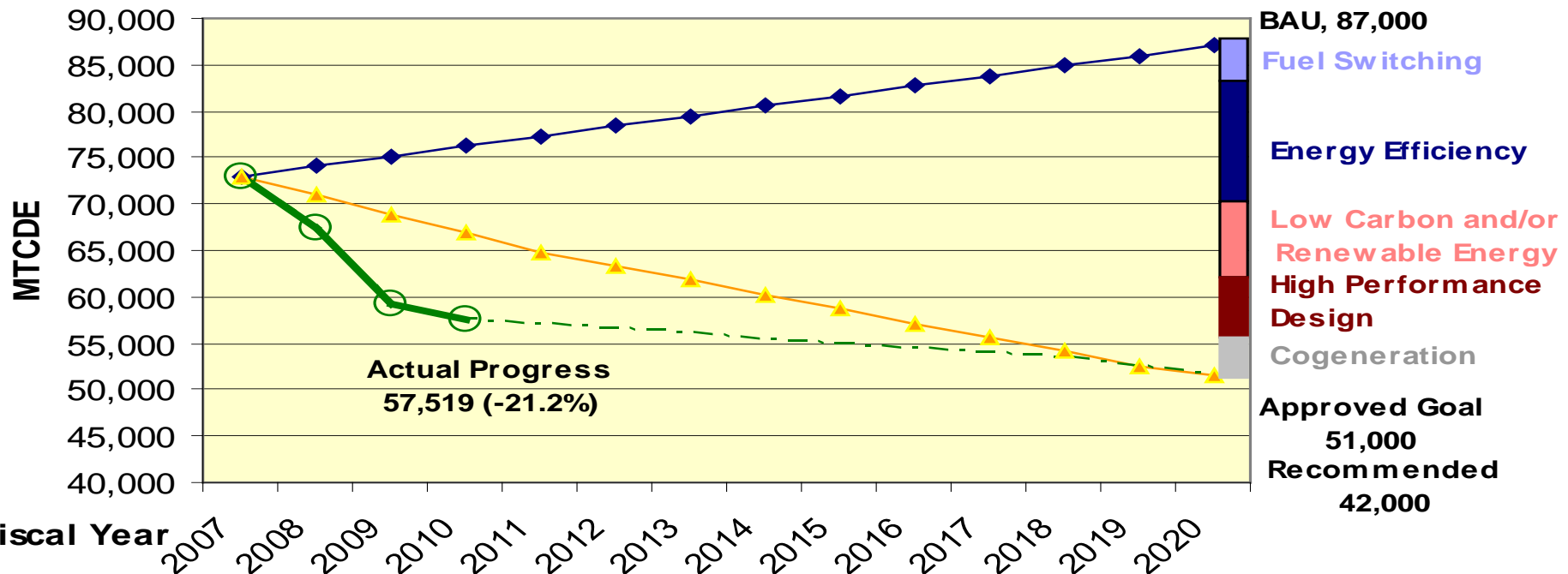


# Brown University's Sustainability Program: Focus on Energy Efficiency and Carbon Reduction

## GHG Reduction Plan and Progress



Recommended reduction is based on 15% below 1990 levels, including growth. Approved Goal is based on 42% below 2007 for existing buildings, up to 50% better than code for new construction, and up to 30% better than code for acquired buildings. Interim reduction goals are 4% per year from 2008 through 2011, 3% per year from 2012 through 2019, and 2% in 2020.



# Energy Conservation Projects

- Energy Conservation Program – \$20M loan program (8 year +/- payback) These Projects enable us achieve 20% of our total carbon reduction goal of 42%. (Approx. reduction of 15K metric tons of carbon through energy efficiency)
- \$10M approved to date
- This initial \$10M investment will yield over \$2M of annual savings with loan paid off by 2015
- Incorporates rebates, incentives and audit co-pays
- Have spent \$6 Million to date, yielding \$1.5 Million in annual savings



# Retro-commissioning

- *Single largest energy efficiency impact*
- Bringing buildings back to design and Beyond through Forensic Engineering
- Identifies less than 2 year payback measures
- Identifies “O&M” improvements
- Identifies Capital Projects to get us better than design



# New tools to get us there

- Brown Energy Efficiency “[BEE](#)”:
  - Web based energy efficiency project decision making and reporting Tool
- HPD (High Performance Design) Guidelines
  - Provides guidance on meeting 25%-50% better than code on all major renovations and new construction
- Long Term Procurement Plan
  - We incorporated a long term plan almost seamlessly with a web-based reverse auction tool (using World Energy expertise and platform)
- Siemens Metering Interface for Monitoring and Verification
- Lucid Design Energy Dashboard to promote student engagement

EE Measure	Item #	Description	Est. Net Cost	Act. Net Cost	Est. IRR %	Act. IRR %	Est. Annual Sav.	Act. Annual Sav.	Est.
Heat Recovery	-	Install heat recovery coil in AC-1 (prior to preheat coil). Recover heat from chilled water syste...	\$139,030	-	20.4	-	\$28,062	-	
Heat Recovery	-	Install new heat exchanger in series with existing process chiller. Use existing building chilled...	\$59,406	-	21	-	\$12,548	-	
			<b>\$198,436</b>				<b>\$40,611</b>		

(Approved & Pending)

Estimated	Actual
4.9	
26.2	
44	-

Measure Saved. [X]

Cancel Apply Changes Apply Changes (stay) Delete Other Tasks [v]

Costs Fuel Savings GHGR Values Rebate Files Calculations

[v] ding

0-CHEM BLDG - GEO-CHEM (100056) [x] [v]

Heat Recovery [v]

Year(s)

Select Funding Source - [v]

Select Funding Source - [v] Amount [ ]

Balancing  Controls  Electrical

Mechanical  Other

01/20/2010 Actual Start Date [ ]

01/31/2010 Actual End Date [ ]

Install heat recovery coil in AC-1 (prior to preheat coil). Recover heat from chilled water system. Provide cooling to CHW system from OA. Further study required to confirm feasibility, more detailed savings calculations and to determine potential utility incentive(s).

Go

Reports

1. Pending My Approval

Actions

Create Project &gt;

Pending My Approval"



2008-2010'



Pending Director Approval'



Project	Location	Brief Description	Project Mgr.	Facilities Mgmt. Eng.	Vendor Contractor	Est. Net Cost	Est. Annual Sav.
Lighting retrofits	ARNOLD LAB	Occ Sensors	IZZI,SETH A	Christian Cherau	James Lavoie	\$56,477.00	\$9,349
Lighting retrofits	PRINCE ENGINEERING LAB	Occ Sensors	IZZI,SETH A	Christian Cherau	James Lavoie	\$24,164.00	\$2,508
Lighting retrofits	POWER STREET PARKING GARAGE	System replacement	IZZI,SETH A	Christian Cherau	James Lavoie	\$13,084.00	\$2,711
Lighting retrofits	SCIENCES LIBRARY	Occ Sensors	IZZI,SETH A	Christian Cherau	James Lavoie	\$29,137.00	\$4,084
Lighting retrofits	OLNEY-MARGOLIES ATHLETIC CENTER	Occ Sensors, Retrofits	IZZI,SETH A	Christian Cherau	James Lavoie	\$126,245.00	\$16,537
Lighting retrofits	ORWIG MUSIC HALL	Occ Sensors and Retrofits	IZZI,SETH A	Christian Cherau	James Lavoie	\$30,246.00	\$7,142
Lighting retrofits	STEINERT CENTER	Occ Sensors, Retrofits, System Replac	IZZI,SETH A	Christian Cherau	James Lavoie	\$16,603.00	\$1,489
Steam Trap Replacement	MAIN CAMPUS	Steam Trap Replacement	Peter Fox	Christian Cherau	-	\$911,181.00	\$288,861
Lighting retrofits	GEO-CHEM BLDG	Retrofits	IZZI,SETH A	Christian Cherau	James Lavoie	\$90,552.00	\$13,522
Lighting retrofits	KASSAR (EDWARD W.) HOUSE	System replacement, retrofits	IZZI,SETH A	Christian Cherau	James Lavoie	\$33,654.00	\$5,562



# The Future of Sustainability in Higher Education: Brown University

- Well developed Greenhouse Gas Reduction Program: Organizational Capacity is in place
- Informal integration with other departments; IT, Purchasing, Dining
- Limited integration of projects with students
- Limited student thesis support from Energy and Environmental (E&E) Office
- Limited engagement with Research for Both Students and FM E&E Office
- Need for broader student engagement on campus...not just the usual suspects



# The Future of Sustainability in Higher Education: Brown University

- How to better link sustainability; students, research, education, Facilities Management's E&E Office
- Who manages and staffs this effort?
- Where is it housed?
- How do we better link outside the ivy walls
- Sustainability Reporting Update

# Sustainability Reporting

- "The Association for the Advancement of Sustainability in Higher Education (AASHE.org), The Princeton Review (PrincetonReview.com), Sierra Magazine (SierraMagazine.org) and the Sustainable Endowments Institute (GreenReportCard.org) have launched a collaborative effort to improve the process of collecting sustainability data from higher education institutions. For the first time, the four organizations are working together to develop common sustainability survey language. The intent of this initiative is to encourage survey participation from an even broader range of institutions, while at the same time reducing college and university staff time required for data collection and survey completion."
- More information can be found at <http://www.greenreportcard.org/media>