PUBLISHED BY APPA

FACILITIES manager

MAR/APR 2011

INSIDE

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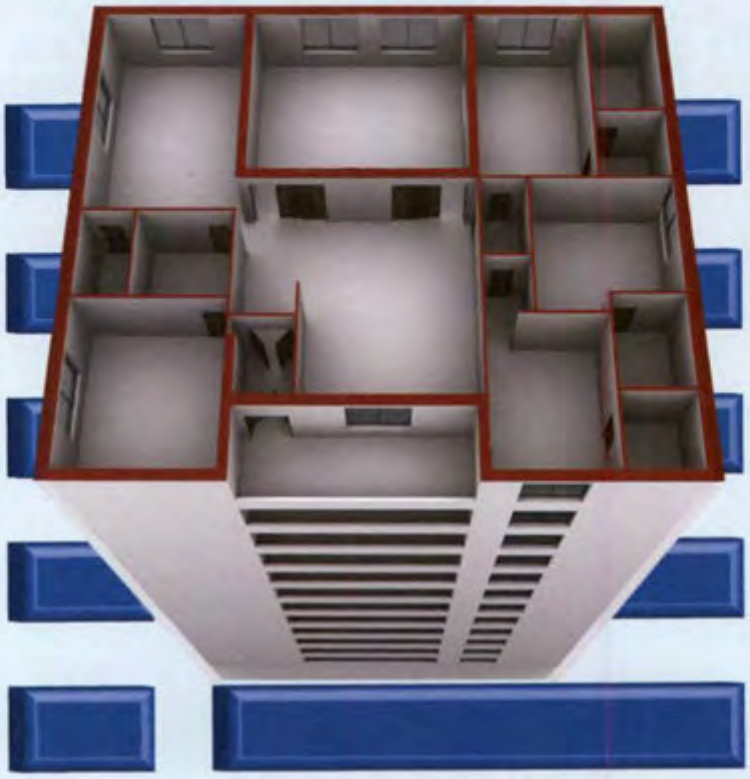

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features

MARCH/APRIL 2011
VOLUME 27 • Number 2

ENVIRONMENTAL SUSTAINABILITY

columns

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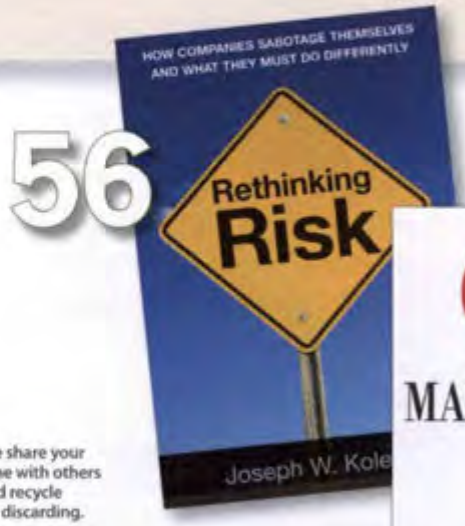

56

11

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For the past several years the March/April issue of *Facilities Manager* has been devoted to topics related to energy, utilities, and environmental stewardship, which make up one of APPA's Four Core Areas for research, information, credentialing, and professional development.

We've timed this issue to coincide with the annual Smart and Sustainable Campuses Conference, this year held April 3-5 on the campus of the University of Maryland, College Park. The conference always has a wealth of topics and presentations that appeal to the facilities professional, sustainability coordinator, business officer, and student leadership at campuses throughout North America.

OUR FEATURES COVER SMARTGRID ECONOMICS, INTEGRATING SUSTAINABILITY PROGRAMS INTO THE FACILITIES CAPITAL PLANNING PROCESS, STUDENT ENGAGEMENT PRACTICES, AND THE USGBC'S GREEN SCHOOLS INITIATIVE.

And we've put together a wealth of articles that add to the knowledge and discussion base for campus environmental sustainability. Our features cover SmartGrid economics, integrating sustainability programs into the facilities capital planning process, student engagement practices, and the USGBC's Green Schools initiative. You'll also read about the latest in geothermal technology and practice, case studies on two recent energy projects in the American Southwest, and an opinion piece on why schools should not cede or sell their Renewable Energy Credits. My thanks to all the authors who contributed to this issue.

You can access the current issue of *Facilities Manager*, along with archives of most past issues, by going to *www.appa.org/FacilitiesManager/archives.cfm*. There you will find the full text of most articles from the past 15 years; recent issues include a Flash file of the entire magazine.

In addition to the magazine archives, you can read past issues of APPA's biweekly e-newsletter, *Inside APPA*, our news and information source for regional and international APPA events, programs, publications, and industry updates. The newsletter archives go back only one year, and you can read them at *www.appa.org/publications/InsideAPPA.cfm*.

Many of you already receive *Inside APPA* every other Wednesday, 24 times per year. However, if you're not receiving the newsletter and would like to be included, you may subscribe by sending an e-mail to me at *steve@appa.org*. The subscription is free.

Coming in May/June 2011

- Community College Focus
- HACC's Green Center
- Hawaii Campus Apartments
- Illinois Green Economic Network

FACILITIES manager

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www.appa.org/facilitiesmanager

Facilities Manager (ISSN 0883-7249) is published six times a year (January, March, May, July, September, and November). Send editorial submissions to *steve@appa.org*. A portion of APPA's annual membership dues ($51) pays for the subscription to *Facilities Manager*. Additional annual subscriptions cost $66 for APPA members, $120 for nonmembers. Contact the editorial office for article reprints.

POSTMASTER: Send address changes to **Facilities Manager**
1643 Prince Street, Alexandria, VA 22314-2818

About APPA

APPA promotes leadership in educational facilities for professionals seeking to build their careers, transform their institutions, and elevate the value and recognition of facilities in education. APPA provides members the opportunity to explore trends, issues, and best practices in educational facilities through research, publications, professional development, and credentialing. Formerly the Association of Physical Plant Administrators, APPA is the association of choice for 5,200 educational facilities professionals at more than 1,500 learning institutions throughout the United States, Canada, and abroad. For more information, visit us at www.appa.org

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facilities digest

By Anita Dosik

2011-2012 CANDIDATES FOR APPA OFFICE

The Nominating Committee, led by Immediate Past President Polly Pinney, is pleased to present the selected slate of officers for the 2011-2012 elections:

PRESIDENT-ELECT:

- Leon MacLellan
  St. Francis Xavier University
- Mary Vosevich
  University of New Mexico

VICE PRESIDENT FOR PROFESSIONAL AFFAIRS:

- David Cain
  Coconino Community College
  running unopposed

SECRETARY-TREASURER:

- David Millay
  University of Arkansas at Little Rock
- Peter Strazdas
  Western Michigan University

Voting will begin in March 2011 and will be open to primary/institutional representatives. Those eligible to vote will be able to do so online or via paper ballot. Please note that the primary/institutional representative will have the option of having an associate member vote on their behalf via proxy (only one vote will be accepted from each institution). The associate member with proxy rights has been listed on the dues invoice.

If you have any questions, contact Anita Dosik at *anita@appa.org* or 703-542-3837.

APPA FACILITIES DRIVE-IN WORKSHOPS

APPA recently launched a new professional development service, the APPA Facilities Drive-in Workshops. These Drive-in Workshops are designed to support your staff education needs at a time when resources are difficult to come by for employee technical training. The four-hour programs allow local professionals to drive in mid-morning for several short sessions, advance their understanding of the latest facilities technologies and network with peers, and get back to their work and home quickly and conveniently with little, if any, travel costs.

The training is delivered by an APPA business partner that sponsors the workshop, while APPA member institutions serve as the host location and provide an adequate meeting space for up to 70 workshop attendees. Recent drive-in workshops have been held at campuses in Kansas City, Seattle, San Antonio, Raleigh, North Carolina, and elsewhere.

APPA staff members coordinate the marketing effort, reaching out to facilities professionals from both member and prospective member institutions within a two-hour driving distance of the workshop location. The workshop program is strictly an educational event with minimal vendor promotion or advertising. Topics are developed and speakers are identified in consultation with the host institution.

For more information on how your institution can host a Facilities Drive-in Workshop, please contact APPA Professional Development Manager Corey Newman at *corey@appa.org*. Additional details are also available on the APPA website at *http://appa.org/Training/Driveinprogram.cfm*.

Registration and lunch for workshop attendees are complimentary, regardless of whether your institution or organization is an APPA member. We hope you will take advantage of this training opportunity.

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Spring is Here - Get In Gear -- Join APPA April 3-7 in Asheville, NC at The Historic Grove Park Inn

Arm Your Supervisors For Tomorrow's Changing World

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Leadership is Everyone's Responsibility

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Visit us at *www.appa.org/training/eventregistration* today!

2009-2010 EFP UPDATE

APPA congratulates the following individuals, who successfully earned their EFP certification in 2009 and 2010.

EFP, 2009-10

Baswell, Brandon L.
Borkman, William C.
Bosler, Timothy J.
Brown, Peter A.
Bryant, Stephen C.
Butler, William
Cain, Jacob H.
Ceballos, Luis F.
Chavez, Robert W.
Christensen, Cameron R.
Connell, Rich R.
Costello, Daniel S.
Davis, Andrew M.
Dickinson, Arthur C.
Drogi, Agnes M.
Eddinger, Frederic G.
Flood, Thomas E.
Gatzke, Steven L.
Ghiotto, Robert O.
Gillette, Brian E
Gray, Dana A.
Hafner, David T.
Hamilton, Michael E.
Henry, Robert H.
Herrera, John
Hightower, Charles S.
Hines, Jim
Johnson, Ted R.
Jones, Nathan G.
Knicely, Kent L.
Konjic, Vedad
Kopach, Christopher
Le Moal, Richard A.
Lester, Ron
Lynch, Viron
Manlet, Ruthann
Marker, John L.
Merriam, Michael B.
Miller, Phillip J.
Mussatti, Holly
Pancoast, Glenn A.
Pasda Jr, Donald J.
Patterson, Patricia
Peary, Steven G.
Pretzman, Richard K.
Privett, Charlie L.
Rader, James B.
Reed, Gary D.
Riley, James G.
Rocha, Luis H.
Rowley, Shawna
Ryburn, Benjamin T.
Savage, Ralph
Schlanger, Patrick L.
Shelter, Clayton E.
Shepardson, Casi
Stank, William J
Stephney, Jessie
Straquadine, Joel A.
Strybos, John
Ulloa, Freddy
Wagner, Lindsay E.
Walker, Scott A.
Webb, Donald M.
Williams, Leslie D.
Williams, Scott E.
Wilson, Robert J.
Yencha, Matthew J.
Zwanziger, Michael

APPA'S ONLINE MEMBERSHIP DIRECTORY

APPA's online membership directory is updated on-the-fly so you'll always have the latest and most current contact information on your friends and colleagues.

The directory is accessible online to all members and includes links to all of the information you're used to accessing through the prior directories, such as APPA programs, leadership information, APPA awards, and staff contacts. Search the directory by logging into myAPPA at *www.appa.org*.

Using myAPPA

The "myAPPA" feature on the APPA website affords you access to many of your APPA benefits. Using your APPA userid and password to log in, you can access the BOK, the bookstore, update your contact information, see what courses you're signed up for, post a job on Job Express, and access the membership directory, to name a few services. Be sure to take a look at this useful section of the APPA website next time you visit us!

EVENTS

Apr 3-5 6th Annual Smart & Sustainable Campuses Conference, *College Park, MD*
Apr 3-7 Leadership Academy, *Asheville, NC*
Apr 3-7 Supervisor's Toolkit, *Asheville, NC*
Apr 8 or 9 EFP Exam, *Asheville, NC*
Apr 9 CEFP Exam, *Asheville, NC*
Apr 9 EFP Prep Course, *Asheville, NC*
Jul 16-18 APPA 2011, *Atlanta, GA*
Sep 18-23 Institute for Facilities Management, *Ft. Lauderdale, FL*
Oct 3-7 ACUHO-I/APPA Housing Facilities Conference, *Orlando, FL*

REGION/CHAPTER EVENTS

Mar 30-Apr 1 NJAPPA Annual Spring Conference, *Galloway Township, NJ*
May 16-17 TNAPPA Annual Conference Best Practices in Facilities Management, *Johnson City, TN*
Sep 12-14 RMA 2011 Regional Conference, *Regina, SK, Canada*
Sep 23-28 CAPPA 2011 Regional Conference, *Springfield, MO*
Oct 2-5 ERAPPA 2011 Regional Conference, *Halifax, NS, Canada*
Oct 7-13 MAPPA 2011 Regional Conference, *Cincinnati, OH*
Oct 16-18 PCAPPA 2011 Regional Conference, *San Francisco, CA*
Oct 16-18 SRAPPA 2011 Regional Conference, *Jackson, MS*

OTHER EVENTS

Apr 27-29 Green Cleaning & Science CIRI 2011 Cleaning Science Symposium, *Atlanta, GA*
May 11-13 2011 Energy/Facilities Connections, *Leavenworth, WA*
Jun 2-3 2011 National Electrical Code, *Richmond, VA*
Jun 18-21 CAUBO 2011 Conference Winds of Innovation, *Calgary, AB, Canada*
Jun 23-24 2011 ACUPCC Climate Leadership Summit, *Washington, DC*
Sep 5-9 26th European Photovoltaic Solar Energy Conference and Exhibition (26th EU PVSEC), *Hamburg, Germany*
Oct 9-12 2011 AASHE Conference & Expo, *Pittsburgh, PA*
Nov 3-4 Campus Heritage Symposium, *Washington, DC*

For more information or to submit your organization's event, visit *www.appa.org/applications/calendar/events.cfm*.

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SAVE THE DATE JULY 16-18, 2011
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July 16-18, 2011
Hilton Atlanta – Atlanta, GA

APPA 2011 is the premier event for educational facilities professionals…the ultimate networking and learning experience for facilities officers, directors, and management personnel at every level, and from around the world.

At this event, we will explore the latest trends, challenges, and solutions facing facilities organizations within colleges and universities; K-12 private academies and public school systems; libraries, museums, and other institutions of learning.

Enjoy over 40 conference sessions with diverse perspectives from today's leading facilities officers, campus administrators, college presidents, students, and education experts who are shaping and influencing the direction of education and the campus facilities environment.

For the latest on APPA 2011, visit us at *www.appa.org/training/APPA2011/index.cfm*.

APPA MEMBERSHIP RENEWAL NOTICES SENT – PAY BY MAIL OR ONLINE!

The 2010-2011 APPA membership year begins April 1, 2011 and runs through March 31, 2012. Renewal notices and invoices were mailed in February to all APPA international and regional members.

APPA now accepts dues payments by major credit card through the APPA website at *www.appa.org* via myAPPA, your personalized APPA website account. Institutional, International, and Affiliate member organizations should also take note that their membership renewal invoices will identify the names of individuals authorized to vote in APPA's upcoming 2011-2012 officer elections.

FPI

The 2009-10 **Facilities Performance Indicators** Report is available at no cost to all APPA members who participated in the survey, and for purchase through the APPA website for all others. The newly enhanced report is based on an extensive data collection effort for the 2009-10 fiscal year.

Participants of the 2009-10 Web-based FPI report will be able to view data from previous years, as well as all other report features.

Accessing the report allows your institution to identify up to five users who can view your report. In addition, you'll have access to the Executive Level Dashboards as well as the Detailed Reports and Raw Survey Data files.

Costs are:

- APPA Member Participant – FREE
- APPA Member Non-Participant - $500
- Nonmember Participant - $895
- Nonmember Non-Participant - $1,000

APPA will be hosting new FPI Report webinars, which will help you discover how to access various reports, indicators, and results. Visit *http://www.appa.org/research/fpi/webinar.cfm* to view a complete listing of archived FPI webinars.

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Continental Connections – Visiting APPA International's Counterparts in Australasia

By David Gray

I would like to express my appreciation to the APPA membership for allowing me to represent APPA International, as President-Elect, at the 2010 Tertiary Education in Facilities Management Association (TEFMA) Conference and at the National University of Singapore. Without exception, during my visit last September I was treated as someone special. Countless times individuals asked how certain past APPA Presidents were doing, and what the latest news was involving their work with our association. It was enlightening to spend time at the TEFMA conference with individuals in the Association of University Directors of Estates (AUDE) and individuals with the Higher Education Facilities Managers Association of Southern Africa (HEFMA).

The visit to **Singapore** was outstanding. My presentations regarding Middle Tennessee State University's "A Best Practice, *Summary of Services* Leads to Informed Decisions" and "APPA International's Role as your Critical Resource," were well-received. There were many good questions and excellent dialogue afterward. My hosts, Foo Tung Mooi (Foo) and P. Samynathan (Sam), were most gracious. Mr. Foo is looking forward to the APPA International 2011 Conference in Atlanta. The Vice-President for Campus Infrastructure, Dr. Young Kevet Yew (KY), took time to visit with me, and have lunch before I was treated to a busy afternoon of campus tours.

After arriving in **Australia**, I was able to visit a number of TEFMA members at their campuses, including Peter Hill of the James Cook University in Townsville. In addition, Darren McKee with RMIT and Chris White with the University of Melbourne attended the TEFMA Conference and, after the conference, we spent considerable time together visiting the University of Melbourne.

The TEFMA Conference is held in conjunction with the Tertiary Education Management Conference (TEMC). TEMC is similar to the National Association of College and University Business Officers and the Canadian Association of University Business Officers. The day before the conference, representatives from AUDE, HEFMA, and I made separate presentations to the TEFMA Board of Directors. We also made presentations during breakout sessions during the conference. This year's TEMC/TEFMA conference theme was "Future Directions." Over 750 delegates attended the conference with a magnificent lineup of speakers and a variety of presentations. It was an outstanding program.

The TEFMA President, Matt Smith, of the University of Tasmania, served as a wonderful host during my visit. TEFMA has a position known as Patron, which resembles a university's chair of excellence. In 2010, the President of the University of Tasmania, Professor Daryl La Grew, served in this role. Time spent with President La Grew and his wife at the TEFMA conference and later with Matt on the campus of the University of Tasmania gave helpful insight into their operations.

The University of Canterbury in Christchurch, **New Zealand** was the next campus to visit with Peter Molony, as host. The city and surrounding area was the site of an earthquake that registered 7.2 on the Richter scale earlier in September. Chris Hawker was key to the planning and execution of *crises emergency management* during the aftermath and clean-up of the university. Chris has traveled extensively in the United States, gathering information regarding emergency management. Many items he picked up as "best practices" were implemented in their recovery efforts. While in the Christchurch area, I was able to visit Lincoln University and walk the campus with Geoff Marks as my host.

The University of Auckland was the last site visit on this Australasian trip. Peter Fehl, organized a number of direct reports to share with me. The university is rich in history as conveyed to me by my several hosts.

TEFMA and APPA International have much in common in that their purpose is to provide services to their respective members and the facilities professional. It's all about better facilities and the need for effective facilities professionals supporting better education for students. Are the facilities safe, clean, and functional? It's also about increased appreciation for the role of the built environment in the instruction's education mission. Visiting with TEFMA, the National University of Singapore, AUDE, and HEFMA has helped me realize just how similar we are in the challenges we face. APPA International provides the tools and resources to help us all.

David Gray is assistant vice president, facilities services at Middle Tennessee University in Murfreesboro, TN and APPA President-Elect. He can be reached at *dgray@mtsu.edu*.

The Institute for Facilities Management: APPA's Influential Training

By Vanessa Anne Rodriguez

When you think of how you utilize your APPA membership, what comes to mind? Maybe it is networking with your colleagues throughout APPA, or all of the resources available on the website such as the library, Job Express, and Résumé Bank. Perhaps it is the annual conference or articles from this magazine. However, do you ever think of the Institute for Facilities Management? I know I do because graduating from it was the culmination of the most influential training I had received in facilities management.

The Institute for Facilities Management is made up of four, week-long courses in four core areas of study. These areas include General Administration, Maintenance and Operations, Energy and Utilities, and Planning, Design, and Construction. Each completed course gives you 3.0 continuing education credits. If you speak to your colleagues about the Institute, you likely will hear things such as, "I already know everything I need to know in that area," or "I've been doing this for 30 years, what could they possibly teach me?" or perhaps "It's too expensive and I can't miss a week of work."

INVEST IN YOURSELF AND YOUR FUTURE

As a professional, you know that investing in yourself and your staff pays dividends back to you, your staff, and your institution. An investment in one's professional development not only increases your knowledge and skills, but also increases self-esteem, productivity, and the quality of your work. Additionally, these courses cover all aspects of our field, teach management techniques, and look great on a résumé. Lastly, continuing your education demonstrates to peers and superiors that you have the wherewithal to increase your knowledge, skills, and abilities making you a more competent and credible professional – a professional worthy of promotion.

As someone who has been working in the housing field since my undergraduate college days over 20 years ago, I learned much by working closely with our housing custodial and maintenance staff. However, when I was preparing to move into a position that required direct supervision of these areas, I knew I needed more than just my work experience. I needed formal training, so I turned to APPA. APPA's Institute for Facilities Management was exactly what I needed. Through the Institute, I was able to gain a well-rounded education. The things I learned from these courses supplemented my experience, broadened my knowledge, and connected me with others in the field. For instance, the first course I took was Maintenance and Operations. The two things I remember learning and utilizing the most were how to create preventive maintenance plans and the focus on team cleaning (which was increasing in popularity).

The following year I took the Advanced Planning, Design, and Construction course because I was knee-deep in renovation and construction projects. Since our housing department was completely separate from the physical plant, we managed the vast majority of these projects. This course was also particularly helpful later in my career when I had the privilege of building $25 million residence halls from design through construction to opening. Without this course, I would not have been able to actively contribute as much as I did. By combining my education and experience,

I was able to work with all of the trades appreciating the fact that what we were building had to work for everyone, not just my future residents. Through that process, I was an extra set of eyes pouring over plans that caught errors that were due to the architect cutting and pasting, or missing something from a progress report. Thanks to APPA, I was comfortable not only being a part of the process, but *owning* my part in the process: I was invested.

Last year I put what I learned from the Energy and Utilities coursework to use on an investment grade audit we received. Two of my smaller residence halls had been using radiator heat and window air conditioning units. Residents continually complained about the noise from the radiators and the excessive heat. As you can imagine, it was not uncommon to see students running their window air conditioning units during the winter. Through the audit, we determined that installing geothermal technology would not only pay for itself but also offer our residents the personalized comfort they are requesting. Our residents love the control that they have along with the silence. I love the energy savings, green technology, and payback.

THROUGH THE AUDIT, WE DETERMINED THAT INSTALLING GEOTHERMAL TECHNOLOGY WOULD NOT ONLY PAY FOR ITSELF BUT ALSO OFFER OUR RESIDENTS THE PERSONALIZED COMFORT THEY ARE REQUESTING.

BUDGET FOR TRAINING

I have no doubt that these courses and graduating from the Institute in 2007 has helped me advance professionally. I am a fan of the Institute and a proud graduate. I am confident about what I do in part because of what I have learned from APPA and their joint ventures with ACUHO-I (Association of College and University Housing Officers – International). When young professionals ask me what they should do to get ahead, I recommend finding an institution that will sponsor their attendance to the Institute. Both at my last and current institution, I have sent my associate director for facilities to this training. It is a two- to four-year commitment depending upon what your budget allows. To make sure my staff can attend an APPA event at least annually, I budget specifically for the Institute because the investment in my staff's training truly does pay dividends.

The Institute for Facilities Management is one of the wonderful benefits of your APPA membership. I hope you consider it.

Vanessa Anne Rodriguez is director of housing and residence life at Wichita State University in Wichita, KS. She can be reached at *vanessa.rodriguez@wichita.edu*. This is her first article for *Facilities Manager*.

The Completion Principle

Joe Whitefield

Runnin' and Gunnin.' Most facilities managers I talk with are extremely busy—in some cases becoming overwhelmed—with the mounting activities and requirements of the job. Of course, there are many contributors to the fast, and sometimes frantic, pace we maintain. Normal work requirements (both routine and non-routine), staffing issues, and personnel issues are more than enough to keep a facilities manager busy. Add to the mix modern-day issues such as the economic recession, changing workplace demographics, increasing regulations, coupled with personal/family demands—all of this can quickly become unmanageable.

Whatever the causes, time is a commodity that seems to be less and less available. It can get a little depressing just thinking about it all, and that is precisely the point that needs to be addressed. There are personal and organizational consequences associated with having so much to do with so little time. Loss of productivity, burnout, sloppy work, impatience with others, stress, and deteriorating attitudes and morale are just a few.

ASKING TWO QUESTIONS

If these problems are plaguing your organization, there are two important questions to ask:

1. What can be done to reduce or eliminate the stressors?
2. What can be done to reduce the negative impact of stressors that remain?

Let's assume (and this is a big assumption) that you have put your best time-management foot forward. You have prioritized your work, delegated as appropriate, and dutifully allocated the time required for each activity. If you are still left with too much work and not enough time (real or perceived), how do you answer question 2? Consider the following.

It has been said that "completeness generates energy and incompleteness drains energy." Let's call this the "completion principle." Think of a time when you received a psychological and/or physical boost from completing a task that required a large effort. Perhaps you completed that report, finally finished that project, paid off one of the kids' braces, etc. It is amazing how small accomplishments can yield so much energy. Likewise, think about a time (perhaps even now) when you just couldn't finish a particular task and it hung over your head, consuming your thoughts and mental energy. The clock just keeps ticking like a time bomb.

If these scenarios resonate with you, then you can probably relate to the completion principle. This is important because the positive effects of completeness can be the antidote required to overcome the negative energy plaguing your organization.

Completing a task(s) or significant steps as part of a larger task provides the following:

- the natural energy boost or second wind that comes with accomplishment
- a mental rest or recharge period before the next task begins
- an ideal time to encourage and recognize others for the important contributions and advancements they are making to the organization

For the facilities manager, fostering a culture of completion can be a useful tool to motivate the team. This culture involves having discrete tasks with specific schedules assigned to the right people. In addition, large tasks can be broken down into a series of smaller tasks and milestones, whereby the responsible person can build his or her way to completion.

KEY: COMPLETION AND ACKNOWLEDGMENT

Having run one marathon (my first and last), I can relate to the importance of the mindset of running a series of 26 one-mile races in lieu of a single 26-mile race. Often, completing one stage of a task will give a person the necessary energy to push through to complete the next stage, and so on, until the entire work is complete.

Another key element of this culture is making the effort to acknowledge the contributions of individuals as they are completing their assignments. There are many ways to say "thank you" or "good work, keep it up." The facilities manager should be generous with this type of encouragement. It builds rapport and establishes a respect for the contributions of others. Finally, a resulting morale boost, in turn, could also reduce the occurrence of incidents (such as employee absenteeism) that add to the problem of time management in the first place.

How well are you taking advantage of the completion principle? If you need help you should consider prioritizing the tasks on your to-do list not only by their relative importance but also by their likelihood to be completed. Don't let the busyness of business drag you down—let the completion principle help energize and propel you.

Joe Whitefield is executive director of facilities services at Middle Tennessee University, Murfreesboro, TN. He can be reached at *jwhitefield@mtsu.edu*.

Don't Sell or Cede Your Renewable Energy Credits

By Sonia Marcus

What is your institution ultimately trying to achieve, sustainability-wise, with an on-campus renewable energy system?

- Good PR?
- Climate neutrality?
- Renewable energy carve-out in your Climate Action Plan?
- Creating new research opportunities?
- Accelerated deployment in your state/region/country/planet?
- Accelerated deployment for colleges and universities?
- Flexibility regarding future selling/trading/owning options?
- Helping utilities reach their Renewable Portfolio Standard (RPS) targets?
- Generating business for energy developers?
- Inspiring the next generation of leaders?

If any of the answers that resonated for you are in green, then you need to ask yourself some tough questions before you relinquish control of the Renewable Energy Credits (RECs) associated with these systems, either through sale or through a contract in which they will be sold off by a third party or developer. These contracts and financing solutions can offer you a fast track to your next solar installation. But they come at a cost that many institutions have not taken the time to acknowledge.

I'm sure that many of you have received persistent e-mails and letters about "no-cost" renewable energy projects for your campus. You get the renewable energy and reduce your carbon footprint, all with no upfront capital outlay. Sounds like a no-brainer, right?

In most all of these arrangements, however, part of the deal is that the Renewable Energy Certificates or Credits will be owned by the developer, and they may sell them off as they see fit. Okay, but it's free, right? So what's the issue?

Let's talk about on-campus renewable energy systems and their value to our institutions. Why do we love them?

- Because they are a visible manifestation of our commitment to sustainability.
- Because they provide green electricity to our campus and thus decrease our reliance on conventional energy sources.
- Because they help us satisfy the recommendations of our climate action plan.
- Because they inspire our students, staff, faculty, and community members.

Implications: Self-Financed	Implications: Third-Party Financed
You get bragging rights	You cannot take credit for the system in your GHG inventory
You are reducing your carbon footprint	You are not reducing your own institution's carbon footprint
You own the renewable electricity	You have to pay for the electricity that has been stripped of its RECs
You can report the renewable energy as such on your GHG inventory	You do not choose the REC buyer
You have complete control of RECs	You may not quality for LEED EA c 2 (on-site)
You can receive LEED EA c 2 (on-site)	

If you have a solar array on campus that is owned by the university, you can choose not to certify the RECs at all. Or you can certify the RECs and then hold them, sell them potentially, or permanently retire them. It's up to you. And if you do nothing, then the bragging rights still belong to you. The only condition in which the bragging rights don't belong to you anymore is where the RECs are sold off to someone else. If you keep them, that's a clear relationship between the electricity that the campus uses and the renewable energy system that you own. You can report the renewable energy on your greenhouse gas emissions inventory, you can get points under LEED for on-site renewable energy generation. And you can tell everyone who's willing to listen that the renewable electricity being produced by that array is offsetting your use of coal-fired electricity.

RECs in this case are most commonly sold into the compliance market, though schools can arrange to buy them on a long-term purchasing contract like the electricity. Because they can get such a good price for them on the compliance market, however, they are going to be extremely expensive. Note also that by arranging for the power purchase agreement (PPA) to cover all the electricity produced by the system, they can avoid the crummy deal offered in net metering relationships by the local utility.

What are the implications of how the system is financed? See the figure on page 14 to see the implications of self-financing versus third-party financing.

It is my opinion that your institution should not sell or cede the Renewable Energy Certificates that you have earned and worked to create. But if you are going to sell the RECs, then be a sophisticated player in the market and know as much or more than the developers do. Don't pay more than what you would pay for conventional power over the long run. Carbon benefits and SOx and NOx benefits should be treated separately.

Consider a contract in which you will be buying back the RECs or that has a sunset date after which point the RECs accrue to you. Be clear in your language. Developers ultimately do not necessarily share our campus sustainability goals, and they do not always have your best interests in mind.

Sonia Marcus is a sustainability specialist and former director of sustainability at Ohio University. Her new blog is Parlez-Vous Green Campus, and she can be reached at *sonia@parlezvousgreencampus.com*. This is her first article for *Facilities Manager*.

Atlanta, GA

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Atlanta

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Leading the Challenge of Change:
How Facilities Professionals Can Help Repair the Educational Business Model

Innovation and student expectations -- coupled with economic uncertainties, are placing great stress on the traditional business model for education, resulting in escalating tuition costs, lower funding and reduced services. What corrective measures must be taken to repair the education business model? What will the future hold if measures are not taken? This panel session will engage audience members in the dialogue and discussion on where education is headed; how institutions can remain competitive; and how facilities professionals can help lead for change that will advance their institutions and the education of their students.

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Georgia

BY

John C. Tysseling, Ph.D., Audrey Zibelman, Esq., and Allen Freifeld, Esq.

Facilities managers are adapting to reduced budgets and increased expectations as university finances continue to be stressed. Several university facilities managers have found innovative approaches to enhance their facilities' economic performance and earn new revenues for their schools.

HIGHER EDUCATION FACILITIES:

THE SMARTGRID EARNS A DOCTORATE IN ECONOMICS

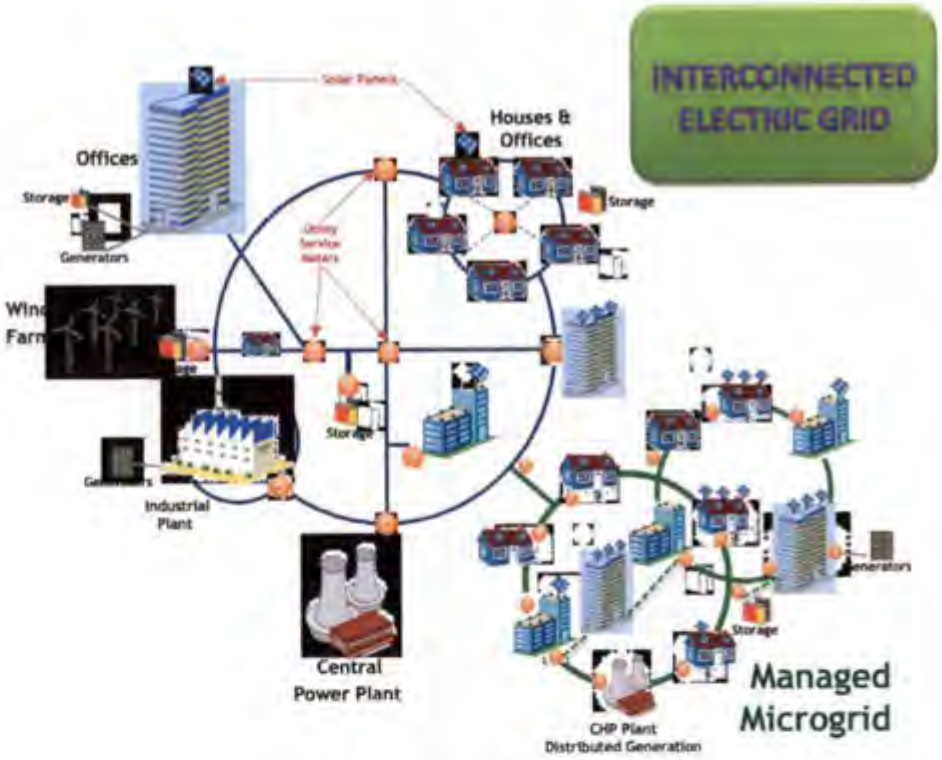
DATA COMPLEXITY AND FACILITY MANAGEMENT

Most higher education facilities have already accomplished some measure of a "microgrid" investment with building control systems (BCS), energy management systems (EMS), and advanced metering infrastructure (AMI) installations. Available energy production facilities may include boilers, chillers, cogeneration, thermal storage, electrical substations — possibly new renewable resources (wind/solar/biofuel/geothermal) — and actively managed district energy (DES) and building management systems (BMS).

Missing, until recently, has been a decision tool tying these resources together in a coherent, optimal control regime that allows facility managers to operate these resources in the most economical fashion, while meeting all organization comfort and operational constraints. The addition of decision logic and control regimes can transform a "microgrid" into a "SmartGrid" resource.

Several vendors now offer microgrid "dashboards" as a tool to monitor and squeeze additional economic benefits from facilities. However, most of these tools fall short of optimizing facilities operations or realizing all the economic value inherent to the facilities operations.

For facilities managers the world has changed. The world is virtual and digital. Information access is greater than it has ever been. Transactions and collaboration with peers is no longer the exception, but the norm. But perish the false platitudes that facilities managers are organized and confident planners — the majority of their time is spent quickly responding to crises more than anything else.



DATA COMPLEXITY AND FACILITY MANAGEMENT

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DISCOVER THE INTERDEPENDENCIES

A microgrid "dashboard" — a system reporting real-time data on the operational and economic status of buildings, HVAC equipment, thermal production, distribution, and loads — is an information reporting system that *tells you what is now occurring, or has* already *occurred, in your facilities operations.*

Elegant, informative, real-time, flexible, and available to Web-enabled connections — a dashboard can reveal how you are spending your energy dollars — providing the tools for future savings.

It is a tool to observe the interdependencies in your facilities operations, identifying strategies that may be implemented by the deliberate operator actions. That is, *when* a specific strategy *is identified.*

Then economics creep into the discussion. Your "dashboard" details expenditures on energy in the past 15 minutes, an hour ago, last month, and allows you to allocate costs to individual facilities. Facility comfort and operation metrics are monitored and recorded. It may even predict, based on historic data, your future expenditures on energy.

But this dashboard is only a discovery tool, it does not implement strategies — that task is the daily operational work of the BCS, EMS, DES, BMS, and the physical plant staff that controls the facilities' operations. Stated differently, it is a real-time *monitor* that *informs* the (largely) manually implemented responses.

THE MORE RELATIONSHIPS, THE MORE COMPLEXITY

The array of energy marketplace transactions between buyers and sellers — including the relationship between consumer-owned energy production facilities, competitive suppliers, regulated utilities, and the pricing of the energy commodity — continues to grow increasingly complex.

What if . . .

- Task-oriented work can be *passively directed* by the control systems.
- The control systems facilitate creation, definition, and transaction of a *new energy commodity* that actually produces revenue, in addition to saving costs.
- The control systems set hourly and day-ahead cost minimization operational strategies while maintaining defined comfort, operational and safety parameters.
- Systems operations could react to dynamic real-time market opportunities, and adjust energy use strategies (within defined operational parameters) *in response to an opportunity to sell latent distributed energy resources (DERs)* and capitalize on unique

energy market conditions.

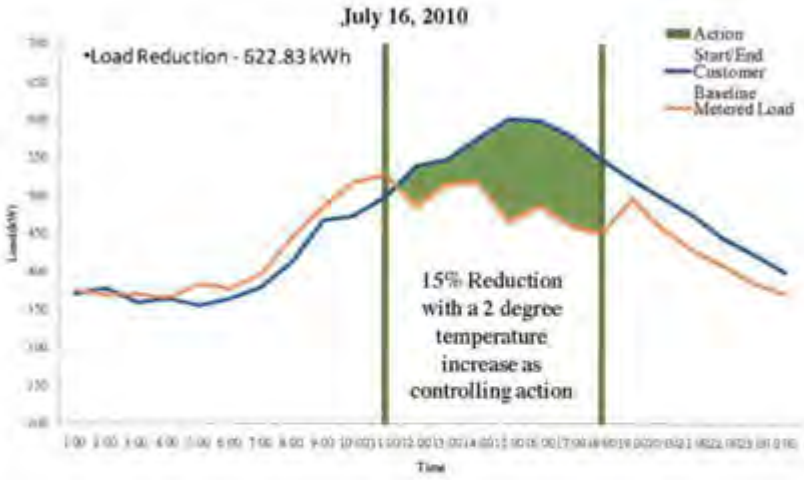
Can the complexity of the energy marketplace be managed to your advantage by IT systems?

Can an advanced control system facilitate actual sale of these new commodities?

Can the sales occur while simultaneously optimizing both the costs of facilities operations *and* actively directing both the dispatch of energy systems and facilities management protocols throughout your microgrid network?

Indeed, such "SmartGrid" opportunities are emerging — as *optimally controlled microgrids*. Drexel University, University of Massachusetts-Amherst, the University of California at San Diego, and other institutions are doing all these things with their advanced SmartGrid systems today.

These campuses, working with Viridity Energy, Inc., are using an automated, advanced decision making tool that enables them to sell energy, and load curtailments, to the grid. Viewed as *virtual power plants* by the grid, these resources are compensated for both generation and load curtailments.[1] They have become active market participants selling to the grid, rather than simply passive buyers of electricity.



OPTIMIZED FACILITIES IMPLEMENTATION: CASE STUDIES

Drexel University is monetizing the value of its distributed energy resource portfolio. Drexel, located in the heart of Philadelphia, is a community of 22,000 students and faculty. The Drexel main campus is host to a diverse portfolio of buildings, energy infrastructure and special-use facilities.

Drexel's own campus facilities contain latent, distributed energy resources that could be harnessed to produce revenue for the university, reduce energy expenditures, and improve the reliability and efficiency of the local power distribution grid. Drexel's DERs include controllable loads, back-up generation plants, thermal storage systems, electricity supply contracts, and the prospect of installing onsite renewable generation and electricity storage systems.

Drexel is a major account customer of PECO, Philadelphia' regulated electric utility. With an annual electricity bill exceeding $4.2 million and a peak demand of 10.5 MW, Drexel views energy supplies in a *new context* including its valuable portfolio of DERs. Drexel's project implemented a DER optimization platform for three campus buildings during 2010.

As a result, Drexel has more than doubled the economic value of the DERs optimized in just three campus buildings, as compared to the monetized value offered by conventional "demand response" programs. Drexel has generated new revenue and cost savings, demonstrating a campus-wide, potential economic value (conservatively) estimated at more than $360,000.

The University of Massachusetts Amherst campus is implementing similar strategies for five building, with successful performance demonstration anticipated to lead to campus-wide deployment of the DER optimization systems. Annual savings of nearly $75,000 have been associated with just optimizing DERs in the first five buildings, with projection of potential campus-wide value greater than $550,000 (conservatively estimated). Significant additional opportunities are anticipated for the UMass campus to achieve its environmental and economic goals through active DER management, optimization of electrical load, generation, and storage capabilities, and by participation in the markets operated by ISO New England.

The University of California at San Diego has undertaken a three-year DER optimization project that will significantly improve economics of available systems' performance. Through optimization scheduling employing autonomous, real-time dispatch of DERs to integrate large volumes of distributed resources into the UCSD microgrid, this project seeks to enable wide-scale deployment of distributed solar generation.

The UCSD microgrid is an advanced, integrated system serving a daily population of 45,000. Facilities in its microgrid have a peak demand of 42 MW, and UCSD self-generates 82 percent of its annual load on campus.

Potential DERs integrated in this project include over 1.2 MW of PV at seven sites, a contracted 2.8 MW fuel cell utilizing "directed biogas" from Pt. Loma

Definitions:

"Distributed energy resources (DER)" are now defined as both supply (production) and demand (consumption) assets, generally collocated with (or proximate to) facilities with energy service requirements. In many regional markets, both "megawatts" of consumable energy and "nega-watts" of (actively) *avoided* energy consumption have economic value in organized energy markets.

"Demand response resources" may obtain compensable economic value for an active decision to *forego taking* electricity from the utility supply grid, in the same market clearing economic transaction that sets the compensation paid sellers of electricity supplies.

Wastewater Treatment Plant, 2.8 MW of electricity storage, 30 MW of combined heat and power (CHP) systems, 32 MW of emergency generators, numerous building EMS systems, and 10 Nissan Leaf™ PHEVs (Plug-in Hybrid Electric Vehicles).

UCSD is integrating controls and optimizing the use of these assets — producing an automated dispatch schedule optimizing economic use of all the DERs based upon rigorous load, weather, price, and generation forecasts, while simultaneously serving campus operations and safety energy requirements. A preliminary estimate of potential value earned by the optimized DER facilities (conservatively) suggests well more than $600,000 annual economic benefit from the strategies.

UCSD's utility providers, San Diego Gas and Electric (SDG&E) and the California Independent System Operator (CAISO), are participating to ensure that meaningful results are provided for utility and grid operators. A "virtual generator" platform will be provided, that is dispatchable by SDG&E into CAISOs regional transmission grid.

Specifically, the UCSD project is:

1. **Developing innovative business models employing autonomous, real-time dispatch of DER** to integrate high penetrations of PV.
2. **Developing innovative utility regulatory programs promoting integrated operation of DERs** to benefit the CAISO, the utility, and customers.
3. **Demonstrating comprehensive DER management strategies in a live, real-time environment**, with PV integration, building on microgrid controller and DER asset optimization software.

These universities are implementing tools needed to intelligently and automatically dispatch controllable DERs. These systems optimize building space conditioning loads to meet operating parameters, while generating revenue by selling dispatchable resources into power markets, capturing O&M savings by reducing wasteful energy consumption, and providing environmental benefits.

MICROGRID OPTIMIZATION

For Drexel, UMass, and UCSD, the software integrates with building automation systems and coordinates facility operations and distributed resource dispatch scheduling to maximize wholesale power market revenues for DERs and reduce facility energy costs.

The process begins with analysis of the portfolio of DERs available in the buildings and models the economic benefits achievable. After validating the benefits, communications equipment is installed (as necessary) to allow real-time data transmissions between the buildings' automation systems and a network operations center.

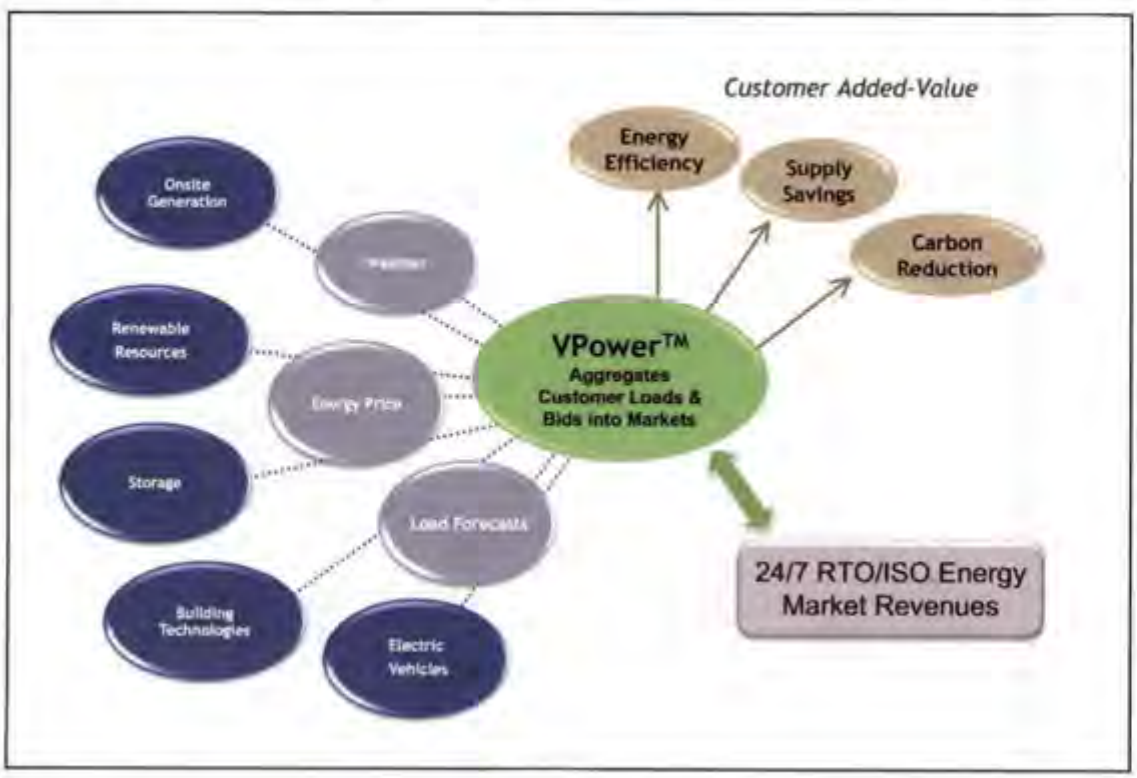
The software engine models the energy requirements of the campus buildings based on multiple parameters, including:

- *Solar gain*
- *Business as usual temperature*
- *External temperature*
- *Building occupancy*
- *HVAC equipment*
- *Lighting*
- *Building temperature conductivity*

The network operations center enables the co-optimization and dispatch of any DER resident within the campus footprint, including controllable building loads, distributed generation, and battery storage configurations.

Unlike conventional "demand response" enabling participation in peak-period *capacity* markets only, the software platform enables continuous participation in *energy* markets. In short, providing significantly greater potential to garner new revenue and cost savings, without risking disruptions to campus operations or sacrificing the comfort of students and staff members.

Traditional "demand response" programs simply provide demand reductions when requested by the RTO/utility.



Instead, optimizing load using behind-the-meter DER resources provides dynamic and measurable demand reductions on a full-time and real-time basis — converting load curtailment into a controllable, fast responding resource to economic (price) signals.

As demonstrated by the Drexel, UMass, and UCSD examples, the system is scalable. Importantly, this advanced SmartGrid system is employed for enhanced economic benefits — not simply the reliability purposes of existing demand response programs.

ADVANCED SMARTGRID: EARNING ITS ECONOMIC CREDENTIALS

Automated SmartGrid systems have traditionally been installed where complex, billion dollar capital assets must be managed to serve increasingly complex loads. These IT systems capabilities are a necessity to optimizing operations of the utility grid, but are now also available to optimize microgrid operations such as found in many higher education facilities.

Moreover, these institutional facilities contain a host of DER "opportunities" that may produce new and enhanced economic value through sophisticated management and operations strategies.

Returning to the "*What if . . .* " questions.

What if the investment that your campus has made in SmartGrid capabilities can be enhanced to become virtual generation resources that are dispatchable to the utility; that is, during those periods when the economics and market prices justify such use of the latent energy resources of your campus.

The economic value of the managed DER grid resources do not simply inure to the owner of the facilities. Where these systems become reliable resources — just like an independent power producer selling generation into the wholesale markets — we have created *new economic value* from the more efficient use of an underutilized resource. This gain in efficiency — manifest (in part) as avoided utility capital investment in generation, transmission and distribution resources — has economic value to society as well.

And so, it is true that these advanced SmartGrid IT systems do have the ability to produce revenue from energy use data and the management of distributed energy resources.

resources (MWs), a supplies (*avoided* MWhs) and ancillary services. The business model for (at least) these three universities shifts all financial costs and risks to the vendor, for a specified share of the realized value.

John Tysseling is president of E3c, Inc., Albuquerque, NM; he can be reached at *jct@e3c.com*. Audrey Zibelman (*azibelman@viridityenergy.com*) is president and CEO, and Allen Friefeld (*afreifeld@viridityenergy.com*) is senior vice president, external affairs, for Viridity Energy, Inc., Conshohocken, PA. This is Zibelman and Friefeld's first article for *Facilities Manager*.

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1. Economic value is derived from purchased supply cost savings (MWhs), and revenues from sales of load curtailments, capacity

INTEGRATING SUSTAINABILITY PROGRAMS

INTO THE FACILITIES CAPITAL PLANNING PROCESS

By Susan Buchanan, LEED AP

With detailed information about the costs and benefits of potential green investments, educational facilities can effectively evaluate which initiatives will ultimately provide the greatest results over the short and long term. Based on its overall goals, every school, college, or university will have different values and therefore different strategies. For instance, one university may focus on investments that will deliver the greatest improvements to the quality of the learning environment, while another may make its top priority those investments that provide operational cost savings or most significantly reduce environmental impact. With enrollment becoming more competitive with campus sustainability practices and policies growing as a criteria for school selection, the visibility of facilities operations and management is becoming more prominent.

The many potential greening initiatives educational facilities can undertake compete with a myriad of other capital and operational investments. This includes systems renewal, building renovations and new construction. Moreover, there is competition for funds with the educational mission itself. While schools may single out opportunities to improve building sustainability for analysis, ultimately those investments will need to be assessed in the context of other building requirements and infrastructure demands of the pedagogical mission.

Having a broad umbrella approach to sustainability (including energy, water, indoor environmental quality, site sustainability, and materials use) is important, but the focus recently has been on prioritizing sustainability projects that provide a clear return on investment (ROI). Educational facilities are more involved in defining "real-life" practical ways to fund and accomplish their overall greening goals, while at the same time maintaining the desired condition of their facilities within a given budget.

In order to optimize sustainable capital investments, there are four important considerations:

1. Mission and mandate
2. Improved efficiency
3. Day-to-day operations
4. Long-range planning

Following these fundamentals enables colleges and universities to successfully integrate sustainability goals into their facilities capital planning process.

MISSION AND MANDATE

The foundation of any sustainability program is based on the university's or college's mission as well as any compliance requirements that must be met. Once the mission is clearly understood, it is possible to create a framework from which to make key decisions. Recommendations for sustainable actions can then be prioritized in support of these goals.

IMPROVED EFFICIENCY

Efficiency is a key area of focus, targeting which actions will reduce operating costs while conserving resources. Colleges and universities may want to consider assessing their current facilities in order to define key opportunities for saving energy and conserving water, which can result in a number of efficiency improvements.

DAY-TO-DAY OPERATIONAL DECISIONS

Consider the impact of daily operational decisions on both sustainability and the operating budget, and how alternative green actions can replace traditional, potentially inefficient choices. In every replacement scenario, whether it's a renewal, upgrade of equipment, or replacement of finishes, there is an opportunity to implement green alternatives which can incrementally improve the sustainability of each facility without a major impact on day-to-day procedures.

LONG-RANGE PLANNING

Faced with numerous challenges, especially lack of funding and emergency repair needs, the facility operations and maintenance world often focuses on day-to-day issues. Long-range planning enables a university or college to be prepared for the future, whether that entails budget cuts or newly available funds. By surveying the facility portfolio, identifying the potential green opportunities, establishing water and energy baselines, setting reduction targets and creating a sustainability implementation plan, universities and colleges can balance short-term needs with long-term success. With sustainable policies, procedures and funding models in place, the long-term result will be increased cost savings over the life of the facilities.

While keeping these considerations in mind, colleges or universities that are early in the process of integrating green programs into their capital plans may choose to focus initially on short-term goals which often involve relatively low-cost initiatives. These can deliver short-term paybacks by reducing energy and natural resource consumption—with the priority based on cost savings and other desired benefits.

As they make progress, and see results, they may go on to evaluate greening opportunities that can provide both short- and long-term environmental, social, and economic benefits. This more integrated approach embracing the "triple bottom line" is important to consider when goals are more complex, as in the educational arena. The triple bottom line represents a framework of values and criteria that measure organizational priorities in terms of environmental and social performance in addition to financial performance. Where emphasis is often placed on financial payback, the triple bottom line creates equity amongst the impacts of an action or decision.

SUSTAINABILITY AND CAPITAL PLANNING

Let's look at the process of integrating sustainability into capital planning in more detail. The first step in identifying the best investment strategy for sustainability is an objective evaluation of the college's or university's current state of sustainability and its options for change—including estimated costs and potential benefits. There are several questions an educational facility should ask itself when establishing a sustainability framework. First and foremost, what are their strategic, real estate, and green objectives? Is there a balance between them? Basically, where do you want to be in terms of sustainability while staying within the master plan? It is important to remember sustainability is not a "one size fits all" process.

Various colleges and universities will have quite different approaches to sustainability. When deciding on institutional or sustainability initiatives, keep in mind: reaching the highest level of green or energy performance is most cost-effective when timed to coincide with new construction, renovation, or major infrastructure renewal. Also, the savings are greatest when improvements are made as close to end of useful life as possible; for example, lighting systems, and water-efficient restroom fixtures are quick, money-saving improvements, but you want to get the full life-cycle benefit of the assemblies.

Once the institution's objectives are decided, it is time to determine what the starting point is; what types of assets and equipment are already in place, where can sustainability be improved easily and where is the most work needed. There are many factors to consider when determining the starting point of the sustainability plan. Climate can affect sustainability drastically; warmer climates will need to consider cooling systems while colder climates will focus on heating. Other aspects of climate like annual rainfall and cloud cover can also determine what sustainable technology is best for that particular facility.

The location of a facility—rural, suburban, or urban—will also play a role in determining sustainable technology needs; urban buildings normally contain more equipment and assets in a smaller area as opposed to rural buildings which can be less

densely occupied. Even microclimates have an effect on which technology to apply, such as on south-facing facades where solar gain is higher, or in landscaping choices where native or adaptive species can serve multiple purposes. Other factors to consider are: type and use of buildings, age and existing condition, institutional mission, community initiatives and partnerships, and mandates.

Financial metrics will obviously have an impact on how a college or university evaluates its sustainability initiatives. When an institution looks at its deferred maintenance, maintaining facilities and keeping them going through their life cycle, it would normally look at an in-kind or conventional replacement. If there are green alternatives, educational facilities should consider several financial metrics while evaluating each option. The life cycle of systems along with the cost of operation over that span is an important factor; keep in mind that many sustainable alternatives include a payback over time resulting from reduced energy and operation costs. One way to evaluate the combined cost of green alternatives is the cost as a percentage of current asset replacement value. If the cost of making a facility sustainable starts approaching the value of the facility itself, it obviously is not financially viable.

While financial metrics are important, it is also necessary to have metrics that define and measure both current and future sustainability. There are several green ratings systems that can be employed as guidelines, including the Leadership in Energy and Environmental Design for Existing Buildings Operations and Maintenance (LEED-EB O&M), Green Globes, ISO 14000, and BRE Environmental Assessment Method (BREEAM).

USING FACILITY CONDITION ASSESSMENTS

A typical facilities condition assessment (FCA) gathers data on facility condition, the life cycle of different systems within the facility, code compliance, functionality, and efficiency, among other aspects. Integrating sustainability into the FCA process using, for example, LEED-EB O&M requirements as a guideline, adds several metrics to the assessment: energy efficiency, water conservation, indoor air and environmental quality, site sustainability, and materials and resources. By combining this information with detailed data about overall requirements across a building portfolio, colleges and universities can get a holistic view of facility needs.

After the performance metrics have been established, the organization can identify green opportunities while also looking at overall facility condition. Many common green opportunities include green roofs, high-efficiency lighting controls and sensors, water conserving bathroom fixtures, organic landscape maintenance, materials with recycled content or bio-based materials, and centralized automated building management. This part of the process involves capturing data and identifying the green options, not deciding which of these options are in line with the organization's capital planning objectives.

EVALUATING OPPORTUNITIES

Once the opportunities have been identified, the next step is to evaluate them in the context of the overall capital plan. When evaluating the options, it is important to take into account initial cost differences between the conventional and sustainable alternatives along with the savings over time; for many resource-saving alternatives, the initial investment may have a rapid payback period. It is also important to understand that some "paybacks" cannot be easily measured, such as the benefits of improved indoor environmental quality on student, faculty, and staff productivity.

Not every green measure has a quantifiable cost benefit. The best way to evaluate all the options is to develop a list of parameters that represent important priorities for the organization. Priorities may include cost, potential energy savings, impact on overall facility condition, impact on occupant health and environment, and other issues of strategic importance. Using these parameters, the organization can make an informed, data-driven decision regarding the alternatives.

Following this approach will allow the school to determine the current state of its facilities and sustainability, the alternatives for sustainable facilities upgrades, the cost and payback of these upgrades, which upgrades are the most important, and how to incorporate the upgrades into an established facilities capital plan and budget. Ultimately, focusing on these fundamentals will result in an integrated approach to planning, budgeting, and funding sustainability projects within the framework of a plan that meets the facility's goals, and transforms the facility portfolio. Step-by-step, incremental change instituted over time will result in a more sustainable building portfolio that maximizes investment and supports the larger mission of any educational facility.

The importance of integrating sustainability into ongoing capital planning was shown at a small New England college, where the facilities undertook a program that included concurrent green building and facility condition assessments. With detailed information about the costs and benefits of potential green investments, the college was able to evaluate alternative options against the backdrop of its traditional choices. Because of this, the school has positioned itself to receive additional funding, and is undertaking a new round of integrated assessments that will continue to evolve its daily and long-term practices into a more sustainable, more cost-effective, and more environmentally responsible program. In this way, the college has been able to accomplish both its fiscal and organizational goals while maintaining the condition of its facility portfolio.

With the right framework and tools in place, educational facilities can evaluate the sustainability of their existing facilities, plan to reduce their environmental impact, increase their energy efficiency and cost savings, and promote a healthier built environment. Whether a college or university already has a sophisticated sustainability program or is newly engaged in this effort, it is desirable to evaluate and prioritize green options while remaining aligned with the overall institutional mission.

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STUDENT ENGAGEMENT IN CAMPUS SUSTAINABILITY

[BY ALLESSANDRA CAIRO]

Faculty, staff, and administrators are all burdened by the lack of time, budgetary constraints, and ever-changing priorities, and facilities staff are no different. With all these constraints, how can real change happen? Student engagement can make facilities work easier and more fulfilling. To benefit from student engagement, utilize some of the following proven strategies and examples. Involving students from the ground up on projects not only gives them hands-on experiences and better prepares them for the real world after graduating, but, if implemented well, can also lessen the burden on staff time and budgets.

There are many common negative assumptions regarding student involvement, such as: students lack the ability to follow through; they do not have the skills, experience, and knowledge necessary to make a significant difference; or they are only interested in what they see as important, not in what actually needs to be accomplished. In addition, a common viewpoint is that it takes more time for facilities staff to work with students than if they were to do it themselves or hire an outside vendor. Also, administration and faculty do not identify facilities departments as a potential educational outlet.

However, there are plenty of examples within an emerging trend toward students working with facilities that prove these negative assumptions and viewpoints are most often misconceptions. There are a number of ways to benefit from student work. Julian Keniry, senior director for campus and community leadership at the National Wildlife Federation, identifies a few. One solution is to bring faculty in as stakeholders to facilitate projects and share in the risk. Another good strategy is to have student work tied to academic success or other similar incentives. Providing internships for students in which they can receive hands-on experience and build and improve their skill set benefits the students and the facilities staff. Students can often push for energy efficiency and sustainability related projects that facilities staff might want but can't advocate for due to internal politics. Once accomplished, the reputation of the facilities area can benefit from lower utility bills and/or lower pollution.

College Student Educators International *(http://www.myacpa.org/task-force/sustainability/)* has an extensive website on the ways student affairs staff can work with students on campus on co-curricular sustainability activities. Student affairs or sustainability coordinators can often be effective facilitators when connecting facilities with students. Faculty and sustainability coordinators can provide skills training to make the students more valuable to facilities departments. While not exhaustive, these approaches provide a good

starting point for student engagement. By institutionalizing some of the aforementioned concepts and resources, positive change towards a greener campus is inevitable. The projects can often be fun and revitalizing for facilities staff as well.

It is important to note that there are plenty of students who need little more than support and encouragement. Passionate students are willing to work extremely hard to make change, and many times all it requires is an outlet to do so. Take Illinois State University, for example.

Illinois State University (ISU) has done an exemplary job of engaging its students to work effectively with their facilities staff to assist in greening their campus. Mike O'Grady, director of grounds and fleet services at ISU, along with his team, has worked collaboratively with not only students, but faculty and staff from several departments to create a greener, more sustainable campus and to promote sustainability initiatives such as campus recycling and composting.

When two students of an environmental studies course approached staff with a thorough proposal to create an herb garden on ISU's main campus, O'Grady and others were ready to assist. The mission of the herb garden, as explained by the students, is "to educate students, faculty, and staff on sustainable agriculture by providing student volunteer grown produce to the Illinois State Campus Dining Services. As well as being aesthetically pleasing, it will promote interdisciplinary cooperation between student environmental organizations and encourage healthier food choice practices."

O'Grady and his grounds crew immediately stepped to the plate to assist with the students' project. While the students recruited volunteers, O'Grady identified land on ISU's main campus that encompassed favorable growing conditions, but was also visible and would allow for campus-wide interaction. Working closely together, O'Grady and the students created a schedule to determine when the land should be cleared, the mulch and compost brought in, the seeds planted and harvested, and when the soil should be turned over for the next season. With budgets tight, O'Grady managed to finance the project through his own department's budget and scheduled staff time to clear and plow the land, provided tools and water, and purchased seeds and mushroom compost.

After a successful first year that produced a new collaboration between students and facilities, an aesthetically pleasing view on campus and locally produced herbs available in the dining hall, the student group has already begun plans for expanding the herb garden this year.

This is just one example of many. When participants in the Green Schools Listserv were asked for examples of positive interactions between facilities staff and students, there were dozens of replies within the first day. The Energy Action Coalition, comprising 50 national youth organizations focusing on making campuses less polluting and more sustainable, have hundreds of stories of students working with facilities departments. Students and facilities staff are working together all over the country, overcoming barriers and challenges one step at a time. In many cases, facilities staff do act as informal "latent professors," adding to the student's education and practical skill set.

Another example is at **Oberlin College** in Ohio. Keith Watkins, director of facilities, is working with administration and the admissions office to be included in first-year student orientation. Watkins believes by providing new students with information up front about the sustainability initiatives occurring on campus, the recycling efforts and other available opportunities for students to get involved, the already successful programs will become even more successful and new programs will begin. He has found that engaging students early on, and allowing them to follow their passion while providing them with guidance, support, and the necessary resources, inevitably creates positive change.

The student resource conservation team at Oberlin (originally a group of two, now a group of 14), along with several other environmentally focused student groups have made major improvements on campus, including the Big Swap, an end-of-the-year collection drive and exchange, a massive composting program, a student garden where the crops

are sold to Campus Dining Services, and the SEED House, an international community of Oberlin students practicing environmentally conscious lifestyles. These changes are benefitting the college not only now, but will continue to benefit the college in the long term. In fact, this is one of the few requirements the student group has. They can choose to work on projects from a laundry list provided to them at the beginning of the year or they can choose a project they themselves create. Either way, they have to choose one project that will provide the campus with positive, long-term effects.

Proven success at Oberlin is neither a top-down nor a bottom-up approach, it is a collaborative effort between students and staff, both working to make a better campus. Several years ago Oberlin's housing facilities experienced some unwanted pests. Bats were getting inside several residence halls. With the obvious complaint from students, Oberlin staff called in a pest control company to rid them of the problem. After several attempts and strain on the budget, Watkins believed that there had to be a more cost-effective and sustainable solution to the problem. After bringing the issue to his students, his students did research to determine that building bat houses near the most highly infested dorms could solve the problem. This solution would save the college money by not having to call pest control and keep a balanced ecosystem in check. Today, if you visit Oberlin you will see two bat houses and residence halls filled only with students.

Several colleges have implemented intern and mentorship programs, or offered hands-on experience in exchange for academic credit, facilitating engagement between students, faculty, and facility staff, as well as other departmental staff. In addition, through these programs and involving multiple departments and faculty, sustainability concepts are being institutionalized at two- and four-year campuses.

At **Kankakee Community College** in Illinois, Rich Soderquist, director of facility and campus security, mentors a student as part of the college's scholarship based leadership development program. Through this program, the student is required to work a predetermined amount of hours in each semester to obtain hands-on experience in the field. This particular mentorship focuses on construction and design.

Joining the design team and Kankakee staff in design meetings for the new advanced technology center, the student participated in the question and answer portion of the meeting and reviewed blueprints and drafts. Through this, the student was able to gain experience in the design process. The student also participated in meetings for the construction of Kankakee's new wind turbine schedule to be built in 2011. Again, gaining real-world experience, the student was able to take part in the pre-construction conference and construction meetings throughout the planning process. As the wind turbine is installed, the student will be observing the work and documenting the progress.

When asked about the program, Soderquist said, "It has been a great experience to give back to students and the community."

Christian Rusby, sustainability coordinator at **North Seattle Community College** (NSCC) in Washington, explains how he overcame the challenge of students not having the necessary skills to do meaningful work. In an interview with Rusby, he acknowledges that facilities staff are unable to invest a sufficient amount of time in training new students, especially with the changing enrollment numbers of community colleges. However, he has found that facilities staff are willing and

WHEN ASKED ABOUT THE PROGRAM, SODERQUIST SAID, "IT HAS BEEN A GREAT EXPERIENCE TO GIVE BACK TO STUDENTS AND THE COMMUNITY."

able to invest their time in him, thus allowing for Rusby to identify small pieces of larger projects in which a student's skill set is a match. By Rusby acting as the facilitator, or "people manager" as Rusby refers to it, facilities staff are able to continue their work with the added benefit of using skilled student workers as Rusby sees fit.

For example, when NSCC decided to complete an inventory of their campus to create a sustainable landscape management plan, Rusby sat with students to identify the skills they had and how they would be able to assist in the large-scale project. Students from several disciplines participated in this large-scale inventory, which to date is approximately 50 percent complete. In spring 2010 two students from a technical writing class were recruited to create a "how to" guide for inventorying trees. One student had a strong background in tree identification, and the other had strong graphic skills. Working together, the students created a 30-page guide that included steps for identifying trees and the most common trees on campus. As the inventory began and data was collected, students from the business program at NSCC analyzed the data and input the information into GIS.

While this is only a brief overview of the project, it is a great example of students working with faculty and staff, from multiple disciplines, toward a sustainable campus.

At Pennsylvania's **Ursinus College**, students of the environmental studies program are requi red to be active on campus working with faculty, staff, and administration on sustainability projects. When Ursinus College was developing several buildings a few years back, state law allowed for a temporary storm water basin to be created. Upon completion of development, Erony Whyte, a student from an ecosystem management class, looked at the temporary design and developed a proposal for a creative storm water management system. The proposal was presented to administration and president, both of whom were quite impressed with the introductory proposal. Whyte was asked to further develop the proposal over the summer through the college's fellowship program.

Whyte, interning with a local engineering firm and working with faculty, created a formal plan to create a wetland on campus that would act as a natural storm management system. The project evolved to a senior thesis where Whyte created the official blueprints and developed the management and economic plans. The final plans were approved by administration and the board of trustees during Whyte's senior year. Construction commenced the next year and the college now has a self-supporting ecosystem and storm management system.

It is obvious from these stories and others that were not included due to space constraints, students are being empowered to make a difference at two- and four-year colleges and universities alike. The successes above are just a few of the many ingenious ways students are working with facilities staff, administration, and others on their campuses to create sustainable campuses. With a new level of engagement emerging, the benefits of building good working relationships between students and facilities staff will continue to grow.

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GREEN SCHOOLS FOR

Changing how we design, construct, and operate our schools and campus buildings will allow educational facilities to enhance student learning experiences

By Jaime Van Mourik

At the U.S. Green Building Council (USGBC), we see the profound, positive impact that green buildings have on our lives and the innovation they have poured into the marketplace—from office and retail buildings to government facilities and individual homes. However, none of these markets speaks more powerfully to the benefits and potential of green buildings than our educational facilities.

Stakeholders at colleges and universities across the country are connecting around the topic of sustainability. With the understanding that green buildings are about more than just bricks and mortar, institution leaders are creating new learning experiences and facilitating higher levels of community engagement. Students are also taking on a larger role, asking to be part of the greening of their campuses, and facilities staff and faculty are working together to provide experiential learning opportunities for students.

THE CURRENT LANDSCAPE

Higher education institutions have a higher percentage of LEED®-certified green space than any other market sector, including government, retail, and hospitality, and represents more than 85 million square feet of construction space. Although impressive, there are more than 83,000 higher education buildings in the United States comprising 3.48 billion square feet on colleges and universities campuses. We have only begun to scratch the surface.

Many colleges and universities currently use the LEED® for Existing Buildings: Operations & Maintenance™ (LEED for Existing Buildings: O&M) rating system to improve facilities performance and guide campus-wide sustainability planning and implementation. The California Institute of Technology (CalTech), for example, is assessing campus-wide activities and scaling up its green efforts by making necessary updates to improve the performance of multiple buildings. As part of this process, several existing buildings are undergoing retro-commissioning to carefully examine their

EVERYONE WITHIN THIS GENERATION

operational policies and procedures. By identifying inefficiencies and areas for improvement, CalTech is expecting to save 40 percent in energy costs in its biology lab alone.

Often, the completion of one green building encourages larger sustainability initiatives across campuses. After the LEED Gold certification of **Western Michigan University**'s (WMU) College of Health and Human Services building, the university witnessed a cultural shift in occupant behavior across the entire campus. WMU has since adopted an enhanced campus sustainability plan, including an effort to benchmark its current portfolio of buildings, make changes to key policies and procedures and obtain LEED certification for additional buildings on its campus.

As part of the District of Columbia's **American University**'s comprehensive sustainability strategy the institution has committed to LEED for Existing Buildings: O&M certification for 30 buildings, using a volume-based certification model that streamlines the certification process. This new program dramatically increases the efficiency of LEED certification and lowers the associated costs.

The AU effort is being led by an interdisciplinary campus team that includes staff members from the Office of Sustainability and the facilities department in addition to faculty and students. The work being done will help the institution reach its carbon neutrality goal while also serving as a model for other colleges and universities.

To enhance and support institutional efforts to finance green building projects, USGBC collaborated with the Energy Services Coalition to create the *Paid-from-Savings Guide to Green Existing Buildings*, a publication providing detailed information on how to leverage the cost savings from improved building performance to fund more comprehensive green building retrofits. As one example of a financing mechanism, the guide outlines how to expand a typical Energy Savings Performance Contract to include more holistic green improvements, and achieve LEED for Existing Buildings: O&M certification in the process.

A VISION FOR THE FUTURE

As USGBC looks ahead, we have a vision: green schools for everyone within *this* generation. As a way to enhance our support of allied institutions, we have formed the Center for Green Schools at the U.S. Green Building Council. The center is increasing our efforts to drive change in how we design, construct, and operate our schools and campuses so that all educational facilities can enhance student learning experiences, not compromise them. We believe that everyone, from the kindergartner entering the classroom for the first time to the post-graduate student performing research in a lab, should be able to learn in green buildings.

The Center for Green Schools continues the work started by the USGBC's Green Campus Campaign, and works directly with staff, faculty, students, and administrators to expedite the transformation of all campuses into sustainable places to live and learn, work and play. The Center applies a holistic and campus-wide approach to greening all buildings and engaging the entire community in the process, and the Center is fostering conversations among K-12 and college and university leaders, as well as advocates on local and national levels.

USGBC is also eager to advance green building at under-resourced higher education facilities, including minority-serving institutions and community colleges. 2011 will see the launch of a more formal program focused on extending the knowledge and benefits of green building in these communities.

PAVING THE WAY

While every institution's path will be different, the core commitment of colleges and universities to create greener campuses transcends school type, size and location. The Center for Green Schools provides guidance, programming and resources for all members of a campus community. USGBC's recently completed *Roadmap to a Green Campus* presents strategies for using LEED as a framework for developing and evolving campus-wide sustainability plans, and implementing practical and measurable green campus solutions. The resource was created with the support of the Association for the Advancement of Sustainability in Higher Education (AASHE) and references over 100 tools and resources to support campus greening efforts, as well as institutional success stories from across the country.

INCREASED COMMUNITY AND STUDENT INVOLVEMENT

The use of many campus facilities extends beyond students, faculty, and staff into the local community. Community participation in the integrated process of designing, developing and implementing LEED projects is vital to success. Including students in these projects also presents an opportunity for the community and students to work collaboratively, creating unique opportunities to foster lasting relationships.

As part of a one-year green building educational internship program, the **Los Angeles Community College District** (LACCD) in California sets a great example for community engagement. Students are paired with their local USGBC chapter members and receive mentoring and green building education, which they take back to LACCD to work on their LEED projects.

At the Institute for the Built Environment at **Colorado State University**, students receive green building training as part of coursework and use this experience on local LEED projects across all sectors of the building industry. Since 2001, CSU students who intern for the institute have worked on more than twenty-five buildings pursing LEED certification.

ENHANCING STUDENT LEARNING

As college and university leaders from across the United States work to green their campuses, students can and should play a critical role. Campuses that implement programs to include students on LEED projects create opportunities for faculty to incorporate project-based learning into course work, provide students valuable hands-on project experience and help the institution lower LEED project costs. At California's

University of San Diego, for example, students accounted for 86 percent of the total labor hours on the school's first LEED for Existing Buildings Silver-certified project, lowering the overall project costs by 30 percent. Student participation on the project also secured a LEED innovation credit.

As a way to help connect students to campus green building projects, the Center for Green Schools at USGBC released a free, online publication called *Hands-on LEED: Guiding College Student Engagement*. This publication focuses exclusively on the role of students and explains how they can be involved in green building projects and contribute to LEED certification efforts. The guide outlines three options for engaging students: coursework, internships, and volunteer opportunities. It details the benefits of involving students and outlines ways to initiate the process of developing an engagement program, such as planning considerations and LEED-related activities and tasks that students can perform. The guide also contains profiles of three campuses that are engaging students with great success.

Working on LEED projects also helps students develop skills that will distinguish them as they seek employment in an increasingly competitive job market. According to a recent study, green building will support nearly eight million U.S. jobs and pump $554 billion into the economy between 2009 and 2013—statistics that are encouraging for soon-to-be-graduates seeking green job opportunities. To help connect students with this growing market, USGBC has created a student program that has nearly 60 active groups. College and university students from all disciplines use this network to learn and participate in hands-on green building experiences on their own campuses.

LOOKING AHEAD

Colleges and universities are USGBC's allies in the green building movement, and we expect to see continued results and innovation as institutions address existing building needs with carbon reductions in mind. A green campus is bigger than the life cycle of its buildings, grounds, and infrastructure. The ability to use research, pioneer technological innovations, engage the community and encourage partnerships provides a unique opportunity for higher education institutions to serve as leaders in the creation of new and revitalized green communities. By continuing an integrated approach to planning and implementing sustainability initiatives, we can achieve green schools for everyone within this generation.

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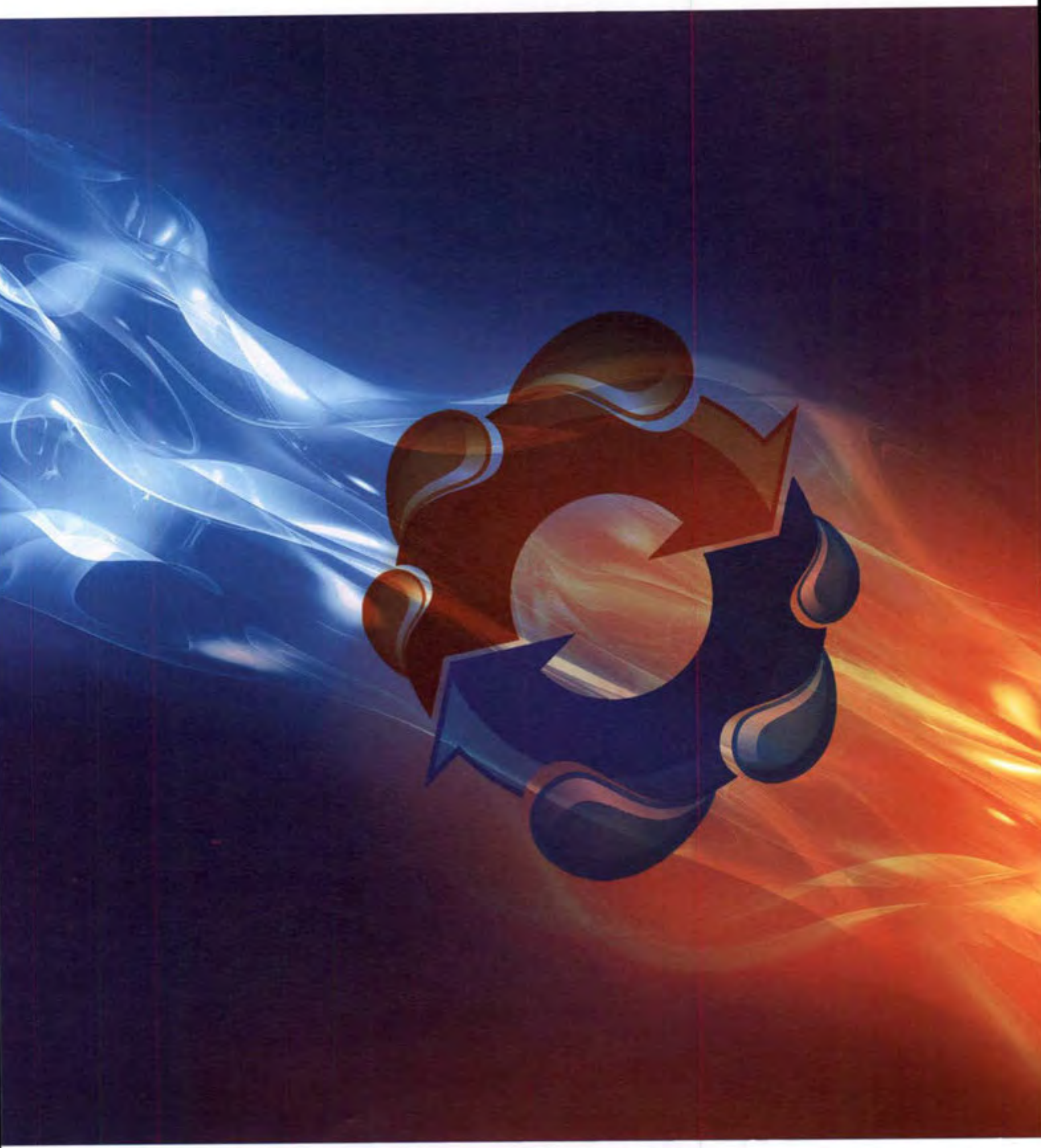


GEOTHERMAL Grows Up

By William C. Johnson
Steven Kraemer P.E.,
and Paul Ormond P.E.

Self-declared energy and carbon reduction goals on the part of progressive colleges and universities have driven ground source geothermal space heating and cooling systems into rapid evolution, as part of long-term climate action planning efforts. The period of single-building or single-well solutions is quickly being eclipsed by highly engineered approaches and district-level programs that take advantage of building diversity, hybrid system designs, and central plant integration. In this article we review where the industry has been, where it's headed, and why. We also touch on the benefits that colleges and universities are enjoying by taking advantage of their geothermal resources.

IN THE BEGINNING....

The first geothermal systems were "designed" in the 1980s by well drillers and heat pump vendors using rules of thumb. For the small residential applications typical of the time, these were adequate, although inefficient solutions. As larger-scale systems came into demand by institutions, vendors applied the "multiplier" approach, using the same single-building models and multiplying them to meet the new peak loads. This one-dimensional approach gave little consideration to long-term well field performance, well field balancing, bleeding aquifers, permitting, and other important issues. The result was unhappy system owners stuck with a legacy of inadequate system performance and outright system failures.

Facilities professionals learned the hard way that using 2- to 3-ton per well, peak load-based residential design approaches, short-well drilling techniques, and residential-scale equipment selections to meet 100- to 800-ton capacity loads have proven woefully insufficient. Unlike other energy conservation measures (ECMs) and renewables, geothermal design and, importantly, geothermal *optimization* requires knowledge and experience over a wide variety of disciplines.

GEOTHERMAL OPTIMIZATION THROUGH APPLIED SCIENCE AND ENGINEERING

A higher educational facility in the mid-Atlantic region applied for a substantial federal grant for geothermal development. In preparing the grant application, they assembled preliminary calculations and pricing from data provided by local mechanical engineering and drilling contractors. Their grant application was accepted and they were awarded project funding.

The initial "rule-of-thumb" estimate for well field sizing called for 25 wells per building. A careful engineering analysis based on area geology and building load characteristics showed conclusively that 35 wells per building would be required to handle 100 percent of the load, which made the initial estimate both for well sizing and funding low by almost 40 percent.

Further engineering analysis determined that, by utilizing a temperature management system comprising geothermal heat pumps and conventional system components to provide heating/cooling, 90 percent of the energy and carbon savings could be achieved by installing six wells per building. In this case, the owner achieved superior financial results and met energy savings goals by harnessing advanced engineering knowledge of both the ground and the building system interface.

NOT LONG AGO....

As the market for institutional-sized geothermal systems arose, mechanical engineers and geotechnical professionals began to team up to deliver more robust solutions to owners. Their evolved approach took into account variables such as groundwater flow, soil and bedrock conditions, and more robust building modeling. During this phase standard ASHRAE-style conductivity testing of the ground was performed, and standard Ground Loop Heat Exchanger Professional (GHLEPRO) models were used with greater regularity. Both tests and models were still based on residential-scale systems and problems persisted with out-of-balance well fields, oversized systems and poor financial performance of the larger systems.

Also characteristic of this phase in geothermal evolution was the tendency to design systems based on peak loads, relying on the geothermal system for 100 percent of the heating and/or cooling load. Long-term financial performance projections were unattractive under these scenarios, which effectively shelved what would otherwise have been great applications, if viewed in a slightly different manner.

WHEN SMALLER IS BETTER

A major New England university was planning a new residence quadrangle with a peak cooling requirement of 800 tons. This university desired to achieve significant carbon footprint reductions on this building complex but space was limited, subsurface conditions were challenging and permitting was difficult. If the geothermal well field was designed handle peak load, the number of wells could exceed 300 – an untenable scenario. By applying partial load modeling and a thorough understanding of the yearly building thermal load profile, the engineer determined that just 50 wells could achieve a 40 percent reduction in carbon footprint while meeting a university requirement of a 12 percent return on investment for the additional dollars spent for the project. Sizing this system for 100 percent of the load was impractical, but with careful engineering and planning, the client's programmatic and financial goals were achieved.

TODAY....

Colleges and universities are evaluating district geothermal applications (geothermal systems serving multiple buildings) for their potential to reduce energy use and carbon footprint for major portions of their campuses. By integrating geothermal

Thermal "waste" from one building can serve as fuel for one next door, with the geothermal system's water effectively serving as the thermal transfer medium.

planning into the current crop of master plans, institutions are realizing the untapped potential that is beneath their feet and accessible from the open space on their campuses.

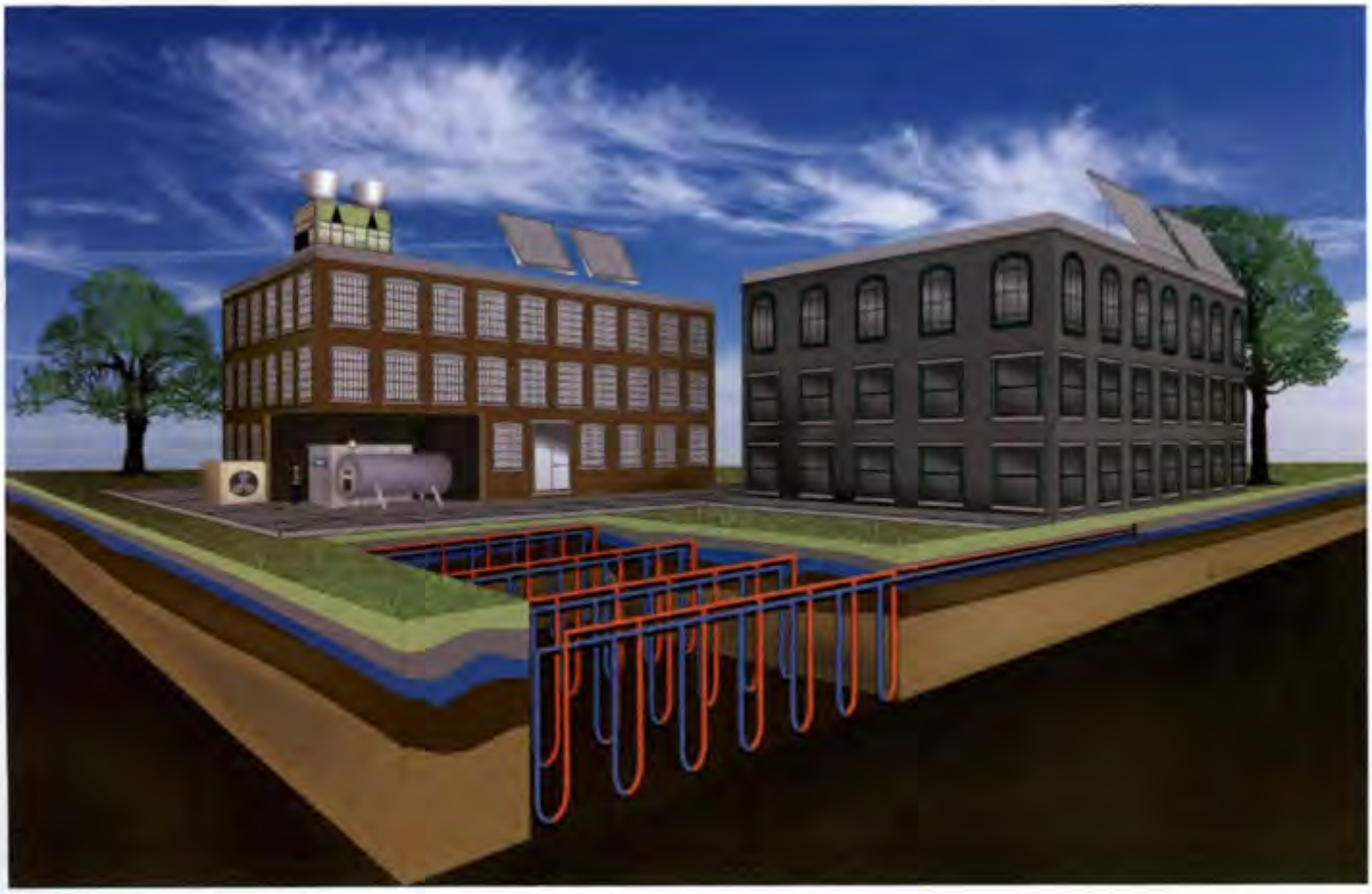
The power of district-level geothermal resides in the inherent building and load diversity, which can be utilized to positively impact the size, operational characteristics and long-term performance of these systems. By incorporating a variety of building types with different heating and cooling load profiles, a geothermal system can be used as a thermal flywheel storing heating/cooling energy for use by another building on the same well field. Thermal "waste" from one building can serve as fuel for one next door, with the geothermal system's water effectively serving as the thermal transfer medium.

By applying advanced building load profile modeling and robust long-term geothermal thermal response testing, the entire system can be optimized, well field sizes reduced, energy efficiency increased and financial performance dramatically improved. In our experience using more advanced integration and districting, well field sizes have been reduced more than 75 percent compared to those sized by using standard design techniques, *while still maintaining nearly all of the efficiency gains.*

Partial Load Modeling (PLM) is a cutting-edge engineering design tool that has been developed specifically to optimize a geothermal well field size and its contribution to the district geothermal application. PLM evaluates a hybrid system design that comprises geothermal and conventional system components. This might be any combination of heat pumps, chiller heaters, chillers, boilers, dry coolers, and cooling towers depending on environmental variables and on an institution's goals and objectives for the district system design.

PLM bases its modeling on the premise that the geothermal system will meet a certain base load for the building(s) and that conventional systems will provide additional capacity to cover peak loads. By using PLM in the design process, dramatic reductions in geothermal well field sizes can be achieved while maintaining significant energy efficiency improvements and carbon footprint reductions. In our experience utilizing PLM, we have been able to manipulate numerous variables in the system design to achieve an optimal solution that we like to call the "geothermal sweet spot."

One more benefit of a smart Partial Load Modeling process is developing an understanding of the influence of groundwater flow, which can have a significant impact on well field



design, sometimes helping to reduce well field size and costs without sacrificing system efficiency.

WHEN LESS YIELDS MORE

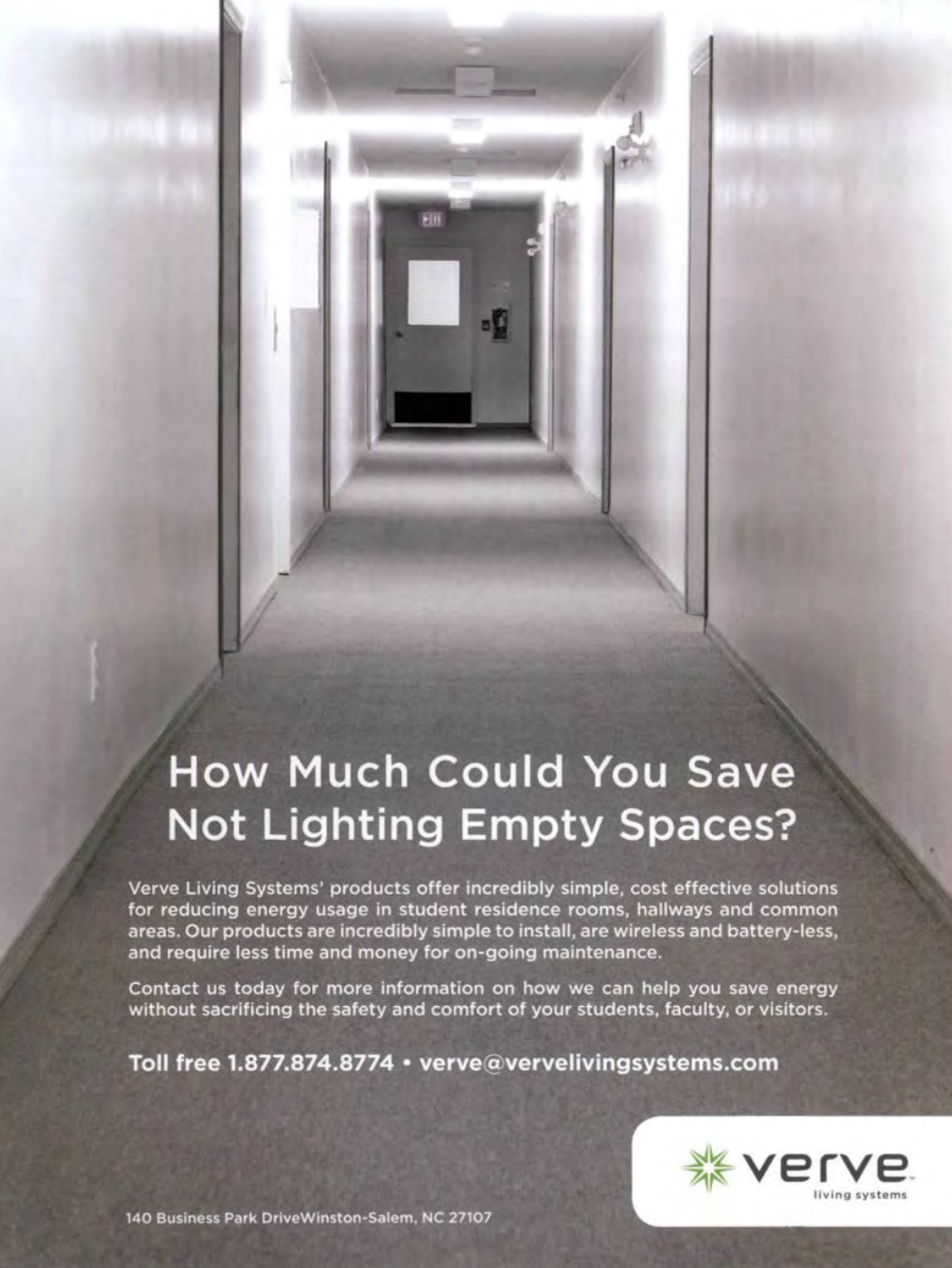
For a major university on the West Coast, initial engineering evaluations arrived at the conclusion that the well field could be as large as 800 wells for a district-level geothermal system. The next phase of engineering analysis incorporated hydrogeologic flow data available from local resources that pointed to a potentially advantageous improvement of heat transfer characteristics due to high ground water flow rates. After verifying these flow rates, the engineering consultant ran the calculations incorporating the new data. PLM modeling showed that the well field size could be reduced to 480 wells, saving approximately $3.2M while maintaining the same performance goals and metrics. The next phase of the project will be installation of a small well field and testing over a period of months to verify engineering results prior to final design.

After a decades-long single design solution, we are beginning to see the emergence of sound and effective alternatives to standard industry practices. Advanced well field designs and building integration techniques are being developed and applied that have the potential to both improve well field performance and broaden the applicability of geothermal solutions.

At the same time as advances in well field configurations are occurring advanced central plant configurations that utilize ground source geothermal are being contemplated that have the potential for significant carbon footprint reductions and energy efficiency improvements and should be one of the options colleges and universities evaluate as part of their overall climate action plan goals. This will be the topic of subsequent articles.

Ground source geothermal is going through a rapid evolution. The design approaches, integration methodologies and modeling tools that can be applied are improving in response to marketplace demand for more robust, reliable, and effective solutions. Geothermal solutions are indeed growing up and can offer college and university campuses a significant opportunity to achieve their strategic energy and carbon reduction goals.

Bill Johnson (*wjohnson@haleyaldrich.com*) is vice president of Haley & Aldrich Inc., Boston, MA. Steven Kraemer (*skraemer@haleyaldrich.com*) is senior vice president, and Paul Ormond (*pormond@haleyaldrich.com*) is senior engineer, at Haley & Aldrich. This is the first article in *Facilities Manager* for Kraemer and Ormond.



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NEW TECH for ENERGY IMP Two Case Studies

Power on the Mesa: Albuquerque Academy's Solar Array

By John Christensen

01

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.

John Christensen is director of physical plant at Albuquerque Academy, Albuquerque, NM. He can be reached at *christensen@aa.edu*; this is his first article for *Facilities Manager*.

Pima Community College's Modular Central Plant Replacement Project

By Mike Posey

02

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.

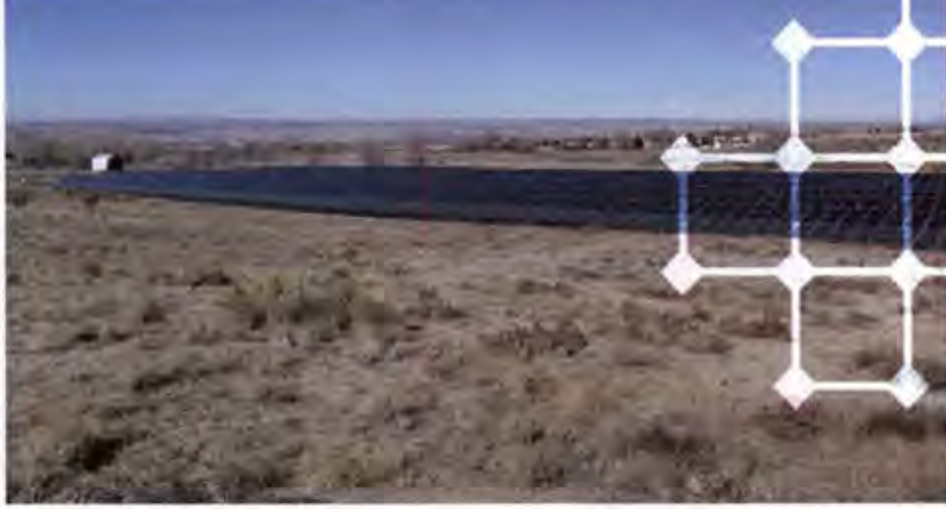
PROJECT PROCESS AND RESOURCES

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.

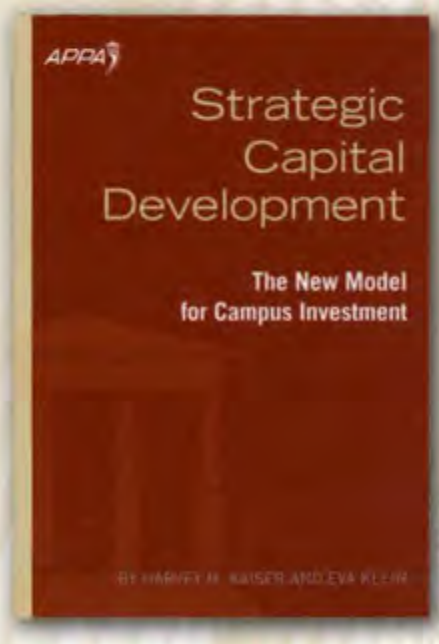
An important feature of this project was that it could be done within a short time period. The plant was installed during the holiday break and was back in operation prior to the start of the spring semester. By skillful planning, coordination, and the hard work of our contactors, there were no breaks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

Mike Posey is director of facilities operations and construction at Pima Community College, Tucson, AZ. He can be reached at *mposey@pima.edu*; this is his first article for *Facilities Manager*.

Strategic Capital Development:
The New Model for Campus Investment
By Harvey H. Kaiser and Eva Klein



Member price: $70
Non Member price: $82
ISBN 1-890956-55-4
Published April, 2010


Harvey H. Kaiser


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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APPA Researches: Implementation of Total Cost of Ownership

By Douglas K. Christensen, APPA Fellow

An exciting research project is currently underway at APPA through the Center for Facilities Research (CFaR) that you need to know about. The concept of Total Cost of Ownership was first introduced to you with a research project and subsequent publication entitled *Buildings…The Gifts That Keep on Taking: A Framework for Integrated Decision Making*. As with all great theories, it is now time to test the theory with actual implementation of the concept. Hence this new research project, Implementation of Total Cost of Ownership (TCO) Principles Into Higher Education as an Integrated Decision-Making Tool. Let me share with you where we are on the project.

CFaR | Center for Facilities Research

PROPOSAL AND PROJECT BENEFITS

This study will focus on the principles of TCO and will be in alignment with both interoperability and sustainability practices. APPA will invite 25 to 30 institutions to participate in this study. The data collected from these institutions will provide the necessary data for analysis and establishment of a "standard of practice" for the industry and could result in a standard for applying TCO and/or a guideline for utilizing TCO in facilities management.

The study is being administered as part of APPA's Center for Facilities Research, and has received major funding from ASHRAE, the American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Agile OAK was selected as an industry survey partner. Doug Christensen is the project's principal investigator and primary author.

Research benefits include:

- An inventory of recently built buildings
- Recent cost/sq ft on new construction in higher education
- Project soft costs reporting on each project
- Aligning APPA's Facilities Performance Indicators report (FPI) with other TCO costs factors
- Facility Master Plan established for:
  - Growth & Impact projects
  - Retrofit & Improvement projects
  - Programmatic Upgrade projects
- Life-cycle management of five major system assets through annual inspections
- TCO costs comparison between institutions on five systems' assets
- Establish data elements and the process to provide the TCO costs factors and how it can benefit institutions in terms of integrated decision-making

PROJECT PLAN/DETAILS

The TCO principles will provide a library of building data/information on the **Birth and Burial** project costs occurring at universities, tracking **Maintenance & Operations** costs against system assets, and **Recapitalization** costs. Data on five key institutional assets will be used to track and compare life-cycle TCO. The TCO principles divide costs into three types of cost groups/factors:

- Birth and Burial
- Maintenance & Operations
- Recapitalization
- (non-recurring costs)
- (annual recurring costs)
- (periodic recurring costs)

There are a minimum of five system assets we would like to identify, locate, inventory, and manage as a life-cycle cost database. Institutions can choose to do more. These five are required and results can be shared between the institutions. The five system assets are:

- Building Envelope - Roof
- HVAC Systems
- Electrical Systems
- Floor Coverings - Carpet
- Parking Lots

Each participating institution will provide a minimum of four building types or they can choose to inventory the entire campus. The institution can provide these five system assets or do more. These four are required for the research. The industry partner's software tool will be used to collect and manage the detail for our research and analysis.

Once the assets are setup in the system and information is shared with institutional leaders, the results will be shared between key institutions. It will also show a total cash flow average per year needed for each asset at each institution. Each institution will share costs, installs, service, performance, etc., about each asset as approved be each institution. This

data will be considered to add to FPI so that the cost of maintaining certain assets can be shared.

PROJECT TIMING

To date the research team has secured the funding, designed the survey instrument, initial test of survey tool, and in the process of finishing the beta test of eight institutions. The next step is to finish the beta, analyze what has been learned from the beta, and prepare to launch the survey of the additional institutions.

Following the completion of the 25+ institutions, time will be spent to analyze the results and then report the finding back to the institutions. We plan to get feedback from each institution around the questions of "Should TCO be implemented by the institution?" and "What are the advantages and disadvantages of doing it?"

TCO Beta Survey Participants

- Brigham Young University
- Carleton University
- United States Coast Guard Academy
- University of Illinois Urbana-Champaign
- University of Maine
- University of Maryland Baltimore
- University of New Mexico
- University of Texas Austin

We will keep you up to date. If you have any feedback or would like to be considered as part of the 25+, please let us know.

Doug Christensen, an APPA Fellow and past APPA President, recently retired from Brigham Young University, Provo, UT, after nearly 39 years of service. He can be reached at *dkchristensen@comcast.net*.

TCO Project Committee

- Doug Christensen, Principal Investigator
- Terry Ruprecht, APPA Member Emeritus
- Jack Dempsey, U.S. Coast Guard
- Darryl Boyce, Carleton University
- Harvey Chace, APPA Member Emeritus
- Maggie Kinnaman, Past APPA President and Member Emeritus
- Steve Kraal, University of Texas Austin
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The Importance of Submetering Campus Buildings

By Lona Rerick, AIA, LEED AP BD+C

With energy prices rising and budgets tightening, energy efficiency upgrades are one of few new expenditures being proposed these days. Using energy more efficiently is one of the only ways that schools can save money without scaling back educational programs. Capturing the benefits of this low hanging fruit starts with metering, which provides the backbone of knowledge about where resources are being used.

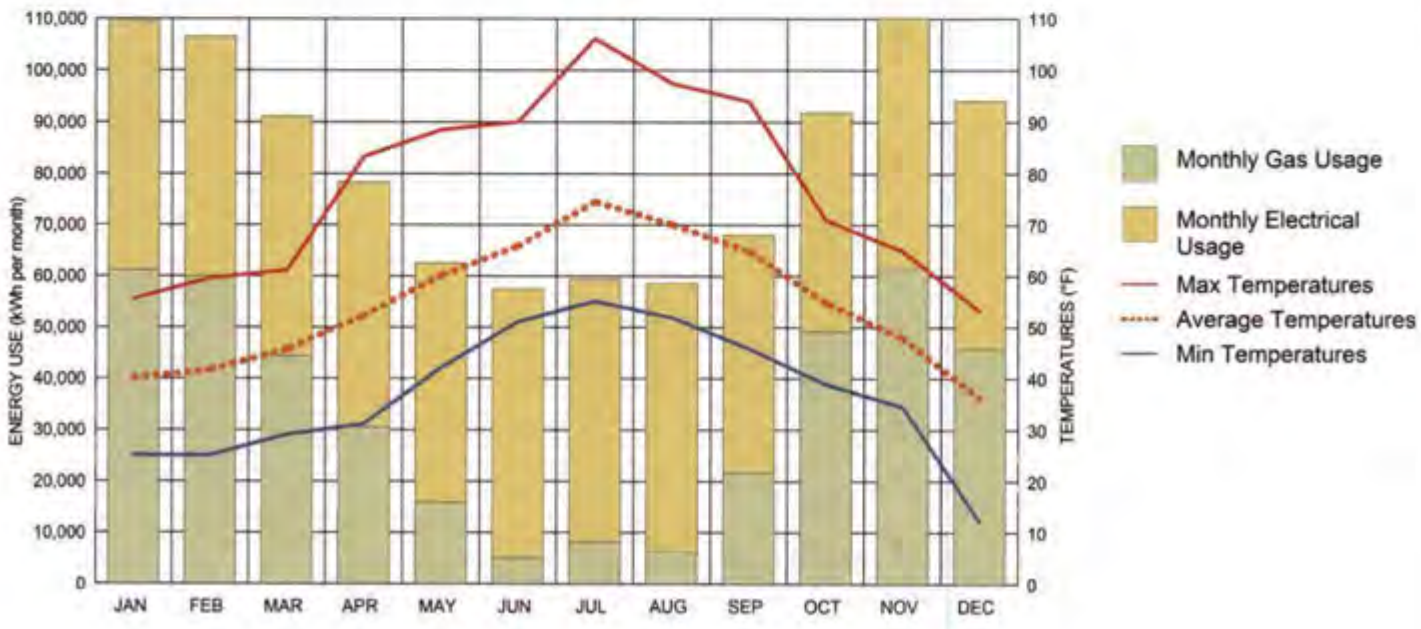
WHY SUBMETERING?

Tracking energy use on campuses, especially higher education facilities, has traditionally been accomplished with only one meter to match large-scale billing arrangements with local utilities. Using a single meter to track a whole group of buildings paid by one organization simplifies payments and allows multiple building use ebbs and flows to balance each other out. Unfortunately, the trade-off for this simplified reporting structure is a lack of real usage information. Facilities managers need to know where, when, and how much energy and/or water is being used before any realistic judgments about where improvements can be made. "Without building metering we would be flying blind," states Oregon State University's Sustainable Program Assistant, Greg Smith, who has led campus-wide building metering efforts since 2007. A joint 2009 study by the University of California San Diego and CB Richard Ellis, "Do Green Buildings Make Dollars and Sense?," showed that individually metered tenant spaces averaged 21 percent lower utility bills than those without.

METERING OPTIONS

Building metering options run the gamut from basic whole building meters to submetering of major uses to comprehensive addressable systems that can report back on every light fixture and piece of equipment individually. With the growth of the green building movement, including LEED-rated buildings, and increasing calls for energy efficiency, the market is also being flooded with new and changing options for smart, Web-based reporting. All these options can make adding building meters to a campus seem like an overwhelming and confusing task. It's important to take a step back and analyze what approach fits your campus.

A comprehensive campus metering effort begins with an inventory of existing systems. A list should include



all utilities that serve campus, including electricity, water, and potentially gas and steam, and which buildings on campus already meter these sources. Next, it is important to understand the strengths and constraints of personnel on campus, likely the facilities group, who will be working to gather and analyze the information. Most importantly, take the time to discuss your options as a group to determine what amount of metering makes sense for your campus. Then you can knowledgably assess where and which types of meters need to be added to buildings to set your campus up for metering success.

If your campus is just getting into the metering game, an electric meter on every building is an excellent place to start. Electrical use is typically a large chunk of a campus utility bill, and thus can generate a good return on investment. Electrical meters are also the simplest and least expensive (typically around $2,000 to$3,000) to install. Gas or steam meters will run you two to three times this cost. When you initially install meters, you will also want to add a campus Data Acquisition System (DAS) if you don't already have one. Make sure that your chosen DAS is flexible enough to add future system meters to it.

There is a careful balance in the metering game between gathering enough information to aid in real money-saving campus improvements--and overwhelming your staff with too much data to be useful. Dan Harris, New Buildings Institute's metering expert, recommends starting with collecting data in monthly or four week chunks. Conceptually, building metering has three levels including the building meters themselves, the DAS, which collects all of the building data to one location, and a Web-based analysis program added to aid in the digestion of building data. To be useful, these metrics need to be normalized for time and square footage and plotted against average outdoor dry bulb temperatures for the same reporting period.

REAPING METERING'S INFORMATIONAL REWARDS

Campus metering benefits begin almost immediately according to Hannah Friedman, technical research director at PECI. The first step is to compare the Energy Use Intensity (EUI) in kBtu/sq ft, for your entire portfolio of buildings and against each other and against typical data for your region and building types. Using the U.S. EPA's Portfolio Manager Program can further this cause by putting more real-life data into the pool for future comparison. You may also pursue Energy Star Building ratings for your best performing structures. An initial analysis of detailed daily and hourly data can help facilities note data patterns, abnormal usage spikes and unexpected energy use during unoccupied periods.

IF YOUR CAMPUS IS JUST GETTING INTO THE METERING GAME, AN ELECTRIC METER ON EVERY BUILDING IS AN EXCELLENT PLACE TO START.

Once you have logged a year or two of building usage metrics, you will have enough information to start noticing when things are off-trend within each building. At Oregon State University, individual building meters have helped identify and fix steam system leaks and wasteful water system problems where water was dumping straight into drains. It is useful to regularly track usage information at some regular interval like every month or four weeks. Your chosen data system should also allow you to delve deeper into daily and hourly data when this monthly snapshot warrants further investigation.

NEXT STEPS

To get the full benefit of the information gathered, there also needs to be an on-campus will to act. Important additional steps should include careful analysis of energy hogs on campus and prioritization of improvements. Recommissioning buildings at regular intervals is an ideal equivalent to regular automobile maintenance. The addition of real-time and Web-based usage information is evolving in the current market at warp speed with the hope that occupant education and influence on user behavior can be achieved more effectively with transparent information.

Building meters are an important basic component to a campus efficiency strategy. Armed with the right information, building meters can help you improve efficiency at all levels from your utility bills to your campus planning. Knowledge is power and knowing your consumption rates will provide the tools and motivation to make the best decisions for your campus.

ADDITIONAL RESOURCES

1. "Metering Best Practices" by U.S. Dept. of Energy, Office of Energy Efficiency and Renewable Energy, Federal Energy Management Program, *http://www1.eere.energy.gov/femp/pdfs/mbpg.pdf*
2. "Building Energy Information Systems: State of the Technology and User Case Studies" by Ernest Orlando Lawrence Berkeley National Laboratory, *http://eis.lbl.gov/pubs/lbnl-2899e.pdf*
3. "A Retrocommissioning Guide for Building Owners" by Portland Energy Conservation, Inc (PECI) with funding from the U.S. Environmental Protection Agency ENERGY STAR Program, *http://www.peci.org/documents/EPAguide.pdf*
4. "Sub-metering Campus Buildings" by the U.S. Environmental Protection Agency New England Division, *http://www.epa.gov/region1/assistance/univ/pdfs/bmps/SCSUSubmetering1-8-07.pdf*
5. "Do Green Buildings Make Dollars and Sense?" by Burnham-Moores Center for Real Estate at the University of San Diego and CB Richard Ellis, *http://www.cbre.com/USA/Sustainability/Environmetrics.htm*
6. EPA's Green Start Portfolio Manager, *http://www.energystar.gov/*

Lona Rerick is an associate and project architect at Yost Grube Hall Architecture (YGH) in Portland, OR. She can be reached at *lona@ygh.com*. This is her first article for *Facilities Manager*.

Mass Notification Systems: Approaching Critical Mass

By Benjamin D. Casey, PE, PSP

Mass Notification System ideology and requirements have been slowly making their way into the mainstream of governmental/military and commercial construction projects in recent years throughout the U.S. This trend follows the latest 2008 updates of the Department of Defense (DoD) mass notification criteria, which was originally initiated by the 1996 Khobar Towers bombing and subsequent increasingly stringent anti-terrorism protection requirements now contained within a multitude of DoD Unified Facilities Criteria documents. Also, the trend follows the escalation of intensified Department of Education and Congressional mandates, most recently enacted via the 2008 Higher Education Opportunity Act, which included amendments to the Clery Act, updating higher educational institutions' criteria for emergency incident reporting to the student body. These major trends are due in large part to the "War on Terror," and a response to school shootings and other security related incidents. Both of which have grasped national attention for the last decade.

NFPA-2007 EDITION

The National Fire Protection Association's *NFPA 72 National Fire Alarm Code* first included Mass Notification System recommendations within the 2007 Edition, as an entirely new "Annex E." This annex, as typical of all other NFPA annexes, was provided for informational purposes only. Therefore, even though most U.S. jurisdictions adopt NFPA 72 as part of their local building code, along with specific jurisdictional amendments after each new edition is released, only the main body chapters of the NFPA Standard are considered the codified requirements, unless specific jurisdictional amendments dictate otherwise.

THESE MAJOR TRENDS ARE DUE IN LARGE PART TO THE "WAR ON TERROR," AND A RESPONSE TO SCHOOL SHOOTINGS AND OTHER SECURITY RELATED INCIDENTS.

Still, the inclusion of Mass Notification System Annex recommendations into the *National Fire Alarm Code* has served to solidify the general agreement that mass notification systems should meet the same stringent physical survivability, performance integrity, and self-monitoring/supervision requirements as fire alarm systems, and could even be fully or partially integrated with fire alarm systems to become coordinated, multi-functional, emergency communications systems. This added annex material set the groundwork for the landmark changes that were to come.

WIDENING THE SCOPE

When the latest 2010 Edition of NFPA 72 was recently released with the addition of Chapter 24 *Emergency Communications Systems (ECS)* to the Standard's body requirements, these major scope changes were reflected in a new document title: *NFPA 72 National Fire Alarm and Signaling Code*. Thus demonstrating the recognition that the scope is now well beyond fire alarm and detection. Mass notification system requirements are now based in the ECS chapter and it is just a matter of time until jurisdictions officially adopt this latest 2010 Edition of NFPA 72.

From the overall perspective of the design philosophy behind mass notification systems, much of the earlier 2007 Edition annex recommendations, and governmental military-based methodologies, have not been significantly changed within the new body requirements of '10 NFPA 72 . But, the National Fire Protection Association needed a new way to provide mass notification design and installation requirements. They needed a system that could be applied not only to a broad range of building construction types, occupant types, and business functions/operations--as the prescriptive (value-based) parameters of NFPA 72 had in earlier editions for only fire-related emergency scenarios--but they had also had to consider every other imaginable emergency scenario as well. This included the possibility of multiple types of emergency scenarios, each associated with potentially conflicting occupant instructions, occurring simultaneously. Major categories of emergency events under which there are a large range of potential emergency scenarios for consideration, include:

- Severe weather
- Terrorism
- Criminal
- Health/medical
- Geological
- Utility service disruption

When thinking about the depth and

breadth of the task of providing specific prescriptive requirements to adequately cover every possible scenario, the sheer magnitude and complexity of the task of creating such requirement parameters seems utterly impossible. It quickly becomes apparent that a set of performance-based guidelines leading to a facility-specific emergency communications system or mass notification system master plan should be created to, in essence, becoming a facility's own customized Standard or "Code." Then, by adding requirements for early planning-stage input, review, and approval by the local Authority Having Jurisdiction (AHJ) to reduce the risks often-times associated with the performance-based approach, this approach becomes the obvious solution.

NO LONGER AN OPTION

In the past, performance-based designs which strayed from the prescriptive word-of-the-Code were allowed as an alternate option "... with AHJ approval", as found in many Standard/Code sections succeeding the value-based requirement. But, this option was rarely considered by designers, let alone allowed by most AHJs, unless an acute project-specific issue was uncovered that forced the two parties to work together on some type of equivalency or performance-based tradeoff in order to not comply with the intent of the Code. Now, not as an alternate option but as a primary requirement, the latest 2010 Edition of NFPA 72 dictates the following for in-building mass notification systems:

(NFPA 72: 24.4.2.2 & 24.4.2.3)

- Each application of a mass notification system shall be specific to the nature and anticipated risks of each facility for which it is designed.
- The designer shall consider both fire and non-fire emergencies when determining risk tolerances for survivability for the mass notification system.
- Performance-based design and the risk analysis shall be applied in accordance with Section 24.7 [of this Standard].
- The risk analysis shall be used as the basis for development of the emergency response plan.
- A well-defined emergency response plan shall be developed in accordance with NFPA 1600, *Standard on Disaster/Emergency Management and Business Continuity Programs*, and NFPA 1620, *Recommended Practice for Pre-Incident Planning*, as part of the design and implementation of a mass notification system.

Furthermore, the typical fire alarm system type of comprehensive record documentation is required for delivery to the Owner or Owner's Representative upon final acceptance of all mass notification systems, along with the newly required risk analysis-based emergency response plan, as indicated in the excerpts above. This emergency response plan record documentation must include, at a minimum, operational management procedures defined for activation and management of the system.

GOALS & OBJECTIVES

The mass notification system design and associated design elements, necessary for the system to continue to meet the AHJ approved performance-based goals and objectives, are required to be maintained for the life of the building. The performance-based design goals and objectives, as required by '10 NFPA 72, are as follows:

(NFPA 72: 24.7.1)

- The risk analysis, design criteria, design brief, system performance, and testing criteria are developed in the spirit of chapter 24 *Emergency Communications Systems (ECS)*.
- The system disseminates information to the target audience in an accurate and timely manner.
- The design and performance criteria are specific to the nature and anticipated risks of each location.
- The system is capable of withstanding various scenarios and survives even if some damage has already occurred.
- Message initiation can be effected by all responding entities responsible for the safety and security of occupants.

All mass notification system designs are required to meet the above goals and objectives. The systems are considered compliant/equivalent provided that: The design's performance criterion includes "timely and accurate notification of all persons within the boundaries of the mass notification system in a medium to which they can respond when given directions by responding entities"; the design team concurs with the design and is comprised of the licensed design professional, the owner or owner's representative, representatives of the AHJ, and representatives of the responding entities (e.g., fire department personnel, security guards, police, military, etc.); and the risk analysis considers the following factors:

(NFPA 72: 24.7.6 & 24.7.7)

- Number of persons to be notified and extent of notification
- Occupancy characteristics
- Anticipated threats
- Staff capabilities and system effectiveness
- Coordination with the emergency response plan

For further '10 NFPA 72 qualification requirements and associated annex recommendations, one may refer to sections 24.7.2 & A.24.7.2. These sections contain information on the pertinent areas of expertise of the aforementioned mass notification system performance-based design team's licensed design professional. An experienced, licensed, design professional is strongly recommended in order to correctly implement Mass Notification System Performance-Based Designs, Emergency Response & Strategic Master Planning, and Risk Analyses. The services of a professional engineer of fire protection engineering are typically sought-out to guide this multi-faceted process from conception to design completion and beyond.

Benjamin Casey is fire protection engineer at the Protection Engineering Group, Inc. in Chantilly, VA. His e-mail address is *casey.ben@gmail.com* . This is his first article for *Facilities Manager*.

Professional Development

WRAP-UP

APPA PROFESSIONAL DEVELOPMENT – FORESHADOWING TO 'APPA U'

By Suzanne Healy

January 2011 marked another successful APPA professional development offering of professional development offerings. Recently, the Supervisor's Toolkit, Institute for Facilities Management, and Tracks 2 & 4 of the Leadership Academy were offered in Orlando, Florida allowing facilities professions from around the global to network at all levels of the institutional hierarchy.

Our ever-popular Toolkit was presented by **Shawna Rowley** – Qualified Trainer from Weber State University, while the Institute, the cornerstone of APPA's professional development offerings, delivered content in the core areas of general administration, maintenance & operations, energy & utilities, and planning, design, and construction at both the basic and advanced levels. The dedication of our Institute Deans – **Mary Vosevich**, University of New Mexico; **Jay Klingel**, University of Virginia; **Lynne Finn**, South Dakota State University; and **Don Guckert**, University of Iowa, ensured that experts in each of these topical areas was delivering top-notch programming. And once again we co-located Tracks 2 & 4 of the Leadership Academy under the direction of **Ann Jenkins, Jack Hug,** and **Doug Christensen**.

The central location of these three programs allowed participants to see what their next steps on APPA's professional development continuum will be and how to take the necessary steps to get there through "APPA U." APPA U will be the twice annually offered programming that will provide every level of the facilities organization their opportunities to develop and enhance their skills under the support, and direction, of our dedicated faculty and Professional Development Committee.

As the week drew to a close we celebrated with ceremonies for the Class of January 2011. Students had the opportunity of interactions with experts who brought not only their knowledge but their experiences from vast backgrounds that provided a rich environment. Sharing the achievement with old friends and new colleagues made for a great evening.

Kudos to all those institutions that supported the professional development of your staffers! Now, like at no other time, we must take the leap of faith and spend on behalf of the institution. This is no time to pinch pennies! The professional development of any individual must be as customizable as the individuals themselves—and APPA is here to help you achieve your departmental goals. Please visit www.appa.org/*training* for more information on all of our programming offerings.

We look forward to seeing you and your staff at the next APPA event.

Suzanne Healy is APPA's director of professional development and can be reached at *suzanne@appa.org*.

Academy Graduates

David Cooper, *Virginia Commonwealth University*
Ronnie Gammage, *Phoenix College*
Paul Hawley, *Georgia Tech Research Institute*
Dave Nalley, *University of Northern Colorado*
DeeAnn Reese, *Georgia Tech Research Institute*
John Shenette, *Smith College*
Thomas Shewan, *Florida State University*
Tony Yamada, *East Carolina University*

Institute Graduates

Marilyn Baker, *University of Vermont*
Brandon Baswell, *Michigan State University*
Samantha Brandt, *University of Michigan/Ann Arbor*
Darcy Bryant, *University of Wyoming*
Erick Ceballos, *Ransom Everglades School*
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Casey Wick, *Hamilton College*
Larry Wilson, *Wayne State University*
Willie Wright, *Saint Louis Community College*

Book Review Editor: Theodore J. Wiedner, Ph.D., P.E., AIA

Two books that are mostly about management are reviewed this month. Whether you come from the technical side of facilities operations or the business side, you've got to deal with management (up or down). As such, consider both of these books based on the reviews below.

RETHINKING RISK: HOW COMPANIES S ABOTAGE THEMSELVES AND WHAT THEY MUST DO DIFFERENTLY

Joseph W. Koletar, AMACOM, New York, NY, 2010, 229 pages, hardcover, $29.95.

As facility managers we manage risk on a daily basis. Sometimes it is financial risk or physical risks. In almost all cases, these become risks associated with people—people who choose to ignore safety procedures, have personal financial needs (and poor judgment), or who choose to ignore conditions on campus. *Rethinking Risk* focuses, in many cases, on the financial risks but does a fairly good job of looking at the other risks, those that are more often in the facilities realm.

When I started my career in facilities I often thought that auditors were the enemy; best avoided—and if necessary—best battled for their lack of understanding of my work. Either experience or age has taught me that auditors are really there to help; they identify potential risks and suggest ways to reduce the risk. *Rethinking Risk* is a friendly discussion about the experiences of the individuals or companies who didn't think about the risks in their business, or elected to believe the risk was limited.

You might think this book is for a financial person, not you. That's understandable, unless you consider what has happened in higher education over the years. This is one of the most highly regulated industries in the U.S. With regulation comes the risk of not knowing what the regulations are, or where the potential problems are. As an example, since 1973 it's been illegal to post student grades for privacy reasons. I recall warning a dean in 1998 of this problem at one campus and the grade sheets eventually came down. But what about the grades in the trash; how private are they? What is the risk of someone going through the building dumpster and getting private student information, or the answers to an upcoming test? Is the facility officer to blame if someone got this information out of the trash? What about managing regulated materials on campus? Do you have determined faculty or students who have a habit of doing building modifications on their own because the facilities staff is too expensive? What are the institutional risks? The good and bad features of this book are that it increased my sensitivity to the risks of my job: frightening!

DON'T ASSUME THAT RISK IS YOUR BOSS'S PROBLEM RISK IS EVERYONE'S PROBLEM.

It's not pretty, but risk is everywhere. My boss just asked the question, "What risks keep me up at night and what am I doing about them?" My preferred solution is a glass of warm milk and a boring book, but that's not a good answer. Even more concerning are the risks that aren't known or obvious. Sadly, too many campuses have learned that individuals can get their hands on weapons and move around campus hurting their fellow students, faculty, and staff. Can these unknown risks be mitigated?

I'd be foolish to believe that any book would have all the answers, and wrong to say this book has answers about eliminating campus risks. What it does well, is to enlighten the reader about the places risks can exist and techniques that are used to identify and mitigate risk. Don't assume that risk is your boss's problem—risk is everyone's problem. As a facility officer with the ability to address many problems on a daily basis, you'll be well served to take a look at *Rethinking Risk*.

MANAGEMENT? IT'S NOT WHAT YOU THINK!

Henry Mintzberg, Bruce Ahlstrand, and Joseph Lampel, AMACOM, New York, NY, 2010, 126 pages, hardcover, $22.

Bring together three professors of management to write a book, and the first expectation is a list of the latest tools and techniques to manage an organization better. While that might be the case in many other books, it's not the case here.

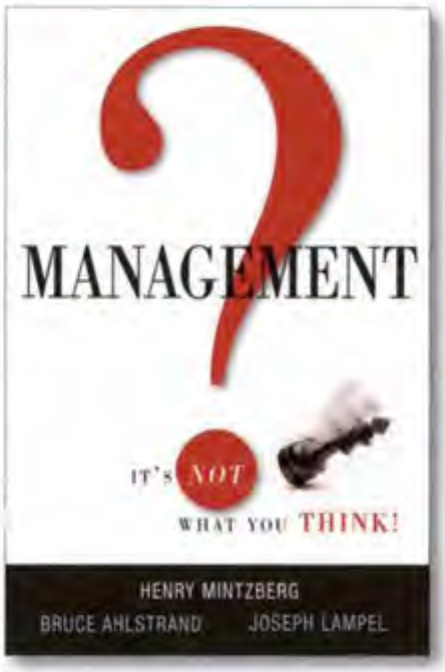
Management? starts off dryly enough with an analysis of different styles or

THE MORE LOGICAL MANAGEMENT ORGANIZATIONS PRESENTED ARE THOSE WHERE THE LEADER LISTENS, OR WHERE THERE ARE MULTIPLE LEADERS IN THE WORKFORCE.

descriptions of management. Okay, that's nice. Conductor, superman, creator, "synergizer," inspiration, etc.—all descriptions of what a manager and leader might be. The authors present the traditional organization chart as a mislabeled artifact. Instead, they believe the organization is really based on doers, and the non-doers who happen to be the bosses. Interesting (or maybe irreverent.)

Think back several years (to APPA 1996 when Scott Adams, the creator of *Dilbert*") spoke in Salt Lake City. Most of us like *Dilbert* because his situations remind us so much or our own jobs (we also don't want to be compared to the pointy-haired boss.) As I kept reading *Management*? I got to thinking more about *Dilbert*. Which is to say that *Management?* is more like an educated version of *Dilbert*. There are some great examples of "management for the sake of management" rather than for the benefit of business. And that seems to be the real theme of the book. Why are we managing based on some faddish theory instead of using some common sense? The authors appear to get a little irreverent when looking at the successes of alumni from one of the great MBA colleges in the U.S. And rightly so; these "magnates of industry" really made a mess of things.

The more logical management organizations presented are those where the leader listens, or where there are multiple leaders in the workforce. The creative frontline employees might pitch an idea for the organization. And when they win the support of peers and the leader, they make the organization more successful and the leader gets support by being



supportive. It's sort of a grassroots system without really calling it that. From personal experience, I find greater enjoyment in working within an organization where the bosses listen to ideas (good and bad,) and then supports (and congratulates) a successful idea that helps the entire organization—not his or her bonus. Dilbert longs for such an organization.

While I was apprehensive at first, I enjoyed this book and the examples of both good and bad management techniques and systems. I also enjoyed the anti-MBA focus probably because of my *Dilbert* leanings. If you're looking for a short, informative, and thoughtful book on management, I recommend *Management?*

Ted Weidner is assistant vice chancellor of facilities management & planning at the university of Nebraska–Lincoln; he can be reached at *tweidner2@unlnotes.unl.edu.*

The Green Campus:

Meeting the Challenge of Environmental Sustainability

Edited by Walter Simpson

Published by APPA, *providing leadership in educational facilities*

Member Price: $55
Nonmember Price: $95

ISBN: 1-890956-46-5
Published 2008, soft cover, 361 pages

Purchase the book at
www.appa.org/bookstore

The Green Campus anthology explores the meaning of genuine environmental sustainability—in global and local terms—while profiling excellent campus environmental programs. The book offers guidance and inspiration to campus leaders and advocates who promote sustainability within institutions of higher education, and addresses these fundamental questions:

- What does it mean to be a green campus?
- Is it possible for educational institutions to effectively reduce their sizable environmental footprints?
- How can individuals make a difference and successfully advocate more environmentally sustainable campus operations?
- Is the education community poised to create solutions to our most vexing environmental problems?

This comprehensive resource is a vital tool that administrators, faculty, staff, students, and concerned citizens can use to help the education community take a leadership role in environmental stewardship.

Contributors include:
David Orr
Tony Cortese
Jim Hansen
Judy Walton
Alex Wilson
Brian Kermath
Michael Philips & Andrea Putman
Will Toor
Karyn Kaplan
Dean Koyanagi
Jack Byrne & Nan Jenks-Jay
and many more!

APPA Leadership in Educational Facilities

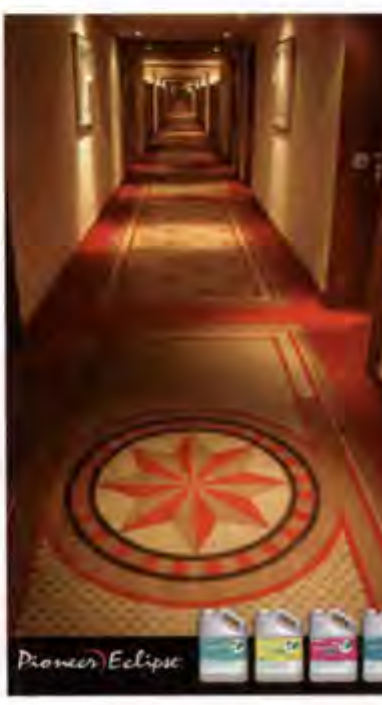
Compiled by Gerry Van Treeck

BigBelly Solar is the maker of the *BigBelly* intelligent waste collection system. Solar-powered *BigBelly*, with integrated recycling units, automatically compacts waste to save up to 80 percent on collection costs system-wide and can provide immediate cash flow savings. *BigBelly* reduces fuel use and vehicle emissions, while freeing up valuable staff time. *BigBelly's* enclosed design keeps litter inand pests out, features a wireless monitoring system to alert staff when units are full, and provides historical collection data to streamline collection operations. *BigBelly* is making campuses cleaner and more efficient nationwide, in all weather conditions. Made in USA. For more information visit Big Belly Solar at *www.BigBellySolar.com*.

Crane Tech Solutions now has available the HD-K Construction Lift. With lifting power capable of transporting 880 pounds 120 feet high, the Boecker line of trailer mounted material lifts provide a unique, safe, and extremely efficient way of lifting construction materials and furniture. The complete Construction Line offers the well-known "knee joint," allowing loads to be delivered beyond the edge of the roof, and lifting speeds of up to 200 ft/min. Set up takes just minutes, and all units are available with a self-propelled drive unit. For greater detail visit Crane Tech Solutions, Boecker line at *www.boeckeramericas.com*.

Henry Company responds to the needs of roofers and has upgraded its packaging for self-adhered cap sheets and roof underlayments from cardboard boxes to new, weather-resistant polypropylene shrink-wrap packaging. This new packaging reduces on-site costs, including labor to collect empty boxes and drive them to the dump, as well as dump fees. A large contractor estimated savings of $600 per job because the waste now fits into a small garbage can. The products that are available in the new polypropylene packaging include Eaveguard® Self-Adhered Shingle Underlayment, Blueskin® Roof Ice and Water Barrier, Blueskin® Roof High-Temperature Underlayment, Blueskin® Roof WP Self-Adhered Waterproofing, Henry LowSlope™ Self-Adhered Roofing and DuraTac® Base & Cap Sheet Systems. For additional details visit Henry Company at *www.henry.com*.

Amano Pioneer Eclipse, a worldwide manufacturer of floor care products, makes it easy to be green even when cleaning carpets. Their EnviroStar Green® carpet care system is an effective and cost-saving method to meet many of today's green requirements. The system is comprised of four products - a dual purpose extractor & pre-spray cleaner, an extraction rinse, a soil release bonnet buff, and an all purpose spotter. The EnviroStar Green carpet care system does more than reduce the environmental impact of traditional cleaning. Competitively priced, these products lower downtime and maintenance costs, extend carpet life, reduce cleaning frequency and improve the health and safety of the surrounding environment. Most of all, they produce results as good as or better than their more harmful counterparts. For more information, please visit Amano Pioneer Eclipse at *www.pioneer-eclipse.com*.



PS Furniture reintroduces David Rowland's 40/4 Stacking Chair. The 40/4 Chair blends celebrated design with amazing function, stacking 40 chairs in just 57 vertical inches. It can be finished to seamlessly fit into any environment with options ranging from standard fabric, leather upholstery, original steel, or solid wood to the new Demi-Glaze® metal finish. Available in a variety of colors and heights including standard, bar, or counter height, this product offers endless use opportunities. For more information about PS Furniture visit *www.psfurniture.net*.

ëkcos innovations announces the introduction of ëkcoscreen, a urinal screen that prevents the splashback effect and the spread of microbes. Based on patent-pending technology, ëkcoscreen uses sealed bristles to keep urine from impacting the urinal wall or still water in a urinal. Each screen is infused with a proprietary resin that uses anti-microbial and timed release deodorant technology to eliminate eColi and klebsiella bacteria on the surface of the urinal screen. The new screen emits a fresh, clean scent and is designed for heavily trafficked public restrooms. The use of an ëkcoscreen will greatly improve the overall hygiene of public bathrooms that operate waterless urinals. Waterless urinals, in particular, often experience significant challenges as urine tends to splash up onto the upper surfaces without a rinsing mechanism. For further information visit ëkcos innovations at *www.ekcos.com*.

New Products listings are provided by the manufacturers and suppliers and selected by the editors for variety and innovation. For more information or to submit a New Products listing, e-mail Gerry Van Treeck at *gvtgvt@earthlink.net*.

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