



Cohousing: How Green Is My Village?

COMMUNITY IS THE HIDDEN dimension of sustainability." Jim Leach, president of the Wonderland Hill Development Company, is convinced of the power of community. A paradigm of automobile-based land use, and with it suburban independence, has dominated American development patterns over the past 50 years. Although it still appeals to many American families, this suburban dream has social and environmental drawbacks that are leading some prospective homeowners and tenants to seek alternatives. The cohousing development model offers such an alternative. Along with offering a sense of community, cohousing opens a wide range of green building opportunities.

This article addresses cohousing, tracing its history and recent trends, examining the sustainability options provided by this form of development, and looking at some leading examples from around the U.S. While offering opportunities to improve our sustainability, cohousing also presents a unique set of design challenges that will be explored below.

History, Trends, and Definitions

According to cohousing lore, 27 dedicated families near Copenhagen, Denmark became the first cohousing community in 1972. This *bofællesskaber* or "living communities" model gained popularity and quickly spread throughout Denmark and Europe. In the 1980s, Americans (continued on page 10)

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"The process at ASTM was so slow. It was taking a long time to get the standard together. Out of that frustration, we said, 'Let's go with the Council.'"

David Gottfried on the ASTM origins of the U.S. Green Building Council

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Hearthstone Denver, Colorado

Developer: Jim Leach, Wonderland Hill Development Company

Completed: February 2002

Setting: 34 units on 1.6 acres (0.6 ha); urban North Denver; part of a mixed-use redevelopment of the old Elitch Gardens amusement park called Highlands' Garden Village by Perry Rose LLC

Web site: www.denvercohousing.com

Home size: 1,304 to 2,114 ft² (120–200 m²); finished space totals 650 to 1,350 ft² (60–125 m²)

Shared space: Common house, including kitchen, dining area, guest room, children's room, teens' room, laundry room, meeting and office spaces, mailroom, large patio; workshop

Green strategies: Panelized construction with 2x6s 24" (600 mm) on-center (advanced framing) was used. Wet-spray cellulose provides R-22 (RSI-3.9) walls and R-38 (RSI-6.7) ceilings. With high-performance windows, ENERGY STAR® appliances, and whole-house fans, the homes achieved a 90



Photo courtesy of Wonderland Hill Development Co.

HERS rating, exceeding the ENERGY STAR Home requirements. Green products include ChoiceDek™ recycled-plastic-composite decking, Mohawk 100% recycled-PET carpeting, fiber-cement siding, straw-particleboard shelving, and low-VOC paint. Xeriscaping was used outdoors with limited turf areas.

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Lighting Design and Sustainability

Your recent "Electric Lighting" article (Vol. 11, No. 6, June 2002) did an accurate and thorough job of summarizing the complex technical and environmental issues regarding lamps. As a professional lighting designer and LEED™-accredited consultant, I appreciated your valuable point that while the article focused on technology and not design, "the two are inextricably linked."

I thought EBN readers might be interested to know that the International Association of Lighting Designers (IALD) has recently established a Sustainability Committee. I'm glad that you sought input from Dave Nelson of Clanton & Associates—he and that firm are active participants in our committee work.

IALD is a 33-year-old organization of more than 700 professional lighting designers worldwide. It has been deeply involved for many years in the development of energy codes and metrics for evaluating the quality of the visual environment. The Sustainability Committee is a natural step in that advocacy work. This group has taken the lead on defining how lighting designers and manufacturers can best integrate these design, technology, and environmental considerations. The Lighting Industry Research Council (LIRC), an IALD-affiliate organization of lighting manufacturers, for which I am the IALD co-chair, is working with the IALD Sustainability Committee on these initiatives.

One of our first steps was to develop the working definition: "Sustainable lighting design meets the needs of the visual environment with the least impact on the physical environment." The attributes of this ap-

proach are described in an article I recently wrote for *Architectural Lighting* ("Sustainable Design: Getting the Green Light," January/February 2002).

Building owners, facility managers, architects, and engineers should be aware that IALD members are ready, willing, and able to help navigate these lighting design and technology issues. For further reference, readers can check the IALD Web site (www.iald.org/index.htm) or contact Sustainability Committee chairperson Samantha Hollomon with Hayden McKay Lighting Design, Inc. in New York (samantha@hmlidi.com) or me (MLoeffler@retec.com).

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The Construction Contractor's Perspective

I found your recent feature article ("Getting from Design to Construction," EBN Vol. 11, No. 7/8) one of the most intriguing yet. I participate in many seminars and events surrounding green building, and the same attitudes and comments from the design community come up at each event—[about how] architects in a learning curve for green building do not allow the same grace of a learning curve for general contractors. I appreciate Ms. Koko's comments on designers being more patient when it comes to the cost, procurement of materials, and understanding of what green building means to the contractor. There is a wealth of information concerning green design. There is not enough information out there for those who make the building a reality.

Additionally, the reality of the bidding process is that one bids on what one knows, the age ol' learn-by-burn method. Right now this is a "burn" area for some contractors, even those that are a step ahead of the curve. Resistance to getting the GC involved as part of the team early on in a green project, LEED or otherwise, is a mistake. I understand that some projects do not allow for a GCs early involvement, but don't you think that maybe, just maybe, you are forcing the hand of a GC to price on risk, or "burn," rather than on what they know? Green building is about education, information exchange, hope for the future, right? So I hope that other contractors out there will stand by me when I say, "Give us a break." Do not continue to leave us out of the loop. We are not the bad guy. We see that this is the way that construction is going. We see that this is the

right thing to do, and we are all just trying to figure it out.

SOME contractors do care about the environment and are working hard to establish lower-impact solutions for construction processes. SOME are working on efforts and initiatives that go beyond what is outlined in LEED or other green building criteria. SOME are even understanding that sustainability applies not just to design and construction but how our businesses/offices operate. Take a closer look at your GCs; get to know them, and get to know what they are doing with all avenues of their business. I think you will like what you see, and it might even be fun!

Kimberly Ann Pexton
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In related news, ASHRAE is working to strengthen its own commitment to sustainability. The Society approved a "Building Sustainability Position Statement" during its annual meeting in June and is working toward completion of a resource tentatively titled *ASHRAE GreenGuide*. According to David Grumman, chairman of ASHRAE's green building subcommittee, "We are not trying to sell the HVAC designer on green design." Rather, the aim is to assist engineers who find themselves working on green projects. "This guide should answer the question 'What do I do now?'" explains Grumman. The position statement can be downloaded from ASHRAE online. The *GreenGuide* should be available by the end of the year.

Also at its annual meeting, ASHRAE proposed *Addendum e* to its current 90.1-2001 Energy Standard. If approved, *Addendum e* will provide a method of rating building designs that go beyond minimum energy requirements. The addendum may eventually replace the existing Energy Cost Budget Method in Section

11 as the U.S. Green Building Council's LEED™ benchmark for energy performance. Recognizing the problems inherent in measuring high-performance buildings with a tool intended for conventional design, Don Steiner, member of the 90.1

committee, explained: "*Addendum e* creates a method by which users can determine how much their design exceeds the requirements of Standard 90.1. This allows for a wider array of measures to receive credit and higher ratings for exemplary buildings." The 45-day public review period for this addendum concludes on September 9, 2002. — JB

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What's Happening

ASHRAE Energy Standards in the News

The U.S. Department of Energy (DOE) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have announced a changeover in the commercial building reference standard for state building energy codes in the federal Energy Conservation and Production Act. The ANSI/ASHRAE/IESNA Energy Standard for Buildings Except Low-Rise Residential Buildings 90.1-1999 will replace the 90.1-1989 edition. States have until July 15, 2004 to certify that their own energy codes are at least as stringent as 90.1-1999 or demonstrate why they should not be held to the standard. Since only New York and New Jersey currently reference the 1999 version, the decision has far-reaching implications.

The ruling predicts that new build-

ing efficiency will improve by 6% for source energy and by 4% when considering site energy due to the change. The ruling was published in the July 15 edition of the *Federal Register* and is available online at www.access.gpo.gov/su_docs/fedreg/frcont02.html.

As this ruling about the 1999 version was released, ASHRAE had already announced publication of 90.1-2001. Larry Spielvogel, former chair of the 90.1 committee, told *EBN*, "There are very few substantive differences between the 1999 and 2001 versions. The 2001 version has 34 addenda to the 1999 version, mainly to clarify and simplify the content." Although DOE is already reviewing the most recent 90.1-2001 version, the committee has made no estimation of when the evaluation will be complete.



Problems With Dishwasher Energy Ratings

Wouldn't it be nice, in shopping for a dishwasher, if you could go down to your appliance store, review the EnergyGuide labels or ENERGY STAR® designations, and be confident that you were really getting an energy-efficient dishwasher? It would be nice, but it's not the case. Due to a glitch in the DOE efficiency test procedure for dishwashers, models are being grossly mislabeled regarding their energy performance.

Here's the problem: Years ago, DOE came up with a standardized procedure for measuring the efficiency of dishwashers—this test calls for filling the dishwasher with clean dishes and measuring water and energy consumption through a wash cycle. (Most of the energy consumption with dishwashing is associated with heating the water—either externally, through a water heater, or internally in the dishwasher.) That used to be fine because dishwashers used the same amount of water (and energy) whether the dishes were dirty or clean. But over the past few years, manufacturers have introduced advanced dishwashers with sensors that measure how dirty the dishes are and adjust the hot water use accordingly. These sensors have photoelectric eyes that sense the turbidity of the wash water. Roughly 40% of dishwashers manufactured today are equipped with this sensor technology, according to Consumers Union, publisher of *Consumer Reports*.

In general, sensors are a good thing, according to Whirlpool's Mike Thompson. "They allow dishwashers to clean better," he says, "because they sense the amount of soil or particulates in the water and use more water [when it's needed]." When dishes are fairly clean, sensor-equipped dishwashers use less hot water. Conversely, however, some dishwashers with sensors use a whole lot more energy when the dishes are even moderately dirty. According to Consum-

ers Union, some use twice the energy to clean dirty dishes as they use for clean dishes. The problem is that the current DOE test procedure doesn't have any way of measuring that increase in energy consumption when the dishes are dirty—so we don't know what the energy consumption of a sensor-equipped dishwasher in real life will be.



Photo: Whirlpool Corporation

Whirlpool expects that its GUI1500xtl dishwasher, with AccuWash™ Sensor technology, will continue to satisfy ENERGY STAR requirements if the draft DOE test procedure for dishwashers is adopted.

As a result, some dishwashers with the highest energy performance ratings can be real energy hogs in actual use. And some of the most efficient dishwashers (in real use) don't do that well in the comparative ratings.

In response to this problem, the Consortium for Energy Efficiency (CEE) recognizes only *non-soil-sensing* ENERGY STAR dishwashers in their Super Efficient Home Appliances Initiative. Similarly, the State of Oregon may be pulling all sensor-equipped dishwashers from the list of energy-efficient products eligible for its rebate program—until a new test procedure is in place. According to Charlie Stevens, a policy analyst with the Oregon Office of Energy,

there is general consensus within the appliance industry that a new dishwasher test procedure is needed. Indeed, a revised standard has already been developed by DOE—but the Notice of Proposed Rulemaking (NPR) with the new procedure is apparently mired in DOE's bureaucracy. For a while, the NPR was languishing in the General Counsel's office at DOE, but according to Thompson, it has apparently been sent back to the Codes and Standards group. While some suggest that it could take another two years for the new test procedure to be put in place, Thompson believes that if there are no serious problems, it could be implemented pretty quickly. The NPR is supported by the Association of Home Appliance Manufacturers, indicating that manufacturers are generally supportive of it. "Everything's ready to go," Thompson told *EBN*.

Just how different the energy performance of dishwashers will be under the new test procedure is very important. If the "dirty-dish" energy performance (as the new test will measure) is a lot worse than the "clean-dish" performance, models may lose their ENERGY STAR designations or see their EnergyGuide performances drop considerably. In some cases, manufacturers may actually have to reconfigure or redesign their dishwashers to retain efficiency designations. Thompson was unable to comment on where Whirlpool stands relative to all this, but the company clearly knows—not only about their own models but about competitors' products as well. "We've tested all our competitors' models," Thompson told *EBN*. Among other manufacturers' products, he said the drop in energy performance with the new test protocol will be "marginal to quite significant." Some manufacturers are "egregiously underreporting the energy use," he said. "It's a real problem."

The issue of sensor-equipped dishwashers raises some interesting questions about dishwashing habits. Manufacturers have tried to con-

vince consumers not to prerinse dishes, but if prerinsing could reduce energy consumption of the dishwasher by up to half, should that practice be reconsidered? A sensor-equipped dishwasher will indeed save a lot of water and energy if the homeowner rinses the dishes before putting them in the dishwasher; if this prerinsing is done with just a small amount of *cold* water, the overall resource use for washing a load of dishes may be lowest with prerinsing and washing in a sensor-equipped dishwasher. Thompson notes that dishwashers from all manufacturers do a great job of cleaning dishes today without any prerinsing; Whirlpool and other manufacturers continue to argue against prerinsing. Studies conducted by Ohio State University several decades ago showed that prerinsing increases overall water and energy use of dishwashing—but this research was before the introduction of dishwashers equipped with sensors.

In response to the problem of inaccurate energy ratings of sensor-equipped dishwashers, we are revisiting the criteria used for approval of dishwashers in our *GreenSpec Directory*. Until new test procedures are in place, we expect to pull all sensor-equipped dishwashers from our *GreenSpec*-approved list unless the manufacturers can demonstrate that they meet our stringent Energy Factor threshold even with soiled dishes. — AW

For more information:

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Newsbriefs

Following the example of Denmark, France, Sweden, and the Netherlands, the **United Kingdom recently enacted a tax on commercial use of aggregate**. The tax affects U.K.-extracted as well as imported sand, gravel, and rock, with some exceptions. To ensure international competitiveness, exported aggregate is exempt from the tax. The U.K. Customs and Excise Department introduced the tax to address societal costs of impacts such as noise, dust, and habitat destruction resulting from aggregate extraction. Shy of the environmental cost of £1.80/tonne (\$2.75/ton) of primary aggregate extracted estimated by the Department for the Environment, Transport and the Regions, the tax is set at £1.60/tonne (\$2.45/ton). Revenues will go toward a reduction in corporate National Insurance contributions and the formation of a £35 million (\$53.5 million) Sustainability Fund, making the policy revenue-neutral for the government and beneficial to businesses not involved with the extraction of aggregate. The tax should encourage more efficient use of aggregate, including recycling and will, in effect, lower the cost of wood structures, which in the U.K. are considered better environmentally, relative to conventional construction practices. Visit the Customs and Excise Web site at www.hmce.gov.uk for further information.

In an effort to solve the ongoing problem of sourcing raw material for production of photovoltaic (PV) cells, **AstroPower, Inc.** has teamed up with the Norwegian company Elkem to develop a cost-effective process for producing **solar-grade silicon** directly from quartz. Traditionally, the PV industry has obtained waste silicon from the semiconductor industry, which requires higher-purity silicon than needed for PV cells. As PV production has grown, this waste-stream silicon has become a limiting

factor. "Removing these raw material constraints will enable AstroPower—and eventually the solar power industry as a whole—to better meet the demand for solar power technology," said Dr. Allen Barnett, president and CEO of AstroPower. The initial focus of this joint venture is production of solar-grade silicon for AstroPower's proprietary Silicon-Film™ process. Industrial-scale production should be achieved by late 2003 or early 2004. For further details, visit www.astropower.com.

The province of Quebec announced in early July that it will ban the use of most **nonfarm pesticides** by 2005. In a phased introduction of restrictions, Quebec will quickly ban the use of 30 specific pesticides on public lands, including parks, schools, day-care centers, and hospitals. By the beginning of 2005, the ban will extend to private and commercial properties. In announcing the policy, Quebec Environment Minister André Boisclair said that "people's health is more important than a perfect lawn; I enjoin Quebecers to no longer use pesticides." This policy follows a June 2001 Canadian Supreme Court ruling that allows cities to ban the use of pesticides in residential areas. Fines for violations will range from C\$500 to \$3,000 (US\$325 to \$1,960).

On July 23, Governor Jane Swift of Massachusetts signed Executive Order 438 creating a multi-agency **State Sustainability Council**. The initiative is aimed at ensuring that state agencies consider environmental consequences of their actions and establishing sound environmental practices for state agencies. "We in state government must lead by example," said Governor Swift in announcing the initiative. The measure builds on the Clean State Initiative (Executive Order 350), which was signed by Governor Weld in 1993. The State Sustainability Council, established through the executive order,

will establish sustainability goals, recommend to relevant state offices sustainability priorities, and assist 16 state agencies in the development of sustainability guidance documents. The state sustainability goals will address such issues as reduction of greenhouse gas emissions, minimization of solid waste and mercury emissions, and environmentally responsible design and construction of state facilities.

The Canada Mortgage and Housing Corporation (CMHC) has completed a survey in which **straw-bale houses** were found to use an average of 21% less space-heating energy than conventional houses. Because comparable conventional homes were not available, the study compared eleven straw-bale homes of various sizes and bale wall types to conventional houses modeled by HOT2000 software. Nine of the 11 straw-bale houses performed better than the conventional models, with savings ranging from 4.7 to 38.7%. The research report is available online at www.cmhc.ca/en/Library/chic/chic_001.cfm.

Another recent study funded by CMHC examined **wood use in straw-bale homes**. In the study, wood use in the envelope of a load-bearing straw-bale home in southern Ontario was carefully tracked by the builder and compared with modeled wood use for the exterior envelope of a comparably sized wood-frame home with 2x6 walls. Wood for interior partition walls and interior finish was not included because those usages would be comparable for both straw-bale and conventional houses. The study found that the load-bearing straw-bale home used 32% less total wood. Exterior walls in the straw-bale house used 57% less framing lumber, while the roof system required 11% more framing lumber. (In the straw-bale home, 60% of all

lumber use was for the roof system.) The savings in dimensional lumber use totaled 22%, and savings in engineered wood products (OSB and I-joists) 60%. If wood use for interior partition walls and interior finish were included in the comparison, the percentage savings in the straw-bale home would be lower. For information, visit www.cmhc.ca (search for "Wood Usage in Straw Bale House Construction"), or contact CMHC at 613/748-2000.



Photo courtesy of Canada Mortgage and Housing Corp.

There has been growing interest in straw-bale house construction in Canada. This straw-bale home in Montreal belongs to architect Julia Burke.

In an effort to convince employees to **carpool, walk, bike, or take public transit to work**, Berger/ Abam Engineers, a 120-person Seattle consulting firm, provides a car that employees who don't drive to work can use during the day. According to the July 22 edition of *The Seattle Times*, the hybrid Toyota Prius can be signed out at no cost and used for errands, doctor's appointments, and lunch engagements. A nonprofit organization in Seattle, Commuter Challenge, has been working with King County companies to reduce solo commuting, and the group has been successful in convincing a number of firms to provide a vehicle for daytime use. (The need for a car for occasional daytime trips has been cited as a

major obstacle to leaving the car at home.) Other incentives being used to encourage alternatives to solo commuting include subsidized bus passes, showers for bicyclists, more convenient parking for car pools, and higher charges for parking. One impetus for such efforts is Washington State's Commute Trip Reduction law, enacted in 1991, requiring companies and other organizations with at least 100 day-shift employees to adopt plans to achieve 35% reductions in solo commuting by 2005. For further details, visit www.commuterchallenge.org.

The Portland, Oregon Office of Sustainable Development announced in July the release of **Portland LEED**, the first locally tailored version of the LEED™ Rating System to be approved by the U.S. Green Building Council. The new version incorporates Portland's stringent Stormwater Management and Erosion Control Manuals as well as the State of Oregon's Energy Code, allowing developers to achieve LEED credit for meeting or exceeding local standards. Portland LEED also reserves innovation credits for projects that recognize the city's land-use and transportation goals through mixed-use development, reduced automobile use, stormwater management, and construction and demolition waste management. Both the City of Portland and the Portland Development Commission require city-financed development to achieve Portland LEED certification. The Portland LEED supplement guidance document is online at www.green-rated.org.

Urban Ecology, a California-based nonprofit organization committed to the intersection of people, cities, and nature, has announced the discontinuation of its *Urban Ecology* magazine, beginning with the Summer 2002 issue. The organization will fo-

cus its resources on strengthening its Community Design Program and land-use planning policy advocacy work. More information is available online at www.urbanecology.org.

According to a California Public Interest Research Group (CALPIRG) Charitable Trust report, **energy produced from renewable sources** is cheaper over the long term and creates far more jobs than energy from natural gas power plants. The report, *Renewables Work: Job Growth from Renewable Energy Development in California*, combines the results of economic studies with the findings of operating renewable-energy facilities. According to the report, building 5,900 MW of renewable energy capacity (including wind, geothermal, solar PV, solar thermal, and landfill/digester gas facilities) would generate 120,000 person-years of employment over 30 years of operation. Building the same capacity of natural gas power plants, by comparison, would create only one-fourth as much employment and require \$10.3 billion in gas purchases. Additionally, because renewable power sources do not require continual fuel purchases, a higher percentage of their generating costs stays in the local economy as wages. For the complete report, including a breakdown of employment rates by type of renewable energy, visit www.calpirg.org/reports/renewableswork.pdf.

Architectural Engineering has released a call for abstracts for the first in a series of **conferences to advance the effective integration of building design, construction, and operation**. The conference will include over two dozen topics, ranging from specifics such as illumination, design for the aging, and the LEED™ Rating System to broader topics such as ethics and mitigation of terrorism. The con-

ference will be held September 17-20, 2003 in Austin, Texas. The submission deadline for abstracts is October 1. Full details are available at www.aeinstitute.org.

The Swiss World Wildlife Fund (WWF) and other European organizations have launched the **Natureplus label for building materials**. Products displaying the Natureplus seal are guaranteed to be "manufactured in an environmentally friendly manner, harmless to health, and of a high functional standard," according to WWF. The seal, representing products from Germany, Austria, Switzerland, Italy, the Netherlands, Belgium, and Luxembourg, incorporates numerous existing labels, thus avoids consumer confusion. Insulation, timber materials, and roof tiles already display the seal; WWF plans to include linoleum, wood flooring, paint, lacquer, mortar, and putty soon. WWF International is online at www.panda.org.

Awards & Competitions

The **U.S. Green Building Council** has announced a new awards program to honor leaders who are helping transform the building market. Awards will be given in three categories: *The Green Business Award* to honor an individual or company that has demonstrated leadership in advancing the green building market; *The Green Public Service Award* to honor an individual or organization for significant contributions in advancing green building through changes in policies, codes, requirements, and other means; and *The Lifetime USGBC Leadership Award* to honor an individual who has demonstrated a sustained commitment to the organization through active participation in the development and advance-

ment of its mission. Award winners will be selected by a nine-person panel in September and announced at the Council's International Conference and Expo in Austin, Texas this November. For information, visit www.usgbc.org or call 202-828-7422.

The American Society for Healthcare Engineering (ASHE) of the American Hospital Association has developed a guidance statement for **healthcare design** that encourages the incorporation of health principles into green design. In conjunction, ASHE and The American Institute of Architects are seeking applications for their first Sustainable Design Awards. The program will recognize both design professionals and projects in the healthcare sector, including projects that have completed either design development or construction. Applications are due October 15. For more information, visit ASHE online at www.hospitalconnect.com

Creative Office Systems, Inc. (COS) of Pleasant Hill, California is being recognized as a Small Business Partner of the Year by the U.S. Environmental Protection Agency's WasteWise Awards program. COS is a contract furniture dealership that specializes in the recycling and remanufacturing of systems furniture. COS estimates that, over the last four years, its remanufacturing operations have diverted over 70,000 tons (63,500 tonnes) of waste from landfills. COS has also reduced its energy usage by 32% compared with the previous year, and shifted its hours of operation to avoid the peak demand period. In addition to selling furniture, COS provides space planning and design services, strategic facilities analysis, and installation nationwide. COS is found online at www.creativeoffice.com, or can be reached by phone at 800/400-7787. Details on the WasteWise program are available at www.epa.gov/wastewise/.



Then & Now: 1992-2002

LEED's Distant Origins

Little did we know, when we reported back in September 1992 (Vol. 1, No. 2) on an obscure ASTM green building subcommittee, that the work of that group would soon become the most significant driving force in the U.S. green building movement. A lot has happened in the ten years since developer David Gottfried founded that subcommittee, E-50.06, under the auspices of Technical Committee E-50 on Environmental Assessment, led by Michael Italiano. "The standard that we were working on in the early days at ASTM was broader than just a rating system," Gottfried told *EBN*. "It was more definitional—what is a green building?"

The ASTM subcommittee represented the first integrated effort on green building with representation from different constituents in the building industry. (The other large group active at the time was The American Institute of Architects' Committee on the Environment.) Gottfried quickly became impatient with the ASTM process, however, and by the end of 1992 he was working towards the creation of the U.S. Green Building Council (USGBC). "The process at ASTM was so slow. It was taking a long time to get the standard together. Out of that frustration, we said, 'Let's go with the Council.'"

Founded in April 1993, USGBC soon began working on a green building rating system, which acquired the name Leadership in Energy and Environmental Design (LEED™) in 1996 (see *EBN* Vol. 9, No. 6 for more on the history and structure of LEED).

Its recent exponential growth driven largely by LEED, the Council now has over 1,800 members. There are 23 LEED-certified projects (14 under version 1.0) and 475 projects that have registered for LEED certification, representing over 66 million ft² (6.1 million m²) of floor space. Other developments with LEED include:



Completed in the spring of 2001, the New York State Department of Environmental Conservation headquarters building in downtown Albany recently achieved a LEED™ Silver rating. Photo courtesy of NYSOGS

- LEED 2.0 is soon to be appended by a version 2.1 with streamlined documentation (currently available as a public draft).
- LEED for Existing Buildings (LEED-EB) is in the midst of a pilot phase.
- LEED for Commercial Interiors (LEED-CI) is just beginning its pilot-phase certifications.
- A residential version of LEED (LEED-R) has been stalled for some time but is expected to begin moving forward again, beginning with an all-day meeting in Washington, D.C. this August (in which *EBN's* Alex Wilson was a participant).
- LEED is being adapted for various

building types, such as schools, health-care facilities, and laboratories, and for specific locations, such as Portland, Oregon (see newsbrief on page 6).

But what became of the ASTM subcommittee? In 1994, Dru Meadows (now with theGreenTeam in Tulsa, Oklahoma) took over from Gottfried as chair. Meadows became frustrated, however, with a lack of participation from building industry constituents and withdrew as chair in 1997, effectively dissolving the subcommittee.

In 1998 a new subcommittee on sustainability and buildings was conceived, this time under the auspices of Technical Committee E-06 on Performance of Buildings. Meadows was recruited to chair the new subcommittee E-06.71 and was motivated to stay on, given the breadth of participation from a wide range of stakeholder groups.

In 2001 this subcommittee published two standards, one of which fulfills the original goal of helping to define a green building: E2114-01—Standard Terminology for Sustainability Relative to the Performance of Buildings. The

second is E2129-01—Standard Practice for Data Collection for Sustainability Assessment of Building Products (see *EBN* Vol. 10, No. 11 for further details). Other working groups are developing standards on earthen construction, green roofs, and general principles of sustainable design. Meanwhile, ASTM itself has undergone a name change, from American Society for Testing and Materials to ASTM International. – NM

For more information:

ASTM International
610/832-9585
www.astm.org

U.S. Green Building Council
202/828-7422
www.usgbc.org

Product News & Reviews

Soy-Based Polyurethane Now in Carpet Backing

Dow Chemical Company has announced the release of its BioBalance™ polyurethane, in which about 25% of the petroleum-based polyols are replaced with Soyoyl®, a soy-based polyol from Urethane Soy Systems Company, Inc. BioBalance is now available in all polyurethane noncushioned and cushioned backings manufactured by Universal Textile Technologies (UTT) and can be specified as an option from many major carpet manufacturers.

Responding to a market demand for reduced dependence on petroleum-derived products, 23 carpet manufacturers, including such major brands as Lees and Millikin, have already expressed interest in BioBalance polymers. Dow Marketing Manager Lisa Romans told *EBN* she is “not aware of any compatibility problems that exist with any face fiber typically used in the commercial carpet market.” Diann Barbacci, Vice President, Sustainable Design Initiative for Lees, confirmed that Lees offers the BioBalance cushion alternatives as an option. She also noted, however, that Lees offers a higher fraction of renewable resource with their standard Unibond backing system, which contains a resin derived from pine trees—a by-product of the paper industry. (It appears, however, that this renewable resource does not fit within the definition of “rapidly renewable” used in the LEED™ Rating System.)

As a polyurethane, BioBalance is composed of a polyol and isocyanate. In BioBalance, one fourth of the petroleum-based polyol is substi-

tuted with Soyoyl. According to Romans, “On average, 7–10% by weight of the of the polyurethane precoat is replaced with the soy-based material. The remaining 90–93% is comprised of fillers and the petroleum-based polyols and isocyanates that allow the system to react and form a finished product.” Since carpet backing consists of a precoat plus addi-



Photo: Universal Textile Technologies

This carpeting has a backing manufactured by Universal Textile Technologies that contains a soy-based polyol.

tional layers, only 4–6% of a typical backing is actually derived from soybeans, and the fraction of the total carpet is, of course, lower still. “Dow and UTT are going to continue to work to increase the percentage of soy oil in the precoat and grow the chemistry so that we can use it in other coats as well,” reports Larry Pope, Vice President of Marketing for Pacificrest Carpet Mills, Inc.

Although the only backings currently incorporating BioBalance—UTT’s The Enhancer and The Enhancer Laminate products—are “high-performance, value-added backings,” according to Romans, and therefore more costly than standard SBR latex backing, no additional charge is added for specifying BioBalance polymers. Pope confirmed this assessment, noting that their E-Lock polyurethane backing systems run

about \$5.50 per square yard (\$6.60/m²), compared with SBR latex backing that costs \$2.60 per yard (\$3.10/m²). All Pacificrest’s E-Lock backings are now labeled “BioBak” due to the soy component. Unlike latex backings, these premium backings are warranted against edge ravel and delamination, according to Pope. BioBalance could also be requested for use in other nonbranded polyurethane backings from UTT. “In essence,” says Romans, “we have opened this up to all mills.” — JB & NM

For more information:

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Urethane Soy Systems Company, Inc.
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Interface Announces LCA Results

Interface Fabrics Group (IFG), an Interface, Inc. company, recently announced the results of its Life-Cycle Assessment (LCA) study exploring the environmental impacts of polyester’s creation, useful life, and disposal. (For more information on LCA, see *EBN* Vol. 11, No. 3.) IFG undertook LCAs for one linear yard (0.9 m) of both virgin polyester and their Terratex-classified fabrics, which are made with recycled polyester. The results, peer-reviewed by Arthur D. Little, show a remarkable difference in each of the 12 categories studied. Recycled polyester, for example, represents only 34% of the embodied energy, 54% of the global warming potential, and 61% of the human toxicity potential of virgin product. Based on these results, IFG estimates that for the 50 million pounds (23 million kg) of recycled polyester they used from 1996 to 2001, they saved an amount of energy equal to 484,150 barrels of fuel oil. For additional information, visit www.terratex.com or call Andrea Loukin at 718/230-8032. — JB

Cohousing (continued from page 1)

Kathryn McCamant and Charles Durrett, seeking a supportive and vibrant environment in which to live and raise children, became intrigued by the Danish housing model. They shepherded the idea across the Atlantic and coined the term “cohousing” in 1988. While Denmark still leads the world in the popularity of cohousing (Durrett estimates that 1% of the Danish population lives in cohousing communities), other countries, including the United States, are experiencing growing interest in this alternative to conventional residential development. At Durrett’s last count, 68 completed cohousing communities dotted the country, with many more in various phases of planning, design, or construction (see table, pages 16–17).

Currently members of Doyle Street Cohousing in Emeryville, California, McCamant and Durrett operate an architecture and development consulting firm, The CoHousing Company, specializing in this form of development. They remain the gurus of the movement, having written and subsequently updated the cohousing bible, *Cohousing: A Contemporary Approach to Housing Ourselves*. (See EBN Vol. 6, No. 9 for a review of this and other cohousing resources.)

Though each cohousing community is unique, some trends serve to illustrate the concept. Most communities consist of one to three dozen households living in distinct but clustered or connected homes. Although the homes are owned by individuals, some spaces, including a common house, are owned by the community as a whole. Cohousers come together for shared meals at least once a week and make an effort to foster interaction and a sense of community at all times. When the results of a decision will affect the entire community, it is generally made only when consensus has been reached.

McCamant and Durrett define cohousing with a set of six principles, listed in the box below. Architect Bruce Coldham, another widely respected designer of cohousing communities—including Pine Street Cohousing in Amherst, Massachusetts, where he lives—describes cohousing as “the creation of a more vital community by means of shared common spaces supporting shared living.” Coldham believes this is “both the goal and the principal mechanism for its achievement.”

Mission statements or guiding principles of cohousing communities often include additional precepts, such

Takoma Village Cohousing Mission Statement

Takoma Village Cohousing is an urban community that fosters mutual support and cooperation while respecting privacy. We welcome diversity, encourage ecologically responsible living, and value active participation in the larger world.

as the intention to operate sustainably (see Takoma Village’s mission statement above). In Durrett’s experience, community, sustainability, and affordability nearly always top the lists of goals of aspiring cohousers.

Sustainable Characteristics and Strategies

Americans’ shift from neighborhood-based community to automobile-engendered suburban sprawl, suggests Coldham, has all too often led us to ignore the neighborhood scale when considering efficiency and sustainability. Our attention has focused instead on the household unit at one extreme and the municipality at the other. Coldham believes that “cohousing’s principal contribution to a sustainable society is that it offers another scale of social organization—an intermediate scale between the single family and the town or municipality—thereby expanding the palette of renewable technologies that can be applied.” While some green strategies are inherent in the cohousing model, others are especially appropriate due to the size and cohesiveness of the community or the members’ willingness to adopt unconventional ideas.

Neighborliness and Sharing

Cohousing communities tend to use land and materials more efficiently than does conventional development. A desire for neighborliness leads to the clustering and often the connection of homes. Westwood Cohousing, in Asheville, North Carolina, for example, houses 24 distinct homes under 6 roofs. Clustered or stacked houses take up less space, permitting

Six Common Cohousing Characteristics

- **Participatory Process:** Residents participate in the planning and design of the development so that it directly responds to their needs.
- **Neighborhood Design:** The physical design encourages a sense of community.
- **Private Homes Supplemented by Extensive Common Facilities:** Each household has a private residence—complete with a kitchen—but has access to all of the common facilities. The common house is designed for daily use and supplements private living areas. Facilities often extend beyond the common house to include children’s play areas, vegetable gardens, and the like.
- **Complete Resident Management:** Residents take complete responsibility for ongoing management, organizing cooperatively to meet their changing needs.
- **Non-Hierarchical Structure:** While there are leadership roles, responsibility for the decisions is shared by the community’s adults.
- **Separate Income Sources:** There is no shared community economy.

—McCamant and Durrett from www.cohousingco.com

efficient urban infill development or, in rural areas, preservation of open space. Clustering houses saves money and materials by avoiding the need for siding between connected homes and for a roof and foundation above and below stacked homes. Clustering also saves considerable energy. "Think beyond high-performance insulation," advises Durrett. "Shared walls are R-infinity."

A large portion of each community consists of shared space, encouraging interaction and allowing individuals access to infrequently used amenities without the cost and hassle of purchasing, maintaining, and storing them in every home. The standard cohousing pattern includes a common house with kitchen, dining area, and children's room, as well as outdoor gardening and recreational space. Shared space often extends to laundry facilities, guest rooms, swimming pools, hot tubs, music rooms, playgrounds, computer rooms, libraries,

offices, and meeting rooms.

An established community encourages cooperation; cohousers frequently provide services for one another. Childcare, shared meals, and social activities are generally available within the community. Neighbors may carpool, run errands for one another, or simply borrow and lend, eliminating the need for a trip. The city of Lafayette, Colorado performed an Environmental Protection Agency-funded transportation study in 1993 comparing average car usage to that of Nyland Cohousing members. They found that cohousers made 25% fewer car trips than their conventionally housed neighbors.

Cohousers routinely share appliances, tools, recreational equipment, and even vehicles. Sharing disperses purchase and maintenance costs, makes available amenities that individuals might not otherwise have access to, and saves resources. Some

sharing arrangements are designed into the community. Instead of each family owning a clothes washer, for example, the community might share a handful of machines. Since each member pays a minimal amount toward the initial purchase, the community can spring for higher-quality, more-efficient machines. Mary Kraus, whose firm, Kraus-Fitch Architects, specializes in cohousing design and consultation, explains: "If I want to bake a zillion batches of Christmas cookies, I can just go down to the common house and use the big mixer. I feel no need to have such an appliance in my own house." More often, sharing is informal: At Pioneer Valley, Kraus and her husband are famous for their bike-repair stand. "Talk to Lyons if you need a belt sander," she advises.

One result of sharing spaces and materials is often smaller homes without a sacrifice in livable area. "If I felt like I personally needed all the

Pleasant Hill Cohousing

Pleasant Hill, California

Development team: The CoHousing Company, Wonderland Hill Development Company, and residents

Completed: September 2001

Setting: 32 units on 2.2 acres (0.9 ha); near downtown Pleasant Hill, with BART transit to San Francisco and a bike path

Web site: members.aol.com/DancerBarb/

Home size: 850 to 1,500 ft², averaging 1,230 ft² (80–140 m², averaging 115 m²)

Shared space: Common house, including dining room, sitting room, kids' room, teens' room, guest rooms, laundry, and crafts room; swimming pool and hot tub; organic garden; workshop; bike shed

Green strategies: Passive heating and cooling strategies include trellises and trees on the south and west; built-in awnings and overhangs; operable windows, ceiling fans, and shallow spaces for cross-ventilation; opaque, reflective, interior shutters; and whole-house fans for night cooling. Polar Ply radiant barriers, corrugated metal roofing, low-e windows, and thicker and denser gypsum board were also used. The houses have no electric air conditioning despite 1,000+ cooling degree days; a cooling tower is used in the common house, supplemented by thermostatically controlled fans when needed. A shared water heater provides potable

The common house view below shows its stack-effect cooling tower, while extra-thick walls for insulation are visible in the daylight extension of the building.



Photos courtesy of The CoHousing Company



Marmoleum, a linseed oil-based floorcovering, was used artistically in the entry shown above.

hot water and radiant baseboard heating. Low-flow fixtures and efficient fluorescent lighting are used throughout. Wet-spray cellulose provides R-22 (RSI-3.9) insulation in the walls and R-38 (RSI-6.7) in the ceilings. Fireplaces were excluded to ensure better air sealing. Driveways and paths are gravel. All concrete contains 15% fly ash. FSC-certified wood was specified for framing, and advanced-framing techniques were used. Bamboo, natural linoleum, and FSC-certified wood were used for flooring. Low-VOC materials were used throughout. CCA-treated wood was avoided.

kitchen appliances available in the common house, I'd need a bigger kitchen, and then I'd need a bigger house," notes Kraus. The CoHousing Company estimates the size of the average American cohousing unit to be 1,250 ft² (115 m²). Cohousers often manage with considerably less space; Chris ScottHanson, a cohousing development consultant and author of *The Cohousing Handbook*, is working on a project in Boston in which the units average a mere 825 ft² (75 m²). By comparison, the 2002 State of the Nation's Housing Report, produced by the Joint Center for Housing Studies at Harvard University, states that the size of an average unit in a new multifamily development is 1,092 ft² (100 m²), while the average single-family house is more than 2,100 ft² (195 m²).

Cohousers are also adept at sharing ideas. "Don't underestimate the power of watching someone else at close quarters," notes engineer and environmental consultant Marc Rosenbaum. Due to cohousing, "people who are more environmentally attentive are now in more contact with people who never even thought of it," he adds. Giles Blunden served as architect for Arcadia Cohousing in Carrboro, North Carolina. His Arcadia house, named *Natural Home* magazine's Natural Home of the Year in 2000, is energy self-sufficient and not connected to the electric grid. Blunden told *EBN* with pride that his neighbor is now energy-independent as well.

Design Advantages

Reluctant to contribute to sprawl, cohousers often choose to redevelop urban areas through new infill construction or the renovation of existing infrastructure. These communities are often within walking distance of amenities such as restaurants, movie theaters, and shopping areas, or at least near public transit lines to urban centers. Pleasant Hill Cohousing in California is a short walk from downtown Pleasant Hill or from San Francisco's BART tran-

sit line. In addition, a public bicycle path runs adjacent to the property. The Hearthstone cohousing community chose to join the mixed-use redevelopment of the Elitch Gardens amusement park in North Denver. Hearthstone is minutes from two major freeways, a Six Flags theme park, and a downtown area that offers shops, restaurants, libraries, and even a college. The urban flavor of lower Denver—including the Colorado Rockies' Coors Field, the Pepsi Center entertainment complex, and the Denver Center for the Performing Arts—is just a short drive or bike ride away.

Communities that choose to build in rural areas may do so with the aim of preserving open space or saving it from less responsible development. "Planned unit development" or "planned residential development" provisions in land-use regulations, which provide a mechanism for clustering homes as long as the overall density remains the same, are frequently used for cohousing projects. Abiding this mandate, rural cohousing sites often include large tracts of undeveloped land. EcoVillage at Ithaca, New York has pledged to develop or farm only 10% of its land, and 55 of its 176 acres will be permanently preserved through conservation easements. Nearly all of Cobb Hill Cohousing's 270 acres in Hartland, Vermont are also protected by conservation easements.

Most cohousing developments cluster the homes, keeping automobiles at the periphery of the community—figuratively and physically. Organizing a neighborhood around people instead of cars allows space that might otherwise accommodate a driveway and garage to be used for social interaction. It also encourages carpooling (as cohousers often meet up in the parking lot) and relegates noxious exhaust to the exterior of the community. Most important, children can play in the heart of the community without the threat of traffic.

Most cohousing communities own garden carts that members use to shuttle loads from the parking lot to their homes. John Abrams, president of South Mountain Company, which designed and built Island Cohousing (the Martha's Vineyard community that he and his company now call home), reports that members are allowed to drive into the community with unusually heavy or large loads, an event that occurs roughly once a day. The distance from car to home ranges from 100 to 400 feet (30–120 m), Abrams estimates, and community members chose their homes according to their willingness to walk.

Food Production

On-site food production is commonplace in cohousing communities; in fact, the neighborhood seems to be the most appropriate scale to support a large garden or small farm. By pooling the labor of several committed cohousers, the community can easily grow a vegetable garden, fruit orchard, or berry farm. Most communities also pool their kitchen compost for use on the gardens.

Food production can be taken beyond the edge of cohousing developments to include local community-supported agriculture (CSA) farms. Coldham sees a "natural marriage awaiting these types of agricultural enterprises and cohousing communities." Both EcoVillage and Cobb Hill support organic CSAs on-site. The community provides compost, some labor, and a guaranteed market for much of the produce. Through this arrangement, cohousers invest in the long-term health of the soil and the local economy. Cobb Hill has made an especially strong commitment to responsible forestry and agriculture: the CSA provides vegetables for 80 area families, members harvest berries and maple sugar, children keep chickens for eggs, and one family produces milk and cheese from their 10-cow dairy herd. Though operating on Cobb Hill's site, these enterprises remain autonomous.

The Power of Group Purchasing

Economies of scale can save cohousers money and open the possibility of incorporating more sustainable materials than are available to individual builders. “A lumber yard might not look at you” as a single builder, says Kraus, but a community “commands attention.” This principle allowed the builders at Pioneer Valley to acquire specially milled local pine flooring. Takoma Village Cohousing, in Washington, D.C., found that they could afford Forest Stewardship Council (FSC)-certified wood when they ordered an entire railway carload of lumber and plywood from a West Coast source.

Cohousers often form buying clubs and order food in bulk for common meals as well as individual use. This arrangement not only costs less, enabling families to afford healthier and more ecologically friendly food, but also minimizes packaging and

trips to the store. A group of cohousers at Pioneer Valley has arranged for milk delivery from a local dairy, and a butcher delivers organic, grass-fed beef by the quarter or side to a group of families.

Energy Advantages

One of the opportunities offered by cohousing developments is the use of centralized heating, cooling, and hot water systems. At EcoVillage, one boiler per cluster of eight homes provides heat and hot water to the individual units. The system is more efficient, and maintenance costs and monthly gas meter charges were reduced—going from 31 separate meters to 5 common meters saves \$364 each month in basic service charges. And, since combustion was moved outside the building envelope, indoor air quality was improved.

Cambridge Cohousing in Massachusetts is heated and cooled via a system of eight 10-ton (35.2 kW) ground-

source heat pumps. Three wells were drilled on-site to a depth of 1,500 feet (460 m), allowing the heat pumps to circulate water at 120°F (49°C) to air handlers in each home. A gas boiler heats the water further to provide domestic hot water and supplementary heat in very cold weather.

If systems are centralized, energy use is often submetered so that each household retains responsibility for its own energy consumption. Although submetering represents an additional cost, most communities find that it saves money in the end. Cost allocation greatly simplifies paying bills, and the added accountability reduces energy use by making individuals aware of their consumption of energy and the money they spend on it. Gregory Thomas, energy consultant and resident of EcoVillage, estimates that submetering cuts energy use by at least 10%, even in energy-conscious cohousing communities.

Cobb Hill Cohousing

Hartland, Vermont

Architect: Jeff Schoellkopf Design (energy and environmental design consulting by Marc Rosenbaum, P.E.)

Completed: Anticipated fall 2002, though residents have moved in

Setting: 22 units on 270 acres (110 ha); rural

Web site: www.sustainer.org/cobhill/

Home size: 450 to 1,400 ft² (40–130 m²)

Shared space: Common house, including kitchen, dining room, children’s play space, porch, library, sitting room, and two guest rooms; storage space; two barns, one of which will be used as art space; extensive green space, forestland, gardens, and agricultural land; stream and pond

Green strategies: The community was built on a rise, leaving prime agricultural land for farming; a CSA, pick-your-own berry farm, maple sugarhouse, and dairy herd are managed on-site. Most of the land is permanently protected through conservation easements. A shared wood-gasifying boiler, with hot-water district heating and propane back-up, heats all units and provides domestic hot water. The homes were designed to take advantage of passive solar heating and are well insulated; they were designed to meet Vermont Star Homes energy efficiency standards. Appliances meet ENERGY STAR standards, and water fixtures are low-flow. Cobb Hill uses composting toilets and a graywater leachfield. The community specified nontoxic indoor finishes. The community

Cobb Hill is located on a working farm owned by one family in the cohousing community. A monitoring system (see control panel at right) will provide real-time feedback and historical data to evaluate energy performance of the buildings.



hopes to incorporate a cogeneration and solar hot water system in the future. Cobb Hill Cohousing, with its comprehensive vision of sustainability, was spearheaded by Donella Meadows, who died unexpectedly just as construction was getting under way. Her vision has been carried on by the cohousing community.

Photos: Ethan Goldman/BuildingGreen, Inc.

Renewable-energy technologies are often more feasible at a community scale, where first-costs can be distributed. "A 10 kW wind turbine is expensive," acknowledges Marc Rosenbaum, "but spread over a number of households, it's more likely to be included." Westwood Cohousing uses solar thermal collectors on their common house roof to provide most of the heat necessary for their district radiant heating system and recirculating domestic hot water system.

If renewable-energy technologies prove too costly to incorporate initially, communities can prepare for their eventual inclusion. "Given a matrix of environmental possibilities," Abrams told *EBN*, Island Cohousing opted for "those that would be most difficult to do later." Island is reserving an appropriate site for a wind turbine and designated 300 ft² (28 m²) of uninterrupted south-facing roof area on each home because the cost and effort of designing for renewable technologies now is minimal compared to the difficulty of redesigning for them later. Pioneer Valley and Pine Street Cohousing similarly opted for PV preparedness, designing roof space at the correct angle and with appropriate materials to accommodate solar hot water and PV panels in the future. When distributed generation becomes more economically feasible, says Coldham, cohousing communities should be in a good position to take advantage of the market because they can hook up a group of houses under one contract.

Centralized systems can facilitate a transition to renewable-energy inputs. Cobb Hill has already switched from temporary propane boilers, shared by 5 to 8 homes each, to one central wood-burning boiler for the entire development. And, reports Rosenbaum, they're excited about the prospect of using a cogeneration system to generate their own electricity when that technology is more mature. Thomas points out that EcoVillage's eight-household systems "could incorporate a central solar water heater,

a wood-fired pellet boiler, or a fuel cell at a much lower cost than providing eight such systems, one for each individual household."

Water Advantages

Various environmentally responsible wastewater treatment alternatives have great potential at the neighborhood scale. Cobb Hill and Island Cohousing use composting toilets exclusively. Although composting toilets can work for single families, in a community there is a shared knowledge base and support system to keep them functioning well, according to Rosenbaum. Also, cohousers are often better prepared to perform regular maintenance and to put the end product to good use. At Island Cohousing, one member was hired and trained to understand the biology and perform the necessary maintenance on the systems. A chamber in each basement collects the compost, which must be leveled each month. Additionally, leachate (the liquid end-product) is emptied twice a year, and the compost itself is emptied every two years. Island Cohousing uses the resulting nutrient-rich fertilizer on portions of the site that are not used for food production.

Challenges

Cohousing is not, of course, without its challenges. Sometimes the very features that make cohousing green can be unique frustrations for the design team and residents. Since most cohousing communities make decisions only when consensus has been reached, the complex and numerous decisions involved in planning and designing a community can be overwhelming. And, opportunities may be lost or problems created when design novices assume the decision-making process without understanding the full implications.

Kraus, whose firm regularly runs participatory design workshops for cohousing groups, advises would-be cohousers to choose members of their design team carefully and then

rely on them. "It is important to put out visions and aspirations," stresses Kraus. With those goals as a starting point, "the role of your professional is to outline for you what some of the decisions are and what the consequences of those decisions are." The key, she says, is to be "attached to a goal but not necessarily attached to a particular solution to that goal."

Clustering homes offers challenges as well. Building codes, for example, may require safety measures such as sprinkler systems for multifamily housing. And connected homes limit privacy. Acoustic separation through walls is easy, in Kraus's experience, but separation between stacked houses poses a greater challenge. Cohousers often institute quiet hours at night and are generally mindful of their proximity to one another.

Fearing a loss of too much privacy, cohousers tend to separate blocks of homes by an average of 30 feet (9 m). Rosenbaum points out that houses closer than 20 feet (6 m) apart can easily be connected by a large-diameter buried pipe through which various services can be run. This approach permits the use of copper piping instead of very costly direct-burial district heating piping, and the thermal losses from these pipes transfer to the basements rather than to the ground. Connecting the homes with a roughly 12-inch (30 cm) conduit also provides easier access in the case of problems and accommodates upgrades in house-to-house cabling. Unfortunately, most rural cohousing projects don't get these benefits because they are leery of the proximity when designing their community. Ironically, once they move in, the cohousers generally find they would be comfortable 10 to 15 feet (3 to 4.5 m) closer. That was the case at Island Cohousing, where Abrams had hoped to include a central heating system. During design, community members placed more value on separation than on the efficiency and cost benefits of a shared heating system, but now most residents agree that tighter

clustering of homes would have been beneficial.

Even if the residents themselves are ready to try unconventional technologies or systems and the design team is happy to implement unusual requests, building codes, zoning laws, and financing institutions may be less flexible. Kraus points out that although innovative strategies such as straw-bale construction are gaining acceptance for single-family homes, officials are less likely to approve such measures for large developments. From his experiences with Island Cohousing, Abrams knows that regulations can change but not without serious effort. After Abrams and the Island cohousers presented a strong case for the potential benefits of cohousing on Martha's Vineyard, the town planning board completed an arduous reworking of local zoning laws to accommodate the community. The Town of Amherst last year passed an addition to its by-

laws specifically enabling cohousing as a development option called Open Space Community Development.

Community Beyond Cohousing

If community is indeed the secret ingredient in sustainability, cohousers are doing their best to let the cat out of the bag. Recognizing that the conventional American dream doesn't yet include car-sharing and common meals, Durrett stresses the importance of community in all sectors. "If you cooperate with your neighbor," he preaches, "great things will happen."

— Jessica Boehland

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Publishers of *CoHousing Journal*—
Stella Tarnay, Executive Editor;
the Spring 2002 issue (Vol. 15, No. 1)
focuses on sustainability.

Their informative Web site has direct links to most cohousing communities: www.cohousing.org

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Takoma Village Cohousing Washington, D.C.

Developer: Eco Housing Corporation/EDG Architects (environmental research by resident Sandra Leibowitz)

Completed: January 2001

Setting: 43 units on 1.43 acres (0.6 ha); urban infill—5-minute walk from Metro stop, bus lines, and center of Takoma Park, MD

Web site: www.takomavillage.org; also see description at www.eren.doe.gov/buildings/highperformance/case_studies/

Average home size: 1,074 ft² (100 m²)

Shared space: Common house with kitchen, dining room, office, workshop, children's playroom, two guest rooms, music room, exercise room, and laundry rooms; outdoor green space and surfaced courtyard

Green strategies: Buildings are oriented along an east-west axis and use overhangs, daylighting with tubular skylights, and low-e glazing to optimize passive solar performance. Units are heated and cooled by individual ground-source heat pumps. Fluorescent lighting was installed throughout. Cellulose insulation, fiber-cement siding, and concrete with fly ash content were utilized. Light-colored roofing reduces heat gain and urban heat-island effect. Most of the wood is FSC-certified, and ACQ-treated wood was used in place of more toxic CCA. Natural



Photo: Sandra Leibowitz

Central green space and a courtyard patio (viewed here from the common house tower) are shared by Takoma residents.



Photo: Eric Mendelsohn

Each unit has a mechanical closet (above right) to house a ground-source heat pump with fresh air intake and a desuperheater to transfer waste heat to an electric water heater.

linoleum, wood, cork, and recycled-rubber flooring were used. All paints, adhesives, and sealants are low-VOC. Each home meets ENERGY STAR standards, based on its individual HERS rating.

Selected Green Features of Cohousing Communities in the U.S. and Canada

Community, Location, and Completion Date	Units and Acres (ha)	Green Features	Community, Location, and Completion Date	Units and Acres (ha)	Green Features
R U R A L S E T T I N G			Cranberry Commons Cohousing Burnaby, BC - 2001	22 units 0.5 (0.2)	Efficient radiant flooring, low-toxicity interior finishes, low-flow fixtures, resource-efficient materials
Alchemy Farm E. Falmouth, MA - 2002	13 units 16 (6.5)	Fully integrated factory-built solar home (via DOE program "PV BONUS"), efficient lights and appliances, good insulation, solar hot water and roof-mounted wind turbines optional	Creekside Cohousing Charlottesville, VA - 2002	24 units 5 (2)	Green space preservation
Arcadia Cohousing Carrboro, NC - 1999	33 units 16.5 (6.7)	Green space preservation, passive-solar design, solar hot water, off-grid option, community composting and recycling, recycled building components	East Lake Commons Decatur, GA - 2000	67 units 20 (8)	Ecological land management, passive/active solar systems, geothermal heating and cooling, rainwater catchment, low-flow fixtures, xeriscaping, biodynamic water filtration system
Bellingham Cohousing Bellingham, WA - 2002	33 units 5.78 (2.34)	Daylighting, low-toxicity materials, linoleum flooring, shared water heater	EcoVillage at Ithaca Ithaca, NY - 2002	30+ units 3 (1.2)	Dense design, community-supported agriculture, conservation easements, gray-water system, passive-solar design, recycled cellulose insulation, tubular skylights
Blueberry Hill Vienna, VA - 2001	19 units 7.5 (3)	Geothermal heating and cooling, Trex™ decking	EcoVillage of Loudoun County Taylorstown, VA - 2002	50 units 180 (73)	Organic vegetable, fruit, and grain production; public transit; ecological septic system
Cobb Hill Cohousing Hartland, VT - 2001	22 units 260 (105)	See profile on page 13 of this issue	Fair Oaks Cohousing Madison, WI - 2002	6 units 0.5 (0.2)	Public transit and bike access
Eno Commons Durham, NC - 1998	22 units 11 (4.5)	Passive-solar design, geothermal heating, low-toxicity materials	Harmony Village Golden, CO - 1996	27 units 5.8 (2.4)	Preserved green space, recycled cellulose insulation, 90%-efficiency furnace
Greyrock Commons Fort Collins, CO - 1997	30 units 16 (6.5)	Preserved green space, passive-solar design, bike access, on-site irrigation pumphouse	Higher Ground Bend, OR - 1998	39 units 7.3 (3)	Straw-bale units, SIPs, Rastra block, solar hot water, Habitat for Humanity high-efficiency houses
Heartwood Cohousing Durango, CO - 2001	24 units 250 (101)	Solar orientation, some straw-bale units, some straw/clay timber-framed units	Highline Crossing Littleton, CO - 1997	40 units 3.6 (1.5)	Light-rail transit, bike access, common gardens
Island Cohousing W. Tisbury, MA - 2000	16 units 30 (12)	Salvaged wood, mixed-use buildings, common greenhouse and gardens, porous paving, conservation easement, composting toilets (see profile in <i>EBN</i> Vol. 10, No. 9)	Liberty Village Libertytown, MD - 2002	38 units 23 (9.3)	Ground-source heating and cooling
Pioneer Valley Amherst, MA - 1994	32 units 25 (10)	Super insulation, solar orientation, low-toxicity materials	Manzanita Village Prescott, AZ - 1998	36 units 12.5 (5.1)	Native landscaping
Sharingwood Cohousing Snohomish County, WA 1999	29 units 40 (16)	Green space preservation	Milagro Tucson, AZ - 2000	28 units 43 (17)	Solar orientation, rainwater collection, graywater system, community orchard, native landscaping, solar hot water, PV-ready
Songaia Cohousing Bothell, WA - 2000	13 units 11 (4.5)	Community composting, organic gardens, recycling, permaculture	N Street Cohousing Davis, CA 1986-ongoing	17 units 2.5 (1)	Native landscaping with swales and berms, xeriscaping, common orchards, solar hot water option, good insulation, double-paned windows
Ten Stones Charlotte, VT - 2002	17 units 88 (36)	Green space preservation, wetland septic system, solar and wind energy, nontoxic and regional materials	Nyland Cohousing Lafayette, CO - 1993	42 units 43 (17)	Common greenhouse; community recycling, composting, drip irrigation, xeriscaping
The Middle Road Community Nelson, BC - 1996	11 units 52 (21)	Community gardens	Pleasant Hill Cohousing Pleasant Hill, CA - 2001	32 units 2.2 (.9)	See profile on page 11 of this issue
Tierra Nueva Oceano, CA - 1999	27 units 5 (2)	Passive-solar heating and cooling, avocado orchard, drainage retention basins	River Rock Commons Fort Collins, CO - 2000	34 units 3.4 (1.4)	Solar orientation, xeriscaping
Vashon Cohousing Vashon, WA - 2002	18 units 12 (5)	Low-toxicity materials	Shadowlake Village Blacksburg, VA - 2002	33 units 33 (13)	Solar orientation of common house
WindSong Cohousing Langley, BC - 1996	34 units 6 (2)	Community office space and resources, underground parking	Solterra Durham, NC - 2002	38 units 20 (9)	Passive-solar design, common gardens
S U B U R B A N S E T T I N G			Sunward Cohousing Ann Arbor, MI - 1998	40 units 20 (8)	2x6 construction, efficient furnaces, passive-solar design, linoleum and ceramic flooring
Blue Heron Farm Pittsboro, NC - 2002	15 units 64 (26)	Common gardens and orchards, wastewater filtration, post-and-beam construction, passive-solar design	Trillium Hollow Portland, OR - 1998	29 units 3.6 (1.5)	Native landscaping
Cantine's Island Cohousing Saugerties, NY - 1998	12 units 8 (3)	Super insulation, units meet NYSTAR standards	Two Acre Wood Sebastopol, CA - 1999	14 units 2 (0.8)	Concrete-slab passive heating and cooling (no AC), solar hot water, integral color siding, PV-ready
Cascadia Commons Portland, OR - 2000	26 units 2.9 (1.2)	Wetland preservation	Two Echo Cohousing Brunswick, ME - 2002	27 units 94 (38)	Slab foundation with radiant heat, super insulation, passive-solar design, conservation easement, modular construction
Coyote Crossing Santa Cruz, CA - 2002	16 units 5 (2)	n/a			

Source: The Cohousing Network (online at www.cohousing.org) and community contacts

Community, Location, and Completion Date	Units and Acres (Ha)	Green Features
Valley Oaks Village Chico, CA - 1996	28 units 5 (2)	Drought-resistant native landscaping
Wasatch Commons Salt Lake City, UT - 1999	26 units 4.25 (1.72)	Passive-solar heating and cooling, car-pooling, recycling
Winslow Cohousing Bainbridge Island, WA 1992	30 units 5 (2)	Community recycling, composting, vermicomposting, native landscaping, permaculture, orchards, energy-efficient construction (see <i>EBN</i> Vol. 1, No. 3)
Wise Acres Cooperative Association Indianola, WA - 2002	9 units 17 (6.9)	Green space preservation, community garden and orchard
U R B A N S E T T I N G		
Acme Artists' Community Chicago, IL - 2000	25 units 0.9 (0.4)	Shared tools/equipment, common greenhouse/roof garden, R-43 (RSI-7.6) roof insulation, high-performance furnaces, closed-combustion water heater, double-glazed windows, fluorescent light fixtures in common areas, low-flow fixtures
Berkeley Cohousing Berkeley, CA - 1997	14 units 0.75 (0.3)	Shared water heater, certified wood, demolition recycling, permaculture, passive and active solar heating, graywater system, low-toxicity and recycled materials
Cambridge Cohousing Cambridge, MA - 1998	41 units 1.5 (0.61)	District heating/cooling, water- and energy-efficient appliances, attention to IAQ (see case study in <i>EBN</i> Vol. 6, No. 9)
Cardiff Place Cohousing Community Victoria, BC - 1994	17 units 0.45 (0.2)	Community recycling and composting, low-flow fixtures, public transit and bike access
Colorado Springs Cohousing Community Colorado Springs, CO 2002	34 units 4.7 (1.9)	Xeriscaping, ENERGY STAR appliances, ACQ-treated lumber, passive-solar design, active-solar option
Commons on the Alameda Santa Fe, NM - 1998	28 units 6 (2.4)	Adobe construction
Community Now! Rochester, NY - 2002	8 units n/a	n/a
Cornerstone Village Cohousing Cambridge, MA - 2001	32 units 1.25 (0.51)	Public and bike transit, common gardens
Culver Way St. Louis, MO - 2002	44 units 1.5 (0.6)	Ground-source heat pump, roof garden, SIPs for new construction, reuse of historic bathhouse
Doyle Street Emeryville, CA - 1992	12 units 0.29 (0.12)	Skylights, common gardens, orchards
Duwamish Cohousing Seattle, WA - 2000	23 units 2.7 (1.1)	Public transit, native landscaping, community gardens
Greenway Park Chicago, IL - 2000	20+ units 0.25 (0.1)	Super insulation, double-glazed low-e windows, low-VOC primer, Trex™ decking, rock wool insulation, fluorescent lighting in common areas, PV energy
Hearthstone Denver, CO - 2002	33 units 1.3 (0.5)	See profile on page 1 of this issue
Jackson Place Cohousing Seattle, WA - 2001	27 units 1.25 (0.5)	Low-toxicity materials, community supported agriculture
Lake Claire Cohousing Atlanta, GA - 1997	13 units 1 (0.4)	Land trust-protected green space, hydronic heating/cooling, recycled cellulose insulation, passive-solar common house
Los Angeles Eco-Village Los Angeles, CA - 1999	48 units 0.5 (0.2)	Demonstration graywater reclamation program
Marsh Commons Arcata, CA - 2000	15 units 2 (0.8)	Native landscaping, salvaged material, rugs made of recycled plastic (from pop bottles), recycled paint, local source SmartWood, linoleum, Trex™ decking

Community, Location, and Completion Date	Units and Acres (Ha)	Green Features
Monterey Cohousing Minneapolis, MN - 1996	15 units 2.5 (1)	Community composting, gardening, recycling; rainwater collection, native landscaping, locally sourced wood
Muir Commons Davis, CA - 1991	26 units 3 (1.2)	Native landscaping
New View Cohousing Acton, MA - 1996	24 units 20 (8)	Public transit
Nomad Cohousing Boulder, CO 1997	11 units 1 (0.4)	Bamboo floors
OnGoing Cohousing Portland, OR - 2002	6 units n/a	Solar hot water, recycled building materials, graywater system, rain barrels, community composting and gardening, public and bike transit
Pathways CoHousing Northampton, MA - 2000	24 units 40 (16)	Green space preservation, solar orientation, low-toxicity materials
Pine Street Amherst, MA - 1994	8 units 5.2 (2.1)	Ground-source heat pump, solar orientation, PV-ready, recycled cellulose insulation
Piñon Ecovillage Santa Fe, NM - 2002	5 units 1.5 (0.6)	Adobe construction, solar hot water, graywater system, rainwater catchment
Puget Ridge Cohousing Seattle, WA - 1994	23 units 2.5 (1)	Native landscaping, good insulation, forced-air gas heating with hot water as heat source, nontoxic paint, rainwater harvesting, construction recycling, efficient lighting, community gardens
Quayside Village N. Vancouver, BC 1998	19 units 0.4 (0.2)	Reused stained-glass windows, wood doors, and oak floors from original structures; graywater system; native landscaping; community garden; units built to BC Hydro Power Smart program and BC Gas Energy Efficiency program
RoseWind Pt Townsend, WA - 2002	24 units 10 (4)	Permaculture; EnerGrid block construction, stucco, and straw-bale units; community gardens and orchard; on-site irrigation well
San Mateo Cooperative San Mateo, CA - 1998	8 units n/a	Community-supported agriculture
Sonora Cohousing Tucson, AZ - 2001	36 units 4.8 (1.9)	Public transit and bike access, native landscaping, 12 SEER AC, recycled cellulose insulation, solar hot water option, tubular skylights, hydronic heat, low-VOC and low-toxicity materials
Southside Park Cohousing Oakland, CA - 1993	25 units 1.3 (0.5)	Infill development, shared laundry facilities, restoration of 100-year-old home
Swan's Market Oakland, CA - 2000	20 units 0.25 (0.1)	Public transit, mixed-use buildings, daylighting
Takoma Village Cohousing Washington, DC - 2001	43 units 1.43 (0.58)	See profile on page 15 of this issue
Temescal Commons Cohousing Oakland, CA - 2000	9 units 0.39 (0.16)	Net-metering PV; solar hot water; bamboo, linoleum, and wood flooring
Temescal Creek Cohousing Oakland, CA - 1999	7 units 0.5 (0.2)	Public transit
Terra Firma Co-housing Ottawa, ON - 1999	6 units 0.5 (0.2)	Native landscaping
Ujima Place Chicago, IL - 1997	8 units 0.25 (0.1)	Energy-efficient infill development design
Village Cohousing Madison, WI - 1999	18 units 0.66 (0.27)	Porous paving
Westwood Cohousing Asheville, NC - 1998	24 units 4 (1.6)	Passive-solar design, permaculture, native landscaping, central hot water for radiant-floor heating, rainwater collection, good insulation

From the Library

Green Urbanism

Learning from European Cities

by Timothy Beatley. Island Press, Washington, DC, 2000. Paperback, 491 pages, \$30.

A professor of Urban and Environmental Planning at the University of Virginia in Charlottesville, Timothy Beatley has a lot to say about cities. *Green Urbanism* was born of his hope that European urban development might inspire Americans and guide our progress toward “more sustainable, more resource-efficient, and less environmentally extractive and damaging” urban areas. *Green Urbanism*'s almost 400 densely packed pages explore various aspects of this broad topic, including housing and land-use patterns, mobility and transit systems, green building, renewable energy, economic development, local governance, and perhaps most important, the integration of these and other approaches.

Most of the book consists of detailed examples drawn from 25 of the most progressive European cities. Beat-

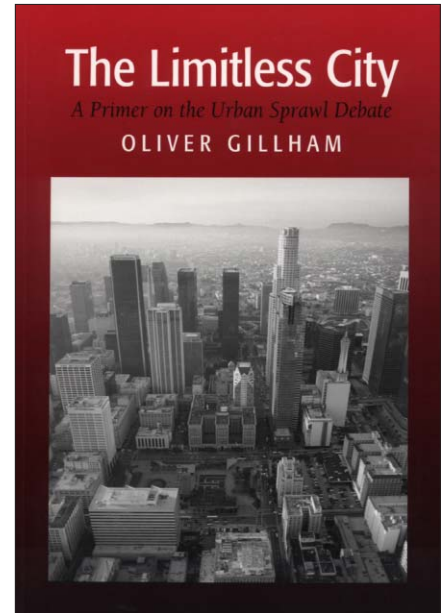
ley's case studies range in scope from major restructuring plans with the broad aim of reducing a city's ecological footprint to more easily digestible components, such as co-housing and public bicycle-sharing programs. Each chapter ends with “Lessons for American Cities,” suggesting modifications to the European examples and recognizing American cities that have already taken the initiative in green development.

Though Beatley never defines his intended audience, the book seems to cater to empowered decision-makers already fluent in the underlying arguments for sustainable design. Beatley acknowledges “a healthy debate about density and compactness as desirable planning goals” but never explores that debate, assuming perhaps that his readers have heard it all before. Even without such an introduction, the case studies demonstrate green urbanism's potential advantages.

The challenge of making our cities sustainable is daunting, and Beatley's enthusiasm is welcome. But *Green Urbanism* may overestimate the success of even the best European examples as well as their transplantability to an American context. For example, our political climate would likely thwart a packaging law such as Germany's, which requires manufacturers to take back their packaging waste or otherwise arrange for its collection and reuse. American cultural barriers would stymie other ideas such as Freiburg, Germany's creative public transit promotional campaign, which has included printing tram ads on beer coasters and condoms.

Regardless of exactly how successful European cities have been or how effective European tactics might prove west of the Atlantic, Beatley's point is well taken: more sustainable urban development is possible. American

cities can and must do better. — JB



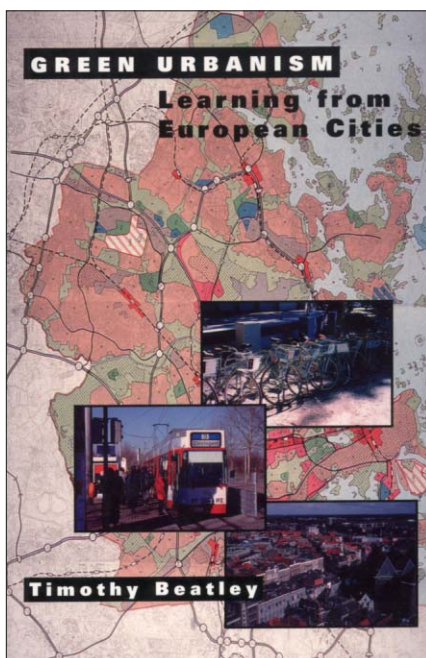
The Limitless City

A Primer on the Urban Sprawl Debate

by Oliver Gillham. Island Press, Washington, DC, 2002. Paperback, 309 pages, \$30.

For readers who may need the groundwork missing from Beatley's *Green Urbanism*, *The Limitless City*, by architect and planner Oliver Gillham, is a good start. Also focused on American development, Gillham's primer tells the history of sprawl and the search for alternatives, lays out definitions for the often-ambiguous argot, and digs into the density debate Beatley only references. Though not without his own opinions, Gillham presents various arguments and backs them with statistics whenever possible.

Focused more on the problem of sprawl than its solutions, Gillham's conclusion is bleak: “Suburbanization clearly is something the nation has brought upon itself willingly.... Without the intervention of some crisis event, the nation may simply continue to build more of the same suburban pattern.” But, he concedes, there must be a limit: “Three or four left-hand turn lanes may be nearing the maximum....” — JB



Designing Low-Energy Buildings with *Energy-10* Version 1.5

Produced by the National Renewable Energy Lab (NREL), Lawrence Berkeley Laboratory, and Berkeley Solar Group, with financial support from the U.S. Department of Energy. Distribution, training, and technical support provided by Sustainable Buildings Industry Council, 1331 H Street NW, Suite 1000, Washington, DC 20005; 202-628-7400 ext. 210; www.SBICouncil.org. \$250 for *Energy-10* software together with *Passive Solar Strategies* handbook. Free to registered users of earlier versions. Windows 98 or newer operating systems with at least 64 MB of RAM recommended. Not Mac or Linux compatible.

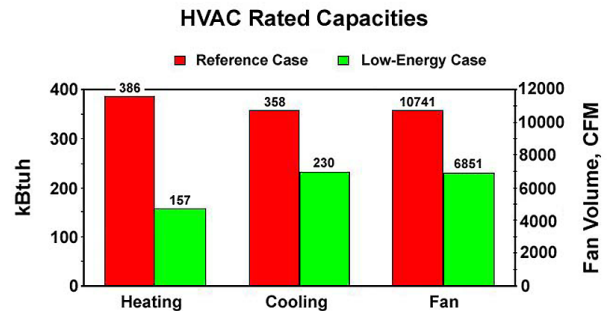
In July 2002, SBIC released version 1.5 of *Energy-10*, the first full update of the software since 1999. This release reinforces *Energy-10*'s position as the best energy modeling tool for simple buildings, especially for use by architects who don't need to model sophisticated mechanical systems. The program is especially useful for its ability to provide feedback on energy performance in the early stages of design, based on a large set of default assumptions that users can change as the design crystallizes. While the "10" moniker indicates 10,000 ft² (930 m²) as a building size limitation for *Energy-10*, the actual limitation is only in the fact that the software can handle no more than two HVAC zones.

Energy-10 is set up to compare base-case and improved building designs, based on a series of potential measures, such as increased insulation levels, more efficient lighting, and shading of glazed areas. With version 1.5, the graphical output capabilities, which were already impressive, have been greatly enhanced. It is now possible to illustrate, both in energy cost and energy

usage, the effect of various design changes, either individually or as a package. The new version 1.5 makes it easier to save various design "schemes" for exploring what-if scenarios. It also allows custom libraries of material or assembly properties to be saved with a project file, rather than in the program's general library of data. Finally, it adds powerful life-cycle costing tools that project the effect of design changes into the future with net-present value and internal rate-of-return data presented both numerically and graphically.

While version 1.5 improves *Energy-10*'s peak load reporting and equipment sizing capabilities, it is not set up to model complex mechanical systems. "*Energy-10* is designed to support architectural design decision making, which is a benefit be-

HVAC Sizing Summary



Sample output from *Energy-10* version 1.5

in San Francisco. The new *EnergyPlus* modeling engine is poised to replace *DOE-2* over time, while programs from HVAC equipment manufacturers, such as *Trace™ 700* from Trane or *HAP* from Carrier are widely used to size mechanical equipment and document code compliance.

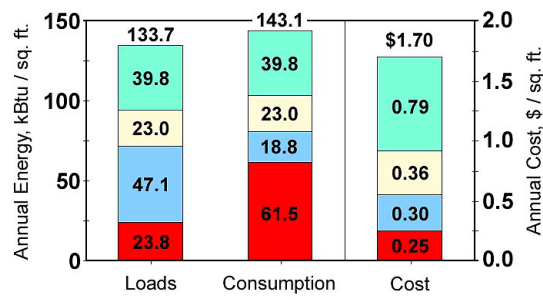
Not immediately apparent to the user is the fact that *Energy-10* has been completely reengineered to take advantage of current Windows operating system capabilities. "It really is just fabulous—a lot of little bugs are worked out," says Franta. One drawback to this update is that project files created with previous versions of *Energy-10* cannot be used in the new version.

Not included in version 1.5 are some photovoltaic modeling features that were included in an earlier limited-distribution version 1.4. That functionality is expected to be reintegrated with the

next major update, version 2.0, currently planned for the fall of 2003. Other features expected with that release include a drawing-based input function called "Sketch" and special reports formulated to document compliance with energy and daylighting credits of the LEED™ Rating System. — NM

Energy and Cost Summary

Reference Case - Performance Summary



Sample output from *Energy-10* version 1.5

cause it can help optimize the building envelope," reports Greg Franta, FAIA, principal of ENSAR Group and a long-time *Energy-10* user. For large, complicated buildings, or to design complex mechanical systems, *DOE-2.1* is the tool of choice, with or without user-friendly interfaces such as *VisualDOE* from Eley Associates

Calendar

SEPTEMBER

12 • Green Building Seminar, Bainbridge Island, WA. *Sponsor:* Lumbermens and Environmental Home Centers. *Information:* 800/453-1327; dgrover@lumbermens.net (e-mail).

12-13 • Building Expectations: Delivering Performance, Milwaukee, WI. *Sponsor:* Focus on Energy. *Information:* 800/466-4631; bjessen@ecw.org (e-mail).

17-18 • "Building Greener, Building Better" in the Mid-Atlantic Region, Linthicum, MD. *Sponsor:* Maryland Green Building Program. *Information:* 410/260-8727; www.dnr.state.md.us/smartgrowth/greenbuilding.

20-22 • Sustainable Communities Symposium, Crested Butte, CO. *Sponsors:* High Country Citizens' Alliance. *Information:* 970/349-7104; www.hccaonline.org.

23-25 • 3rd International Sustainable Building Conference, Oslo, Norway. *Sponsors:* Norwegian Ecobuild Program, CIB, iiSBE, UNEP, et al. *Information:* +47 22 92 55 40; www.sb02.com.

27-28 • Expanding Partnerships: Celebrating a Decade of Sustainable Building Materials, Seattle, WA. *Sponsors:* Environmental Home Center and the Healthy Forests, Healthy Communities Partnership. *Information:* 503/221-6911 x112; www.hfhcp.org-or-www.environmentalhomecenter.com.

30-Oct. 1 • High Performance School Buildings Workshop, St. Louis, MO. *Sponsors:* SBIC, U.S. DOE, U.S. Dept. of Ed., et al. *Information:* 573/635-0049 (Linda Warden); lwarden@aol.com (e-mail).

OCTOBER

3 • 5th Annual Green Materials Showcase, San Francisco, CA. *Sponsors:* No. California Chapter ADPSR. *Information:* 415/383-5105; www.adpsr-norcal.org/adpsr/menu/Events/Calendar2002/Oct2002.htm#BEF.

3-4 • Smart Design Forum 3, Washington, DC. *Sponsors:* Sustainable Washington Alliance, DC AIA-COTE, DC USGBC. *Information:* 804-360-1500; www.swampnet.org.

4-5 • 4th Annual Green Building Expo, Phoenix, AZ. *Sponsor:* Cities of Scottsdale and Phoenix. *Information:* 480/312-4202; www.ci.scottsdale.az.us/greenbuilding.

5 • Green Buildings Open House & National Tour of Solar Buildings. *Sponsors:* NESEA (N. Eng., NY, NJ, DE, PA), American Solar Energy Society. *Information:* 413/774-6051 x22, www.nesea.org; 303/443-3130, www.ases.org.

7-9 • Laboratories for the 21st Century: Annual Conference, Durham, NC. *Sponsor:* U.S. EPA & U.S. DOE. *Information:* www.epa.gov/labs21century/.

9 • Building Green with LEED™ in New Jersey, Trenton, NJ. *Sponsor:* NJ Dept. of Env'tl Protection. *Information:* 732/932-9271; broccoli@aesop.rutgers.edu (e-mail).

9-12 • EEBA 2002: Excellence in Building, Phoenix, AZ. *Sponsor:* Energy & Environmental Building Association. *Information:* 952/881-1098; www.eeba.org/conference.

16 • Midwest Green Building Conference & Expo, Auburn Hills, MI. *Sponsor:* Small Business Association of Michigan. *Information:* 800/362-5461; www.sbam.org/green.htm.

16-17 • 2nd Annual National Symposium on the Impact of Mold on Health and Indoor Air Quality, Atlanta, GA. *Sponsor:* Aerias, LLC. *Information:* 678/931-2290; www.aerias.org.

18-20 • Bioneers Conference: Visionary & Practical Solutions for Restoring the Earth, San Rafael, CA. *Information:* 877/246-6337; www.bioneers.org.

19-20 • Homes for the Future Tour 2002: Sustainability in Action, Los Angeles, CA. *Sponsor:* Eco-Home™ Network. *Information:* 323/662-5207; www.ecohome.org.

25-26 • CleanMed 2002: An International Healthcare Conference on Environmentally Preferable Products & Green Buildings, Chicago, IL. *Information:* www.cleanmed.org.

31-Nov. 3 • Building Performance: Improving the Quality of the Built Environment, Washington, DC. *Sponsor:* AIA's Building Performance PIA. *Information:* 202/626-7317; www.aia.org/pia/piaevents.htm.

NOVEMBER

5-7 • International Conference on Energy and Environment, Chongqing, China. *Sponsor:* Chongqing University et al. *Information:* fao303@cqu.edu.cn (e-mail).

13-15 • USGBC International Conference & Exposition, Austin, TX. *Sponsor:* U.S. Green Building Council with AIA-COTE, CSI, ULI. *Information:* 202/828-7422; www.usgbc.org.

2003

Feb. 13-15 • Greenprints, Atlanta, GA. *Sponsor:* Southface Energy Institute, Georgia Env'tl Facilities Authority. *Information:* 404/872-3549 x114; www.greenprints.org.

Mar. 30-Apr. 1 • National Green Building Conference and Awards, Baltimore, MD. *Sponsor:* NAHB Research Center. *Information:* 888/602-HOME; www.nahbrc.org.

Apr. 30-May 2 • EnvironDesign7, Washington, DC. *Sponsor:* Interiors & Sources. *Information:* 561/627-3393; www.isdesignet.com.

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