NEW TECH for ENERGY IMP Two Case Studies

Power on the Mesa: Albuquerque Academy's Solar Array

By John Christensen

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Joining a growing number of solar installations in schools and colleges throughout North America, Albuquerque Academy's one-megawatt DC photovoltaic solar array is one of the largest secondary schools projects to date in the United States. One megawatt is currently the maximum size facility allowed under New Mexico Utility regulations.

The array is located on five acres of land at the east end of the Academy's 312-acre campus. Construction began in September 2010, following almost three years of creative thinking and planning to build the mutually beneficial partnerships needed to develop the project which was fully funded by companies outside the Academy. The project was completed in late December 2010 and started generating power to the campus on January 1, 2011.

The 20-year, $5 million project is a power purchase agreement between the Academy and Rockwell Financial Group, an independent company specializing in energy project financing. Many of the design and construction partners have New Mexico ties including Consolidated Solar Technologies, Mosher Enterprises, Conergy, Schott Solar, and Unirac.

Comprising 5,096 panels, the solar array is expected to generate 2,181,000 kilowatt hours per year. By serving as the solar

NOLOGIES
ROVEMENTS:

Learn how two institutions in the U.S. Southwest—Albuquerque Academy in New Mexico and Pima Community College in Arizona—have implemented new energy projects on their campuses.

"host," Albuquerque Academy agrees to consume all power generated, approximately 25 percent of annual consumption. The school's only other responsibility under the agreement is to insure the facility and provide security. All panel and equipment maintenance is arranged by the partners. The financial group owns the array and receives all the renewable energy credits provided by the local utility, as well as federal incentives and tax advantages, available only to for-profit companies.

Albuquerque Academy pays a negotiated rate per kWh to the financial group for all power generated and consumed. In turn, the Academy receives demand relief and a predictable economic hedge against additional rate increases in the future.

The array is expected to reduce demand and on-peak charges by as much as 70 percent.

The array is expected to reduce demand and on-peak charges by as much as 70 percent. That could result in over $70,000 per year in savings, and even more when reduced customer charges, fuel surcharges, and New Mexico gross receipts taxes are factored in.

LESSONS LEARNED (OR WHAT *I* LEARNED): TEN TIPS FOR FACILITY MANAGERS

Stay involved. If you are thinking about a third-party power purchase project, it is important to keep involved throughout the design and installation. Installation of an array will be a hot topic on any campus, even if the school does not own the equipment and the installation is contracted through the financial group.

Expect new challenges. Although the Academy's head of school was enthusiastic about the project from the start, our business officers were challenged by a number of political and legal procedures. There were times when it appeared that the project might not happen. This may not be unusual at schools that have third-party agreements for other campus facilities, but it was very different for us. Managers should be prepared to deal with new problems and new ideas.

Study possible locations. I was happy to see our project out on the mesa. I know that there are plenty of successful rooftop installations around the country, but I have always felt that roof maintenance was hard enough without compounding the problem with racks and traffic. The bonus of owner contracted maintenance made the mesa location that much more attractive for us.

Be a good neighbor. We wanted to keep the array close enough to our high voltage connection points, but out of sight of most of our neighbors. Even with 312 acres, we are still in the city. Although we think the array looks impressive, we thought some of our neighbors might not agree. We also had to consider how close we were to the arroyo that runs through campus. Twenty years is a long time and we wanted to stay clear of possible flooding due to runoff from the Sandia Mountains.

Keep in mind that any conservation or lighting projects you are considering will have a different return on investment.

Consider the environment. Environmental impacts should be considered, and you may need to perform a phase one environmental impact investigation.

Remember end of life. It is important to incorporate end-of-life decisions into the contract. What happens to the panels and electrical equipment after the end of the contract period?

Be ready to negotiate. Expect negotiation and plenty of red tape with your local utility and the public regulatory commission or authority in your area. Renewable Energy Credits were a major political issue in New Mexico. Planning and zoning was easy for us, but may be difficult in your application. Engage the planning office and neighborhood associations early. Don't forget the LEED points if you are involved with the USGBC.

Think about carbon. Carbon credit rights may come up. The idea of using renewable energy points to offset possible carbon emission penalties in the future is something that should not be given away without some thought.

Map your trenches. Connecting the high voltage from the campus to the inverters and the communication infrastructure is something to keep on top of. Just like any other high-voltage project, you will want to make sure trench locating measures are in place so the next guy can find it 15 years from now.

Track utility costs. Invoicing and tracking utilities become more complicated with another vendor charging a different rate. Keep in mind that any conservation or lighting projects you are considering will have a different return on investment. This can include current projects. The Academy is in year eight of a successful ten-year energy performance contract; year nine and ten performance calculations will be affected by the solar project and the different rates for power.

Albuquerque Academy welcomes visitors to the array. Tours and information sessions for school groups and interested parties are available. Please e-mail solar@aa.edu and your inquiry will be routed to the appropriate office.

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Pima Community College's Modular Central Plant Replacement Project

By Mike Posey

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Pima Community College (PCC) is one of the largest multi-campus community college systems. PCC includes six campuses and five education centers located throughout Pima County, Arizona. The college serves more than76,000 students and consists of 1.64 million square feet of facilities and 532 acres of district grounds. The 60-acre Desert Vista Campus in the southwest part of Tucson serves over 4,000 students.

The campus's central cooling/heating plant has been operating for over 35 years. The chiller units utilized R-12 refrigerant, which is no longer EPA compliant. The plant serves 134,285 square feet of classroom and facilities spaces. This critical equipment was inefficient and becoming unreliable and was creating an unacceptable situation for a college in a desert climate with temperatures in excess of 105 degrees for most of the summer season.

When considering the replacement of heating, ventilating, and air conditioning (HVAC) equipment, PCC's Facilities Management team faced the challenge of developing a project that could be completed with minimal disruption to our customers. The College allocated a $4 million capital improvement budget for the complete replacement of the Desert Vista central cooling/heating plant.

PROJECT PROCESS AND RESOURCES

The assistant vice chancellor for facilities was given the task to develop a replacement plan for this mission-critical equipment. After several years of research and investigation of the latest HVAC technology, the choice was to remove and replace the central plant with a packaged modular central plant (MCP). The Facilities Department believed this system would allow for installation savings, a fast-track schedule, and improved energy efficiency. The staff worked closely with the selected architectural firm to begin the design concept for this work.

The facilities department then recommended to the College Board of Governors a proposed budget for capital funding. The project was started in mid-summer 2009. Requests for Proposals (RFP) were solicited from various HVAC contractors. The RFP required that the equipment manufacturer be the responsible party and that they be the general contractor for the project. A committee of college staff selected McQuay International to perform the work.

One major benefit that the college realized from this project was the opening up of 1,850 square feet of additional classroom and science lab space.

The newly assembled team of college staff, the architect, the equipment manufacturer, and an engineering firm worked together to design the new system. The contractor ensured the continued operations of the campus by the installation of a temporary cooling tower to be used during the project. This tower allowed the college to use the existing central plant chillers while the demolition of the old cooling towers was performed. Upon removal of the old cooling tower, the concrete slab was prepared to allow for placement of the new unit. At the same time the site preparations were ongoing, the MCP unit was assembled. Upon completion of the site work, the unit was shipped with three separate modular pieces, plus the cooling tower module. After delivery to the site, the units were assembled in one ten-hour day and the unit was ready to be operated.

PROJECT OUTCOMES

One of the major problems associated with any educational institution is excessive noise levels. The College decided to install chillers in the new modular central plant that use magnetic-bearing frictionless centrifugal compressors. The use of magnetic bearings eliminated an oil system and results in reduced maintenance costs compared to traditional centrifugal compressor chillers. By using magnetic bearing chillers, there is virtually no noise emanating from the equipment. This new technology and the associated high-efficiency boilers have helped reduce energy usage.

During the March to December 2010 time period, the campus saw a $73,000 utility cost savings from this project. The college applied for an energy incentive rebate from Tucson Electric Power and will realize approximately $41,000 in rebates. There have also been reduced energy costs for gas utilities from this project. The project also incorporated solar panels for heating water for the entire campus domestic water system.

One major benefit that the college realized from this project was the opening up of 1,850 square feet of additional classroom and science lab space. The former central plant space became available for other uses. The college administration decided that this area could be used for new classrooms and a laboratory for the science programs. After the project, the area was remodeled into a state-of-the-art classroom with several laboratory areas added. With the magnetic bearing chillers, there are no issues with loud operating noises with the plant.

An important feature of this project was that it could be done within a short time period. The plant was installed during the holiday break and was back in operation prior to the start of the spring semester. By skillful planning, coordination, and the hard work of our contactors, there were no breaks in service to the college HVAC system during this period.

LESSON LEARNED FROM THE PROJECT

A key lesson learned from this project is that colleges need to plan far in advance for the replacement of critical systems such as central plants and other infrastructure equipment. By using a modular central plant instead of a conventional plant the college saved $2 million. This project reflects the vision of the College Board of Governors and administrators to embrace the latest technology in our facilities. The project was a combined effort of the manufacturing team to pre-engineer the modular central plant per our specifications off-site, carry out site work with our contractors simultaneously to provide continuous operation of the existing old system, while implementing the site installation of the modular plant. The skillful orchestration of all parties with the demands of the college helped to ensure that this was a project that others could emulate.

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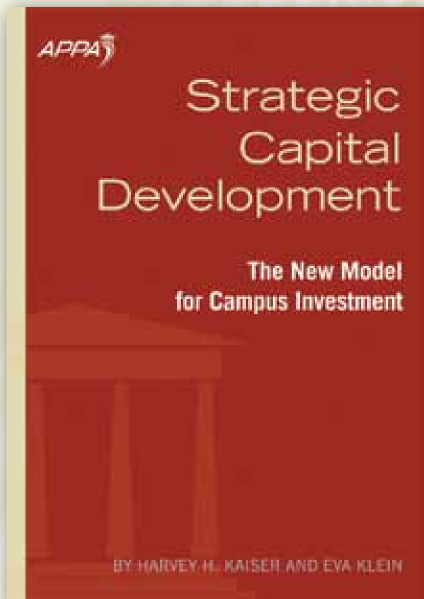
Strategic Capital Development:

The New Model for Campus Investment

By Harvey H. Kaiser and Eva Klein



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Eva Klein

APPA's newest book, Strategic Capital Development: The New Model for Campus Investment, presents a bold approach for planning capital investments from a strategic and long-range perspective. The authors combine their extensive higher education experience, and their specific work of the last decade to improve capital planning and decision-making, to make a case for a new model in which they seek to balance idealism with pragmatism. They define stewardship principles necessary to create and sustain a physical plant that is responsive to institutional strategies and functions; remains attractive to faculty and students; and optimizes available resources.

The book is organized into three parts:

Part 1—provides a summary of how capital planning and funding practices in higher education have evolved from the late 1940s to the present—including case studies of relatively more effective planning models.

Part 2—makes the authors' case for why change is needed, based on examination of environment/context factors, and articulates six key principles for 21st century facilities stewardship—the foundation for the model.

Part 3—provides the proposed model, based on the observations and conclusions in Parts 1 and 2. Following the model overview, Part 3 provides practical, hands-on, how-to details of methodologies and data requirements, along with illustrations of many of these elements.

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