

# John A. Logan College Campus Sustainability Report - 2016

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John A. Logan College  
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# Table of Contents

- Executive Summary.....1
- Overview of Sustainability at John A. Logan College .....2
  - Sustainability and the John A. Logan Strategic Plan.....2
  - John A. Logan Sustainability Center.....3
  - John A. Logan Sustainability Committee.....3
  - Illinois Green Economy Network.....4
  - College Partners in Sustainability .....10
  - Affiliated Sustainability Organizations .....11
  - Campus Energy Procurement and Management Strategy .....11
- 2013 - 2016 Campus Sustainability Efforts.....13
  - Facilities and Operations .....13
    - C-125 Chiller(s) Replacement Project.....14
    - CHEC Building Pool Boiler Replacement Project.....14
    - O’Neil Auditorium Lighting Replacement.....14
    - Steam Valve Replacement Project .....15
    - Steam Boiler Tune-up and Re-tubing.....15
    - G Building Cooling Tower.....15
    - Gymnasium HVAC Replacement .....15
    - Roof Replacement Projects .....15
    - Interior Building Lighting Replacement.....16
    - Parking Lot and Roadway LED Lighting.....16
    - Exterior Building Lighting Replacement Project .....16
    - Upgrade of Steam Control Valves.....16
    - OFC and H Building HVAC System Improvements.....17
    - Automotive Lab HVAC Systems Upgrade .....17
  - Custodial and Environmental Services.....17
  - Landscaping and Grounds .....17
  - Recycling.....18
  - Electronic Waste Collection Events .....19
  - Green Purchasing and Surplus Disposal.....19

Green Job Training and Community Education .....	19
Student Education and Sustainability .....	20
Professional Development for Faculty and Staff.....	20
Sustainability Focused Meetings, Trade Shows, Webinars.....	21
JALC Sustainability – Other Programs and Projects.....	21
Building Operator Certification Classes.....	21
IGEN Career Pathways Consortium Classes.....	21
Sharing our Story.....	22
APPENDIX A .....	1
Completed Sustainability Projects and Programs.....	1
APPENDIX B.....	1
EnerNOC Training Webinars Attended by JALC Facilities Staff Fall 2013 .....	1
APPENDIX C.....	1
Summary of Electrical Savings from Various Completed Campus Projects .....	1
APPENDIX D .....	1
Greenhouse Gas Equivalencies Calculations .....	1

## 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 Illinois 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 Illinois 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 to achieve. 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 Sustainability 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 these costs would continue to 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 an initial two year electrical purchase contract signed that has since been renewed. Since that time, EnerNOC's "Insight" energy monitoring system has provided the College with data on campus electrical consumption in real time.

John A. Logan College continues to infuse sustainability principles and practices across a wide spectrum of campus activities. Multiple energy efficiency projects have been completed including replacing roadway parking lot and building exterior lighting with LED lighting. With grants from IGEN, two energy "dashboards" have been installed in campus buildings. A study by the University of Illinois verified that College staff effectively use the dashboards 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 2016 and beyond. Included is the replacement of old pneumatic HVAC controls, upgrades to our BAS system, and additional lighting replacement. 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 through 2016 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 to achieve. 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. However, the College has undertaken a number of projects which have lowered gas consumption. These projects have typically occurred 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 as well as 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 also helps to educate students on sustainable issues, as well as 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 Sustainability Committee**

The John A. Logan College Sustainability Committee was formally called the Green Committee which had grown out of our original Recycling Committee. Until 2015 this committee was a sub-committee of the Environmental and Business Services (EBS) committee. The membership is comprised of individuals representing the College staff, faculty, and administration, and it includes a student representative. The Sustainability 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. Sustainability Committee members have contributed to the success of a wide variety of campus sustainability projects and programs and provide valuable support and advice in an ongoing effort to the JALC Sustainability Center and to the college administration.

### **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](#) and member of the IGEN administration team - 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.

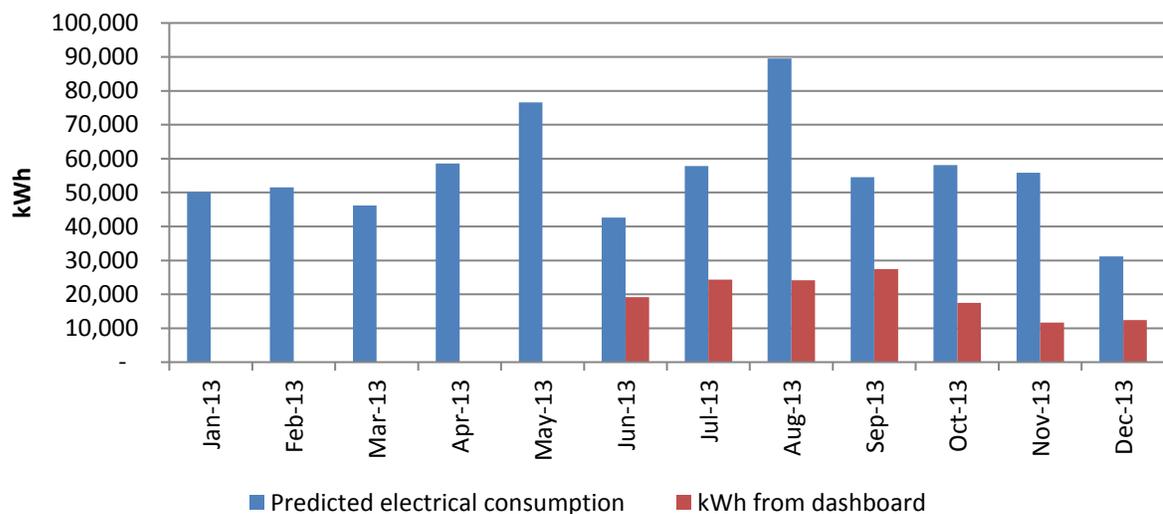
IGEN Initiatives John A. Logan College have and/or are currently participating in include:

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

JALC is one of only four Illinois 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”.

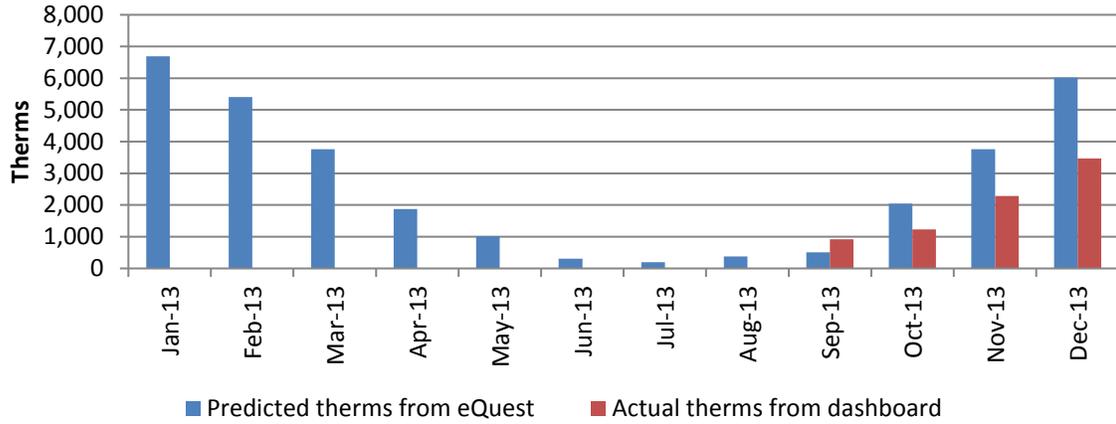
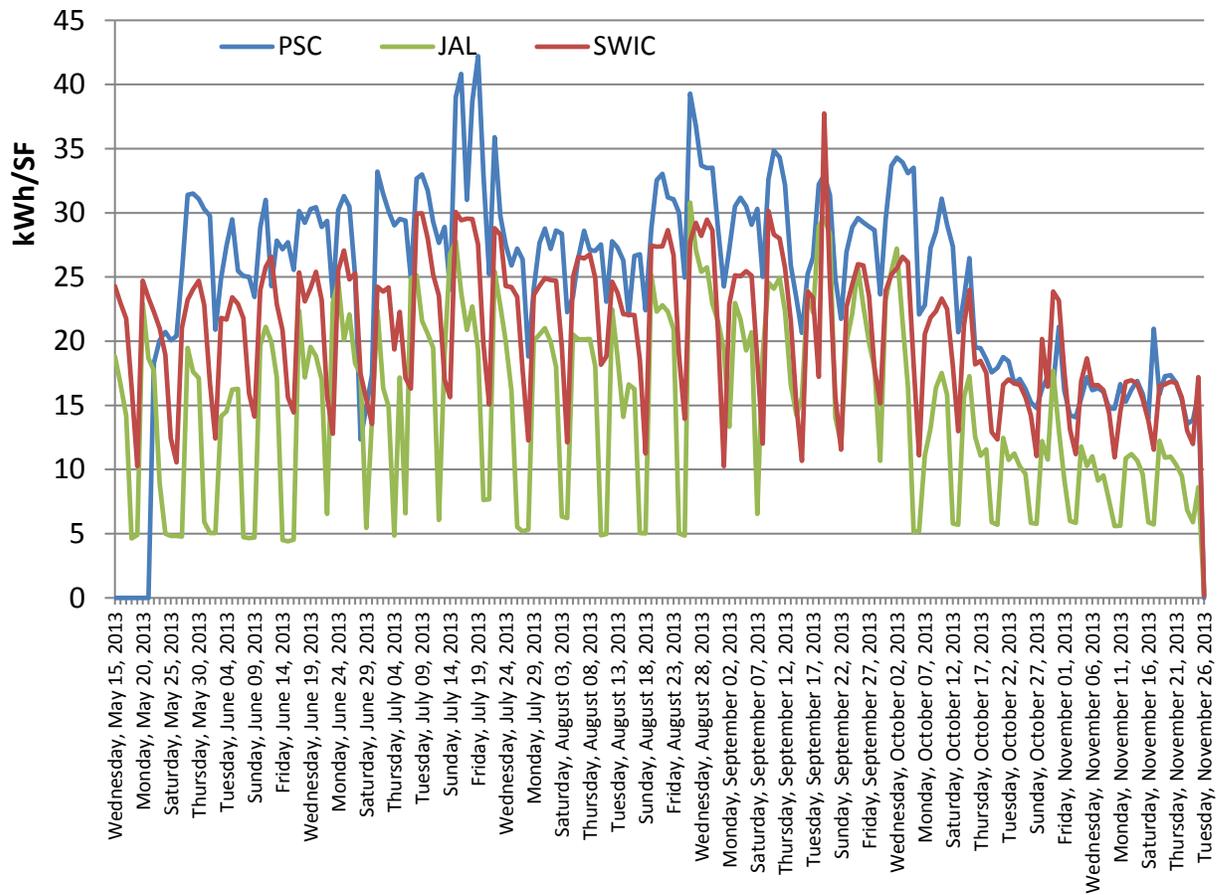


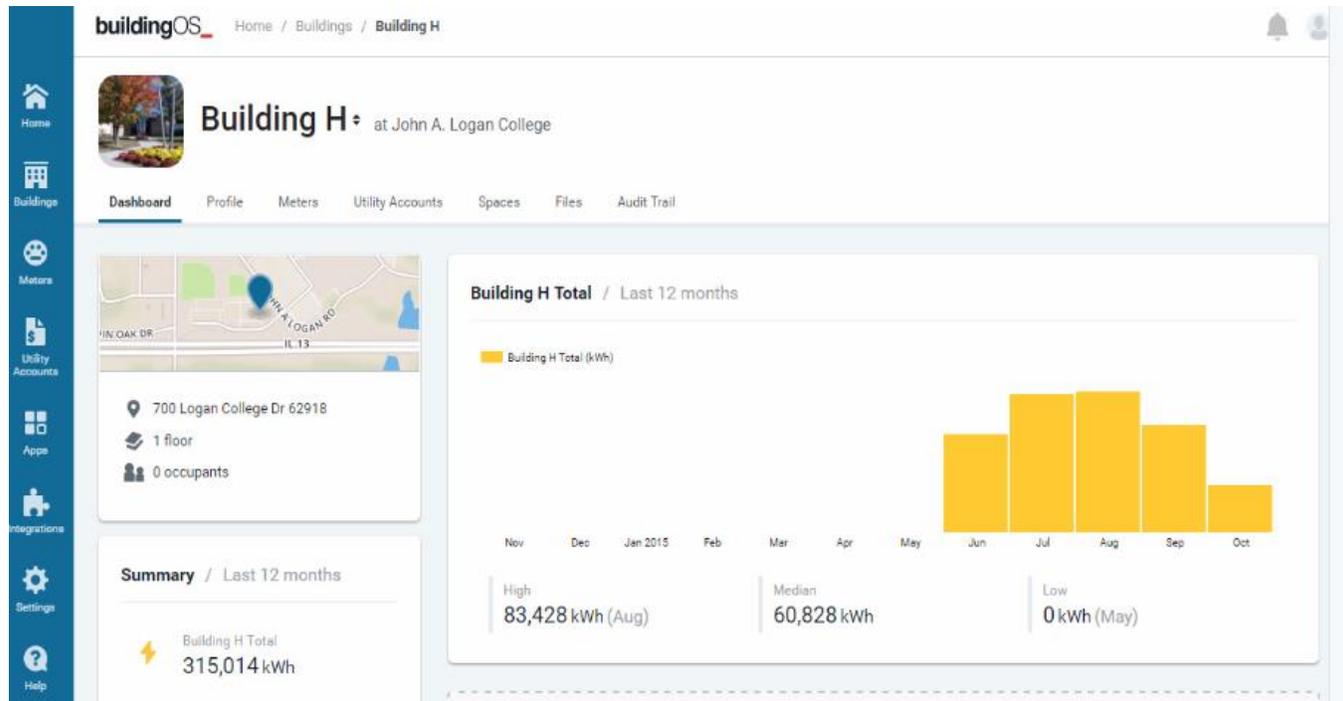
Figure 3 below shows Electrical use per square foot for three of the dashboard colleges: Prairie State College, John A. Logan College, and Southwestern IL College



In 2014 the IGEN dashboard program was expanded to enable JALC to receive a grant to install a building dashboard in the Workforce Development and Construction Management building. This

dashboard from Lucid Design Group provides information on energy use by various equipment in the building. It includes a touchscreen display in the H building atrium. And also shows energy provided by a solar thermal array on the roof of D building.

Figure 4 below is a screenshot from the H building Lucid dashboard depicting energy consumption in the building.



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, the kits are available to College faculty and/or staff to use in classes and programs.

Funding was secured in fall 2013, 2014, and 2016 to expand the program to additional Illinois 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 continues to serve as the program's statewide coordinator.

#### ✓ **IGEN Renewable Energy Installations Program -**

IGEN was awarded a \$3.7 million dollar grant from IL DCEO in 2013 to pursue numerous renewable energy initiatives and programs. IGEN 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 other than receiving substantial project management funding from the program. In the second year of the program the College was able to secure grant funding for a small solar thermal array installed on the roof of D building to supplement hot water requirements of the building.

The JALC Sustainability Coordinator served 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 -**

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

JALC was one of seven Illinois community colleges to receive IGEN initial 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, which covered 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 helps prepare students with skills needed in the power supply and distribution sectors of the green economy. Participating colleges are sharing curriculum and lessons learned through the Smart Grid Work Group. In addition, the grant has funded JALC staff and instructor travel to conferences to learn more about smart grid. This program and funding continues. In 2014 the College received a Smart Grid "kiosk" display which was installed in the East wing lobby, and in 2016, the College held a series of education events across the district to bring information to the community about the

implementation of smart grid technology and its benefits. More information can be found at: [http://www.igence.org/re\\_smart\\_grid](http://www.igence.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 and funding for the kiosk display and community education events.

✓ **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. 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 to achieve measurable reductions in energy consumption.

While the program was in its fourth year, no Illinois community colleges had ever participated until 2014. Building on the success of the Behavior Change for Energy Efficiency "Dashboard" Pilot Program, IGEN provided funding for nine Illinois colleges, including John A. Logan, to enter the CCN competition in 2014. While entered as a group in the competition, each of the Illinois colleges was really competing against itself to lower energy consumption. During the three week competition period in the spring 2014 semester, a team of JALC CCN organizers led the College's effort to target students, faculty and staff with an energy use awareness campaign and ask them to help us conserve energy. Nationally recognized dashboard solution company Lucid created a virtual dashboard for each college to report energy consumption and track results during the competition period. John A. Logan College won the IL statewide CCN competition in 2014, and again in 2015.

The JALC Sustainability Coordinator served as IGEN's statewide CCN Program Manager. The College was 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**

In 2014 IGEN funded and conducted a comprehensive analysis of Illinois community colleges' energy commodity purchasing, energy consumption/use management and the potential for renewable energy asset development. The College participated by providing information to help IGEN determine if there is potential for consortium procurement of energy for our campuses.

✓ **IGEN Electric Vehicle (EV) Work Group**

IGEN formed the Electric Vehicle Work Group in 2011. 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 Illinois community college campuses as well as to develop strategic partnerships to advance EV deployment.

JALC was able to secure DCEO funding to purchase and install the first EV charging station on our campus in the fall of 2012, the first charging station on a college campus south of I-70. A second charger was installed in the fall of 2014.

#### ✓ **IL Electric Vehicle Tour**

The IGEN Electric Vehicle work group held an IL EV Tour in the summer of 2014. This event was developed to highlight the role community colleges play in development of Illinois's EV charging station infrastructure on Illinois community college campuses and to educate students and the public about electric vehicles and alternative transportation. The tour began 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. A statewide EV Rally is planned for 2017.

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 Illinois EV Tour and Rally.

#### ✓ **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 created 32 certificate and degree programs to prepare individuals for careers in the green economy. The curricula was shared via the Department of Energy's innovative National Training & Education Resource (NTER) online delivery platform.

John A. Logan received significant funding from the grant to create a new Sustainable Energy AAS degree to provide students with the knowledge, skills and training to meet industry needs and pursue employment in sustainable and renewable energy careers. The degree program was designed to 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. Additional classes started in the 2014 spring and fall semesters.

The IGEN Career Pathways Organizational chart showed 14 individuals at the College contributed to the success of the program. Several, including one TAA Regional Coordinator based at the College and two Faculty Coordinators, were supported full-time from the grant. Faculty in the JALC Electronics and HVAC programs developed the course material and are teaching 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 Illinois Urbana-Champaign, [SEDAC](#) is an applied research program sponsored by Illinois DCEO that provides advice and analyses to private and public facilities in Illinois 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 Illinois including Building Operator Certification, Home Performance with Energy Star, the Illinois 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 Illinois DCEO's state Energy Office, and the College takes advantage of many of the public sector energy efficiency rebate and incentive programs they offer.
- ✓ **EarthWays Center of Missouri Botanical Gardens** – JALC Sustainability Center has collaborated on training programs focused on increasing energy efficiency with EarthWays Energy Programs Manager.

## 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 Illinois 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 2013, 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, is providing 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). In mid-January 2014, the Insight system began 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 in 2012, 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%
						<b>Total:</b>	<b>\$9,534.23 10.16%</b>

**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 took steps in recent years to reduce gas usage, including replacing outdated pneumatic boiler valve controls, insulating piping, tuning up our main campus boilers, and repairing leaky steam valves. More inefficient pneumatic gas controls are scheduled to be replaced with DDC in a 2017 PHS project.

## 2013 - 2016 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). John A. Logan College continues 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, former JALC Director of Building, Grounds, and Maintenance.**

Several major energy efficiency projects were implemented on the campus between 2013-2016. Energy efficiency and energy conservation projects in the areas of campus facilities and operations, include the following:

### **C-125 Chiller(s) Replacement Project**

This 2014 project involved the replacement of two (2) Dunham-Bush chillers that were essentially beyond their service life with two (2) York high efficiency chillers in the C-125 mechanical equipment room. At the time they were purchased, the Dunham Bush chillers were chosen for their affordability, not energy efficiency. These chillers were not tied into our Building Automation System (BAS) and did not have Variable Frequency Drives. The efficiency rating of the replacement York chillers is 34% higher than the old Dunham-Bush chillers which is helping to reduce operating costs significantly. The new chillers are interfaced with the campus BAS helping them function more efficiently and giving facilities staff greater control of the system. As they run much more economically at lower loads than the 350 ton Carrier, the Yorks 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 efficiently. 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, still used in many of the A/C systems at JALC, was reclaimed from the Dunham-Bush chillers for future use. A significant DCEO rebate helped with costs of the two new chillers.

### **CHEC Building Pool Boiler Replacement Project**

This 2014 project replaced the existing Lap and Therapy Pool water heating boilers in the Community Health Education Complex building with high efficiency (97%), direct vent condensing boilers. These boilers run year round and provide heat to the pools. The existing gas boilers were original to the building and were rated at 80% maximum efficiency when they were installed. The new boilers are saving in excess of \$8,000 per year in natural gas costs as they are better suited for low temperature water heating applications such as pool water heating.

### **O'Neil Auditorium Lighting Replacement**

More than half of the existing 120 dimming fluorescent fixtures in the auditorium "clouds" did not function and others were blinking rapidly. Replacing these fixtures was part of a 2016 project to repair deteriorating and dangerous clouds. Ninety dimmable LED recessed lights replaced the existing lighting and in addition to a substantial energy savings, brought the auditorium back into compliance with health, safety and lighting codes.

## **Steam Valve Replacement Project**

This 2013 project involved replacing two inefficient and inaccurate pneumatically controlled steam valves in our main boiler room with direct digital control (DDC) valves that re-set to correlate with ambient temperature. These valves control steam for heating of 22 percent of the main campus. It is estimated that this project will result in 20% savings on natural gas used by the steam boilers.

## **Steam Boiler Tune-up and Re-tubing**

A tune-up was completed on our two large capacity Kewanee steam boilers in 2013. A boiler tune-up reestablishes the air-fuel mixture for the operating range of the boiler and assures safe and efficient operation. The tune-up included cleaning, recalibration of major components, and replacing gaskets to maximize boiler efficiency. Seventy five percent of this project was funded by DCEO incentives. In 2015 deteriorated tubing in both boilers was replaced along with door gaskets and refractory panels to prevent potential leaking and increase efficient boiler operation.

## **G Building Cooling Tower**

The galvanized cooling tower serving G building was original to the buildings construction and had out-lived its expected service life leading to more repairs and down time. A new 296 ton stainless steel tower was installed in 2013 with high-efficiency fill and fans and more efficient mechanical drive systems to offer maximum cooling with minimum power use.

## **Gymnasium HVAC Replacement**

This 2016 PHS project involved removing eight existing heating and air conditioning units hanging from the gym ceiling which were original to the gym construction and at over 40 years old well beyond their life expectancy. These units were replaced with two new roof top units with conditioned air being delivered to the gym through new inflatable fabric ductwork for more consistent, comfortable and efficient heating and cooling.

## **Roof Replacement Projects**

Old E Building: A 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. The 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.

A Building: This 2014 PHS included removal of the existing ballasted EPDM roofing system for the Administration building which was past it's useful life and not compliant with energy codes. The existing roof was replaced with a new energy saving roof consisting of four inches of polyisocyanurate insulation and a new, fully adhered, white, Thermoplastic Olefin roofing (TPO) membrane. The new insulation and white reflective membrane will help keep the building cool and reduce energy consumption.

B Building: This PHS funded 2015 project replaced the existing ballasted EPDM roof. The insulation level of the new roofing system was dramatically increased for more energy savings.

### **Interior Building Lighting Replacement**

The College has done several lighting projects in the past 4 years to replace old, inefficient T-12 fluorescent interior building lighting with T-5, T-8, and in some areas LED fixtures and lamps. DCEO incentives have enabled the College to achieve less than 3 year payback in energy savings on these lighting upgrade projects.

### **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. These fixtures carry a 10-year warranty. 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.

A significant DCEO rebate was received for the project making it extremely cost effective with a payback period of less than 3 years. In addition to far less maintenance costs, facilities staff estimates the energy savings of the new lights at over 130,000 kWh's annually.

### **Exterior Building Lighting Replacement Project**

This 2015 project built off our 2013 LED parking lot and roadway project. The project involved replacing approximately 100 recessed exterior lighting fixtures, and 230 exterior wall packs, canopy, courtyard, upshot, pathway and bollard fixtures with LED. In addition to a brighter, cleaner look, with a 10 year fixture warranty the new LED lighting will reduce maintenance costs as well as save energy and money. Project estimates show a savings of over 165,000 kWh and \$ 11,000 annually.

### **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 in this 2013 project. 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.

### **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 into 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, so the College 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 and does so with a strong environmental conscious. In addition to mowing, weed eating, and trimming in the summer, as well as 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
- ✓ creating 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 and continues to be successfully used in watering flowers and plants.

*“During 2013 approximately 25,000 gallons of water was utilized from the catch system to water campus trees, shrubs, and flowers. Only one 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 reflected a savings of more than 19 man hours.”* **Tom Hamlin, former 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 Director of Buildings and Grounds in March 2015. The next update to the waste reduction plan will be due January 1, 2020.

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. A short video about the importance of recycling was created and plays on campus television monitors on occasion. The College works closely with various other public entities to share information and promote recycling events. Among these are the SIU-C Sustainability Center and Sustainability Council, Williamson and Jackson County recycling committees, Beautify So. IL committee, Sierra Club, and cities of Carbondale and Marion, IL. The College uses eight third party companies to aid in collection, processing and recycling efforts.

## **Electronic Waste Collection Events**

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. In the past 5 years alone over 21 tons of electronic waste was collected at the College.

## **Green Purchasing and Surplus Disposal**

The College's Purchasing Policies and Procedures Handbook states that recycled-content products "shall be procured wherever and whenever cost, specifications, standards, and availability are comparable to products without recycled content". In 2016 the College began selling surplus property through an online auction website. The online auction has not only been profitable but enables a lot of our surplus property to be repurposed that otherwise may have ended up in a landfill or recycling center.

## **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 – former 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.

Sustainability and green jobs focused training offered at John A. Logan College has 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
- ✓ Building Operator Certification Level 1 – helps advance skills in energy efficient building operations
- ✓ River Watch training - teaching citizen scientists to monitor stream quality

Seminars offered have included:

- ✓ Smart Grid and Smart Meter community education seminar series
- ✓ Go Solar community education events to education the public on solar power

## **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, Illinois 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 have attended 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.

## **Sustainability Focused Meetings, Trade Shows, Webinars**

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

- ✓ Illinois Green Economy Network Annual Meeting
- ✓ Illinois Chief Engineers & Facilities Managers Conference
- ✓ Illinois DCEO Trade Ally Shows
- ✓ Ameren Illinois Act On Energy Symposium

## **JALC Sustainability – Other Programs and Projects**

[National Drug Take-Back](#) events have been held each year since 2013 at the College. This program aims to provide a safe, convenient, and responsible means of disposing of prescription drugs, while also educating the general public about the potential for abuse of medications. Other programs and projects underway or planned include the following:

### **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 partnered with MEEA to offer a BOC Level 1 certification class in the spring of 2014. One College facilities staff member attended the 8 week class and earned BOC certification. Another BOC Level 1 class is planned for spring 2017 at the College. Qualified area veterans interested in a job in the growing field of building operations and maintenance may be able to attend the class free through the [BOC Veterans Program](#).

### **IGEN Career Pathways Consortium Classes**

Two new certificate courses began 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, are being shared with community colleges throughout Illinois via the Department of Energy's National Training & Education Resource (NTER) online delivery platform.

## **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, as well as 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 and special consumer education events in the College district. Facilities staff and the Sustainability Coordinator have traveled to area Colleges and state-wide conferences 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 few years in areas such as recycling, energy efficiency and conservation, wildlife enhancement, water conservation.

- Installed 10 water bottle refilling stations on campus that to date have resulted in over 250,000 refills.
- Installed convenient, colorful recycle bins throughout campus
- Installed 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 two electric vehicle charging stations on campus
- Installation of building dashboards in Building G and H to monitor gas and electric use. Install other energy saving equipment such as smart strips and vending misers.
- A partial list of updates to campus building systems to improve efficiency, cut maintenance and operations costs, and reduce energy consumption include –
  - ✓ Installation of new high efficiency chillers –
  - ✓ Indoor lighting replacement projects - 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, RTU's in multiple areas
  - ✓ Install of high efficiency LED parking lot and roadway lighting
  - ✓ Install new LED exterior building lighting
  - ✓ Tune-up steam boilers, replace outdated controls with direct digital
  - ✓ Continual upgrade of building controls as new equipment installed
  - ✓ 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 on multiple buildings are replaced with polyiso insulated roofing with white reflective membrane to improve building energy efficiency
  - ✓ Full campus electrical energy metering installed and facilities staff trained to track usage throughout day to cut peak demand
  - ✓ Temperature and scheduling adjustments made across campus to reduce energy cons

## 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.

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#### 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.

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#### 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.

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#### 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.

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#### 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.

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## APPENDIX C

### Summary of Electrical Savings from Various Completed Campus Projects

Project	Est. Energy Saved (kWh)/Yr.	Est. Dollar Savings per Year
IGEN ICCTES Lighting	228,180	\$19,395.30
Phase 2 Lighting	161,261	\$16,448.57
Vending Misers	5,306	\$520.00
350 ton Chiller Replacement	306,122	\$30,000.00
Welder Replacement	188,160	\$15,000.00
Parking/Roadway LED Lighting	124,259	\$10,562.00
York Chillers Project	104,081	\$10,616.26
Exterior Building LED Lighting	136,000	\$11,563.00
<hr/>		
Totals	1,253,369	\$114,105.13

## APPENDIX D

### Greenhouse Gas Equivalencies Calculations

From the EPA's eGRID emission factors: On average, electricity sources emit 1.222lbs CO<sub>2</sub> per kWh (0.0005925 metric tons CO<sub>2</sub> per kWh).

**1,253,369 kWh** of electrical energy **saved annually** on the campus since 2008 is equivalent to:

#### CO<sub>2</sub> emissions from



#### Carbon sequestered by



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