John A. Logan College
Campus Sustainability Report - 2020

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John A. Logan College
April 30, 2020

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"We are a diverse learning and teaching community committed to improving individual life and society through high-quality, accessible educational programs and engaged learning opportunities."

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Executive Summary

This report builds from JALC Sustainability reports written in 2013 and 2016 and covers our institution's sustainability work through April, 2020. 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%. We continue to implement energy efficiency measures that result in large reductions in gas and electric use and save significant utility dollars. Public sector rebates from DCEO, and now Ameren, IL 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. With continued support from the JALC administration, the College continues its strong relationship with IGEN. We are one of only a handful of "lead" IGEN IL Colleges, with the JALC Director of Sustainability serving on IGEN's administrative team and as a Regional Coordinator for IGEN. The College continues to promote sustainability as a guiding principle in 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 regional, 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, Inc. 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. EnerNoc was rebranded to become Enel X and the College added their natural gas consulting and procurement services to our Enel X relationship.

John A. Logan College continues to infuse sustainability principles and practices across a wide spectrum of campus activities. In addition to multiple completed energy efficiency projects the College installed a 2MW solar array that came online in December 2019 which can provide up to 40% of our campus electrical use. Grants supporting energy efficiency, renewable energy, and student engagement continue from IGEN. Workshops and trainings have been offered to support public awareness of renewables and to strengthen the workforce and increase employment opportunities in green jobs. 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 April 2020 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. Most recently is a project which will install pool covers by June 2020 funded from a grant with IGEN. This will result in a significant reduction in gas use at Logan Fitness.

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 has relocated from the Workforce Development and Construction Management Building, room H-205 to B-215. A 2010 grant from the Illinois Green Economy Network helped establish the Sustainability Center and allowed the College to hire its first full-time campus Sustainability professional.

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 was comprised of individuals representing the College staff, faculty, and administration, and it includes a student representative. In 2018 in an effort to streamline campus committee operations the Sustainability Committee suspended independent operations and was merged back into the EBS committee which in 2019 became the Business Services Advisory Committee. However, the work to promote campus sustainability continues under leadership of the Sustainability

Coordinator (now Director of Sustainability) and various former Sustainability Committee members now infused throughout other campus committees. These individuals continue to contribute to the success of a wide variety of campus sustainability projects and programs and provide valuable support and advice in the ongoing effort to promote Sustainability at the College.

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. Formed via intergovernmental agreements in 2008 IGEN is a consortium open to all Colleges within 39 Illinois community districts whose purpose is to provide a platform for collaboration among all IL community colleges and their partners to drive growth of the green economy. It is led by an administrative team that receives direction from a President's Steering Committee. IGEN 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. There are eight areas of focus that guide IGEN's work; energy, building sciences, manufacturing, natural resources, sustainable food, transportation, waste, and water resources.

To date, IGEN has successfully managed the implementation of numerous grant-funded sustainability-related initiatives and programs at Illinois community colleges statewide, totaling over $30 million. Funding from IGEN allowed the JALC 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.

John A. Logan is a "lead" IGEN College, one of only a few in the state. JALC helped found IGEN network and as a lead college IGEN JALC receives first access to available grants and program opportunities. This status also provides Logan with; 1) a base funding grant to be used to support sustainability efforts of our choosing; 2) a grant to offset the salary of a designated "liaison" to the network; and 3) since FY18-19 funding to offset the salary of JALC's Director of Sustainability Tim Gibson who is both a member of the IGEN administration team and IGEN's Regional Coordinator. The role of the Regional Coordinator is to develop, implement and managing renewable energy and energy efficiency-related education and training initiatives, grants, programs, and projects at JALC and at other participating Illinois community colleges in the region.

Previous IGEN initiatives at JALC have been reported in JALC Sustainability Reports of 2013 and 2016. Projects, programs, and equipment purchases made possible by IGEN funding from 2017 to the present are making a significant impact at the College. IGEN grants in support of our sustainability efforts have contributed over $500,000 to JALC in the past two years alone. It should be noted that JALC's Coordinator of Grant Development,

Tammy Gwaltney has played a pivotal role in helping to secure and process much of this grant funding for the College.

The following are some of the IGEN funded sustainability initiatives at JALC from 2016 to present:

- ✓ **Smart Grid Consumer Education and Solar Outreach Program –**

  With funding received from the IL Science and Energy Innovation Foundation, IGEN awarded grants to Colleges to help local communities understand the smart meter deployment process and connect consumers with smart grid-related resources. This opportunity allowed JALC to host a series of both on and off campus community events in 2015, 2016 and 2017 to educate consumers on Smart Grid and Smart Meters. In 2017 work began to identify JALC as an IGEN Solar Training Program Community College Partner. In this capacity we began the process of integrating our existing solar courses into the IL Solar for All Solar Training Pipeline program under the then recently passed Future Energy Jobs Act (FEJA). The College partnered with a local solar provider on the Smart Grid community education events to include helping people understand the benefits of going solar. These workshop/seminars included the use of IGEN funded "You've Got the Power" Smart Grid equipment demonstration kits and reached a large number of JALC employees, students, and community members. (See Appendix A)

- ✓ **Lighting Aggregation Grant -**

  Continuing a program started FY 15 which resulted in 135,581 kWh annual energy saved, in FY16-17 the College again participated in the IGEN IL public sector Energy Efficiency Exterior/Interior Lighting Aggregation Program. IGEN awarded a contract to a lighting wholesaler to provide bulk pricing on various new energy efficient lighting fixtures selected by participating Colleges. JALC was able to install a large number of LED lighting fixtures under this program, saving an additional 42,977 kWh annually.

- ✓ **Electric Vehicle Workgroup and new EV Charging Stations -**

  IGEN formed the Electric Vehicle Work Group in 2011. The College has been involved since its inception with JALC's Director of Sustainability being an original member of the workgroup. A few of the goals of the EV workgroup have been to provide public education about electric vehicles, grow the EV workforce, and build a network of charging stations on Illinois community college campuses as well as to develop strategic partnerships to advance EV deployment. The workgroup sponsored an EV tour of IL in 2014 and a statewide rally in 2017 in which JALC participated.

  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.

  In January 2020 IGEN funded another EV charging station for JALC which is on order. It will be a dual head Level II station to replace the single head charger at Logan Fitness. Yet another dual head Level II EV charging station IGEN grant is pending final approval. This station is expected to be funded in May 2020 and will be located in the A lot.

- ✓ **Building IQ Building Energy Use Program –**

  Funded by a DCEO grant to IGEN, this 2017 IGEN grant enabled JALC to partner on a pilot program with Building IQ, a leading energy management software company whose mission is to enhance and redefine the way energy is managed in buildings to reduce energy consumption and costs. College staff worked with Building IQ to integrate their proprietary Predictive Energy Optimization (PEO) software platform into our Building Automation System (BAS) to adjust HVAC system parameters to monitor and optimize energy use and diagnose problems while maintaining occupant comfort.

  In the final program status report, it was concluded that JALC's commitment to energy reduction and energy efficiency is exemplary compared to IL community colleges across the state. In large part, this is due to JALC's participation in programs that have resulted in cost and energy savings, including several HVAC equipment upgrades. Additionally the report concluded JALC's facilities staff is conscious of energy use and focused on conservation. The Building IQ PEO software platform and support services provided detailed and targeted information to facilities staff to help redirect resource time in analyzing problems, and increase occupant comfort and operational savings. (See Appendix B)

- ✓ **Solar for Businesses Symposium -**

  This 2019 IGEN grant provided funding to allow JALC to host a symposium for area business leaders to learn about incentives available for installing solar, and benefits such as decreased tax liability, protection from rising energy costs, lower utility costs and improved customer perception. It featured presentations from Ameren, Egyptian Electric, area solar installation companies and customer testimonials. (See Appendices C)

- ✓ **Habitat for Humanity Solar Installation -**

  This IGEN grant provides over $29,000 in funding for rooftop solar PV systems on two Habitat for Humanity houses in our College district. The funding provides for 100% of the equipment needed for these homes. The first installation was completed in December 2019 by students in JALC solar energy Community Education classes as part of the course work. The second was scheduled for April 2020 with the installation to be done by the first class from the IGEN Department of Energy grant to "Expand the Solar Workforce through the IL Community College System". The install is now on hold pending resolution of the Covid-19 crisis.

- ✓ **Highway Careers Construction Program (HCCP) Energy Efficiency Workshop(s) -**

  An IGEN grant in the fall of 2019 enabled the College to offer a two-day workshop for students in the Highway Careers Construction Program class provided by an expert in Building Science. Students received classroom and hands on training in weatherization, renewable energy, efficient HVAC systems, building envelop air sealing and effective insulation techniques. Students installed insulation in a mock building structure, and conducted blower door testing and other energy saving work. This was the first instruction covering building science principles in the 10-year history of the HCCP program and was very

well received by both students and instructors. A spring 2020 repeat was planned but had to be cancelled due to the Covid-19 shutdown of hands on classes.

- ✓ **TEC DG 1,000 Manometer Purchase –**

  An IGEN grant in early 2020 enabled the College to purchase two Energy Conservatory DG 1,000 manometers for the JALC HVAC program. These highly precision, state of the art instruments replaced aging, broken manometers needed to operate blower door and duct pressure testing equipment used in hands on classes.

- ✓ **Solar HVAC System for the HCCP Building –**

  Required program deliverables IGEN considers when evaluating grant applications often include a focus on energy efficiency improvement, renewal energy, and student engagement. This 2020 IGEN grant application hit all three deliverables. The College was awarded funding to purchase a high efficiency air conditioning system in the HCCP building that will be built in late spring 2020. The a/c system will in part be powered by a rooftop solar PV array. When we are able to resume hands on classes the system will be installed and maintained by students in JALC's HVAC program. This grant will not only provide our students with hands on experience and training on some of the most up to date HVAC technology on the market today, but will help lower utility bills and further support our campus sustainability efforts.

- ✓ **Solar Powered Table/Work Stations –**

  A 2020 IGEN grant has provided funding for two Sunbolt solar powered table/work stations to be installed in the JALC Waterfall Courtyard. These units are essentially attractive tables with bench seating under a solar umbrella. Students will be able to study or socialize while keeping charged. The tables include LED lighting, 4 – 120V outlets, 8 USB outlets, and two wireless chargers. They can accommodate 75 to 150 charges/day and require just 6 hours of sunlight to maintain full capacity. They are currently on order. Production has been delayed by the Covid-19 situation but it's our hope they will arrive in June.

- ✓ **Solar Powered Emergency Blue Light Call Towers –**

  Working with our Campus Safety office, the College received an IGEN grant to purchase six solar powered emergency blue light call towers from Case Emergency Systems. These towers will be placed in Lots A, B, C, D, and at Logan Fitness and the Historical Village and will provide voice communication directly to the JALC Campus Safety office for anyone with an emergency or needing assistance. They feature an easy to use push button interface, a top mounted solar panel and internal battery to provide round-the-clock operation with no electrical wiring necessary. An internal Verizon cellular modem provides for communications to Campus Safety and the towers have a self-monitoring system that checks for proper functions and sends automatic alerts for service or maintenance. The towers are on campus awaiting installation which will be done as part of a service learning project by the HCCP class.

- ✓ **Logan Fitness Pool Covers –**

  In alignment with a key IGEN funding component – "energy related capital and installation/upgrade projects for campuses as living laboratories that will have a demonstration, education, and training component that incorporates faculty, staff and community members", the College was awarded funding in 2020 to cover 100% of the purchase and installation costs of two pool covers. To be completed in June 2020, this highly visible project will entail installing fully automated pool covers in the Logan Fitness Center natatorium. This building represents about 5% of the main campus "under roof" square footage, but utility bills for the facility in some months have been as high as 50% of the rest of the College's energy usage. The high energy consumption at Logan Fitness is directly related to our two indoor pools (lap pool and therapy pool) that remain uncovered 24/7. In a 2011 Smart Energy Design Assistance Center (SEDAC) audit of the Logan Fitness Center, SEDAC's #1 energy conservation and reduction measure (ECRM) was to purchase pool covers. The cost of the covers has been prohibitive, especially in recent years with the state budget cutbacks. Not having covers over the two pools when they are closed (which is 85 hrs./per avg. week and nearly 4,500 hrs./year) results in excessive and unnecessary gas and electricity use due to heat loss by evaporative processes driven by temperature differences between the pool water and space. SEDAC's Smart Energy Tips for Pools flyer states that for a pool with a 4,500 sq. ft. surface having a 2-degree temperature difference between the pool water and space temperature (our lap pool) water loss is equal to 216 pounds – or 26 gallons/hr. Each pound of water that evaporates takes 1,048 Btu of heat out of the pool. So, every hour 226,368 Btu of heat is lost to evaporation which has to be put back into the water by our natural gas pool boilers. While having a smaller surface area, our therapy pool is kept at 91 degrees which increases the evaporative process exponentially. In addition to increased use of natural gas, the evaporative processes occurring from uncovered pools; 1) requires 24/7 operation of energy consuming space dehumidification equipment (two -50 ton units serve the Logan Fitness natatorium space alone); 2) leads to increased water waste and; 3) significantly increases pool chemical usage. SEDAC's energy audit and the U.S. DOE's Smart Energy Pool Cover Analysis software indicate that covering the two pools when not in use can result in a reduction of gas and electricity costs by 35-50% (up to 50,000 therms and several hundred thousand kWh/year), and up to 188,000 gallons of water per year saved. (See Appendix D)

- ✓ **Expanding the Solar Workforce Through the IL Community College System**

  In 2018 IGEN received funding in the amount of $1.25 million dollars from the U.S. Department of Energy for a three year grant program to expand the solar workforce in IL. Currently, Illinois ranks 20th nationally in solar jobs but the demand for solar workers in Illinois is increasing and projected to grow faster in the future. Demand is driven by the Illinois Future Energy Jobs Act, which requires utilities to get 25% of their power from renewable sources like solar and wind by 2025. Grant objectives included; 1) addressing the need for more solar installers by increasing the pool of skilled solar workers; 2) to keep pace with evolving needs of the solar workforce by improving training programs to be more accessible and industry-driven and; 3) strengthen IGEN's capacity as a statewide resource for solar education, training, and workforce initiatives.

John A. Logan quickly offered our support and became one of only five IL colleges participating in the grant. (See Appendix E) Year one funding from this grant will enable the College to build a simulated solar training roof with a working PV system on it which will be on the east side of the new HCCP building. When hands on classes are able to resume, students from the HCCP program will build the solar roof. A first program year solar install class of 18 was recruited and the first two of four day long sessions was completed before the class was suspended due to the Covid-19 shutdown. Tuition, class materials and instructor compensation was being paid for by the grant. At the completion of the course students would be eligible to take the North American Board of Solar Practitioners (NABCEP) PV Associate credential examination. The PV Associate credential gives evidence of training in such topics as solar PV system design, site assessment, solar sales, and solar installation and opens the door to employment in the solar industry. It is our hope that this class can be completed when we are able to again have face to face classes.

College Partners in Sustainability

In addition to IGEN, the College has excellent working relationships with several other local and statewide 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 affiliated with the College of Engineering that provides advice and analyses to private and public facilities in Illinois to help save energy in buildings. SEDAC performed an audit of the Community Health Education Complex (Logan Fitness) building in 2011 and have assisted with IGEN funded JALC initiatives such as the Behavior Change for Energy Efficiency "Dashboard" Pilot Program. In late 2018 funded by an Ameren grant, the College was able to engage SEDAC to perform a Level III Energy Assessment Report covering the entire main Carterville campus. According to the U.S. Green Building Council, "most commercial buildings use 10 to 30 percent more energy than necessary and have ample opportunities to reduce their energy consumption levels." SEDAC estimated how much energy is used throughout the College and what it costs. These charts represent those energy and costs breakdown. Figure 5 shows how much of all the energy that JAL College uses goes to each function. Figure 6 places a cost on each one of these functions. The two graphs do not align because the cost per kBtu for natural gas is much less than for electricity.

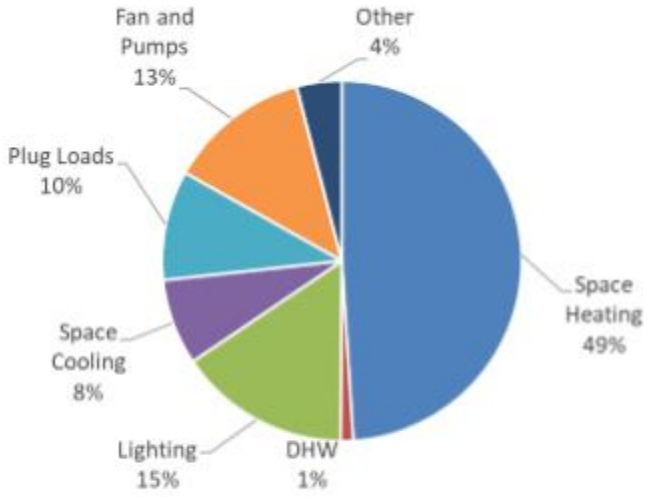


Figure 5: Energy Breakdown (kBtu)

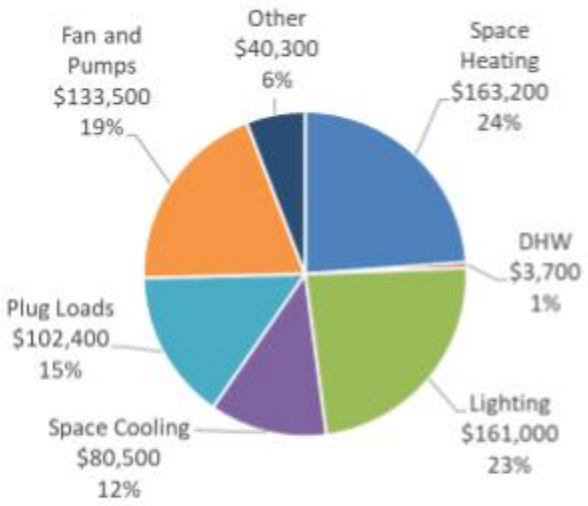


Figure 6 Cost Breakdown

The report identified multiple energy cost reduction measures (ECRM's) and calculated payback, savings, and energy reduction for these ECRM's (see table below). SEDAC felt confident their recommendations would allow us to create an effective and financially prudent plan to help become more energy efficient.

Recommended Package 2 of Energy Efficiency Measures			
Simple Payback (before incentives)	**4.8 years**	**Incentives Available**	**$130,579**
Annual Utility Cost Savings	**$88,700**	**Percent Energy Savings**	**11.8%**
kWh Reduced/yr	**906,900**	**Percentage kWh Reduction**	**14%**
therms Reduced/yr	**21,570**	**Percentage therms Reduction**	**10%**

SEDAC noted that the **JALC facilities staff appear focused on energy savings efforts and attempts to reduce energy consumption**, despite dealing with many aged mechanical systems dating to original construction when energy use was of negligible concern. In summary they indicated our campus energy usage per kBtu/ft^2 is below the median national reference for site energy use for universities and colleges which is commendable considering the aged mechanical, electrical, lighting and control systems staff have to deal with. The College is working diligently to implement the recommended measures as much as time and funding allow. (See Appendix F)

- ✓ **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 Savings Through Efficient Products (STEP) program and the Illinois Home Performance Equipment Loan program that JALC has

participated in since its inception. IGEN collaborates with MEEA on various programs, and the College works directly with them on others.

- ✓ **EarthWays Center of Missouri Botanical Gardens –** JALC Sustainability Center has collaborated on training programs focused on increasing energy efficiency with EarthWays Energy Programs Manager.

- ✓ **Citizens Utility Board (CUB), Faith-in-Place, and Elevate Energy** – These three statewide consumer advocacy became members of the **Illinois Clean Jobs Coalition (ICJC)** following passage of the Future Energy Jobs Act (FEJA) in 2016. FEJA legislation marked one of the most significant steps to address energy policy in IL history and set the stage for significant renewable energy and energy efficiency growth in the state. Following passage of FEJA, members of the IL Clean Jobs Coalition began to put together a state-wide community feedback program called Listen, Lead, and Share. The purpose of these dialogue sessions was to ask questions related to green jobs, transitioning from fossil fuels, environmental justice, etc. in order to get thoughts on the needs of specific communities. To give our district residents a voice in the legislative process, the College hosted Listen, Lead, and Share events in October of 2018 and February 2019. These events featured speakers from CUB, Faith-in-Place and Elevate Energy. Attendees were able to complete a survey about the legislation, engage in discussion, and offer their opinion to the event moderators. Several in attendance were students from the Department of Applied Technology, Construction Management Program Green Building class. These students were highly interested in how FEJA and the growth of green jobs will impact their careers and future employment possibilities.

  When IL legislators were considering the successor to FEJA – the Clean Energy Jobs Act (CEJA), the College again partnered with CUB, Faith-in-Place and Elevate Energy in August of 2019 to host and event called the Carterville Clean Energy Community Dialogue. This event enabled our community members to join in a discussion of the highlights of CEJA and what was being done to create a cleaner future.

Campus Energy Procurement and Management Strategy

As background to help understand our most current rational and strategies with respect to energy procurement and management some background information and a look back to when we began to evaluate our energy and actively manage our energy policies is helpful.

The College annually spends well in excess of $ 500,000 in energy costs - gas to keep the buildings and hot water heated, and electricity to keep the lights on and buildings cooled. A portion of our campus is within Egyptian Electric Cooperative's service territory (Logan Fitness, the ballfields and concession building) but Ameren "delivers" electricity to the majority of the campus. Where Ameren delivers our energy, 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.

Electrical Energy Consultant Selected – In 2013 nationally prominent energy consultant company EnerNOC was chosen to provide the College with energy advisory services, which included an analysis of our energy consumption and utility bills, energy education, and assistance with development of an energy strategy. The College also installed EnerNOC's innovative "Insight" system which, for the first time, provided the College with data on campus electrical consumption in real time.

New Electric Supply Contracts – Working with the College to select an energy supplier and manage the procurement process, EnerNoc bid our usage to six different energy suppliers and negotiated a multi-year electrical supply contract which was estimated to reduce overall electrical costs by 8% annually over the previous supply contract.

Results of First EnerNoc Negotiated Contract – 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%
						Total:	**$9,534.23**	**10.16%**

At the expiration of the first contract, EnerNoc again took our electrical account to market and negotiated a contract which once again offered us substantial savings.

Natural Gas Contract – Building on their success procuring our electric supply, the College made the decision to allow EnerNoc to manage our natural gas supply contract. Consumption of natural gas has been slowly rising on the campus over the past several years for a number of reasons. The College added additional square footage with completion of the new Communications wing, we have removed a number of inefficient electric resistance heating systems and converted them to gas, and we are using more gas "reheat" in a number of buildings to cut cooling costs.

EnerNoc recently re-branded to become Enel-X but remains one of the largest energy procurement and services companies in the world and our relationship with remains strong and very beneficial.

Despite our best efforts to find the lowest price for electricity and to manage our systems to reduce both demand and kWh consumption – our electrical usage and utility costs began to slowly rise. In 2018, partially to

combat these rising costs the College began to seriously explore the possibility of installing a large solar PV array on campus.

JALC Solar Array Project

It's important to note that strong incentive for the growth of renewable energy in the Future Energy Jobs Act mentioned earlier in this report made installing a large scale solar PV array on our campus financially feasible. As the College began to explore solar three things became evident; 1) we were the first community college in IL to consider a large scale, direct generation, behind the meter solar PV system; 2) there were not a lot of resources or information available to assist in the process and; 3) we'd have to figure things out on our own. Nevertheless, with the strong support of our President and Board of Trustees, the College moved forward. It was determined to site the system on a 10-acre parcel of land the College owned on the NE portion of the campus.

Project Goals

In addition to the immediate saving on utility costs it was important that the College lock in long term energy costs. Other goals were to leverage the highest state and federal incentives possible, structure the project with third-party ownership wrapped within a Power Purchase Agreement (PPA), and adhere to our long established Egyptian Building Trades Project Labor Agreement. Lastly – it was important that the project be a visible demonstration of our leadership in Sustainability.

Vendor Selection Process Construction

The College developed and issued a Request for Proposals (RFP) to select a contractor/developer for the project. Energy bills and usage data was provided to companies seeking to bid on the project. Opportunities for onsite visits were developed. College legal reviewed the PPA.

After careful evaluation of the responses to the RFP, the College selected Straight Up Solar (SUS) to build the array, an IL/MO company with local representation and broad experience in constructing large scale solar. The JALC system would be the largest project for SUS to date. SUS brought Lightwave Solar in to assist with system siting and design, and Shine Development who would fund the project and "own" the system. As a non-government entity, Shine can take advantage of tax and other incentives the College is not able to realize which makes a financial arrangement beneficial to both parties.

Construction

Local union contractors were engaged to build a road into the site from Tippy Street and clear the site (Ramsey Excavating) and to construct the array (Burke Electric) which would consist of over 5,000 solar panels on a steel pier system with associated inverters, transformers and 900+' of underground wiring through woods and under a creek to reach our main campus electrical panel. Construction began in the summer of 2019 with the system coming online on December 18th, 2020.

System Summary

The JALC solar array is a 1.87 MW DC system. For reference, given our Midwest location, this is enough electricity to power approximately 300 average homes in IL annually. It is calculated that at peak output the system can provide up to 40% of our campus electrical needs. The College provided the land for the system, and it was constructed at no cost to us, including no maintenance costs for the life of the system. Under the terms of the PPA, we will purchase power produced by the array for less than we are paying for electricity presently with no cost escalator built into the agreement. The system will produce power for the next 25 years and save the College an estimated $1.5 million dollars.

The JALC array includes hardware which reports its power production through an online portal. College staff have begun to closely analyze the output to compare it to pre-array utility use. It's too early to tell if the system is living up to expectations as any and all PV system performance is related to weather conditions. Early indications show strong evidence this project will meet most if not all the goals set forth when it was conceived and is a huge win for the College. A final anecdotal note: There seems to have been more public interest in this project than any construction project in the history of the College.

Appendix G gives a more in depth look at the process we went through, explains the why and how of the project and tells the story of our success. The appendix comes from a training module developed by the Midwest Renewable Energy Association working under an IGEN contract to help other IL Colleges replicate what JALC has accomplished.

Other 2017 - 2020 Campus Sustainability Efforts

The commitment to sustainability on college campuses in IL continues, supported by organizations such as IGEN and others sustainability partners such as those identified in this report. 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. We have documented JALC sustainability efforts in previous JALC Sustainability Reports and do so again in the following section of this 2020 report. 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.

> *"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 facilities driven energy efficiency improvement and energy conservation projects were implemented on the campus in the years 2016 through April 2020. They include the following:

Two Campus Lift Stations Upgraded

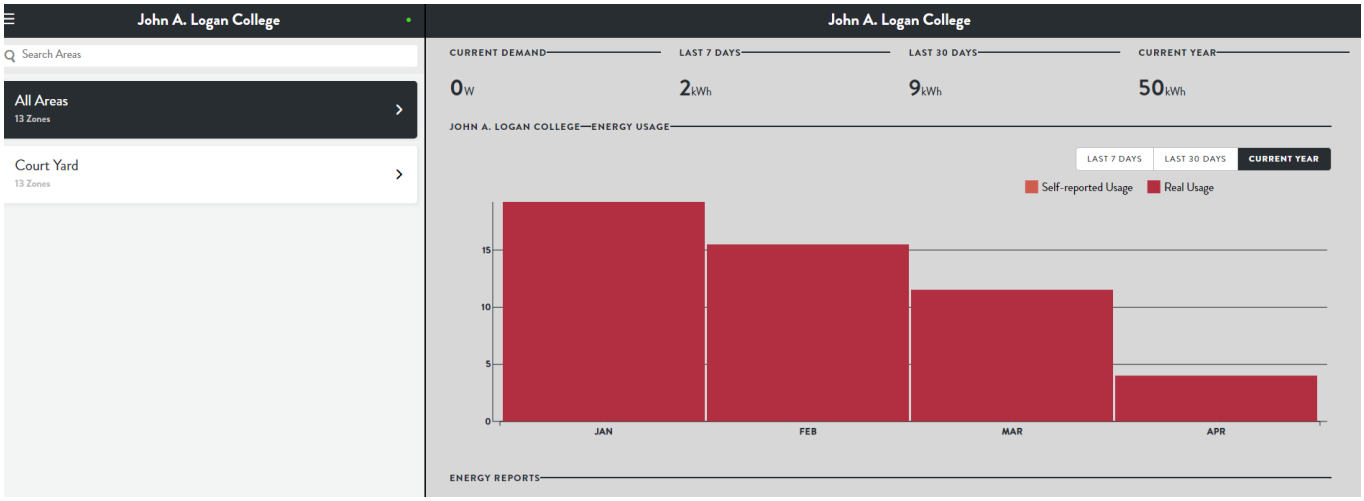
It seems obvious that it's not environmentally friendly to have raw sewage flooding into hallways and other occupied spaces on campus. Two recent projects mitigated that real possibility by replacing four worn, outdated and problematic sewage lift pumps and controls at two critical campus lift stations. As part of the work the lift station controls were integrated into our Building Automation System for the first time. This enables maintenance staff to receive emergency alerts via the BAS system or text when there is a station malfunction.

H Building Chiller Replacement Project

This project replaced the existing air cooled chiller and associated cold water pumps serving the H building. The chiller and pump system was original to the building and was beyond its service life. One of two compressors in the chiller had failed completely and the other was on life support. After calculating the energy savings vs estimated cost and seeing the payback period was extremely attractive, engineers specified high efficiency self-sensing pumps controlled by variable frequency drives for the project. It's estimated that the energy savings of the high efficiency pumps and drive equipment which will have a service life of around 15 years would pay for itself within the first two years of operation.

Historical Village Lighting Project

Our Historical Village has seen more use in recent years, including evening events at the Mees Center and activities organized and supported by an active group of dedicated volunteers which brings history to life for visitors. Outdoor lighting was essentially non-existent and lack of it was a growing functional and safety concern. A lighting project was undertaken which resulted in installation of outdoor lighting that is both "period appropriate" and highly efficient. Thirteen pedestal light towers were placed along the Historical Village pathways, each having a twin headed LED fixture (26 total lights) atop it which looks somewhat like turn of the century gas street lighting. The lighting is controlled by a state of the art cellular modem controller interface. The lighting can be programmed to operate as a group or individually, schedules be set to control time of operation or lighting "scenes" can be programmed for special events. JALC staff can control and program the lighting using any computer on campus or with a simple phone app. The lighting is generally set to come on at dusk and go off about 10:00 p.m. each evening and set to run at about 20% power level. If we turned this lighting on full there's a chance we'd have people pulling in for gas or aircraft attempting to land! The system is capable of reporting energy used by day, week, or month. To say this lighting is efficient is an understatement. The graph below shows kWh used by the entire 26 lighting fixtures for the period Jan. 1, 2020 through April 15th 2020. Obviously more electricity was used in January as the days are shorter. But in total, the lighting used only 50 kWh of electricity. In monetary terms this equates to about $1.50/month for the period shown.



Pool Chemical Controller Replacement Project

This 2019 project involved replacing an old, inefficient and inaccurate automated pool chemical controller system. For sometime staff at Logan Fitness have worked diligently to accurately and safely control dispensing of required pool chemicals. A new chemical controller system with more accurate sensors and capable of being remoted monitored and/or controlled by computer or phone app was installed. This project assures the safety of Logan Fitness patrons using our pools and is more environmentally friendly because the accuracy of chemical use is increased while waste is reduced.

Interior LED Building Lighting Improvements

The College has done several interior lighting projects in past years to replace inefficient T-8 and T-12 fluorescent lighting and exterior lighting projects to replace high intensity discharge and sodium vapor parking lot and building lighting. With recent improvements in lineal LED technology, the College has begun to replace 4' fluorescent light bulbs in our standard interior fixtures with lineal LED bulbs. In 2019 the College purchased and installed nearly 2,300 4' T-8 equivalent LED bulbs. With the Ameren instant incentive program, the cost of these bulbs is less than the cost of a standard T-8 fluorescent bulb. They use less energy, have a much longer life, produce more light, and unlike T-8 fluorescent bulbs – don't need to be recycled at the end of their life which costs about 30 cents per bulb. The T-8 bulbs we use are 32 watts vs 20 watts for the LED bulb. Savings with this project have been estimated at close to $5,000/year. The College recently purchased another pallet of the T-8 equivalent LED bulbs and is experimenting with T-5 LED replacement bulbs.

WF LED Building Lighting Improvements

In 2019 lighting was upgraded at our West Frankfort Extension Center. JALC facilities staff installed LED recessed lighting fixtures in some interior spaces, and under the canopy at the main entrance. New LED lighting on the building exterior replaced outdated and failed fixtures.

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, 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 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
- ✓ snow and ice removal

Snow and Ice Removal Improvements

Past procedures for snow and ice removal on the campus was to use common road salt on roadways and parking lots spread via a truck mounted box spreader, and pelletized calcium chloride on sidewalks, steps and at building entrances. Salt is very hard on surfaces, not environmentally friendly, needs sunlight to work, and does not work well at extremely low temperatures. Calcium chloride pellets melt snow and ice but are difficult to apply and difficult to keep out of our buildings which leads to issues with maintenance and wear on flooring. In late fall 2018 the College purchased a salt-brine making system and equipment to apply the salt brine. Nearly every highway department in areas subject to snow and ice is now using some form of liquid anti-ice or de-icing

system. You'll often see highway departments spraying ahead of snow or ice events. The purchase from a Minnesota based manufacturer included a 750-gallon brine maker, a 305-gallon truck mounted spreader with a three lane power boom, and a 110-gallon tank with 140' automatic hose reel that could be mounted in an RTV. A 2,000-gallon brine storage tank was purchased to hold additional brine. Facilities staff installed the equipment, and taught themselves how to make salt brine but had only a few chances to utilize the brine system over the winter of 2018-19. The brine is much more environmentally friendly, and easier on roadway and vehicle surfaces. Spraying sidewalks, steps and building entrances avoids tracking in pelletized calcium chloride and is easier on staff who would otherwise need to shovel snow and ice and apply chemicals with hand pushed spreaders. To better enable the College to meet snow and ice removal needs, an aging small plow truck was replaced this past year with a new truck and plow, and a dedicated sidewalk machine with a snow blade and rotary broom was purchased winter. In a nice surprise, the winter of 2019-20 did not offer our grounds staff much opportunity to use this new equipment.

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 and submitted every five (5) years. The College submitted a waste reduction plan in 2010 and another was submitted March 2015. Management and oversite of the Solid Waste Management Act was recently transferred from the IL Dept. of Commerce and Economic Opportunity to the IL Environmental Protection Agency. The 2020 JALC Waste Reduction plan was due April 1st and recently submitted to the ILEPA. After EPA review and acceptance, it will be posted on the College website.

The College continues to recycle a wide variety of waste products, including the following:

- ✓ 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
- ✓ roofing materials – recycled or used in landscape projects
- ✓ automotive paints, filters and parts cleaning fluid -collected and sent to an environmental recycler
- ✓ cardboard - collected daily, bundled and 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 sent 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 multiple 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. From 2015 to 2019 over 32,000 pounds of electronic waste was collected at the College.

Green Purchasing and Surplus Property 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 August 2016 the College began selling surplus property through the online auction website – GovDeals. Our sales experience with online auctioning has not only been profitable and time saving but enables a lot of our surplus property that otherwise may have ended up in a landfill or recycling center to be repurposed and reused. Since we began to use GovDeals in 2016 the College has sold 150 surplus items, raising nearly $79,000.

Green Job Training 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, Ameren and others, the College continues to offer 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 have included:

- ✓ Diagnostic Energy Tester training which certifies individuals to do residential diagnostic testing for 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

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 Meetings
- ✓ Illinois Chief Engineers & Facilities Managers Conference
- ✓ Illinois DCEO Trade Ally Shows
- ✓ Ameren Illinois Act On Energy Symposium
- ✓ Missouri/Illinois Electrical Board Trade Show and Expo

Blackjack Disc Golf Course

Established in the fall of 2018 with a grant from the JALC Foundation, the nine-hole Blackjack Disc Golf Course opened and shortly after the JALC Disc Golf Club was formed. Located on the east side of campus, the course offers a great recreational experience for both novice and veteran players of this highly popular and growing sport. Designed with safety foremost, the course uses natural pathways, natural terrain (including a pond), and natural openings through the woods, putting sustainability at the forefront of design and operation. While disc golf is similar to conventional golf, a disc golf course is much more sustainable as there is little need to create man-made hazards, plant different species of grasses for rough, fairways or greens, little need to use pesticides, daily mowing or irrigation.

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.

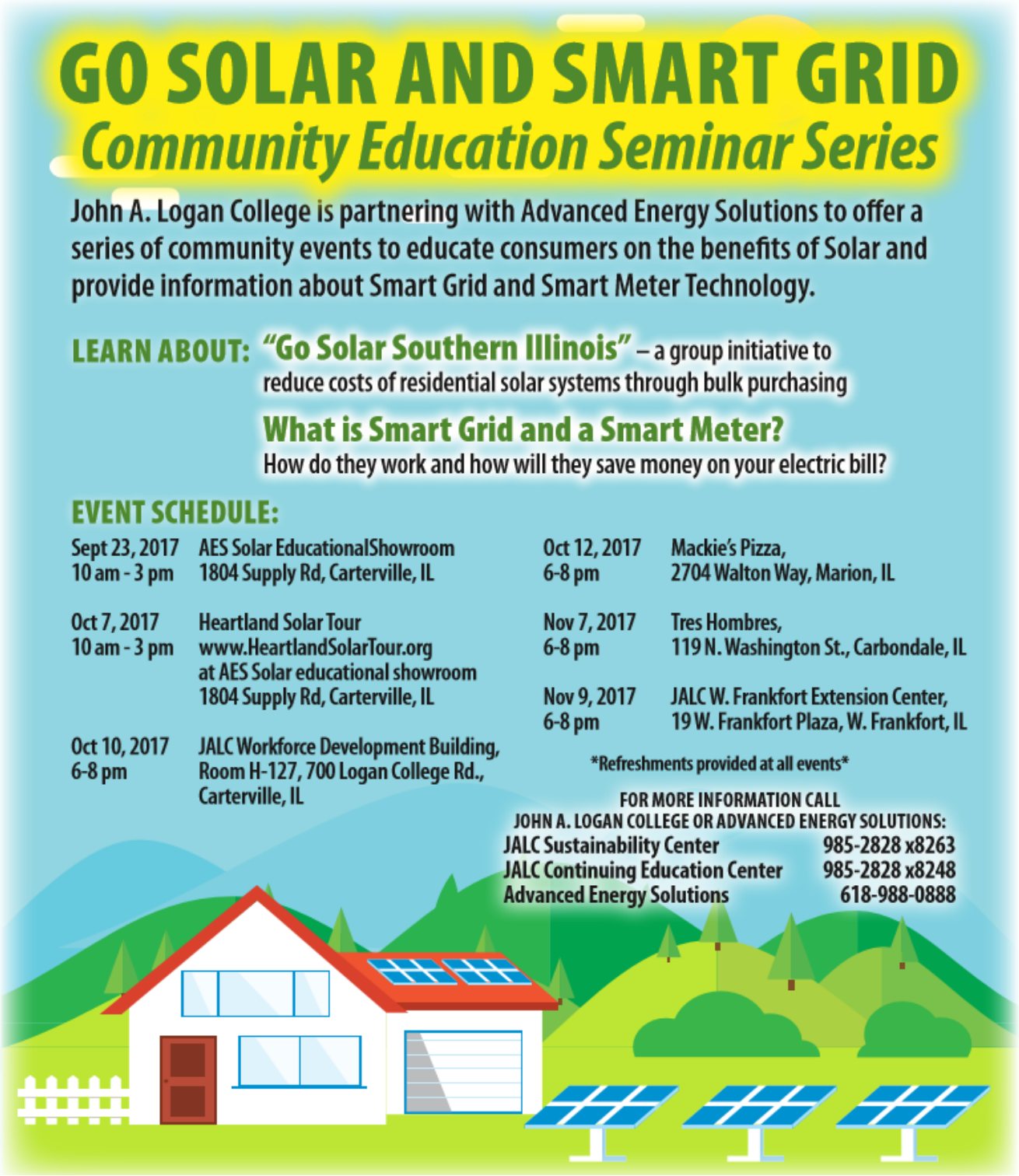
The College partnered with MEEA to offer a BOC Level 1 certification class in the spring of 2014 and again in the spring of 2017. One College facilities staff member attended the 8-week class in 2014 and another in 2017 and both earned BOC certification. Appendix ___ gives an overview of topics covered in the BOC course.

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 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

Smart Grid Flyer



APPENDIX B

DCEO Final Report on Building Energy Program

Department of Commerce and Economic Opportunity: Final Program Status Report

Market Transformation Grant

Building Energy Program

June 26, 2017

Illinois Green Economy Network (IGEN)

Illinois Department of Commerce & Economic Opportunity
Bruce Rauner, Governor

IGEN Illinois Green Economy Network
A Community College Partnership

Program Description

The Illinois Green Economy Network (IGEN) implemented and managed a building energy program at an Illinois community college with an existing dashboard system in the Ameren electric utility service territory. IGEN partnered with BuildingIQ to integrate Predictive Energy Optimization (PEO) into John A. Logan College's existing building management system (BMS) and dashboard systems. BuildingIQ is a leading energy management software company with a mission to enhance and redefine the way energy is managed in buildings. BuildingIQ's PEO technology is the foundation for reducing energy consumption and cost. The BuildingIQ system is the only energy management system that predicts energy demand and directly adjusts the HVAC system parameters in real--- time to optimize energy use. It communicates with the BMS, factoring in weather forecasts, occupant comfort, peak demand, and demand response signals, in order to automatically reduce energy consumption, cost, and emissions, while maintaining or improving tenant comfort. Energy reductions in the range of 10--- 25% are typical, with reductions climbing to as high as 40% during operational peaks. The purpose of this program was to monitor energy usage to diagnose problems, increase facility manager and occupant awareness, optimize the operations of electrical/mechanical systems, and provide insights into operational issues, that may lead to energy savings at John A. Logan College.

Program Overview

In January 2017, the Illinois Green Economy Network (IGEN) submitted proposed modifications to the grant agreement to the Illinois Department of Commerce and Economic Opportunity (DCEO). In March 2017, IGEN received approval from DCEO. With approval from DCEO, IGEN distributed a professional services agreement to BuildingIQ, as well as a subcontractor agreement to John A. Logan College, including detailed scopes of work. Throughout March 2017, BuildingIQ worked with John A. Logan College to integrate its Predictive Energy Optimization (PEO) into the campus' existing building management system (BMS) and dashboard systems, including: establishing a real--- time data feed from the BMS to the appliance/site agent, establishing a real--- time data feed from the campus' central server to the appliance/site agent, installing the software platform on the appliance/site agent, and mapping in all required control points and data from the BMS to the software system. BuildingIQ worked with John A. Logan College to check and confirm the installation of the appliance/site agent and software platform, perform a walkthrough of the facilities, identify any operational issues, and examine BMS and dashboard systems, in preparation for data retrieval. Beginning in April and through May 2017, with assistance from John A. Logan College, BuildingIQ analyzed and monitored energy consumption and performance on campus to enable an automated building optimization model. Due to John A. Logan College's multiple building management systems, an automated building optimization model was not wholly enabled prior to the end of the grant period. However, the appliance/site agent and software platform are fully operational and reporting data. Also in May 2017, BuildingIQ provided education and training for pertinent staff at John A. Logan College, including the creation of a BuildingIQ portal user guide, via a webinar. Finally, BuildingIQ and IGEN worked with John A. Logan College to develop a data collection and evaluation process to measure energy savings on campus.

Evaluation Process

The purpose of this program was to integrate BuildingIQ's Predictive Energy Optimization (PEO) into John A. Logan College's existing building management system (BMS) and dashboard systems to monitor energy usage to diagnose problems, increase facility manager and occupant awareness, optimize the operations of electrical/mechanical systems, and provide insights into operational issues, that may lead to energy savings. BuildingIQ and IGEN worked with John A. Logan College to develop a data collection and evaluation process to measure energy savings on campus, as follows:

1) **Provide equipment/infrastructure and software required at John A. Logan College to employ the applicable components and services to optimize the campus' performance, as well as measure and verify the results:** BuildingIQ worked with John A. Logan College to integrate its Predictive Energy Optimization (PEO) into the campus' existing building management system (BMS) and dashboard systems, including: establishing a real---time data feed from the BMS to the appliance/site agent, establishing a real---time data feed from the campus' central server to the appliance/site agent, installing the software platform on the appliance/site agent, and mapping in all required control points and data from the BMS to the software system. BuildingIQ worked with John A. Logan College to check and confirm the installation of the appliance/site agent and software platform, perform a walkthrough of the facilities, identify any operational issues, and examine BMS and dashboard systems, in preparation for data retrieval.

2) **Adjust and monitor an automated building optimization model for John A. Logan College based on real---time sensory feedback:** BuildingIQ and John A. Logan College have been monitoring the current data that was extracted from the building management systems and dashboard systems. Due to John A. Logan College's multiple building management systems, an automated building optimization model was not wholly enabled prior to the end of the grant period. However, the appliance/site agent and software platform are fully operational and reporting data. John A. Logan College is in the process of integrating its building management systems to help BuildingIQ setup a complete building optimization model.

3) **Provide education and training to building facilities/technical staff at John A. Logan College to ensure proper monitoring and operation:** BuildingIQ provided education and training for pertinent staff at John A. Logan College, including the creation of a BuildingIQ portal user guide, via a webinar. The training is accessible to John A. Logan College at any time, as the webinar was recorded. The education and training provided an overview of the capabilities of the data analysis and collection system, as well as identified potential anomalies and issues. The complete BuildingIQ portal user guide is included in the appendices section of the report.

4) **Provide information based on John A. Logan College's performance analysis:** BuildingIQ provided information to John A. Logan College while conducting a performance

andsystems analysis. This information demonstrated the capabilities of BuildingIQ's Predictive Energy Optimization (PEO). The detailed technical information is included in the results section of the report.

5) **Develop and distribute measurement and verification (M&V) methodology and report to John A. Logan College:** Baselining is an essential component of measurement and verification (M&V). It provides a definition of how the building would react in the absence of BuildingIQ control, thus serving as a numerical ground truth to compare performance against. Model training is performed over an agreed baselining period (i.e. a period over which BuildingIQ is not in control, taken as reflective of the baseline power consumption of the building) to create a master baseline. The master baseline is assumed to bereflective of historical power consumption. Any changes in the building operation (equipment/occupancy changes) that occur subsequently to that period will need to be accounted for as an adjustment to the master baseline. The baseline methodology consists of a multiple linear regression model that expresses a response variable as an error term, plus a mean that is conditional upon several factors. The best fit in the least---squares sense minimizes the sum of squared residuals (error), a residual being the difference between an observed value and the fitted value provided by a model. The power prediction, at a given time, depends on outside air temperature/humidity, building thermal mass, and a derived occupancy based on daily and hourly energy consumption changes. BuildingIQ's M&V conforms 100% to the international standard IPMV.

Results

John A. Logan College was created in 1967, opened its doors to its charter class in the fall of 1968, and acquired its permanent grounds in the following year. John A. Logan College's main campus is located in Carterville, Illinois. The campus has a total building capacity of 677,451 gross square feet. Based on data from IGEN's comprehensive energy analysis in 2014, John A. Logan College has an energy use intensity (EUI) of 53.91 Mbtu/SqFt and its energy unit cost intensity (EUCI) is

$0.99/SqFt. This data suggests competitive delivered energy unit costs and high energy efficiency among Illinois community colleges. Through goals set as a signatory to the Illinois Campus Sustainability Compact, John A. Logan College reduced energy usage per square foot by 18% between 2008 and 2010, and costs per square foot decreased by 27%. Since 2013, John A. Logan College's energy costs are down by an additional 11%. When John A. Logan College began to focus on energy management, it was ranked in the middle, in terms of energy efficiency among Illinois community colleges. Now, John A. Logan College is ranked third in the state.

John A. Logan College has participated in many of IGEN's energy---related programs that have contributed to its energy efficiency:

- In FY12, participated in the Illinois Community College Targeted Energy Savings (ICCTES) Program, resulting in 271,113 kWh saved and 1,650 therms saved.

- In FY13, participated in the Behavior Change for Energy Efficiency Pilot Program, as part of the Illinois Community College Targeted Energy Management and Training (ICCTEMT) Program, and installed the Eniscope Real---Time Energy Management System from ENSOL.

- In FY14, participated in Campus Conservation Nationals, as part of the ICCTEMT Program, resulting in an energy reduction of 9.5% and 25,100 kWh saved.

- In FY14, participated in the Renewable Energy Resources Program and installed the G2 Power Technologies 120 Gallon Eagle Sun Solar Thermal System.

- In FY15, participated in Cohort II of the Baseline and Enhanced Building Energy Dashboards Program and installed the Lucid building energy dashboard system, which was integrated into IGEN's statewide dashboard.

- In FY15, participated in the Public Sector Energy Efficiency Exterior Lighting Aggregation Program, resulting in 135,581 kWh saved.

- In FY16---FY17, participated in the Public Sector Energy Efficiency Exterior/Interior Lighting Aggregation Program, resulting in 42,977 kWh saved.

- From June 1, 2014 through May 31, 2015, John A. Logan College used a total of 5,117,020 kWh. The highest daily usage was 32,070 kWh in August 2014 and the lowest daily usage was 5,851 kWh in July 2014, with an average of 14,962 kWh.

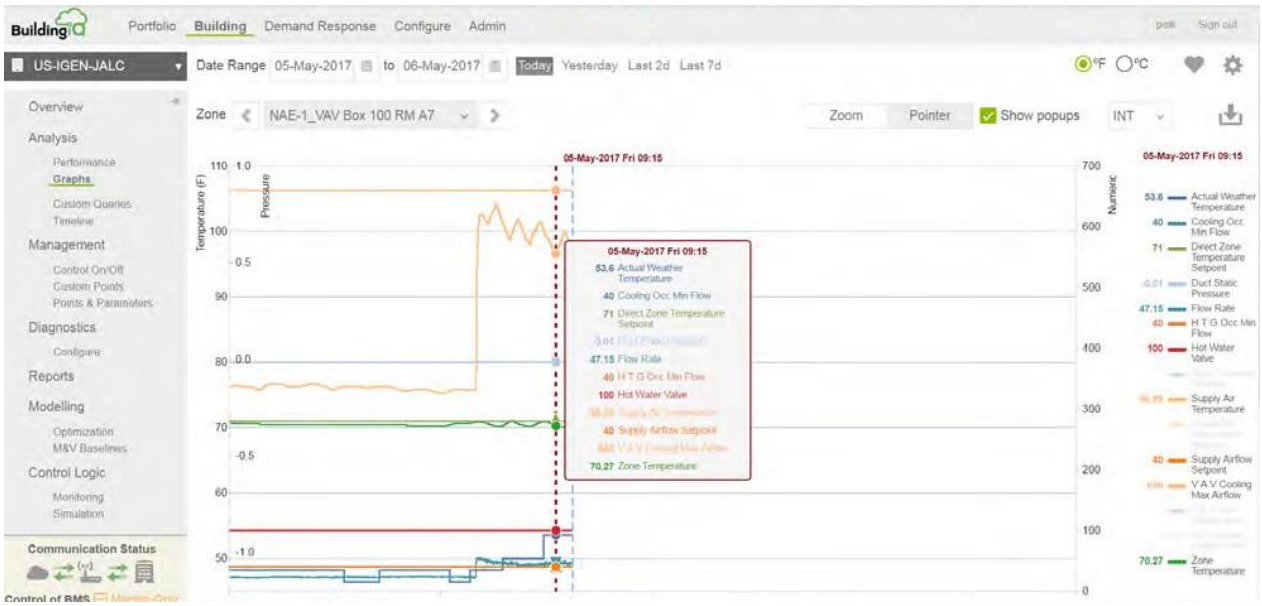
From June 1, 2015 through May 31, 2016, John A. Logan College used a total of 5,837,813 kWh. The highest daily usage was 31,873 kWh in July 2015 and the lowest daily usage was 6,929 kWh in May 2016, with an average of 15,907 kWh.

From June 1, 2016 through May 31, 2017, John A. Logan College used a total of 6,448,288 kWh. The highest daily usage was 32,139 kWh in June 2016 and the lowest daily usage was 8,526 kWh in May 2017, with an average of 17,618 kWh.

The purpose of this program was to integrate BuildingIQ's Predictive Energy Optimization (PEO) into John A. Logan College's existing building management system (BMS) and dashboard systems to monitor energy usage to diagnose problems, increase facility manager and occupant awareness, optimize the operations of electrical/mechanical systems, and provide insights into operational issues, that may lead to energy savings. Through the development of the evaluation process, BuildingIQ provided information to John A. Logan College regarding its performance and systems analysis. This information demonstrated the capabilities of BuildingIQ's Predictive Energy Optimization (PEO), including data that the existing building management systems are unable to provide. Based on mapping VAV boxes from the JCI system, BuildingIQ reported the following observations:

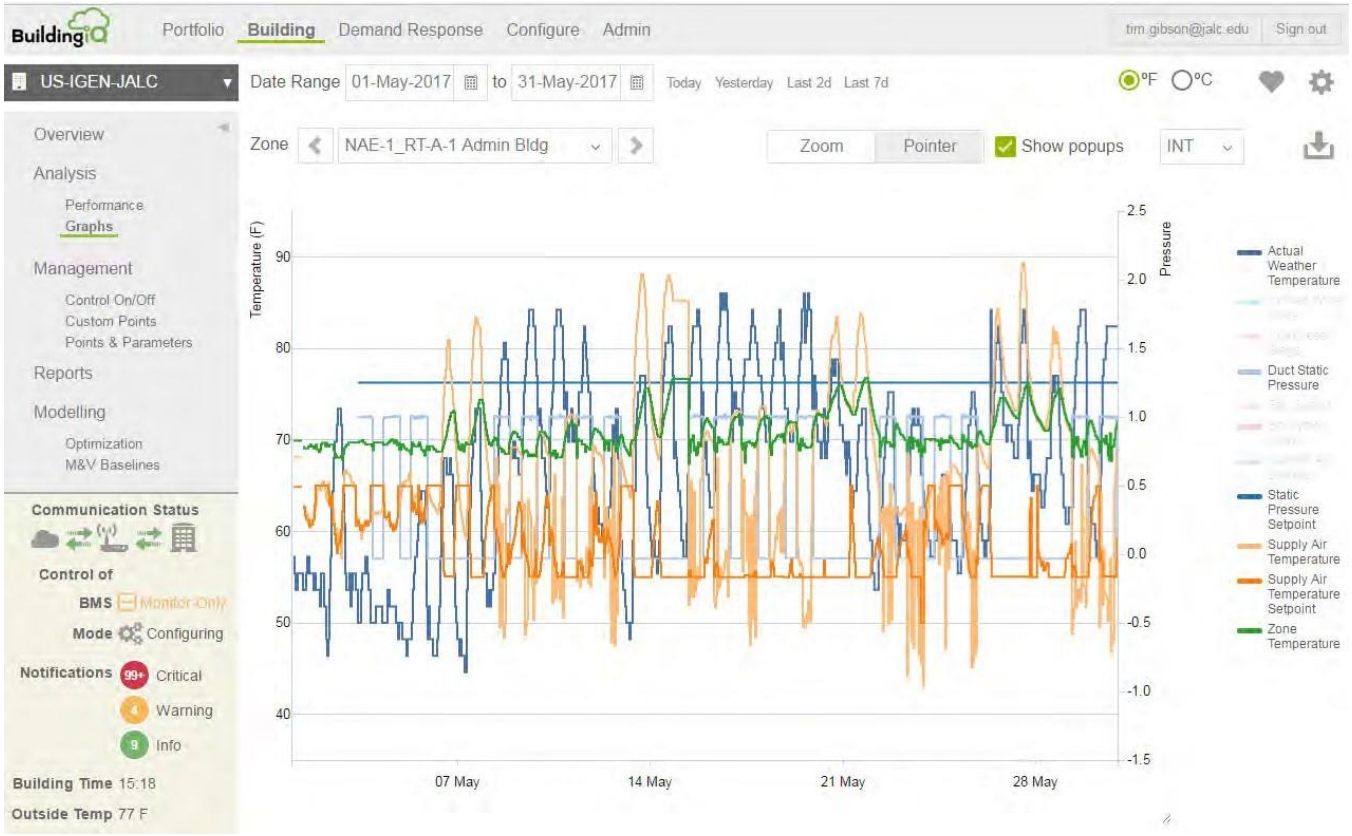
- Specific to NAE---5, the airflow rate is available, but cannot pick up the flow set points. Therefore, it is difficult to reflect how the VAV box is performing in relation to what it should be doing. Also, the programmed maximum and minimum flow rates are unavailable. Thus, it is difficult to identify if a VAV is flowing near capacity or minimum. Some flow more than others, so they may not have been sized correctly for the spaces.
- On a specific day, the OAT is low. It appears that the economizers are running, but not the chillers. Supply air set points are around 55 degrees Fahrenheit, which is what the air is trying to deliver. However, the spaces remain warm, so there is some means of heating the spaces, such as VAV reheat coils or fin tube radiation.
- It is difficult to determine if the chillers are running, as the units do not have any mapped sensors regarding CHW inlet and outlet temperatures. The two units are fed from the air---cooled chiller at the H Building.

BuildingIQ conducted an analysis of the system performance to determine inefficiencies and find solutions for cost--- effectiveness. As some of the information was limited, BuildingIQ made likely conclusions. BuildingIQ informed John A. Logan College of opportunities for energy savings and performance gains through simple maintenance tasks.



Using the BuildingIQ portal, John A. Logan College is able to view its cost and energy savings, as well as access numerous data visualization and site monitoring tools. Below is a detailed overview of John A. Logan College's performance in terms of energy savings, communication status, and weather.

Through the BuildingIQ portal, John A. Logan College can capture the performance of individual equipment, which is not possible with a building energy dashboard that only reports total energy usage. Below is a graph of the performance of a unit on the roof of John A. Logan College's administrative building from May 1 through May 31, 2017. Additionally, below is a graph of duct static pressure variations on the same unit from May 29 through May 31, 2017. This information is useful in demonstrating how well equipment is functioning and meeting set points. These graphs provide HVAC technicians with critical information that can be used to keep occupants comfortable and save energy.


BuildingIQ
Portfolio
Building
Demand Response
Configure
Admin
tim.gibson@jalc.edu
Sign out
US-IGEN-JALC
Date Range 01-May-2017 to 31-May-2017
Today Yesterday Last 2d Last 7d
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Overview
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Control On/Off
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Points & Parameters
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Modelling
Optimization
M&V Baselines
Communication Status
Control of
BMS Monitor-Only
Mode Configuring
Notifications 99+ Critical
4 Warning
9 Info
Building Time 15:18
Outside Temp 77 F
Zone NAE-1_RT-A-1 Admin Bldg
Zoom
Pointer
Show popups
INT
Temperature (F)
Pressure
07 May
14 May
21 May
28 May
Actual Weather Temperature
Duct Static Pressure
Static Pressure Setpoint
Supply Air Temperature
Supply Air Temperature Setpoint
Zone Temperature


BuildingIQ
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Demand Response
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Sign out
US-IGEN-JALC
Date Range 29-May-2017 to 31-May-2017
Today Yesterday Last 2d Last 7d
°F °C
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Custom Points
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M&V Baselines
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Building Time 15:28
Outside Temp 77 F
Zone NAE-1_RT-A-1 Admin Bldg
Zoom
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Show popups
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Temperature (F)
Pressure
29 May
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18:00
30 May
06:00
12:00
18:00
31 May
Actual Weather Temperature
Duct Static Pressure
Static Pressure Setpoint
Supply Air Temperature
Supply Air Temperature Setpoint
Zone Temperature

Conclusion…

In conclusion, John A. Logan College's commitment to energy demand reduction and energy efficiency is exemplary compared to Illinois community colleges across the state. In large part, this is due to John A. Logan College's participation in programs that have resulted in cost and energy savings. John A. Logan College has implemented multiple energy efficiency improvement projects, which included several HVAC equipment upgrades. Additionally, John A. Logan College's facilities staff is conscious of energy use and focused on conservation. Although John A. Logan College's energy usage has increased by 1.2 million kWh over the past three years, based on available data, this can be attributed to equipment and infrastructure upgrades, as well as new building construction. Without the cost and energy savings that resulted from participation in energy efficiency programs, these new projects would not have been possible at John A. Logan College, and its energy usage would be much higher. Previously, when John A. Logan College saw increases in its utility bills, it had difficulty identifying problem areas in buildings, equipment operations, and schedules. To simply start turning off equipment would mean sacrificing occupant comfort, which adversely impacts the building and learning environment. The BuildingIQ Predictive Energy Optimization (PEO) software platform and support services analyze the equipment and operation of John A. Logan College's building automation system and provide detailed, targeted information to identify issues and solutions. As a result, it redirects engineering resource time in analyzing problems, increases occupant comfort, increases maintenance and operational savings, and increases kWh savings when energy efficiency is more quickly identified and improved. During the limited time that BuildingIQ's Predictive Energy Optimization (PEO) has been integrated into John A. Logan College's campus, several problems in buildings have already been identified for further energy savings. BuildingIQ is confident that it can guarantee energy savings at John A. Logan College once all building management systems are integrated and Predictive Energy Optimization (PEO) is fully enabled. Energy reductions in the range of 10---25% are typical, with reductions climbing to as high as 40% during operational peaks.

APPENDIX C

Solar for Business Symposium

AGENDA

Welcome	Tim Gibson, Director of Bldgs. and Grounds, JALC	10:00 – 10:05am
Aur Beck	AES Solar – Overview of Solar in Illinois	10:05 – 10:10am
Brian D. Cuffle	Ameren, Supervisor of Distribution Design	10:10 – 10:35am
Brad Austin	Egyptian Electric Cooperative Association, Engineering Manager	10:35 – 10:50am
BREAK – COFFEE AND CONVERSATION		10:50 – 11:00am
Joe Baker	Rosebud Antique Mall, Owner	11:00 – 11:10am
Brent Ritzel	Straight Up Solar, Project Director	11:10 – 11:25am
Shariff Shakir	AES Solar, Commercial Accounts Executive	11:25 – 11:40am
Tina Williamson	Elevate Energy, Field Organizer	11:40 – 11:50am
Q & A		11:50 – Noon

Thank you for attending!
Thank you to our speakers for making this program possible.

IGEN Illinois Green Economy Network

Funded by a grant from the Illinois Green Economy Network

ELEVATE ENERGY
Smarter energy use for all

AES

StraightUp SOLAR

Ameren ILLINOIS

Egyptian Electric Cooperative Association

APPENDIX D

Pool Cover Project

SEDAC ENERGY SMART TIPS

Pools

HOW MUCH WATER IS LOST THROUGH EVAPORATION?

For an indoor aquatics facility that has a 25 x 20 yard pool with 80°F water, 82°F interior air at 50% relative humidity, water loss is equal to 216 pounds or 26 gallons of water per hour. Each pound of 80°F water that evaporates takes 1,048 Btu of heat out of the pool . This means that every hour 226,368 Btu, or approximately $2-3 are lost due to evaporation. If pool covers are deployed during unoccupied hours, this heat loss is virtually eliminated. Assuming the same conditions, the same losses would occur from an outdoor pool, except there is no need for dehumidification equipment to deal with the evaporated water.

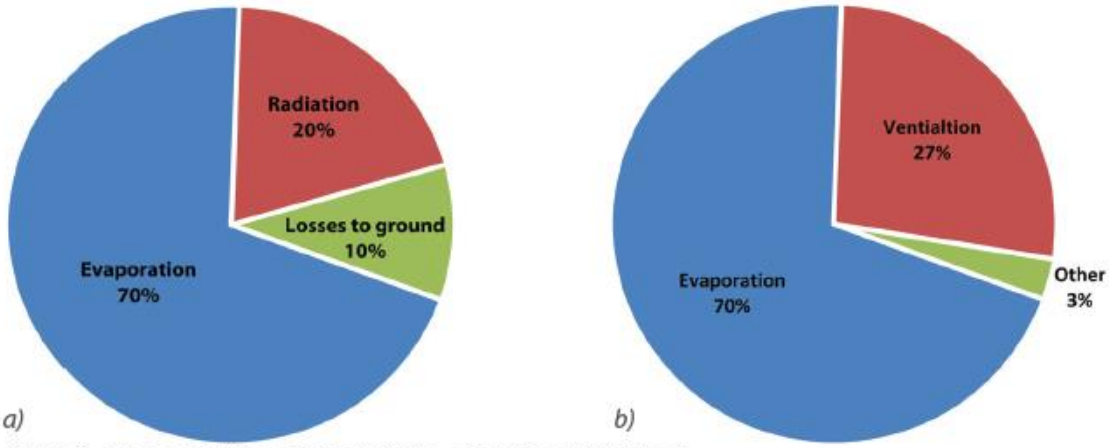


Figure 2. Pool energy loss characteristics, a) outdoor, b) indoor

www.SEDAC.org | 800.214.7954
info@SEDAC.org

Lap Pool Analysis

ENERGY SMART POOLS
Pool Cover Analysis

U.S. Department of Energy — February 11, 2020

Jalc - Lap Pool
700 Logan College Rd. Chec
Carterville, Il 62918

Annual Energy/Water Savings Analysis:

Pool Cover Only Energy Savings		$28,166
Pump/Ventilation Motor Electrical		0
Water Consumption/Cost Savings Due to Reduced Evaporation	103,202 gals.	452
Total Annual Energy & Water Savings		$28,618

Annual Energy/Water Cost Analysis:

Pool Heating Costs w/o Pool Cover		$75,435
Pump Motor Electrical Cost		6,861
Ventilation Motor Electrical Cost (indoor only)		0
Water Consumption/Cost Due to Evaporation	275,010 gals.	1,204
Total Annual Energy & Water Costs		$83,501
Pool Heating Costs with Pool Cover Only		$47,268
Pump Motor Electrical Cost		6,861
Ventilation Motor Electrical Cost (indoor only)		0
Water Consumption/Cost Due to Evaporation	171,807 gals.	752
Total Annual Energy & Water Costs		$54,882

System Cost/Payback Analysis:

Pool Cover System	**,***
Payback Years	3.58

	Mon	Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat
Open	1	1	12:00AM	05:00AM	05:00AM	05:00AM	05:00AM	05:00AM	05:00AM
Close	12	31	12:00AM	8:00PM	8:00PM	8:00PM	8:00PM	8:00PM	1:00PM

General Pool Data		Indoor Pool Data		Pool Cover Data		Solar Heating Data	
Pool Area	4500			Cover Type	Insulated	Collector Type	Non
Pool Temp (F)	84	Room Temp (F)	82	System	Automatic		
Activity Level	High	Room Humidity %	50	Cover R-Value	4.0		
Pool Htr Fuel	Natural Gas	Vent Htr Fuel	Electric Resistance	Pool Area Covered %	100		
Fuel Cost	$0.940	Fuel Cost	$0.080	Installed Cost	102,518		
Pool Heater Eff %	97	Vent Heater Eff %	80	Water Cost $/k gal	$4.38		
Pump Motor HP	15.00	Vent Motor HP	0.00	Pump Motor Hrs/day	24.0		
Pump Motor Eff %	80	Vent Motor Eff %	80	Vent Motor Hrs/day	16.1		
Pump Run Hrs/day	24.0	Vent Run Hrs/day	24.0			Comments	
Pump Motor Load %	80	Vent Motor Load %	75				

Lap Pool Analysis Summary

ENERGY SMART POOLS

Pool Cover Analysis Summary

Prepared for:

Jalc - Lap Pool
700 Logan College Rd. Chec
Carterville, Il 62918

ANNUAL SUMMARY INFORMATION
based on the data YOU provided.

Installing a Pool Cover will:

Lower energy costs by: 34.2 % **or** $28,619
Lower water consumption by: 37.5 % **or** 103,202 **gals.**

Current energy & water costs	$83,501	Current water consumption	275,010	gals.
Projected energy costs w/Pool Cover	$54,882	Projected water consumption	171,807	gals.
Savings per year	$28,619	Savings per year	103,202	gals.

The estimated cost of a Pool Cover system is 102,518.
The payback period to realize a return on your investment is 3.58 years.

Therapy Pool Analysis

ENERGY SMART POOLS
Pool Cover Analysis

U.S. Department of Energy — February 12, 2020

Jalc - Therapy Pool
700 Logan College Rd. Chec
Carterville, Il 62918

Annual Energy/Water Savings Analysis:

Pool Cover Only Energy Savings		$22,442
Pump/Ventilation Motor Electrical		0
Water Consumption/Cost Savings Due to Reduced Evaporation	84,874 gals.	371
Total Annual Energy & Water Savings		$22,814

Annual Energy/Water Cost Analysis:

Pool Heating Costs w/o Pool Cover		$60,780
Pump Motor Electrical Cost		3,430
Ventilation Motor Electrical Cost (indoor only)		0
Water Consumption/Cost Due to Evaporation	226,168 gals.	990
Total Annual Energy & Water Costs		$65,201
Pool Heating Costs with Pool Cover Only		$38,337
Pump Motor Electrical Cost		3,430
Ventilation Motor Electrical Cost (indoor only)		0
Water Consumption/Cost Due to Evaporation	141,294 gals.	618
Total Annual Energy & Water Costs		$42,387

System Cost/Payback Analysis:

Pool Cover System	69,500
Payback Years	3.04

	Mon	Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat
Open	1	1	12:00AM	05:00AM	05:00AM	05:00AM	05:00AM	05:00AM	05:00AM
Close	12	31	12:00AM	8:00PM	8:00PM	8:00PM	8:00PM	8:00PM	1:00PM

General Pool Data		Indoor Pool Data		Pool Cover Data		Solar Heating Data	
Pool Area	2400			Cover Type	Insulated	Collector Type	None
Pool Temp (F)	92	Room Temp (F)	82	System	Automatic		
Activity Level	High	Room Humidity %	50	Cover R-Value	4.0		
Pool Htr Fuel	Natural Gas	Vent Htr Fuel	Electric Resistance	Pool Area Covered %	100		
Fuel Cost	$0.940	Fuel Cost	$0.080	Installed Cost	$69,500		
Pool Heater Eff %	97	Vent Heater Eff %	80	Water Cost $/k gal	$4.38		
Pump Motor HP	7.50	Vent Motor HP	0.00	Pump Motor Hrs/day	24.0		
Pump Motor Eff %	80	Vent Motor Eff %	80	Vent Motor Hrs/day	16.1		
Pump Run Hrs/day	24.0	Vent Run Hrs/day	24.0			Comments	
Pump Motor Load %	80	Vent Motor Load %	75				

Therapy Pool Summary

ENERGY SMART POOLS

Pool Cover Analysis Summary

Prepared for:

Jalc - Therapy Pool
700 Logan College Rd. Chec
Carterville, Il 62918

ANNUAL SUMMARY INFORMATION
based on the data YOU provided.

Installing a Pool Cover will:

Lower energy costs by: 34.9 % **or** $22,815
Lower water consumption by: 37.5 % **or** 84,874 **gals.**

Current energy & water costs	$65,202	Current water consumption	226,168	gals.
Projected energy costs w/Pool Cover	$42,387	Projected water consumption	141,294	gals.
Savings per year	$22,815	Savings per year	84,874	gals.

The estimated cost of a Pool Cover system is $69,500.
The payback period to realize a return on your investment is 3.04 years.

APPENDIX E

IGEN DOE Grant Support Letter

JOHN A. LOGAN COLLEGE
700 Logan College Road
Carterville, Illinois 62918

United States Department of Energy
Office of Energy Efficiency and Renewable Energy
Solar Energy Technologies Office
Regarding: Application 1840-2434

June 27, 2018

To Whom It May Concern,

John A Logan College is pleased to submit this letter of commitment to the Illinois Green Economy Network (IGEN) proposal, **Expanding the Solar Workforce Through the Illinois Community College System.**

We strongly support this grant application and IGEN's goal of creating and sustaining a comprehensive, statewide solar workforce ecosystem that equips education and training providers, job seekers, industry-related employers, industry leaders, and local communities to effectively address solar workforce needs across Illinois.

The proposed program would provide John A. Logan College with opportunities to develop and implement innovative education and training programs, connect future employees to accessible, relevant education and training in solar fields, support the current solar workforce through credentialing, and/or increase the talent pool of veterans and other populations by addressing unique barriers to employment.

In turn, John A. Logan College will commit staff, resources, curriculum, training, relationships with employers and community partners, infrastructure, technical expertise, etc.) in partnership with IGEN, other community colleges, and statewide solar partners.

We look forward to working with IGEN and all project partners to address an unmet need in Illinois' solar workforce through the strategies outlined in this proposal.

Sincerely,

Brad McCormick
Vice President for Business Services
And College Facilities
618-985-2828
bradmcormick@jalc.edu

APPENDIX F

SEDAC 2018 JALC Energy Assessment Report

SEDAC www.sedac.org | 800.214.7954 | info@sedac.org

SEDAC Energy Assessment & Feasibility Report

Smart Energy Design Assistance Center (SEDAC)
Level III Energy Assessment Report

Published:	12/18/2018
SEDAC Report Author:	Robert Nemeth
Facility Location:	700 Logan College Drive Carterville, Illinois 62918-2500
Site Visit:	10/30/2018

This report was prepared as the result of work by a member of the staff of the Smart Energy Design Assistance Center (SEDAC). It does not necessarily represent the views of the University of Illinois, its employees, or the State of Illinois. SEDAC, the State of Illinois, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. Reference to brand names is for identification purposes only and does not constitute an endorsement. All numerical data are order of magnitude estimates and the number of digits shown is an artifact of the calculation procedure; they are not meant to imply greater accuracy or precision. SEDAC is an applied research program at the University of Illinois at Urbana-Champaign. SEDAC works in collaboration with the 360 Energy Group.

Facility Contact :	Tim Gibson Director of Building and Grounds John A. Logan College 618.985-3741 ext.8109 timgibson@jalc.edu
SEDAC:	Robert Nemeth Technical Director 217.300.5617 rnemeth@illinois.edu
	Sumi Han Assistant Director of Operations 217.300.1820 sumihan@illinois.edu
	Ryan Siegel Senior Energy Engineer 217.300.6495 rwsiegel@illinois.edu
	Hannah Ahn Energy Engineer 217.300.1752 hahn28@illinois.edu

Acknowledgements

The Smart Energy Design Assistance Center (SEDAC) would like to thank Tim Gibson, of John A. Logan College, for participating in the Public Sector Design Assistance Program and for providing access to information necessary to develop this report. Robert Nemeth, of SEDAC, was the engineer responsible for the analysis and is the primary author of this report. Additional assistance in report preparation by Sumi Han, Ryan Siegel, and Hannah Ahn is greatly appreciated. Other contributors to this report of SEDAC are also gratefully acknowledged.

Executive Summary

SEDAC performed a site visit to John A. Logan College on 10/30/2018. This report provides a preliminary energy assessment and summary of recommendations for the campus. The College can use this report to prioritize the investment for energy efficiency measures.

JAL College building and grounds staff appear focused on energy savings efforts and attempts to reduce energy consumption. Many of the mechanical systems that staff deal with are aged and date to the original construction when energy use was of negligible concern. The current

U.S. National Median Reference Values for site energy use for universities and colleges is 84.3 kBtu/ft^{2}.[2] JAL College's energy usage is below the median at approximately 76 kBtu/ft^{2}. That is commendable considering the aged mechanical, electrical, lighting, and control systems staff have to deal with. Updating of systems is being performed piecemeal as funds become available.

This report identified thirteen (13) potential energy cost reduction measures (ECRMs) for implementation. After a thorough evaluation of each measure, twelve (12) of the ECRMs are recommended based upon their feasibility for implementation and strong return on investment.

Recommended Package 2 of Energy Efficiency Measures

Simple Payback (before incentives)	4.8 years	**Incentives Available**	$130,579
Annual Utility Cost Savings	$88,700	**Percent Energy Savings**	11.8%
kWh Reduced/yr	906,900	**Percentage kWh Reduction**	14%
therms Reduced/yr	21,570	**Percentage therms Reduction**	10%

The recommendations in this report are designed to allow the facility to create an effective and financially prudent implementation plan to be used to help the building become more energy efficient. The report should be used as a tool to facilitate budgetary planning and obtaining funding/financing. Eligible public-sector incentives are described in this report as well as other opportunities for need-based grants and other funding sources. All information is current at the time of the assessment; for up-to-date information on funding or incentives, contact SEDAC any time at 800.214.7954. Alternatively, you may contact your utility. Implementing the recommendations in this report will reduce energy consumption, help improve occupant comfort and reduce vulnerability to fluctuations in future energy costs. This report can also help towards obtaining LEED® and ENERGY STAR building certification.

Introduction

The Public-Sector Design Assistance Program is an energy efficiency program that provides millions of dollars in rebates to public facilities that make large-scale equipment improvements to their electric and natural gas systems. SEDAC supports the Public-Sector Design Assistance Program in advocating the efficient and effective use of energy by businesses and public buildings throughout Illinois. The objective of SEDAC is to encourage communities, building owners and operators, design professionals, and building contractors to incorporate energy efficiency practices and renewable energy systems. SEDAC is managed by the University of Illinois at Urbana-Champaign, in collaboration with 360 Energy Group.

The Smart Energy Design Assistance Center (SEDAC) has performed an energy savings and cost analysis for various energy cost reduction measures (ECRMs) for John A. Logan College, located in Carterville, Illinois. The analysis is based on a site inspection conducted on October 30, 2018, engineering calculations, and typical industry assumptions. This report presents the results of the analysis along with the methods and assumptions used.

Engaging in energy-efficiency strategies to control costs is more critical than ever as organizations face the lingering recession and budget challenges. Organizations that take a systematic and strategic approach toward energy management will acquire a broad array of tangible and intangible benefits of interest to themselves and the public at large.

The elevation of energy management to critical importance is a result of many factors, including an increasingly complex and volatile energy marketplace, a growing awareness about the realities of climate change, recognition of the rising importance of intangibles in calculating market value, and an expanding awareness of the importance to restrict the carbon footprint of organizations. According to the U.S Green Building Council, most commercial buildings use 10 to 30 percent more energy than necessary and have ample opportunities to reduce their energy consumption levels. Further, cutting a building's energy use by 30 percent often yields the same bottom-line benefits as a 5 percent increase in net operating income and building asset value.

Public entities known for aggressive and proactive environmental policies stand to reap many intangible benefits including improved community relations, an enhanced

reputation as a socially responsible entity, and improved productivity/morale. Energy management practices also help to ensure the reliability of equipment, which reduce the risks and costs associated with equipment failures and downtime.

1 Building Description

1.1 General

The analysis of the building was based on engineering calculations, rule of thumb assumptions, and experience of the engineer. The sections which follow describe details of each building and important input parameters of the calculations.

1.2 Site Conditions and Building Details

John A. Logan (JAL) College is located in Carterville, Illinois. The Illinois Technical Reference Manual (TRM) uses 30-year normals from the National Climactic Data Center (NCDC) to calculate heating and cooling degree days but does not follow the historical 65^{O}F degree base temperature convention. Since internal gains are often much higher in commercial buildings; the base temperatures for both heating and cooling is 55^{O}F. For Southern Illinois/Marion area, the TRM lists 2,515 for heating degree days (HDD) and 3,090 for cooling degree days (CDD). This is a cooling dominated climate.

The College has approximately 649,053 sq. ft. of usable space. JAL College serves 6,718 students (31% of students are full-time), and has a total faculty of 157 staff. The buildings are occupied by students during fall, spring, and summer sessions, and by faculty and staff year- round. Fall session typically runs mid-August through mid-December. Spring semester runs mid-January through mid-May, and summer session runs mid-June through early August. The building closes on Holidays.

1.3 Building Envelope

Except for Building G, construction documents for the other buildings were not inspected. The buildings are primarily face brick on the exterior and drywall on the interior. Building G has a structural steel frame with an infill of 6" steel studs, fiberglass insulation, plywood sheathing, an air space, and face brick veneer. SEDAC suspects the other buildings are of similar construction.

All of the roofs are low-slope with a white membrane covering. Roof deck insulation levels are unknown.

Doors and windows all have aluminum frames and appear in good condition. Some areas still have single-pane glazing while areas that appear to have been updated since the original construction have double-pane windows. All public access entryways have entry vestibules.

1.4 HVAC Systems

There are dozens of HVAC systems present at JAL College. HVAC systems date from the original construction in the early 1970's to brand new. The systems appear to be very well maintained.

The Johnson Controls building automation system (BAS) was just updated recently which provides far greater transparency of HVAC systems, yet portions of some systems are still not visible or controllable since they are pneumatic.

1.5 Lighting, Water Heaters, and Internal Loads

The facility uses a mixture of different types of lighting: fluorescent lamps, metal halide, and LED. As time allows, the building operations staff have been retrofitting 32W fluorescent lamps with 14W LED lamps. Lamps that operate 24/7, such as in stairwells, have all been retrofitted with LED strips.

The lighting levels throughout the building appeared to be well within the acceptable range. There are a variety of lighting controls throughout the facility. Many lights have been placed on occupancy sensors yet there are remaining opportunities. Some lights are on dimming switches that remain on when users think they have been turned off. These switches should be replaced and is addressed in Other Opportunities in Section 4.14.

Most exterior lighting has been upgraded to LED. 1000W and 400W metal halides were upgraded to 400W and 100W LEDs respectively. Exterior lighting is controlled by the BAS. Unfortunately, since exterior security cameras do not operate in the infrared spectrum, exterior lighting now stay on throughout the night due to security concerns. Security may want to consider placing exterior lights on motion sensors so that they can turn off when no one is present and turn on when triggered by activity making it obvious that something is going on.

There are numerous hot water heaters around the facility. Some are gas fired, others are electric. Most water heaters are equipped with a fractional horsepower circulating pump which minimizes the amount of time that it takes for hot water to reach a fixture when used, but keeps the piping hot, trading increased heat loss for reduced water waste.

The facility has a variety of other pieces of equipment that are consuming electricity. This equipment includes: staff computers and peripherals, welding equipment, air compressors, vending machines, kitchen equipment, entertainment equipment, and more.

The building's energy consumption was obtained from utility bills obtained from Ameren Illinois. Utility bills were analyzed for a twenty-four month time-frame from October 2016 through September 2018. The building is supplied with electricity by Ameren Illinois. Natural gas is distributed by Ameren Illinois. JAL College does have an additional electrical supplier, Egyptian Electric Cooperative, but it only serves Building J – the Community Health Education Complex. Consumption from Egyptian Electric Coop is not included in this analysis.

The total utility cost for the facility from October 2017 to September 2018 was $684,613. The facility paid a total of $516,816 for electricity in this time frame and $167,798 for natural gas.

2 Energy Consumption Analysis

The building's energy consumption was obtained from utility bills obtained from Ameren Illinois. Utility bills were analyzed for a twenty-four month time-frame from October 2016 through September 2018. The building is supplied with electricity by Ameren Illinois. Natural gas is distributed by Ameren Illinois. JAL College does have an additional electrical supplier, Egyptian Electric Cooperative, but it only serves Building J – the Community Health Education Complex. Consumption from Egyptian Electric Coop is not included in this analysis.

The total utility cost for the facility from October 2017 to September 2018 was $684,613. The facility paid a total of $516,816 for electricity in this time frame and $167,798 for natural gas.

Table E1: Utility Information for October 2017 through September 2018

Building		**John A. Logan College**							
Address		700 Logan College Drive, Carterville, Illinois 62918							
Fuel	**Utility**	**Rate Class**	**Peak Demand (kW)**	**Annual Consumption**		**Annual Cost ($/yr)**	**Annual Cost (%)**	**Unit Cost***	
Electricity	Ameren IL	DS-4	1,761	6,460,194*	kWh	$516,816	75%	$0.08	/kWh
Natural Gas	Ameren IL	RGS-4	N/A	223,730	therm	$167,798	25%	$0.75	/therm
Floor Area	584,488 sf**	Totals		44,415,182	kBtu	$684,613	100%		
Site Energy Use Intensity				76	kBtu/sf/yr	Energy Cost Intensity		$1.17	$/sf/yr
Electricity Use Intensity				11	kWh/sf/yr	Natural Gas Use Intensity		0.38	therms/ sf/yr

Note: Unit Costs are blended averages which include all taxes and demand charges.

*- Does not include electrical purchases from Egyptian Electric Cooperative

**- Does not include certain grounds maintenance and very low-energy buildings.

Benchmarking is a valuable tool for gauging energy usage relative to similarly classed facilities. ENERGY STAR Target Finder does not provide a score for College/University buildings.

However, ENERGY STAR Portfolio Manager does provide a U.S. National Median Reference Values for all Portfolio Manager Property Types, including College/University.[3] The Technical Reference lists Site EUI (Energy Use Intensity) for a College/University as 84.3 kBtu/ft^2 as shown in Table 2. The EUI for JALC College is approximately 76 kBtu/ft^2. Being below the U.S. National Median Reference Value is commendable.

Table 2: ENERGY STAR Portfolio Manager College/University Benchmark

Technical Reference

ENERGY STAR® PortfolioManager®

U.S. National Median Reference Values for All Portfolio Manager Property Types

Broad Category	Primary Function	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Education	College/University	180.6	84.3	CBECS - College/University

Figure 1 represents the comparison of electricity consumption (kWh) and annual cooling degree days (CDD). A degree day compares the outdoor temperature to a standard indoor temperature of 55 degrees Fahrenheit. The more extreme the outdoor temperature, the higher the degree day number. Therefore, degree-day measurements can be related to the amount of energy needed for space heating and cooling as compared to the outdoor temperature. Note that electrical consumption tends to increase during warmer periods due to increased use of air conditioning equipment.

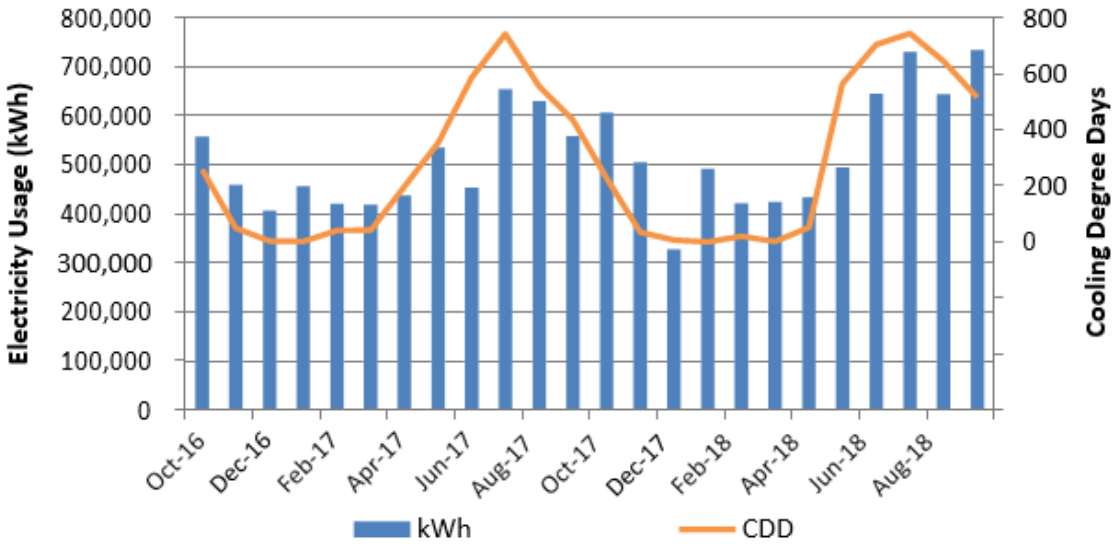


Figure 1: Comparison of Regional Cooling Degree Days versus kWh

Figure 2 represents the comparison of natural gas consumption (Therms) and annual heating degree days (HDD). Note how closely the natural gas consumption tracks HDD. This indicates that natural gas consumption is primarily used for heating purposes. The natural gas consumption during the summer is due to hot water being used for reheat, domestic hot water, and pool heating.

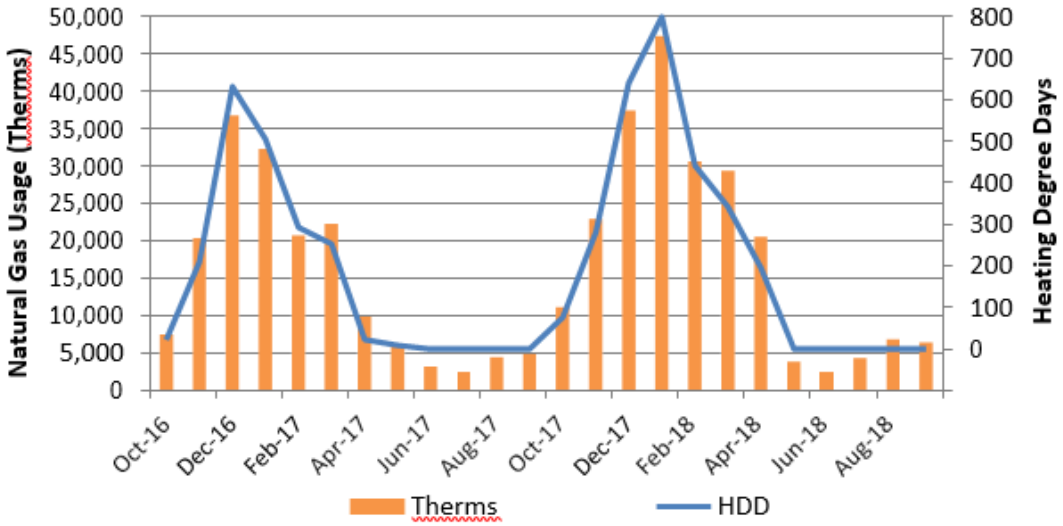


Figure 2: Comparison of Regional Heating Degree Days versus Therms

Table 3 contains data obtained from Ameren Illinois.

Table 3: kWh and Therm Consumption for Two Years from Ameren

	Base 55	Actual	Base 55	Actual		Base 55	Actual	Base 55	Actual
Months	**HDD**	**Therms**	**CDD**	**kWh**	**Months**	**HDD**	**Therms**	**CDD**	**kWh**
Oct-16	22	7,500	259	557,662	Oct-17	76	11,170	228	606,318
Nov-16	210	20,370	50	458,837	Nov-17	281	22,980	34	505,439
Dec-16	632	36,790	3	406,825	Dec-17	641	37,470	6	327,933
Jan-17	506	32,350	2	455,889	Jan-18	800	47,450	0	492,252
Feb-17	293	20,750	41	420,645	Feb-18	442	30,660	20	421,259
Mar-17	253	22,310	42	419,162	Mar-18	343	29,450	2	424,239
Apr-17	23	9,870	197	436,974	Apr-18	196	20,610	52	433,792
May-17	9	5,920	353	535,378	May-18	0	3,850	565	494,622
Jun-17	0	3,190	586	452,938	Jun-18	0	2,450	705	645,469
Jul-17	0	2,420	742	654,423	Jul-18	0	4,350	744	730,058
Aug-17	0	4,440	555	630,194	Aug-18	0	6,840	645	644,899
Sep-17	0	4,830	436	559,092	Sep-18	0	6,450	516	733,914
Total	1,948	170,740	3,266	5,988,019	Total	2,779	223,730	3,517	6,460,194

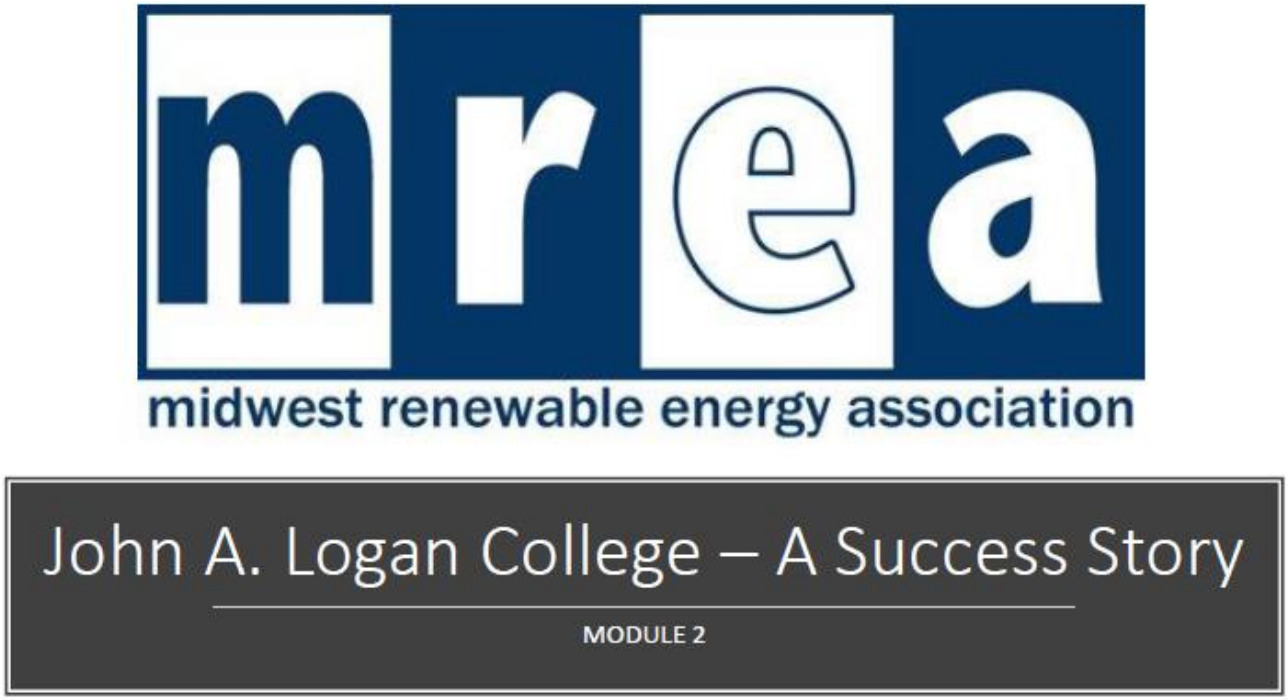
JALC Energy and Cost Breakdown

Table 4: Energy and Cost Breakdown for JAL College

Function	kWh	Therms	kBtu	%	Cost	%	% of Electricity
Space Heating		217,561	21,756,105	49%	$163,200	24%	0%
DHW		4,994	499,360	1%	$3,700	1%	0%
Lighting	2,012,977		6,868,276	15%	$161,000	24%	31%
Space Cooling	1,006,219		3,433,218	8%	$80,500	12%	16%
Plug Loads	1,280,029		4,367,458	10%	$102,400	15%	20%
Fan and Pumps	1,668,534		5,693,038	13%	$133,500	20%	26%
Other	492,436	1,175	1,797,727	4%	$40,300	6%	8%
Totals	**6,460,194**	**223,730**	**44,415,182**	**100%**	**$684,600**	**100%**	**100%**

APPENDIX G

JALC Solar Array



Executive Summary

Description

This presentation includes a brief overview of the John A. Logan College (JALC) solar project, including why JALC chose to pursue solar, the vendor selection process, the financial structure and benefits, as well as outcomes to date.

Content

- Scope & Purpose
- Team
- Tools
- Process
- Outcomes

Scope & Purpose

The **Scope** of this module includes a review of the team, tools, process, and outcomes associated with John A. Logan College's solar project.

The **Purpose** of the module is to explain why and how an IGEN College initiated a solar development and installation project, the financial structure and benefits, and project outcomes to date so that other IGEN colleges may have a better understanding of the steps toward developing a solar project of their own.

Team

John A. Logan College Solar RFP team:

- **Brad McCormick** (Vice President for Business Services and College Facilities)
- **Tim Gibson** (Director of Building and Grounds, IGEN Regional Coordinator for energy-related programs)
- **Dr. Ron House** (College President)

Team expertise:

- Finance
- Facilities
- Engineering
- Utilities
- Procurement
- Risk Management

Tools

Solar Project Goals:

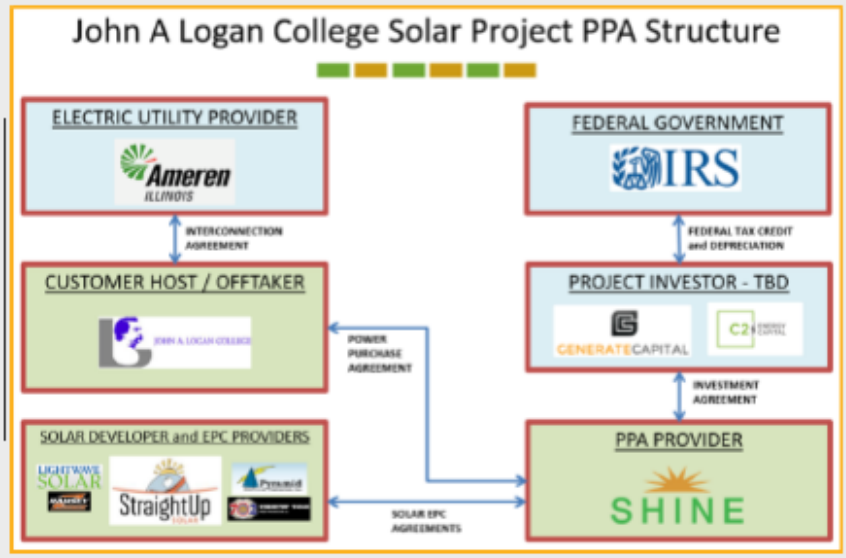
- Financial savings near- and long-term
- Sustainability leadership
- Lock in long term energy costs
- Leverage highest state and federal incentives
- Third Party Ownership (Power Purchase Agreement, or PPA)
- Pre-determined installation and interconnection location
- Compliance with Egyptian Building Trades Project Labor Agreement

Process

Vendor Selection Process

- Solar Request for Proposal (RFP) with multiple companies
- Energy bills and energy usage interval data
- Onsite visits
- In-person proposal presentation
- PPA legal review
- Board of Trustees approval

Process



Outcomes

System Summary

- 1.87 MW DC
- Ground Array
- 25-year $0.04/kwh PPA (0% escalator)
- Ownership Option beginning at 7 years
- First year savings Est. $40,000
- 15-year savings Est. $800,000
- 25-year savings Est. $1.5M
- With ownership at year 7, savings increase approximately 40% through end of 25-year term

John A Logan College
Construction Progress September 25, 2019
Est. Completion December 2019

John A Logan College
Construction Progress Nov. 8, 2019
Est. Completion December 2019

John A Logan College
Construction Progress Nov. 19, 2019
Est. Completion December 2019

John A Logan College
Construction Progress Nov. 19, 2019
Est. Completion December 2019