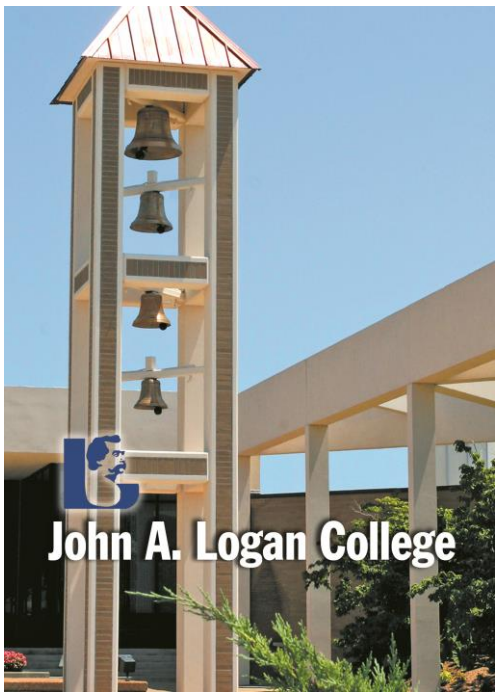
John A. Logan College
Campus Sustainability Report - 2013

Compiled by Tim Gibson, JALC Sustainability Coordinator



Sustainability
JOHN A. LOGAN COLLEGE

Prepared for the John A. Logan College Board of Trustees
February 25, 2014

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Executive Summary

What began as efforts to improve in areas such as recycling and campus energy efficiency has led to John A. Logan College becoming a leader in sustainability in IL. Through goals set as a signatory to the IL Campus Sustainability Compact, the College reduced energy usage per square foot by 18% between 2008 and 2010 and costs per square foot dropped 27%. A recent CDB report showed JALC as the number three community college in IL for lowest energy cost per square foot. Energy efficiency measures such as lighting upgrades resulted in large reductions in electrical energy consumption and significant dollars saved. Public sector rebates from DCEO gave these projects the attractive payback periods of less than three years the College was looking for. In 2011, the College received the Illinois Governor's Sustainability Award which recognizes organizations in Illinois that have demonstrated a commitment to environmental excellence through outstanding innovative sustainability practices.

John A. Logan's pledge to continue fostering a culture of sustainability and becoming a recognized leader and change agent for environmental sustainability in southern Illinois is evident by multiple references to sustainability in our Strategic Planning documents. A grant from the Illinois Green Economy Network (IGEN) helped the College establish the Sustainability Center and hire its first full-time campus Sustainability Coordinator. The Sustainability Center, along with the JALC Green Committee helps make sustainability a guiding principle for all institutional practices, and promotes initiatives that reduce campus energy use and environmental impacts. In addition to IGEN, the College partners with a number of other state and national organizations who support our sustainability mission.

JALC annually spends in excess of $ 500,000 in energy costs, and with the expectations that energy costs would continue rise, the College began a comprehensive review of our energy procurement and management strategies in the summer of 2013. Energy consultant EnerNOC was selected to provide the College with energy advisory services and a two year electrical purchase contract signed. EnerNOC's "Insight" energy monitoring system will provide the College with data on campus electrical consumption in real time.

In 2013 John A. Logan College continued to infuse sustainability principles and practices across a wide spectrum of campus activities. Multiple energy efficiency projects were completed, including replacing roadway and parking lot lighting with LED. And with a grant from IGEN, the first energy "dashboard" was installed in a campus building and a study by the University of IL verified that College staff effectively used the dashboard to save energy. Courses were added to degree and certificate programs and a number of trainings were offered to strengthen the workforce and increase employment opportunities in green jobs.

A number of projects are already underway which will reduce campus energy use in 2014. Included are replacement of two chillers, and two boilers. The next lighting project will be to convert exterior building fixtures to LED. The College will continue to build on partnerships in support of sustainability related initiatives and serve as an example to our students and to the community.

Overview of Sustainability at John A. Logan College

This report on sustainability efforts at John A. Logan College for the calendar year 2013 is intended to share initiatives and successes and highlight work being done by individuals and departments across the campus that have helped position the College as a recognized leader in sustainability among Illinois community colleges. Several years ago the College recognized the value of a more focused effort to improve our commitment to sustainability and become a more environmentally responsible institution. Our leadership, from the Board of Trustees through our campus administration understands that how we behave as an institution, what we teach, and the example we set has a huge impact on our students and the community.

What began as an effort to improve in such areas as recycling and campus energy conservation led to the College becoming a signatory to the IL Campus Sustainability Compact in 2008. Through the Compact, the College made a commitment to reduce energy usage per square foot by 10% by the end of the 2010 calendar year. From 2008 to 2010, electrical usage per square foot fell by 18% and cost per square foot dropped 27%.

> *"As we have encouraged energy awareness, everyone on campus was impacted and contributed in their own ways. It really is the little things we do that make great things possible".* **Brad McCormick, JALC Vice-President for Business Services and College Facilities**

An early focus was on increasing campus energy efficiency and reducing energy consumption, in particular electricity use. Energy efficiency measures such as lighting upgrades resulted in large reductions in electrical energy consumption and dollars saved. Public sector rebates from DCEO gave these projects the attractive payback periods of less than three years the College was looking for. Gas use reduction measures are not as attractive as electrical energy reduction projects due to the higher cost of many gas savings projects, and the fact that gas prices remain at historically low levels. The College has undertaken a number of projects which have lowered gas consumption, usually when maintenance issues are involved and there is a need to replace outdated or broken equipment and controls. More efforts are now being expended on energy conservation - changing behavior of building users to help reduce energy consumption.

In 2011, the College received the Illinois Governor's Sustainability Award which recognizes organizations in Illinois that have demonstrated a commitment to environmental excellence through outstanding innovative sustainability practices. The value of sustainability to our institution, first recognized several years ago continues to increase. As evidence that our commitment to sustainability will continue, it is now infused into the College's long-term strategic planning process.

Sustainability and the John A. Logan Strategic Plan

The IL Campus Sustainability Compact, as presented by the IL Green Governments Coordinating Council notes that the highest recognition of a college's commitment to sustainability is achieved by incorporating sustainability at a "high level in the institution's strategic plan".

John A. Logan's pledge to continue fostering a culture of sustainability and to incorporate it into campus facilities and operations, academic programs and student activities is evident by multiple references to sustainability in the document: Logan at 50: A Strategic Plan for 2017 and Beyond.

Pillar 1 - Strategic Direction: Build Dynamic Learning Environment
Goal 1.2 Globalization:

Objective 1.2A Develop educational opportunities in diversity, awareness, environmental sustainability and globalization (exchanges, scholarships, financial support, foreign languages).

Pillar 2 - Strategic Direction: Strengthen Collaborations
Goal 2.2 Partnerships:

Objective 2.2A Create new partnerships and communication models with business and industry to develop programs that meet present and projected workforce training and global development needs.

Objective 2.2F Become a recognized leader and change agent for environmental sustainability in southern Illinois.

John A. Logan Sustainability Center

The JALC Sustainability Center is located in the Workforce Development and Construction Management Building, room H-205. A grant from the Illinois Green Economy Network helped establish the Sustainability Center over three years ago, and allowed the College to hire its first full-time campus Sustainability Coordinator.

The Sustainability Center helps make sustainability a guiding principle for all institutional practices, and promotes initiatives that reduce campus energy use and environmental impacts. It serves as a liaison between the campus and the community on sustainability related programs and projects, and between the campus and various state agencies, organizations and companies. The Sustainability Center provides assistance and training to faculty and staff to integrate sustainability and green economy content into curriculum and general educational programs. It helps educate students on sustainable issues, and identify, develop and expand quality green job/career training for students and non-students. The Sustainability Center helps facilitate College and business partnerships on sustainability related initiatives and training, and serves as a source of "green" information to the community at large. The Sustainability Center assists campus facilities staff with implementing many campus energy efficiency and conservation measures. More information can be found on the JALC Sustainability Center website at: http://www.jalc.edu/green/

John A. Logan Green Committee

The John A. Logan College Green committee grew out of the former "Recycling" committee, and is a sub-committee of the Environmental and Business Services committee. The membership is comprised of individuals representing the College staff, faculty, and administration, and it includes a student representative. The Green committee is dedicated to creating a culture of environmental responsibility by:

1. supporting the College in taking a leadership role to increase the environmental literacy of its internal and external constituencies,
2. striving to be a model campus where environmental stewardship is taught and practiced,
3. assisting in the incorporation of “sustainable thinking” in college decision making processes,

4. encouraging environmental responsibility in the construction of new facilities, as well as, making certain all facets of the college's facilities operate with an environmental conscience, and
5. pledging to accomplish goals set forth in the Illinois Sustainable University Compact.

The committee is chaired by the JALC Sustainability Coordinator and meets a minimum of twice each semester to discuss comments, concerns, and suggestions from students, faculty, staff and the community about sustainability issues at the College. Green committee members have contributed to the success of a wide variety of campus sustainability projects and programs and provide valuable support and advice to the JALC Sustainability Center and to the college administration.

A recommendation has been made to bring the committee out from under the auspices of the Environmental and Business Services committee and to rename it the JALC Sustainability committee. The EBS committee would then be renamed the Business Services committee.

Illinois Green Economy Network

The most significant resource in support of the College's sustainability goals continues to be our partnership with the Illinois Green Economy Network (IGEN). The College was one of the earliest members of what was first called the Illinois Community College Sustainability Network and is now IGEN. IGEN is a consortium of all 48 Illinois community colleges who are working together to grow the green economy of Illinois. It exists to share best practices in sustainability between all community colleges in Illinois (the third largest community college system in the nation) and their respective communities. IGEN's unique statewide cooperative approach leverages the power of a sustainability network with the deep community connections of individual colleges to expand deployment of clean energy technologies, increase employment opportunities, improve environmental and human health, foster community engagement, and accelerate market competitiveness.

IGEN's vision is the Illinois Community College System as a global leader in transforming education and the economy for a sustainable future. To strategically advance the work of the colleges, IGEN is developing Green Economy Consortia to focus on seven statewide green economic development opportunities in Illinois. These include Energy Innovation, Building Energy Efficiency, Freshwater Resources, Community Food, Advanced Manufacturing, Electric Vehicles and Biofuels, and Career Pathways.

Funding from IGEN allowed the College to establish the Sustainability Center, and various grants continue to help fund campus staff, sustainability projects and educational programs to the benefit of the College, our students, and the community. In turn various individuals at the College play a significant role in both management and support of IGEN's multiple endeavors.

JALC Coordinator of Sustainability Tim Gibson is an IGEN Network Affiliate - engaged in local, regional, and state-wide IGEN initiatives and programs and JALC college projects related to IGEN's green economy consortia. IGEN Network Affiliates seek to share best practices, advance specific initiatives and programs, and act as a resource for other colleges that are interested in advancing the goals of the network.

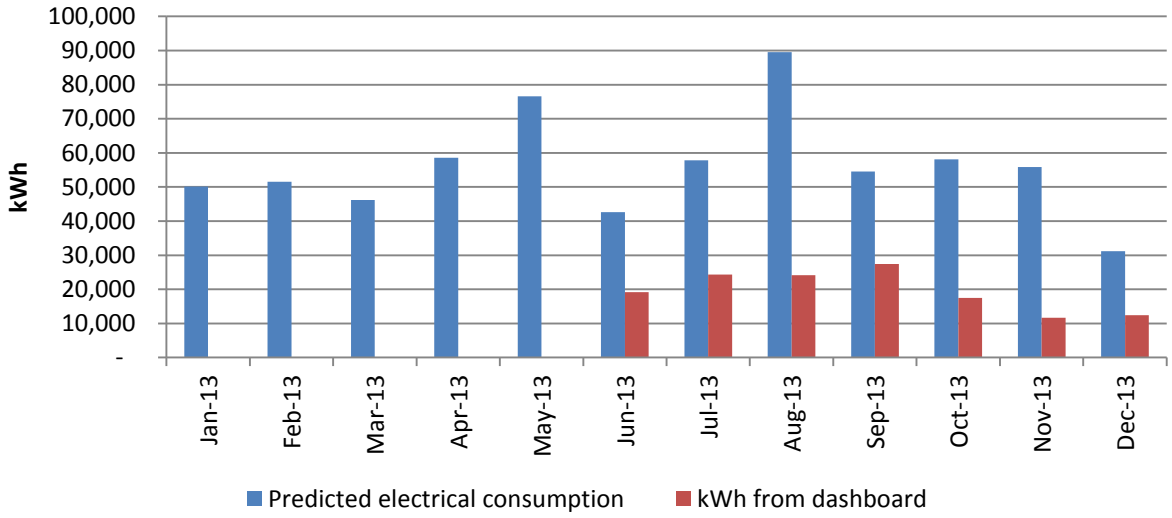
IGEN Initiatives John A. Logan College currently participates in includes:

- ✓ IL Community College Targeted Energy Management Training (ICCTEMT) **IGEN Behavior Change for Energy Efficiency "Dashboard" Pilot Program** –

JALC is one of only four IL colleges to participate in this program. Building energy dashboards by Ensol USA were placed in targeted buildings in order to analyze the effectiveness of displaying energy consumption data in combination with implementation of an occupant engagement campaign to produce measurable reductions in energy use in. A $20,000 grant from IGEN allowed the College to install an energy dashboard display in "G" building in May 2013. The display helps create awareness among the building users as to how energy is being used and will hopefully provide the incentive to change their behavior because they can see the benefits of their efforts in real time. It includes a virtual display that can be accessed by the public. Further, the system includes Eniscope Analytics, a web-based energy diagnostic tool which will help JALC facilities staff analyze energy usage and identify energy reduction and saving opportunities.

A behavior change campaign began with the fall 2013 semester to educate and challenge G building users to conserve energy. The University of IL at Urbana-Champaign participated in the program by "modeling" the expected energy use in G building, then monitoring the energy use through the end of the FL 13 semester. A report on the project by UIUC showed the College used considerable less gas and electricity than building energy modeling predicted.

Figure 1 below shows JALC predicted kWh use versus actual usage in building "G":



The UIUC final report on the IGEN Behavior Change for Energy Efficiency "Dashboard" Pilot Program noted that:

- JALC consistently uses less energy per square foot than the other colleges in the program
- JALC almost consistently shuts-down mechanical equipment on weekends
- Two other colleges appear to be turning off mechanical equipment but for very short periods

Figure 2 below shows predicted JALC gas usage versus actual gas usage in building "G".

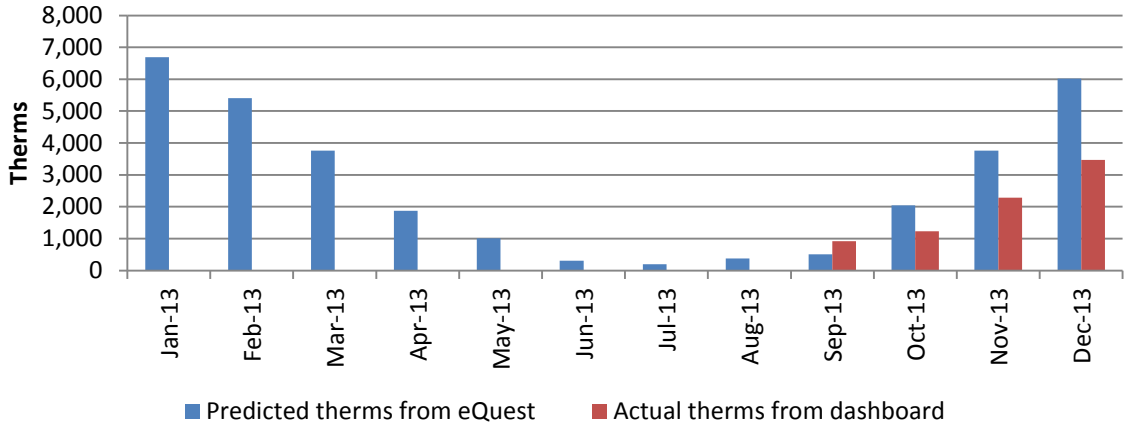
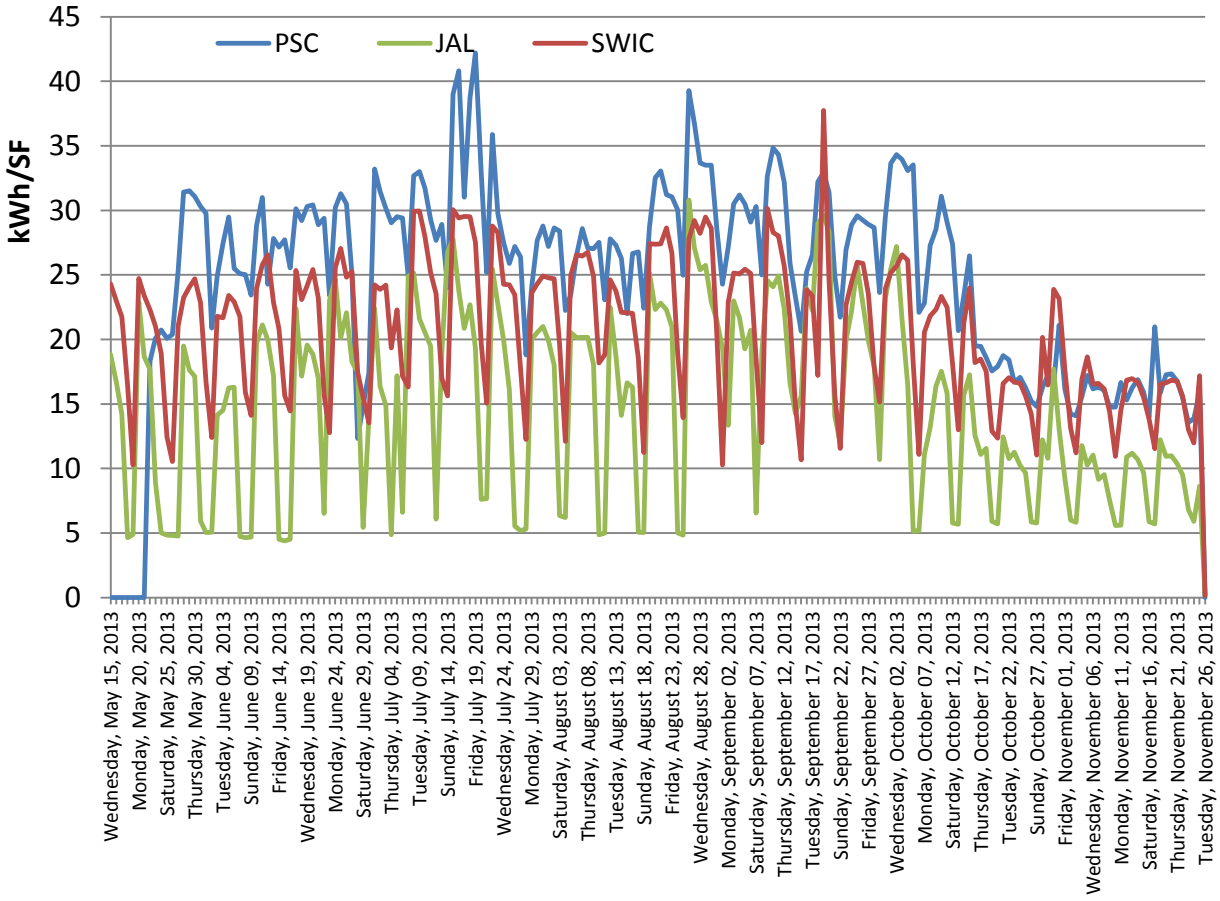


Figure 3 below shows Electrical use per square foot for three of the dashboard colleges: Prairie State College, John A. Logan College, and Southwestern IL College



The JALC Sustainability Coordinator helped develop the ICCTEMT Behavior Change for Energy Efficiency "Dashboard" Pilot Program and is the program's statewide facilitator.

✓ **Illinois Home Performance Equipment Loan Program –**

The IHP Equipment Loan Program was developed in 2012 with funding from the Illinois Department of Commerce and Economic Opportunity (DCEO) and a partnership between the Illinois Green Economy Network (IGEN) and the Midwest Energy Efficiency Alliance (MEEA), the agency that runs the IL Home Performance program. This free loan program helps eligible home performance professionals just getting started to hone and enhance their skills by making energy evaluation equipment available to them to use at no charge. Equipment "kits" valued at over $12,000 each were placed at five participating colleges. When not loaned, it is available to College faculty and/or staff to use in classes and programs.

Funding was secured in Fall 2013 to expand the program to additional IL colleges and to purchase additional equipment for the current participating colleges. More information about the IHPELP can be found at: http://www.energyequipmentloan.org/index.php.

The JALC Sustainability Coordinator chaired the IGEN workgroup that originally developed the idea for the IL Home Performance Equipment Loan Program and currently serves as the program's statewide coordinator.

✓ **IGEN Renewable Energy Installations Program** -

IGEN was awarded a $3.7 million dollar grant from IL DCEO to pursue numerous renewable energy initiatives and programs. Among these is the Renewable Energy Installations Program where IGEN has approved proposals and awarded year 1 funds of over $1 million dollars for 15 renewable energy projects (solar PV, solar thermal, wind turbines) totaling over 600KW to be installed on college campuses and partnering facilities.

These projects will produce energy to operate campus buildings and provide opportunities for students to experience hands-on renewable energy assessment, installation, and maintenance technologies. They will help advance IL towards its goal of 25% renewables by 2025.

JALC did not apply for a campus renewable project in program year 1. However, the College is receiving substantial project management funding from the program. More information on the program can be found at: http://www.igencc.org/re_installations.

The JALC Sustainability Coordinator serves as the IGEN statewide Renewables Installation Manager for the program, responsible for managing all 15 renewable energy installations to ensure their timely completion.

✓ **IGEN Smart Grid Work Group** and **IGEN Smart Grid Classrooms Project** -

In 2012, IGEN initiated the Smart Grid Work Group, a team of faculty and staff interested in discovering the role of community colleges in upskilling the workforce and providing consumer education about the emerging smart grid technology across our community college districts.

JALC is one of seven IL community colleges to receive IGEN funding to participate in the Smart Grid Classrooms Project. A grant to the College in excess of $ 50,000, awarded in the fall of 2013 will cover the cost of procuring and installing five smart grid "trainers" for use by instructors in courses in the Applied Technology Department. This real-world distributed generation simulation equipment will help prepare students with skills needed in the power supply and distribution sectors of the green economy. Each college will share curriculum and lessons learned through the Smart Grid Work Group. In addition, the grant will allow JALC staff and instructors to travel to conferences to learn more about smart grid, and for JALC to host a smart grid summit to bring information to the community about the implementation of smart grid technology and its benefits. More information can be found at: http://www.igencc.org/re_smart_grid.

JALC Sustainability Coordinator Tim Gibson has been a member of IGEN's Smart Grid Work Group since its inception and was instrumental in obtaining the grant for the smart grid trainers. The grant will be administered by the office of the Dean of Workforce and Community Education, and the Sustainability Coordinator will handle the grant reporting requirements.

- ✓ **Campus Conservation Nationals (CCN) -**

The Campus Conservation Nationals (CCN) is the largest energy reduction competition program for colleges and universities in the world. It's jointly organized by the U.S. Green Building Council, National Wildlife Federation, Lucid, and the Alliance to Save Energy. While in its fourth year, no IL community colleges have ever participated until now. Building on the success of the Behavior Change for Energy Efficiency "Dashboard" Pilot Program, IGEN is providing funding for nine IL colleges, including John A. Logan to enter the CCN competition this year. Among the goals of the program are to engage, educate, motivate and empower students, faculty, and staff to conserve energy in campus buildings, to propel campus sustainability initiatives, and achieve measureable reductions in energy consumption.

The team of JALC CCN organizers will lead the College's effort. While entered as a group in the competition, each of the IL colleges is really competing against itself. During a three week competition period during the Spring 2014 semester, college employees will be targeted with an energy use awareness campaign and asked to help conserve energy. Nationally recognized dashboard solution company Lucid will create a virtual dashboard for each college to report energy consumption and track results during the competition period.

The JALC Sustainability Coordinator is serving as IGEN's statewide CCN Program Manager. The College is the recipient of grant funding for both the statewide project management and to purchase additional energy savings equipment used in the competition.

- ✓ **IGEN Energy Analysis**

IGEN is conducting a comprehensive analysis of IL community colleges' energy commodity purchasing, energy consumption/use management and the potential for renewable energy asset development. The College has been participating by providing information which will help IGEN determine if there is

potential for consortium procurement of energy for our campuses. A complete analysis and final report is due in Spring 2014.

- ✓ **IGEN Electric Vehicle (EV) Work Group,** and the **IL EV Tour**

  IGEN formed the Electric Vehicle Work Group approximately two years ago. A few of the goals of the workgroup have been to provide public education about EV, grow the EV workforce, build a network of charging stations on IL community college campuses, and to develop strategic partnerships to advance EV deployment.

  JALC was able to secure DCEO funding to purchase and install an EV charging station on our campus in the Fall of 2012, the first charging station on a college campus south of I-70. The IGEN EV Work Group is planning an IL EV Tour in 2014 in which an electric vehicle will take off from John A. Logan College and be driven the length of the state, ending up at the College of Lake County in Grayslake, north of Chicago. The EV Tour will highlight the role community colleges play in development of Illinois's EV charging station infrastructure and in student and public education about electric vehicles and alternative transportation.

  The JALC Sustainability Coordinator has been a member of IGEN's EV Work Group since it was formed a couple of years ago and is on the IGEN planning team for the IL EV Tour.

- ✓ **IGEN Career Pathways Consortium**

  IGEN was awarded a three-year, $19.4 million dollar U.S. Department of Labor Trade Adjustment Assistance Community College and Career Training (TAACCT) grant to fund the Career Pathways Consortium. Over three years, 17 colleges will create 32 certificate and degree programs to prepare for careers in the green economy. The curricula will be shared via the Department of Energy's innovative National Training & Education Resource (NTER) online delivery platform.

  John A. Logan is receiving significant funding from the grant to create a new Sustainable Energy AAS degree which will provide students with the knowledge, skills and training to meet industry needs and pursue employment in sustainable and renewable energy careers. The degree program will share resources and be stackable with existing "green" courses and programs at JALC. Sustainable Energy degree classes in Weatherization and Renewable Energy Principles launched in the Fall 2013 semester. More class will start in the 2014 Spring and Fall semesters.

  The IGEN Career Pathways Organizational chart shows 14 individuals at the College contributing to the success of the program. Several are supported full time from the grant, including one TAA Regional Coordinator based at the College, and two Faculty Coordinators. Faculty in the JALC Electronics and HVAC programs are developing the course material and will teach the new degree classes.

College Partners in Sustainability

The College has excellent working relationships with several organizations whose support is very valuable to us in our sustainability efforts. Among these are:

- ✓ **Smart Energy Design Assistance Center (SEDAC)** – Located at the University of IL Urbana-Champaign, SEDAC is an applied research program sponsored by IL DCEO that provides advice and analyses to private and public facilities in IL to help save energy in buildings. They have completed a campus wide energy audit for the College, and assist with IGEN initiatives such as the Behavior Change for Energy Efficiency "Dashboard" Pilot Program.

- ✓ **Midwest Energy Efficiency Alliance (MEEA)** – MEEA is a collaborative network advancing energy efficiency in the Midwest. Based in Chicago, they coordinate several training and educational programs in IL including Building Operator Certification, Home Performance with Energy Star, the IL Home Performance. IGEN collaborates with MEEA on various programs, and the College works directly with them on others.

- ✓ **Other area Community Colleges, and SIUC** – JALC's facilities staff and the JALC Sustainability Coordinator have collaborated on sustainability issues with staff at Rend Lake, Southeastern, Shawnee, Kaskaskia, Southwestern, and Lewis and Clark community colleges as well as SIUC. This past spring the College hosted a summit where area college facilities directors gathered to network and exchange ideas on how to make campus operations more energy efficient. Good communications and a sharing of resources and information with these valuable partners helps each of us to further our sustainability efforts.

- ✓ **Illinois Department of Commerce and Economic Opportunity (DCEO) -** JALC staff have developed good working relationships with IL DCEO's state Energy Office and the College takes advantage of many of the public sector energy efficiency rebate and incentive programs they offer.

Affiliated Sustainability Organizations

The College belongs to the Association for the Advancement of Sustainability in Higher Education (AASHE) and the SEED Center (Sustainability Education & Economic Development), an initiative of the American Association of Community Colleges and eco America.

We are also a member of the National Wildlife Federation, the Illinois Recycling Association and the United States Green Building Council (USGBC). JALC Sustainability Coordinator Tim Gibson serves on the USGBC Illinois' Green Schools Higher Education Sub-committee

Campus Energy Procurement and Management Strategy

Recent efforts to reduce energy consumption and increase energy efficiency have contributed to John A. Logan being ranked in a recent CDB report as the number three community college in IL for lowest energy cost per square foot. The College annually spends in excess of $ 500,000 in energy costs - gas to keep the buildings heated, and electricity to keep the lights on and buildings cooled. Ameren delivers electricity to the majority of the campus, but the College has the choice of selecting an energy supplier. The challenge any large consumer of energy faces is determining the best procurement options available in order to make intelligent and financially sound choices in a very complex and constantly evolving energy market. With the expectations that energy costs would continue rise, and in an effort to further reduce energy expenses, the College began a review of our energy procurement and management strategies in the summer of 2013.

New Electrical Energy Consultant - When the contracts with our existing electrical energy consultant and supplier expired in September, nationally prominent energy consultant company EnerNOC, and their SupplySMART platform was chosen to provide the College with energy advisory services. EnerNOC's agreement with the College included an analysis of our energy consumption and utility bills, energy education, and assistance with development of an energy strategy for supply procurement.

New Electrical Supply Contract - Among other client services, EnerNOC worked with the College to select an energy supplier and manage the procurement process. Evaluating the risk potential of a floating contract versus a fixed price product, EnerNOC bid our usage to six different energy suppliers and negotiated an electrical supply contract with MidAmerican Energy which was estimated to reduce overall electrical costs by 8% annually over the previous supply contract.

Efficiency Smart Insight System - The College has installed EnerNOC's innovative "Insight" system which for the first time will provide the College with data on campus electrical consumption in real time. Insight energy consumption data acquisition equipment has been placed on both the main campus Ameren electric meter, and on the Egyptian Electric Cooperative electric meter serving the Community Health Education Complex building. This tool will help facilitate no- and low-cost operational savings measures such as peak demand management, scheduling optimization, and staged shutdowns. In the fall of 2013, JALC facilities staff participated in a number of informative webinars on use of the Insight platform to better manage building systems and reduce energy consumption (see APPENDIX B). As of mid-January 2014, the Insight system is now streaming campus electric energy use data in real time back to EnerNOC's Network Operations Center where it is available to both College facilities staff and to instructors in the Applied Technology Department for use in various energy management classes.

Results to Date – An analysis of our main campus electrical bill since changing electrical suppliers in mid-September of 2013 shows we have saved over $ 9,000 over the same billing period last year, which is an average reduction of 10.16%. (See chart below)

JALC - MAIN CAMPUS ELECTRIC COMPARISON

COVERAGE PERIOD	AMEREN ENERGY MARKETING	AMEREN	TOTAL	MIDAMERICAN	COVERAGE PERIOD		SAVINGS	(PERCENT)
9/18/12-10/17/12	$22,093.50	$9,106.62	$31,200.12	$34,437.87	9/18/13-10/17/13		-$3,237.75	-9.40%
10/17/12-11/16/12	$22,822.06	$9,262.70	$32,084.76	$28,139.13	10/17/13-11/19/13		$3,945.63	14.02%
11/16/12-12/18/12	$20,854.51	$7,160.51	$28,015.02	$24,824.34	11/19/13-12/18/13		$3,190.68	12.85%
12/18/12-1/21/13	$22,523.03	$7,438.70	$29,961.73	$24,326.06	12/18/13-1/21/14		$5,635.67	23.17%
						Total:	**$9,534.23**	**10.16%**

Reducing Campus Gas Consumption – Natural gas consumption has been slowly rising on the campus over the past three years for a number of reasons. The College has added additional square footage with completion of

the new Communications building wing. We have removed a number of inefficient electric resistance heating systems and converted them to more efficient gas furnaces, and we are more effectively using “reheat” in a number of buildings to cut cooling costs. The facilities staff is closely monitoring gas consumption and has taken steps in 2013 to reduce gas usage, including replacing outdated pneumatic boiler valve controls, tuning up our main campus boilers, and repairing leaky steam valves. Two low efficiency boilers that have outlived their useful life are scheduled to be replaced in early 2014. The College is closely reviewing our gas procurement contract, due to be renewed in the spring of 2014.

2013 Campus Sustainability Efforts

Across the country, the commitment to sustainability on college campuses is growing. Community colleges are in the unique position to serve as a role model for best sustainability practices for students, employees, and the communities we serve. Over the past several years, the College has completed a number of sustainability projects (see APPENDIX A). In 2013 John A. Logan College continued to infuse sustainability principles and practices across a wide spectrum of campus activities, from campus operations to education and training.

Facilities and Operations

John A. Logan's Facilities Department is responsible for creating an energy efficient and environmentally sustainable campus through the development and implementation of building energy efficiency and energy conservation practices and programs. Sustainable practices in building operations reduce energy waste and save money on utilities and maintenance costs. An Energy Conservation Reminder is sent to the campus community at the beginning of each fall semester to remind everyone that the College is committed to an aggressive and long term energy conservation plan and program and ask for their help.

> *"To achieve our goals of making the campus more energy efficient and environmentally friendly we must have the assistance of the complete campus community. This can't be a facilities department effort alone. A team effort will make us successful."* **Dwight Hoffard, JALC Director of Building, Grounds, and Maintenance.**

Several major energy efficiency projects were implemented on the campus in 2013. Included were:

Parking Lot and Roadway LED Lighting

This project was completed in October 2013. One hundred thirty six existing metal halide and high pressure sodium roadway and parking lot lights were replaced with state of the art LED lighting fixtures by Cree. Existing 1,000 watt fixtures were replaced with 426 watt LED fixtures, and 400 watt fixtures were replaced with 101 watt LED fixtures. The College has received strong positive feedback from staff and visitors about the brightness of the new lighting, which carries a 10 year warranty.

A significant DCEO rebate was received for the project, making it extremely cost effective with a payback period of less than 3 years. Facilities staff estimates the energy savings of the new lights at over 130,000 kWh’s annually. To further help reduce costs, parking lot and roadway lighting schedules have been reduced or cut back. No parking lot lighting is used on holidays or weekends except when special events are scheduled.

Boiler Tune-Up Project

While our campus boilers are cleaned and tested on an annual basis, it's important for safe and efficient operation that they be tuned-up every few years. A boiler tune-up reestablishes the air-fuel mixture for the operating range of the boiler and assures safe and efficient operation. This summer 2013 project involved tune-up of the burners and combustion control systems on our two largest campus steam boilers. The College applied for a DCEO energy efficiency rebate which helped pay for this project.

Upgrade of Steam Control Valves

Two outdated pneumatically operated steam valves controlled heat to 124,000 square feet (22%) of our campus. One had totally failed and was being operated manually and the other was not operating efficiently or accurately. The inability of the pneumatic valves to reset water temperature based on ambient temperature as well as the non-functioning valve was resulting in overheating of the water supply and wasting significant energy. These problems were making it very difficult for facilities staff to maintain comfortable temperatures in the affected building areas, particularly when outside temperatures fluctuated throughout the day.

This 2013 maintenance project, completed prior to the heating season replaced the two existing pneumatic valves with new direct digital control (DDC) modulating valves and included new fittings, pipe insulation and DDC graphics for the heat exchangers added to the campus building operating system. The College estimated the project would result in 7,000 therms saved annually and a dollar savings of almost $ 1,800 per year. DCEO engineers confirmed the estimates and the College received a substantial DCEO rebate to assist with project costs.

OFC and H Building HVAC System Improvements

Significant improvement were made to the heating and cooling systems in the OFC and H building. Outdated and inefficient outside air condenser units were replaced with an extension of the H building's chiller loop to OFC. A new air handler having an energy efficient variable frequency drive and low maintenance direct drive fan motors was installed in the OFC. Two new radiant heaters were installed in the Construction Management lab to provide efficient gas heat. This project was funded by a performance contract whereby costs are paid by the energy savings realized from a project.

Roofing Replacement Project

This summer 2013 project involved replacing the roof on old "E" building. The existing roof was past its service life and not compliant with current energy efficiency codes. Old stone roof ballast was removed and kept for campus landscaping projects. The College requires any roofing that is removed be recycled. Over 8 tons of ISO rigid insulation and 4 tons of EPDM roofing membrane were recycled.

Automotive Lab HVAC Systems Upgrade

This project, part of the performance contract work performed in the summer of 2013 involved replacing inefficient and costly electric furnaces in the Vocational building automotive lab with high efficiency gas furnaces. Included were new exhaust fans to remove noxious odors and dangerous CO from the space.

Custodial and Environmental Services

Cleaning products are necessary for maintaining attractive and healthful conditions at the college. However, cleaning products can present several health and environmental concerns. Many products are released to the environment by going down the drain after use, and toxic or volatile ingredients in some cleaning products can present hazards to janitorial staff and others.

> *"Logan's Custodial Services department is committed to being environmentally friendly throughout our campus systems and methods. The inclusion of sustainable concepts in equipment, chemicals, and procedures has proved not only to produce a smaller environmental footprint, but has also allowed us to provide cost savings with no reduction in quality."* **Chris Naegele – JALC Coordinator Environmental and Custodial Services**

The College understands that choosing less hazardous cleaning products is better for the environment and better for our employees and students and chooses to use Green Seal Certified cleaning products. The environmental standards of Green Seal Certified assures that products are non-toxic, non-corrosive, and formulated without phosphates or ozone depleting compounds. These products are applied from concentrates using a proportioned measuring system that avoids waste and protects custodial staff.

Landscaping and Grounds

Our grounds maintenance staff works hard to make the JALC campus one of the most beautiful in the state, doing so with a strong environmental conscious. In addition to mowing, weed eating, and trimming in the summer, and snow and ice removal in the winter, grounds staff is involved in a variety of activities that have a strong positive impact on the campus environment. Included are:

- ✓ planting and maintaining wildlife food plots and a native prairie grass meadow
- ✓ installing and maintaining bat, bird and duck nesting houses across the campus
- ✓ created and maintaining walking trails and an outdoor 3-D archery range on campus
- ✓ planting native flowers and grasses that require less water
- ✓ composting much of the grass and debris trimmed from trees and bushes
- ✓ using recycled roof ballast in landscaping projects
- ✓ watering with rainwater which saves money and is better for plants and grasses

A 2,000 gallon rainwater collection system was installed on the new grounds maintenance building in 2012.

> *"During 2013 approximately 25,000 gallons of water was utilized from the catch system to water campus trees, shrubs, and flowers. Only 1 time during the year was tap water used to fill the transport tank. Filling the transport tank with tap water takes 15 minutes, while filling it from the rain water catch system takes 7 minutes. During 2013 this reflects a savings of more than 19 man hours."* **Tom Hamlin, JALC Coordinator of Grounds and Campus Recycling Manager**

Recycling

The Illinois Solid Waste Management Act requires all state-supported institutions of higher learning to develop and submit comprehensive waste reduction plans that meet or exceeds a 40% waste reduction standard. The legislation requires that plans be updated every five (5) years. The College's most current waste reduction plan, available on the JALC website, was submitted by our Campus Recycling Manager in March 2010 after an exhaustive waste generation study was conducted on the campus. The next update to the waste reduction plan will be due January 1, 2015.

Among the items collected at the College for recycling are:

- ✓ metal - from welding, automotive, HVAC classes and campus building and remodeling
- ✓ fryer grease - collected from cafeteria operations
- ✓ bi-steel tin cans - separated by kitchen staff, collected by grounds department
- ✓ motor oil - collected from the automotive lab and grounds department
- ✓ aluminum cans - collected throughout the campus
- ✓ phone books - collected in an annual drive when new phone books arrive
- ✓ textbooks - collected in same containers as office paper
- ✓ landscape waste - composted, and fire wood given away
- ✓ automotive paints, filters and parts cleaning fluid -collected and sent to an environmental recycler
- ✓ cardboard - collected daily, bundled and sent picked up by a recycling facility
- ✓ mixed office, glossy and shredded paper - collected throughout the entire college
- ✓ plastic bottles - collected throughout the campus
- ✓ newspapers - collected daily
- ✓ bio-hazardous waste - collected in red vessels and picked up by special waste collector
- ✓ fluorescent bulbs - fed into an air cycle bulb eater and send to recycler in 55 gallon drums
- ✓ electronics - computers and other electronic equipment that is not donated to local schools is collected by electronic recyclers annually

Colorful recycling containers are placed at various locations across the campus. The first few sets were funded by a grant from IGEN. Later, several campus clubs and organizations funded additional recycling bins.

The College holds periodic electronic waste recycling events on the campus where employees and the public can drop off electronic waste for recycling. State law mandates that e-waste is no longer allowed to be disposed of in landfills. On October 9th, 2013 over 21,000 pounds of electronic waste was collected at the College.

Green Job Training and Community Education

> "Training is a key component of the College's Workforce Development and Community Education (WDCE) department. By being assigned to WDCE, the coordinator of the Sustainability Center is able to leverage resources to provide the southern Illinois workforce with training in energy-efficiency, renewable energy, and other green workforce education topics." **Phil Minnis – JALC Dean for Workforce Development and Community Education.**

Community colleges are in the unique position to help educate and strengthen the workforce and increase employment opportunities. In partnership with organizations such as IGEN, MEEA, DCEO, and others, the College offered a number of workshops, seminars, and certification courses to provide the knowledge and skills necessary to help prepare area workers for jobs in the emerging green economy.

Training offered at the College in 2013 included:

- ✓ Diagnostic Energy Tester training which certifies individuals to do residential diagnostic testing for 2012 IECC code compliance
- ✓ IL code training - for area code officials and home performance professionals on new energy codes
- ✓ Builder's Breakfast - blower door and duct pressure testing, ASHRAE 90.1 standards for design and plan review for construction in IL
- ✓ Developing and Reviewing Performance-Based Submittals for Code Compliance
- ✓ Building Science Series Infrared Imager Training -
- ✓ Building Science Series HVAC Performance Testing Class
- ✓ Residential Combustion Safety Testing - for home performance professionals
- ✓ River Watch training - teaching citizen scientists to monitor stream quality

Student Education and Sustainability

Degree and Certificate Instructional Programs offered at the College having a sustainability related focus include:

- ✓ Energy Management Systems Certificate
- ✓ Green Technology Certificate
- ✓ Heating & Air Conditioning AAS Degree
- ✓ HVAC Green Technologies Certificate
- ✓ Alternative Energy and Industrial Maintenance AAS Degree
- ✓ Environmental Resources and Geography AS Degree
- ✓ Environmental Studies AS Degree

Solar Energy Technician training Occupational and Continuing Education classes offered included:

- ✓ NABCEP exam – (North American board of certified energy practitioners)
- ✓ Solar knowledge for beginners
- ✓ Solar electric design and installation
- ✓ Solar electric design and installation
- ✓ Solar electric installation (advanced)

As a Building Performance Institute certified home performance professional, IL certified weatherization instructor and Diagnostic Energy Testing instructor, the JALC Sustainability Coordinator assists instructors in the

HVAC and Construction Management programs with demonstrations on use of building diagnostic testing equipment.

Professional Development for Faculty and Staff

Opportunities for College faculty and staff to learn more about sustainability have included development of an online course "Greening Your Curriculum" offered through the Sustainability Center and presentations and speakers at faculty development day focusing on the value of sustainability. Facilities staff have trained in the use of the analytics capabilities of the G building dashboard, and in the fall of 2013 attended a series of webinars on the EnerNOC's real time energy data management system.

A presentation on sustainability at JALC was given to area high school technology instructors attending a dual-credit workshop at the College in November 2013. Travel funding has been provided by a grant from IGEN for College faculty and staff to attend summits on smart grid and technology innovation in 2014.

Sustainability Focused Meetings, Trade Shows, Webinars

Representatives of the College attended a number meetings and events in 2013 to gather information about funding opportunities for public sector energy efficiency projects and successful energy reduction measures implemented at other institutions. The events attended included:

- ✓ IGEN Quarterly Meeting
- ✓ IL Chief Engineers & Facilities Managers Conference
- ✓ Illinois DCEO Trade Ally Show
- ✓ Ameren Illinois Act On Energy Symposium

JALC Sustainability in 2014 – Energy Efficiency Projects

A number of significant campus sustainability projects and programs are planned for 2014 and in some cases already well underway. Projects in the areas of campus facilities and operations, energy efficiency and energy conservation include the following:

C-125 Chiller(s) Replacement Project

This project involves the replacement of two (2) Dunham-Bush chillers with two (2) new chillers in the C-125 mechanical equipment room. The Dunham-Bush chillers are essentially beyond their service life and parts are very expensive when they can be found. These two chillers now function primarily as backup to our 350 Carrier chiller installed 3 years ago.

At the time they were purchased, the Dunham Bush chillers were chosen for their affordability, not energy efficiency. These chillers are not tied into our Johnson Building Automation System (BAS) and they do not have Variable Frequency Drives. The efficiency rating of the proposed replacement chillers is 34% higher than the

existing Dunham-Bush chillers which will reduce the operating costs over the existing chillers significantly. The new chillers will be interfaced with the campus BAS helping them function more efficiently and giving facilities staff greater control of the system. As they can run much more economically at lower loads than the 350 ton Carrier, it is estimated they will run about 75% of the cooling season, or approximately 1500 hours per year. The Carrier will handle high load days where it runs most efficient. This switch in roles from the smaller chillers going from backup to primary will result in additional energy and dollar savings per year.

Additionally, the York chillers use environmentally friendly, zero ozone depletion potential (ODP) HFC-134a refrigerant. Approximately 650 lbs. of R-22 refrigerant in the Dunham-Bush chillers will be reclaimed by the College for future use. R-22 is still used in many of the A/C systems at JALC. The current market price of R-22 is around $ 60 per pound and climbing which makes the value of the reclaimed refrigerant at least $39,000. A significant DCEO rebate will help with costs of the two new chillers. Bids for the new chillers have been accepted by the College with the project schedule calling for installation before the 2014 cooling season begins.

CHEC Building Pool Boiler Replacement Project

This project would replace the existing Lap and Therapy Pool water heating boilers in the Community Health Education Complex building with high efficiency, direct vent condensing boilers. These boilers run year round and provide heat to the pools. The existing gas boilers are original to the building and were rated at 80% maximum efficiency when they were installed. An energy audit by SEDAC determined that these should be replaced with high efficiency (97%) direct vent, condensing boilers which are better suited for low temperature water heating applications such as pool water heating. Replacing the existing boilers will result in significant energy reduction and cost savings. The existing boilers have extensive exhaust stack and combustion chamber corrosion problems which further reduce their efficiency and can be a safety issue.

Engineers have estimated the College will save in excess of $ 8,000 per year by adopting this energy efficiency measure. Bids for the new boilers have been accepted by the College and the project is planned for a spring 2014 completion.

Campus Outdoor Lighting Replacement Project

This project is currently in the planning stages and builds off our recent LED parking lot and roadway project. This proposed project involves replacing inefficient exterior building, sidewalk, and courtyard lighting with LED. A stark contrast is now evident between the bright, clean looking LED parking lot and roadway lighting and the yellowish exterior building lighting.

A recent campus exterior lighting survey conducted by JALC facilities staff identified approximately 100 recessed exterior lighting fixtures, and 230 exterior wall packs, canopy, courtyard, upshot, pathway and bollard fixtures that would be candidates for replacement with LED. The lamps in these fixtures currently consist of a combination of high pressure sodium, metal halide, incandescent, and flood bulbs. Lighting replacement projects are the “low hanging fruit” of energy reduction measures as they offer significant energy savings coupled with short payback periods. It is estimated that replacing existing exterior campus lighting with LED could result in a savings of over 165,000 kWh and the project payback period will be less than three years.

Pilot Project - Retrofit of Roof Top HVAC Units

Since the late fall of 2013, the JALC Sustainability Coordinator and IGEN executive director Stephen Bell have been in discussions with a Midwest based company whose patented technology reduces energy consumption in roof top mounted packaged HVAC systems (RTU's). When installed, their technology equips RTU's with a number of advanced energy saving strategies not commonly found on older, single-zone, constant-volume roof top equipment. In addition to saving energy, the company claims reduced maintenance and increased equipment life.

The company is seeking to partner with IGEN and an IL community college for a pilot project whereby they would install their technology on RTU's on a campus building to showcase its energy savings potential. The Smart Energy Design Assistance Center at UIUC would partner in the project to monitor equipment and verify energy savings. If the potential savings goals were realized, IGEN could open the door for the company to other colleges and industry partners, and the pilot project would provide DCEO information necessary to compute energy efficiency rebates for the equipment.

The company estimates that by installing their equipment on two 20 ton RTU's on the CHEC building, annual savings for the units combined would be approximately 53,000 kWh in electricity and 800 gas therms saved - a total annual dollar savings of over $ 4,000. Wireless network equipment and cloud based software allows real-time energy consumption monitoring, equipment diagnostics, remote access and notification, and fault detection, not available on many RTU's at this time.

Roof Replacement Project

Under this PHS funded capitol project anticipated to be completed in the summer of 2014, the roof on building "B" will be replaced. The existing roof is past its service life and not compliant with current energy efficiency codes. The existing roof ballast will be removed and used in landscaping projects on campus and the existing rigid insulation will be removed and recycled. The scope of the project includes providing 4 inches of polyisocyanurate insulation board and a new, fully adhered white, Thermoplastic Olefin roofing (TPO) system. The new insulation and white reflective membrane will help keep the building cool and reduce energy consumption.

JALC Sustainability in 2014 – Other Programs and Projects

Successful past events such as the electronic recycling and National Drug Take-Back events are being planned again for 2014. Other programs and projects underway or planned include the following:

2014 Campus Conservation Nationals

As noted earlier in this document, the College will join 8 other IL community colleges and over 150 other schools nationwide in competing in the Campus Conservation Nationals (CCN), the largest electricity and water reduction competition program for colleges and universities in the world. During the 3-week competition period from April 7th to April 25, 2014 students, faculty and staff will be challenged by an energy conservation campaign

asking them to reduce energy use on the campus. Campus energy consumption will be entered into an online virtual dashboard during the competition period.

Smart Grid Summit

IGEN is building on the existing relationships between community colleges and their utility providers and is partnering with several organizations to offer smart grid information sessions across the state between January and August 2014. The College is in discussions with IGEN to host a smart grid summit in southern Illinois. Some JALC faculty and staff have registered to attend the March 5th Energy Innovation Conference at Lake Land Community College with travel funding provided by the Smart Grid Classrooms project grant.

Building Operator Certification Classes

Building Operator Certification is a nationally recognized training and certification program focusing on energy efficient building operations and preventative maintenance procedures. Facilities with BOC certified staff are proven to save energy, lower energy bills, and offer an improved comfort for the occupants.

The College is partnering with MEEA to offer BOC Level 1 certification classes in the spring of 2014. At least one College facilities staff member will attend the classes. Area veterans interested in a job in the growing field of building operations and maintenance will be able to attend these classes free through the BOC Veterans Program.

IL Electric Vehicle Tour

The IGEN Electric Vehicle work group is planning the IL EV Tour for early summer 2014. This event will help showcase the network of charging stations on IL community college campuses and the help advance the manufacturing, development and infrastructure for EV's throughout the state. The tour will begin with an electric vehicle taking off from John A. Logan College and driving the length of the state, ending up at the College of Lake County in Grayslake.

USGBC Illinois Green Shadow Mentor Program

Green Shadow, being developed by the United States Green Building Council Illinois' Green Schools Higher Education Sub-committee is a mentorship program to expose students to green jobs through a one day shadow of local business and industry people in green occupations. JALC's Sustainability Coordinator serves on the USGBC Illinois' Higher Ed Sub-committee as is working to bring this program to the College in 2014.

IGEN Career Pathways Consortium Classes

Two new certificate courses will be offered at the College in the Spring of 2014. These classes were developed by JALC faculty in the Applied Technology department as part of the IGEN's TAACCT grant and its Career Pathways Consortium program. HAC 224 Geothermal Systems and ELT 260 Introduction to Hydropower courses will be shared with community colleges throughout IL via the Department of Energy's National Training & Education Resource (NTER) online delivery platform.

Proposed Building Dashboard Enhancement

The Applied Energy Group at University of IL at Urbana-Champaign is proposing to partner with the College and ENSOL Energy Management Solutions to expand the capabilities of the energy dashboard installed in 2013 in G building (see APPENDIX C). The dashboard collects and displays information on electric and gas consumption in the building. This was a monumental improvement over what existed beforehand, which was unmonitored energy usage. However, with minor additions, the dashboard has the capability to monitor far more than gross energy consumption. Individual monitoring of the largest consumers of energy (chillers, air handlers, pump motors, lighting, etc.) can be of great benefit to building operators and can disclose scheduling, operating, or failure problems.

The project seeks funding from DCEO to demonstrate that simple additions to existing dashboards can help optimize facility operations and reduce energy consumption and costs. Results will be disseminated so that other community colleges can examine project costs, benefits and lesson learned. In cooperation with the JALC Sustainability Center, a comprehensive project proposal is being developed to present to DCEO.

Update of JALC Waste Reduction Plan

The College is required by Illinois statue to submit an update to our current waste management plan by January 1, 2015. All current recycling and waste reduction endeavors will be reported.

Sharing our Story

It's important that we continually remind ourselves and others of our College's commitment to sustainability, the successes we've had, and the challenges we still face. The College shares information about our sustainability efforts with the campus community through articles in the General News and the Volunteer, and through announcements, flyers, e-mail and both the College and Sustainability Center websites. Sustainability projects and programs have been highlighted at faculty development workshops and in news articles by Logan Media Services. John A. Logan College is regularly featured in IGEN's Network News and the JALC Sustainability Coordinator has been a speaker at meetings of community organizations such as Rotary and the Sierra Club. Facilities staff and the Sustainability Coordinator have traveled to area Colleges to speak about our sustainable practices at John A. Logan College.

APPENDIX A

Completed Sustainability Projects and Programs

The following is a list of several sustainability related projects and programs undertaken on the campus in the past three years in areas such as recycling, energy efficiency and conservation, wildlife enhancement, water conservation.

- Installing 10 water bottle refilling stations on campus that to date have resulted in over 250,000 refills.
- Installing convenient, colorful recycle bins throughout campus
- Installing a rainwater collection system on new grounds maintenance building
- Geothermal HVAC system installed in new grounds maintenance building
- Installation of pumps to use creek water for lawn irrigation
- Installation of a pervious pavement parking lot (Lot P) – the first of its kind in So. IL.
- Planting of native grasses and wildlife foot plots, and creation of hiking trails
- Installation of electric vehicle charging station on campus
- Installation of a building dashboard in Building "G" to monitor gas and electric use. Install other energy saving equipment such as smart strips and vending misers.
- Updates to campus building systems to improve efficiency, cut maintenance and operations costs, and reduce energy consumption include –
    - ✓ Installation of new high efficiency chiller (with two more planned) - saving an estimated $30,000 per year in cooling costs
    - ✓ Indoor lighting replacement project - upgrade classroom and corridor lighting, and install occupancy sensors
    - ✓ Installation of multiple VFD drives on air handlers across campus
    - ✓ Upgrade and replacement of inefficient air handlers in multiple areas
    - ✓ Install of high efficiency LED parking lot and roadway lighting
    - ✓ Tune-up steam boilers, replace outdated controls with digital direct
    - ✓ Updates to building controls and HVAC systems software
    - ✓ Upgrade HVAC system in main IT server room to state-of-art
    - ✓ Remove inefficient electric furnaces and replace with HE gas
    - ✓ Upgrade demand control ventilation systems
    - ✓ Gym and exit lighting changed to high efficient
    - ✓ New energy efficient welders installed in welding lab saving 188,160 kWh per year
    - ✓ Extensive roof replacement projects whereby older, leaky roofs are multiple buildings are replaced with polyiso insulated roofing with white reflective membrane to improve building energy efficiency
    - ✓ Full campus electrical energy metering is being installed and facilities staff trained to track usage throughout day to cut peak demand
    - ✓ Temperature and scheduling adjustments made across campus to reduce energy consumption

APPENDIX B

EnerNOC Training Webinars Attended by JALC Facilities Staff Fall 2013

Intro to Navigating Your Real Time Energy Data

September 5th, 12:00 p.m. CST

OVERVIEW: EnerNOC's energy management portal puts a ton of valuable data at your fingertips. This session will guide you in the basics of the EnerNOC portal so that you can get the most value out of your real-time metering.

Understanding (and Managing) Peak Demand and Reducing Demand Charges

October 3rd 12:00 p.m. CST

OVERVIEW: Depending on how your rate is structured, peak demand charges can represent up to 30% of your utility bill. Learn how actively managing your peak demand can translate into a meaningful savings opportunity for your organization. Here you will learn how to identify your peaks, diagnose the cause, and use tools to prevent setting them in the future.

Optimizing Setbacks to Avoid Energy Waste
Tuesday, October 15th, 12:00 p.m. CST

OVERVIEW: Not sure what your buildings are doing when you're not around? Night, weekend, and holiday setbacks are one of these easiest and most often overlooked energy efficiency measures. Using real-time energy data, we'll show you how to spot wasted energy based on your organization's occupancy schedule.

Smart Start-Up & Coasting Strategies
Wednesday, November 6th, 12:00 p.m. CST

Start up spikes, resulting from turning on multiple pieces of equipment or systems at once, can often result in excessive demand charges. This session will teach you how to identify start-up spikes, make behavioral changes to adjust them, and then coast into the on-peak period. We'll also cover how to translate savings by coasting into shutdown schedules.

Identifying Your Worst Performing Facilities
Wednesday, November 20th, 12:00 p.m. CST

Have a hunch that one of your buildings is using more energy than the others? Want to see how similar or different buildings compare to one another when it comes to energy intensity? Using the Portfolio View in our portal, this session will help you identify your organization's under- (and over-) achievers.

APPENDIX C

Dashboard Enhancement Proposal

John A. Logan College Sustainability Center

Applied Energy Group at University of Illinois at Urbana-Champaign

ENSOL Energy Management Solutions

December 2013

Proposal for

Dashboard Enhancement and Lessons Learned Dissemination

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I. Introduction

The Illinois Green Energy Network (IGEN) recently funded the installation of dashboards at four community colleges (JAL, SWIC, CLC, PSCC) to study whether dashboards can influence building occupant behavior to save energy. Data for this project is still being collected and results will be published in early 2014.

The dashboards have already shown their utility at John A. Logan College where preliminary data disclosed that air handlers were turning on at midnight on Sunday rather than Monday. Not only was this a problem at the building where the dashboard is installed, it was across campus. The energy savings from resolving this simple scheduling problem that the dashboard disclosed will save significant energy and cost.

Generally, the dashboards are already doing what they were intended to do. Make information available and accessible to help with reducing energy consumption patterns. Two important issues have emerged over the course of this study:

1. Additional information would be useful for identifying additional approaches to conserve and improve efficiencies and for maintaining energy conservation levels over time
2. Training and other materials are needed to make the process more transparent and to transfer lessons learned to other community colleges for dashboard implementation

The dashboards that were installed are only collecting overall electrical and natural gas consumption. This is a monumental improvement over what existed beforehand, which was unmonitored energy usage, however, the dashboards, with minor additions, have the capability to monitor far more than gross energy consumption. With the fairly simple installation of current transformers (CTs), the data that the dashboard can collect and display could be significantly enhanced. The CTs would allow for the individual monitoring of the largest consumers of electricity in each building (chillers, air handlers, pump motors, lighting, etc.). The disaggregation of the energy consumed within the building can be of great utility to facility managers. Monitoring of individual system components can disclose scheduling, operating, or failure problems.

Without the benefit of consumption data, problems with mechanical systems may persist for long periods as long as the systems can maintain comfort conditions. This fact has been disclosed on numerous retrocommissioning projects. This proposal enhances the utility of the dashboard primarily for facility managers but may also interest others.

II. Objective

This project seeks to address the needs and challenges inherent in collecting energy usage data, processing the data to diagnose problems, and optimizing the operations of mechanical and electrical systems in buildings. The objective is to demonstrate that with simple additions to existing dashboards, visualization of energy data can help optimize facility operations.

Now that the dashboards have been collecting overall consumption, an energy consumption baseline can be established for each facility that can be used to compare subsequent data to. Energy consumption data collected after implementation of physical, operational and/or behavioral changes in the future can then be normalized and compared to pre-implementation to determine whether or not it resulted in energy savings. This proposal for dashboard enhancement will allow facility managers to increase their insights into how and where the facility is consuming energy and fine-tune system operations. In October 2011 the National Science and Technology Council (NISTC) issued a report titled: SUBMETERING OF BUILDING ENERGY AND WATER USAGE. This report provides insights into the purpose and benefits of submetering, and provides case study examples of where submetering was used to pinpoint inefficient systems and thereafter update building mechanical systems.[1]

Additionally, results of this project will be disseminated so that other community colleges can examine project costs, benefits, and lessons learned to determine if a dashboard would be appropriate for their facilities.

III. Project Scope

This project has been divided into several distinct phases: identification of current transformer (CT) locations, installation of CT's, development of graphical display of data, collection of energy consumption data, analysis of data, resolution of issues identified through data analysis, collection of post implementation data, comparison of pre and post energy consumption data, economic analysis, write-up of results, and dissemination of information.

The work involves faculty, students, and facility staff, from three Community Colleges, the University of Illinois Applied Energy Group, and Ensol, the dashboard provider.

Following are the phases of the project:

Phase 1. Identify CT locations, install, and establish communications

- Work with facility managers to determine optimal locations and sizes of CTs.
- Order and Install CTs.
- Establish CT communications with dashboard.

Phase 2. Collect Data and Develop/Implement Graphical Displays

- Collect energy data from submetered systems for three months
- Work with ENSOL to develop graphical displays of data that facility managers can use to easily identify faults, scheduling problems, and anomalies with submetered systems.
- Implement graphic displays

Phase 3. Analyze Data, Determine System Modifications, Implement Changes

- Analyze collected data and identify scheduling problems, system problems, and system anomalies.
- Work with facility staff to implement changes

[1] http://www.bfrl.nist.gov/buildingtechnology/documents/SubmeteringEnergyWaterUsageOct2011.pdf

Phase 4. Collect Post Implementation Data, Analyze, Compare to Pre-Implementation Data

- Collect three additional months of data
- Analyze collected data and compare to pre-implementation data.
- Calculate energy savings

Phase 5. Calculate Economics of Dashboards, Write-ups, Dissemination of Results

- Calculate economics of Dashboard
- Write-up results of the study
- Disseminate information to other community colleges.

IV. Deliverables

Deliverables will include a paper that documents:

- Costs for the dashboards and ancillary devices
- Discussion of dashboard implementation challenges
- Examples of pre and post energy consumption
- Examples of data analysis
- Calculations of energy savings and economics
- Lessons learned

Deliverables will also include a webpage available on each of the participating junior college websites and the yet to be developed, Applied Energy Group website.

V. Work Plan

	Description of Work	Start and End Dates
Phase One	Identify CT locations & install	January 1, 2014 February 29, 2014
Phase Two	Phase 1 Data Collection, Development & Implementation of Graphic Display	March 1, 2014 May 31, 2014
Phase Three	Data Analysis, Identification of Modifications, Implementation	June 1, 2014 July 31, 2014
Phase Four	Phase 2 Data Collection & Comparison of pre and Post Data	August 1, 2014 October 31, 2014
Phase Five	Economic Analysis, Write-up of Study, Develop Webpage, Information Dissemination	November 1, 2014 December 31, 2014

VI. Budget

	Description of Work	Anticipated Costs
Phase 1	Hardware and Travel	$46K ($36K + $10K)
Phase 2	Phase 1 Data Collection/Graphic Development	$10k
Phase 3	Data Analysis/Mtgs/Implementation*	$9k
Phase 4	Phase 2 Data Collection/Comparison to Phase 1 Data	$7k
Phase 5	Economic Analysis/Project Documentation/Information Dissemination	$10k
	Total for all phases	**$82K**

* System Implementation costs not included. Those costs will be borne by the Junior Colleges

VII. Key Personnel

Tim Gibson. Sustainability Coordinator. John A. Logan College
- Project Principle Investigator
- Program Coordinator

Robert Nemeth. Applied Energy Group. UIUC.
- Planning support
- Data Analysis
- Project Documentation

Brian Deal. Applied Energy Group. UIUC.
- Planning support
- Project Documentation

Stephanie Timm. Applied Energy Group. UIUC.
- Data Analysis
- Project Documentation

Amirhossein Ghoreishi. Applied Energy Group. UIUC.
- Data Analysis
- Project Documentation

David Muller. Sales Director. ENSOL Energy Management Solutions
- Dashboard Consultant
- Liaison to ENSOL Programmers

APPENDIX D

Summary of Electrical Savings From Completed Campus Projects

*Project	Est. Energy Saved (kWh)/Yr.	Est. Dollar Savings per Year
IGEN ICCTES Lighting	228180	$19,395.30
Phase 2 Lighting	161261	$16,448.57
Vending Misers	5306	$520
350 ton chiller replacement	306,122	$30,000.00
Welder Replacement	188160	$15,000.00
Parking/Roadway LED Lighting	124259	$10,562.00
Totals	1013288	$91,925.87

APPENDIX E

Greenhouse Gas Equivalencies Calculations

From the EPA's eGRID emmission factors: On average, electricity sources emit 1.222lbs CO2 per kWh (0.0005925 metric tons CO_2 per kWh) .

1,013,288 kWh of electrical energy **saved annually** on the campus since 2008 is equivalent to:

Greenhouse gas emissions from....

149 passenger vehicles 268 tons of waste sent to landfills

CO2 emissions from.....

80,149 gallon of gas used 98.4 homes electricity use for one year 1,663 barrels of oil

Carbon sequestered by.....

18,331 tree seedlings grown 10 years 586 acres of forests

Calculated at: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results