

# **Utilities Project Team**

## **Final Report**



STEWARDING EXCELLENCE @ ILLINOIS

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## Team Charge

On May 10, 2010 Interim Chancellor and Provost Easter and Interim Vice Chancellor for Academic Affairs Wheeler appointed the Utilities Project Team under the Stewarding Excellence @ Illinois initiative to examine the extent to which resources dedicated to utilities can be reduced. Specific charges of the committee included:

- What strategies should the campus adopt to continue to reduce energy consumption? Are there creative strategies that could be designed to involve more faculty, staff, and students in the process of conservation?
- To support conservation practices, it is necessary to have a widely understood utility rate that distinguishes between the fixed and variable costs of utility operations. How should the following factors affect a campus rate?
  - ICR and funds recovery
  - Debt service, deficit reduction, capital renewal, plant replacement
  - Price escalations in commodity prices that drive rate changes
  - Capital and operating budgets and their impact on rates and rate-making
- What procedures should be established to periodically review campus utility rates?
- Successful conservation practices require centrally funded initiatives along with unit based initiatives. What rules should guide the determination of savings and the assignment of financial credit for savings?
- What role should loan programs play in unit led conservation practices? How should the campus determine the appropriate level of central investment in conservation? How should these investments be sequenced?

## Team Membership

Jeff Oberg, *Chair*, College of Engineering

Mara Dahlgren, Student Representative

Michael DeLorenzo, Office of the Vice Chancellor for Student Affairs

Kevin Jackson, Department of Accountancy

Julie Jarvis, Office of Government Costing

Mike Marquissee, Facilities and Services

Neal Merchen, Department of Animal Sciences

Daniel Ozier, School of Molecular & Cellular Biology

Terry Ruprecht, Facilities and Services

## Executive Summary

There can be no doubt that escalating energy costs have become a major area of concern. Over a seven-year period, state-funded energy costs for the Urbana-Champaign campus have mushroomed from \$25 million in fiscal year 2003 to over \$68 million in fiscal year 2009. This change resulted from volatile fuel costs, significant growth in demand and, not least, lack of focus on conservation. The situation was exacerbated by the \$400 million campus deferred maintenance backlog that has left many building envelope and building system problems unaddressed for too long. Efforts are now underway to address some of the most pressing deferred maintenance problems. Progress has also been made more recently in gaining better control of a number of the other variables. The result has been a 15% reduction in energy use since fiscal year 2007.

With looming debt service cost increases and mandatory deficit reduction payments combined with expected increases in fuel costs, it is not likely significant funding will be available within the existing \$68 million utilities budget to fund a large incentive pool. However, we believe that there could be a modest pool of funds made available from energy use reductions to allocate incentive dollars out to units that demonstrate clear savings resulting from their actions. With this in mind, it is recommended that a standing campus oversight committee be formed to work closely with the Facilities and Services (F&S) Energy Services unit regarding various utility budget related issues, including rate determination, review of fixed and variable cost assumptions, and incentive pool calculations.

Every effort should be made by the campus to encourage energy conservation. This report outlines the following specific recommendations to address the charges outlined in the letter of May 10, 2010 from Interim Chancellor and Provost Easter and Interim Vice Chancellor for Academic Affairs Wheeler to the Utilities Project Team:

1. Establish a Campus Utilities Fiscal Oversight Committee
2. Calculate a Variable Cost Incentive Pool
3. Identify a Corporation to Sponsor a Unit Energy Conservation Award
4. Normalize Deficit Reduction and Debt Service Payments
5. Consolidate Unit-based Utility Budgets into Campus Utility Budget
6. Implement Energy Information Program
7. Sustain Administrative Accountability for Energy Conservation

## Team Activities and Process

To obtain a base-line understanding of the current utility budget situation, the Team reviewed actions already taken to reduce utility costs. We also reviewed two prior committee reports that explored utility budget issues both at the University and Campus levels. These documents are the Report of the Energy Task Force, dated October 28, 2009, and the Report of the Utilities Subcommittee included in the document entitled “A New Budget Model: the Illinois Resource Allocation Program,” dated June 2008.

Associate Provost Mike Andrechak met with the Team to provide some financial context to our review and to offer further guidance on focusing our review and recommendations. In addition, the Chair met with the Director of the Office of Sustainability to obtain his input and to understand the role of the Office of Sustainability with regard to energy conservation.

Team meetings occurred on a weekly basis from May 12, 2010 through July 14, 2010. These meetings were used to discuss questions posed in the charge letter and to develop recommendations to include in this report. We also considered email input from the Stewarding Excellence website.

We looked at some best practices at similar institutions and reviewed several articles on how to encourage energy conservation at large public universities. The University of Michigan stood out as a successful model for energy conservation. Their long-term investment in reducing energy costs has produced a strategic advantage for them by freeing up scarce resources for important infrastructure investments and academic initiatives. Due to the fact that Michigan’s budget model allocates all revenues and expenditures out to revenue producing units, conservation efforts are now largely driven by academic and major administrative units across their campus. While it would be extremely difficult to fully implement their model, there were many lessons learned that helped guide our deliberations.

Significant progress has been made in reducing energy consumption over the past three fiscal years. Since FY07, consumption has dropped by approximately 15%. The following efforts were important to achieving this reduction:

- Determining where the energy goes by upgrading/replacing meters and implementation of a new metering/billing system (InStep Energy Billing System).
- Retro-commissioning more than 16 buildings accounting for 20% of the academic space on campus. This resulting in a 28% average energy reduction or more and \$2 million in cost savings each year. Funding for this program has primarily been from the Academic Facilities Maintenance Fund Assessment (AFMFA) fees paid by students.
- Implementing a campus lighting retrofit program in approximately 40 buildings. More than 90,000 fixtures have been retrofitted to date resulting in annual savings of about \$1 million. Sixty percent of this program was funded by an external grant.
- Providing metered data by building and other information to units across campus and facilitating cooperation among units through a new Energy Liaisons group and the creation of a new website.

In order to achieve the campus goal of a 25% cumulative reduction by 2017 it will be necessary to:

- Focus on more active management of campus space.
- Continuing retro-commissioning activities
- Funding more lighting retrofits
- Promoting additional conservation measures
- Increased attention to HVAC systems operating schedules
- Encouraging college/department/administrative unit initiatives

The following specific objectives were identified to guide recommendations.

1. Reward unit efforts to conserve energy.
2. Develop clearly understood procedures or rules to allocate any incentive pool funds.
3. Specify minimum funding requirements to eliminate the historic utility deficit within 15 years.
4. Match dollar savings resulting from energy conservation projects to funding source that produced them.
5. Require units acquiring facilities or equipment that will increase energy consumption to be held accountable for the increased cost.
6. Identify the size of reserve that will be used to buffer fluctuations due to fuel costs and weather.
7. Indicate where recurring funds derived from savings on utility expenditures could be allocated to units if usage reductions are sustained.

## **Recommendations**

After careful consideration of the charge questions and recommendations made in earlier reports, the following recommendations are offered.

### ***1. Establish a Campus Utilities Fiscal Oversight Committee.***

The Team concurs with earlier recommendations that a committee should be charged to assist the F&S Energy Services unit by reviewing the annual utility budget and rate setting process. We discussed the role and composition of the committee and determined that it should be composed of no more than 8 to 10 persons representing the following constituencies: Colleges, Auxiliaries, the Office of the Provost, the Office of Sustainability, and the Office of Government Costing. Membership on the committee would include representation from among faculty, budget officers, and students.

Such a committee would function in a manner similar to the Deans' Budget Committee and would have the following specific charges:

- Facilitate the congruence of utility enterprise operation and investment with respect to campus climate initiatives and energy conservation strategies.
- Make recommendations on how to ensure continued viability of campus energy services operations.
- Focus on the cost effectiveness of investment strategies and operations.
- Recommend annual energy incentive pool distributions.

The benefits that would accrue from this approach would include:

- Increased transparency and communication to colleges and departments.
- Exercise of some control over rate setting and incentive distribution process.
- Provide “sanity check” on efficiencies and expenditures

The budget process would take place over a nine-month period beginning in September and culminating at the end of the University’s fiscal year with publication of new rates and establishing amount of incentive pool. This would include:

- Establish annual capital investment program
- Determine staffing levels and rates of pay for new fiscal year
- Address strategic issues such as vendor rate increases, fuel price increases, and other external threats.
- Review production rates and efficiencies

F&S Energy Services would prepare the budget and rate proposal in concert with Plant Operating personnel and Utilities risk management personnel in University Administration (UA).

F&S Energy Services would calculate annual incentive pool and distribute according to principles administered by committee.

Meeting frequency would be:

- Once at the end of the First Fiscal Quarter to review and distribute prior year’s energy incentive distribution.
- Once in May to review annual operating and capital budgets and to recommend the rates to UA for approval.

## ***2. Calculate a Variable Cost Incentive Pool.***

In order to provide an incentive to conserve energy and meet campus goals, we propose that an incentive program be used to drive the conservation effort. Reductions in energy consumption in departmental buildings usually are derived from changes in behavior (that is, turning off computers when not in use for the night) and/or from investments in energy conservation projects, such as replacing existing lamp fixtures with more energy efficient lamps and ballasts. A goal of this incentive program should be to encourage re-investment in facilities, particularly in projects that reduce energy usage. The campus utility budget will continue to be held centrally, with annual budget adjustments and the utilities billing data used to report out on usage and distribute the incentives.

Colleges reflecting savings over benchmark targets would receive a portion of the energy incentive pool calculated for the current year through a non-recurring budget adjustment. Colleges using more than the benchmark amounts would be assessed an additional charge through a year-end budget adjustment.

The Energy Incentive Program would be based on a benchmark of FY08, FY09, and FY10 average metered steam, electric and chilled water data by college. F&S is currently using the ARCHIBUS space management system to calculate the amount of space allotted to departments, and then using that allocation to distribute metered energy usage. The units of electricity, heat and chilled water measured in the benchmark would be converted to one million British Thermal Units or MMBTUs to arrive at a common measure for energy. Once the college benchmark is calculated, the benchmark should be adjusted for mitigating factors such as new buildings or centrally funded conservation activities. This adjustment would be added or deducted from the base. We are proposing to hold a college harmless for new buildings for a three year period during which time a new benchmark is calculated and added to the college allowance. F&S Energy Services staff should be required to meet with each college or major administrative unit annually to review and negotiate benchmark data based on shared knowledge of the facilities and changes that may occur each year.

When calculating energy savings and related incentives, this program should consider the source of funds used to achieve the reduced consumption. Savings derived from a centrally (campus) funded project, should not be returned to the unit benefitting from the reduction, rather, the returns should flow back to the source to finance other efforts. In this way, there will be a portion of the energy savings being reinvested in future projects. The estimated energy savings from the centrally-funded project will be deducted from the building's baseline consumption before the annual savings are calculated to remove the anticipated savings from the departmental incentive. Locally- or departmentally-funded initiatives would not result in adjustment of the benchmark, enabling the resulting incentive dollars to flow back to the unit that funded the initiative.

Once the benchmark MMBTU allowance has been calculated, the incentive pool would be calculated by comparing the current year's overall campus MMBTU usage to the FY08-FY10 benchmark. Then, the pool amount would be derived from the total savings expressed in the variable cost of energy (Steam, Electric and Chilled Water) expressed in dollars per MMBTU.

Each department showing a reduction in usage as measured by this program, would receive the difference in MMBTU's times the dollar per MMBTU amount calculated for the current year. Departments which exceeded their MMBTU allowance would be charged using the same measures. Appendix 1 shows an example of these calculations.

Eligibility for the program would be extended to all colleges and administrative units that are funded by the campus base budget. Auxiliaries would be exempted, since their utility bills are billed directly to their accounts. Funds received from the incentive program must be used by the unit for facilities-related projects, including equipment purchases, renovations and infrastructure upgrades.



### ***3. Identify a Corporation to Sponsor a Unit Energy Conservation Award.***

The Utilities Project Team recommends a program whereby units share in energy savings generated by their reduced consumption, but are held accountable for energy consumption that exceeds a pre-determined baseline consumption amount. Although we believe the proposed program's strength is that it can be effective in reducing overall campus energy consumption, the program relies on incentives that may not be as effective in changing the campus' culture and attitude towards energy conservation.

With this mind, we also recommend an initiative to create momentum for framing the mindset of campus units towards conservation. We propose the "Green Cup" initiative which would annually present "Green Cup Awards" to units for observable changes in their energy consumption behaviors. Success of such a program in creating momentum would depend heavily on the ability to market the award. Therefore, we recommend identifying a corporate sponsor for the initiative to defray the costs of marketing the program and to provide any monetary incentives in addition to an actual award (e.g., plaque or trophy). It may be most advantageous to target a corporate sponsor that has demonstrated a strong interest in energy conservation issues.

### ***4. Normalize Deficit Reduction and Debt Service Payments.***

There are two major fixed components of the utility budget for the campus: debt service and payments to reduce the utilities deficit identified in the 2008 audit of what was then the University Office of Facilities Planning and Programs Utilities Operations. The current debt service schedule published by the Treasurer's Office of Capital Financing reflects sharp increases in payments over the next 6 years and continuing over a twenty year period. The current campus deficit is \$92.5 million, and a commitment has been made to eliminate the deficit over the next ten years. The uneven payment structure in the debt service and the rapid payback proposed for the deficit, if left unadjusted, will result in shocks to the campus utility rate in the coming years. We propose that we "normalize" deficit and debt service payments to avoid sharp fluctuations in utility rates.

Normalizing rates would entail calculating a ramp-up in payments over the next twenty years, beginning with FY11 at \$3.3 Million, and ramping up gradually to \$16 Million by 2019. In the early years, this would create a fund balance reserve. Between 2015 and the end of the period, this would create a deficit, which would be gradually paid off by the end of the payment period. The deficit repayment schedule should grow from the current \$2.5 Million to \$7.5 Million between now and 2015. The deficit will be retired in 2023. Included as Appendix 2, is a schedule of debt service payments and deficit reduction target amounts.

### ***5. Consolidate Unit-based Utility Budgets into Campus Utility Budget.***

There are currently examples in campus units where recurring utility budget allocations are provided in base allocations to units. These recurring allocations are largely historic in nature and are targeted specifically for costs associated with utility usage "off the grid", primarily at some south- and off-campus facilities. Past practice indicates that allocations have been substantially less than actual expenditures and the resulting deficits have been reconciled from the central utility budget. This approach is unwieldy and creates anomalies in the budget to those units. More recently, permanent adjustments have been made to these recurring budgets to

align them with prior year expenditures. While this action provides funding up front as opposed to year-end reconciliation, it does not address the continuing administrative costs at the unit level for managing these accounts. This is also not consistent with this Team's recommendation that utility allocations be based on usage rather than cost, as there is no basis for such financial allocation other than historic costs.

It is recommended that the recurring budget allocation and accounting for expenditures be returned to the central utility account and that separate handling of these accounts at the unit level be eliminated. All utility expenditures could then be handled in a consistent manner across the campus through the central system for usage accounting. Because utility allocations to units would be based on usage rather than cost, it seems that this approach would be effective in encouraging conservation. Energy usage in these facilities should be monitored in the same manner as occurs for on-campus facilities. Central monitoring of usage and conservation efforts would allow the same rules to apply for these facilities in the energy conservation incentive program. It is critical to the success of an energy incentive program to be administratively efficient and to be perceived as fair and consistent across all campus units.

#### **6. Implement Energy Information Program.**

Despite the success of the Energy Conservation Program since early 2007 (14%+ overall energy reduction through FY10) there is substantial evidence it has been a result of focused technical initiatives, without broad involvement or assistance from large portions of the campus community. Due to lack of both staff and funds, Facilities and Services has not been able to create an information/awareness program to match the technically-oriented initiatives. Interviews with faculty and students tell us that conservation efforts and resources in those two large campus population groups are largely untapped on the Urbana campus. Major studies indicate 10% or more savings are possible from actions and initiatives of individuals - the so-called "behavioral" aspect to conservation; *but only when they are appropriately informed and involved.*

The campus needs a regular, persistent, and high quality information campaign to enhance campus awareness of immediate energy needs, conservation efforts, and future initiatives; and to galvanize the broader campus community into conservation action. The Energy Information Program could entail updates on:

- campus progress toward energy goals; results of metered usage in specific buildings and colleges
- notable successes in reducing department usage
- progress in reducing carbon emissions
- new on-campus sustainability initiatives
- new technology, systems, and approaches

The Information Program could employ any of the following:

- information bulletins and updates using e-mail, hard copy flyers, websites
- frequent press releases, newspaper/news bulletin articles, and radio/TV spots
- an improved Urbana campus Energy Management website

- a campus-wide Advisory Committee with faculty, student, and staff representatives
- new multi-function LCD energy displays in major buildings
- frequent meetings around the campus with department and/or college reps
- "incentivized" approaches to conservation actions by departments and colleges
- Energy "dashboard" information available on a website to the campus community at large

Expected outcomes include:

- 5% to 8% additional reduction in campus energy usage
- broad community and state consciousness regarding energy conservation at the University of Illinois
- a significant increase in the number of active-and-involved academic and administrative units
- sustainable changes in the energy-related behavior of campus citizens
- a permanent change in the campus culture toward sustainable living

#### ***7. Sustain Administrative Accountability for Energy Conservation.***

We concur with an earlier recommendation of the Utility Sub-Committee regarding the inclusion of Energy Use Statements in the annual report process. Units should be required to address efforts that were undertaken in the prior year to reduce energy consumption and future plans. This will keep conservation efforts in the forefront of administrators' minds and encourage them to carry through on commitments to aggressively pursue initiatives that will reduce energy costs and thereby free up funds for important academic priorities.

Similarly, energy use data should be incorporated in the Division of Management Information's Campus Profile data. This will help raise the visibility and importance of conserving energy. More detailed data should also be made available in the Electronic Data Warehouse for units to analyze and potentially to create energy use dashboards to regularly monitor activity and trends.

## Reference Material

University of Illinois at Urbana-Champaign, Campus Energy Use Policy, <http://www.energymanagement.illinois.edu/pdfs/EnergyUsePolicy.pdf>

Report of the Energy Task Force, October 28, 2009

University of Illinois at Urbana-Champaign, Report on A New Budget Model: the Illinois Resource Allocation Program, Appendix C - Report of the Utility Subcommittee, June 2008, [http://www.provost.illinois.edu/committees/Budgeting\\_at\\_Illinois.pdf](http://www.provost.illinois.edu/committees/Budgeting_at_Illinois.pdf)

Marans, Robert W. and Edelestein, Jack Y. (2010), "The human dimension of energy conservation and sustainability. A case study of the University of Michigan's energy conservation program", *International Journal of Sustainability in Higher Education*, Vol. 11 No. 1, pp. 6-8

University of Michigan, Planet Blue PowerPoint Presentation at MAPPA 2008, <http://www.planetblue.umich.edu/news.php?nid=23>

University of Illinois at Urbana-Champaign, Illinois Climate Action Plan (iCAP) dated May 15, 2010, <http://sustainability.illinois.edu/climateactionplan.pdf>

University of Illinois at Urbana-Champaign, Energy Liaison Program, [http://www.energymanagement.illinois.edu/energy\\_liaisons.cfm](http://www.energymanagement.illinois.edu/energy_liaisons.cfm)

## Appendix 1: Energy Incentive Example

### Step 1: Determine cost of Fuels and other Consumables per MMBTU

\$	2009	2010 (Budget)	2011 (Budget)
Purchased Gas	\$ 31,062,616	\$ 29,221,296	\$ 22,116,010
Purchased Electric	7,717,889	4,510,246	8,703,007
Coal	5,865,177	7,607,500	7,486,113
Limestone	437	373	452
Chemicals	627	900	550
Total Cost	44,646,746	41,340,315	38,306,132

#### Units consumed (MMBTU's)

Gas Burn	3,156,770	4,198,003	3,004,349
Coal Burn	2,057,258	1,661,934	2,014,678
Purchased Elect	496,106	266,630	502,885
	5,710,134	6,126,567	5,521,912

Cost per MMBTU	\$ 7.8189	\$ 6.7477	\$ 6.9371
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### Step 2: Determine Total Baseline Usage and compute incentive pool (MMBTU's)

	2007	2008	2009	3-Yr Avg
Steam	1,786,377	1,810,864	1,938,951	1,845,397
Electricity	1,549,474	1,535,400	1,456,570	1,513,815
Chilled Water	1,090,287	972,903	825,363	962,851
Total	4,428,145	4,321,175	4,222,893	4,324,071

Estimated Current Year Consumption (90% of FY2008) 3,889,058

Estimated Savings over Baseline in MMBTU's - Campus Goal 435,014

Total Incentive Pool (Rate x Savings) \$ 3,017,738

### Step 3: Compute College Benchmark Data - Total MMBTU's consumed per year

	2007	2008	2009	Average/Baseline
College of ACES	255,280	326,623	313,374	298,426
College of Business	19,932	35,915	44,083	33,310
College of Engineering	580,122	737,018	713,048	676,729
College of LAS	542,261	613,615	622,778	592,885
All Other Colleges	3,030,551	2,608,004	2,529,611	2,722,722
Total	4,428,145	4,321,175	4,222,893	4,324,071

Step 4: Compare Current Year Usage with Benchmark Data

	Baseline	2010 (WAG)	Difference	Incentive to Colleges x cost per MMBTU
College of ACES	298,426	365,055	(66,629)	\$ (462,212.96)
College of Business	33,310	27,824	5,486	38,055
College of Engineering	676,729	817,510	(140,781)	(976,613)
College of LAS	592,885	535,992	56,893	394,670
All Other Colleges	2,722,722	2,142,677	580,045	4,023,835
Total	4,324,071	3,889,058	435,013	\$ 3,017,735

Note: the above information was prepared as an example of how an incentive might be calculated. Some actual data has been changed to make the example more relevant. Therefore, while the above tables represent a means for calculation, they should not be relied upon to provide a snapshot of college information.

## Appendix 2: Urbana Debt Service and Deficit Reduction Payments

<b>Fiscal Year</b>	<b>Unnormalized COP Debt Service</b>	<b>Deficit Reduction</b>	<b>Cummulative Deficit</b>	<b>Debt Service &amp; Deficit Reduction</b>
2010	\$3,355,125	\$4,500,000	\$92,538,000	\$7,855,125
2011	\$511,363	\$4,500,000	\$88,038,000	\$5,011,363
2012	-\$516,649	\$7,500,000	\$80,538,000	\$6,983,351
2013	\$6,886,216	\$7,500,000	\$73,038,000	\$14,386,216
2014	\$12,635,583	\$7,500,000	\$65,538,000	\$20,135,583
2015	\$12,644,583	\$7,500,000	\$58,038,000	\$20,144,583
2016	\$19,689,298	\$7,500,000	\$50,538,000	\$27,189,298
2017	\$15,197,663	\$7,500,000	\$43,038,000	\$22,697,663
2018	\$18,664,856	\$7,500,000	\$35,538,000	\$26,164,856
2019	\$23,191,014	\$7,500,000	\$28,038,000	\$30,691,014
2020	\$23,221,973	\$7,500,000	\$20,538,000	\$30,721,973
2021	\$23,251,327	\$7,500,000	\$13,038,000	\$30,751,327
2022	\$14,340,338	\$7,500,000	\$5,538,000	\$21,840,338
2023	\$8,293,211	\$5,538,000	\$0	\$13,831,211
2024	\$8,308,656			\$8,308,656
2025	\$8,317,499			\$8,317,499
2026	\$8,321,396			\$8,321,396
2027	\$8,331,593			\$8,331,593
2028	\$8,342,171			\$8,342,171

Debt Service schedules provided by the UA Capital Finance department in October 2009.  
Recent changes in market conditions may result in changes to some of the future payments.