

Where you live should not decide  
Whether you live or whether you die  
U2  
"Crumbs From Your Table" (2004)

SUSTAINABLE DEVELOPMENT

# Growing Green Communities

Advocates of green housing received a boost when the nonprofit Enterprise Foundation of Columbia, Maryland, announced that it plans to build 8,500 environmentally friendly, affordable homes through its Green Communities Initiative. Launched in September 2004, the Green Communities Initiative commits \$550 million over five years to developers to construct housing units that promote health, conserve energy and natural resources, and are located near public transportation, jobs, social services, stores, and schools. The initiative is led by the Enterprise Foundation and the Natural Resources Defense Council, with the support of several other organizations.

The Denny Park Apartments, being built in Seattle, Washington, are a shining example of what can be achieved through the Green Communities Initiative. The project—the first recipient of funding through the Green Communities Initiative—is being built by the Low Income Housing Institute (LIHI), which develops and manages affordable housing units in Seattle. The six-story building will provide

50 units ranging from studios to three-bedroom apartments. The first tenants plan to move in by December 2005. Ten units will be reserved as transitional housing for homeless families.

The apartment building features numerous energy-saving features. It is located along an east-west axis to allow the units to capture more natural light through their oversized windows, reducing electricity bills. A central gas boiler will supply hot water and heat to all the units. "Gas is more efficient and less expensive than electricity in Seattle," says architect Brian Sweeney, manager of development for LIHI. Moreover, hot-water heat makes people feel warmer at lower room temperatures than electric heat, according to Sweeney—people feel as warm at 65°F with hot-water heat as they do with drier electric heat set at 69–70°F. Ventilation fans will run continuously to reduce humidity and mold growth, a problem in Seattle's moist climate.

The building is being constructed with sustainable building materials such as metal roofing and metal siding, which should last 50 years. These durable materials eliminate petroleum-based products such as traditional asphalt roofing shingles and oil-based exterior paint, which—in addition to their nonsustainable provenance—must be replaced every 10 years or so. The project is

using caulks, paints, adhesives, and other construction materials with low levels of volatile organic compounds to ensure healthy indoor air. Carpets are made from recycled plastic products. Rainwater will be captured off the metal roof, purified by gravel filtration, and recycled to irrigate the landscaping, including a communal garden for the tenants.

Although green buildings currently can cost about 2% more to construct, the self-evident long-term energy and health benefits are passed on to tenants. "The things considered 'green' today are going to be part of any building project in the next ten to fifteen years," predicts Sweeney.

Dana Bourland, senior program director at the Enterprise Foundation, says the foundation has received about 50 letters of inquiry from public housing administrators across the United States. Eight grants have been awarded for other projects in the Bronx, Boston, Chicago, and other cities, which are in various stages of development. The housing projects can consist of multi-family or single-family structures, but individuals cannot apply to build just one home. Most of the applicants are public housing offices and nonprofit groups seeking to improve their communities.

What distinguishes the Green Communities Initiative from other green housing programs? "We're not interested in

just one aspect like energy efficiency," says Bourland. Each project has to meet "certain levels of greenness," she says. Her group's criteria include meeting standards for water conservation, healthy indoor air, use of environmentally friendly materials, good operations and management (for example, making sure gutters that collect rainwater for irrigation are kept free of leaves), and optimal location (for example, projects located within a quarter-mile of public transportation earn extra points toward meeting funding criteria). "Our goal is to transform the marketplace and shift the way we build to achieve health, environmental, and economic benefits in communities," says Bourland. —Carol Potera

Sustainable Development Features



## Denny Park Apartments

Seattle, WA

Mixed-use building on urban infill site with public transportation



Runberg Architecture Group, PLLC

## INNOVATIVE TECHNOLOGIES

## Organic Solar Cells

Photovoltaic cells that convert sunlight into electricity have been around for decades, yet their commercial use has been largely limited to applications where conventional electric power is difficult or impossible to provide, such as lighting of road signs and offshore buoys. The problem is primarily economic—although sunlight is free, the high cost of manufacturing traditional silicon-based solar cells has limited their penetration into markets where coal, nuclear, and other nonrenewable sources currently provide more economical energy. Researchers at the Georgia Institute of Technology have developed a new type of solar cell that may someday change that equation.

Bernard Kippelen, a professor in the Center for Organic Photonics and Electronics and the School of Electrical and Computer Engineering at Georgia Tech, is leading studies into the use of pentacene as a medium for converting sunlight to electricity. Pentacene, a compound of carbon and hydrogen, can form a crystalline film in which molecules assemble in an ordered pattern. This makes the compound more conducive to the flow of electricity than the disordered organic compounds that have been tested in the past for possible photovoltaic applications. Improved conductivity leads to higher efficiency, and if that quality can be combined with low cost of manufacture and ease of use, the material holds great promise.

In an article published in the 29 November 2004 issue of *Applied Physics Letters*, Kippelen and fellow research scientists Seunghyup Yoo and Benoit Domercq describe their tests of an organic film made of pentacene combined with a form of carbon known as  $C_{60}$ . The organic layers and an electrode were sequentially deposited onto indium–tin oxide substrates. Broadband illumination was provided by a lamp, photocurrent was measured under varying light spectrums, and conversion efficiencies (the amount of light converted into electricity) were calculated.



**Solar sensation.** New thin-film technology offers promise in converting solar energy into electricity.

The team was able to convert solar energy into electricity with 2.7% efficiency; in unpublished tests since then, they demonstrated power conversion efficiencies of 3.4%. Kippelen believes they will be able to reach 5% in the near future.

Commercial photovoltaic cells that employ silicon crystals are 12–15% efficient, but they are expensive to manufacture and run. Complete systems, including installation, produce electricity at a cost equivalent of 20–40¢ per kilowatt hour (depending upon scale of system and financing) versus 8–12¢ per kilowatt hour for electricity generated by conventional power plants. Kippelen says development of thin-film organic solar cells is not far enough along to estimate the costs of energy production. However, the thin-film cells could possibly be manufactured in a roll-to-roll process, significantly lowering their cost and narrowing the gap with fossil fuel-generated electricity.

Kippelen is confident that his product's unique properties will allow it to be used in applications for which silicon cells are not appropriate. Whereas silicon cells are rigid and relatively thick at 100 microns across, thin-film organic solar cells are lightweight, flexible, and less than 1 micron thick. This could open up new markets for solar energy, perhaps powering small electronic devices such as radiofrequency identification tags, MP3 players, and laptop computers. Kippelen estimates that organic solar cells are at least five years away from residential applications but could find niche low-power applications within two years.

However, thin-film solar power will need to be deployed on a much larger scale if it is to significantly improve the environment. "Small electronic devices represent a minuscule part of total energy consumption," says Tom Starrs, chairman of the American Solar Energy Society. "For any photovoltaic technology to make a significant contribution to global energy needs, it needs to be interconnected with the electrical grid, displacing power generated by coal, nuclear, and other nonrenewable sources of energy." —**John Manuel**

## The New Face of Herbs

After a meteoric rise in sales in the 1990s, use of botanical dietary supplements appears to have plateaued, according to a study in the 14 February 2005 issue of *Archives of Internal Medicine*. Still, exposure may continue to increase as more multivitamins now include botanical ingredients such as the carotenoid antioxidants lutein and lycopene (which may protect against macular degeneration and cancer). The study authors, from Boston University, wrote that the latter finding suggests that herbal supplements are gaining wider acceptance as evidenced by their incorporation into mainstream medicine. Furthermore, multivitamins are now being marketed not just as a source of daily allowances of vitamins and minerals but also as a means for preventing chronic diseases.



## Sunny Spanish Energy

Spain, known for its sunny climate, is turning that resource into energy. The Spanish Industry Minister has announced that as of 2005 any new or renovated buildings must be outfitted with solar panels. Spain's government is seeking a 10-fold increase in the area of solar panels in use in Spain by 2010, and hopes to make the nation a leader in the use of renewable energy. The government has promised subsidies to help get the program off the ground, with details yet to be announced.

In making the announcement, the government stated that this measure could reduce greenhouse gases and save homeowners more than US\$100 each year on fuel. According to additional government estimates, a single two-meter solar panel can cut a household's yearly hot water bill by up to 70%.

## A Fresh Wind Blows in Beijing

Everyone knows China is a big place with a big population. Now it can add having the world's largest wind power project to its list of superlatives. The new power plant, located 60 miles outside Beijing, will generate 400 megawatts per day, enough to power 240,000–400,000 households. This nearly doubles the amount of wind-generated power that China currently has. China announced in 2004 that it hopes to generate 12% of its energy from renewable sources such as wind by 2020.

The plant was planned as a means to help relieve Beijing from some of the world's worst air pollution. Some 70% of the country is affected by acid rain formed in part by emissions from the coal-burning power plants that China currently relies on. The country is also fraught with power outages as demand outstrips supply.



## POLICY

## Healthier Housing Ahead

Community-based organizations around the country are working to promote healthy and affordable housing for all. Yet reduced government funding and increased competition for foundation support make it even harder to redress housing-based health disparities. In early March 2005, the Alliance for Healthy Homes convened nearly 50 leaders from community groups around the country to plan how to work together to build a national movement for healthy homes in the face of political and funding challenges.

Several groups shared recent local successes and strategies. Cleveland has passed a city ordinance that provides incentives for landlords to make housing lead-safe. In San Diego, the Environmental Health Coalition trained *promotoras* (community health promoters) to teach families and code inspectors

about home environmental hazards; the coalition is also organizing citizens in support of a proposed lead-safe housing ordinance. The Boston Urban Asthma Coalition reported progress in promoting good air quality in schools, getting insurers to pay for asthma patient education, and referring asthma patients to city building inspectors for targeted housing code enforcement. These and other experiences provided fodder for workshops on enhancing code enforcement, strengthening ordinances, working with the media to communicate healthy homes issues, and funding housing improvements.

The Alliance for Healthy Homes presented a plan for combining forces with the National Center for Healthy Housing to integrate research, policy, and practice into practical solutions for communities. Community leaders also stressed the need for a separate “uncensored voice” to speak on behalf of low-income communities that suffer most severely from unhealthy housing. The advocates in attendance agreed to pursue forming a new network to serve as this voice for the people.

The meeting highlighted the need to build recognition of the importance of healthy housing and the political will to ensure it through new partnerships at many levels. Community groups can organize residents and promote local policy changes. Local and national groups concerned with education, health, criminal justice, economic development, and poverty can include healthy housing among their central objectives. Researchers can focus further attention on the health risks posed by substandard housing, test and evaluate practical solutions, and educate policy makers and the media.

At the federal policy level, the Alliance for Healthy Homes and the National Center for Healthy Housing are drafting federal healthy homes legislation to comprehensively address the current policy gaps. This legislation could provide the rallying point for community advocates, special interest groups, researchers, and others to move healthy and affordable housing to the central position it deserves on our national agenda.

—Katrina Smith Korfmacher

## CHILDREN'S HEALTH

## Sour News for Soy Formula?

Naturally occurring phytoestrogens have been intensively studied for health effects in adults. However, studies of soy formula, which delivers high levels of phytoestrogens to infants, have not extended much beyond ensuring that babies are growing and developing normally. Still, soy formula has been considered a safe alternative to milk-based formulas for some 40 years. Recent studies from the University of Illinois at Urbana–Champaign now show that the soy phytoestrogen genistein can alter intestinal cell proliferation and migration, with unknown effects for infants fed soy formula.

“We are feeding infants soy formula as their sole source of nutrition for the first four to six months of life, a period of time when many systems are immature and undergoing development,” says Sharon Donovan, a professor of nutrition involved in both studies. It is known that infants metabolize genistein and can have some circulating level of the bioactive form.

But whether the effects are good, bad, or even measurable is unknown and fiercely debated. “Why [soy formula] has not received more research attention, I’m not sure,” says Retha Newbold, an NIEHS toxicologist who has investigated the developmental effects of genistein and other estrogenic substances for more than 25 years.

In the first Illinois study, published in the June 2004 *Journal of Nutrition*, researchers exposed human intestinal cells to varying doses of genistein and noted effects on cell numbers, DNA replication, apoptosis, and cell cycle. At low doses, genistein acted as a weak estrogen and stimulated cell growth; at high doses, the compound inhibited proliferation and altered

cell cycle dynamics. This biphasic response correlates with how genistein is thought to exert its effects.

In the other study, published in the February 2005 *Pediatric Research*, 24 2-day-old piglets were divided into three dietary groups for eight days, receiving plain sow milk replacer or replacer with either a low or high dose of genistein. The high-dose piglets had circulating concentrations of genistein on par with those of soy formula-fed infants. At 10 days of age, there were no significant differences in weight gain, intestinal length or growth, nutrient uptake, or digestive enzyme activity among the piglets. However, there was a 50% decrease in intestinal cell proliferation and a 20% decrease in cell migration associated with the high genistein dose.

Donovan cautions that it’s premature to draw conclusions about negative or positive effects of infant soy formula. “This is what we see when we look at genistein alone,” she says, “but what happens when you look at a whole soy formula?”

More than 20 million American infants have been fed soy formula in the last 25 years, and their growth and development have been equal to that of infants fed milk-based formula, according to Thomas Badger, director and senior investigator at the Arkansas Children’s Nutrition Center in Little Rock. “If there have been no problems in more than twenty million people exposed to soy formula, then there is no human evidence of a problem,” says Badger.

Still, many researchers believe that more information is needed about the safety of infant soy formula. Phytoestrogen doses comparable to what infants receive through soy formula have been shown to cause cancer in some animal studies if given before puberty. “I think too little is known to conclude that soy formula is safe for the general infant population,” says Newbold. —Julia R. Barrett



**Formula fitness?** New findings on genistein raise questions about the safety of soy formula.

ehpnet

## Community Environmental Health Resource Center

The U.S. Environmental Protection Agency defines environmental justice as “the fair treatment of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” Among other goals, environmental justice activists work to better the living conditions of low-income communities, which often bear a disproportionate burden of environmental health hazards and the resulting health problems. One group working to improve housing for low-income communities around the nation is the Community Environmental Health Resource Center (CEHRC, pronounced “search”), based in Washington, DC. The CEHRC website at



<http://www.cehrc.org/> gives communities the tools to document housing deficiencies as well as to pursue corrective and preventive action. A number of the pages on the site are available in Spanish.

One section of the website is devoted to

exposing health hazards in housing. This section provides discussion papers and other documents that describe why it is important for community members to become involved in identifying the hazards in their homes. There is also guidance to help advocates work effectively and responsibly with community residents. This guidance offers insights into how to avoid adverse outcomes (such as faulty repairs that exacerbate hazards), protect residents' rights and privacy, and other ethical considerations.

At the core of the site is the Tools for Detecting Hazards section, which concentrates on five main health threats: lead, carbon monoxide, cockroaches, mold/moisture, and radon. For each threat the site provides background materials, step-by-step sampling instructions and checklists, decision guides to help determine whether testing is warranted in certain situations, and other materials. The lead segment includes specific information for various routes of exposure: dust, paint, soil, and water. The Tools section also provides thorough instructions in both English and Spanish for conducting a visual survey of a residence and preparing a visual survey report.

The How Communities Create Solutions section has information on how to actually enact change within a community. The Data as a Catalyst for Change portion discusses how data can be used to back up advocacy campaigns. It also provides a discussion paper on strategies for holding property owners and government agencies responsible, as well as an overview of models of social change to help organizations define their missions and goals. The Tools for Change page provides time-tested methods to create change through recruiting and training volunteers, accessing political resources, and fundraising. Other portions include information on tenants' rights, case studies, and the basics of developing and understanding policy and legislation.

—Erin E. Dooley

## Butting Out of Bhutan

Known for its fierce protectiveness of its environment and culture, the Himalayan kingdom of Bhutan now has a unique place among the world's nations—it is the first to impose a nationwide ban on public smoking and the sale of tobacco products. According to an act passed in July 2004 by the Royal National Assembly, selling tobacco products will result in a fine of US\$225, a huge sum in this modest nation, and businesses caught in the act will lose their business licenses. Bhutanese bringing tobacco into the country from elsewhere will be charged a 100% tax and may smoke their tobacco only at home. Currently about 1% of Bhutanese are believed to smoke.



## Federal Agencies Pledge Computer Stewardship

The U.S. government represents 7% of the world demand for computers and is expected to spend \$60 billion this fiscal year on information technology needs. Now the White House and 11 federal departments and agencies have signed a memorandum of understanding to develop and promote common strategies for more sustainable management of government computer resources. The signatories will put their purchasing power toward increasing demand for more energy-efficient and environmentally sustainable equipment; promoting implementation of optimal life cycle management practices for electronic equipment; reducing the economic and environmental costs of federal electronic equipment; and promoting the market and infrastructure for the reuse, demanufacturing, and recycling of obsolete equipment.

## Think Globally, Shop Locally

How much does that apple or carton of eggs really cost? A team of researchers from Britain's University of Essex and City University tallied up the unaccounted environmental and transportation costs involved in bringing organic and conventionally grown produce to UK markets and published their calculations in volume 30, issue 1 (2005) of *Food Policy*. If Britons bought more organic produce and made their grocery trips by a means of transportation other than a car, the country would save more than US\$7.5 million in impacts upon the environment. If all UK farms went organic, environmental costs would fall from almost US\$3 billion to just over US\$750 million. And if food came from within 12 miles of where it was consumed, environmental and congestion costs related to the transportation of food would fall from US\$4.4 billion to US\$440 million. Said coauthor Jules Petty, “The most political act we do on a daily basis is to eat, as our actions affect farms, landscapes, and food businesses.”

