

Los Angeles Community College District (LACCD)

Larry Eisenberg, Executive Director, Facilities Planning and Development

Setting the Policy

As we approach 2009, the Los Angeles Community College District is a national leader in the implementation and development of sustainable building and renewable energy technology. In 2009, the colleges and satellites of the district will feature numerous LEED certified building and more importantly 100% of the energy need will be met through the use of cutting edge renewable energy generation and energy storage technology. The story of the transition from being an aging educational colossus to a gleaming example of the best that architecture and technology can offer follows.

With more than 220,000 students a year attending classes, the Los Angeles Community College District (LACCD) is the largest community college district in the world. The nine colleges of the district and major satellites serve the 882 square mile district and 36 incorporated cities. The infrastructure at the nine colleges was largely built in the 1940's, 1950's and 1960's. With the passage in California of Proposition 13 in 1969, funding to public entities was severely curtailed and community colleges were no exception. As a result, for nearly 30 years, despite a rapidly growing population, the LACCD colleges saw little investment in new buildings and hardly any investment in maintenance of existing buildings. Time and intense use took their toll and eroded the quality of the buildings to the point that potential students living in the District chose to go to surrounding community colleges that had been able to invest in and maintain their basic building stock.

In 2001, the Board of Trustees of the LACCD asked the District's voters to approve a general obligation bond issue that would end the more than 30-year drought in construction and a growing deferred maintenance backlog for the nine colleges of the District. The voters in the nine campus district approved not only the initial bond proposal of \$1.245 billion to make an investment in affordable higher education, but also approved a second bond issue of another billion dollars in early 2003 to create a combined construction, renovation, and restoration program of \$2.2 billion.

However, the opportunity presented by the initial LACCD bond issue did not escape notice of the environmental community in Southern California. Working closely with the District's Board of Trustees environmental advocates educated and cajoled to explain the importance of a sustainable building program. The message was simple: Not only would a sustainable building program have long term benefit for the District and its students, but it would serve as an educational laboratory that could move sustainability into the mainstream.

After numerous hearings, prolonged conversation, and careful study, the Board of Trustees adopted the LACCD sustainable building and renewable energy policy in 2002.

The policy established by the Board required that all buildings built under the new bond program would be built at least to the then new LEED “Certified” standard. The policy also set a goal of self-producing 25 percent of the District’s energy needs with at least 10 percent utilizing photovoltaic cells. The result would be more than 40 new buildings built to LEED standards and a few megawatts of renewable power put in place.

In retrospect, this policy, although bold and courageous in 2002, was really quite modest. The Board consciously set a modest policy since no other large organization had set such an ambitious sustainable policy, and there was genuine concern that this policy would create significant added cost to the District’s nascent bond program. In conversation about setting the sustainable policy, the Trustees had been told that there would be at least a ten percent cost premium if they chose to build at the LEED “Silver” level rather than at the lower LEED “Certified” level. They were also told that the technology was not really available to support a significant renewable energy commitment. The reality in both regards proved to be quite different.

Implementing the Policy

In the fall of 2003, the District hired a new Executive Director for Facilities Planning and Development with a background in large capital programs and with knowledge of and commitment to sustainable building requirements. He was charged with implementing the Board policies for sustainable building and renewable energy. In turn, the Executive Director hired several talented individuals with a background in these disciplines to create a core sustainability / energy team.

The result is that LACCD is currently undertaking the largest sustainable building program in the United States. The more than 500 projects include renovations, upgrades, modernizations, and most exciting of all, more than 40 new “green” buildings, representing the best in environmentally sensitive building techniques. Utilizing \$2.2 billion in voter-approved funds, the District is executing an extensive building program to address much-needed campus improvements and transform its nine community colleges into state-of-the-art educational resources for students and the community.

The District will also be building two new college centers, one of which will be an adaptive sustainable reuse of the historic Van De Kamp bakery in the Atwater area of Los Angeles. The other satellite project will be the adaptive reuse of the former Firestone factory in the City of South Gate to create a state of the art education center and sustainable technology institute.

Recognizing that a \$2.2 billion program has the power to change the market place, the Board of Trustees created a requirement that each design team, of which we currently have 140 working, would include a certified Leadership in Energy and Environmental Design (LEED) professional. When the program began, there were perhaps a dozen in all of Southern California. Today, there are nearly 400 certified LEED professionals in the LA area. The training that these architects and engineers obtained to achieve the certified designation will of course not only benefit the LACCD program, but also every future project that they touch.

The educational process would be enhanced in the design of the sustainable buildings, the buildings themselves when complete as examples of sustainable choices, and the development of an integrated curriculum component devoted to sustainability. Students and faculty along with the community would be partners and learners in building sustainable and smart college campuses. After all, the purpose of higher education is to research, innovate, and educate.

The LACCD Renewable Energy Program

Energy use and supply has become a significant component of the LACCD capital program. Living in sunny but energy short California leads one to naturally think of alternate energy sources such as photovoltaic and solar heating solutions.

The modest renewable energy policy established by the Board of Trustees in 2002 has blossomed into a far reaching energy program working on the cutting edge of energy technology. This policy has given license to explore a broad range of energy technologies including all forms of photovoltaic energy, energy storage, fuel cells, wind power, hydrogen generation and use, nanotechnology based and industrial scale battery systems, anaerobic digestion, solar thermal, thermal storage and geothermal concepts.

Energy and power for the LACCD colleges came from several sources that are central-gird oriented. The Los Angeles Department of Water and Power (LADWP) is a Municipal Utility (MUNI) owned by the public and with a Mayoral appointed Board of Commissioners. It has six campuses in its jurisdiction. The Southern California Edison (SCE) is an Investor Owned Utility (IOU) company that supplies the other three campuses.

LADWP supplies more than 22 million megawatt-hours of electricity a year for Los Angeles' 4 million residential and business customers. It is the largest municipal utility in California. The Department's model is time-tested and simple: a reliable and increasingly diverse supply of power, coupled with stable rates that are among the most affordable in the nation. This combination has effectively fueled the growth of Los Angeles for more than a century.

To improve system reliability and to ensure that power supplies continue to meet the city's needs for the next 100 years, LADWP is spearheading an aggressive Renewable Power System energy program (20% by 2010) to enhance generation capacity, modernize transmission and distribution infrastructure, assure power quality and identify cost-saving, environmentally sensitive efficiencies.

For the LADWP to move ahead into the future, people must be educated and trained at all ages about energy, water, waste, land, transportation, and air which make-up the component parts of sustainability development. Edison on the other hand has implemented many renewable energy projects. And since it is governed by the State of California Public Utility Commission, it has raised rates in order specifically to fund

solar/pv systems for homes, offices, and complexes including college campuses. In 2006, the rate increases started to generate \$300 million per year for the next 11 years. Working closely with LADWP and SCE, the LACCD has established a program that will meet the need to train people of all ages about energy, water, waste, land, transportation, and air which make-up the component parts of sustainable development. The core concept involved in this effort is to use the energy infrastructure that will be put in place at the LACCD colleges and satellites to teach the technology. This effort will be supplemented with stand alone touch screen kiosks and enhanced classroom capability to allow delivery of a sophisticated curriculum.

The energy generation program is at the core of the sustainable infrastructures for the nine college campuses and consists of four strategies that are now being implemented:

- 1) Efficient Renewable Energy Central Plants
 - a) Build Sustainable Central Plants that produce and deliver hot water and chilled water to heat and cool all college buildings
 - b) Build a comprehensive four pipe distribution system throughout each college to deliver and return the hot and chilled water
 - c) Utilize solar thermal and geo-thermal as the only energy source to drive the heating and cooling process
 - d) Install thermal storage (ice storage) to reduce the afternoon peak heat load.
- 2) Demand Management / Energy Conservation
 - a) Conduct an investment-grade energy audit of all buildings on all campuses
 - b) Retrofit all energy consuming elements in all interior and exterior spaces for maximum efficiency (e.g., lights, fans, pumps, etc.)
 - c) Install state of the art and new technologies in all buildings (e.g., occupancy sensors, harmonic reduction filters, etc)
 - d) Install individual building and building sub-system metering and monitoring systems to determine building and system energy use
 - e) Add insulation, low e-glass, window film, white roofs, green roofs, etc.
- 3) 100% Renewable Energy at each campus
 - a) Solar – Solid Panels, Thin Film and Concentrator technology
 - b) Wind – Urban building scale wind turbines
 - c) Geo-Thermal – ground source heat loop
 - d) Hydrogen Gas - Utilize locally generated electricity to electrolyze water to produce hydrogen gas
 - e) Hydrogen Storage – Utilize low pressure solid state hydrogen storage system
 - f) Fuel Cells – PEM and Alkaline Fuel Cells with direct hydrogen feed
 - g) Micro-turbines burning pure hydrogen gas
 - h) Lithium Ion Batteries for large scale energy storage
 - i) Flow Batteries for redundant energy storage
 - j) Hydrogen Fueling for hydrogen fuel cell vehicles

- 4) Sustainable Development Curriculum
 - a) Build on different Campuses with basic focus courses as certificated, licenses and degrees
 - b) Career opportunities and training for jobs, new companies and advanced degrees
 - c) Collaborate with unions, private businesses, public, government and non-profit sectors
 - d) Provide actual experiences on campus through building programs
 - e) Sustainable Development Curriculum: solar, wind, geothermal, hybrids, etc as well as new businesses, accounting, operations and maintenance

Paradigm Shift

The desire to explore alternative energy concepts and the realization that the LACCD bond program will be adding 50% more square footage to the existing college building based led to a new thought: the idea that there will not be enough resources to effectively heat, cool, maintain and clean this significant expansion in space. At the same time, the District realized that an alternative energy program had the potential to supplement the District's energy demand and in the process lower utility bills. Carried to its logical conclusion, alternative energy supplies could be developed in a manner that would entirely offset the District's energy bill. As noted above, at \$9 million per year, this is a significant portion of the District's annual operating budget, and if re-directed could pay for a large number of additional maintenance and custodial personnel.

This combined thought led to the paradigm shift: a comprehensive alternative energy program could be the source of badly needed operational funding to meet pressing needs. The development of significant alternative energy resources combined with either a long term funding strategy, or a shorter term buyout strategy, the District could lower its energy bill in the near term, or eliminate the energy bill all together in the long term.

To implement this concept, the LACCD has adopted a four part energy strategy as outlined above. The components of the energy strategy are as follows:

1) Efficient Renewable Energy Central Plants

Given the age of the LACCD College's facilities, for the very large part, the building's heating and cooling needs were met by the use of traditional roof top heating and cooling units. In many cases, buildings were not even equipped with cooling capability, making teaching in the hot months a tenuous proposition at best. Some of the college's were equipped with central plants that served part of the college heating and cooling need with chilled water and hot water based on the need at any point in time. These central plants utilized traditional boiler and chiller technology and distributed their chilled and hot water through a distribution network of pipes.

The first component of the new strategy is to move comprehensively to central plant provision of hot and cold water to all buildings. New central plants will include highly efficient boilers and chiller, and will have the majority of their energy supplied through the use of a new technology – the Sun Chiller solar vacuum heat tube. These tubes are placed on the roof of the central plant, water is introduced into the tubes, and the sun heats the water to nearly the temperature of steam. The very hot water travels into the central plant and through thermodynamics and heat exchangers the energy is removed from the water and used to drive the chillers and boilers.

Similarly, for those colleges with an existing central plant, designs have been developed that provide for a smaller new central plant to supplement the existing central plant, creating a virtual central plant that relies on sophisticated energy management system software that blends their capabilities together.

2) Minimize Energy Demand through Performance Contracting

An effective energy strategy requires that each building be retrofitted to present the lowest energy demand possible. To make this occur, every single energy consuming element needs to be analyzed to understand its potential to be retrofit with the most energy efficient version available within an economically viable payback period, usually seven years. In addition, the building needs to be analyzed for what does not exist, such as occupancy sensors, insulation, and multi-pane windows. A detailed building by building, room by room, device by device analysis needs to occur to determine what exactly needs to be retrofit and what needs to be added to the building in terms of state of the art technology to allow it to present the absolutely lowest energy profile possible. Typically, a metering and monitoring system is added to evaluate performance of the building over time and allow fine tuning of energy conservation measures to occur.

For the list of items noted in the report that have an economically viable payback period, there are companies that are willing to come in for free to retrofit and add the appropriate energy conserving measures. These companies are paid back from the energy savings that they have guaranteed over a period of years. If the projected savings do not occur as predicted, the period of repayment lengthens to accommodate the amount of money available to payback the initial investment. In any case, the recipient of the retrofits has no out of pocket expenses beyond its current cost of energy, which is now made up of two components, the amount used to payback the performance contractor and the funds going to pay for utilities consumed.

LACCD is launching a comprehensive demand management performance contracting program to squeeze out every watt and therm possible from every building at each College. The result will be the minimal energy profile possible for every LACCD building. The cost will be borne by the performance contractor and supplemented through incentives and rebates available from the local utility companies.

3) 100% Renewable Energy and Energy Storage

The last major physical component of the LACCD Energy Strategic Plan is the installation of at least one Megawatt of photovoltaic generating capacity at each college and satellite facility. One Megawatt of rigid frame photovoltaic panels covers approximately three acres and would cost approximately \$9 million if purchased in today's marketplace on a stand alone basis. At all but the largest colleges, one Megawatt will cover the day time peak load and provide a good amount of excess capacity. Three acres of panels requires the construction of carport structures over surface parking lots or the use of numerous building rooftops.

At a cost of \$9 million per Megawatt, photovoltaic panels would not be a cost effective solution to meeting ongoing energy generation requirements. However, we are at a unique point in history where the combination of incentives and tax law have driven the cost of photovoltaic installations into the cost effective range when done by a contractor that can utilize the tax incentives and rebates.

Cost factors that can be taken into consideration by a 3rd party vendor that has the ability to use or sell tax credits include:

- 1) the current federal energy tax credit
- 2) the rapid depreciation capability of the internal revenue code
- 3) availability of state and local rebates on solar projects
- 4) the sale of the renewable energy credits (green tags) created with the installation of photovoltaic panels
- 5) price reduction through bulk procurement or captive production concepts
- 6) other federal investment tax credits

When used in combination, it is possible that costs of 10 to 20 cents on the dollar can be achieved for a photovoltaic array, bringing project payback well within normal standards for investment payback.

The other significant issue when considering a photovoltaic or wind driven energy solution, for that matter, is the fact that the sun only shines during the day, and wind does not typically blow in a consistent manner. If one is to provide solar or wind energy at night, or during the doldrums, there must be an energy storage technology employed. A host of new energy storage technologies are now being released that move far beyond the lead-acid battery and have storage capabilities in the multi-megawatt range. One example is a system that uses the excess solar power generated during the day, and generated on weekends to electrolyze water and captures the hydrogen gas that is generated. The hydrogen gas is used as the fuel stock in a proton exchange membrane fuel cell, and generates electricity and heat. The only byproduct in this system is water from the recombination of the hydrogen gas and oxygen in the fuel cell. The heat can be used to supplement central plant requirements, or meet other site specific needs such as heating a swimming pool.

A comprehensive photovoltaic / storage system will meet the needs of the LACCD colleges on a 24 by 7 basis with a redundant capability. The systems will be financed

through the employment of a power purchase agreement where every watt generated and used by the colleges is paid for on a per unit basis. The per unit cost covers the cost of maintenance on the system, and the cost of capital that pays back the final cost remaining on the system after the employment of all available tax credits, incentives and rebates. The initial agreement developed by LACCD has established a per watt charge of 13 cents compared to the present, and escalating cost from SCE of 21 cents per watt. This difference results in an instant reduction of cost to the college for electricity.

The LACCD power purchase agreements will contain a buyout clause that will allow LACCD to purchase the system at any time, but in particular after year 5 (end of the rapid depreciation period), to eliminate the per watt charge. At that point, LACCD will own the means of energy production and eliminate its energy bill.

4) Sustainable Development Curriculum

The final component of the LACCD Strategic Energy Plan is the incorporation of the scientific, business and environmental lessons learned into the curriculum of the colleges. The concept is that our students across all disciplines can benefit from sustainable curriculum elements in either an academic or vocational context.

The successful execution of the LACCD Strategic Energy Plan has the real potential to take the LACCD colleges off the grid, and presents an organizational model that can be readily replicated by any organization. The model offers not only an environmentally sound energy strategy but a comprehensive budget strategy that will allow organizations to supplement operational resources to meet other high priority needs.

Sustainable Practices

The LACCD commitment to sustainability extends to campuses being “smart” as well in other areas of the extensive program, including the purchase of furniture and concrete. We have established a zero landfill policy that will reuse or recycle all items that come from our construction activity. A central feature of this program is to avoid sending mountains of 30, 40 and 50 year old furniture to the dump. With a little work, the District determined that old college furniture; equipment and modular buildings could see a second life in the hands of countless non-profit organizations in Southern California, and in rural Mexico. Through partnerships with local organizations, our reuse program will not only save us money in terms of avoided transportation and landfill fees, but will provide a direct value to those who voted for our bond program.

For the replacement furniture and equipment, thanks to the support of the progressive national furniture industry, we will be buying high quality 100% recyclable furniture that comes with a fully unlimited 15-year warranty at the best prices available. This was only possible because the major manufacturers were willing to change their factories to meet our large purchasing requirements. The use of our huge purchasing power in support of our sustainable goals has changed the way products are produced for the benefit of all.

Interestingly, myths remain about the wisdom of building green. A recent survey sponsored by Turner Construction reported continuing doubt about the costs of building green. The reality is that the huge volume of construction that is making the green choice, as our program did, has changed the marketplace. Green products are readily available at comparable prices. We have found that it is just a matter of making the right choice at the beginning and finding design professionals who will support sustainable goals. The LACCD program is a showcase for what is possible, but it is clear that higher education building programs across the country are getting the message loud and clear.

Sustainable Practices - Water Conservation

Even though 70 percent of our earth's surface is covered in H₂O there are many parts of the world - especially developing countries, where it is in short supply. Even for us living in Southern California, water is a precious resource that we must conserve in order to ensure that we have enough to meet our daily needs. The LACCD recognizes this fact and recently began a process to install 1,224 cartridge-type waterless urinals at all nine community colleges.

Waterless urinals are important to the District's sustainability program because they will benefit the District in three ways:

- a. Each urinal will save approximately 40,000 gallons of water per year. All together that's a savings of almost 50 million gallons of water a year (that's enough water to fill 259 Olympic-sized pools!);
- b. Less water consumption will result in a decrease in water bills;
- c. Waterless urinals will eliminate the need to send wastewater to treatment plants, therefore reducing the sewage costs across the District.

Sustainable Practices - Purchasing Carpet

1. Specifications reduced the number of ounces per square yard of carpet while retaining performance with a 30 year warranty. This reduces manufacturing waste, production cost, transportation cost, and energy used in the production process.
2. Specifications required that the LACCD carpet be made from solution tied fibers. This choice avoids the use of 50 gallons of water per yard of carpet if it were to be dyed after production. The after production dyeing process requires that the water be heated to boiling. Solution dyeing avoids the need to boil this large quantity of water and saves large amounts of energy, reducing the generation of greenhouse gases.

3. The LACCD contract calls for very low tolerance for VOC emissions. This improves the safety of the occupants and helps broader environmental air quality.
4. The carpet contract is a “closed loop” contract. It requires the use of recycled content in the face and backing of the carpet. It also requires old carpet to be take back for 100% recycling.
5. The contract specifies carpet tiles for most areas. The use of carpet tiles allows for efficient use of the material, eliminating much of the installation waste.

Sustainable Practices - Concrete

The problem is that these “impervious” surfaces, such as parking lots, send pollutants directly into our waterways and ultimately into the ocean. According to the United States of Environmental Protection Agency (EPA), as much as 90 percent of these pollutants, such as oil and anti freeze run directly off the surface of traditional impervious surfaces into our rivers, streams and oceans during rainstorms. With the need to balance development with preservation and to minimize its impact on the environment, the LACCD has looked to other alternatives for its construction projects. One such alternative has been the use of pervious concrete so that stormwater seeps into the ground.

Pervious concrete is a mix of coarse aggregate, cement, water and little or no sand. Although used in some areas for decades, this mixture is generating renewed interest. Due to its open cell structure, which allows rainwater to filter down to underlying soil, it is an excellent choice for mitigating pollutants and increasing the quality of storm water when used in parking areas, low traffic streets, plazas and walkways. Because of its practicality and effectiveness, this concrete actually replenishes aquifers, conserves and protects water supplies and is American Disabilities Act (ADA) - friendly.

As a result of its lighter color and lower density, it also helps to enhance air quality by lowering atmospheric heating and decreasing heat island effects. (The heat island effect occurs when tree-covered areas are replaced with dark pavement surfaces. It is a contributing factor to the fact that an urban area can be up to 12 degrees hotter than its surrounding countryside.)

In addition, pervious concrete’s lighter color naturally reflects heat and light, which studies have shown can save as much as 30% in lighting costs over other pavements.

Using pervious pavements can also reduce the need for large wet pond detention and retention systems allowing for more effective land use in addition to decreasing costs for labor, construction and maintenance of detention ponds and other stormwater management systems. Furthermore, it decreases or eliminates the need for expensive irrigation systems.

Pervious concrete is also quite durable. Areas properly designed and constructed will last 20-40 years with little to no maintenance. As a result, it is widely recognized as the

lowest life cycle cost option (an analysis of the savings generated throughout the average life of a product compared to other similar products) available for paving.

Sustainable Practices – Construction Waste

A heavy construction phase of our program has begun. That means old and temporary buildings are being razed to make room for more efficient and technologically advanced structures. Classroom and offices are being renovated and upgraded. Parking lots are becoming parking structures or new buildings. But while these wonderful improvements are what our program is all about, each of them creates construction waste.

Construction waste is one of the largest contributors to landfill volume in the United States. Our region's landfills are already in high demand. Communities are advocating closing existing sites and strongly protesting the creation of new locations. As it becomes increasingly expensive to bury our waste, governments are seeking alternative solutions. Construction waste is a major target of waste reduction efforts because it is a major contributor to the need for more landfills, it requires an extensive transportation system to haul materials and is a tremendous waste of the resources that have great recycling and use potential.

Finding secondary markets (users that can use diverted waste for new purposes) is, both environmentally and economically rewarding.

Base rock, used for roads and building pads, is expensive. However, recycled concrete and asphalt, crushed on-site, is a viable alternative to purchasing new base rock, and at a fraction of the price. Not to mention the cost and pollution benefits of eliminating in-and-outbound dump-trucks.

As classroom buildings are renovated, many materials have potential for secondary markets. Wood, metal, plastic, glass, cardboard, sheetrock, and carpet, found in outdated classroom buildings, can all be recycled. In fact, all of the classroom and office furniture offered through LACCD's Furniture Value Program is made, in part, with recycled content.

By seeking out local secondary markets for our construction waste, we are supporting the local economy, extending the life of our existing landfills, having a significant positive effect on the environment, and of course making good financial sense.

LACCD is in the process of implementing our goal to better process our construction waste. We are looking into on-site sorting of basic materials into bins and then having them transported, hopefully at no cost, to the appropriate secondary market. The general contractor on each site would be tasked with implementing the sorting of materials for their respective work site and bins would be picked up by the secondary-market vendor when full.

Inevitably, after the wood, carpet, metal, sheetrock, concrete and asphalt has been removed, there will be some left over "trash." This bin would be sent to a more

sophisticated sorting facility for further reduction which would divert even more waste away from the landfill. Our goal is to divert at least 90% of our construction waste away from landfills and into productive uses. Our ultimate, if ambitious, goal is to divert it all, and send no construction waste at all to local landfills!

Resources are scarce, as all of us who have to deal with the cost of cement and steel are acutely aware. I strongly believe that our advocacy of construction waste recycling will help to change the market we rely on. By providing our “waste” to the local secondary market, we will provide the raw materials that will create the future products we will need to purchase, and save us the cost of the dumping fees. If other contractors and construction sites join us in our support of construction waste recycling, the cost of sustainable materials will continue to decrease. By working together we can all benefit together.

Training the 21st century workforce

A recent analysis of the California Air Resources Board (CARB) proposed plan to cut carbon dioxide emissions to 1990 levels by 2020 estimates that California’s productivity would potentially increase by \$27 billion over what would be realized if the state didn’t make the cuts. The ‘greening’ of California could also mean 100,000 more jobs in 12 years and an increase in per capita income of \$200 annually.

As the housing and financial markets continue to suffer, many local governments are looking to green industries and technology as the ‘future’ for economic success and vitality. As those industries continue to grow in response to the industry’s evolution and overall need, there is a greater necessity for trained workers that are in step with the technology and prepared to take that technology to the next level.

There are more than 18 million students at 4,000 colleges and universities around the country. While many colleges are focused on greening their campus, a study by the National Wildlife Federation found that only 53 percent of the more than 1,000 campuses examined offered environmental studies majors or minors. This is particularly true of disciplines that aren’t traditionally connected to the environment or environmental issues. While overall growth may be slow, the good news is that there more than 600 environmentally-focused institutes at schools throughout the country.

Beyond promoting a more sustainable future, institutes for higher learning would also do well to consider presenting initiatives, education and training programs in an environment that further promote environmental awareness and that directly and indirectly impact students in a positive way:

- Colleges designed with proper ventilation, materials selection, and acoustical quality have been found to improve student and employee health, which leads to improved attendance figures;

- Attention to site planning and adequate day lighting has been shown to heighten student performance by as much as 25 percent;
- Energy and water operating costs can be reduced by 20 to 40 percent through the use of new technologies and conservation methods;
- When advanced technology and design are made visible, buildings can become teaching tools and important features of college curriculum.

Educating more than 220,000 students per year, the LACCD is in an ideal position to not only provide our region's green workforce with the education and job training they need to succeed, but to lead by example on global issues which can make a positive impact on our environment.

Last summer, the LACCD announced the development of a new curriculum, which will provide both advance technical and basic skills training to unemployed and underemployed residents in our region to improve their job placement. The programs and services are sector-specific and target high-wage, high-demand industries such as sustainable energy/utilities, technology and construction to name a few. After completing their studies, students will be able to obtain jobs in the full-range of career paths in each of these sectors.

But learning doesn't just take place in the classroom or lecture hall. That is why LACCD extends its education efforts about sustainability to the community as well. Once a month, the LACCD's board room doubles as a lecture hall as attendees gather to listen to notable experts on every important issue of our environment, both local and international, learn about the problem, and become an active part of the solution. This Sustainability Collaborative is free and serves as a networking activity where attendees can learn about all aspects of a sustainable future.

Conclusion

The LACCD is aware of its role as both an institution of higher education and a role model for the community, which is why it has embarked on an ambitious campaign to raise awareness on the benefits of sustainability. On a state wide level, its Board of Trustees has actively participated in the League of California Community Colleges, sharing sustainable building policy implementation techniques with other boards of trustees, and has participated in UC/CSU sustainability conferences, Green Build Conferences, the state-wide Partnership between Energy Companies and Colleges, and addressed many neighboring school district boards to encourage duplicative efforts in other school districts.

On an international level, the Board has been a leader in the field of sustainable development by becoming the first in the world to seek both LEED™ and Building Research Establishment Environmental Assessment Method (BREEAM) credentials. LACCD acquired the historic Van de Kamp Bakery Building, which will become the first

construction conversion project in the U.S. to achieve a BREEAM rating. BREEAM seeks to minimize the adverse effects of new buildings on the environment while promoting healthy indoor conditions for the occupants.

Seventeenth century British author, John Donne said, "No man is an island, entire of itself; every man is a piece of the continent." The Los Angeles Community College District wholeheartedly agrees, which is why, over its long history, the District is proud of the various partnerships and collaborations it's established. During the development of the District's sustainability policy, Board members turned to leading environmental groups to brainstorm and draft what would become District's award-winning green policy. The partnership not only provided a good source of intellectual capital and experience, but it also provided strong leadership and support when it counted.

If we are to act as leaders for the next generation, we understand that it's important for us to prepare for the future, educate those that will take the reins, and lead by example. That is why the LACCD is embarking on a sustainable path of growth and development and, at the same time, imparting what we learn to the students who will become the business, government and community leaders for the next generation.

Many people already know that the Los Angeles Community College District's \$2.2 billion building upgrade and renovation program is one of the largest sustainable (that is, "green") building programs in the United State. But the sustainable mission of the LACCD is greater than simply designing and constructing buildings certified by the US Green Building Council. The LACCD view is much more holistic, and includes supplying classrooms with sustainably built furniture, seeking out the most energy efficient appliances, and developing a method to develop 100% of our own energy needs. As the mission and goals are implemented, a keen eye is being kept on the long-term cost efficiency.

A core principle of the LACCD Proposition A/AA Bond construction program, which is updating nine community colleges to better serve its students, is to incorporate best practices in sustainable design, construction and operations wherever it can. With each sustainable step, the LACCD is taking us one step closer to our goal of balancing the need for development with protecting our environment for generations to come.