



The Illinois Energy Enterprise

Facilities & Services | UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN | fs.illinois.edu/services/utilites-energy



Since 2008, the University of Illinois at Urbana-Champaign has reduced energy use per square foot in existing facilities by 23%. This exceeds the [Illinois Climate Action Plan](#) (iCAP) goal of 20% by FY15. Funding from campus, student fees, and energy conservation grants allow the university to integrate new technologies and streamline the processes of a \$100M per year energy business. This business features a wholly-owned utility enterprise consisting of Abbott Power Plant, main campus electrical substation, natural gas transmission pipeline, Campus Chilled Water System, and associated distribution systems. The university is proactively shaping its energy enterprise through improved utility production, distribution, and monitoring to meet the evolving energy needs of campus.

Optimizing Our Energy Portfolio

Over the last 10 years, the University of Illinois has reduced energy consumption more rapidly than its peers, vaulting to the top of the Big Ten. Illinois ranks first for the least BTUs per square foot among peer institutions. These results have been achieved through Retrocommissioning, Energy Performance Contracting, eDNA energy billing system, lighting retrofits, and the addition of a Thermal Energy Storage tank.

Retrocommissioning (RCx) has improved the operation and maintenance systems of 60 campus buildings with an average 27% energy avoidance. RCx work has covered approximately 8M gross square feet with cost avoidance of \$30M.

Energy Performance Contracting (EPC) is a guaranteed energy savings project. The Board of Trustees approved a \$41M Energy Services Agreement with Energy Systems Group as part of an EPC project for five buildings in the College of Engineering (Seitz Materials Research Laboratory, Loomis Laboratory, Engineering Sciences Building, Superconductivity Center, and Micro and Nanotechnology Laboratory). EPC projects could potentially reduce deferred maintenance (DM) on the buildings by more than \$25M. This EPC project is part of a long-term plan for 23 campus facilities executed under multiple EPCs.

Two EPC projects have already been completed. The \$22M **Veterinary Medicine** EPC resulted in approximately 36% reduction in energy consumption with annual cost avoidance of \$1M. In addition, \$25M was eliminated from the deferred maintenance backlog. The \$10M **Oak Street Chiller Plant** project, which included the installation of two electric, high frequency chillers, resulted in an annual cost avoidance of \$1.2M.

A large scale **Lighting Retrofit** project is upgrading older inefficient fluorescent lighting systems with more efficient fluorescent systems, reducing buildings' electrical use by 40% and providing \$2M cost avoidance annually. Since 2008, 147,000 fixtures have been replaced and 531 LED wayfinding signs have been installed in support of the Chancellor's commitment to become the first major research university to incorporate LED technology as its major source of lighting.

To date, the university has received approximately \$13.3M in Illinois Department of Commerce and Economic Opportunity and Illinois Clean Energy Community Foundation grant funding for campus energy conservation efforts including \$4M for lighting projects.

Facility managers receive real-time energy consumption and cost information through the **Energy Billing System** and its metering, billing, and reporting components.

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A 6.2M gallon **Thermal Energy Storage** tank allows the production of reserved chilled water capacity at night during off-peak hours when electricity costs are normally lower. Further integration between demand, production, and the real-time market can be optimized during unpredicted events.



Renewable Energy

The university and **Solar Farm** project partners achieved commercial operation on December 11, 2016. The date marked the beginning of the university's procurement of renewable electricity from Phoenix Solar South Farms, LLC as part of a 10-year power purchase agreement. The 5.87 megawatt DC/4.68 megawatt AC Solar Farm is expected to produce 7.86 million kilowatt-hours per year or approximately 2 percent of the average electrical demand for the Urbana campus.

To meet the university's renewable electricity iCAP target goals, 20,000 megawatt-hours of Wind Renewable Energy Certificates (RECs) were purchased through Prairieland Energy Inc., for FY15 and future options for a wind power purchase agreement are being evaluated.

The Future of Energy at Illinois

With the **Energy Management Control Center**, the university can display and analyze data, coordinate and maintain uniformity on how controls are set up, integrate distribution in all campus control systems, and quickly determine what service is needed and who needs to perform it. The Center will help evaluate forecast loads respective to market prices and better determine asset allocation for enhanced cost effectiveness. Systems & Controls programmers and Retrocommissioning teams can better monitor computer-controlled HVAC systems, card access systems, chilled water, and various energy metering systems. It will also enable remote access to controls for Abbott Power Plant, chilled water plants, and the Thermal Energy Storage tank.

The **Utilities Production and Distribution Master Plan** addresses Illinois' energy future. This plan, approved by the Chancellor's Capital Review Committee, is a recognized report associated with the University of Illinois at Urbana-Champaign master planning process. The Utilities Master Plan focuses on

three main tasks: 1) evaluating existing UES production and distribution services to establish an updated baseline and to provide costs to operate and maintain existing systems; 2) analyzing potential load options; and 3) providing universal recommendations.

The Utilities Master Plan assessed infrastructure requirements to meet future energy needs based on campus input regarding space utilization type and quantity (growth) as well as further investments in energy conservation. The plan will assist with evaluating how the university can best achieve iCAP targets for renewable energy and building energy reduction.

Supporting Campus Research

A university proposal from the Illinois Sustainable Technology Center (ISTC) to retrofit Abbott Power Plant for **carbon capture technology** is an award finalist for large-scale testing and evaluation. The estimated total project size for the Phase II award is approximately \$75 million, with \$60 million from the Department of Energy and \$15 million in non-federal matching funds. The retrofit project is part of developing an overall approach to building a new market for captured CO2 within the state and region. For more information: uofi.box.com/abbott



ISTC Director Kevin O'Brien (center) described project goals to Illinois Governor Bruce Rauner and Interim U of I Chancellor Barbara Willson at the Abbott Power Plant.



Mike Larson, director of utility operations at Abbott Power Plant, showing Illinois Senator Dick Durbin a gas turbine.