STATE OF UTAH

STATE BUILDING ENERGY EFFICIENCY PROGRAM

FISCAL YEAR 2012 ANNUAL REPORT

STATE OF UTAH

STATE BUILDING ENERGY EFFICIENCY PROGRAM

FY 2012 ANNUAL REPORT TO THE GOVERNOR AND THE LEGISLATURE

Prepared by
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DFCM Energy Director

Division of Facilities

Construction & Management

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SUMMARY

Increasing energy efficiency is one of the many important goals for the State of Utah. Energy efficiency is the process of doing more with less. The goal is to accomplish the same tasks and functions as before while using less energy now and for the life of the building. Utah boasts some of the most diverse and abundant natural resources in the nation which has resulted in some of the lowest utility rates in the United States. Utah has among the lowest natural gas prices in the U.S. while electricity rates are the some of the lowest in the nation. The Legislature's commitment to energy conservation and energy efficiency has driven the creation of the State Building Energy Efficiency Program (SBEEP). This can be found in the Quality Growth Act of 1999.1 (1 Chapter 24, laws of Utah 1999). In his 2010 State of the State address, Governor Gary R. Herbert announced his 10-year energy plan, which is, to utilize the State's di- verse natural resources and combine that with innovative and entrepreneurial minds to have Utah at the forefront of helping the world solve its energy challenges. Together, the actions taken by Governor Herbert and the Legislature ar- ticulate an understanding that improving energy efficiency can provide long-term economic and environmental benefits to the state. Efforts to increase energy efficiency in response to the directives issued by both the Governor and the Legislature have focused on state-owned buildings.

The State Building Energy Efficiency Program strives to carry out the goal of improving energy efficiency while reducing the energy costs for state facilities. The program looks to reduce operating costs and lower maintenance costs which will in turn extend the life of the building equipment. The efficiency programs being targeted by the State Building Energy Efficiency Program are:

- High Performance Building Standard for Capital Development Projects
- Building Systems Commissioning
- Building Envelope Commissioning
- Energy Efficiency Incentive Programs for New and Existing Buildings
- Renewable Energy Projects
- State Facility Energy Efficiency Loan Fund
- Energy retrofits to optimize energy efficiency in existing buildings
- Energy Saving Performance Contracts
- Energy Efficiency Projects State Employee Behavior Partnership for Energy Conservation
- Utility Auditing Services

From design to operations, the costs incurred by the state for implementing energy efficient measures in state owned buildings will, over time, yield monetary benefits which far exceeds the costs of those measures undertaken. Also of value are those additional measures included in the portfolio of efficiency measures undertaken by SBEEP, which include efforts to educate, train, and raise employees awareness of the critical role they play in meeting the state's energy efficiency goals. SBEEP is a resource for state facilities to help guide monetarily conscious energy efficiency decisions. The program provides funding resources as well as tools and cost-effective methods for energy efficient design, construction and operations. SBEEP aims to reduce the impact of energy usage in buildings while maintaining high quality spaces for State building occupants.

BACKGROUND

This report is provided annually in response to policy directives from the Governor's Office and the Legislative Branch that officially established improving energy efficiency as a priority policy goal for the State of Utah.

Policy Directives for Energy Efficiency in State Facilities

Directives focusing on energy efficiency in state facilities were created by the Utah State Legislature in amendments made to UCA §63-9-638 and UCA §63-9-679 during the 2006 General Session. With regard to energy efficiency in state facilities, the Legislature declared in UCA §63-9-63 that it is the policy of the state to:

- Undertake aggressive programs to reduce energy use in state facilities in order to reduce operating costs of government and to set an example for the public
- Utilize alternative funding sources and methods of financing to minimize state appropriations
- Employ private sector management incentive principles
- Develop incentives to encourage state entities to conserve energy, reduce energy costs, and utilize renewable energy sources where practical
- Procure and use energy efficient products

Amendments to UCA §63-9-67(2) in 2006 transferred responsibility over SBEEP to DFCM, and directed the division to:

- Develop and administer the state building energy efficiency program, including guidelines and procedures to improve energy efficiency in the maintenance and management of state facilities
- Provide information and assistance to state agencies in their efforts to improve energy efficiency
- Analyze energy consumption by state agencies to identify opportunities for improved energy efficiency
- Establish an advisory group composed of representatives of state agencies to provide information and assistance in the development and implementation of the state building energy efficiency program; and
- Submit to the Governor and to the Capital Facilities and Administrative Services Appropriations Subcommittee an annual report that accomplishes the following:
    - ⇒ Identifies strategies for long-term improvement in energy efficiency
    - ⇒ Identifies goals for energy conservation for the upcoming year
    - ⇒ Details energy management programs and strategies that were undertaken in the previous year to improve the energy efficiency of state agencies and the energy savings achieved

Finally, the Legislature authorized state agencies to enter into an energy savings agreement for a term of up to 20 years under the provisions of UC 63-9-67(4). However, the state agency may enter into an energy savings agreement only if it agrees to:

- Utilize DFCM to oversee the project unless the project is exempt from the division's oversight or the oversight is delegated to the agency
- Obtain prior approval of the governor or the governor's designee
- Provide the Office of the Legislative Fiscal Analyst with a copy of the proposed agreement before the agency enters into the agreement

State Building Energy Efficiency Program Staff

John Harrington

DFCM Energy Director

Bianca Shama

Energy Program Director

John Burningham

Energy Program Director

Richard Young

Energy Program Specialist

Staff Biographies

John Harrington CEM, DFCM Energy Director:

John Harrington has over 40 years experience in the vast field of energy. He worked in the private sector of energy for over 34 years and is currently employed with the State of Utah for 6 years. He manages all aspects of the SBEEP program including new construction and existing buildings. He is an Energy Manager certified through the Association of Energy Engineers (AEE) and is the current President of the AEE Utah Chapter. In 2009 John was named the National Energy Manager of the Year for Region 5 from AEE. In 2010 John was the recipient of the Governor's Award for Excellence in Energy and Environment.

Bianca Shama, MPA, Energy Program Director:

In 2009 Bianca joined the State to assist in the facilitation of a $10 million grant awarded to the DFCM to do energy efficiency work. In August of 2011 Bianca's role shifted and expanded to focus on project management of energy conservation, efficiency and renewable energy projects in state owned facilities. Bianca responsibilities with the DFCM include managing the allocation of the revolving loan fund, collaborating with State agencies and institutions to develop energy efficiency projects and assisting them in exploring resources in which to make efficiency work possible at their facilities. Bianca works on initiatives such as identifying and making best use of utility incentive programs for efficiency work and coordinating with other project managers at the State to ensure available incentives are collected from the utility companies. Bianca is working to refine best practices in the installation of energy efficient products in state owned buildings. Prior to working for the State of Utah, Bianca worked as a consultant focusing on behavioral energy change and looking to find cost effective solutions to reducing utility usage without the disruption of occupant comfort. Bianca served as a member of the Climate Action Plan Task Force at the University of Utah in 2009. Bianca holds a Masters in Psychology from Adelphi University and in 2011 completed a Masters of Public Administration from the University of Utah. In 2010 Bianca was inducted into the National Honor Society for Public Affairs and Administration and serves as Secretary of their Board. She is a member of the Energy Management Program Advisory Committee for Salt Lake Community College. Bianca is also an active member of the AEE Board for the local Utah Chapter.

John Burningham, LEED AP, Assoc AIA, Energy Program Director:

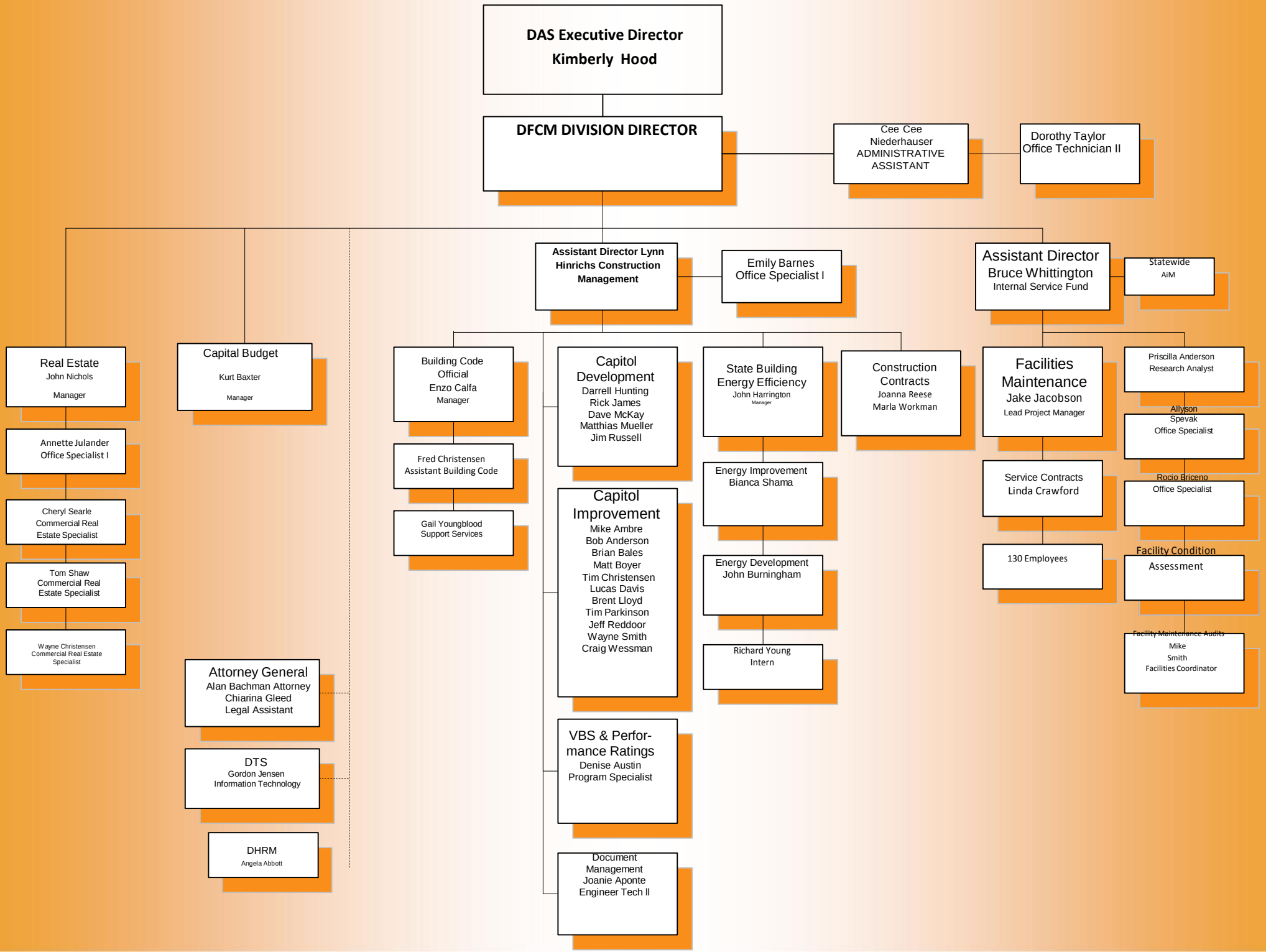
John joined DFCM in the fall of 2011. His work includes overseeing the implementation of the State's High Performance Building Standard as well as analyzing the effects thereof and revising the standard as necessary to further enhance the performance of state owned buildings. Additionally, he provides technical advice and support to design teams working on state buildings as it relates to energy and the High Performance Building Standard. He works with the state agencies and institutions to develop agency wide energy management plans and programs as well as identifying feasible energy efficiency projects. He also works on state initiatives such as State facility energy performance measurement, integrating and maximizing utility incentive programs, and participating on the Utah Building Energy Efficiency Strategies (UBEES) team, an entity charged with promoted energy performance measurement, above code programs, workforce development, and education. John holds a Masters of Architecture from the University of Utah and has practiced architecture locally for several years. He is also a LEED Accredited Professional and worked as a consultant to the EPA, DOE and United States Green Building Council prior to coming to DFCM.

Rich Young, Energy Program Specialist:

Rich holds an Associate's of Applied Science Degree in Energy Management from Salt Lake Community College.

He currently attends the University of Utah where he is pursuing a bachelors degree in Business Administration, with a masters in Real Estate Development.

Rich joined DFCM in January 2012, and has performed various energy audits on UDOT Maintenance facilities, and captured incentives from different energy projects that DFCM has performed.


DAS Executive Director
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Tom Shaw
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Legal Assistant
DTS
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Information Technology
DHRM
Angela Abbott
Building Code Official
Enzo Calfa
Manager
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Assistant Building Code
Gail Youngblood
Support Services
Capitol Development
Darrell Hunting
Rick James
Dave McKay
Matthias Mueller
Jim Russell
Capitol Improvement
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Bob Anderson
Brian Bales
Matt Boyer
Tim Christensen
Lucas Davis
Brent Lloyd
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Construction Contracts
Joanna Reese
Marla Workman
Facilities Maintenance
Jake Jacobson
Lead Project Manager
Service Contracts
Linda Crawford
130 Employees
Priscilla Anderson
Research Analyst
Allyson Spevak
Office Specialist
Rocio Briceno
Office Specialist
Facility Condition Assessment
Facility Maintenance Audits
Mike Smith
Facilities Coordinator

ENERGY MANAGEMENT PROGRAMS AND STRATEGIES UNDERTAKEN IN PREVIOUS YEARS

Energy Efficiency in New Construction Projects

.*High Performance Building Standard for Capital Development Projects*

Since the implementation of the United States Green Building Council's LEED Silver certification as the basis of the State's High Performance Building Standard (HPBS) state buildings have become known to be some of the most energy efficient and sustainable buildings in the state. Over the last year a thorough review of recently completed building and the design and construction process associated with each has provided the opportunity refine and further develop the HPBS. The goal being to increase the energy cost savings, occupant comfort, quality, and level of sustainability while keeping associated design and constructions costs at existing levels, in short make the process more efficient. See **Appendix A** for a full list of projects and their energy savings based on proposed de- sign. The following measures are currently being implemented and developed in recent projects with correspond- ing standards and guidelines being developed in draft form. Appendix A for a sample of case studies involving
HPBS in the State.

LEED and Small Building Guidelines

Experience has demonstrated that smaller projects have less funding available for LEED and many of the requirements of LEED do not align with project programs and budgets. Therefore a revision of the standard requiring all projects above $2.5 million to be LEED silver is being reconsidered. A graduated schedule that allows buildings with budgets in the $2.5 to $10 million range have the option of pursuing LEED or a simplified green building guide such as ASHRAE's Small Building Design Guidelines or Energy Star is being tested. The goal is to provide a well built, energy efficient building that provides occupant comfort for decades.

Energy Modeling Energy modeling of new buildings is required by LEED but more importantly when integrated into the design process of architects and engineers it becomes a valuable tool that provides critical information as to the energy, energy cost, and operational costs implications of possible design strategies. By dovetailing energy modeling into the entire design process, from building programming through design, owners, operators and design teams have information they need to design cost effective efficient buildings that will potentially save the state millions of dollars in energy costs over the life of the building.

Collaborative Design One key element to the long term success of a high performance building is to bring the building operators who will run the building to the table during the design process. As with energy modeling this type of integrated process helps bridge the gap that exists between design, construction and the operation of a building. This gap is one of the biggest culprits of designed energy savings and sustainability measures not being realized. When designers, owners, and operators can exchange ideas on what works, what doesn't and what the latest technologies have to offer designed energy savings are realized and the transition from construction to occupancy is much smoother. As the HPBS is being revised measures will be implemented to foster this type of design process and information exchange.

Building Envelope The building skin or envelop plays a major role in determining the energy efficiency, occupant comfort and indoor environment quality of buildings. Over the last 3 years DFCM has been developing building envelope standards on over a dozen buildings. This process of designing and constructing a building to be as air tight as possible is providing significant energy savings, reduced first costs of mechanical systems, and high quality construction. These efforts coupled with guidelines to control heating and cooling loads before they enter a building by limiting the amount of glass ensure that energy costs will be held in check over the life of the building.

Building System Commissioning

Over the last four years whole building system commissioning has proven to be a valuable step to ensuring the energy goals are realized once the building is occupied. When buildings systems are inspected at installation, calibrated per the Owner's Project Requirements and construction documents and functionally tested energy savings are realized. Additionally, operating costs are lowered, warranty issues decline, occupants are more comfortable and building managers receive better training and building as builts. All building systems ranging from HVAC to security to electrical are commissioned. This process also supports efforts to maximize utility incentives by providing data verifying that the various energy efficiency strategies are installed and operating as expected. The utility companies use this information for a basis of the incentive amounts to be paid. Dozens of state buildings have benefited from this process and building operators are use this commissioning process as a basis for ongoing commissioning programs throughout the life of the building.

Additional components of the HPBS will include guidelines for energy metering and benchmarking, life cycle cost analysis, facilities management training, and proper development of owner's project requirements. The coupling of these efforts with the LEED silver requirement will provide a holistic and comprehensive approach to designing, building and operating state buildings over their expected 50 year life. It is expected that the average energy cost savings per LEED EA credit 1 will rise from 20% to 30% to 25% to 35% consistently with little or no additional cost to the project.

Incentive Programs for New and Existing Facilities

As one of the largest customers to the local utilities, the State participates in utility incentive programs wherever feasible. Major electric and gas utilities offer incentives for efficient new construction and retrofit projects in the form of cash, utility bill credits, and design assistance. Incentives often provide a means for projects to implement energy efficient strategies that result in energy efficiency levels beyond levels required by current energy codes. These heighted levels also reduce the yearly operating costs thus providing long-term savings to the State over the life of the building. Since July 2006 the state has received over $4.2 million in utility incentives for energy efficiency projects in addition to any resulting energy savings over time. SBEEP facilitates the process to work with the utilities and take advantage of these programs by coordinating energy analysis, design and implementation of energy saving strategies that qualify for utility incentives. Over the course of dozens of projects DFCM and SBEEP have developed a healthy working relationship with each utility provider allowing for both incentive dollars and energy savings to be maximized. **See Appendix A**

IMPROVEMENTS IN EXISTING BUILDINGS

Equipment and system upgrades, recommissioning, and conservation measures combine to reduce energy use and avoid unnecessary costs. DFCM strives to incorporate energy efficiency into all projects to provide the lowest cost for building operations to the State of Utah. It is the intent that all projects will consider using at least the minimum efficiency ratings for materials as outlined by the public utilities where applicable. The engineers, architects and/or contractor who work with DFCM are responsible for evaluating each project measure for energy efficiency potential.

State Facility Energy Efficiency Loan Fund

The State Facility Energy Efficiency Fund (SFEEF) was established in fiscal year 2008 to provide the State Building Energy Efficiency Program with a revolving loan fund from which agencies and institutions can borrow to complete energy efficiency improvement projects. Repayment of the loan is achieved by capturing cost savings from reduced energy use and demand and by capturing utility incentives. Borrowed funds are paid back into the SFEEF so that it can be lent out again. The fund total is $2.15 million. Funding requests must be approved by the SBEEP Manager and the Utah State Building Board. The Building Board approved projects are listed, in

APPENDIX A

Energy Saving Performance Contracts

Larger campuses have bundled energy efficiency projects to maximize their impact without using State funds through Energy Saving Performance Contracts with guaranteed savings from Energy Services Companies (ESCO). An ESCO project uses third party financing; the typical funding source is a tax exempt municipal lease/ purchase. Payment to the contractor is made through a guaranteed stream of future energy cost savings. The project is self-funded and does not require state appropriations to proceed. This public-private partnership provides an agency or institution with the following:

A campus wide energy audit

Prioritization of energy projects relative to payback and maintenance needs

An expedited project timeline to receive more immediate energy savings

Bundled energy projects and cohesive project management

A funding vehicle for needed infrastructure upgrades

The Following Agencies have implemented ESCO Projects:

University of Utah (Multiple Phases)

Utah Valley University (Multiple Phases)

UDC - Draper Prison

Ogden Regional Center DHS - Utah State Hospital

Utah National Guard (Multiple Phases)

Salt Lake Community College

Dixie State College

To aid institutions and agencies in the selection of ESCOs, the State Building Energy Efficiency Program oversaw the selection of a pre-qualified list of contractors to provide services in the Energy Performance Contract Program (EPCP). This was facilitated by SBEEP in order for agencies and institutions to be able to reduce their costs and time associated with solicitation and selection. This allowed for better quality control, and ESCO projects were able to be initiated more quickly to expedite receipt of cost savings from energy improvements.

SBEEP is utilizing Energy Savings Performance Contracts with Energy Savings Companies as a means of implementing and financing large comprehensive energy efficiency projects. In addition, utility incentives will be used to help finance ESCO projects.

Several agencies and institutions went through campus-wide energy audits with ESCOs and ultimately decided that a performance contract was not the method they wished to pursue. These institutions and agencies, understanding the significant payback to their facilities by increasing efficiency, instead chose to do comprehensive energy efficiency projects at their facilities using alternate funding methods. The following agencies implemented projects using this method:

Weber State University

Capitol Complex

Utah State University

Southern Utah University

State Employee Behavior Partnership for Energy Efficiency

Even well managed facilities that employ the most innovative technologies may experience unnecessary energy consumption as a result of building occupant behavior. Simple modifications to daily tasks or habits can lead to large energy savings.

SBEEP participated in launching a program to identify leaders within State Agencies that can understand both office culture and its related energy impact. These leaders are tasked with finding employee behavior changes that will save energy over time.

In the program's pilot year, agencies stepped up and reduced energy consumption by changing their office cultures in terms of energy efficiency. As the program has moved forward there is a continued effort from within the agencies to implement ground level changes to eliminate wasted energy. For example, plug loads are being reduced by ridding workplaces of unnecessary equipment and appliances such as superfluous refrigerators.

Goals for Energy Conservation for Upcoming Year

Support the Goals of Energy Efforts throughout the State

The SBEEP serves as a resource and liaison to the various entities throughout the state whose focus is on energy efficiency and energy resources. SBEEP serves as a resource and works at collaborate the efforts of these various groups to maximize the impact of energy efficiency on state buildings by continually being involved in meetings throughout the state that address energy issues.

State Facility Energy Efficiency Loan Fund

The State Facility Energy Efficiency Loan Fund (SFEEF) will continue to be available to agencies that develop viable energy efficiency projects that show energy cost savings. SBEEP will work with the State agencies to identify opportunities for improved energy efficiency and assist them to define scope of work that will maximize on return. The loan is intended to remain fully allocated through the year and new loans will be presented for approval to the Utah State Building Board as funds are collected back to DFCM from existing loans.

Energy Internship

Salt Lake Community College created a new Energy Management Applied Science Associates degree. DFCM's intention is to support energy management needs within State facilities, as well as the College's program by hiring interns as there is a demand. Interns can assist with energy benchmarking, developing state facility case studies and collecting documentation needed for obtaining utility incentives.

Continued Partnership with Agency Occupants

SBEEP continues to partner with agency staff and leaders throughout the State of Utah to ensure that the daily building occupant behavior is administered in a way that fosters an energy efficient environment. SBEEP continues to work with individuals and groups throughout a multitude of agencies to address energy relevant behaviors that can be modified in ways that will result in a reduction of unnecessary utility usage within agencies and institutions without disrupting occupant work flow. SBEEP intends to partner with the Office of Energy Development in 2013 to explore ways that these efforts can be expanded throughout the State.

Development of Agency Energy Programs

SBEEP will build upon existing relationships with state agencies including the States higher education institutions that have yet to develop their own energy programs. SBEEP will use program examples from other agencies and institutions within the state to help administration identify values and priorities relating energy efficiency. These values and priorities will be used as basis for the agencies energy program. It is critical to have the support of administration to ensure the successful implementation of an agency energy program. Program elements often state priorities in relation to energy efficiency projects, financing mechanisms, projects to be pursued, and return on investment goals. Each program will be unique and tailored to the priorities of the agency and institution.

Continued Assessment of High Performance Building Standard (HPBS)

SBEEP will continue to work with new buildings from the start of design as a resource in implementing the HPBS for the state. The SBEEP staff is also working with new building occupants and facilities managers to ensure that decisions made in the design process are translated into efficient operations once a building is occupied and running. Additionally, an increased effort will be made to bridge the gap between the building design and construction process and the actual day to day operations of the building. Efforts to promote a greater collaboration between designers and facilities managers will be explored within the HPBS. Current efforts to review and develop specific case studies of the effectiveness of the HPBS, HVAC commissioning, energy modeling and envelope commissioning will continue. As part of the development of the HPBS the implementation of measurement and verification of energy use and building performance will be explored.

Building Performance Measurement

State agencies are implementing measures to improve energy efficiency. SBEEP, as a program tasked with coordinating statewide building efforts to improve energy efficiency, is working towards methods to support the organizational structure needed for a statewide effort to report and track progress towards further increasing the state's energy efficiency. Energy benchmarking efforts will continue in conjunction with a review of buildings recently completed under the HPBS. A statewide methodology for Higher Education is being explored to create a consistency with reporting among campuses, including good baseline information.

Renewable Projects

State agencies and Higher education institutions have expressed interest in exploring cost effective ways to use renewable energy. SBEEP is helping to coordinate an RFP that will allow facilities to look at ways that they might be able to build renewables either through their own means or through a public private partnership that will make sense financially for the state and will allow for competitive rates that can be locked in for a period of time avoiding some of the costs of the rising cost of public utilities.

Incentive Programs for New and Existing Facilities

SBEEP is increasing the efforts to collect on incentives that often provide a means for projects to implement energy efficient strategies that result in energy efficiency levels beyond levels required by current energy codes. DFCM and SBEEP will continue to develop a healthy working relationship with each utility provider allowing for both incentive dollars and energy savings to be maximized. SBEEP will also work with the industry partners to make certain that they are aware of the incentive programs and that the most cost effective and energy efficient materials are specified in all Development and Capital Improvement work carried out through DFCM.

Strategies for Long-Term Improvement in Energy Efficiency

Creative Financing

The State Building Energy Efficiency Program (SBEEP) strives to identify all potential sources of funding available for efficiency projects to maximize the impact for savings throughout state buildings. SBEEP continues to collaborate with other state agencies and non-profits to follow any potential sources of funding that might be applicable to state building energy efficiency work.

Construction management of energy projects

SBEEP strives to keep costs of energy projects low for all agencies and institutions by employing DFCM's procurement efficiency and credibility. SBEEP is staffed with knowledge of cost-effective energy project pricing and quality and works to keep the staff educated in all new technologies so that over the long term they are providing the most cost effective solutions to energy efficiency in State owned buildings. SBEEP has a continuous learning process in place.

Ongoing education of DFCM consultants and service providers.

Since the implementation of the HPBS and the LEED certification process in 2009 significant improvements in the service levels of DFCM's service providers has been made. Architects, Engineers, Contractors and related consultants are becoming experts in issues related to the HPBS. The amount of time required to implement the HPBS has diminished while the effectiveness of the energy efficiency measures has increased. The design and construction means and methods required by the standard are continually being improved as each new building is designed and built resulting in a significantly better building.

Integrated approach with DFCM project management to:

- Prioritize energy efficiency in all construction projects
- Reduce disruption related to renovations for energy needs
- Learn from facility performance and improve DFCM processes
- Connect with facility management to verify energy saving strategies
- Engage in early stages of design and construction
- Provide technical support and educational opportunities to each agency and design and construction teams.
- Create knowledge base and peer groups that understand how to do energy projects correctly and cost effectively
- Disseminate lessons learned from energy projects across state institutions and agencies

APPENDIX A

Building Board Approved Loans

Total Incentives 2007-2012

High Performance Building Standard Projects

High Performance Building Case Studies

- **Dixie College Centennial Commons Case Study**
- **DSC LEED Case Study**
- **SLCC Energy Conservation Report**
- **UVU Classroom & Central Plant Case Study**
- **U of U Quinney Law School- High Performance Study**

Improvement Projects in Existing Buildings

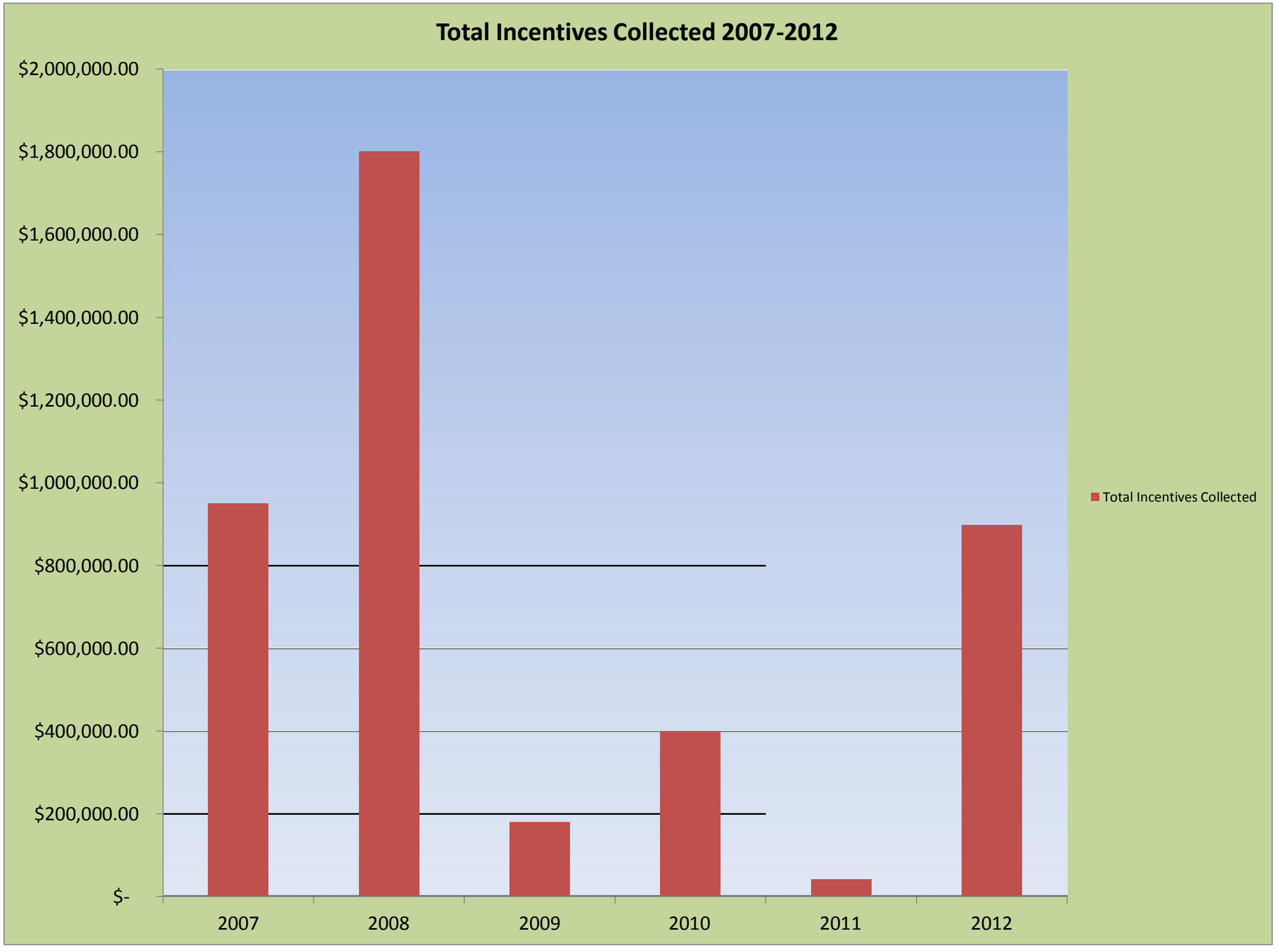
Utility Auditing Services & Resultant Savings

BUILDING BOARD APPROVED LOANS

PROJECT	LOAN $	Annual Savings	Simple Payback Years	Simple ROI
USU HPER Lighting Upgrade	$62,470.00	$12,281.00	5	19.66
USU Lighting Upgrades at Biotech, CPD,AND Geology Buildings	$115,247.00	$23,278.00	5	20.20
WSU Steam Tunnel Repairs & Upgrades	$300,000.00	$96,000.00	4.4	32.00
UVU ESCO Phase II	$250,000.00	$16,200.00	5	6.48
USU Campus Wide Steam Line Improvements	$585,000.00	$164,000.00	2.58	28.03
USU Housing Lighting Efficiency Upgrade	$161,534.65	$59,222.51	3.9	36.66
Snow College Recommissioning	$100,000.00	$50,000.00	2	50.00
Weber State University- Recommissioning	$400,000.00	$150,000.00	2.75	37.50
University of Utah Evaporative Cooling	$300,000.00	$213,800.00	1.7	71.27
USU Central Utah Steam Pipe Insulation	$179,388.82	$89,991.00	2	50.17

Average Simple Payback= 3.43 years

Average Simple Return on Investment= 35.2%


Total Incentives Collected 2007-2012
$2,000,000.00
$1,800,000.00
$1,600,000.00
$1,400,000.00
$1,200,000.00
$1,000,000.00
$800,000.00
$600,000.00
$400,000.00
$200,000.00
$-
2007
2008
2009
2010
2011
2012
Total Incentives Collected

DFCM Projects where the design or construction are substantially completed and energy savings can be calculated	Total Utility Incentive	Electrical Incentive Amount	Natural Gas Incentive Amount	Energy Savings (kWwh)	Demand Savings (kW/mo.)	Energy Savings (therms)	Electric Cost ($/yr)	Simple Payback of Electrical/Gas EEMs
SLCC South City CFNM	$28,725	$28,725	$0	201458	91	0	$24,614	7.4
SLCC South City CTE	$19,802	$19,802	$0	142390	53	0	$14,790	7.5
SLCC South City Annex	$8,468	$8,468	$0	62600	20	0	$5,651	2.2
Tooele ATC	$28,323	$28,323	$0	255995	85	TBD	$11,899	1.4
UU School of Business Replacement/ Expansion Phase I	$20,275	$20,275	$0	471941	117	TBD	$25,337	9.3
UU USTAR - Neuroscience & Biomedical Research Technology InstitueInstitute	570, 886	570, 887	$0	5398975	747	30380	$268,698	6.5
SUU Gibson Science Center Addition	$12,320	$12,320	$0	95166	18	30000	na	na
UU L.S. Skaggs Pharmacy Building	$126,437	$126,437	$0	1047394	15	TBD	$39,381	2
WSU Wasatch Hall Renovation Housing I	$8,094	$8,094	$0	112202	25	19215	$6,462	5.2
Utah Museum of Natural History	$41,594	$41,594	$0	391311	85	59272	$72,081	3.4
Unitah Basin ATC	$49,170	$18,810	$30,360	134080	54	30360	$15,166	13.1
USU USTAR--Bio Innovation Research Institute	$68,485	$68,485	$0	531707	94	3018	$42,309	10.3
USU Early Childhood Development	N/A	N/A	N/A	159900	78	5360	$21,010	N/A
Mountain Land ATC	$21,201	$21,201	$0	150632	63	241777	$14,310	9.5
Unified Lab Dept of Health	$91,975	$91,975	$0	694040	215	5360	$57,116	19.3
UU College of Nursing Renovation/Seismic Upgrade	$39,669	$39,669	$0	276405	130	5553	$28,799	3.1
Multi-Agency State Government Office Building	$122,924	$111,604	$11,320	1014147	203	11320	$62,426	11.7
Northern Region State Veterans Nursing Home	$18,127	$18,127	$0	130225	50	41857	$13,450	2.5
USU Vernal Bingham Energy - BEERC	$36,792	$6,432	$30,360	127321	35	3922	$9,134	8.3
UU Neurophysicatric Institue Expansion	$62,912	$44,182	$18,730	337352	74	18730	$23,685	na
UU Student Life Center	TBD	$83,185	$0	706,544	TBD	24,600	$72,639	7.5 Years

Ogden Juvenile Courts	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
UU Sorenson Arts and Education Complex	$26,955	$26,955	na	161354	24	na	$9,952	3.6
UU Honors Housing at Legacy Bridge	$69,502	$69,502	na	530850	116	na	$36,751	5.9
SLCC Instructional Admin Building (IAB)	$20,076	$25,992	na	176402	59	na	$20,076	16.5
Ogden Driver's License Division	na	na	na	na	na	na	na	na
UU David Eccles SOB	$32,618	$32,618	na	334631	87	na	$19,873	12.4
UU Data Center	$387,244	$387,244	na	4373147	460	na	$179,052	2.2
UVU Student Wellness Center and Parking Structure	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd
Snow College Student Housing	na	na	na	na	na	na	na	na
Ivins Veterans Administration CLC	$110,759	$110,759	na	771265	150	na	$55,833	2
Payson Veteran Administration CLC	na	na	na	na	na	na	na	na
Camp Williams BEQ	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd
UVU Pope Health Science Building	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd
Ogden Weber ATC Health Technology Building Addition	$37,928	$37,928	na	271482	107	na	$129,796	1.1
Utah State Hospital Consolidation	$57,772	$57,772	na	327525	109	na	$27,601	2
UU S.J. Quinney College of Law - Programming	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd
Camp Williams Tass Complex Phase II	tbd	tbd	tbd	tbd	tbd	tbd	tbd	tbd

Total Calculated to Date	$1,548,147	$1,463,293		19388441	3364	506124	$1,307,891	

Please note that the given the nature of the design and construction process these values are subject to change as the project is completed. They are primarily based upon Utility Incentive Reports that utilize various estimating and energy

High Performance Building Case Studies

LEED for new building design & construction

- The Dixie State College Jeffrey R. Holland Centennial Commons has been designed and constructed in alignment with the LEED Rating System. LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based, market-driven program that provides third-party verification of green building. new.usgbc.org
- The project is anticipated to achieve a Gold level certification.
- The following LEED points were achieved through the design and construction of this project:

Sustainable Sites
p1 Construction Activity Pollution Prevention
c1 Site Selection
c2 Development Density and Community Connectivity
c4.1 Alternative Transportation-Public Transportation Access
c4.4 Alternative Transportation-Parking Capacity
c7.2 Heat Island Effect, Roof

Water Use Reduction
p1 Water Use Reduction, 20% Reduction
c1 Water Efficient Landscaping
c3 Water Use Reduction

Energy and Atmosphere
p1 Fundamental Commissioning of the Building Energy Systems
p2 Minimum Energy Performance
p3 Fundamental Refrigerant Management
c1 Optimize Energy Performance
c3 Enhanced Commissioning
c4 Enhanced Refrigerant Management

Materials and Resources
p1 Storage and Collection of Recyclables
c2 Construction Waste Management
c4 Recycled Content
c5 Regional Materials
c7 Certified Wood

Indoor Environment Quality
p1 Minimum Indoor Air Quality Performance
p2 Environmental Tobacco Smoke (ETS) Control
c1 Outdoor Air Delivery Monitoring
c2 Increased Ventilation
c3.1 Construction IAQ Management Plan-During Construction
c3.2 Construction IAQ Management Plan-Before Occupancy
c4.1 Low-Emitting Materials-Adhesives and Sealants
c4.2 Low-Emitting Materials-Paints and Coatings
c4.3 Low-Emitting Materials-Flooring
Systems c6.1 Controllability of Systems-
Lighting
c7.1 Thermal Comfort-Design

c7.2 Thermal Comfort-Verification

Innovation in Design
c 1.1 Reduced Mercury in Lamps
c 1.2 Enhance Envelope Commissioning
c1.3 Education Program
c2 LEED® Accredited Professional

SUSTAINABILITY goals

According to the 2011 Dixie State College **Master** Plan, "Sustainable development meets the needs of **the** present without compromising the ability of future generations to meet their needs. New building designs and remodels shall:

- Utilize sustainable energy practices: such as the use of efficient HVAC Systems, low power use items and renewable energy sources.
- Use sustainable building materials: Whenever possible, we select materials that are recyclable, renewable, non-toxic, and locally produced.
- Water Efficiency: By specifying fixtures and appliances that are low flow we can reduce the amount of water consumption saving water and money.
- Waste Management: The building or space shall be designed in such a manner to encourage recycling and waste reduction."

ENERGY CONSUMPTION reduction

The new Jeffrey R. Holland Centennial Commons has efficiency integrated into both the programs housed in the building and the building itself.

Co-locating administrative and student service functions to make the campus operations more efficient for both students and staff. It also opens up space in existing buildings that can be renovated to accommodate campus growth.

An integrated project envelope and system design processes has resulted in huge operational and energy cost savings.

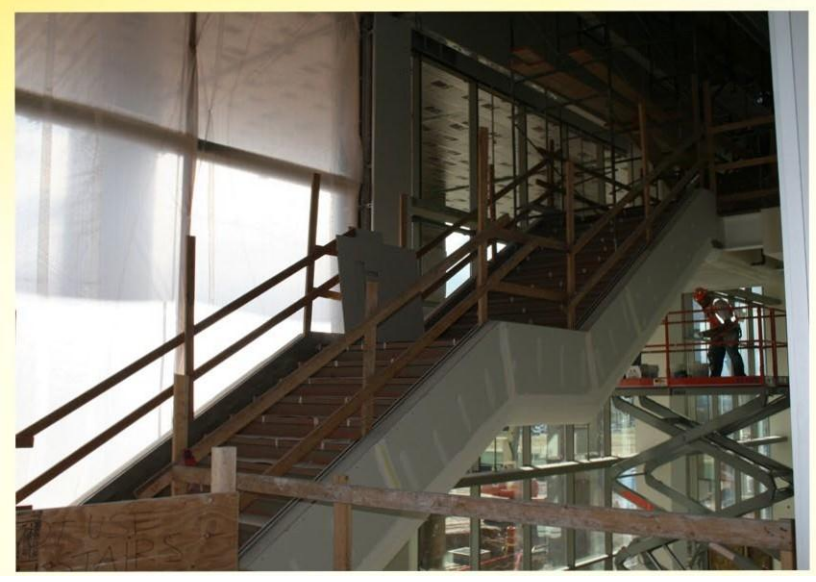
Key components include:

- An enhanced exterior envelope with continuous insulation and integrated exterior shading louvers at windows on the east, south and west facades.
- Evaporative cooling in addition to the campus provided chilled water.
- Effective lighting design with library lighting at the stacks, rather than the high ceilings and an integrated daylight control system.

SUSTAINBLE building materials

CONTRIBUTING TO THE LOCAL ECONOMY

A key priority for the design team and Dixie State College was keeping the project money local to the extent feasible. To this end, as many local materials as possible were sourced.



- All glass and glazing systems are manufactured within a couple hundred miles of the site
- All gypsum wall board is mined and manufactured within one hundred miles of the site
- All stone is extracted and manufactured locally
- As many trades people as possible were chosen from the local area to ensure the project contributes to its community during construction

WATER efficiency

St. George only receives 8-9 inches of rain per year, which makes it one of the driest cities in the United States.

To help reduce water consumption, high efficiency plumbing fixtures, including low flow toilets, low flow urinals and sensor operated sinks were all integrated into Jeffrey R. Holland Centennial Commons.

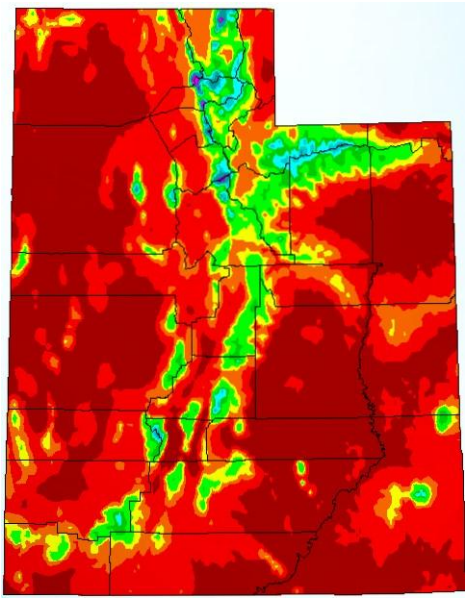
The building is anticipated to save 30% more water than a comparative code baseline building.

Average Annual Precipitation
Utah

LEGEND (in inches)

- under 10
- 10 to 15
- 15 to 20
- 20 to 25
- 25 to 30
- 30 to 35
- 35 to 40
- 40 to 45
- 45 to 50
- 50 to 55
- above 55

Period: 1961-1990



This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher *Daly* used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was re-sampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by USDA-NRCS National Water and Climate Center.

WASTE manageme11t

More than 79% of the total construction waste was diverted from the landfill and recycled.

Recycling bins are located throughout the building to allow you to recycle glass, mixed metals, plastic, cardboard and mixed paper.

ALTRNATIVE transportotion

Jeffrey R. Holland Centennial Commons is conveniently located along red and blue SunTran lines and 5 bus stops that offer 44 trips daily.

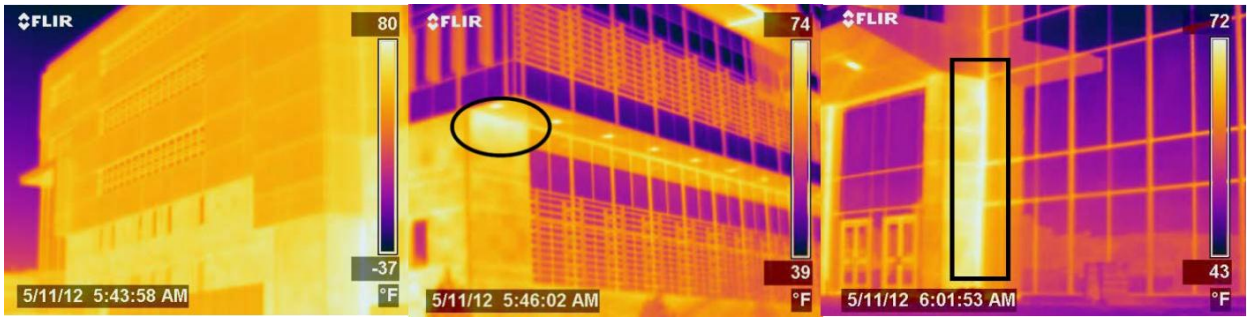
The project was able to achieve LEED points through encouraging alternative transportation and being located within walking distance of transit stops. You should consider using SunTran or walking instead of driving to campus.

DSC Holland Centennial Commons Building - Building Envelop Case Study

Early during the design phase of the Holland Centennial Commons building, energy modeling was utilized to evaluate envelope insulation options, appropriate glazing selections, as well as the most life cycle cost effective HVAC system for the project. The goals of these energy modeling efforts was to minimize the project costs by reducing initial first costs, and reducing ongoing operational costs. The results of this analysis were presented to the design team, as well as the owner's representative, to be incorporated into the project. By utilizing a "measure twice, cut once" approach, the design team and building owners are able to realize significant savings.

Building Envelope Commissioning

Approximately half way through design a Building Envelope Consultant was brought in by DFCM to assist the design team with the design of the building skin. This process sets the stage for a robust inspection and testing process that ensures that the building components perform as intended. Air, wind and water tests are performed on a stand-alone mock up and then again on the building. This process is key to the success as it provided the design teams and construction team opportunities to fully understand how the systems are to be assembled. Once the building is complete a whole building air test is performed to ensure that the building was built as designed. The HCC exceeded the air tightness requirement and turns out to be one of the tightest buildings in the country.



Thermography images of the only two areas of minor leakage

Through a collaborative process the design intent was balanced with customized detailing of the various building envelope components to ensure a high quality, energy efficient, air tight building envelop that will help provide energy savings and occupant comfort of the 50 year life expectancy of the building.

Too Much Insulation

Initially, the energy modeling analysis focused on optimizing the envelope insulation options being considered by the design team. It was discovered, that due to the building's primary function as a college commons building, combined with St. George, Utah's tepid climate, that the building could be over insulated. **Over insulating the building would create a "lose-lose" situation, and could cost the project an estimated $35,000 in initial capital costs and $100,000 in equipment operational costs, over 40 years**. By performing an energy modeling analysis during the early design phase, to understand the operational efficiency and energy usage of the building, this situation, of over insulating the building, was avoided.

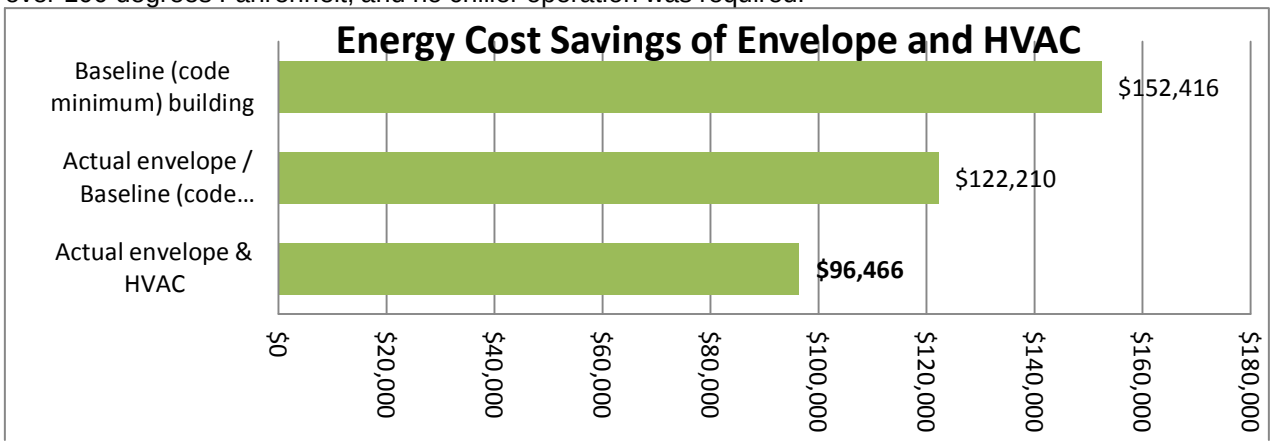
The Right Amount of Glass

Once the appropriate insulation levels were selected, the energy modeling analysis evaluated different glazing options for the building. The design team presented four different glazing options, based on owner preference, initial cost, and aesthetics, to the energy modeler for evaluation. **It was discovered through the analysis process that the highest initial cost and highest performance glazing would actually cost the building an additional $268,000 to install and provide no savings on annual operating costs**. Additionally, the more expensive glazing would reduce the potential to utilize natural daylight within the building, and require more artificial lighting.

	Window Type	GFRC Insulation R-value	Yearly Energy Consumption (10^6 BTU/yr)	Yearly Energy Costs ($)
With Daylighting Controls on the lighting system	Solarban 80	R-13	4062.8	$77,875
		R-19	4054.2	$77,954
		R-27	4047.3	$77,914
	Viracon 2-54	R-13	4085.1	$78,513
		R-19	4075.8	$78,536
		R-27	4065.9	$78,462
	Viracon 13-63	R-13	4080.9	$78,407
		R-19	4069.9	$78,326
		R-27	4059.9	$78,240
	Solarban 70xl	R-13	4018.3	$76,916
		R-19	4005.2	$76,783
		R-27	4002.1	$76,890
Without Daylighting Controls on the lighting system	Solarban 80	R-13	4367.7	$85,378
		R-19	4365	$85,450
		R-27	4354.2	$85,360
	Viracon 2-54	R-13	4373.4	$85,403
		R-19	4371.3	$85,479
		R-27	4364.1	$85,431
	Viracon 13-63	R-13	4434.5	$87,202
		R-19	4423.2	$87,120
		R-27	4415.7	$87,072
	Solarban 70xl	R-13	4341.1	$84,772
		R-19	4333.4	$84,746
		R-27	4330.2	$84,788

Evaporative Cooling

Additionally, the energy modeling analysis focused on the HVAC system for the building. The design team incorporated an evaporative cooling system into the project. Evaporative cooling only provides adequate cooling when the humidity is low. St. George, Utah experiences monsoon seasons during the late summer months, which causes the humidity to remain high. Therefore, the design team wanted to ensure that evaporative cooling still made economic sense, despite St. George, Utah's monsoon seasons, and that supplemental cooling during those times would be appropriately sized. **The results showed that the project could save approximately $25,700 annually,** compared to a HVAC system without evaporative cooling, and that supplemental cooling would not be necessary until the monsoon season. These results were validated during the summer of 2012, when outdoor temperatures reached over 100 degrees Fahrenheit, and no chiller operation was required.



UVU Classroom Building & Central Plant Energy Engineering Case Study

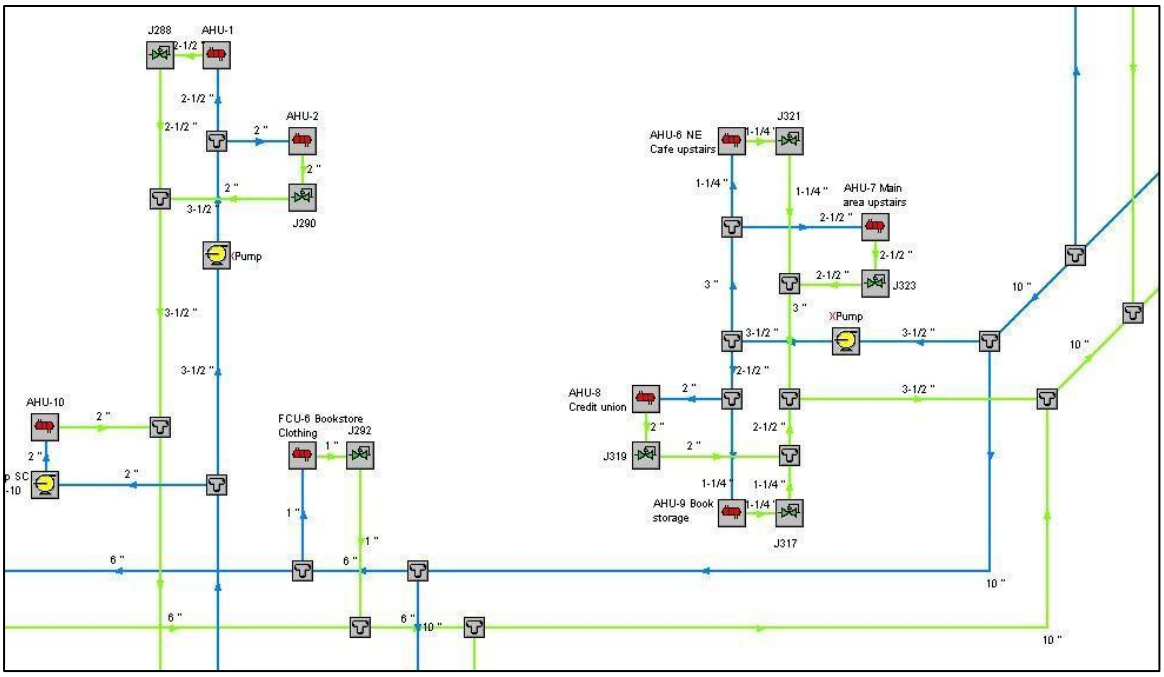
In 2012, design efforts began toward the construction of a new classroom building and central heating/chilled water plant, for Utah Valley University Campus. As part of these design and engineering efforts, energy analysis and engineering were utilized to evaluate four facets of the project, in order to reduce capital costs and minimize operational (utility/fuel) costs, over the expected life of the new classroom building and central plant. Parts of the analysis also dealt with the existing infrastructure, to determine the most efficient integration of the new central plant with the existing central plants, and to flush out any existing inefficiencies related to the existing central plants and distribution of the thermal energy produced in these plants.

Energy Engineering/Analysis of central plants and heating and cooling distribution (piping & pumps) systems

A hydraulic pipe-flow analysis was generated from field verifying the current systems. The following issues became apparent and can now be addressed.

- Inefficiencies in the current system
- Adequate & In adequate pipe sizes
- Identification of unwanted/unnecessary flow restrictions
- Improper control methods
- Problems in the existing piping distribution systems
- Other infrastructure and unnecessary operation cost issues

Once this information was discovered it was presented to facilities management and a collaborative process of determining the proper corrective actions began which will result in lower heating and cooling cost as well as improved campus wide performance.



UVU Campus Hydraulic Pipe Flow Analysis Schematic

The Hydraulic Pipe Flow Analysis was also used to project and optimize the inclusion of a new central plan within the existing central plants. This process included consideration of future buildings, as outlined in the campus master plan, and provided critical information to allow all three central plants to work in concert, rather than potentially conflict with each other, which can lead to operational inefficiencies and increased operational costs.

New Central Plant Design Options Analysis

Once the current plants and distribution system were understood, energy engineering efforts turned toward evaluation of design options for the new central heating and chilled water plant, through careful study of hour-by-hour weather data and buildings usage profiles. These plant options considered different types of chillers, boilers, heat rejection methods (including geothermal), and control options, and the data was used to perform life-cycle cost analysis for each option, in accordance with Federal Energy Management Program standards. Results of the life-cycle cost analysis showed that through optimizing the central plant design as shown in Option 2 below, **approximately $2.59 million could be saved, over the first 40 years of the plants existence**, when compared to industry standard central plant design.

Description	Code Baseline – Chillers & Boilers	Option 1 – Heat Recovery Chillers w/ground water wells	**Option 2 – Heat Recovery Chillers w/ground water wells**
Installed Cost, Total	$ 3,642,520	$ 1,245,240	$ 2,973,640
Expected Life of System (years)	27.6	22.3	28.8
Routine O&M Cost ($ / year)	$ 32,000	$ 27,500	$ 9,000
Non-Recurring Expense (year / $)	10 years / $ 50,000		10 years / $ 50,000
Annual Energy Cost ($)	$ 155,860	$ 169,560	$ 152,980
Other Cost ($ / year)	-	$ 30,000	-
Life Cycle Cost Over 40 Years	$8,253,629	$ 6,998,224	**$ 5,663,359**

Energy Modeling of Classroom Building

The central plant design (above) was coupled with a whole building energy simulation to evaluate how the building uses energy. Several iterations of potential energy efficiency measures, relating to the mechanical systems, lighting options, building envelope, and glazing options, were explored. The goal being to apply them to the building design in order to save energy costs, reduce capital and operational costs.

In one case, evaluation of the quantity of glass used in different building envelope options, during design development, showed that reduction of glass area, by twenty percent, **would reduce utility costs by slightly over $1.5 million, over the first 50 years of operation.**

Final Design with a Lower Window to Wall Ratio

While the description of energy engineering activities, offered above, is only a brief, oversimplified description of the extent of work that was conducted for a single project, related to energy cost, it does demonstrate the enormous potential for significant reduction of ongoing utility costs incurred by the state. Furthermore, these energy engineering efforts can eliminate costs due to existing infrastructure issues, and also contribute to reductions of capital costs and life-cycle costs associated with state funded buildings, district energy central plants, and central plant distribution systems.

U of U Quinney Law School - High Performance Building Case Study

During late 2012 and early 2013, DFCM and the University of Utah designed a new law building, to replace the existing, aging law building. One of the particular focuses of the modeling activities is the University of Utah's requirement for all new buildings to achieve 40% energy cost savings when compared to a Baseline building as prescribed by ASHRAE 90.1-2007 Appendix G. The project has secured additional funding to pursue the energy efficiency measure required to reach this goal. By utilizing energy modeling analysis, the design team is able to determine which energy efficiency measures are most life-cycle cost effective, and how the project will meet this goal.

As part of the preliminary design process, the architect created several massing options for the building, to be considered. Each massing option was analyzed to determine its relative impact on energy costs and consumption, and then used as an additional consideration when deciding on an overall look of the building. The figure below shows building key performance indicators, indicating a difference of 15% in energy consumption between the least effective and the most effective massing options. This fact combined with other design parameters was considered in choosing Option 4 as the final massing design.

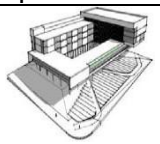
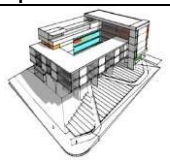
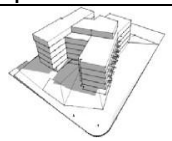
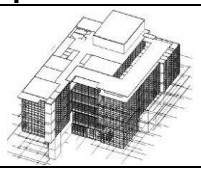
	Massing Option 1	Massing Option 2	Massing Option 3	**Massing Option 4**
				
Relative Annual Energy Consumption	107%	**113%**	100%	**98%**
Relative Annual Energy Cost	105%	110%	100%	**102%**
Relative EUI (kbtu/sqft/yr)	101%	105%	100%	**94%**

Figure 1: Results of massing options analysis

Ice Storage & Irrigation Water to Cool the Building

To achieve a reduction in the energy cost, the project utilized energy modeling analysis to determine the energy cost savings and feasibility of an ice storage system. Ice storage reduces energy costs by offsetting peak demand to the evening and early morning, when Rocky Mountain Power provides a reduced rate. The energy modeling analysis results show that approximately **$9,000** a year can be saved by utilizing an ice storage system.

Due to the unique situation of this project being located adjacent to the main irrigation line for the university, the project is now focusing on using energy modeling analysis to determine the feasibility of using irrigation water to cool the building, before being utilized by the rest of the campus for irrigation purposes. By modeling the building, the design team is able to fully understand the load profile of the building, including the effects of changing building occupancy, lighting, and weather. A detailed understanding of this building load profile is critical to ensuring if, and to what extent, irrigation water can be used to cool the building. If the final building design is able to take advantage of using irrigation water, a savings of up to **$15,000** in annual energy costs could be realized.

Improvement Projects in Existing Buildings

2006-2011	Budget	Electricity Savings (kWh)	Gas Savings (Therm)	Annual Savings
Total	$26,804,121.00	37,916,511	685,765	$3,120,895.00

FY-2012					
AGENCY	**PROJECT**	**BUDGET**	**ELECTRICITY SAVINGS**	**GAS SAVINGS**	**ANNUAL SAVINGS**
USDB	USDB ESCO Project	$551,696	317,472	17,457	$36,485

Utility Cost Management Consultants

Savings by Customer Summary

April 1, 2010 through April 1, 2012

	April 1, 2010 to April 1, 2011 Savings	April 1, 2011 to April 1, 2012 Savings	April 1, 2012 to April 1, 2013 Savings
Alpine School District	$116,178.55	$133,794.35	$75,481.55
American Fork City	$29,405.18	$44,603.26	$70,125.22
Box Elder School District	$12,472.89	$315.11	$1,025.11
Canyons School District		$124,157.74	$148,961.94
Carbon School District	$24,584.45	$976.38	$942.53
Centerville City	$533.35		
Cottonwood Heights City	$1,425.03		
Davis Applied Technology College		$1,367.23	$342.60
Emery County School District	$5,642.97	$5,919.74	$5,458.17
Ephraim City	$1,489.63		
Garfield School District	$1,461.31	$2,177.94	$2,530.60
Green River City	$700.54	$548.98	$530.64
Herriman City	$19,012.45	$42,059.90	$54,193.43
Holladay City	$528.72	$397.42	$469.26
Hooper City	$8,341.98	$9,695.24	$8,062.86
Hyde Park City	$534.26		
Iona City	$898.83		
Iron County	$5,309.60		
Iron County School District	$4,079.78	$5,948.06	$5,274.24
Juab School District	$66,235.94	$60,597.86	$67,237.40
Kane County School District	$2,067.34		$1,463.97
Lindon City	$3,875.86	$2,061.89	$15,727.37
Mapleton City Corp.	$8,801.34	$12,460.04	
Metropolitan Water Dist. of SLC and Sandy			$17,667.83
Morgan School District			$1,433.89
Mountainland Applied Tech Colleg	$215.66	$351.70	
Nebo School District		$567.31	
Nibley City	$6,675.02		
North Logan City	$4,340.86	$5,943.70	
North Summit School District	$220.18	$213.90	$3,141.22
Ogden-Weber Tech College	$2,030.74	$3,805.74	$322.94
Ogden City Corp.	$7,356.71	$11,088.69	$12,953.97
Orem City	$44,546.24	$20,843.68	$11,710.34
Panguitch City	$4,748.82	$4,278.90	$2,055.80
Park City School District			$35,942.83
Pleasant Grove City	$17,991.24	$18,990.24	$2,809.84
Provo City School District	$2,365.08	$1,142.06	
Richfield City Corp.	$5,947.60	$7,168.14	$5,995.08
Riverdale City	$2,284.83	$1,769.80	$2,181.23
Salt Lake City Corp.	$11,737.00	$8,102.55	$10,323.45
Salt Lake City Department of Airpo	$13,955.33	$146,660.21	$115,845.48
Salt Lake City Dept of Public Utiliti	$19,354.12	$7,276.03	$7,375.36
Sandy City Corp.	$13,155.96	$1,411.86	
Sevier County	$2,582.80	$2,382.94	$2,443.69
Smithfield City Corp.	$2,993.88		
So. Sanpete School District	$9,726.40	$5,243.48	$4,533.42
South Ogden City		$1,666.23	$1,118.11
South Salt Lake	$17,404.12	$15,147.22	
South Weber City	$12,617.68	$11,090.46	
Southern Utah University		$637.57	$560.26
Spanish Fork City	$1,466.53	$329.88	$389.58
Summit County	$6,412.10	$5,137.26	$3,590.24
Syracuse City	$16,439.69	$18,477.24	$9,769.84
The Waterford School	$1,466.97	$1,466.97	$3,222.71
Tooele City Corp.	$1,439.28	$1,559.02	$1,547.06
Tooele County Corp.	$51,671.68	$16,679.82	$1,684.90
Tooele County School District	$11,414.36	$12,791.54	$6,359.74
Tremonton City	$4,904.16	$2,961.52	$2,578.40
Utah Department of Transportation		$20,551.29	$29,070.11
Utah Division of Wildlife Resource	$4,693.26	$3,249.46	$4,355.49
Utah State Development Center	$64,386.29	$85,749.60	$110,231.57
Utah State Hospital	$57,243.46	$68,997.54	$82,948.69
Utah Valley University	$216,277.60	$49,000.46	$44,917.09
Washington City		$48,900.97	$12,037.14
Washington County School Distric	$97,379.46	$97,491.52	$6,318.92
Weber County	$8,125.68	$2,233.20	
Weber State University	$162,638.44		
West Jordan City	$15,030.28	$4,669.20	
West Valley City	$4,310.98	$1,537.95	
Westminster College		$379.46	
Woods Cross City	$1,735.86		
TOTAL	**$1,242,866.33**	**$1,165,027.44**	**$1,015,263.12**

APPENDIX B

DFCM Internal Service Fund Annual Energy Report

DSC Energy Efficiency Conservation Efforts

DNR State Parks Energy Conservation Measures

SUU Energy Report

USU Energy Report

UoU Energy Report

WSU Energy Report

UVU Energy Report

Snow College Energy Report

Department of Transportation Energy Report

Department of Technology Report

Utah National Guard Energy Report

Department of Human Services Energy Report

Annual Energy Report FY 2012

prepared by: DFCM
Chris Atkins
January 23, 2013

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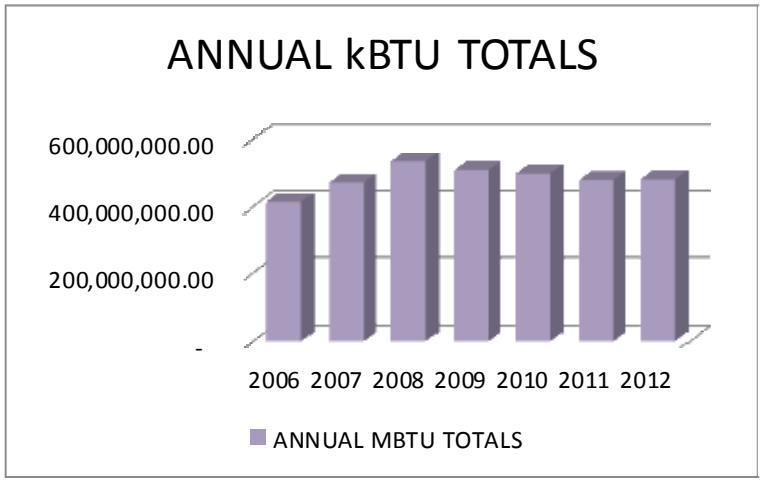
Overview

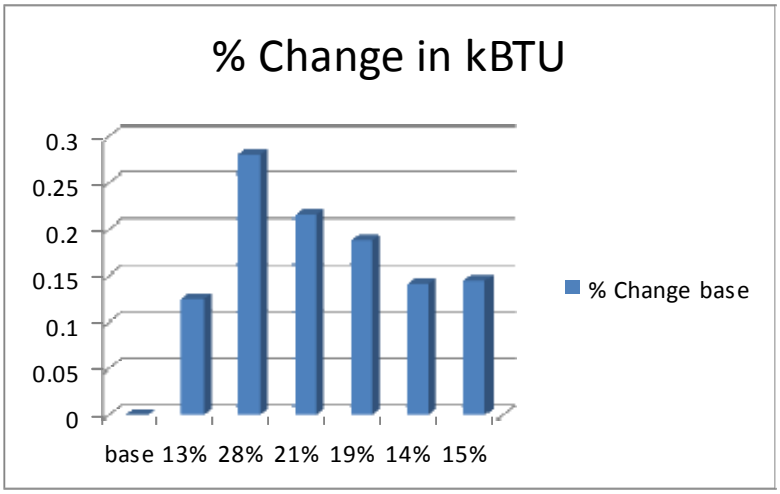
The Division of Facilities and Construction management utilizes the utility tracking system recommended by the Utah State Energy Office – Portfolio Manager and UM Pro. Natural Gas and Electricity usage data was entered into this system for fiscal years 2005-2011 to create a history of energy usage for the campus.UM Pro converted this usage data into mega (100,000) British thermal units (kBtu) for use in computing total site energy usage for each month. Using fiscal year 2006 as a baseline, an analysis of energy reduction efforts has been conducted and the

Total kBtu Usage per Year

From the monthly data provided by the UM Pro system the total kBtu's consumed by DFCM each fiscal year was computed. These graphs display the annual yearly totals and the computed percentage change from the baseline year are shown below.



DATE	ANNUAL kBTU TOTALS	% Change
2006	415,101,600.00	base
2007	467,046,300.00	13%
2008	531,086,500.00	28%
2009	504,213,900.00	21%
2010	493,286,400.00	19%
2011	473,971,700.00	14%
2012	475,532,300.00	15%

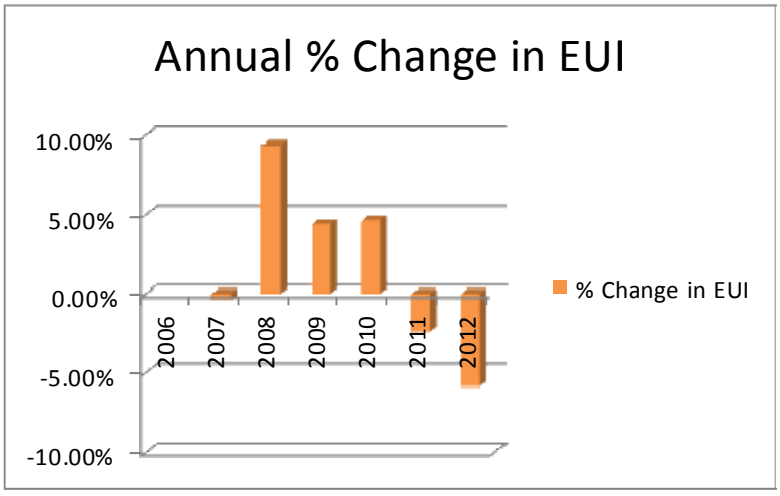


Energy Performance

DFCM computes an energy usage index based on kBtu's per square foot. Using this method and tracking the changes in square feet maintained by DFCM during this time period, an EUI (Energy Use Intensity) was computed for each month in the analysis period. The results of this computation are shown

	Site Energy Performance (Kbtu/Sq Ft)* = EUI						
	2006	2007	2008	2009	2010	2011	2012
Sq ft	415101.7	467046.1	531086.4	504,214.00	493286.3	473971.6	475,532.50
Jan	112.65	122.46	130.16	122.04	133.63	123.48	120.73
Feb	97.47	95.63	109.17	102.19	108.16	103.88	106.51
Mar	97.95	77.48	97.93	99.35	102.24	94.96	90.11
Apr	74.81	70.96	82.27	80.54	77.85	82.64	72.62
May	64.82	61.16	76.17	64.44	69.57	70.66	67.11
Jun	62.53	57.71	64.63	56.64	59.65	57.69	62.18
Jul	67.64	68.73	62.10	59.22	60.21	59.54	65.66
Aug	65.61	66.55	59.23	58.57	60.10	59.84	64.71
Sep	63.99	65.21	55.39	59.12	55.29	57.13	60.15
Oct	78.88	80.45	69.43	73.70	67.34	71.93	75.01
Nov	95.97	98.04	82.83	92.42	91.66	97.99	90.68
Dec	117.69	135.61	110.71	131.78	114.31	120.27	124.53

* KBtu/Sq Ft calculation does not account for variation in temperature between years



Energy Conservation Efforts

DFCM has always made a proactive effort to reduce building energy consumption. Some of these efforts are highlighted below.

- Recommissioning projects – Matheson Courthouse, a fine point effort to restore building operating systems for increased energy efficiency.
- Extensive lighting retrofits – High efficiency lighting products installed in the State Office Building, Mt Pleasant Armory, Provo Juvenile Court, and various liquor stores, and parts of other DFCM buildings are enabling DFCM to achieve lighting energy savings greater than 80% .
- HVAC and Equipment Improvement – Tax Commission upgraded all of their HVAC equipment. Cannon Health was one of the first State Buildings to use the new "fan-wall" system, enabling the building to have better air distribution with less energy and noise.
- Find-n-Fix Commisssioning program – Department of Natural Resources is the first installment of a new commissioning program that will better improve our building performance.

In addition to these efforts and many others not listed, DFCM employs an Energy Manager whose duty is to constantly investigate, design, and fulfill new energy conservation measures within the scope of DFCM buildings.

Sherry J. Ruesch
Executive Director of Campus Services

Dixie State College of Utah
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St. George, Utah 84770
Phone: 435-652-7562
Email: ruesch@dixie.edu

March 7, 2013

John Harrington, Manager, Energy Office
Division of Facilities and Construction Management
4110 State Office Building
Salt Lake City, Utah 84114

Dear John,

Re: Dixie State College Energy Efficiency and Conservation Efforts FY2012

Dixie State College has continued its progression towards becoming a more energy efficient institution.

1. ***Dixie State completed two American Recovery and Reinvestment Act Projects in 2012. The first of these projects was to replace 235 exterior lights across campus. The lamps were replaced with an energy efficient LED lamp. This project has not only saved in energy costs, but has also provided a safer night environment for our students***

2. ***The second ARRA project was the installation of 60 225 Watt Solar Modules. These panels were installed on the roof of the Science Building where they could also be used as part of academic instruction.***

3. ***Dixie State completed the construction of the Holland Centennial Commons, our first LEED Gold Building. Information about the LEED aspects of the building is provided in the attached document.***

Sincerely,

Sherry J. Ruesch
Executive Director of Campus Services

Summary of energy efficiency/conservation measures for Utah State Parks implemented since July 2007

- In August of 2008 Utah State Parks implemented the 4 Utah initiative and changed to the 4/10 work week. However in September of 2011 the legislature required a change back to 5/8 work week.
- In 2008 Edge of the Cedars State Park upgraded to HID lights for the visitor center.
- In 2008 Territorial Statehouse upgraded to high efficiency boiler.
- In 2008 Fremont Indian State Park did a complete window upgrade at the museum with eglass.
- In April 2009 Utah State Parks Salt Lake office building (Department of Natural Resources) was upgraded with motion sensor lighting and timing devices on appropriate light fixtures.
- Utah State Parks is a partner in the "Think Energy Employee Efficiency Partnership" In October of 2009 DNR put together an energy committee. The committee representative educated parks employees through presentations and emails on energy efficiency and conservation efforts that can be done at work as well as at home.
- In December 2009 Utah State Parks Salt Lake office completed an appliance survey to find out which appliances are using the most energy, and which appliances cost the most money. This assisted the Salt Lake Office to make changes and save on office appliance energy.
- In 2009 Dead Horse Point State Park upgraded their interpretive display to HIP lighting.
- In April of 2010 Utah State Park employees participated in the statewide "Energy Pledge". We had 71 employees pledge to: 1) Turn off the lights when they leave their office. 2) Turn off their computer/monitor when they are not using it, at night, before the weekend and before holidays. 3) To reduce the use of, or eliminate, personal electronic appliances and devices in their work space. 4) To try an alternative mode of transportation such as public transportation, bicycle, alternative fuel vehicle or start car pooling.
- In 2009 Goblin Valley State Park replaced their diesel generator with a more efficient propane generator. The park also added additional solar panels & retrofitted batteries
- In 2010 Bear Lake State Park upgraded the Rendezvous Beach campground restroom with two new high efficiency water heaters.
- In 2010 Antelope Island State Park Visitor Center was upgraded with a high efficiency HVAC system.
- In 2010 Utah Lake State Park Visitor Center upgraded 2 new high efficiency HVAC units.
- In 2010 Soldier Hollow Golf Course upgraded to a new high pressure high efficiency irrigation pump.
- In 2010 Edge of the Cedars State Park upgraded museum with high efficiency doors and weather stripping though out the museum.

- In 2010 Sand Hollow State Park Campground restrooms were upgraded to new high efficiency HVAC systems
- In 2011 Utah State Parks entered into an MOU with Surplus Services for the disposal of aluminum cans. Recycling is now available at the parks.
- In June of 2011 Utah State Parks Salt Lake Office created a team for the Utah Clean the Air Challenge to reduce CO2 emissions.
- In 2011 East Canyon State Park upgraded the boat ramp restroom with a new high efficiency water heater.
- In 2011 the North Region crew upgraded numerous parks with sensor lighting and programmable thermostats in bathrooms and shops.
- In 2011 Palisade Golf Course clubhouse upgraded to a new high efficiency HVAC system.
- In 2011 Wasatch Golf Course clubhouse upgraded to new high efficiency HVAC system.
- In 2011 Dead Horse Point Visitor Center was upgraded with a high efficiency HVAC system.
- In 2011 Anasazi State Park Visitor Center upgraded to new high efficiency HVAC system
- In 2012 Antelope Island State Park upgraded the Ranger Residences, main office and concessionaire building with new high efficiency HVAC systems
- In 2012 Jordanelle State Park upgraded to a new high efficiency culinary water pump.
- In 2012 Deer Creek State Park constructed a new water storage tank with more capacity. As well as upgraded two high efficiency pumps and controls.
- In 2012 Red Fleet State Park upgraded to a new pump house and high efficiency well controls.

Salt Lake Community College

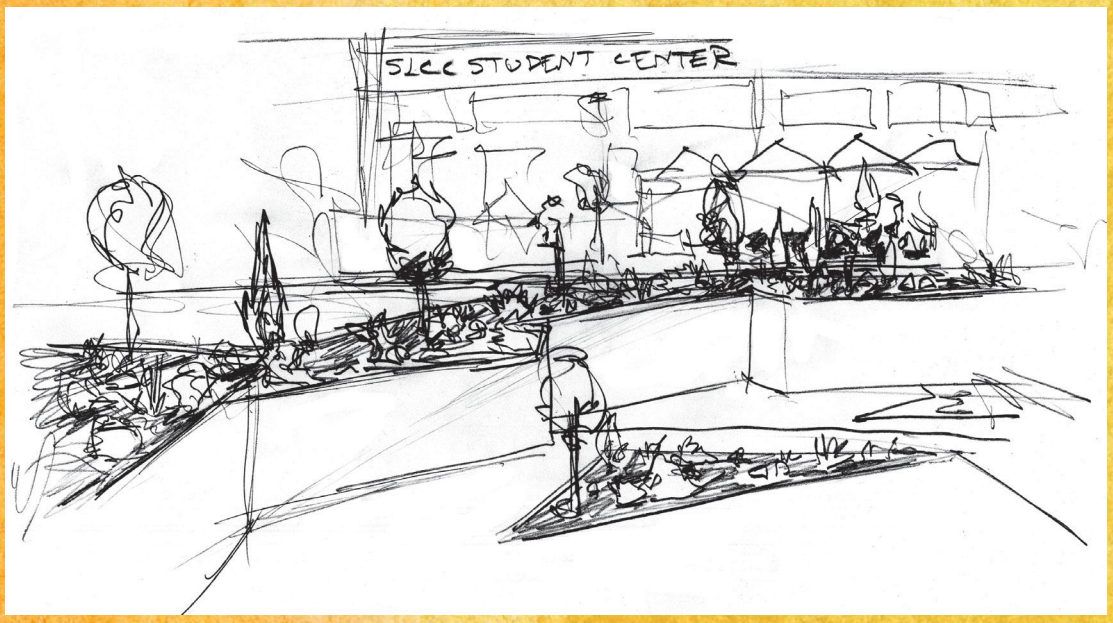
Step Ahead.

Annual Energy Report 2011-2012

Prepared by:

Facilities Services

Ezra Nielsen, Energy Technician



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Over the last year, Salt Lake Community College has taken steps towards sustainability. This includes reducing our overall energy consumption, water usage, and waste.

ESCO Project: Chevron Energy Solutions

- **Lighting Upgrades:** This was implemented at all of SLCC's major campuses. This included measures such as installing high efficiency fluorescent ballasts and bulbs, high reflectivity fixtures, CFL lamps, LED lamps and fixtures, de-lamping, and more
- **Enhancing Energy Management System:** Adjusting heating/cooling set-points, implementing building start up programs, retro commissioning, demand control ventilation, and more.
- **Mechanical Upgrades:** Replaced chiller with high efficiency VSD chiller, retrofit multiple air handler types to VAV, installed VFD's on air handlers, installed low flow faucet moderators, and more.
- **Substation:** In the process of constructing the college's own electrical substation, making us a high voltage customer and reducing our power/energy rates.

*Many of these measures were supplemented and made possible through rebates and incentives from Rocky Mountain Power's Finanswer & self direct programs.

Internal measures:

Sub Metering

We have been pursuing sub metering for individual buildings and central plants. This includes electrical, natural gas, water, and BTU meters. This allows us to compare individual buildings to each other and also to the overall total of the main campus meters. Individual building BTU metering is where we are lacking so, that is where much of our efforts are being directed. HW & CHW BTU usage for our central plant campuses is a critical component of the individual buildings overall energy usage. We can use this information in a variety of ways such as controlling central heating/cooling equipment based off building demand, and calculating a cost per BTU for tenant sub billing.

Energy Manager

Salt Lake Community College, along with various partners in the community, has developed a degree program for Energy Management. It is the first accredited degree program of its kind in the State of Utah, and one of only a handful in the country. Some graduates from this program have been hired by Salt Lake Community College as Interns who are working with, and have helped to develop a future position for an onsite Energy Manager. This manager will not only pave the way for further energy efficiency within the college, but also help build Salt Lake Community College into the leaders for Energy Efficiency among Higher Education Facilities.

New Buildings

South City Campus: Annex Building & Center for New Media

- Submitted for LEED Silver status.
- Variable Frequency Drives
- High Efficiency Motors
- Efficient lighting technologies including daylight harvesting, and advanced zone control
- All newly purchased occupant equipment shall be Energy Star compliant.
- Environmentally friendly chemicals and construction materials
- Water conserving restrooms

Redwood Road Campus: Instructional, Administration Building

- Submitting for LEED silver/gold status
- Efficient lighting technologies, including interior and exterior LED fixtures and occupancy sensors
- Energy modeling and enhanced commissioning
- Daylight harvesting
- Enhanced air quality with room CO2 sensors.
- Low flow water fixtures
- 3 stage cooling design + economizer

Water

- In 2004-2005 our grounds department built, and has successfully maintained an elaborate watering system using the North Jordan canal water.
- The culinary usage was drastically reduced, and the dollar savings was approximately $20,000 per year.
- 2008-09 SLCC purchased enough water shares to maintain all landscaping on the Taylorsville/Redwood Road Campus, and it was no longer necessary to lease water shares.
- From 2008 – Present, the cost savings is approximately $45,000.00, and saving over 52,000,000 gallons of culinary water per year.
- 2011 A new 900 gallon pump was installed to ensure all irrigation was done during the evening.

Data Center:

- To maximize the efficiency of our Data Center's cooling equipment, we've recently implemented a hot aisle containment system.
- We have changed the unit settings to a hot aisle containment configuration with the built in software. We also increased the set points of the AC units from 69 degrees to 74 degrees.
- We've seen a drop in overall fan speeds of the AC units from a constant 100% to an average of approximately 75% and we've seen the cooling demand drop from approximately 80kW to 70kW.
- Many folks say that the ROI for a hot aisle containment project can be as short as six months but on average is about eighteen months. We're hoping to watch the changes in the building power consumption to see what type of financial impact the project has.

Recycling

Comprehensive, award winning recycling program

- Wet Cell (lead acid) batteries – 70/year
  Rechargeable Batteries: Lithium Ion, Nickel Metal Hydride
  Refurbished and Recycled – 300/year
- Used Oil – 2000gal/year
- Cardboard, Paper, Magazines, Books – 12 ton/month
- Plastic – 400lb/month
- Used Antifreeze – 200gal/year
- Waste Paint – 400gal/year
- Computers
  sold to public – 400/year
  sold as scrap – 50/year
- Other electronic waste: Televisions, Cell phones, Communication equipment

Avoidance of Harmful Chemicals

- No electronic waste is sent to landfills
- Use of low VOC paints
- Biodegradable cleaning compounds

Coming Soon

- Recycling of all green waste
- Recycling of all metals
- 80% landfill diversion of all solid waste

Fuel Consumption & Emissions

- CNG has 90% less tailpipe exhaust as regular fueled vehicles
- 5 new CNG vehicles , 3 bi-fuel
- CNG forklift, lawnmower, & CNG fueling station
- 5 hybrid electric vehicles, 5 all electric vehicles
- No idling policy

SUU SOUTHERN UTAH UNIVERSITY
LEARNING LIVES FOREVER

Annual Energy Report FY 2011

prepared by: **Southern Utah University**
Facilities Management
November 1, 2011

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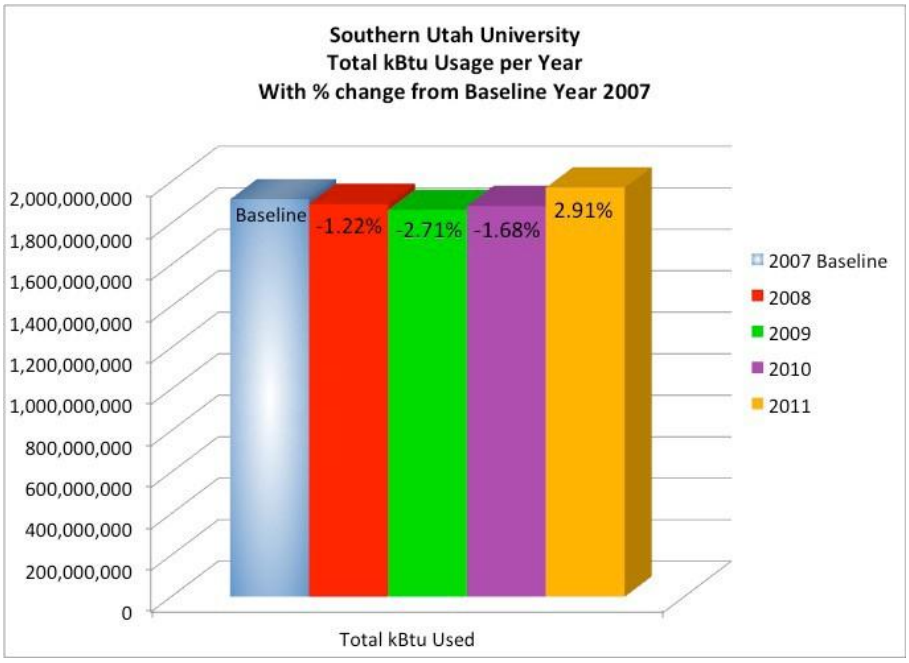
Southern Utah University Annual Energy Report FY 2011

Overview

Southern Utah University utilizes the utility tracking system recommended by the Utah State Energy Office – Portfolio Manager. Natural Gas and Electricity usage data was entered into this system for fiscal years 2007-2011 to create a history of energy usage for the campus. Portfolio Manager converted this usage data into kilo (thousand) British thermal units (kBtu) for use in computing total site energy usage for each month. Using fiscal year 2007 as a baseline, an analysis of energy reduction efforts has been conducted and the results are in the following sections.

Total kBtu Usage per Year

From the monthly data provided by the Portfolio Manager system the total kBtu's consumed by SUU each fiscal year was computed. These yearly totals and the computed percentage change from the baseline year are shown below.

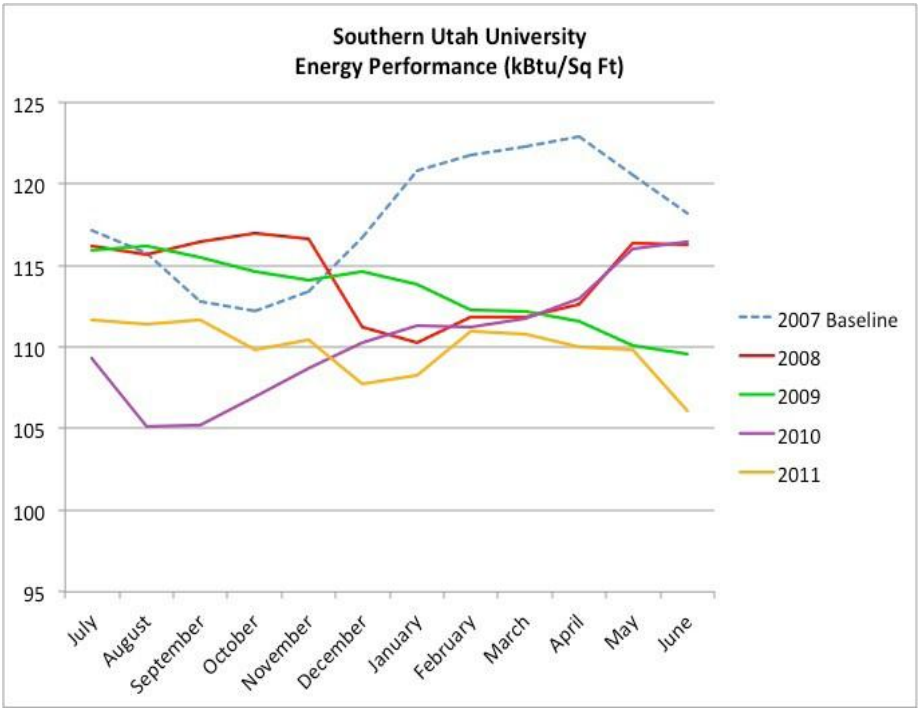


Fiscal Year	Total kBtu Used	% Change from Baseline Year
2007 Baseline	1,916,046.61	
2008	1,892,655.36	-1.22%
2009	1,864,059.62	-2.7%
2010	1,883,845.91	-1.66%
2011	1,971,860.74	2.91%

Photovoltaic solar array at Facilities Management Shops

Energy Performance

The Portfolio Manager system computes an energy usage index based on kBtu's per square foot. Using this method and tracking the changes in square feet on the SUU campus during this time period, an EUI (Energy Use Intensity) was computed for each month in the analysis period. The results of this computation are shown below.

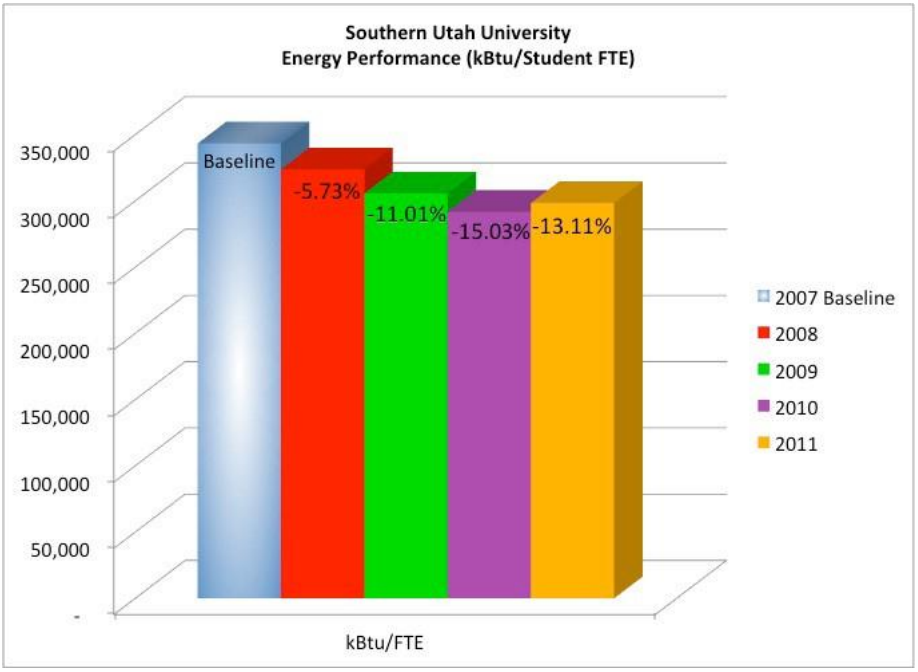


	Site Energy Performance (kBtu/SqFt*)				
Month	**2007 Baseline**	**2008**	**2009**	**2010**	**2011**
July	117	116	116	109	112
August	116	116	116	105	111
September	113	116	115	105	112
October	112	117	115	107	110
November	113	117	114	109	110
December	117	111	115	110	108
January	121	110	114	111	108
February	122	112	112	111	111
March	122	112	112	112	111
April	123	113	112	113	110
May	121	116	110	116	110
June	118	116	110	116	106

* KBtu/Sq Ft calculation does not account for variation in temperature between years

LED light on exterior of R.C. Braithewaite Liberal Arts Center

Southern Utah University's energy usage is influenced by more than just changes in overall campus square footage. During the analysis period student FTE enrollments increased as well. Using student FTE data from the Fall semester of each year, an additional EUI was computed showing kBtu's per student FTE. The results of this computation are shown below.



Fiscal Year	Total kBtu Used	Student FTE (based on Fall 3rd Week USHE Report)	kBtu/FTE	% Change from Baseline Year
2007 Baseline	1,916,046,610	5,580	343,378	
2008	1,892,655,361	5,847	323,697	-5.73%
2009	1,864,059,617	6,100	305,584	-11.01%
2010	1,883,845,912	6,457	291,753	-15.03%
2011	1,971,860.74	6,609	298,360	-13.11%

Energy Conservation Efforts

Southern Utah University has made a proactive effort to reduce campus energy consumption. Some of these efforts are highlighted below.

- **Photovoltaic Solar Array installation at new Facilities Management Administration Building –** Installation of a 4kW photovoltaic net metering system, produces power and relieves the campus electrical load (10,752 kilowatt hours of electricity per year, enough to offset the production of 14,407 lbs. of CO2 that would otherwise be released to the atmosphere and is the equivalent of electrical power used by 3.07 homes in a year).
- **Photovoltaic Solar Array installation at Facilities Management Shops-** Installation of 70.37 kilowatts of photovoltaic solar arrays, producing an estimated 189,154 kilowatt-hours of electricity per year, enough to run 54.1 average homes and offset the production of over 259,141 pounds of CO2 per year.
- **Recommissioning projects** – Sharwan Smith, Student Center, Centrum- a fine point effort to restore building operating systems for increased energy efficiency.
- **Extensive lighting retrofits** – High efficiency lighting products installed in the Administration, Sharwan Smith, Student Center, Science, Business, Technology, Multipurpose, Centurium, Library, Facilities Management Shops, and ELC.
- **Water heater insulation jackets** have been purchased and installed on most water heaters on campus, reducing the loss of radiant heat from the heaters and reducing energy usage.
- **Pipe insulation repair and replacement** – The repair and replacement of insulation on steam, hot water, and chilled water lines saves thousands of BTU's per year.
- **Weather-stripping Installation** – placed on thresholds to better seal doors on many buildings, including: Randall Jones Theatre, Bennion Building, Harris Center, and Music Building to reduce energy waste.

In addition to these efforts and many others not listed, Southern Utah University employs an **Energy Conservation student** whose duty it is to complete rounds in each building on campus every night to turn off lights and leave reminders to shut down computers, printers, and other electronics, eliminating phantom loads overnight. This student also tags non-compliant space heaters which need to be replaced by more energy efficient, safer models.

2012 Annual Energy Report

USU Facilities

October 3, 2012

Overview

Utah State University Logan Campus has nearly 4 million square feet of usable space that is maintained and operated by state O&M funding. Nearly all buildings on campus are metered individually, and Facilities is working on installing meters on the small number of buildings that are not. Meters that do not have the capability of providing live monitoring through building automation systems of electrical, steam, and condensate usage are being upgraded to meters with that capability. Currently, all chilled water BTU meters are monitored continuously through the building automation systems. The utility data is currently in the process of being transferred from USU's Famis database and entered into Energy Star's Portfolio Manager.

USU Energy Reduction Measures

Several resources have been used to fund the projects discussed in this document. The state energy efficiency loan fund, American Recovery and Reinvestment Act (ARRA), Capital Improvement, and Operation & Maintenance funds have provided the capital to invest in these projects.

Lighting upgrade projects have included the conversion to electronic ballasts and T-8 lamps campus wide. Most recently these projects have been completed in the following buildings: Agricultural Systems and Technology Education, Spectrum, Eccles Conference Center, Technology, Engineering Lab, Science Engineering Research, Industrial Science, Biotech, CPD, and Geology Buildings. The lamps in the HPER gymnasiums and classrooms were also replaced during the lighting upgrades. Over $300,000 of work and 4,021 lamps have been replaced over the past five years as part of the lighting upgrade projects.

Photovoltaic panels where integrated into the design of the new College of Agriculture Building on USU's campus. The original plan for sunshades was changed to support 108 photovoltaic modules, each with a 310 watt capacity, which will now serve two purposes as sun shading and electricity generation. All 108 modules will produce over 43,000 kWh per year.

LED exit signs have replaced incandescent signs in the HPER and Eccles Conference Center buildings.

A two million gallon chilled water storage tank has been constructed and is now operational. This will reduce the peak power consumption, but also allow for extended used of the Central Energy Plant water-side economizer and provide more efficient operating conditions for the chillers at night.

New high performance glass has replaced single pane windows in the Ray B. West, Family Life, and Animal Science buildings.

Replacement of aging steam piping and insulation has been completed for several branches of the steam distribution system.

Pipe insulation has been installed in areas that had been damaged, removed, or benefited from additional insulation. Over $100,000 of insulation work has been completed over the past year campus wide on steam, condensate, chilled water, and hot water systems.

Insulation jackets have been installed on steam and condensate equipment throughout utility tunnels and mechanical rooms campus wide. A total of 1,828 jackets have been made as part of the project, which is nearing completion. The calculated yearly savings for this project is estimated as $225,000 per year.

Re-roofing projects have included additional insulation to reduce heat gains and losses. These projects have been completed most recently at the Old Vet Science, Engineering Lab, Water Lab, Motor Pool, Family Life, and Biotechnology Buildings.

Mechanical upgrades in the Chase Fine Arts Building and the Veterinary Science and Bacteriology Building replaced constant volume mixing box systems to variable volume systems. VFD's provide fan energy savings along with significant heating and cooling savings. These upgrades have brought old outdated mechanical systems in-line with the current energy code.

Fume hood upgrades in the Utah Water Research Lab and the Veterinary Science and Bacteriology Buildings replaced old constant volume fume hoods with modern variable volume hoods with proximity sensors that reduce the airflow when hoods are not in use.

Central chilled water plant efficiency has been studied and measures have been taken to increase the chilled water supply and return temperature difference. Constant flow systems in Old Main and Ray B. West have had three-way valves replaced with two-way valves and VFD's installed to allow pumps to circulate less water and provide more efficient heat transfer at the air handler coils. Satellite chillers in the Chase Fine Arts Building, Human Services Research Center Building, and Center for Persons with Disabilities Building have been removed and connected to the more efficient central cooling system.

Gas boiler tune-ups are performed on a regular basis in conjunction with Questar's Thermwise program to ensure proper operation of 39 satellite boilers.

Building envelope improvements have included the addition of insulation in attic spaces in the Lillywhite Building. Also, extensive efforts have been made to seal the leaky envelope of the Biotechnology Center and the Natural Resources Building.

A steam trap maintenance program was started in 2009. The database currently contains 1,712 steam traps and is continually being added to. The steam trap failure rate during the initial audit was 19.7% and over 300 traps were repaired or replaced during the subsequent year. Steam traps are now tested one to two times per year and the failure rate has decreased significantly since the start of the program.

Controls upgrades have removed outdated pneumatic controls, and added modern digital controls. Providing improved comfort and tighter control, while improving energy efficiency. Updated controls allow the ability to connect lighting occupancy sensors into HVAC controls, and make it possible to schedule individual zones. Over the past five years, controls have been updated in the Science Engineering Research, Natural Resources, Spectrum West, Human Resources, Agricultural Systems Technology and Education, the original wing of the Merrill-Cazier Library, Old Main, Student Health and Wellness Center, and Geology Buildings.

Re-commissioning of buildings has reduced maintenance calls, improved comfort, and improved the overall performance of the buildings. These projects include Space Dynamics Laboratory, Veterinary Diagnostics Lab, Janet Quinney Lawson, Lillywhite, Engineering Labs, Natural Resources, Human Resources, Agricultural Systems Technology and Education, Edith Bowen, Health and Wellness, Engineering Classroom, and Geology Buildings.

Temperature setbacks and occupancy control has been implemented in buildings that have extended use in localized areas. Edith Bowen Laboratory School classrooms, and other student areas, are not air conditioned for three to four months during the summer, while a few select offices remain conditioned. This control approach has also been implemented at the Animal, Dairy, and Veterinary Science Building (ADVS), Maeser Lab, Veterinary Diagnostics Lab, and the Veterinary Science and Bacteriology Buildings. Energy savings have been significant for laboratory buildings that must run 24 hours a day and provide 100% outside air. The payback is typically less than 6 months.

Variable frequency drives and premium efficiency motors have replaced less efficient motors, constant speed pumps, and fans. VFD's have been installed on heating pumps in the Business (2-10 HP), Natural Resources, (2- 7.5 HP), Space Dynamic Lab (2-10HP), and Dee Glen Smith Spectrum Buildings (2-10 HP). Also vortex dampers have been replaced with a VFD at the Student Health and Wellness(30 HP), Biology and Natural Resources Building (15 HP), and Utah Water Research Lab (10 HP) Buildings.

High efficiency furnaces have been installed to replace outdated inefficient furnaces. These projects include the furnace replacements at the Caine College of the Arts Building, Multimedia and Distance Learning Services Building, and the Western Rural Development Center.

Occupancy Sensors, Programmable Thermostats, and Timers have been installed as part of projects campus wide. Occupancy sensors and day lighting controls were installed in the Health and Wellness center in the weight room that had natural lighting most of the day. Timers and occupancy sensors are being installed to control lighting, exhaust fans, and other equipment that is unintentionally left on. Old thermostats for furnaces and other heating and cooling equipment are being replaced with weekly programmable thermostats on buildings.

Energy Usage

To validate the energy savings from the above measures, all utility data was converted to Btu's and the total energy usage was calculated. The energy usage intensity (kBtu/ft^2) was calculated for each building and averaged for all buildings. This yearly data, from fiscal years 2004 to 2011, is presented in the graph below.

Historical weather data has been gathered to provide more insight into the impact of building cooling and heating on the energy consumption. Salt Lake City weather data was used due to the lack of historical data for Logan. National Climatic Data Center's data of monthly cooling and heating degree days (65 degree base temperature) were used to determine the total number of degree days each year over the past eight years. This will relate how much of the year that the temperature was above or below 65 degrees and how far the temperature was from the base temperature of 65 degrees.

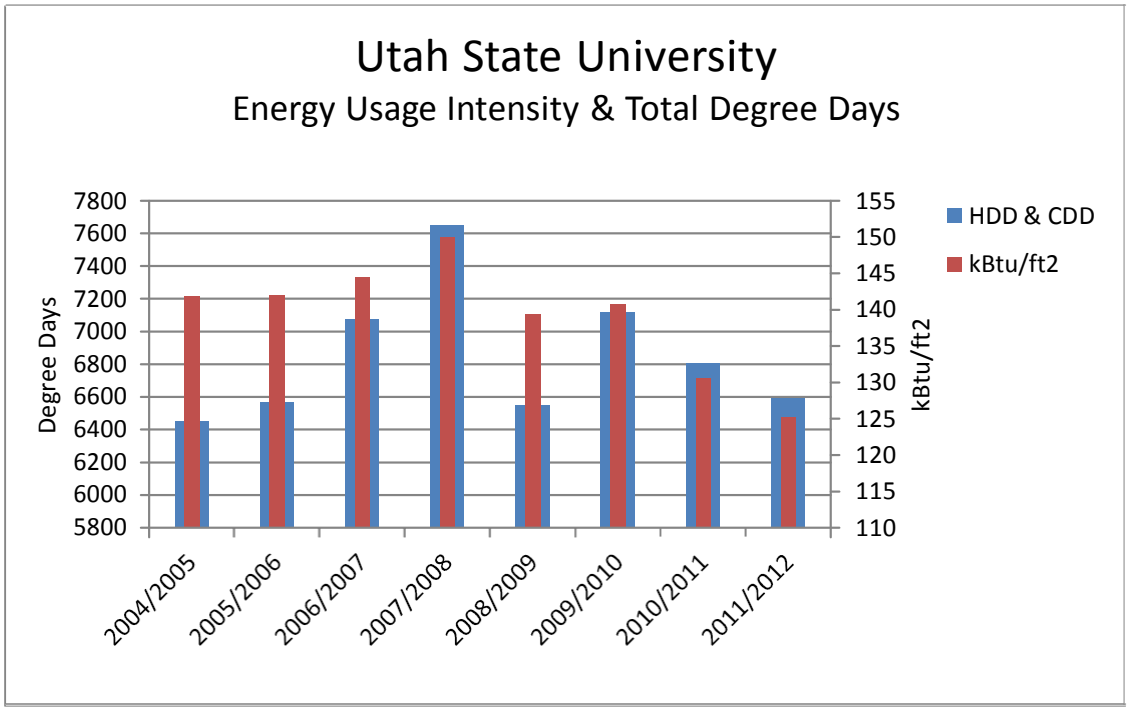


Figure 1. The average energy usage intensity for buildings on campus over the past 8 years and the number of degree days for each given year.

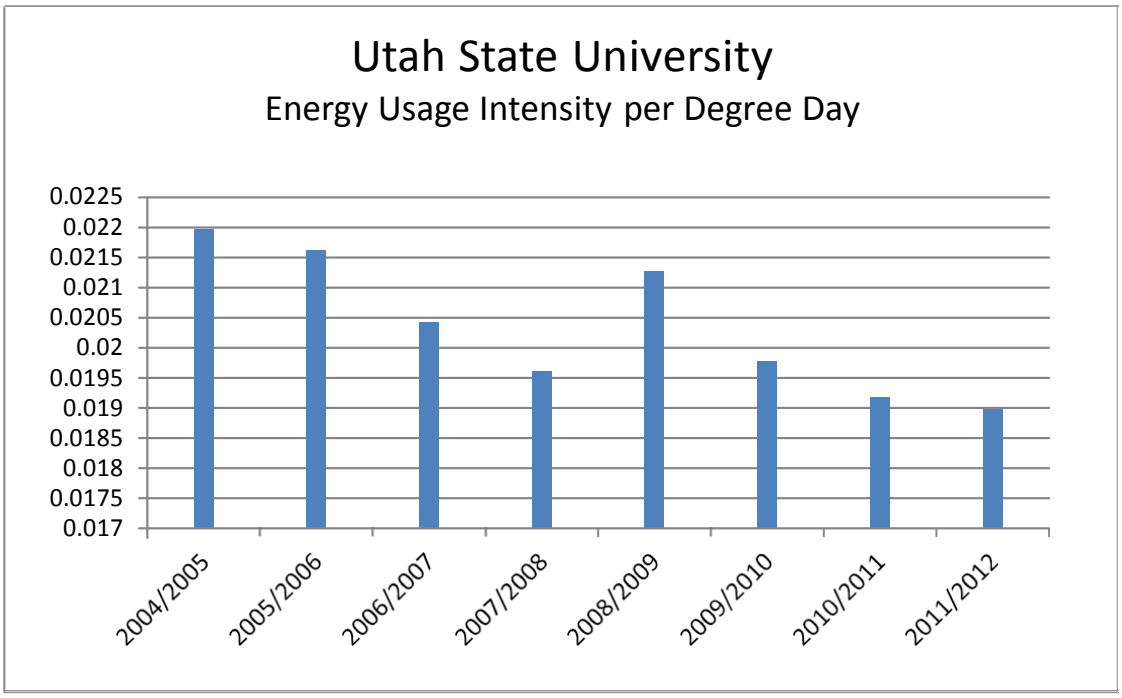


Figure 2. The average energy usage intensity per degree day for buildings on campus over the past 8 years.

A noticeable decline in the energy usage per square foot can be seen, which encourages the continued and increased efforts to reduce USU's energy consumption. There is much than can yet be done and is being done. As faculty and staff become more aware and involved and as funds are available to continue investing in energy savings this trend will continue.

ENERGY MANAGEMENT
ANNUAL REPORT

AUGUST 21, 2012

1. Purpose

The purpose of this annual report is to update the Administration on the activities and performance of Energy Management's energy and utility-cost savings program. It provides a summary of the program's accomplishments in fiscal year 2012 and presents a forecast of activities planned in fiscal year 2013. A secondary purpose of this report is to provide a summary of the University's consumption of electricity and natural gas in fiscal year 2012 and compare this usage to previous fiscal years.

2. Background

Since fiscal year 2008, Energy Management has been managing an energy and utility cost saving program that receives funding, in part, from the University's fuel and power accounts. This funding is based on shared utility cost savings from completed energy improvement projects. Savings are shared on an 80/20 basis between Energy Management and the fuel and power accounts. Other funding for the program comes from cost savings from a discontinued Measurement and Verification contract, utility incentives and support from other outside sources.

3. Fiscal Year 2012 Summary

This section provides a brief account of Energy Management's actions over the last year in terms of financial activity, projects and other activities. It also contains a summary of the University's power and fuel accounts.

3.1. Financial Activity Table 3.1 summarizes the program's financial activity for FY12, showing the sources of Energy Management's funding and a general breakdown of expenses.

Table 3.1: FY12 Energy Program Financial Activity

Inflows		
Measurement &Verification	$	228,933
Electrical Energy Savings	$	148,145
Gas Energy Savings	$	27,592
Rocky Mountain Power Self Direct Credit	$	115,414
Other Incentives	$	2,657
Transfers from Other Departments	$	79,336
Transfer: Metering Project Refund	$	21,765
Total Inflows, Projects	$	623,841
Outflows		
Energy Efficiency Project Expenses	$	410,834
Metering Project Expenses	$	109,969
Measurement & Verification	$	43,296
Other	$	3,867
Total Outflows, Projects	$	567,967
Net Balance	**$**	**55,874**

3.2. Projects Table 3.2 provides a list of projects completed during fiscal year 2012 along with their costs, incentives and projected annual energy-cost savings. Annual energy savings shown include only Energy Management's 80% share. The overall average post-incentive payback for all projects completed in FY12 is 2.18 years.

Table 3.2: FY12 Completed Projects

Project Name	Project Cost	Incentives *Estimated Incentives*
040 SSB Lighting[1]	$ 22,500	*$ 5,000*
303 Chiller Plant HX[1]	$ 75,000	*$ 60,000*
853 HPEB Boiler Replacement[1]	$ 25,000	$ -
017 Performing Arts Lighting	$ 9,654	$ 4,938
043 Naval Science Lighting	$ 9,832	$ 7,185
073 Law Lighting	$ 26,568	$ 24,248
036 Auditorium Lighting	$ 3,457	$ 2,010
586 RB Pipe Insulation	$ 649	$ -
587 ARC Pipe Insulation	$ 4,604	$ -
072, 073 & 084 Retrocommissioning Study	$ 92,892	$ -
Campus "T12 Roundup" Lighting Retrofit	$ 134,073	*$ 94,000*
028 Marriott Dance Stage Lighting[2]	$ 36,528	*$ 34,000*
036 Master Games Studio Lighting	$ 13,747	*$ 9,500*
350 Solar Array Repair	$ 5,500	$ -
035 LED Lighting Phase 4	$ 10,111	$ -
025 BEH Computer Energy Mgmt	$ 1,638	$ -
		TOTAL

[1] Energy Management contribution to project managed by Construction Project Delivery.

[2] Cost shown is net after department contribution of $12,146.

3.3. Other Activities. In addition to implementing energy saving projects, Energy Management was involved in a variety of other roles in FY12. Ongoing functions include:

- Performing measurement and verification of past energy-saving projects
- Providing analytical support to Facilities Management (and other departments)
- Managing the University's utility metering system
- Managing the energy behavioral program.

Beyond these regualar ongoing functions, last year Energy Management began participating in two unique and important projects:

- Metering - Energy Management is heavily involved in two large projects (totaling $1.5M) designed to provide new and upgraded meters to all of the University's major buildings. These include automated power, high temperature water, chilled water, gas and water meters that will be capable of communicating on our developing campus-wide energy information network.

• Better Buildings Challenge - The University of Utah is one of a handful of universities that was invited to take part in this high profile program administered by the U.S. Department of Energy. Through this program, the University committed to reducing campus-wide energy consumption by 20% by 2020. During FY12, Energy Management played a large role in developing strategies that will enable the University to meet this commitment..

3.4. Power and Fuel Accounts. Tables 3.4.1 through 3.4.4 summarize activity in the fuel and power accounts for fiscal year 2012. Line items highlighted in red include payments made to utilities. Rocky Mountain Power and Questar are the primary electric and gas utilities. WAPA is hydroelectric power purchased on contract directly from the Western Area Power Authority, which is part of the U.S. Department of Energy. Gas from Wasatch Energy is purchased wholesale on state contract and is delivered through Questar's distribution system. S Power is a new power provider that owns, under a Power Purchase Agreement, the solar systems on HPER East and the Natural History Museum of Utah.

Table 3.4.1: FY12 Electric Power Account Summary

Inflows		
Base Funding	$	15,457,469.00
Tuition & Fees Distribution	$	371,386.06
For Wind Power	$	23,950.50
Electricity Contra		
Power	$	6,088,083.03
Chilled Water	$	2,267,428.26
From DFCM (Solar)	$	1,000,000.00
Refund for RMP Overcharge	$	129,080.61
Other Services	$	75,270.45
Total Inflows	**$**	**25,412,667.91**
Outflows		
Utilities		
Rocky Mountain Power	**$**	**13,466,820.13**
WAPA Power	**$**	**427,216.62**
S Power (Solar)	**$**	**1,017,910.38**
Chilled Water Plant O&M	$	226,013.10
Chilled Water R&R	$	668,640.72
Wind Power Purchase	$	109,999.65
Transfer - Water	$	291,790.47
Transfer - Energy Management Projects	$	263,559.00
Transfer - Energy Engineering	$	61,499.97
Behavioral Consultant	$	90,841.06
Debt Retirement - East Campus Chilled Water Plant	$	6,022,157.42
Other Charges	$	137.16
Total Outflows		
Net Balance, Electric Power Account	**$**	**22,646,585.68**

Table 3.4.2: Net Electric Utility Cost

Payments to Rocky Mountain Power and WAPA	$	13,894,036.75
Power & Chilled Water Charges to Auxiliaries	$	8,355,511.29
Net Electric Cost	**$**	**5,538,525.46**

Table 3.4.3: FY12 Gas Account Summary, July - Dec., 2011

Inflows		
Base Funding	$	9,970,378.00
Tuition & Fees Distribution	$	372,397.35
Heat, Steam & Gas Contra		
High-Temp Water	$	3,273,836.71
Steam	$	91,313.14
Natural Gas	$	896,601.85
Other Services	$	138,063.15
Total Inflows	**$**	**14,742,590.20**
Outflows		
Utilities		
Questar Gas	**$**	**6,845,787.53**
Wasatch Energy	**$**	**3,117,281.42**
High-Temp Water System O&M	$	692,306.94
High-Temp Water System R&R	$	631,635.58
Boiler Inspections	$	9,255.00
Transfer - Water	$	291,892.47
Transfer - Energy Management Projects	$	27,592.00
Debt Retirement - East Campus Chilled Water Plant	$	2,313,744.66
Other Charges	$	411.48
Total Outflows		
Net Balance, Gas Account	**$**	**13,929,907.08**

Table 3.4.4: Net Gas Utility Cost

Payments to Questar and Wasatch Energy	$	9,963,068.95
Gas Related Charges to Auxiliaries	$	4,261,751.70
Net Gas Cost	**$**	**5,701,317.25**

4. Fiscal Year 2013 Projections

This section provides a forecast of financial activity, a list of projects expected to be completed, and a summary of other activities Energy Management will be involved in in fiscal year 2013.

4.1. Financial Activity. Table 4.1 shows the budget with projected inflows and outflows for FY13. Fuding from the discontinued Meausurement and Verification contract is scheduled to increase 1% over last year. Energy savings from completed projects are expected to grow from $175,000 in FY12 to $225,000, an increase of 29%. Utility incentives are expected to increase from $118,000 in FY12 to $275,000, an- increase of 133%. This is the result of a conscious effort made in FY12 to target projects that can take advantage of Rocky Mountain Power's "Self-Direct Credit" program that provides large incentives for projects that are designed and managed in-house.

FY13's budget includes an anticipated loan from the State Facility Energy Efficiency Fund, a 0% loan program administered by DFCM. Energy Management is in the process of applying for this loan to help fund the Better Buildings Challenge Showcase Project: Installation and restoration of evaporative cooling in a variety of buildings.

Table 4.1: FY13 Program Budget

Inflows		
Measurement &Verification	$	231,222
Projected Energy Savings	$	225,000
Projected Utility Incentives	$	275,000
0% Loan from State Facility Energy Efficiency Fund[1]	$	300,000
Total Inflows, Projects	$	1,031,222
Outflows		
Energy Efficiency Project Expenses	$	947,926
Metering Project Expenses	$	40,000
Measurement & Verification	$	43,296
Total Outflows, Projects	$	1,031,222

[1] Potential funding for BBC Showcase Project (Evaporative Cooling). Arrangements are preliminary and it is shown for forecasting reasons only.

4.2. Projects. Table 4.1 summarizes the estimated costs, energy cost savings and utility incentives associated with projects that are in progress at the beginning of fiscal year 2013. All of these projects are scheduled to be complete and will be yielding savings by December 2012.

Table 4.1: FY12 Current Projects

Project Name	Estimated Cost *Actual Cost*	Estimated Annual Savings	Estimated Incentives
565 EEJMRB Retrocommissioning	$ 30,000	$ 39,929	$ -
086 Marriott Library Retrocommissioning	$ 45,000	$ 23,300	$ 8,000
009 Widtsoe Retrocommissioning	$ 30,000	$ 10,300	$ -
013 Cowles Retrocommissioning	$ 30,000	$ 15,400	$ -
FY13 Meter Maintenance	$ 40,000	$ -	$ -
372 KENN Hybrid Elevator[1]	$ 8,800	$ 1,050	
083 JFB LED Lighting[1]	$ 15,000	$ 3,200	
049 LNCO Lighting Controls (SCIF)	$ 4,500	$ 1,200	$ -
054 OSH LED Lighting (SCIF)	$ 2,000	$ 400	$ -
006 Stewart Lighting	$ 18,000	$ 4,266	$ 9,000
093 Natatorium Lighting	$ 105,000	$ 4,980	$ 53,000
040 SSB Lighting Phase 2	$ 124,000	$ 16,900	$ 62,000
035 LED Lighting Phase 5	$ 22,000	$ -	$ -
Campus Building Scheduling	$ 40,000	$ 150,000	$ -
Muliple Building Evap Cooling (BBC)	$ 450,000	$ 150,000	$ 100,000
TOTAL	$ 964,300	$ 420,925	$ 232,000

[1] Energy Management contribution to project managed by Construction Project Delivery.

4.3. Other Activities. During FY13, in addition to implementing energy-saving projects, Energy Management will again be involved in a variety of ongoing tasks. Highlights include:

• Metering - Thanks to careful scoping and competitive pricing, the $1.5M budget for these projects is stretching a long way and additional meters are being added. Even with the added scope, both metering projects will be complete this year.

• Better Buildings Challenge - this program has been divided into three areas: Energy Improvement Projects, Behavioral and Retrocommissioning:

Energy Improvement Projects: Activities in this area include moving forward with the BBC Showcase Project, wich involves adding or restoring evaporative cooling in a variety of buildings. Energy Management will also continue developing strategies for implementation of larger projects including pulling together data from past and current studies to establish a list of "shovel-ready" projects.

Behavioral: Energy Management is moving forward with changes to building shedules that reduce equipment run-times.

Retrocommissioning: With available funding from this program, Energy Management is moving forward with the retrocommissioning of several buildings that have already been studied and will pursue additional projects as funding becomes available.

5. Fiscal Year 12 Energy Summary

This section provides information about electricity and gas consumption in FY12 along with comparisons to two the last two years. The area covered by these utilities includes main campus, health sciences, housing and several large buildings in the research park area.

5.1. Energy Tables

Tables 5.1.1 through 5.1.3 show electricity and gas totals for FY12 and compares them to the last two fiscal years.

Table 5.1.1: Electricity

	FY 2012	FY 2011	% Change	FY 2010	% Change
Energy (kWh)	251,797,128	236,390,045	6.52%	241,104,407	4.43%
Power (kW)	43,885	41,520	5.70%	41,299	6.26%
Cost ($)	$ 14,314,353	$ 13,175,590	8.64%	$ 12,844,525	11.44%
Rate ($/kWh)	$ 0.0568	$ 0.0557	2.00%	$ 0.0533	6.71%

Table 5.1.2: Gas

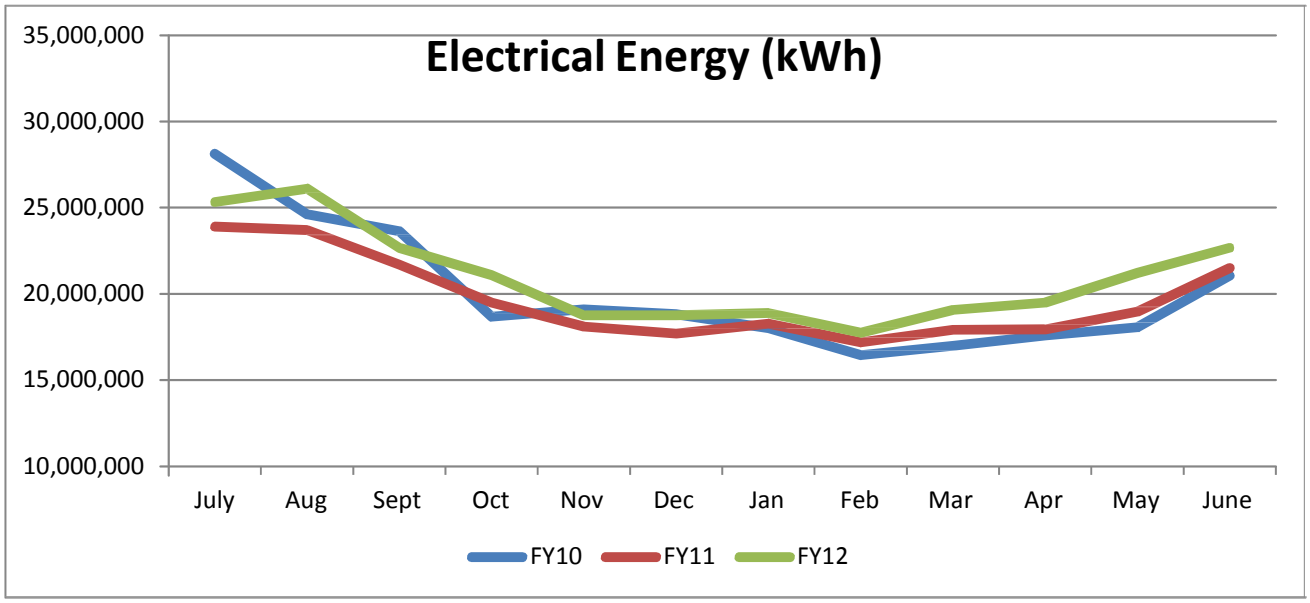
	FY 2012	FY 2011	% Change	FY 2010	% Change
Energy (DTH)	1,920,254	1,846,801	3.98%	1,739,991	10.36%
Cost ($)	$ 10,369,104	$ 11,099,545	-6.58%	$ 9,301,354	11.48%
Rate ($/DTH)	$ 5.400	$ 6.010	-10.15%	$ 5.346	1.01%

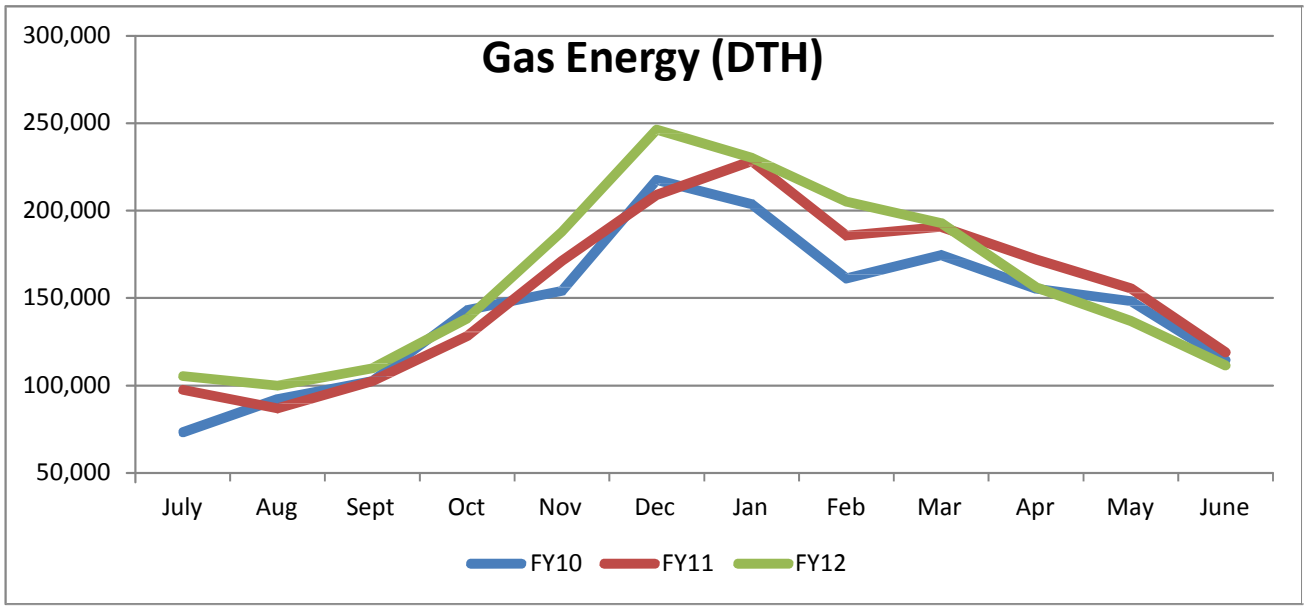
Table 5.1.3: Combined Electricity & Gas

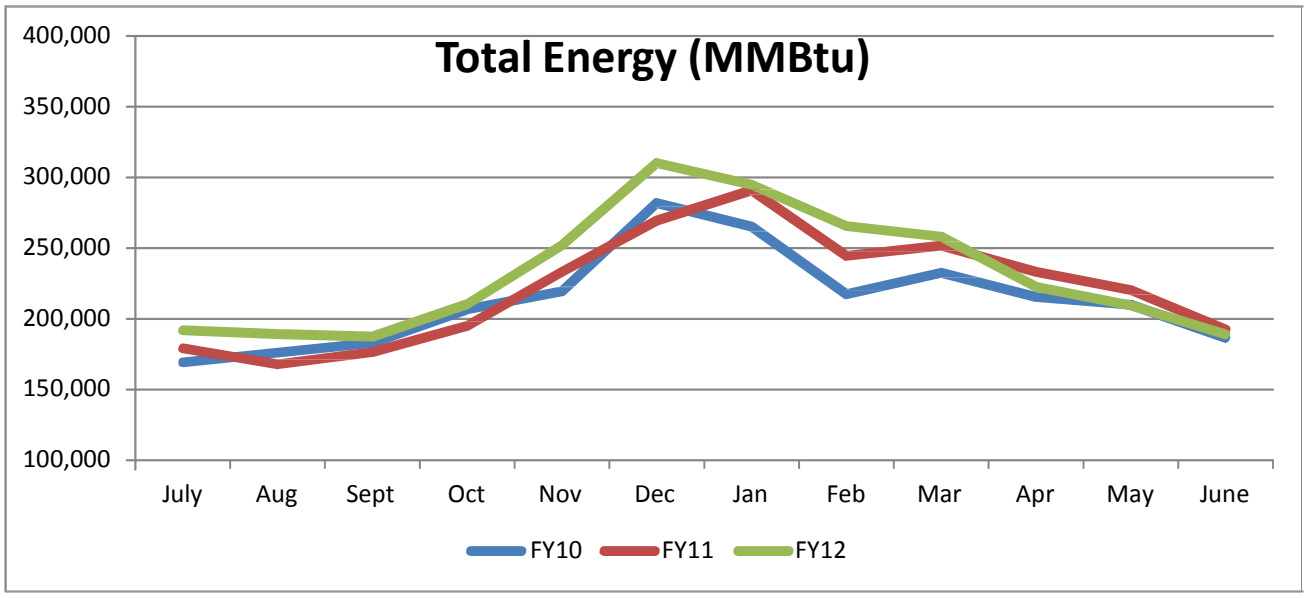
	FY 2012	FY 2011	% Change	FY 2010	% Change
Energy (MMBtu)	2,779,421	2,653,397	4.75%	2,562,673	8.46%
Cost ($)	$ 24,683,457	$ 24,275,135	1.68%	$ 22,145,879	11.46%
Rate ($/MMBtu)	$ 8.881	$ 9.149	-2.93%	$ 8.642	2.77%

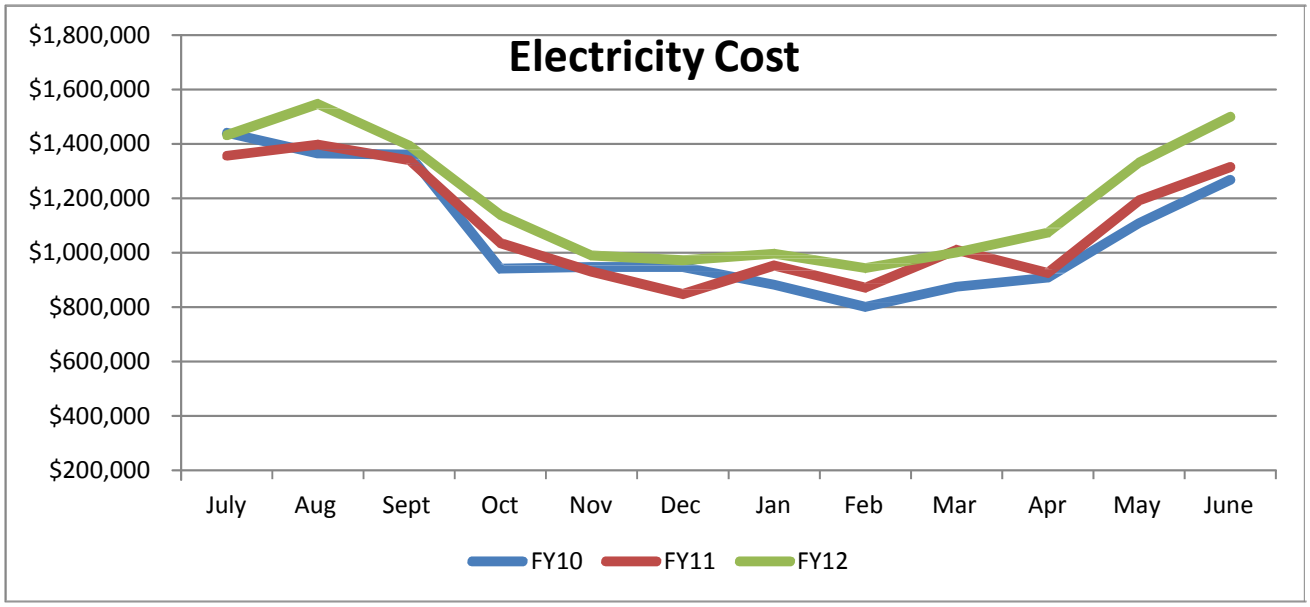
kWh = kilowatt-hours
kW = kilowatts
DTH = dekatherms
MMBtu = millions of btus

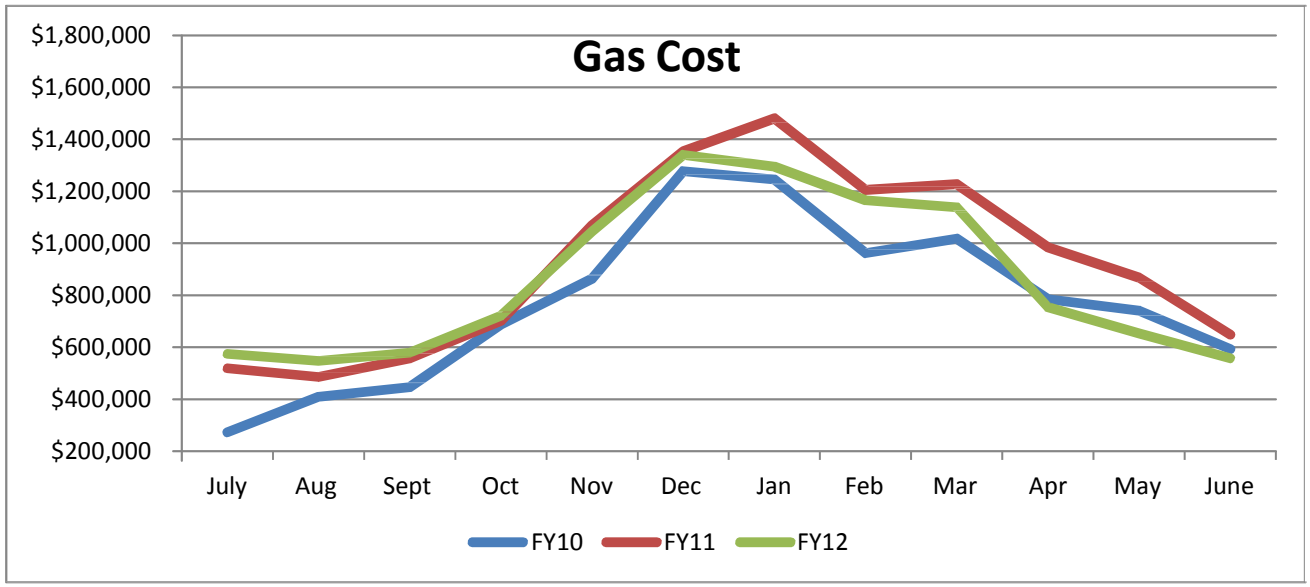
5.4. Energy Graphs. The following graphs show monthly electricity and gas usage for FY12 in comparison with the last 2 years


Electrical Energy (kWh)
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Gas Energy (DTH)
300,000
250,000
200,000
150,000
100,000
50,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Total Energy (MMBtu)
400,000
350,000
300,000
250,000
200,000
150,000
100,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Electricity Cost
$1,800,000
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
$600,000
$400,000
$200,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Gas Cost
$1,800,000
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
$600,000
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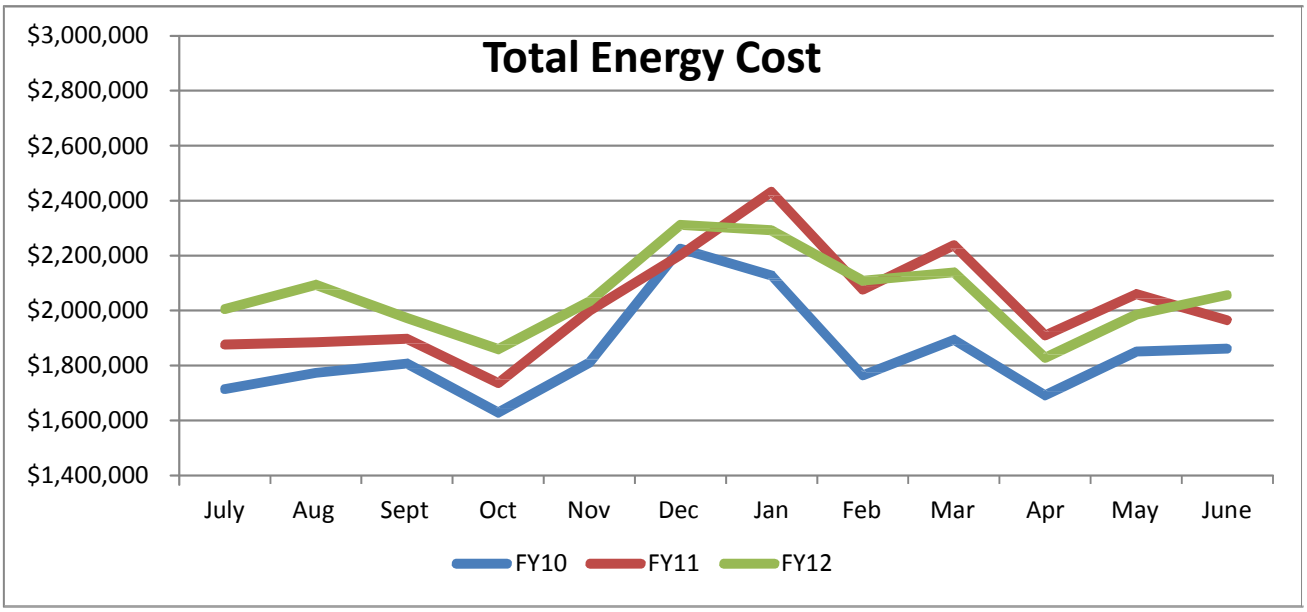
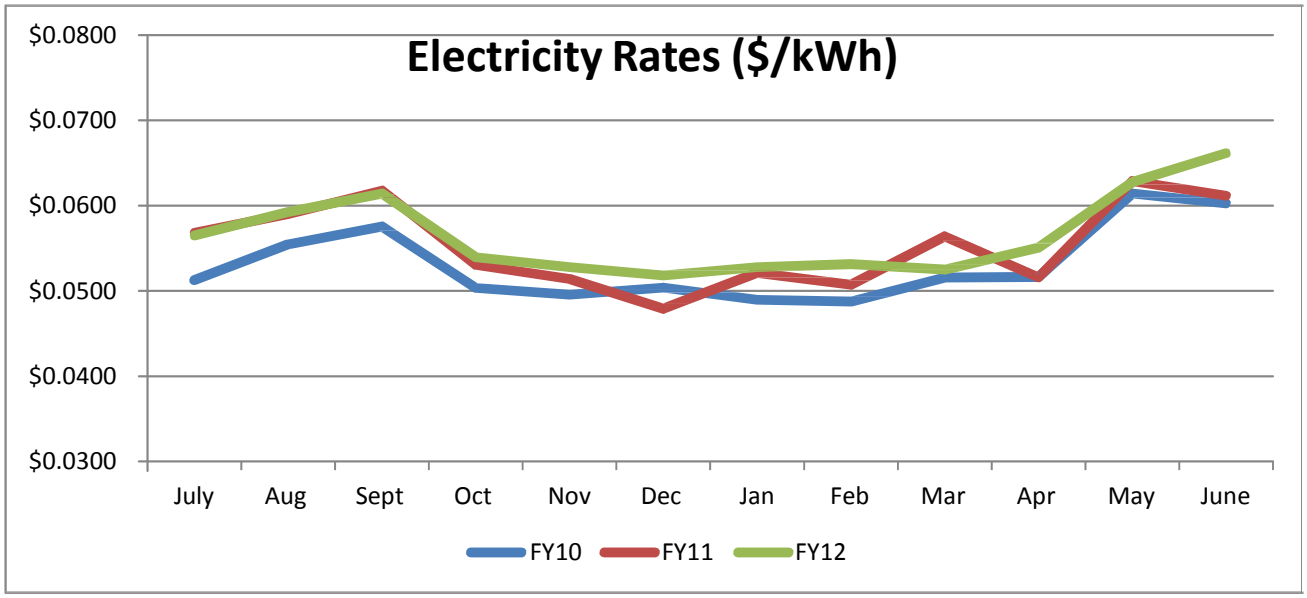
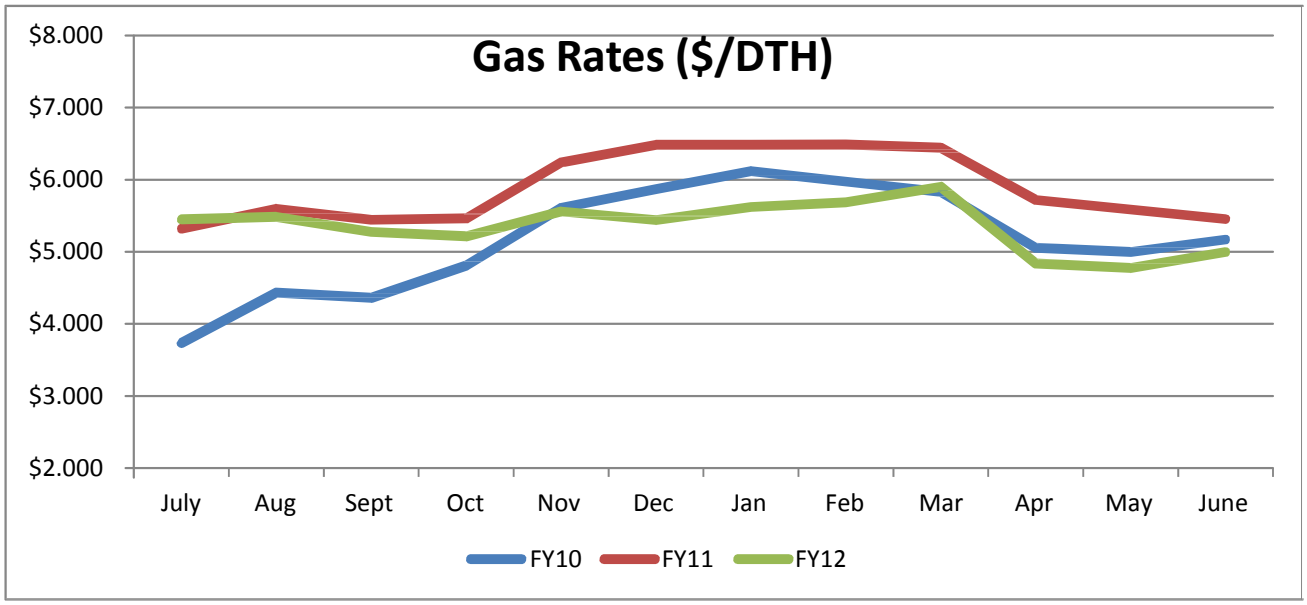
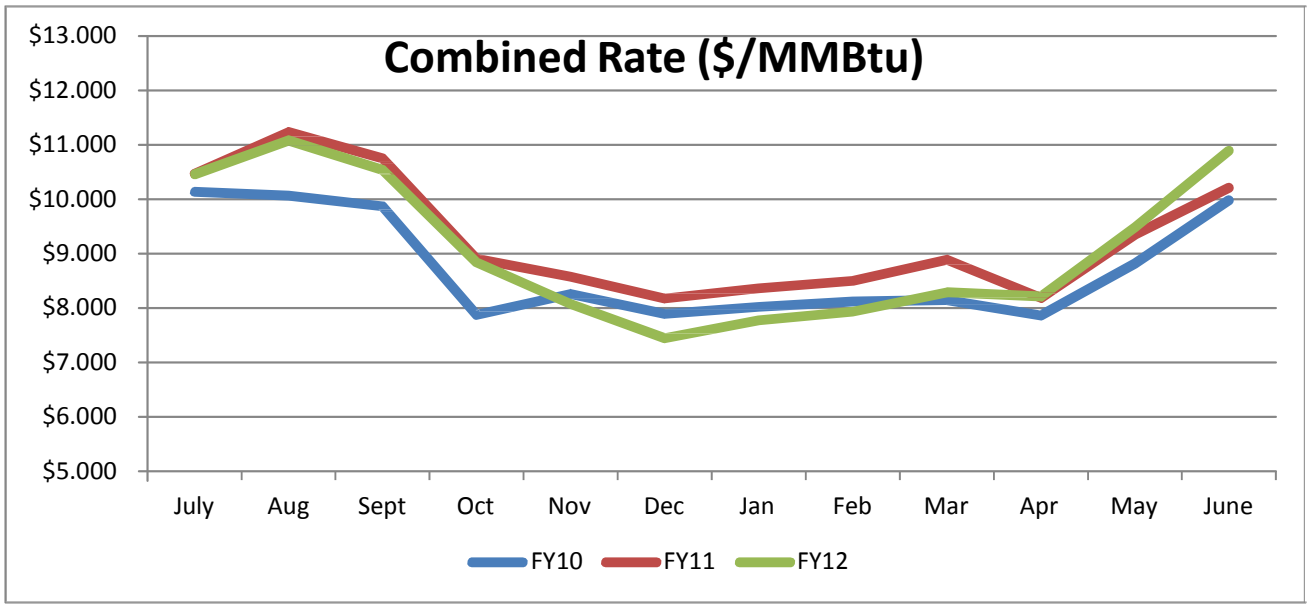
$200,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Total Energy Cost
$3,000,000
$2,800,000
$2,600,000
$2,400,000
$2,200,000
$2,000,000
$1,800,000
$1,600,000
$1,400,000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Electricity Rates ($/kWh)
$0.0800
$0.0700
$0.0600
$0.0500
$0.0400
$0.0300
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Gas Rates ($/DTH)
$8.000
$7.000
$6.000
$5.000
$4.000
$3.000
$2.000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12


Combined Rate ($/MMBtu)
$13.000
$12.000
$11.000
$10.000
$9.000
$8.000
$7.000
$6.000
$5.000
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
FY10
FY11
FY12

Appendix A. Past Projects

Tables A.1 - A.4 include lists of projects completed in fiscal years 2008 through 2011 and provide summaries of the energy cost savings these projects have yielded through June 2012. Projects highlighted in red have reached their maximum pay-backs and are no longer sharing savings with the fuel and power accounts.

Table 5.1: FY08 Completed Projects

Project Name	Project Cost	Other Funding	Incentive	Savings To-Date from Fuel & Power	Total Benefit To-Date to Energy Mgmt	Total Benefit To-Date to Fuel & Power
063 EMCB Lighting	$ 121,226	$ 90,000	$ 97,781	$ 42,596	$ 230,377	$ 10,649
533 Genetics Retrocommissioning	**$ 64,500**	**$ 64,500**	**$ -**	**$ 55,200**	**$ 119,700**	**$ 13,800**
091 HPER Lighting	$ 137,996	$ 144,124	$ 110,996	$ 112,634	$ 367,755	$ 28,159
570 Retrocommissioning	$ 61,083	$ 22,880	$ -	$ 28,981	$ 51,861	$ 7,245
302 East Plant Combustion Improvement	**$ 60,000**	**$ -**	**$ -**	**$ 60,000**	**$ 60,000**	**$ 15,000**
303 Central Plant Lighting	$ 35,540	$ -	$ 17,770	$ 23,066	$ 40,836	$ 5,766
555 HCI Computer Energy Mgmt	$ 7,740	$ -	$ 3,870	$ 2,934	$ 6,804	$ 734
TOTAL	$ 488,085	$ 321,504	$ 230,417	**$ 325,412**	**$ 877,333**	**$ 81,353**

Table 5.2: FY09 Completed Projects

Project Name	Project Cost	Other Funding	Incentive	Savings To-Date from Fuel & Power	Total Benefit To-Date to Energy Mgmt	Total Benefit To-Date to Fuel & Power
350 USB Remodel	$ 254,937	$ -	$ -	$ 70,000	$ 70,000	$ 17,500
072 Law Library Lighting	$ 44,540	$ -	$ 35,632	$ 30,483	$ 66,115	$ 7,621
040 SSB HVAC Improvements	**$ 101,489**	**$ -**	**$ -**	**$ 103,701**	**$ 103,701**	**$ 25,925**
029 Fieldhouse Lighting	$ 109,128	$ -	$ 83,250	$ 57,357	$ 140,607	$ 14,339
TOTAL	$ 510,094	$ -	$ 118,882	**$ 261,540**	**$ 380,422**	**$ 65,385**

Table 5.3: FY10 Completed Projects

Project Name	Project Cost	Other Funding	Incentive	Savings To-Date from Fuel & Power	Total Benefit To-Date to Energy Mgmt	Total Benefit To-Date to Fuel & Power
032 REC Lighting Controls	$ 80,421	$ 37,900	$ 1,627	$ 19,333	$ 58,860	$ 4,833
062 Warnock LED Lighting	$ 13,887	$ -	$ -	$ 7,422	$ 7,422	$ 1,856
565 EEJMRB Delamping	**$ 264**	**$ -**	**$ -**	**$ 6,400**	$ 6,400	**$ 1,600**
065 MBH Lighting	$ 70,865	$ -	$ 37,992	$ 17,842	$ 55,833	$ 4,460
077 CRCC Lighting	**$ 3,388**	**$ -**	**$ -**	**$ 4,046**	**$ 4,046**	**$ 1,012**
105 Annex Boiler Controls	**$ 4,500**	**$ -**	**$ -**	**$ 4,582**	**$ 4,582**	**$ 1,146**
008 Emery Lighting	$ 38,564	$ -	$ 35,529	$ 8,099	$ 43,627	$ 2,025
025 BEH Computer Energy Mgmt	**$ 1,365**	**$ -**	**$ -**	**$ 1,414**	**$ 1,414**	**$ 353**
091 HPER Lighting Controls	$ 21,841	$ -	$ -	$ 1,412	$ 1,412	$ 353
105 Annex Pipe Insulation	**$ 3,529**	**$ -**	**$ -**	**$ 3,562**	**$ 3,562**	**$ 890**
090 Huntsman Lighting	$ 5,184	$ -	$ 1,256	$ 1,743	$ 3,000	$ 436
052 Alumni Pipe Insulation	$ 2,285	$ -	$ -	$ 1,872	$ 1,872	$ 468
TOTAL	$ 246,092	$ 37,900	$ 76,404	**$ 77,727**	**$ 192,031**	**$ 19,432**

Table 5.4: FY11 Completed Projects

Project Name	Project Cost	Other Funding	Incentive	Savings To-Date from Fuel & Power	Total Benefit To-Date to Energy Mgmt	Total Benefit To-Date to Fuel & Power
054 OSH Pipe Insulation	$ 2,720	$ -	$ -	$ 870	$ 870	$ 218
066 PMT High Bay Lighting	$ 4,108	$ -	$ -	$ 840	$ 840	$ 210
083 Fletcher Lighting	$ 7,184	$ -	$ -	$ 1,436	$ 1,436	$ 359
306, 309 Occupancy Sensors	$ 5,680	$ -	$ -	$ 865	$ 865	$ 216
035 UMFA LED Lighting Phase 1	$ 6,053	$ -	$ 2,184	$ 1,470	$ 3,654	$ 367
051 Sill Lighting Controls	$ 3,037	$ -	$ -	$ 330	$ 330	$ 82
025 BEH Window Film	$ 25,409	$ -	$ -	$ 3,193	$ 3,193	$ 798
026 CSW Lighting Controls	$ 14,392	$ -	$ -	$ 1,004	$ 1,004	$ 251
849 Red Butte LED Lighting	$ 9,136	$ -	$ 2,718	$ 2,558	$ 5,276	$ 639
350 Lighting - Room 241 Lighting	$ 1,494	$ -	$ -	$ 380	$ 380	$ 95
Campus Steam Traps Phase 1	**$ 8,902**	$ -	$ -	**$ 26,584**	$ 26,584	$ 6,646
052 Alumni Lobby Lighting	$ 7,106	$ 3,712	$ -	$ 947	$ 4,659	$ 237
035 UMFA LED Lighting Phase 2	$ 6,753	$ -	$ 1,320	$ 1,991	$ 3,311	$ 498
012 Sutton Relief Fan Modulation	$ 1,128	$ -	$ -	$ 180	$ 180	$ 45
019/040 Hx Insulation Blankets	$ 2,763	$ -	$ -	$ 4,254	$ 4,254	$ 1,063
086 Marriott Humidifier Tubes	$ 66,156	$ -	$ -	$ 7,296	$ 7,296	$ 1,824
Lot 39 LED Lighting	$ 44,486	$ 16,239	$ 2,429	$ 1,988	$ 20,656	$ 497
025 BEH Computer Energy Mgmt	**$ 1,365**	$ -	$ -	**$ 8,483**	$ 8,483	$ 2,121
350 Print Shop Lighting Controls	$ 6,807	$ -	$ -	$ 776	$ 776	$ 194
001 Park Lighting	$ 18,179	$ -	$ 14,134	$ 518	$ 14,652	$ 130
014 Talmadge Lighting	$ 22,149	$ -	$ 14,930	$ 2,982	$ 17,912	$ 745
306, 309 Lighting	$ 21,254	$ -	$ 15,614	$ 1,043	$ 16,656	$ 261
038 Art Lighting	$ 31,607	$ -	$ 21,769	$ 1,099	$ 22,868	$ 275
035 UMFA LED Lighting Phase 3	$ 25,656	$ -	$ 20,525	$ 8,570	$ 29,094	$ 2,142
533 Decorative Panel Lighting	$ 21,096	$ 13,753	$ -	$ 1,174	$ 14,927	$ 294
210 Football Boilers (building demolished)	**$ 65,000**	$ -	**$ 16,244**	**$ 17,068**	$ 33,312	$ 4,267
040 Cooling Tower VFDs	$ 12,500	$ -	$ -	$ 2,571	$ 2,571	$ 643
570 Steam Boiler Replacement	$ 5,000	$ -	$ -	$ 800	$ 800	$ 200
TOTAL	$ 447,117	$ 33,704	$ 111,868	**$ 101,272**	**$ 246,843**	**$ 25,318**

Weber State University
Annual Energy Report

Fiscal Year 2012

Contact: Jacob Cain
Manager, Office of Energy and Sustainability
801-626-6311
jacobcain@weber.edu

Introduction

Weber State University's efforts in energy conservation and production stem from its pledge to become completely carbon neutral. By signing the American College and University President's Climate Commitment, WSU is committed to accomplishing this by 2050. To do so, WSU is implementing energy conservation projects, investing in renewables, and striving toward behavioral change. National organizations have recognized WSU for its energy efforts and for its revolving green fund.

Overview

Since 2007, WSU has seen an increase in enrollment of over 40%. During this same period, the University has also begun to implement a number of energy and water saving projects on campus. Despite the increase in enrollment, the University has been saving substantial amounts of money by conserving electricity, water, and natural gas.

Fiscal Year	Combined Utility Savings
2010	$439,155
2011	$527,222
2012	$939,575

Note: Savings calculations are based on a baseline determined by average utility bills from 2007 – 2009 and include electricity, natural gas, and water. These savings are equivalent to 3,795,000 pounds of carbon dioxide that were not released into the atmosphere.

Figures 1 and 2 depict electricity and natural gas consumption for the periods 2007 – 2012.

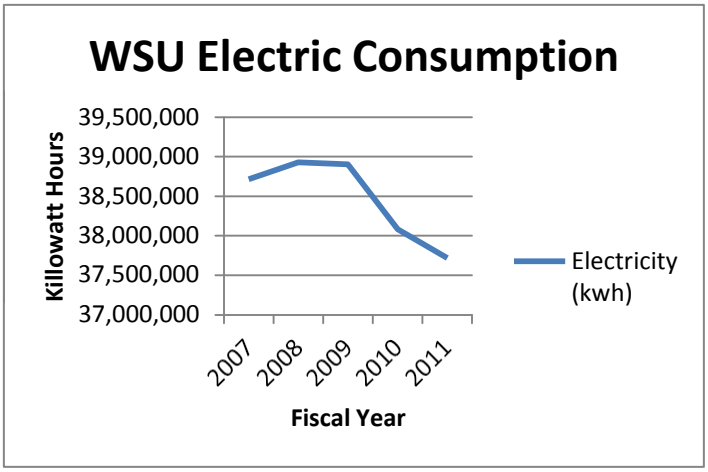


Figure 1 WSU Electric Consumption

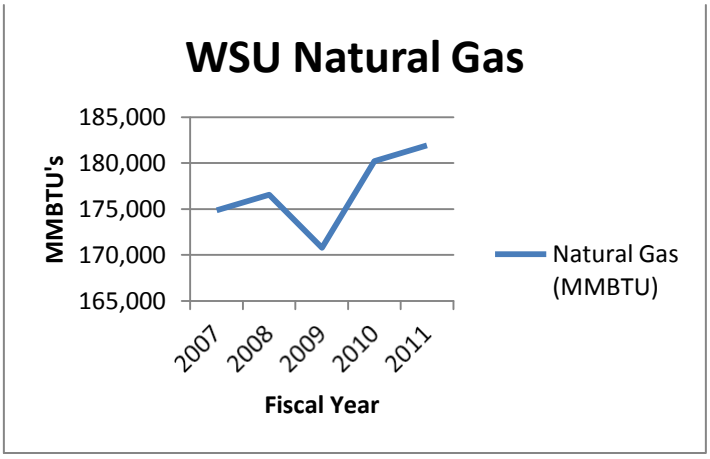


Figure 2 WSU Natural Gas Consumption.

The increase in natural gas consumption is due to new construction occurring on campus and a relatively cold winter. Once the new construction projects are complete, we expect to see a significant decline in the amount of natural gas being used as our efficiency projects take effect. While WSU has seen increased enrollment and increased total square footage during this time period, consumption per square foot and consumption per capita has decreased. This is shown in Figures 3 and 4 in terms of greenhouse gases emitted.

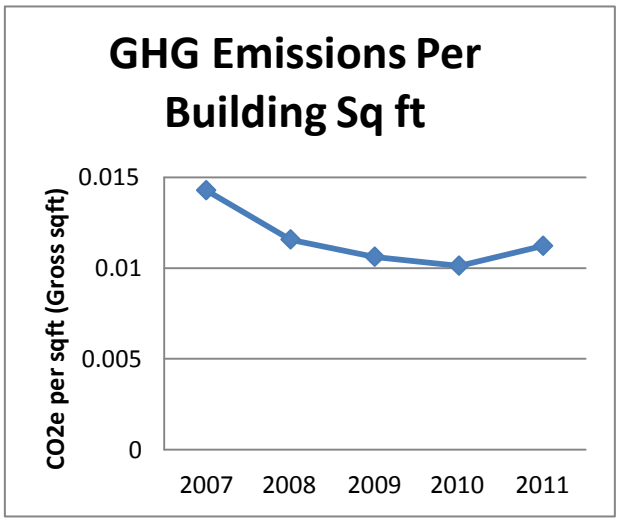


Figure 3 - Greenhouse Gas Emissions per Square Foot

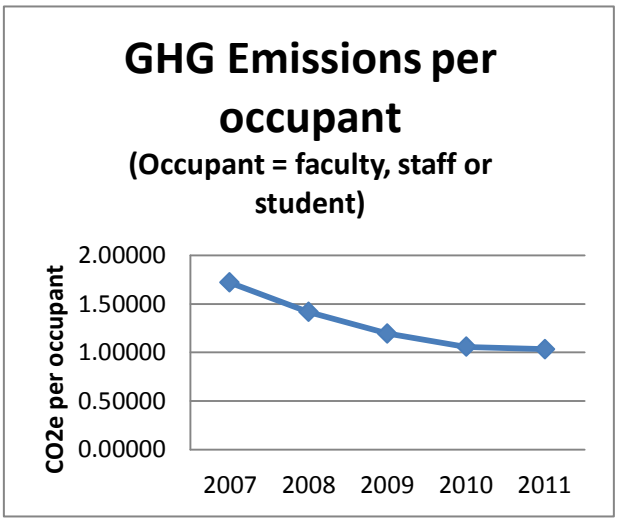


Figure 4 - Greenhouse Gas Emissions per Occupant

Energy Projects

- All indoor and outdoor lighting is being upgraded to high efficiency LED's and CFL's. Motion sensors are being installed to ensure that lighting is not being left on when not needed. This project is about 30% complete.
- A number of upgrades and repairs are also underway on WSU's steam tunnel system. By repairing leaks and installing AeroGel insulation, substantial natural gas savings are being realized.
- WSU currently has three solar installations, with one currently under construction. A photovoltaic array on top of the Shepherd Union Building is producing 43,345 kilowatt hours annually. A similar array on the Davis 2 building is producing 32,954 kilowatt hours annually. The pool in the Swenson Gym is now heated by a solar thermal array, which is the equivalent of 1070 dekatherms of natural gas. A third photovoltaic array will soon be completed on a new building at the Davis Campus.
- WSU currently purchases 11% of its total electricity through Rocky Mountain Power's Blue Sky program.
- WSU is also making efforts in behavioral change towards energy conservation. Last year, several of WSU's buildings were entered into the EPA's National Building Contest. WSU's shipping and receiving building won for its category.
- WSU utilizes the Lucid Building Dashboard system to provide real time information on electricity, natural gas, and water consumption. Currently, two academic buildings and one residence hall are being monitored. WSU is in the process of installing meters on every building on campus so they can all be tracked on the Lucid Dashboard. This will allow WSU to analyze energy use better and schedule buildings appropriately.
- A newly hired Student Sustainability Coordinator has organized a student group aimed at increasing environmental awareness on campus. This group, known as WSU's Environmental

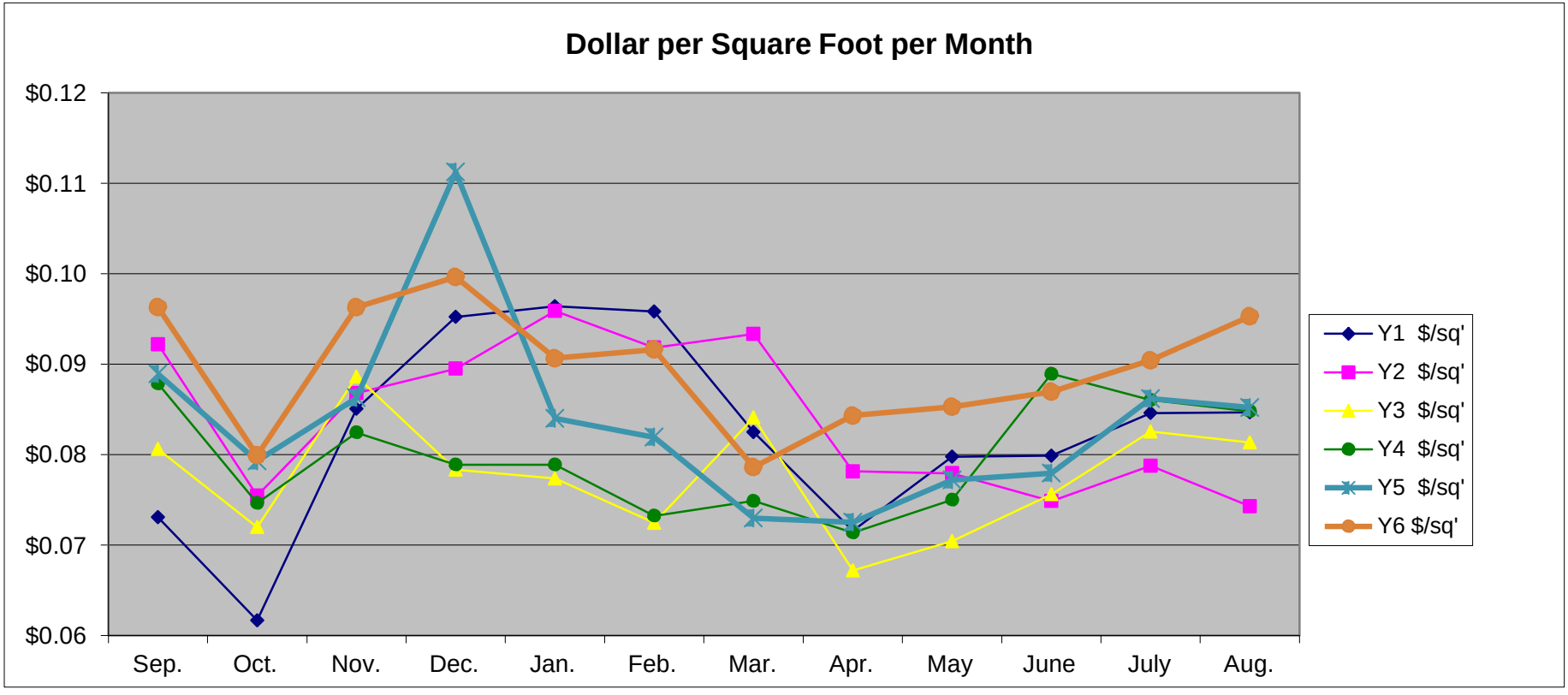
Ambassadors, is a peer to peer educational organization whose goal is changing student behavior in favor of more energy efficient practices.

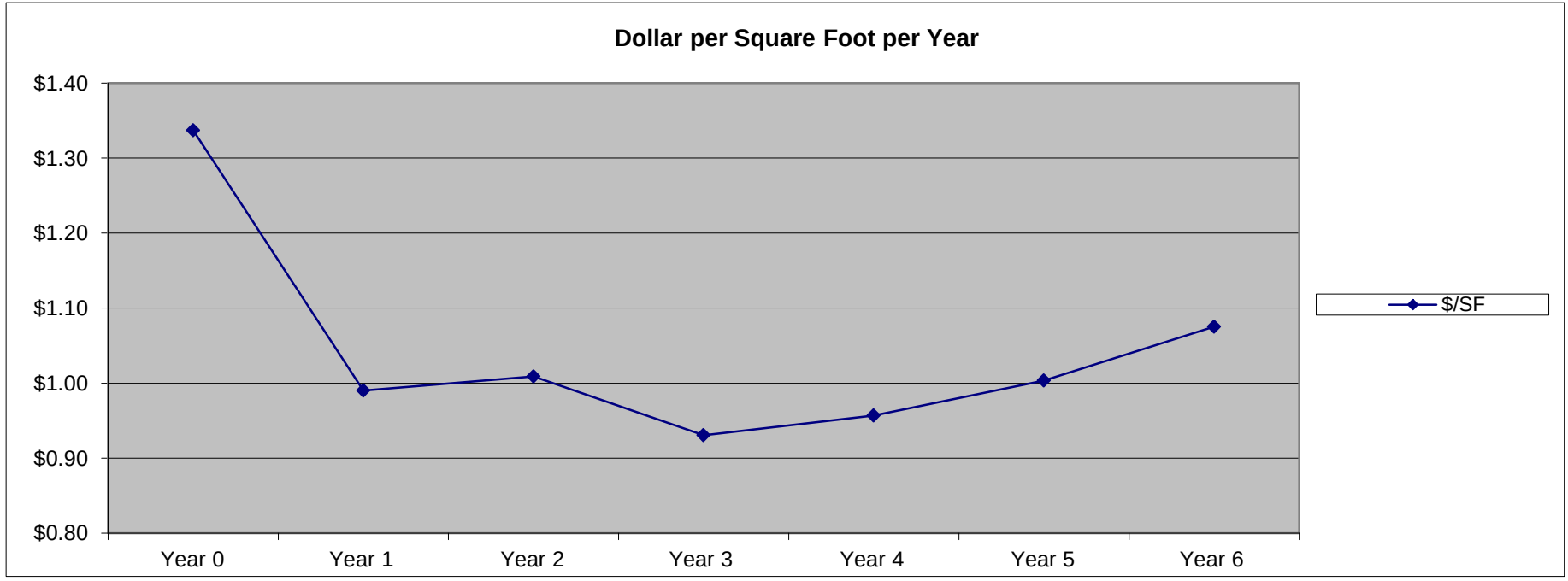
- WSU's shuttle bus fleet is now powered by natural gas. WSU also partnered with Questar gas to construct a new public compressed natural gas fueling station near the south end of campus. This station not only benefits the university, but the community at large.
- Each Spring, WSU hosts the Intermountain Sustainabiliity Summit. This event serves as education, training, and networking for energy professionals, business people, students, and anyone else who is interested in the topics of sustainability, energy, and recycling.
- WSU was ranked 74th on Sierra Magazines list of Cool Schools. The 5th Annual report of the ACUPCC featured an article on WSU and its funding model.

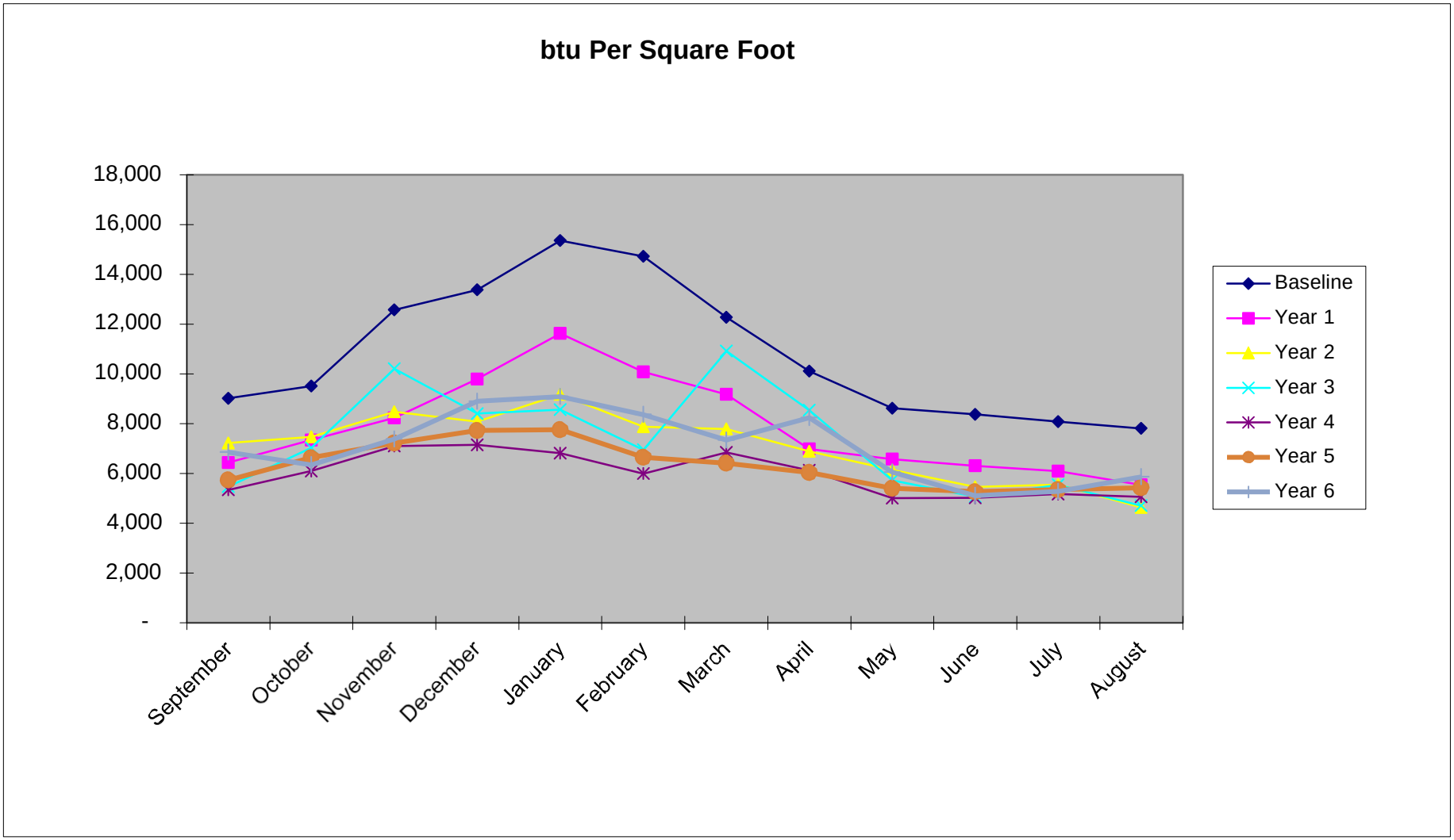
Other energy projects currently under way at WSU are listed below.

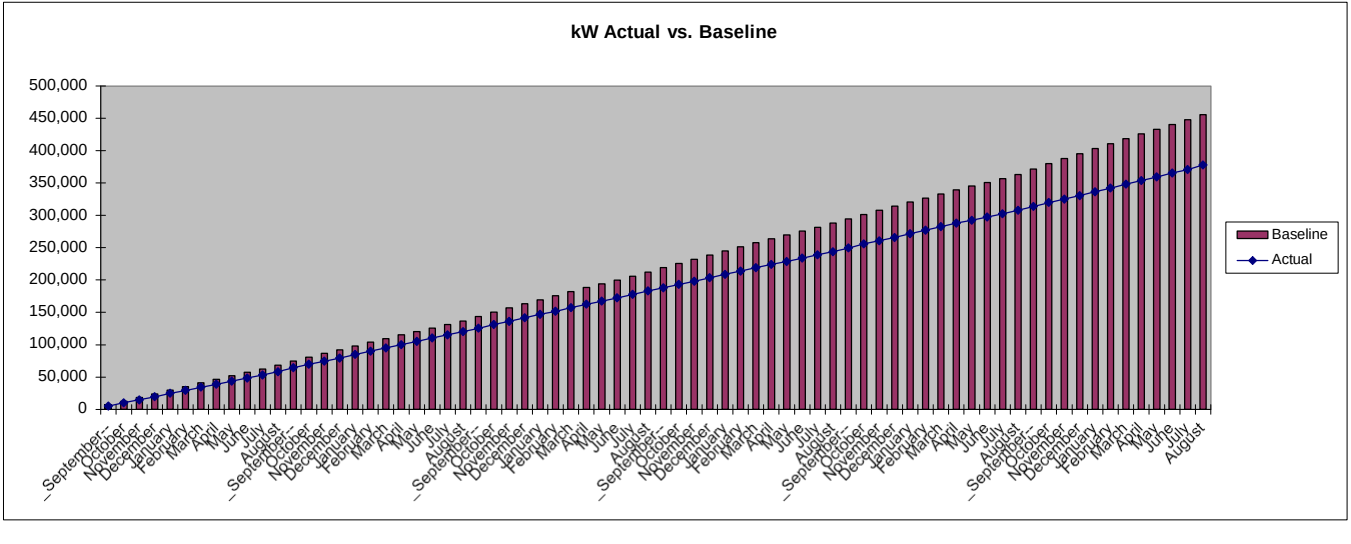
Interior Lighting - Campus Wide	Construction 30%
DEC Chiller Replacement	Complete
ECM 2.1 Steam Powered Condensate Pumps	Funded
ECM 6.8 Replace DHW Tanks with HX	Funded
Steam Energy Upgrades Phase 1	Substantial Completion
Steam Tunnel Support Repair	Funded as part of steam repairs
ECM 4.4 Replace Piping Insulation on AHUs	Awaiting In-House Labor
ECM 2.5 Boiler 2 Economizer	Substantial Completion
ECM 3.3 VFDs for Central Plant Cooling Towers	Complete
ECM 4.3 Convert DX Units to CHW	Canceled
ECM 7.1 TE Convert Inlet Vanes to VFD	Awaiting In-House Labor
ECM 5.1 Davis 2 VAV Upgrade and IDEC	Engineering
ECM 5.15 Recomission Sky Suites, ED, SS	Out to Bid
ECM 10.1 Solar Water Heating - GYM	Complete
Solar PV Davis	Complete
Solar PV Union	Complete
ECM 9.4 Weatherproofing - SS, LI, SL	CI - Next Year
ECM 11.1 Computer Controls	In Progress
ECM 11.4 Greenhouse Temperature Controls	Engineering
Swimming Pool Cover	Construction
Electric Meters	Construction 98%
Steam Meters	Awaiting Funding
Chilled Water	Construction 10%
High Efficiency Transformers	CI - 2 Years Out
HV Switches	CI - 2 Years Out
Exterior Lighting	Construction 50%
DEC Power Factor Correction	Funded

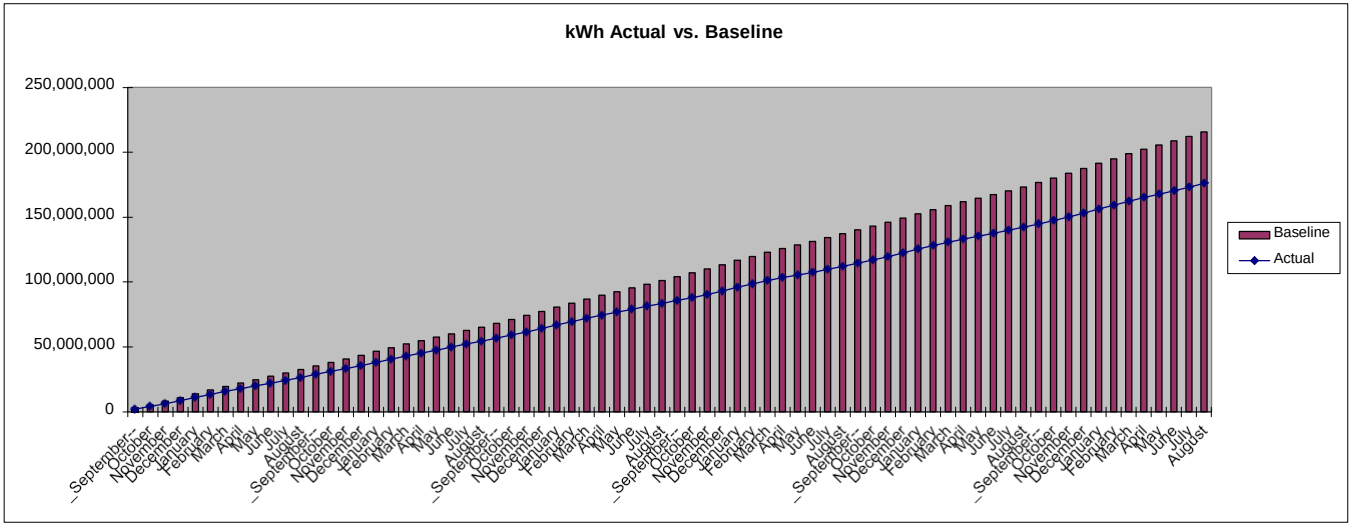
Actual VS Base

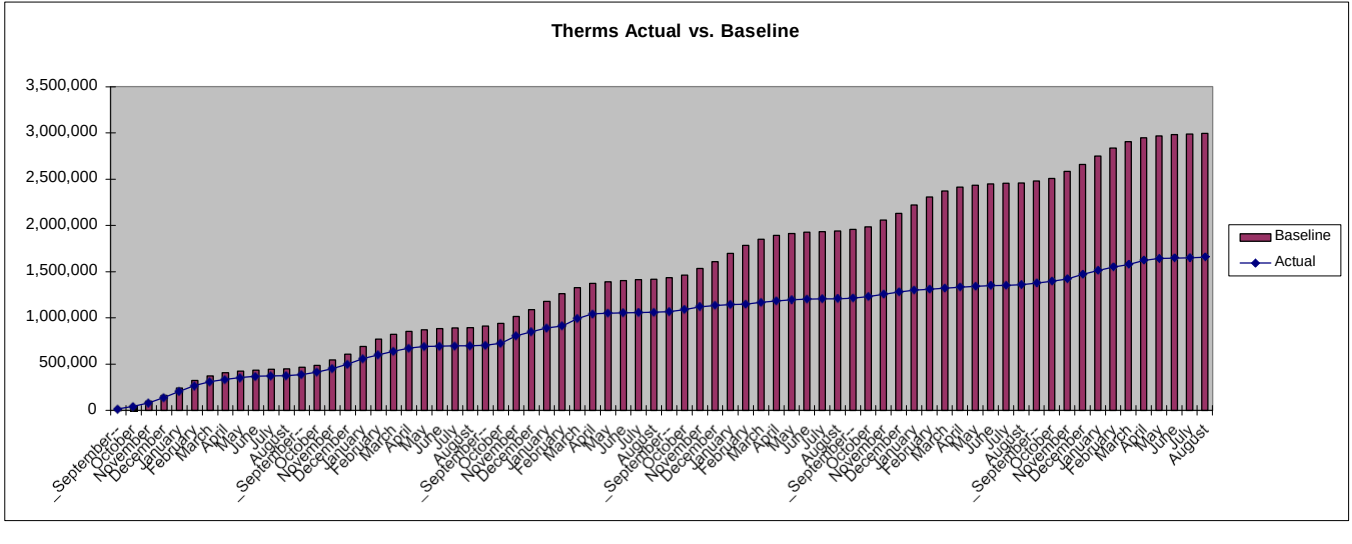

Dollar per Square Foot per Month
$0.12
$0.11
$0.10
$0.09
$0.08
$0.07
$0.06
Sep.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Y1 $/sq'
Y2 $/sq'
Y3 $/sq'
Y4 $/sq'
Y5 $/sq'
Y6 $/sq'

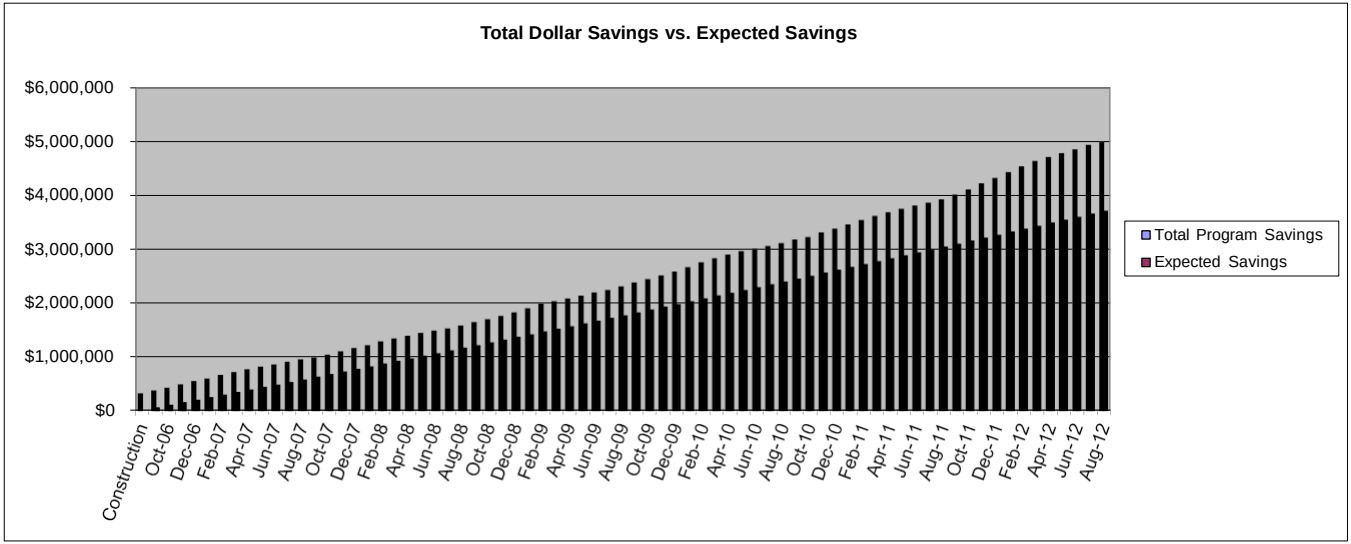

Dollar per Square Foot per Year
$1.40
$1.30
$1.20
$1.10
$1.00
$0.90
$0.80
Year 0
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
$/SF


btu Per Square Foot
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6

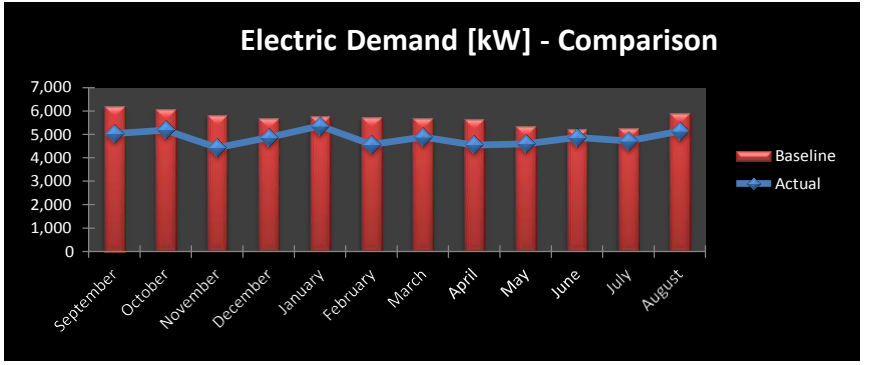

kW Actual vs. Baseline
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Baseline
Actual

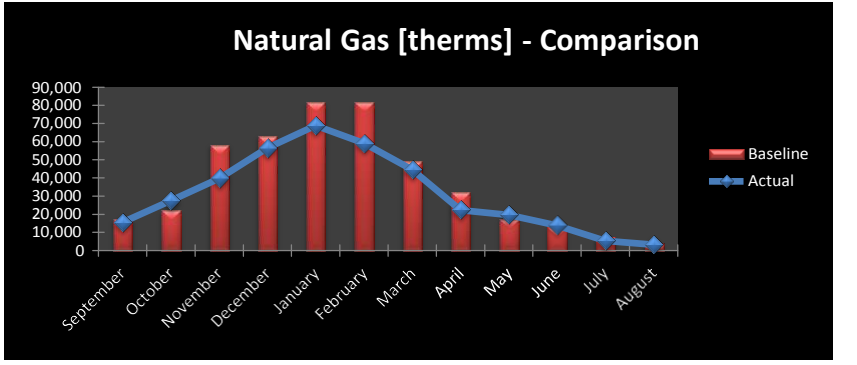

kWh Actual vs. Baseline
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
Baseline
Actual

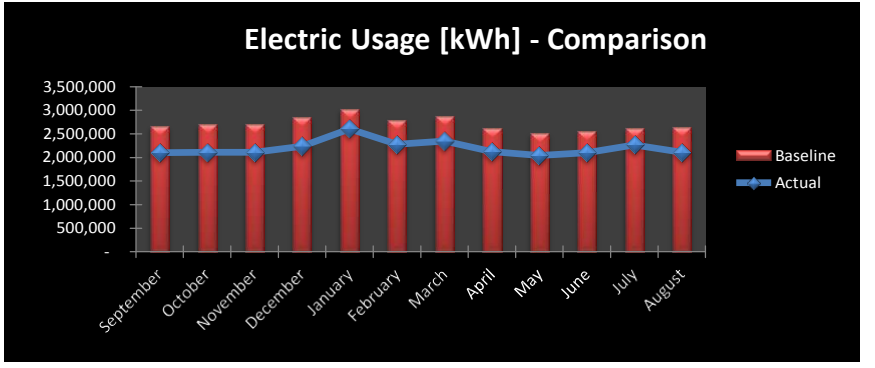

Therms Actual vs. Baseline
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Baseline
Actual
September–
October
November
December
January
February
March
April
May
June
July
August

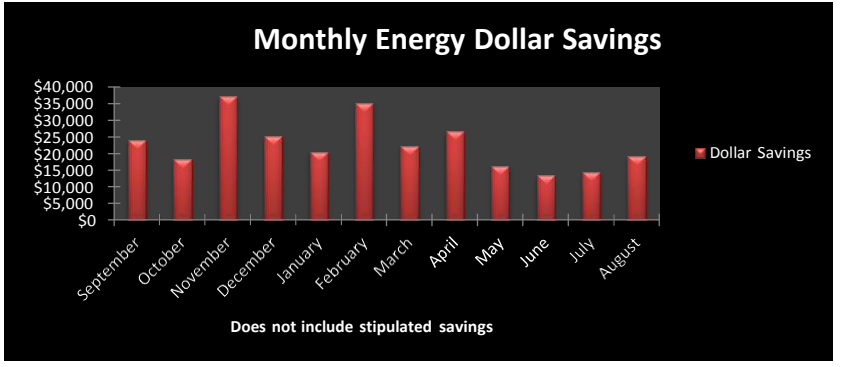

Total Dollar Savings vs. Expected Savings
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
Construction
Oct-06
Dec-06
Feb-07
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Feb-08
Apr-08
Jun-08
Aug-08
Oct-08
Dec-08
Feb-09
Apr-09
Jun-09
Aug-09
Oct-09
Dec-09
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Total Program Savings
Expected Savings

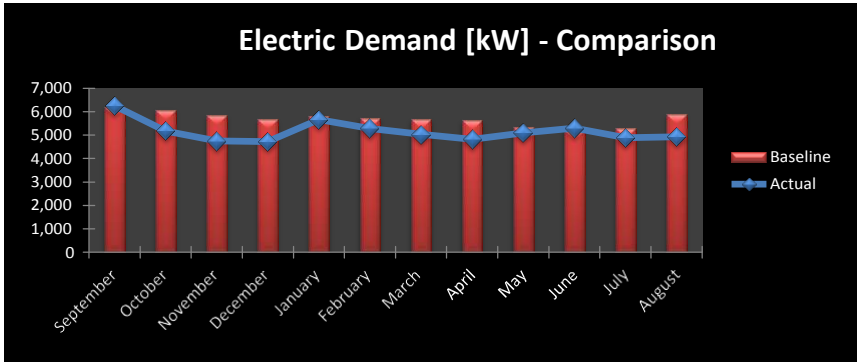
Monitoring Year 1

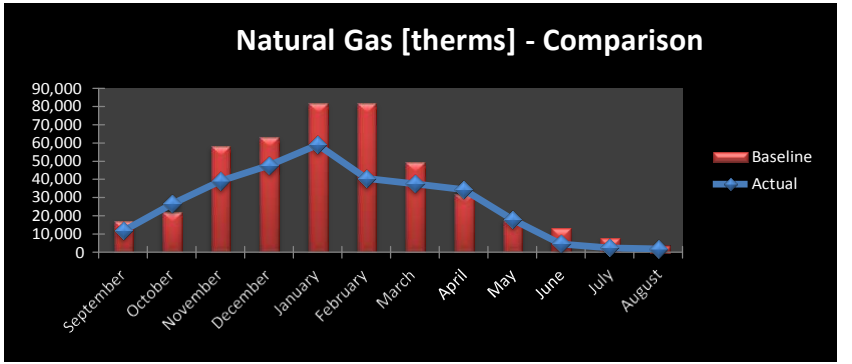


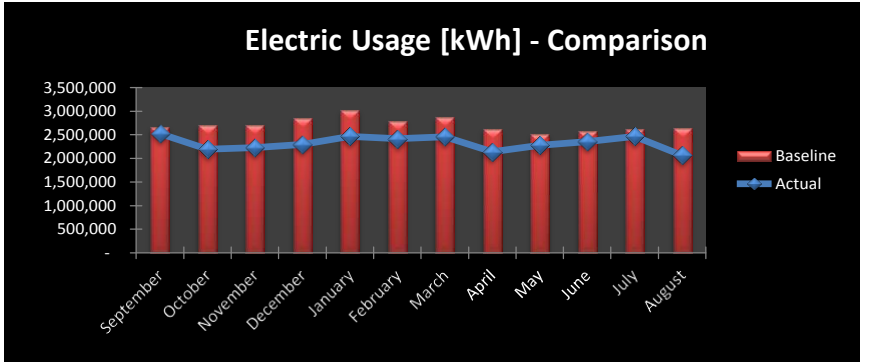


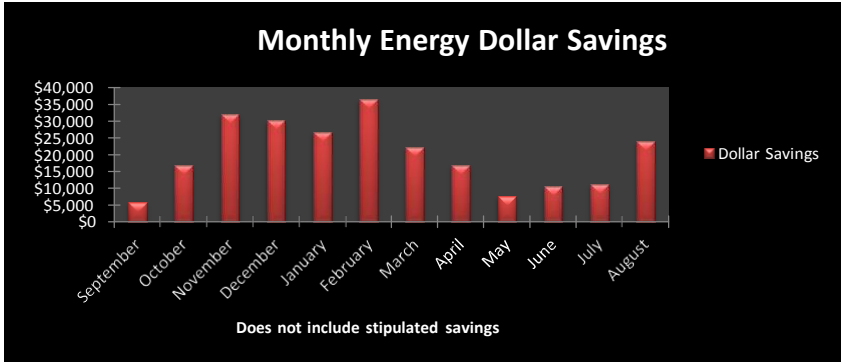


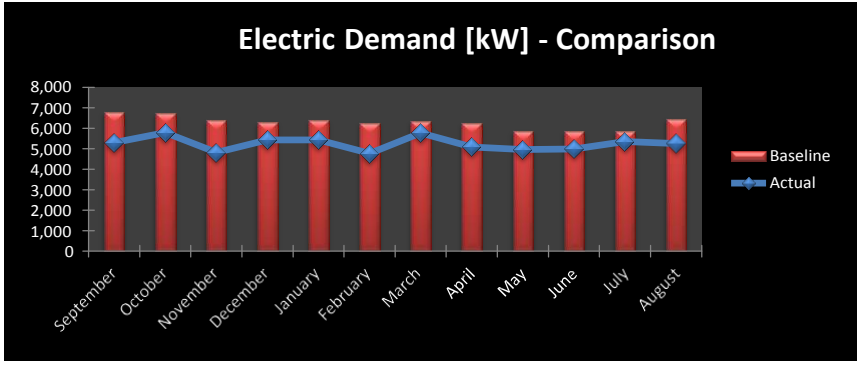


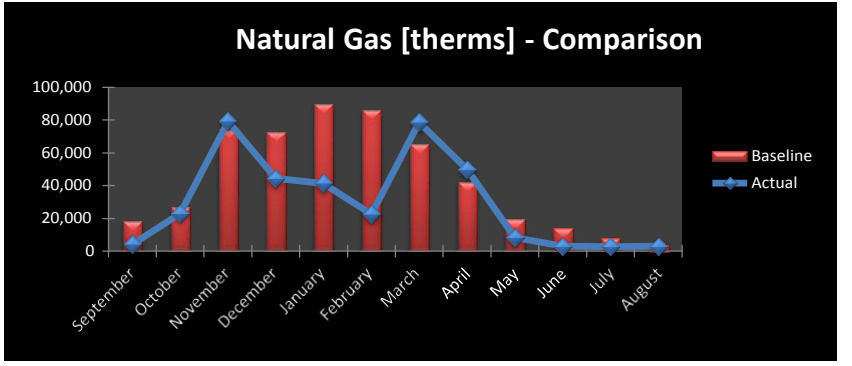

Electric Demand [kW] - Comparison
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

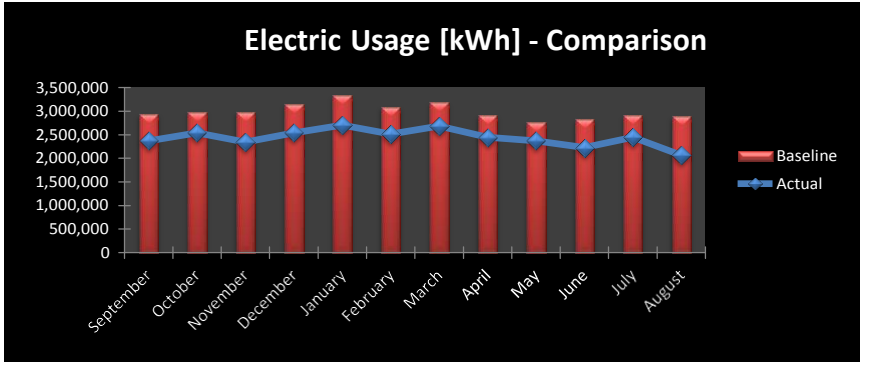

Natural Gas [therms] - Comparison
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual


Electric Usage [kWh] - Comparison
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual


Monthly Energy Dollar Savings
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
September
October
November
December
January
February
March
April
May
June
July
August
Dollar Savings
Does not include stipulated savings


Electric Demand [kW] - Comparison
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual


Natural Gas [therms] - Comparison
100,000
80,000
60,000
40,000
20,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual


Electric Usage [kWh] - Comparison
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
September
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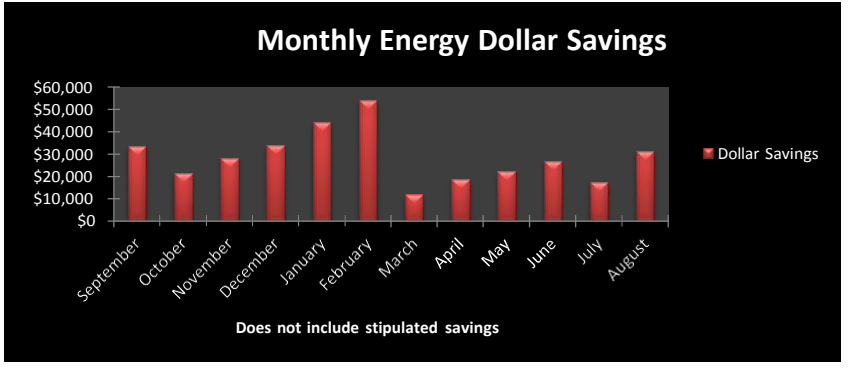
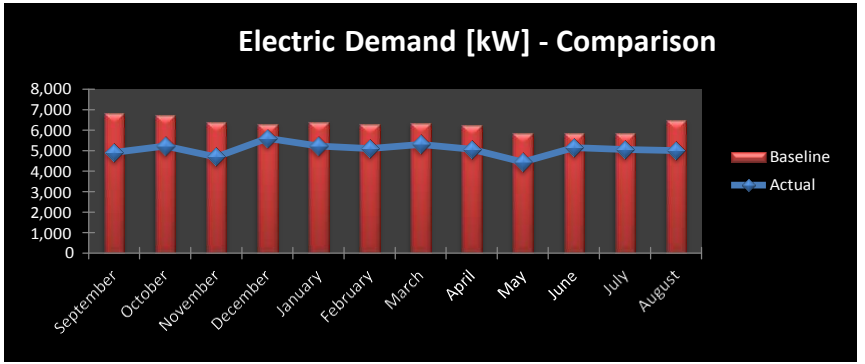
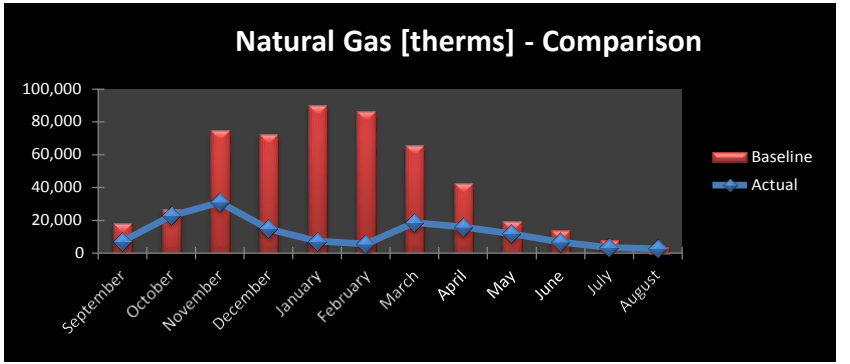
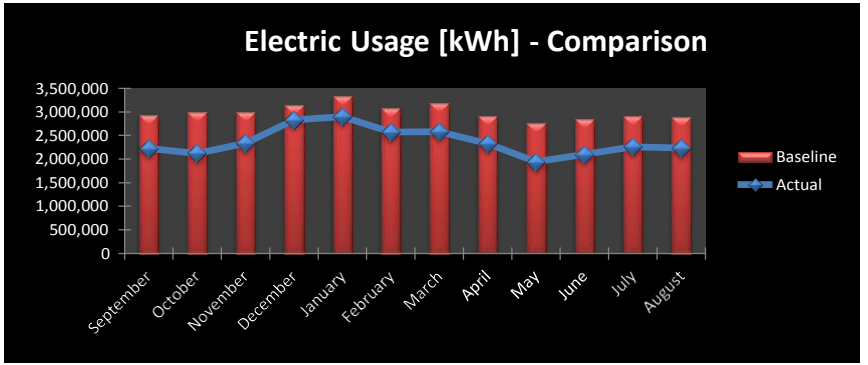
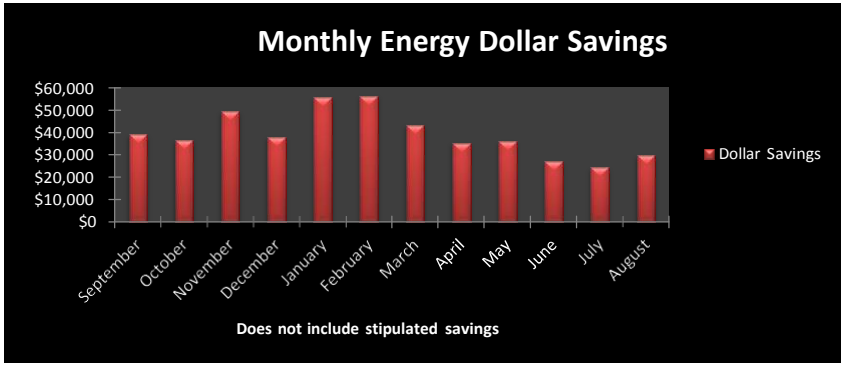
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

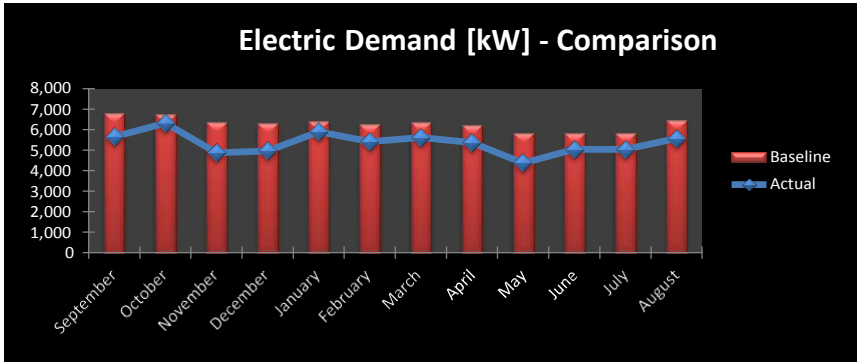

Monthly Energy Dollar Savings
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
September
October
November
December
January
February
March
April
May
June
July
August
Dollar Savings
Does not include stipulated savings

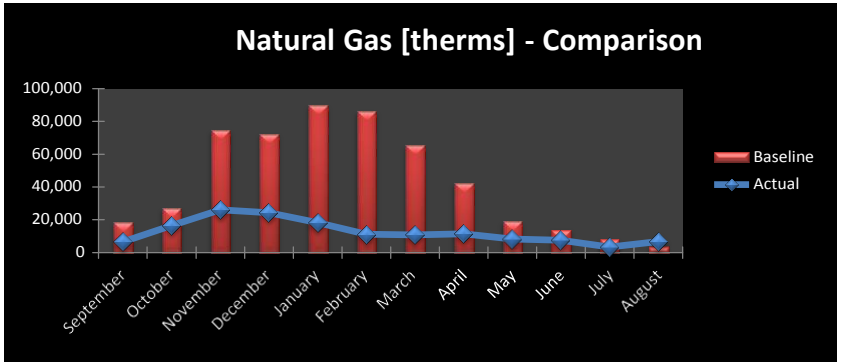

Electric Demand [kW] - Comparison
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

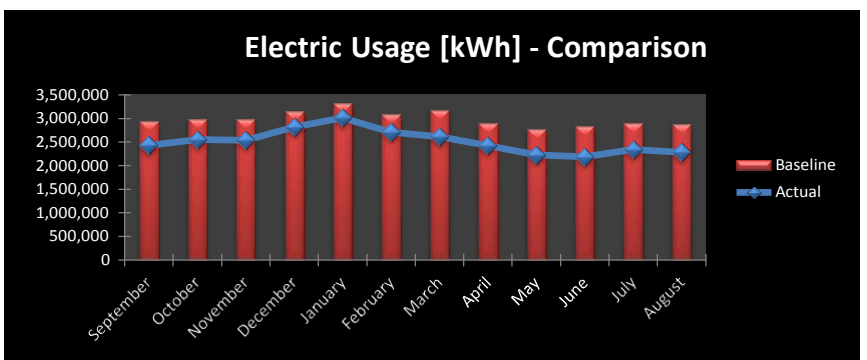

Natural Gas [therms] - Comparison
100,000
80,000
60,000
40,000
20,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

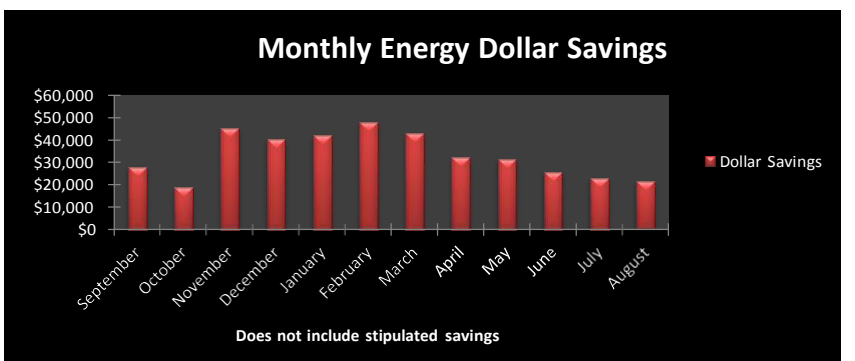

Electric Usage [kWh] - Comparison
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

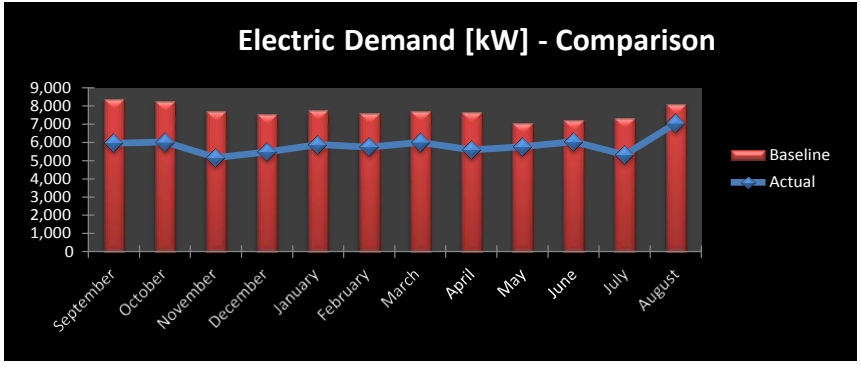

Monthly Energy Dollar Savings
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
September
October
November
December
January
February
March
April
May
June
July
August
Dollar Savings
Does not include stipulated savings

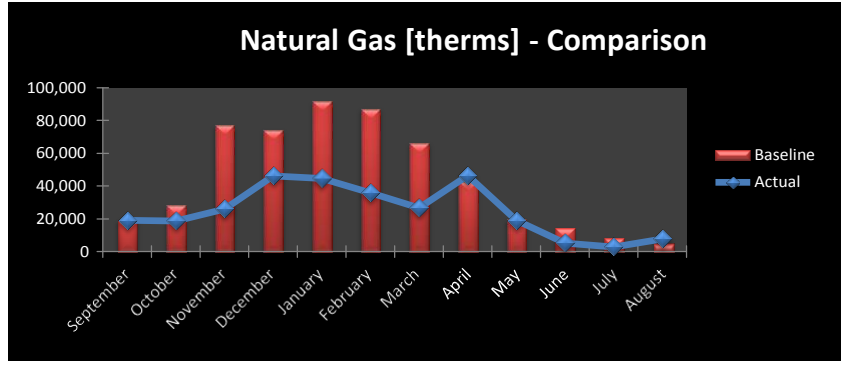

Electric Demand [kW] - Comparison
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

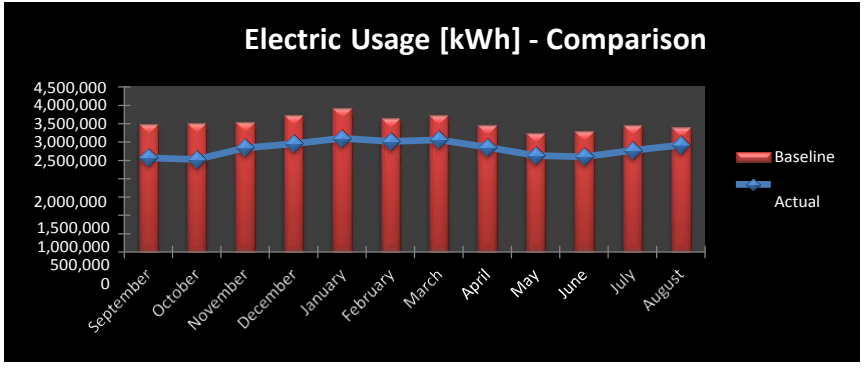

Natural Gas [therms] - Comparison
100,000
80,000
60,000
40,000
20,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

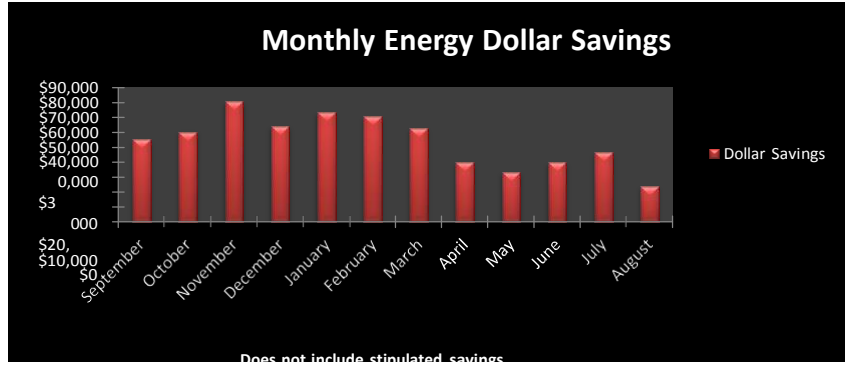

Electric Usage [kWh] - Comparison
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

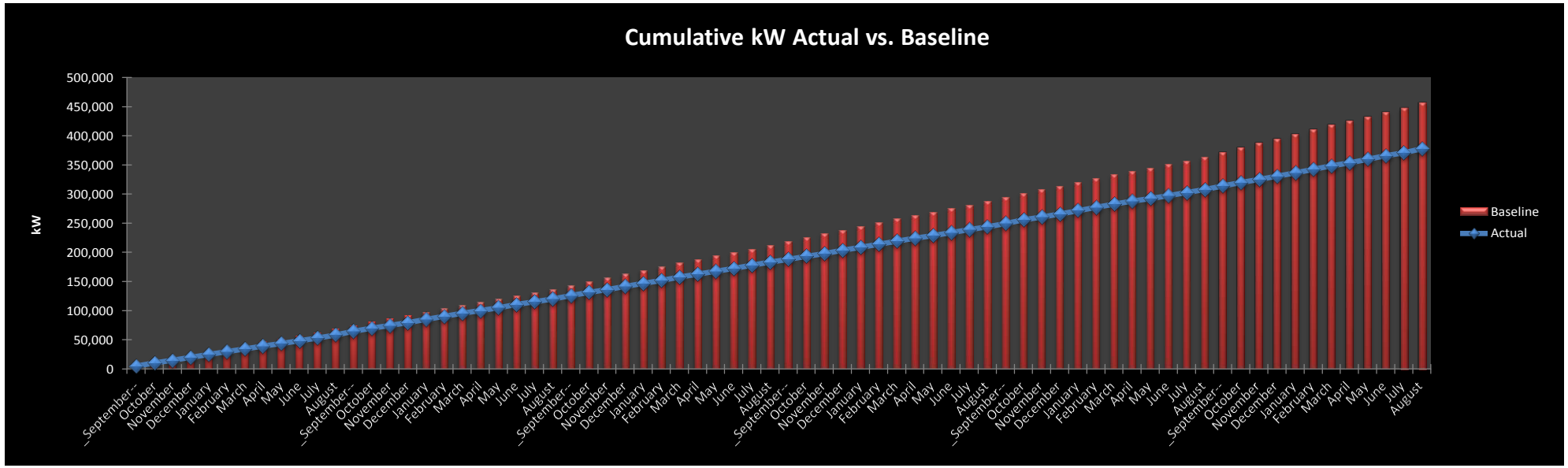

Monthly Energy Dollar Savings
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
September
October
November
December
January
February
March
April
May
June
July
August
Dollar Savings
Does not include stipulated savings

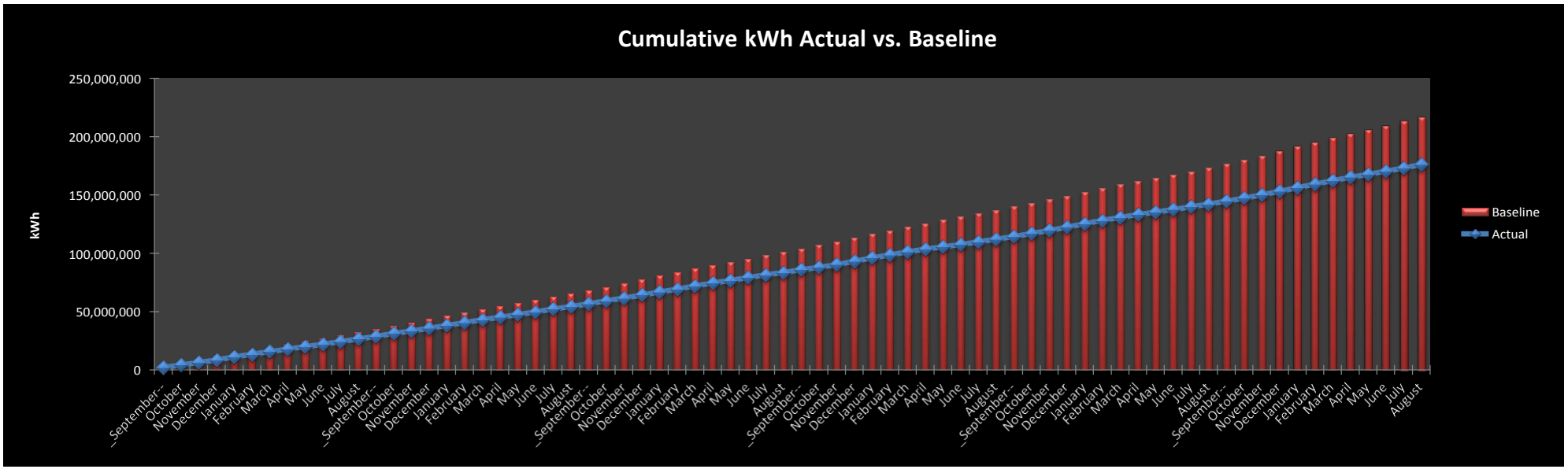

Electric Demand [kW] - Comparison
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

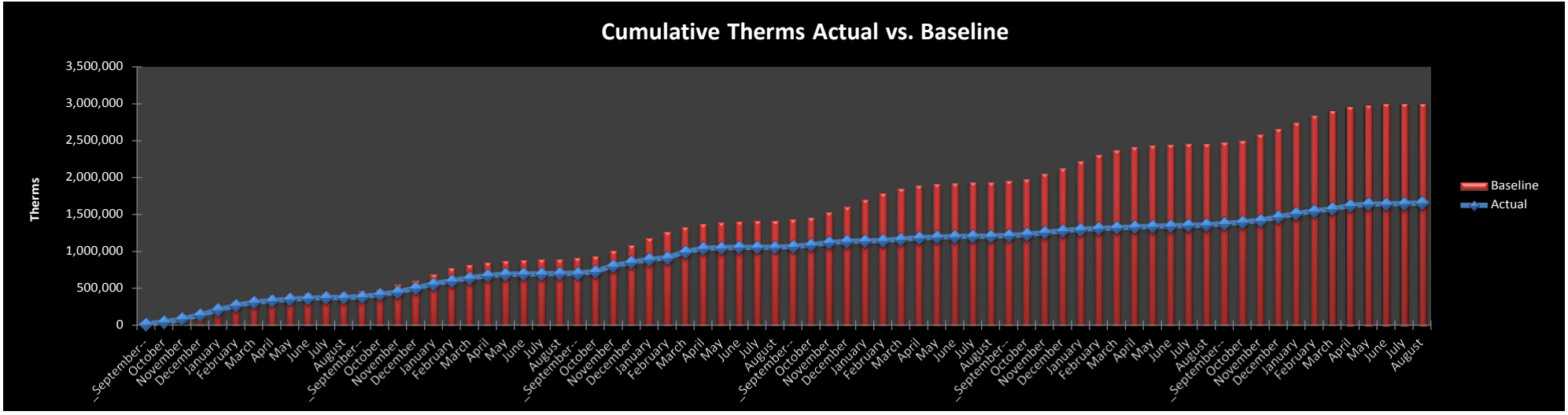

Natural Gas [therms] - Comparison
100,000
80,000
60,000
40,000
20,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

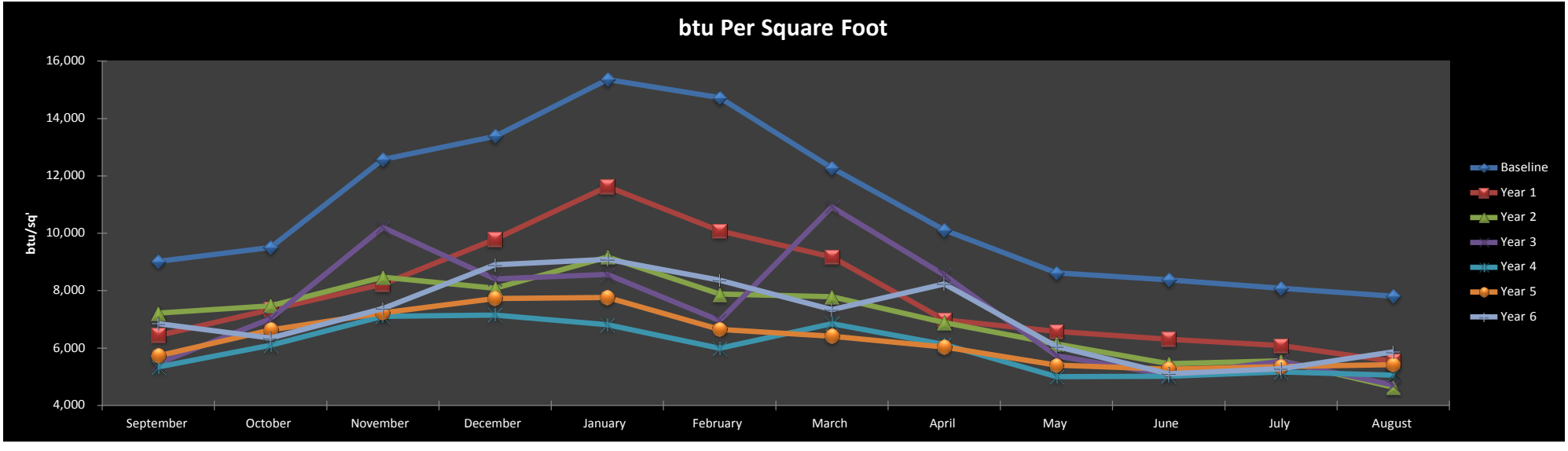

Electric Usage [kWh] - Comparison
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Actual

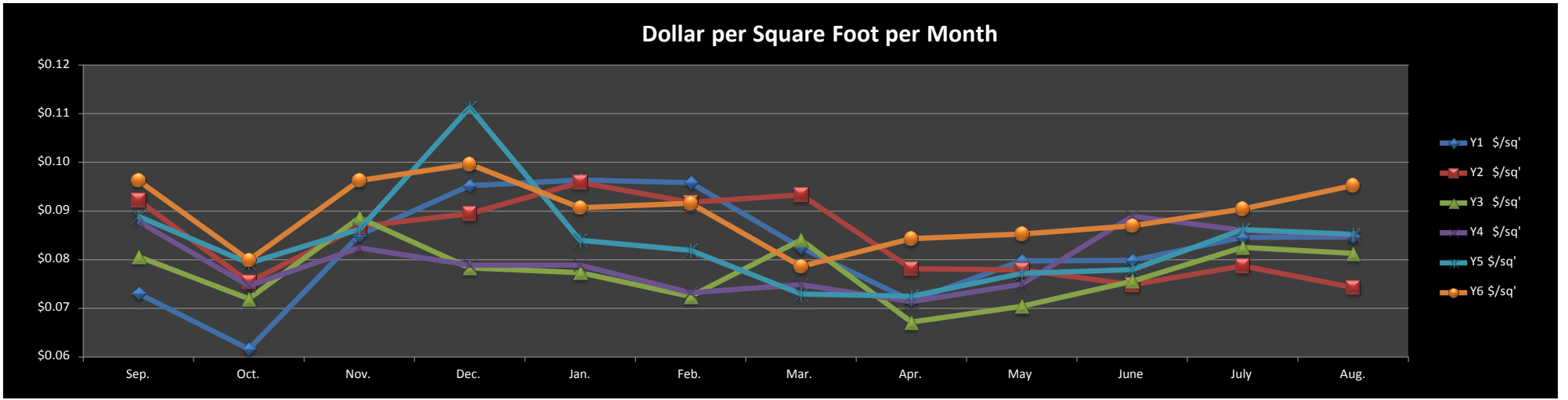

Monthly Energy Dollar Savings
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
0,000
$3
000
$20,
$10,000
$0
September
October
November
December
January
February
March
April
May
June
July
August
Dollar Savings
Does not include stipulated savings

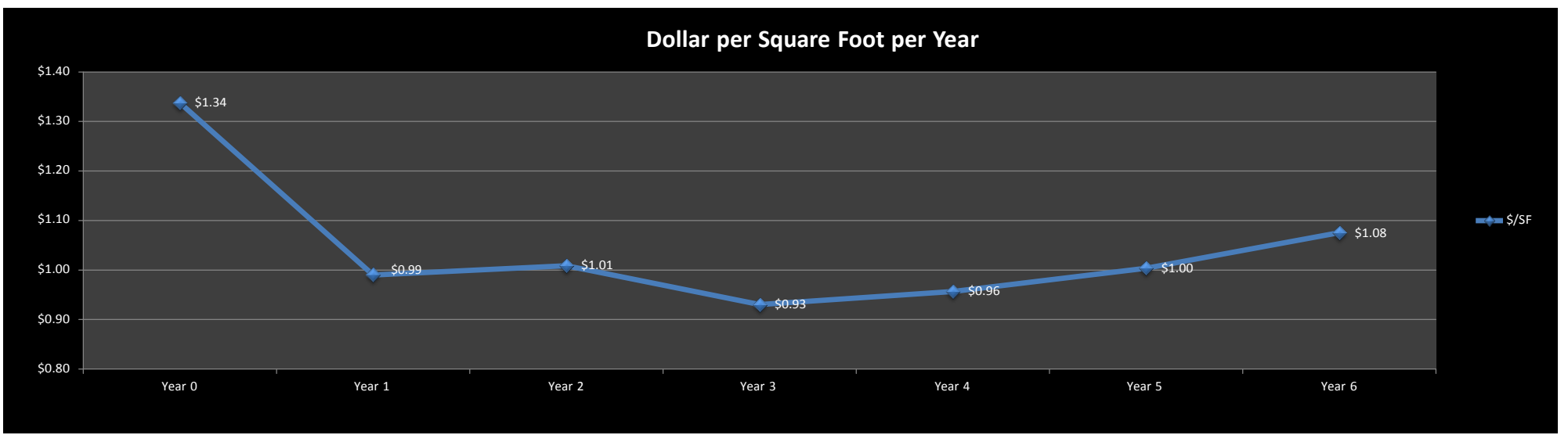

Cumulative kW Actual vs. Baseline
kW
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Baseline
Actual

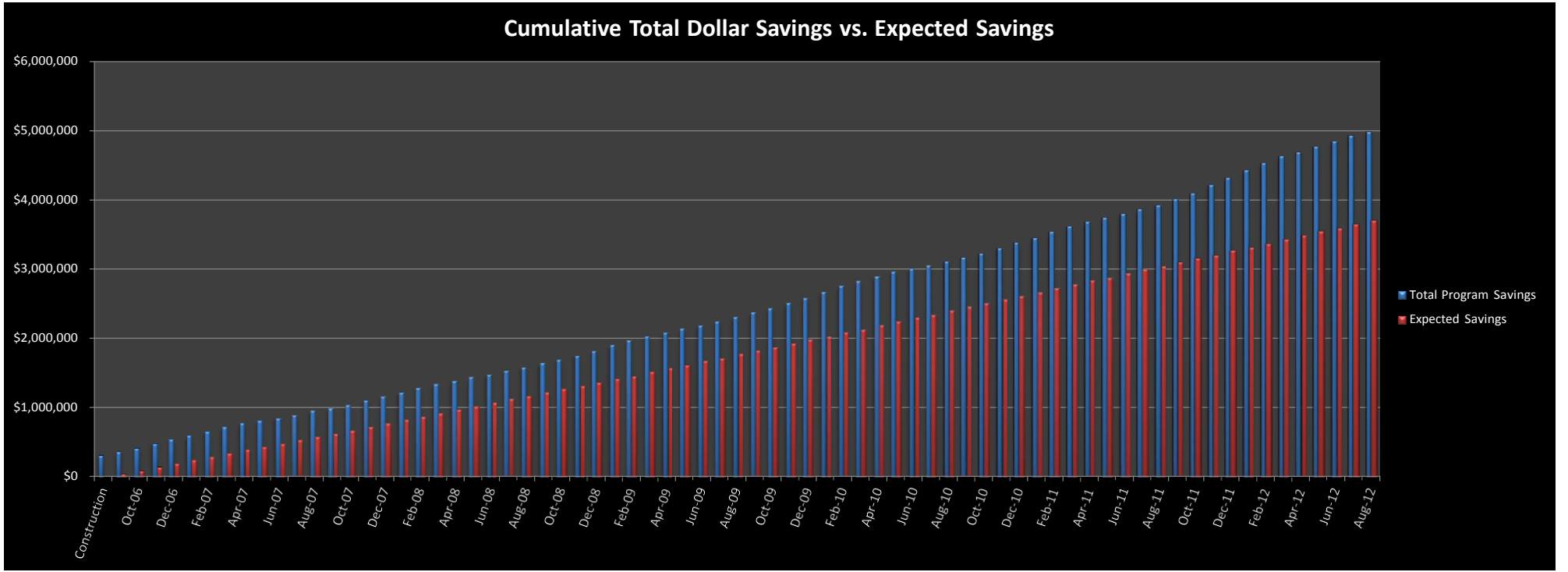

Cumulative kWh Actual vs. Baseline
kWh
250,000,000
200,000,000
150,000,000
100,000,000
50,000,000
0
Baseline
Actual


Cumulative Therms Actual vs. Baseline
Therms
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Baseline
Actual


btu Per Square Foot
btu/sq'
16,000
14,000
12,000
10,000
8,000
6,000
4,000
September
October
November
December
January
February
March
April
May
June
July
August
Baseline
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6


Dollar per Square Foot per Month
$0.12
$0.11
$0.10
$0.09
$0.08
$0.07
$0.06
Sep.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Y1 $/sq'
Y2 $/sq'
Y3 $/sq'
Y4 $/sq'
Y5 $/sq'
Y6 $/sq'


Dollar per Square Foot per Year
$1.40
$1.30
$1.20
$1.10
$1.00
$0.90
$0.80
$1.34
$0.99
$1.01
$0.93
$0.96
$1.00
$1.08
Year 0
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
$/SF


Cumulative Total Dollar Savings vs. Expected Savings
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
Construction
Oct-06
Dec-06
Feb-07
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Feb-08
Apr-08
Jun-08
Aug-08
Oct-08
Dec-08
Feb-09
Apr-09
Jun-09
Aug-09
Oct-09
Dec-09
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Total Program Savings
Expected Savings

SNOW COLLEGE

Energy Report Summary

The energy-saving projects on the Ephraim campus in FY 2012 focused on the Science Building, the new Business Building, the Humanities Building and the Trades Building.

Science Building

- Replaced two (2) large original motor control systems for the building.
- Replaced the large main power panel and the main breaker panels.
- Replaced the main switch gear to the building.
- Added a Proto mode which tracks kilowatt usage throughout the building.
- Ran new feeder lines into the building from the switch gear.
- Installed emergency generator.
- All of these improvements were included in the capital improvement funding received from DFCM through the annual project review process. The switchgear had exceeded its statistical life and the building had reached maximum breaker capacity. The emergency generator provides a safety net for thousands of dollars in frozen samples and specimens which have been lost in previous power outages.

New Business Building (Old Ephraim Elementary School)

- 22,000 ft^2 of the 44,000 ft^2 was demolished. The remaining 22,000 ft^2 was totally remodeled.
- New insulated glass for windows.
- Replaced T-12 lights with new fixtures, T-8 lamps and electronic ballast.
- The HVAC system was connected to our Johnson Control Metasys System.
- Installed five new roof top units. A portion of the roof over 50 years old (12,000 ft^2) was replaced with a new insulated roof.
- Replaced the old metal halide lights in the parking lot with LEDs.

Humanities Building

- Re-commissioned the total building (54,000 ft^2).
    - Balancing the air handler, VAV equipment, and fan coils.

    - Upgrading two new VFD, DDC controls and frequency drives.
- This project was completed through a zero-interest Energy Office loan. In the past five years no single building on campus received more complaints about inadequacies in heating and air conditioning. Following a substantial number of corrections, the building's tenants are comfortable for the first time.

Trades Building Cabinet Shop (West Ephraim Campus)

- Replaced 60/ 8' T-12 lamps with T-8 lamps with new electronic ballast.

On the Richfield campus, several important projects were completed.

- Replaced old nonfunctioning Toshiba Industrial Inverters on three air handlers in the Administration Building. Upgraded to an E7 Yaskawa for better VFD efficiency.

- Replaced older ceiling-mounted lighting in the Library. Added 52 Troffers lights with recommended EEM's and entered into an agreement with Rocky Mountain Power FinAnswer Express Incentive. Incentive will be approximately $3,100 for a one-time payment to help offset project costs.

- The College installed five new parking-lot light fixtures changing to LED's to improve several dark areas on campus and to improve energy efficiency. We have asked for funding from Capital Improvements in 2013 to replace all remaining 36 heads to LEDs and will once again enter into an Incentive Agreement with Rocky Mountain Power.

- Started replacing two-inch paper filters and adding four-inch Merv 13 Aeolus Synthetic filters to air handlers throughout the campus to improve efficiency and reduce wear on motors. The new Merv 13 filters will last for five years at a minimum.

- Replaced two gas-fired boiler water heaters in the kitchen and added one gas-fired Energy Star water heater. This new water heater provides domestic hot water throughout the Administration building.

- We are currently exploring the concept of adding an evaporative system to pre-cool the air for a large chiller at the Sevier Valley Center. MSS is compiling a cost and savings estimate to install such a system. Cost savings will be driven largely by the amount of summer use of the Arena. Other HVAC modifications have been made to limit air condition to just those sections of the building in use on a regular basis.

- The following chart itemizes electrical use on the Richfield campus from 2007-2012. During this period significant efforts have been made to limit power consumption and to address power factor charges through Rocky Mountain Power.

Snow College - Electric Charges

Richfield Campus

Building	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Totals
Washburn FY12	$ 4,556.64	$ 6,766.18	$ 6,035.48	$ 5,893.98									$ 23,252.28
Washburn FY11	$ 5,782.89	$ 6,299.38	$ 7,354.78	$ 6,686.09	$ 5,669.61	$ 4,863.72	$ 5,256.25	$ 5,000.09	$ 6,242.57	$ 5,173.47	$ 5,225.96	$ 4,739.10	$ 68,293.91
Washburn FY10	$ 4,716.51	$ 4,318.72	$ 7,671.87	$ 6,380.59	$ 5,352.96	$ 5,676.60	$ 4,803.73	$ 5,066.51	$ 5,209.65	$ 4,909.27	$ 6,052.08	$ 6,017.83	$ 66,176.32
Washburn FY09	$ 5,333.97	$ 5,064.92	$ 7,046.54	$ 6,385.76	$ 4,699.92	$ 5,002.89	$ 4,508.58	$ 4,832.67	$ 4,555.13	$ 4,794.69	$ 5,201.05	$ 5,508.57	$ 62,934.69
Washburn FY08	$ 5,341.62	$ 5,701.95	$ 7,133.42	$ 6,236.86	$ 5,025.75	$ 5,061.54	$ 5,210.56	$ 4,824.55	$ 4,717.41	$ 4,646.22	$ 5,971.00	$ 6,094.10	$ 65,964.98
Washburn FY07	$ 5,117.35	$ 5,047.31	$ 6,916.59	$ 5,553.82	$ 4,222.59	$ 4,487.71	$ 4,252.67	$ 4,625.08	$ 4,484.09	$ 4,580.75	$ 5,218.87	$ 5,440.69	$ 59,947.52
Admin/Conf FY12	$ 4,470.47	$ 4,658.90	$ 3,640.88	$ 2,590.58									$ 15,360.83
Admin/Conf FY11	$ 4,251.06	$ 4,248.86	$ 4,471.04	$ 4,061.98	$ 3,042.92	$ 2,826.88	$ 2,947.63	$ 2,980.85	$ 3,379.03	$ 2,742.55	$ 3,882.66	$ 4,314.80	$ 43,150.26
Admin/Conf FY10	$ 4,201.29	$ 3,854.61	$ 4,437.35	$ 4,127.85	$ 2,836.16	$ 2,843.39	$ 2,734.17	$ 2,927.00	$ 2,838.81	$ 3,137.59	$ 2,954.71	$ 3,815.45	$ 40,708.38
Admin/Conf FY09	$ 4,560.41	$ 3,740.22	$ 4,157.68	$ 4,732.12	$ 2,804.81	$ 2,787.65	$ 2,393.07	$ 2,691.35	$ 2,615.31	$ 2,876.17	$ 3,727.99	$ 3,633.64	$ 40,720.42
Admin/Conf FY08	$ 4,330.69	$ 4,316.79	$ 4,988.99	$ 4,678.26	$ 3,661.25	$ 3,403.74	$ 3,460.99	$ 3,048.52	$ 3,016.32	$ 2,941.35	$ 3,306.75	$ 4,106.65	$ 45,260.30
Admin/Conf FY07	$ 3,947.65	$ 3,636.56	$ 4,024.54	$ 3,601.53	$ 2,824.41	$ 3,002.08	$ 2,936.91	$ 3,125.13	$ 4,484.09	$ 3,666.78	$ 4,119.73	$ 4,155.93	$ 43,525.34
SVC FY12	$ 7,881.87	$ 10,182.48	$ 9,296.27	$ 8,685.10									$ 36,045.72
SVC FY11	$ 9,723.88	$ 9,205.43	$ 9,645.68	$ 8,761.80	$ 7,065.90	$ 7,006.88	$ 6,802.74	$ 5,977.32	$ 6,242.57	$ 7,005.70	$ 7,976.25	$ 8,558.16	$ 93,972.31
SVC FY10	$ 12,486.82	$ 10,904.71	$ 11,357.53	$ 11,760.69	$ 8,743.96	$ 7,382.70	$ 6,930.57	$ 6,730.98	$ 6,863.47	$ 5,415.86	$ 6,380.50	$ 9,717.90	$ 104,675.69
SVC FY09	$ 16,157.05	$ 17,328.72	$ 11,183.97	$ 12,150.49	$ 9,459.76	$ 9,811.85	$ 10,298.66	$ 10,772.01	$ 6,876.24	$ 6,104.61	$ 10,127.77	$ 11,540.21	$ 131,811.34
SVC FY08	$ 13,050.56	$ 14,144.62	$ 14,936.54	$ 14,588.91	$ 10,805.24	$ 10,768.63	$ 7,350.34	$ 7,018.03	$ 7,292.20	$ 6,059.54	$ 13,728.02	$ 13,103.61	$ 132,846.24
SVC FY07	$ 18,056.90	$ 11,709.34	$ 12,035.26	$ 10,802.78	$ 9,672.66	$ 9,819.41	$ 8,030.56	$ 8,263.92			$ 7,053.27	$ 13,202.11	$ 108,646.21

March 5, 2013

To: John Harrington, C.E.M
DFCM Energy Director

From: Tim Ularich, P.E.
Maintenance Methods Engineer

Subject: UDOT Energy Projects Update

Please find attached an update on UDOT's Renewable Energy (RE) and Energy Efficiency (EE) initiatives, related to facilities, over the past few years. These are organized into Past/Current Projects, and Tentative Projects/Initiatives.

Past/CurrentProjectsRE:

2007
- 3.6 kilowatt photovoltaic array at Murray Maintenance Station
- 1.8 kilowatt wind turbine at Milford Maintenance Station

2008
- 3.8 kilowatt photovoltaic array at Wanship Maintenance Station
- 5.9 kilowatt photovoltaic array at Moab Construction Office

2009
- 10 kilowatt photovoltaic array at Centerville Maintenance Station
- 10 kilowatt photovoltaic array at Clearfield Maintenance Station

2011
- 270 Watt Navigation Beacon Antelope Island (UDOT responsibility)
- 700 Watt power and light system for remote salt shed (SR-20)

2012/2013
- 17.28 kilowatt photovoltaic array on Traffic Operations Center
- Conclude Study of the Weber Canyon Wind Feasibility Study
- Initiate "Sponsor a Rest-Area programs that will include a Renewable Energy and Energy Efficiency component in the RFP/Bid process.

NOTE: All RE projects(with the exception of Antelope Ilsand and SR-20) were partially funded by matching grant money from the US DOE, Rocky Mountain Power or ARRA.

PastProjectsEE:

2009

- UDOT Aeronautics Office Lighting Upgrade
- Region I Main Office Lighting Upgrade

2010

- Wanship Maintenance
- Murray Maintenance Lighting Upgrades

2011/12

- Cedar City District Office light upgrade
- Wanship Maintenance Station window upgrade
- Rest Area street lighting upgrade to LED Lighting

2012/2013

- Continue LED lighting upgrades at Rest Areas
- Bluffdale Maintenance Station Lighting Upgrade
- Silver Summit (Park City) Maintenance Station Lighting Upgrade

NOTE: All EE projects were funded using the DFCM revolving loan program or ARRA funds. All lighting projects are eligible for additional self directed credits from Rocky Mountain Power to help offset the costs.

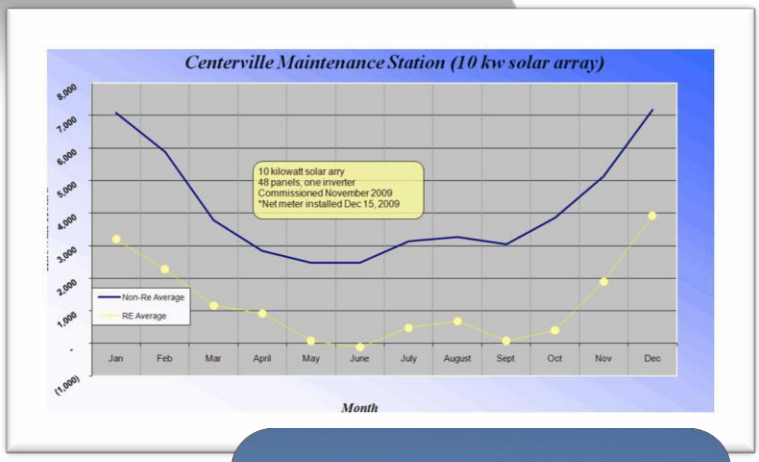
RE/EEActivitiesofStaff:

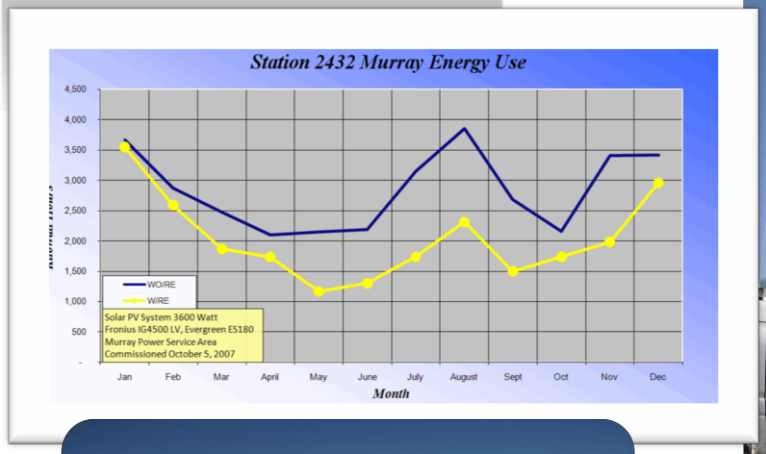
- National Acadamies of Science/Transportation Research Board
  - NCHRP Study 20-85: Renewable Energy Guide for Highway Maintenance Facilities
  - http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2731
    - Participated as a panel member on the project

FutureInitiatives(RE/EE):

- Strawberry Maintenance Station Solar Thermal Heating ($165,000)
- Additional Rest Area LED lighting Upgrade ($100,000)
- Large Scale wind study in Weber Canyon (Feasibility Study)
- Solar Thermal hot water at Grassy Mountain Rest Area
- Wind/PV at Grassy Mountain Rest Area
- Sponsor a Rest-Area program

Some Project Photos:





Department of Technology Services- 2012 Energy Report

The Department of Technology Services (DTS) completed a Data Center Consolidation in July 2010. The consolidation merged 34 Data Centers into 2 Data Centers, with the primary Data Center in Salt Lake City on the Capitol Campus. Through the consolidation, DTS was able to significantly improve the infrastructure of the Data Center to help reduce energy consumption, and also provide redundancy for State Agencies. The following are examples of how DTS was able to reduce energy consumption:

- In 2010 installed a new roof with a higher insulated R-value.
- In 2010 closed down 32 data centers throughout State Agencies.
- In 2011 installed hot aisle containment in the data center to prevent cold air from mixing with hot air, making the facility more efficient.
- In 2011 replaced all fluorescent lighting with high efficiency lighting.
- In 2011 installed a water tower/cooling system to reduce the energy consumption, which also provided the data center a backup cooling system.

Since August 2011, DTS has been able to reduce the monthly power consumption by 29%, despite moving 34 data centers to the Salt Lake Data center. It is anticipated that DTS will continue to reduce power consumption as the system is further refined. In FY2012, we continue to move serves into the containment aisles, which will save energy.

Thank you

Dan Gallegos
State of Utah
Department of Technology Services
Division of Enterprise Technology
dgallegos@utah.gov

Utah Army National Guard

2012 Energy Report

The Strategic Energy Security Goals (ESGs) of the Army's Energy Security and Implementation Strategy

- Reduced energy consumption
- Increased energy efficiency across platforms and facilities
- Increased use of new renewable and alternative energy
- Assured access to sufficient energy supplies
- Reduced adverse impacts on the environments

Utah Army National Guard Annual Energy Report 2012

Overview

The Utah Army National Guards (UTARNG) energy conservation actions support The Energy Policy Act of 2005 (EPAct 2005), signed into law on August 8, 2005, Executive Order (E.O.) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, signed on January 24, 2007, which supersedes E.O. 13123 and E.O. 13149, State of Utah House Bill (H.B.) 80. More specifically, we are to achieve a 20% increase in energy efficiency by 2015 and reduce energy consumption annually 3% with a base-line year of 2003.
To measure current performance the UTARNG utilizes the utility tracking software as directed by National Guard Bureau. Additionally all utility information is reported to Congress through the Army Energy and Water Reporting System (AEWRS).

Energy Conservation Efforts

FY 2012 has proven to be a landmark year for the Utah Army National Guard's Energy Management Initiative. With an inventory of equipment that has exceeded expected life cycle and the ever increasing need to conserve energy the UTARNG funded over $4 million in energy projects utilizing Federal, State, ARRA and Utility incentive dollars.

Projects

$600,000 in solar renewable energy

1.2MBTU capacity solar thermal water panels at Camp Williams,
18kW Photo Voltaic Array at the Draper HQ Facility,
25 ea. High Efficiency 200 Gallon Water Heaters.

$2.6 million in FIMs WJ Aviation Facilities

100 percent lighting upgrade,
6 Condensing Boilers with associated pumps (dual arm) and piping,
Desertification fans in the aviation hangers and the armory drill hall,
Chiller/Cooling Tower replacement,
Radiant Heat in the FMS shops,
Improved Control Strategies.

$800,000 Boiler Plant Renovation

Replaced 2 ea. 17mmbtu Boilers with 5 ea. 4.5 mmbtu High Mass Condensing Boilers with associated pumps and piping.

The Utah Army National Guard continues to make Energy Management a top priority through Executive Order, Energy Training and aggressive project development. UTARNG efforts were recognized as they received the Utah Military Energy Champion Award presented by the Association of Energy Engineers in December.

The Department of Human Services (DHS) has taken on an aggressive approach in energy conservation beginning with our energy conservation initiatives that we introduced department wide in 2009. The following represents the actions that we have been taken to help reduce the overall DHS consumption of electricity, as well as our efficiency strategies and measures to continue reducing energy consumption in over 200 of our facilities located throughout the State.

Lighting Measures
DHS maintenance and staff, in cooperation with DFCM, have gone through all of our State owned facilities and have upgraded the lighting, or are currently attempting to upgrade the lighting, in an effort to improve and convert our buildings to efficient lighting. We have educated our staff on proper usage of lighting, including the elimination of halogen bulbs and lamps in all of our facilities, owned and leased, and encouraged these same efforts in their individual homes. We have worked with DFCM to reduce the amount of lighting in those areas where the amounts of lumens exceed standard lighting requirements.

DHS continues to monitor offices where halogen bulbs have been present and have worked with staff to have those removed. In an effort to reduce halogen bulbs, we added the measure to our annual preventative audit to find these bulbs and have them removed. This includes bulbs used in personal desk lamps or candle warmers. Most of our buildings are now comprised of compact fluorescent lights.

We have been successful in installing lighting control systems and teaching DHS staff when to turn off lights, computers, monitors and copy machines.

Personal Computers and Appliance Measures
We continue to monitor and educate employees when to turn off printers and monitors not in use. We also monitor all of our buildings for personal appliances. No personal appliances are allowed in individual offices. Once these are found, we have them removed by staff and taken home.

Energy Awareness Measures
Each month we educate our new employees on how to conserve energy for the Department during our New Employee Orientation training. We also educate our more tenured employees by holding “table top” trainings during their staff meetings held in each our facilities throughout the state. We also perform routine inspections of the facilities for compliance and awareness. DHS continues to participate in the E-team Trainings hosted by the National Energy Foundation. Education that is gathered during those trainings is then passed down to our employees throughout the State. The majority of our buildings are also participating in some form of recycling program.

More recently, we began incorporating energy conservation measures into our quarterly safety bulletin to continue education in energy awareness.

Partnerships and Reduction Measures
DHS has worked with several vendors that have audited and analyzed our energy consumption in our facilities. Over the past several years, we have worked with vendors who have found ways that we could save money and reduce our energy consumption. One such entity is Nexant

Incorporation. DHS contracted with Nexant to perform an investment grade energy audit in 8 State owned facilities. Using ARRA funding, we are able to take Nexant's recommendations and replace antiquated or energy consuming machinery and, at the same time, reduce our overall energy consumption.

DHS has been working with Spectrum to develop a scope of work to refurbish or replace the machinery, as stated and recommended in the Nexant Recommendations Report. Some of this work is as simple as providing a mechanical design, to implement energy conservation measures, or as large as installing economizers on air handling units, upgrading lighting, replacing boilers and chillers, installing low flow water devices, installing occupancy sensors, installing premium efficiency motors on pumps, installing white roof systems, installing low flow faucets, and many other changes as recommended by the Nexant audit.

DHS has also contracted with Utility Cost Management Consultants (UCMC) to review our campuses and the Division of Juvenile Justice Services facility's utility accounts and to recover and correct all overcharges caused by errors, misclassifications or other factors, current and for the next couple of years. They have been able to find areas where we are able to save additional costs and correct the overcharges that were discovered.

Fleet Services

DHS has also incorporated energy savings in our fleet vehicles. With over 200 fleet vehicles throughout the state, we wanted to create goals that would result in savings. This year, we participated in the telemetrics program, allowing telemetrics to be collected on several of our fleet vehicles in an effort to track idle time. This included educating our employees on the effort to reduce our fuel consumption by reducing our overall idle time.

We also encourage routine maintenance outside of the ARI coupon suggested maintenance mileage. This helps us track tire pressures to make sure that we maintain a proper tire pressure throughout the entire year in our vehicles.

Energy Star Tracking Results

Overall, DHS has an increase of only 12% of Change from Baseline for our Portfolio Adjusted Percent Energy Use. This baseline was created in the year 2000 for 20 facilities that are monitored each month for energy consumption and energy star capabilities using energystar.gov. Of the 20 facilities being monitored, 6 facilities have decreased their consumption of energy and more than half are under a 5% increase in consumption since 2000. One of our buildings has reached the point where it qualifies for the Energy Star rating; two others are close to the 75% rating requirement.

A majority of these facilities are currently being retrofitted with energy saving measures that will help reduce the 12% of Change from Baseline and will continue to decrease as the large energy consuming equipment and machinery are replaced as recommended by our Nexant and Spectrum partners.

For the last 9 years, beginning in 2003, DHS has been able to decrease percentage consumption on a baseline comparison for all 20 of our monitored facilities. Since 2008, we have also been able to decrease our annual energy costs per square foot from $1.84 to $1.26 per square foot.