HIGH PERFORMANCE CAMPUS DESIGN HANDBOOK

Volume I: Overview and Rationale

Prepared by
The New Jersey Higher Education Partnership for Sustainability

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PREFACE

This handbook was originally prepared by Herb Simmens, then Executive Director, NJHEPS and Carmela Federico, then Program Manager, NJHEPS. It was revised under the present staff of NJHEPS, under the guidance and direction of Terra Meierdierck. The New Jersey Higher Education Partnership for Sustainability (*NJHEPS*) describes an increasingly accepted approach to campus planning, design and construction that results in facilities and landscapes that are healthier, less costly to operate and have less impact on the environment. Called High Performance Design (HPD), Green Design, or Sustainable Design, any institution can undertake this process for any project. NJHEPS has recently cosponsored with the National Association of College and University Business Officers (*NACUBO*) a book entitled *The Business Case for Renewable Energy*. This book is available from the NACUBO website *www.nacubo.org*. This book is also particularly relevant to higher education buildings and campuses.

This is Volume I of the *High Performance Campus Design Handbook*. It presents an overview of HPD, the New Jersey context, a description of its features, a rationale and description of benefits, implementation recommendations, case studies, and a resource guide.

Volume II serves as a technical guide for planners, designers, and facilities personnel. A copy of Volume II can be acquired by contacting NJHEPS, or by visiting *www.njheps.org*.

NJHEPS staff and its Green Design team of design professionals, faculty and higher educational facilities staff can assist institutions of higher education in learning more about implementing HPD to meet the particular needs of each campus.

ABOUT NJHEPS

NJHEPS, whose members include 40+ Garden State campuses, was launched in March 1999 with the support of the Geraldine R. Dodge Foundation of Morristown, NJ. Additional support comes from AT&T, the NJ Board of Public Utilities, Corporate Sponsors and member contributions. The Partnership includes faculty, administrators, and students cooperating with friends throughout the private sector and government.

The mission of NJHEPS is to be an agent of transformation so that New Jersey campuses might become models and messengers of sustainability in our society and the world.

The ***Sustainable Campus Initiative,*** an organizing framework for the work of *NJHEPS*, is a comprehensive Five-Year Plan (2001-2005) to change curriculum, research, campus facility operations and community outreach. The SCI utilizes six interrelated strategies:

- **Education for Sustainability**: the expansion and integration of sustainability-related instruction in the curriculum
- **Energy efficiency and conservation measures**, aimed at climate change and allied with the Department of Environmental Protection's New Jersey Sustainability Greenhouse Gas Action Plan to reduce both energy costs and emissions
- **High performance "green design"** at a time of major spending for construction and renovation in education, which can greatly reduce total life-cycle energy costs and emissions
- **Sustainable materials use** and "green" procurement
- **Student activism** in promoting this agenda
- **Media outreach** aimed at the education sector and the public

We welcome your participation in our Internet *listservs*, which can connect you to a community of people concerned about sustainability and higher education:

- ***NJHEPS-news***, which sends out our newsletter to you via email twice a month.
- ***NJHEPS***, which is an interactive exchange of events, resources, and information related to sustainability on New Jersey's campuses.
- ***HEEPP***, the Higher Education Environmentally Preferable Purchasing listserv, which serves as an interactive forum for event announcements, resources, and questions related to green purchasing on college campuses (remanufactured printer supplies, paper, green cleaning supplies, healthy computer choices, etc.)

Please also visit our website, *www.njheps.org*, for further information.

EXECUTIVE SUMMARY

An exciting opportunity now exists for campuses to save money, garner prestige, enhance learning, and benefit the environment: High Performance Design for campus buildings. This summary, prepared by the New Jersey Higher Education Partnership for Sustainability, introduces High Performance Design, briefly explains its relevance to New Jersey higher education, and presents guidance for successfully implementing High Performance Design.

By 2008, New Jersey's institutions of higher education will spend in excess of $4 billion for capital construction and renovation and there is a proposal pending in legislature for a bond act to fund and additional $2.7 billion of Higher Education capital projects. With High Performance Design, this construction can bring multiple, substantial benefits to your campus and the environment.

High Performance Design (HPD) integrates a set of field-tested design, construction and operational practices

- Improve student learning
- Save operating and maintenance expenses–at little or no additional construction cost
- Increase student, faculty and staff productivity
- Contribute to meeting the Greenhouse Gas Action Plan emissions reduction target (established by all 56 New Jersey college presidents in 2001)
- Combat sprawl and encourage smart growth
- Reduce fossil fuel dependence, energy consumption and air pollutants
- Increase campus energy security and reliability
- Create healthier indoor and outdoor environments
- Support markets for non-toxic and sustainable building materials and supplies
- Educate students about green design, environmental impacts, and sustainability
- Position higher education in New Jersey as a national leader in High Performance Design, complementing its leadership in reducing greenhouse gas emissions

The Ramapo Sustainability Center is being designed to incorporate high energy efficiency, sustainable technologies, and green management. It will provide faculty, students, and staff with a cost-effective and educative model of sustainability.

*The **Joseph Lewis Center for Environmental Studies, Oberlin College** (Ohio) features an 'indoor living machine' to purify waste water and sustainable materials. It aims to produce more energy than the building consumes.*

***Kean University's Center for Academic Success is under LEED Gold submission for 32 points** with many Earth-friendly and high performance features.*

Characteristics of High Performance Buildings (HPB's)

- **Designed in a collaborative process** involving designers, builders, facilities personnel, campus decision makers and the building's eventual occupants
- **Employ a holistic approach to design**, which aims to maximize performance of the entire building rather than particular features or components
- Designed with a financial calculus that considers **all costs over the life of the building** (life cycle costs) rather than just the first cost of construction
- Sited and designed to take **maximum advantage of sun, wind and site features** to significantly reduce energy use and generate on-site green energy
- **Avoid sprawl and habitat destruction** by building on or near developed land
- Use materials that are **sustainably produced or harvested**
- **Maximize indoor air quality and natural light**
- **Recycle construction materials**
- **Comprehensively and continually monitored**, throughout design, construc tion and operation, to achieve optimal performance.
- Designed to meet the energy efficiency requirements of **Governor Corzine's Executive Order #11** on energy efficiency in state facilities.

The Case for High Performance Buildings

High Performance Design saves money. While capital costs for HPB's currently are about the same or slightly higher than those of conventionally-designed buildings, operating costs for personnel, energy, water and building maintenance are significantly lower. Energy savings of 25 to 50% are not uncommon. In the future, as HPD becomes more widespread, an institution's outlay for HPD should further decline. HPD features such as superior indoor air quality also reduce liability costs (employee health, mold, etc.) Further savings also result from fewer adverse environmental costs and impacts.

Campuses particularly benefit from High Performance Design . HPB's are designed for long life, and provide continual benefits throughout their long building life. Campuses, moreover, can use the HPD process as a teaching and pedagogical tool, involving students from many disciplines in the design and monitoring of the facility. Data also suggest that certain features of HPB's, such as optimal daylighting, increase academic performance.

High Performance Design is essential in meeting greenhouse gas targets. Using less energy and green energy in building operations has aided higher education institutions in attempting to meet their greenhouse gas emissions reduction target—a climate-friendly goal of 3.5% below 1990 levels by 2005, set by all 56 New Jersey college and university presidents.

High Performance Design can significantly enhance higher education's leadership role. Through its commitment to HPD, which has many and varied positive environmental impacts, New Jersey higher education can take the lead in fostering responsible resource use, health, and sustainable development. Donors may be attracted to the many achievements associated with this innovative building technique.

Both state and federal governments support High Performance Design. Governor James E. McGreevey issued Executive Order 24, mandating HPD for all school construction funded through the New Jersey Schools Construction Corporation. State financial incentives are available from the Board of Public Utilities for HPD design, energy equipment for HPD building, and other HPD components. New Jersey also makes regulatory priority review available to HPD buildings. A variety of federal agencies also provide information and technical assistance for HPD.

High Performance buildings can be independently certified and can attract national recognition. The nonprofit United States Green Building Council, through its voluntary LEED (Leadership in Energy and Environmental Design) program, can certify a building at one of four levels of performance: certified, silver, gold or platinum. There are about 50 certified buildings in the U.S with another 800 undergoing certification. LEED certification gives a 'brand' name and national exposure to a building. LEED standards are also a reliable guide to HPD practice, and ensure priority regulatory review from state government.

High Performance Design on New Jersey Campuses

- **The College of New Jersey** (new LEED library; LEED certification an objective in new construction)
- **Kean University** (LEED Gold Submitted- New Academic Building with daylighting, solar power, and energy efficient features)
- **Montclair State University** (LEED submitted New Academic Building; planned LEED-certified Recreation Center)
- **The New Jersey Institute of Technology** (new Student Center with solar power, efficient equipment, and a green roof)
- **The Ocean County College** (LEED-registered Technology Center and High Performance Design Policy for all new buildings)
- **Princeton University** (High Performance Design policy for all new buildings)
- **Richard Stockton College** (LEED-certified laboratory)
- **The University of Medicine and Dentistry** (High Performance Design Policy for all new buildings)

Implementation Strategies for Successful HPD

- Enlist the support of senior administration.
- Select a design team experienced in HPD.
- Structure the design fees to reward life cycle savings.
- Involve the campus community through workshops and design "charrettes"
- Encourage and structure regular collaboration amongst the design team and the campus facilities staff right from the beginning of the design process

NJHEPS can help campuses support High Performance Design through the resources of its staff and Green Design Team. Visit the NJHEPS website (*http://www.njheps.org*) to contact NJHEPS staff, the NJHEPS Green Design Team, and to download the complete overview or the HPD technical guide.

FACILITIES NEEDS IN NEW JERSEY HIGHER EDUCATION

Dr. Donald W. Aitken (Senior Scientist, *Union of Concerned Scientists*) states that **buildings use two-thirds of all the electricity in the United States—** which in turn creates one-quarter of the carbon dioxide emissions responsible for global climate change and one-third of the nation's mercury pollution. He notes:

"We can have our greatest impact for the least cost in the shortest time in mitigating climate change if we start with the built environment, both the existing built environment and those buildings we're designing and which have not yet been built."[1]

The Higher Education sector in New Jersey contains 56 degree granting institutions, including three public research universities, nine state colleges and universities, 19 community colleges and 25 independent colleges and universities.

A 2001 survey by the Commission on Higher Education of 42 campuses counted 15,000 acres, 2,000 buildings and 54 million square feet of building space, (for comparison downtown Philadelphia has about 37 million square feet). Over $310 million was spent annually on maintenance of buildings and grounds, with deferred maintenance estimated at $541 million and a recent report done by the New Jersey Presidents Council identifies a rise to $5.8 billion in capital needs.

The $5.8 billion in capital projects identified by 42 institutions does not include additional costs for security, nor does it include $481 million for equipment and technology over the next seven years. $2.7 billion is needed for new construction and $1.3 billion for renovation (the remainder consists of compliance and infrastructure costs). Of these amounts $490 million will be spent on campus housing.

A recent report issued by the Higher Education Steering Committee concluded:

"Most of the Colleges and Universities in New Jersey operate at or near capacity and are not prepared for the significant increase in students that is expected over the next eight years."

New Jersey campuses are projected to enroll some 22,000 to 35,000 additional freshman by 2008, with a slower growth rate to 2112, when a leveling off of demand is anticipated.

Some 26% of the capital expenditures are attributed to rising enrollments. Construction is also driven by increased demand for research laboratories, ancillary facilities such as athletic fields and student centers, and increasing space standards for classrooms and offices.

FINANCING HIGHER EDUCATION CONSTRUCTION IN NEW JERSEY

Eight separate capital bond funds have been adopted in the past 20 years, providing $1.5 billion in funds for state, community college and independent institutions. A new proposal for a $2.7 billion higher education facilities bond act was scheduled to the NJ legislature in early 2006, which may be passed in the next 2 - 3 years. These programs often required a match by the institution. The state has provided limited annual appropriations for maintenance and renewal. Most institutions have supplemented state capital aid with bonding, donations and internally generated funds.

Since there is no stable or predictable source of funding, capital planning and budgeting occurs in an environment with little certainly about if, when and how recommended projects will be funded and constructed.

Neither state legislation nor state bond acts generally dictate the size or locations of buildings. Certain bond issues have been dedicated to equipment, dormitories, or technology. Nor do they give guidance as to the environmental characteristics of buildings, such as those features discussed in this report. There is substantial capital project autonomy for both the public and independent institutions. There is some discussion that the pending bond act may require buildings to be built to LEED or High - Performance standards.

Thus the design process, standards for construction, costs and location are determined by the Boards of Trustees of each institution, subject to local land use control and state environmental and construction regulations.

HIGH PERFORMANCE DESIGN: WHAT IS IT?

High Performance Design is an integrated process that brings together design professionals, facility planners and managers, occupants and users of the facility at the beginning of the design process to create a building that:

- Maximizes the health, safety, and productivity of the occupants
- Minimizes energy and other operational costs
- Utilizes sustainable materials
- Locates the building to minimize adverse environmental, social and economic impacts

HPD is *not* a cookbook for campus buildings; rather, it is a philosophy and process that is successful when shaped by the unique qualities and potential of each project. It does not necessarily simplify or shorten the design process; indeed, it may well lengthen and add to its complexity. It *does,* however, guarantee that the project will have a positive impact on the structure's human inhabitants and on the planet. It contributes to the growing efforts worldwide to create sustainability—to insure that the welfare of future generations is not compromised by our actions today.

Many of the elements of HPD have been implemented on campuses over the last quarter century. Energy efficiency efforts were underway as a result of the oil and energy shortages of the 1970's. Recycling programs started in the 70's and 80's in response to the shortage of landfills. Campuses have implemented greenhouse gas reduction strategies since the mid-90's. The 'sick building syndrome' first became an issue in the 1980's.

"The overall goal is to produce buildings that take less from the earth and give more to people"

— A Primer on Sustainable Building, The Rocky Mountain Institute (1995)

What is unique about HPD
is the integration of these and other concerns
into the entire project-delivery process
through planning, design,
construction and monitoring.

PRINCIPLES OF HIGH PERFORMANCE DESIGN

Create a Campus Master Plan

Any significant facilities project should result from a comprehensive campus master plan. The master plan should analyze the facility needs of the campus and establish principles that guide the placement, design, and performance characteristics of buildings and landscapes. High Performance Design principals should be an inigrated part of a campus masterplan.

After all—the most sustainable building is one that is not built. Utilizing existing buildings more efficiently; leasing classroom, office or storage space; developing distance learning programs and sharing facilities with other campuses or organizations (such as the New Jersey Coastal Communiversity) can postpone or eliminate the need for newly constructed space resulting in more cost-effective use of existing facilities.

Include a wide range of people in the design process

Engage the campus community and the broader neighboring community (to the broadest extent possible) in all stages of the building process—design, construction and operation.

Conceive of the building design process in an integrated way

Integrated design rests on the understanding that a building, like a living organism, is more than the sum of its parts. Address the building and its function on campus holistically right from the start. Pool the knowledge and experience of design professionals, campus decision-makers and users at the beginning of the process, to jointly set the overall goals for the project. An integrative process should make explicit the different priorities (e.g., performance, cost, and schedule) that exist between the fiscal, design, operational and user representatives—and allow for compromise and reconciliation.

Develop a budget that reflects the integrated design process

An integrated design process that sets clear high performance building objectives is likely to result in some systems costing more than conventional systems (windows, raised floors, daylighting systems), with others that can be reduced in scale and cost (e.g., much smaller HVAC systems), which maintains the overall project budget.

Perform a life-cycle analysis that includes external costs

The cost of a material or system includes acquisition, operations and maintenance, amortization and disposal costs. Most decision-making processes rigidly separate the accounting of these costs. The result is often that a less expensive acquisition cost may be more than offset by higher operating and maintenance costs, a shorter useful life, or higher disposal costs, yet since these separate costs come out of different budgets in different departments, the overall or life cycle cost is not considered in making design decisions.

In addition, the cost to the institution does not reflect hidden social or environmental costs that are incurred by others. These costs may include damaging rainforests by buying unsustainably harvested wood, buying products (such as aluminum) that take enormous amounts of energy to produce, or acquiring products that come from far away and create transportation-related air pollution and climate change, rather than locally available products. Identifying these often non-quantifiable costs and seeking materials and systems that minimize these costs is an essential element of HPD.

Select a site to maximize its natural and performance characteristics

Maximize the opportunities offered by the site, the climate and the availability of local building materials. High Performance Buildings can best be created by fully utilizing the sun for energy and light, carefully examining temperature ranges to develop appropriately sized heating and ventilation systems and taking advantage of locally produced brick, stone, wood or other materials which are compatible with surrounding buildings and landscapes.

Design a building for the long run

Design for maximum flexibility, durability, upgradeability, and easy reuse, by locating and sizing buildings for multiple uses and by having materials that can be disassembled and reused, rather than demolished and disposed.

IMPORTANT HPD FEATURES

The features of HPD outlined in this section are consistent with and result from applying the principles outlined above. Generally the more that these features are incorporated into the project, the higher the performance of the building will be.

Campus and Site Design and Planning

- Avoid construction on agricultural land, flood plains, areas near wetlands, containing parkland, or threatened or endangered habitat or species
- Build in downtowns or brownfields rather than in greenfields. In New Jersey State Plan terminology this would also include building in Planning Area 1 or 2 or centers in other Planning Areas
- Consider mixed use buildings, including shared community or commercial uses
- Avoid or reduce runoff, treating any runoff that does occur
- Reduce heat islands by providing shade
- Minimize light pollution
- Take advantage of topography by building into slopes to create structures tucked into the earth
- Ensure adequate erosion and site sediment control including minimizing the development footprint, and restoring native planting on previously developed sites

Transportation

- Encourage car and van pooling
- Increase density on campus to make mass transit more cost effective
- Integrate intra-campus transportation and public transportation
- Create pedestrian linkages between campus and off campus services
- Use low-emission and alternative energy (natural gas, biofuels, hybrids) vehicles for the campus fleet and encourage their use by the campus community
- Include provisions for bicycles, including bike paths, bike racks and showers
- Minimize new parking capacity

Indoor environment

Air quality

- Prohibit smoking in or near the building
- Monitor CO_2 to insure that levels are no higher than ambient outdoor levels
- Provide adequate and effective ventilation
- Install materials (paint, carpet, wood) that minimize or eliminate toxic emissions
- Provide individual control of temperature, ventilation and lighting
- Ensure a thermally comfortable environment through temperature and humidity monitoring systems

Light

- Introduce controlled daylight and views into the occupied areas of the building (daylighting)

Noise

- Minimize indoor and outdoor sources of noise

Water

- Minimize use of water for landscaping by capturing rain water, efficient irrigation or recycling rain water
- Reduce sewage flow by low-flow toilets and/or recycling of gray water
- Reduce potable water use through captured storm water, and use of composting toilets or waterless urinals

Energy

- Reduce ozone depletion through zero use of CFC refrigerants
- Reduce energy consumption below current state code requirements through such techniques as site and building configuration, interior layout, design and orienta-

"Efficient lighting is not just a free lunch; it's a lunch you are paid to eat."

–Amory Lovins, Co-Founder, Rocky Mountain Institute (1987)

tion of the building, an optimized building envelop, daylighting and sun control, high-efficiency lighting, electrical systems, mechanical systems and load manage ment systems

- Use rooftops with reflective surfaces or that provide gardens or other green space
- Design buildings to efficiently accommodate future technologies when cost-effective
- Use renewable energy such as fuel cells, photovoltaic cells or wind power

"In 1982, Houston residents paid $3.3 billion for cold air, more than the gross national product of 42 African nations."

–The Wall Street Journal (1983)

If we recognize that our goal is not to heat buildings but to *provide comfort to people,* then we design buildings in an *entirely different way.*

Materials

- Use materials and products that contain recycled content, are locally produced, degradable and certified to be sustainably produced or harvested
- Use salvaged materials, which are often architecturally unique and aesthetically pleasing
- Consider the amount of embodied energy consumed by examining the full amount and consequences of the extraction, preparation, transportation, installation, and disposal of materials
- Purchase Energy Star or other highly energy-efficient equipment for the building, including copiers, computers, printers and laboratory equipment

Landscaping

- Incorporate nature trails, herb gardens and other food production
- Use light colored reflective materials for walkways and paved parking and other areas to minimize heat islands
- Use adaptive plant materials with low water use and that require little or no pesticides or fertilizer
- Use pervious surface materials for paving of walkways, driveways and parking areas when feasible

Construction

- Minimize impact on surroundings by careful construction practices
- Utilize construction and waste management
- Reduce, reuse and recycle materials

Commissioning

- Comprehensively monitor and test systems to ensure optimal integrated performance throughout the design, construction and operation phases

Operating and Maintenance

- Ensure optimal maintenance through staff involvement in design and through staff training
- Use healthy cleaning and other products
- Prevent waste by reducing, reusing and recycling

BENEFITS OF HIGH PERFORMANCE DESIGN

Lower Costs, Increased Productivity and Improved Learning Opportunities

Many campus facility planners and administrators are favorably disposed towards HPD in concept but are leery of HPD in practice because they believe HPD costs more.

In fact, HPD buildings often* do not *cost more to build, and* always *save considerable money when the full life-cycle costs of operations, maintenance, health and productivity are considered.

Conclusions about cost necessarily result from how one calculates it. The conventional approach to cost calculation looks primarily at the *first cost* of the building (the project cost, including construction and soft costs). The High Performance approach to cost looks at *the entire stream of costs* over the expected life of the building, appropriately discounted for present value. Not only are life-cycle operating costs calculated, but more significantly the cost of personnel is considered.

For most buildings, the cost of personnel working in the building can be* more than fifteen times *the operating cost of the building, and* forty to fifty *times the capital cost of the building.

Reducing personnel costs, such as absenteeism and health care, by providing a healthier, happier and more productive workplaces, can produce enormous savings and benefits, both measurable and intangible.

Our ecology departments teach that organisms thrive by finding food and other supplies locally, conserving energy, avoiding toxic substances and recycling their waste.

That's also a good description of High Performance Design.

Witness the following results from a new, comprehensive study of 36 HP buildings in California:

♦ Buildings with many HPD features (rated "gold" or "silver" according to LEED guidelines) cost an average of 1-2% more in initial construction costs. Many of these buildings, however, cost less than conventional buildings. The highest rated buildings (LEED Platinum) cost about 8% more. These buildings are difficult to compare to conventionally-designed and built structures, as the characteristics of sustainable design –high performance, durability, efficiency–often result in higher-quality components and finishes. The pricing data may be even more positive than at first glance: the extra cost premium appears to be about 50% less for more recently constructed buildings versus buildings from the mid-90's. This is consistent with the expectation that as HPD becomes more common, market transformation and greater experience in design, materials selection and construction will result in first costs comparable to, or less than, the cost of conventional buildings.

Pennsylvania projected savings in excess of $800,000 over the life of their HPD Cumbria office building through use of flexible design technologies such as underfloor air distribution systems, which cut average relocation costs by 90%.

Starting the design process today with an experienced design team should result in a facility comparable in cost to a conventional building for all but the highest-rated Platinum buildings.

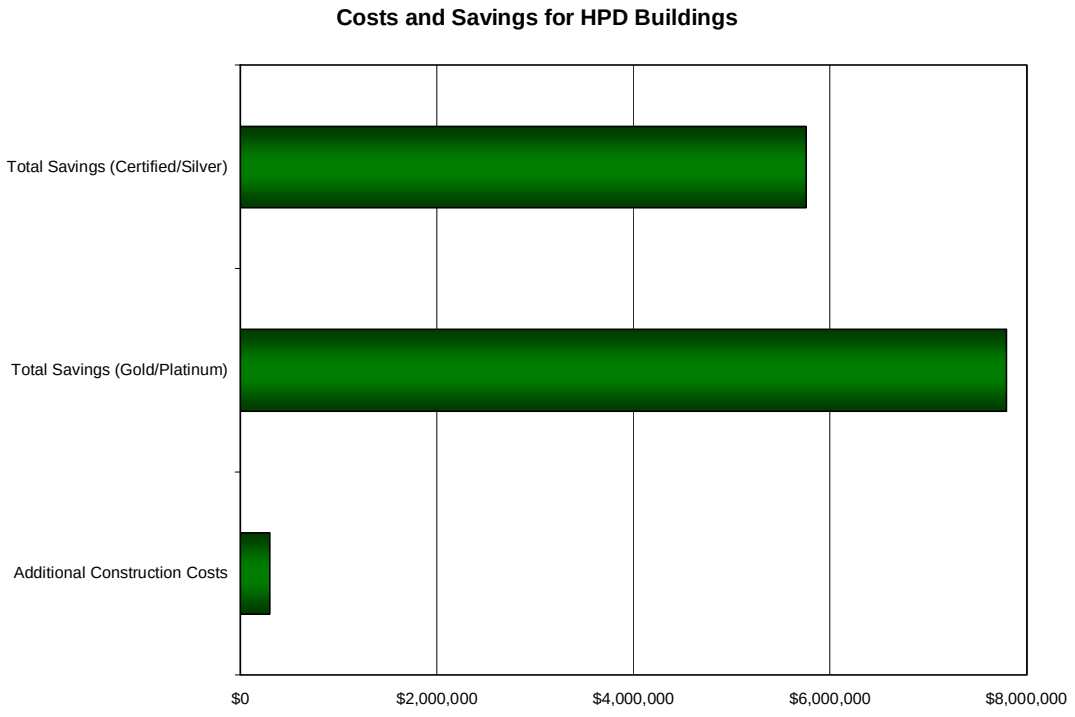
♦ Lower operating costs accrue as a result of more efficient use of energy and water. Other sources of lower operating costs include a reduction in the cost of employee relocation within the building (churn) resulting from flexible interior design technology. Further economic value may be realized in the future from lower greenhouse gas and other air emissions, as markets in emissions trading develop.

♦ The life-cycle cost savings also are notable. Using a discounted present value over twenty years the study estimated total savings. For a 100,000 square foot building (savings are proportionate to the size of the building) average savings are as follows:

Savings for HPD Buildings

Energy	$ 626,000.00	
Water	$ 51,000.00	
Commissioning	$ 920,000.00	
Resource Savings	**$ 1,747,000.00**	**(total)**
Employee Productivity	$ 3,995,000.00	(Certified and Silver)
	$ 6,030,000.00	(Gold and Platinum)
Total Savings	$ **5,757,000.00**	(Certified and Silver)
	$ **7,792,000.00**	(Gold and Platinum)

Compared to an average additional construction cost of $200,000 to $400,000 (assuming $200 per square foot project cost for the facility), the present value of the life-cycle cost savings are about 15-40 times greater than the higher average first cost.



Other studies have shown that HPD increases occupant performance from 6 to 26%. These studies looked at facilities operated by such varied organizations as the U.S. Postal Service, Lockheed Martin and NMB Bank of the Netherlands.

A carefully-controlled study of school systems in Colorado, California and Washington found that students in classrooms with the most diffuse and glare-free daylight scored up to 26% better on standardized tests than students in classrooms without daylight, and 10 % over average classrooms.[1]

[1]Joel Loveland, "Daylighting and Sustainability," *Environmental Design and Construction* October, 2002; Lisa Heschong, "Daylighting in Schools, An investigation into the relationship between daylighting and human performance," Report to the Pacific Gas & Electric Company, San Francisco CA, Aug. 1999. *Note: Daylighting does not mean direct sunlight. Direct sunlight can actually reduce learning.*

Reduced Liability

Conventionally designed and operated buildings are subject to increasing numbers of lawsuits for ill health caused by unhealthy air quality resulting from toxic materials, inadequate ventilation and mold. Insurance companies have begun to include mold exclusion clauses in their policies. HP buildings minimize this liability exposure, and are likely to result in lower business interruption, liability and health insurance rates in the future. According to *The Wall Street Journal* (May 7, 2003), some insurance companies in Europe are considering requiring companies to meet Kyoto Treaty greenhouse gas reductions to obtain Directors and Officers liability coverage.

"The energy efficiency model of today involves benefits not sacrifices."

—High Performance Building Guidelines, City of New York (1999)

Enhanced Health and Well-Being

Buildings that avoid non-toxic materials, that bring daylight to all, and that are quiet are likely to improve occupants' health and well-being.

A recent Lawrence Berkeley National Laboratory study reported that feasible and commonly recommended improvements to indoor environments could reduce health care costs and work losses:

- from communicable respiratory diseases by 9 to 20%;
- from reduced allergies and asthma by 18 to 25%; and
- from other non-specific health and discomfort effects by 20 to 50%.

The researchers also found that this would generate estimated national savings of from 17 to 44 billion dollars annually in lost work and health care costs.

Less Impact on the Environment

Reducing energy usage by 20 to 75%, increasing recycling, using non-toxic materials, avoiding construction in sensitive areas, using environmentally preferable products significantly reduces the amount of air, water and land pollution on-site and regionally.

Increased Building Value

A facility with easier maintenance, more productive and healthier occupants and lower occupancy costs for energy is likely to command a higher market value when or if the facility is sold or leased for other uses

Longer Life Span

Using durable materials and life-cycle analysis, greater utilization of sun and wind, and closer attention to operation and maintenance will lead to buildings that last longer

THE CAMPUS AND HPD

The characteristic principles and features of high-performance buildings make higher education uniquely positioned to benefit from and participate in HPD:

- Sustainability is about the long view. Campus buildings are often used for many decades or even centuries, unlike commercial buildings. Generally, the longer a building's useful life, the more benefit accrues from applying HPD principles.

- Higher education provides the intellectual and ethical leadership for society, thus the widespread use of HPD principles on campuses can create an important and powerful model to the rest of society.

- The process and the outcomes of HPD are particularly well suited to the mission of higher education to create and disseminate knowledge to future generations.

- Substantial opportunities exist to apply the HPD principles of individual buildings to create High Performance Campuses that are livable, efficient and beautiful places

- Donors may find a high performance building a particularly attractive opportunity.

- All 56 NJ college presidents signed the Greenhouse Gas Covenant in 2001 with the Department of Environmental Protection, pledging to reduce greenhouse gas emissions by 2005 to 3.5% below 1990 levels. Data collected by NJHEPS from 21 campuses shows an increase of 1.6% from 1990 to 2000 in carbon dioxide levels, a fairly small increase given an increase in enrollment of over 14% and an increase in reported floor space of 16%. To reach their reduction targets, however, campuses must find ways to further reduce their emissions–through green power purchases/installation, green design, and energy efficiency.

- Much of what makes HPD's especially important on campus is their potential as a teaching tool for students:

    - The initial planning of the campus should involve all sectors of the campus community. Students, as well as faculty and staff should participate in the goal setting workshops. They may also have the opportunity to participate in workshop planning and background information gathering, either through internships, participation in campus environmental or other clubs, or as part of class assignments.

    - Students from a wide range of disciplines can benefit from participation. Business school students can examine the financial and economic implications of HPD, and engineering, planning, environmental studies and science students can focus on the physical design questions. Social science students can help design the participatory process to be used and economics, policy studies and finance students can look at costs and policy implications. Computer science students could develop programs to monitor resource consumption and other building and site parameters.
    - The design of the building can provide opportunities to see how buildings

actually work. Exposing wiring, piping and ductwork can demonstrate flows and interconnections within buildings. Metering of water, electricity and solid waste production can show real-time resource use and can be accessible both in the building and on the web. Designing mechanical rooms to allow easy observation of equipment and systems would enhance learning in any number of disciplines. Observing changes in the consumption of these resources in relation to weather or occupancy patterns can provide valuable insights into the nature of these complex interactions.

•Classes could focus on doing post-occupancy assessments of resource use and efficiency and also student and staff productivity, absenteeism, health and user satisfaction. Intra-campus comparisons of these parameters in conventional and HPD's could be an ongoing project over a period of years, complementing the data developed through the building commissioning process.

•The rationale, design, use and functions of HPD's could be incorporated into campus orientation programs, and tours of HPD buildings can be arranged for students and community members. Interpretive signage could be placed throughout the campus explaining the workings of the buildings and landscape projects.

•Landscaping and grounds projects present other opportunities, including monitoring the ecosystem health of any restored habitats, measuring the impacts of vegetation and reflective or green roofs on local heat islands and monitoring water quality as pesticide use is reduced or eliminated.

***Georian Court University** will be breaking ground in 2006 for their new **Wellness Center and Complex**. The Center will have a holistic design and offer a variety of spaces to engage the entire person. As a Sliver - Rated LEED structure, the Wellness Center will be water, material and energy efficent. An enviornmentally friendly "green" structure supportsa core Sisters of Mercy value - respect for all living things.*

LEED CERTIFICATION:

GUIDELINES FOR HPD ACHIEVEMENT

In order to evaluate the degree to which high performance features such as those in the previous sections are incorporated into a project, in 2000 the United States Green Building Council developed the Leadership in Energy and Environmental Design program (LEED™), a standardized voluntary rating system and certification process for new construction. This system provides a self-administered scoring process with four levels of certification: Certified, Silver, Gold, and Platinum. Almost 800 buildings have been registered, with about 50 having been certified to date. Several academic buildings have achieved certification including Emory University's Whitehead Biomedical Research Building in 2001, which received a silver certification, and the Donald Bren School of Environmental Science and Management at UC, Santa Barbara which received a platinum rating in 2002. The first campus building in New Jersey to receive a LEED rating will be the New Technology Building at Ocean County College.

A new program, LEED-EB, is was developed for the operation, maintenance and upgrading of existing buildings. This program, uses a similar point system to LEED-NC. More information about LEED-EB can be found at www.usgbc.org/LEED/LEED-existing.asp. Future LEED certifications are being tested for commercial interiors and are planned for laboratories, housing, neighborhoods, core and shell, and campus development.

Benefits of LEED certification:[2]

- Third-party validation of green features. This insures that a building delivers what it advertises: high performance.
- Enforcement of full implementation of green features, throughout design, construction and operation. LEED certification guarantees that the facility not only was designed to be high performance, but also was constructed and is operated in such a manner.
- Third-party rating of degree of sustainability The four levels of LEED certification provide a consistent way to determine the extent of HP features incorporated into the facility.
- Benefit of LEED "brand" association. LEED is becoming a nationally known and widely accepted benchmark of a building's high performance.
- Incentives from public agencies. New Jersey State government recognizes the beneficial impacts of LEED and provides expedited permit review for facilities using LEED.

[2]Dr. Malcolm Lewis, P.E. *Environmental Design and Construction,* July 2002.

PUBLIC POLICY & HIGH PERFORMANCE DESIGN IN NEW JERSEY

HPDs are encouraged by state and federal policy:

The New Jersey State Development and Redevelopment Plan policies advocate reducing resource consumption by "selecting building location, building orientation, building materials, heating and cooling systems and plant materials to reduce consumption" There are also policies that support the use of schools as centers of community.

Governor James E. McGreevey's Executive Order 24, issued July 29th, 2002 requires that all new K-12 schools financed by the New Jersey Schools Construction Corporation "shall incorporate the guidelines developed by the United States Green Building Council known as "Leadership in Energy & Environmental Design ("LEED") … to achieve maximum energy efficiency and environmental sustainability in the design of schools." In addition there are requirements for design practices that enhance the learning process and provide maximum access and benefit to the residents of the communities where they are located. Furthermore, the "design of school facilities should incorporate maximum operating efficiencies and new technologies to advance the energy efficiency of school facilities and the efficiency of other school building systems."

The significance of the massive LEED-required K-12 school construction program for higher education is two-fold:

- The number of professionals qualified to design, construct and operate HPD's will increase significantly in coming years, providing a talent and knowledge pool for campuses to tap.
- As students attend HP K-12 schools the importance they give to building performance is likely to be much greater when they consider choosing a higher education institution.

State policy also supports the purchase of environmentally preferable products, supporting earth-friendly construction materials and building equipment.

The New Jersey Board of Public Utilities policy supports market transformation to promote energy efficiency and clean energy. The Board has programs and financial resources available to assist with the acquisition of energy-efficient devices and to promote the use of renewable sources of energy in renovation and new construction projects. These funds support the planning and design process, technical consultations, audits, and the purchase of energy-efficient equipment and green energy generation.

Legislation has been introduced by Senator Martha W. Bark, District 8 (Burlington) that requires existing state buildings to be evaluated under certain energy and environmental performance standards (LEED) and new State buildings to be designed and managed using those standards.

The federal government has been a leader in HPD, with many federal agencies seeking LEED certification for their projects. Among are the leaders are the Department of Defense, the Environmental Protection Agency, the General Services Administration and the Department of Energy (see Resources). Federal agencies are required to consider life cycle costs when proposing new facilities.

The Congressional Leave No Child Behind Act of 2001 contains a "healthy schools" provision requiring a study of the impacts of decayed schools on child health and learning as well as grants to the states to jump-start "green" design and engineering for indoor air quality and energy efficiency in school renovations. (No money has yet been appropriated for these provisions.)

On April 27, 2006, Governor Corzine issued Executive Order #11, which mandates increased energy efficiency and use of renewable and sustainable materials in all state facilities, including state-run and/or financed higher education institutions and buildings.

HPD ON NEW JERSEY CAMPUSES

Many New Jersey campuses are applying HPD to their buildings:

Bergen Community College is in the planning process of a new high performance Arts Building.

Caldwell College is actively exploring green design for a new dormitory.

The College of New Jersey is pursuing LEED certification for its new library and is incorporating LEED as an objective for other new construction.

The College of Saint Elizabeth is integrating green design features in their New Arts Center.

Drew University will be using many high performance features in the renovation of Seminary Hall.

Fairleigh Dickenson University is completing a feasibility study of a new green library on their Madison campus.

Georgian Court University is currently in the planning stage of a new Wellness Center to be LEED Silver rated.

Kean University has a LEED-rated building, the Center for Academic Success pursuing a LEED gold rating and a planned Wellness Center under construction.

Montclair State University's New Academic Building aims for LEED certification, as does its planned Recreation Center.

New Jersey City University has integrated the NJHEPS High Performance Campus Design Guidelines with their own guidelines.

The New Jersey Institute of Technology Student Center is incorporating many aspects of HPD, including photovoltaic cells, water conservation equipment, a green roof and high-efficiency boilers.

Ocean County College is committed to High Performance Buildings for new facilities as well as for renovation of existing facilities, and has a LEED-certified Technology Center.

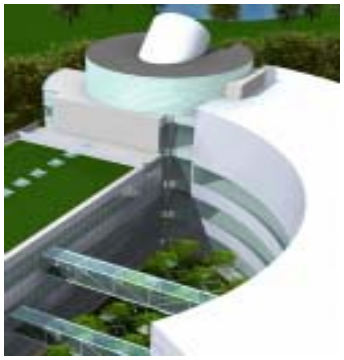
Princeton University has a policy of constructing High Performance Buildings.

HPD ON NEW JERSEY CAMPUSES

Ramapo College of New Jersey is developing a Sustainability Center to be LEED-certified.

Richard Stockton College is planning a LEED-certified laboratory addition.

Rowan University has made a commitment that all new buildings will be built to LEED standards, if not certified.



Rutgers University proposed LEED Institute for the Environment and High Performance Design policy for new buildings.

Seton Hall University is actively exploring green design for its laboratory renovation and addition.

Sussex County Community College is building a new Academic Building that will be LEED certified or Silver. They are also integrating green design in all future projects.

The University of Medicine and Dentistry is dedicated to High Performance Design by instituting a policy on all new construction.

POTENTIAL OBSTACLES TO HPD

"The administrative time and cost associated with the documentation required for LEED certification may discourage certification efforts."

Response: LEED procedures and requirements have been revised in the latest version, LEED 2.1, to streamline and simplify the certification process, and compliance costs often have a very short payback period (1 - 2 years), especially if integrated into project planning from the beginning.

"*HPD changes roles of architect, building facility people, design professionals.*"

Response: Facilities professionals can become familiar with the HPD process through professional publications, workshops, and LEED certification training.

"Nationally and internationally-known architects that some campuses hire may not be either sympathetic to or knowledgeable about HPD. And HPD may be difficult to fit in with a particular style, building mass, orientation or exterior skin that a campus desires."

Response: Careful selection of the design team and a comprehensive up-to-date campus master plan and design guidelines can minimize these issues.

"A HPD requires more work and could lengthen design and construction process."

Response: This can be true. However, adequate advance planning can afford sufficient time to have a properly designed HP building while meeting campus space needs in a timely fashion. In many cases, the integrated approach of HPD can even speed up construction and prevent unnecessary delays.

Compensation practices for design professionals do not provide sufficient incentive for HPD.

Response: Structure compensation to reward high performance design and innovation.

HPD's may not function as planned, causing problems for those on campus who championed the concept.

Response: Be realistic in expectations and performance targets. Have a comprehensive commissioning process in place to insure that systems work as per specification. Train building managers and maintenance staff to understand novel features of materials and systems. Learn from mistakes so the next project is better.

PRACTICAL STEPS TO SUCCESSFUL HPD

- The selection of a design team, usually through a Request for Proposal, is a critical step in insuring that the right people are chosen. The American Institute of Architects has published 16 actual Green RFP's (see Resources).

- Senior campus administration needs to support HPD through written policy and clear communication to campus constituencies.

- Specific campus goals for HPD should be established through an inclusive workshop or *charrette* process and incorporated into the campus master plan. These goals may include, for example, achieving a particular level of LEED certification and reducing energy consumption and greenhouse gases by an agreed-upon percent. Other possible goals: using predominantly sustainable building materials, reusing certain facilities, moving towards integrated pest control, water body restoration, or the planting of native grasses. *This is the time to achieve a balance between those who want zero-emission buildings with all-sustainable materials and those who believe that the campus facilities are just fine as they are.*

- Conduct *charrettes* or work sessions in the programming stage, schematic design phase, design development phase and the construction document phase. This creates a way to ensure all implications of any design decision have time to be processed and/or changed.

- *Have a clear collaborative communication program in place to assist, guide and engage the team in the process.* One important tool is a project website, where all submittals can be hosted at one place so all stakeholders have access to secure viewing of all drawing, submittals and other documentation required. Other tools are the use of conference-calling and web-conferencing tools. Project teams using these tools streamline the process.

- Understand that the first (maybe even the second) building or grounds project will not perform exactly as expected. *Recognizing the learning and development curve will help prevent a backlash that discredits future attempts at HPD.* An example of such a backlash can be found on many campuses with regard to recycled paper. Because quality was often not first-rate when recycled paper was introduced years ago, current efforts to promote recycled paper, now a high-quality and low-cost product, often meet resistance because of memories of earlier less-than-successful experiences.

- Create the context, goals, and administrative structure for managing the project before the program is developed, or as the concepts and drawings are being prepared. *HPD is only achieved through a planning process that starts early and remains through the completion and testing or commissioning of the building.* Adding green features to a project already underway will achieve little and may even be counterproductive.

- Look for funding from government rebate programs such as the BPU SmartStart program, and involve utilities and state agencies early in the process to insure maximum utilization of subsidy money and opportunities for regulatory streamlining. Several funding programs (like SmartStart) exist to fund the process of designing and planning green buildings.

- Hire an architect and design team who has demonstrated experience in HPD.

- Recognize that the design fees may be more than conventional projects. *Since design fees make up much less than 1% of the life cycle costs of the building, not providing adequate fees for the additional collaboration, research, energy modeling and design process work often required can be shortsighted.*

- Benchmark or compare conventional building capital and operating costs throughout the process to guide decision-making and provide the data for the publicizing of the building to campus constituents.

- Prepare clear construction documents. *Since many HPD facilities will be calling for materials and processes that are not well-known to contractors, the preparation of clear construction documents is critical to a successful project.* Articulating the data collection and reporting expected to gain LEED certification, if sought, should be included in the construction documentation.

- Maximized operational efficiencies. *Do not forget operations.* Many of the building benefits may be negated by operational and maintenance procedures that do not fully exploit the installed systems. Involving the operation and maintenance staff throughout the process, from the first goal-setting workshop to participation in design team meetings, will help insure that buildings operate as intended or are modified as problems are discovered after the building is occupied.

- Commissioning or verification of the installation, documentation, function, performance and training of the systems is essential to achieving the benefits of HPD. Many construction management firms advocate commissioning as a way to reduce liability by insuring that systems work properly. *Resist the temptation to dispense with comprehensive commissioning because of unfamiliarity or added first costs.* State financial support for commissioning is often available, and the payback for commissioning costs is often measured in months, not years. Commisioning and verification establish a firm baseline for future masterplans, and strategies for further energy-efficiency improvements in the future.

Ocean County College Technology Building

This $6 million 25,000 square-foot building is the first college facility in the State of New Jersey to apply for LEED certification. The building provides the latest computer technologies learning setting for the students, faculty and visitors with classrooms, labs, lecture hall, offices and support facilities. High-efficiency heating, air conditioning, ventilation systems, lighting systems, glazing systems, insulation, control systems and other systems were incorporated into the design. In addition, LEED construction practices, the use of recycled materials, and other High Performance Building techniques were included. The college also installed a fuel cell to meet energy demands in an environmentally responsible manner.

Further information: email Ken Olsen, kolsen@ocean.edu.

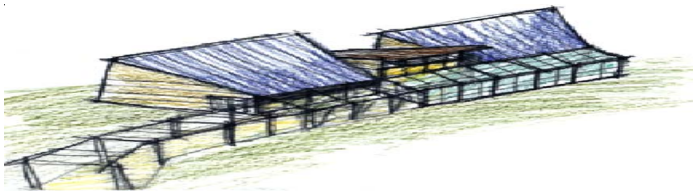
Ramapo College Sustainability Center

This proposed 6700 sq. ft. building will use state-of-the-art sustainable technologies to provide college and K-12 classroom space, an environmental science laboratory, offices, display space and a greenhouse. Among the planned features of the building are weather monitoring equipment, solar panels, a wind turbine generator, energy efficient appliances and lighting, waterless toilets, organic gardens, solar hot water heater and native planting.

A later phase of the project will include an Ecological Living Facility (ELF), a residential facility for 12 students. Residents will model sustainable living by helping to maintain the gardens, monitor the interior systems and provide outreach programs to visitors. The goals of the RCSC are to provide:

- Model sustainable classroom and laboratory space for Ramapo College environmental programs
- A teaching/learning facility and demonstration building as a resource for sustainability for the campus and the wider community
- A resource for education in sustainability at all levels: K-12, college, and the general public
- A center to house and disseminate information and knowledge to the college, public schools, and the general public

Further information: http://www.ramapo.edu/resources/SpecialResources/sustainabilityctr/.



Kean University Center for Academic Success

This 124,000 sq. ft. building, aims for LEED Gold certification, at a cost of $169/sq. ft. It will have solar panels, energy-efficient and Earth-friendly HVAC systems, digital metering and extensive energy management, and energy-efficient lighting (energy efficiency is projected to be 20% above code). Moreover, the building will recycle or salvage at least 75% of construction debris and land-clearing waste. The concrete and masonry from the building it is replacing, for example, were crushed on site and used as backfill.

Further information: email John Maso, jmaso@kean.edu.

Montclair State University New Academic Building

Scheduled for completion in October 2005, this 270,000 sq. ft. building aims for LEED certification. Strategies include stormwater management (including filtering dissolved phosphorus); waterless urinals; recycling of construction waste; energy efficiency at 22% above code; extensive use of recycled content; certified sustainable wood; and low-VOC paints, sealants, and composite wood products. The architecture firm, The S/L/A/M Collaborative used an unusual simultaneous programming/design process to develop a series of conceptual design options, resulting in contract documents thirteen months after design contract award. As of Winter 2003, costs associated with LEED certification have been substantially lower than projected. MSU also seeks to apply its LEED experience in the planned construction of a LEED-certified Recreation Center.

Further information: email Walter Kanzler, kanzlerw@mail.montclair.edu.

Oberlin College (Ohio)

The Joseph Lewis Center for Environmental Studies is the best known green campus building, It was constructed in 2000 and contains many advanced features including an 'indoor living machine' to purify waste for reuse in the toilets, an extensive array of photovoltaics with the goal of eventually producing more energy than the building consumes, extensive daylighting and sustainable materials.

Further information: http://www.oberlin.edu/envs/ajlc/Default.html.

Northland College (Wisconsin)

This $4.1 million investment in green building design demonstrates Northland College's commitment to developing a sustainable future. The 32,373 sq. ft. two-story student-housing complex has 114 residents and is used in the college's curriculum to teach about energy performance, green materials, building lifecycles and sustainability. Computers monitor the building's renewable systems: passive solar South wing; a 20-kilowatt wind turbine, a solar domestic hot water system, and three photovoltaic panels. Students were involved throughout the design process. Other features include: high efficiency gas boilers and light fixtures; operable windows instead of air conditioning; heat recovery ventilation; low-flow showers and toilet fixtures; composting toilets; low VOC finishes to ensured exceptional indoor air quality; high recycled-content products; bio-composite counter surfaces; and regionally harvested wood. The building was designed to be 50% more energy and water efficient than a typical college residence.

Further information: http://www.northland.edu/studentlife/ELLC/index.html.

Joseph Bren School (California)

Opened in April 2002 at the University of California, Santa Barbara, Donald Bren Hall is the "greenest" laboratory building in the United States, and has achieved LEED Platinum certification. Bren Hall sets a high standard for sustainable buildings of the future, and is being used as a model for facilities and operations at UC Santa Barbara and other UC campuses and throughout the state of California.

Further information: http://www.esm.ucsb.edu/about/donald_bren_hall.html.

RESOURCES

New Jersey and Regional Resources

New Jersey Higher Education Partnership for Sustainability
http://www.njheps.org/

New Jersey Higher Education Partnership for Sustainability (*NJHEPS)*, Green Design Team
http://www.njheps.org/people.html

New Jersey Board of Public Utilities
http://www.bpu.state.nj.us

New Jersey Clean Energy Program
http://www.njcleanenergy.com/

New Jersey Schools Construction Corporation
http://www.njscc.com/index.asp

Northeastern Sustainable Energy Association
http://www.nesea.org

U.S. Green Building Council, Local Chapters
NY, NJ and the Delaware Valley each have chapters. These chapters provide local, regional and statewide resources for LEED, creating opportunities to produce educational workshops, present case studies and network within the industry.
http://usgbc.org/Chapters/newjersey/default.asp

Delaware Valley Green Building Council
http://www.usgbc.org

New York Chapter Green Building Council
917-656-1800
catherineshawn@go2buildings.com

National organizations and companies

American Institute of Architects. "Writing the Green RFP…16 Sample Requests for Proposals for High Performance Projects."
http://www.aia.org/pia/cote/rfp

Building Commissioning Association
http://www.bcxa.org

Building Commissioning Association. "Do school facilities affect academic outcomes?"
http://www.edfacilities.org/pubs/outcomes.pdf

Breaking Down the Barriers: Challenges and Solutions to Code Approval of Green Building. David Eisenberg, Robert Done, Loretta Ishida (Tucson, Arizona Development for Appropriate Technology, 2002).
http://www.dcat.net/about_dcat/current/Breaking_Down_Barriers.pdf.

Environmental Building News
http://www.buildinggreen.com

Green Developments 2.0 (CD-ROM)
Rocky Mountain Institute
http://www.rmi.org/store/p385pid959.php

Green Resource Center
http://www.greenresourcecenter.org

High Performance Campus Design Book, Vol. II, Sustainable Design Guidelines
http://www.njheps.org/greenbuildings.htm

National Association of College and University Business Officers
http://www.nacubo.org

National Wildlife Federation - Campus Ecology Program-Green Buildings
http://www.nwf.org/campusecology/ListProjects.cfm?id=2

Oikos: Green Building Source
http://www.oikos.com

Second Nature
http://www.secondnature.org

Society for College and University Planning
http://www.scup.org

Solar Electric Power Association- Schools Going Solar
http://www.ttcorp.com/upvg/schools/

Sustainable Buildings Industry Council
http://www.sbicouncil.org

U.S, Green Building Council
http://www.usgbc.org

Whole Building Design Guide
http://www.wbdg.org

Federal Resources

National Clearinghouse for Educational Facilities
http://www.edfacilities.org

U.S. Department of Energy, Energy Efficiency and Renewable Energy Network-Smart Communities Network: Creating Energy Smart Communities
http://www.sustainable.doe.gov

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy-High Performance Buildings
http://www.eren.doe.gov/buildings/highperformance/

U.S. Department of Energy and U.S. Environmental Protection Agency, Labs21 (Labs for the 21st Century)
http://www.epa.gov/labs21century

U.S Environmental Protection Agency-Comprehensive Procurement Guidelines
http://www.epa.gov/cpg/products.htm

EPA-Green Building
http://www.epa.gov/greenbuilding

EPA Energy Star for Higher Education
http://208.254.22.6/index.cfm?c=higher_ed.bus_highereducation

Other Jurisdictions

Building Green in Pennsylvania
http://www.gggc.state.pa.us/building/newbldg.htm

California Integrated Waste Management Board-Green Building Design and Construction
http://www.ciwmb.ca.gov/Greenbuilding/Blueprint

Minnesota Sustainable Design Guide
http://www.sustainabledesignguide.umn.edu

New York City Department of Design and Construction-High Performance Building Guidelines
http://www.nyc.gov/html/ddc/html/highperf.html