



It's only natural, say proponents
of eco-friendly construction.
And natural gas fits right in.

building green

BY SANDRA R. SABO

When constructing a new administration building for its Cove Point facility, Richmond, Va.-based Dominion Resources pursued two primary goals: energy efficiency and low environmental impact. The resulting building—carefully sited to avoid wetlands—uses 32 percent less energy than a typical office building.

“Given our environmental management of the site, we felt like our new administration building needed to be green,” says Michael D. Frederick, director of LNG operations for Dominion Cove Point. Dominion operates the liquefied natural gas facility, situated on Maryland’s Chesapeake Bay, through a partnership with four environmental groups—the Maryland Conservation Council, Sierra Club, The Nature Conservancy and the Maryland Environmental Trust. Of the facility’s 1,017 acres, only 134 have been developed. The majority of the remaining acres are devoted to conservation management, in addition to a county park and a freshwater marsh.

Not the Traditional Route

In general, “green building” refers to employing design, construction and operational practices that make a building more energy efficient and environmentally responsible, as well as healthier for occupants. At Cove Point, that goal translated into decisions such as:

- » Purchasing about 25 percent of construction materials—including bricks, windows and cement—from local producers, thus reducing the amount of energy used for transportation.
- » Recycling approximately 85 percent of construction waste rather than sending it to a landfill.
- » Installing downward-focused outdoor lighting to prevent “light pollution” that disturbs nocturnal animals.

When it conducted a post-occupancy evaluation of 12 U.S. General Services Administration (GSA) buildings in 2008, the GSA Public Buildings Service found that green buildings, compared with typical commercial construction, consumed 26 percent less energy, registered 33 percent fewer greenhouse gas emissions and had 13 percent lower maintenance costs.

» Using a highly reflective roof, highly insulated walls and insulated glass in windows and doors to reduce heat and cooling loss.

» Installing plumbing fixtures that use 40 percent less water than their standard counterparts.

» Encouraging employees to commute by bike (by offering on-site showers) or car pool (by reserving prime parking spaces for registered car and van pools).

“The air-conditioning system uses environmentally friendly refrigerants, and all materials used for cleaning the building are non-toxic,” adds Frederick. “And even though Cove Point generates all of its own power, Dominion purchases more than 550,000 kilowatt hours of wind power credits annually to offset the power used.”

Thanks to these and other energy-saving features, Cove Point qualified for Silver certification from the LEED (Leadership in Energy and Environmental Design) program for new construction.

Developed by the U.S. Green Building Council (USGBC) in Washington, D.C., the LEED green building certification program awards points in five areas: building site, water efficiency, materials and resources, indoor environmental quality and energy use. The final point total, based upon written documentation submitted after construction or renovation concludes, determines the building’s level of LEED certification as Certified, Silver, Gold or Platinum.

A Hot Topic

“Currently, LEED represents about 10 percent of the commercial construction market, or about 4.2 billion square feet of space—and we’re seeing that number increase,” reports Ashley Katz, USGBC’s manager of communications.

“The whole market is asking for green buildings, from contractors on down the line,”

she continues. “Users want to work in healthier spaces where air quality is better, and building owners are seeing that they can save money through more efficient operations.”

Increased research and observations related to global climate change also have contributed to the rising interest in green building practices. Simply put, buildings represent a huge target. According to the *2008 Annual Energy Outlook* released by the Energy Information Administration, buildings are not only the largest consumers of natural resources—accounting for 39 percent of primary energy use in the United States—but also produce 38 percent of all carbon dioxide emissions.

The flip side garners attention as well. When it conducted a post-occupancy evaluation of 12 U.S. General Services Administration (GSA) buildings in 2008, the GSA Public

Dominion Resources’ new administration building for its Cove Point liquefied natural gas facility is situated on Maryland’s Chesapeake Bay. The use of drought-resistant landscaping, a highly reflective roof, insulated glass and other features helped the building earn LEED Silver certification.



PHOTO COURTESY OF DOMINION RESOURCES

AGA's Naturally Green Natural Gas Home Program enables builders and remodelers to self-certify new construction that makes the most of natural gas appliances.

Heightened Interest on the Hill LAST SUMMER,

the U.S. Congress formed the High-Performance Buildings Congressional Caucus Coalition to highlight and raise awareness of best practices in building design. As defined in the Energy Independence and Security Act of 2007, a high-performance building "integrates and optimizes on a life-cycle basis all major high-performance attributes." These attributes include energy conservation, sustainability, safety and security, functionality, productivity and cost effectiveness.

Co-chaired by Rep. Judy Bigger, R-Ill., and Rep. Russ Carnahan, D-Mo., the caucus currently has 17 members and the support of a private sector coalition whose membership ranges from the American Institute of Architects to the Portland Cement Association.

To help shape policy decisions and voluntary codes and standards related to the environmental impact of buildings, the caucus plans to hold quarterly educational briefings and an annual event. These activities would showcase buildings that are not only cost effective to build and operate but also feature reduced greenhouse gas emissions when compared with standard construction.

For more information, visit www.hpbccc.org. —S.R.S.

Buildings Service found that green buildings, compared with typical commercial construction, consumed 26 percent less energy, registered 33 percent fewer greenhouse gas emissions and had 13 percent lower maintenance costs.

"Green building has practically become a household term. You can't open up a magazine or watch TV without seeing or hearing something about a green product or an environmentally friendly operation," observes Vicki L. Worden, vice president of commercial programs for the Green Building Initiative (GBI).

Based in Portland, Ore., GBI serves as the U.S. administrator of the Green Globes environmental assessment and rating tool. The Internet-based system, which incorporates Energy Star performance criteria, awards points in seven categories: energy, indoor environment, site impact, water, resources, emissions and project/environmental management. Buildings that score at least 35 percent on the 1,000-point scale can apply for an independent, third-party site assessment that may result in one of four levels of Green Globes certification (one Globe, two Globes and so forth), depending on the building's level of performance.

At Home With Natural Gas

Both LEED and Green Globes offer green certification for new and existing commercial buildings, and

the National Association of Home Builders (NAHB) and LEED offer certification for new single-family homes. But none of these rating tools—nor any of the residential building rating systems—specifies a base heating source.

That's why when AGA recently introduced the Naturally Green Natural Gas Home Program for single-family residences, it provided an approach for recognizing homes directly upon the use of natural gas options. Offered through natural gas utilities, the program enables builders and remodelers to self-certify new construction that makes the most of natural gas appliances.

"In its transport and delivery, natural gas is very efficient. And, when it burns, it's the most environmentally friendly fuel. So that's the starting point for the Naturally Green program, which requires a home to have both a natural gas water heater and furnace," says Paul Cabot, administrator, national fuel gas code, for AGA.

AGA based the Naturally Green criteria on green home guidelines developed by the NAHB Research Center, which were adapted to reflect regional and other considerations. A home qualifies for Bronze, Silver or Gold certification depending upon the points it earns for various green features, including energy efficiency within the applicable climate zone (Hot, Cold or Mixed). For appliances, the points are based on the national average reduction in the estimated carbon dioxide emissions compared with the equivalent electric appliance.

"Most of the existing rating systems, with the exception of Green Globes' commercial performance ratings, don't look at the carbon produced by the source energy. Over the full fuel cycle, natural gas not only has the benefit of carbon reduction but also is low in other

emissions, such as sulphur,” notes Ted Williams, AGA director of codes and standards technical support. “But given the current international focus on carbon-based emissions and ‘carbon footprint,’ Naturally Green focuses on direct use of natural gas and its potential to reduce carbon emissions over the full fuel cycle.”

Williams emphasizes that the Naturally Green program does not replace nor compete with other ratings systems for green homes. Rather, the specialized program looks just at natural gas homes and can result in a Naturally Green award level for a home at the same time the home receives another green building recognition.

A home that receives a Gold rating under AGA’s Naturally Green program, for example, may not meet criteria for an Energy Star Home rating. Or a home earning a Silver LEED certification may not contain any natural gas appliances.

“The rating systems aren’t mutually exclusive,” says Williams. “You can do both Naturally Green and another system, but you can do Naturally Green only when the home has gas appliances.”

Also, by comparing different packages of natural gas options, the program accounts for potential carbon reductions among these natural gas packages, not in direct comparison to other end-use energy options. Because Naturally Green applies only to natural gas homes, including some minimum requirements for natural gas appliances, it doesn’t provide rankings relative to other fuels.

What You May Hear

With all the chatter about green building, here are the counterpoints to some common assumptions you’re likely to encounter in conversations with customers:

Green buildings look weird. Not necessarily. Sure, you’ll probably see a few green buildings surrounded by earthen berms and bicycle racks or sporting a roof of photovoltaic panels. But most look like conventional buildings because many green features aren’t obvious—such as better insulated walls and windows, energy-saving appliances and excellent indoor air quality.

In Michael Frederick’s opinion, you’d be

Seeing Green **YOU CAN SEE** and hear about the latest green technologies during AGA’s Operations Conference in Pittsburgh, May 19–21. The conference will feature a special area devoted to “Energy Efficient and Green Technologies: Helping Natural Gas Customers Build the Future.”

“We’ll have hands-on exhibits as well as a workshop, all focused on how natural gas utilities and their customers can meet the challenges of a carbon-constrained future,” explains Pam Lacey, AGA senior managing counsel. “These will include a look at promising, new low-carbon technologies for natural gas customers.”

For example, AGA has invited Southwest Gas to demonstrate how it combines natural gas with heat pumps to provide combined heat and power to commercial customers. The process essentially recycles excess heat that would normally go to waste.

Another invitee, Enbridge Gas New Brunswick, participates in a consortium with Atlantic Hydrogen Inc., which has developed its Carbon Saver Reactor to reduce greenhouse gas emissions. The experimental technology uses a process that separates natural gas into hydrogen and solid carbon; the latter is then captured for reuse rather than being released as a gaseous pollutant. —S.R.S.

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—TED WILLIAMS, AGA

hard pressed to find a nicer building than Cove Point in which to work. Each office has the ability to regulate its own temperature, including windows that open. Clerestory windows bring in a lot of natural light, reducing the energy usage associated with artificial lighting.

Cove Point has attracted so many visitors that Dominion installed small plaques to explain the building’s environmentally friendly features, essentially providing a self-guided tour. “A lot of visitors are thinking about doing their own green building, and they see that Cove Point isn’t something esoteric or strange,” says Frederick.

Going green is a temporary craze. Highly unlikely. Interest in the LEED certification program has exploded in the last five years. Between 2004 and 2008, the number of LEED-



registered commercial buildings—new projects that intend to pursue certification upon completion—grew from 1,792 to 9,555. That's a 433 percent increase.

The value of green building construction rose from \$10 billion to at least \$36 billion between 2005 and 2008, according to a recent study by McGraw-Hill Construction. *Green Outlook 2009: Trends Driving Change*, released last November, projects a possible tripling in the value of green buildings under construction in the next five years, reaching as much as \$140 billion.

Further supporting that growth, notes Vicki Worden, is the Obama administration, which has indicated interest in promoting energy efficiency and environmentally friendly policies and practices. In addition, a growing number of states and municipalities now require new construction to meet the criteria associated with one of the rating systems for green buildings.

Two other developments underscore the idea that eco-friendly construction is here to stay. For one, "The insurance industry is creating incentives, such as offering discounts on premiums for buildings certified as green," says

Is It *Really* Green?

WHILE ECO-FRIENDLY building is increasingly popular, more scrutiny is being applied to what exactly *green* constitutes. The New Buildings Institute (NBI) recently studied how much more energy commercial buildings certified by the Leadership in Energy and Environmental Design (LEED) certification program saved when compared with other commercial structures built at the same time. The findings? While some buildings did save considerably more energy, others saved far less.

The Energy Performance of LEED for New Construction Projects study was performed at the request of the U.S. Green Building Council (USGBC), which developed LEED. USGBC says that "on average, LEED buildings are 25 to 30 percent more efficient than non-LEED buildings."

"Chasing 'green points' doesn't get you good buildings that are truly green. You can get a LEED rating and not save any energy compared to traditional buildings," writes Joseph W. Lstiburek, PhD, PEng, Fellow ASHRAE, in the November 2008 *ASHRAE Journal*.

Engineering and building industry experts have pointed out that the most fundamental issue is that LEED performance is ranked against "average" buildings calculated on Department of Energy national data, not on baseline buildings that meet current minimum energy codes. But even ranked against today's buildings—which must meet the building code minimum of ANSI/ASHRAE/IESNA Standard 90.1—the NBI study reported no significant improvement in energy savings for LEED structures.

While buildings can earn LEED certification by excelling in certain areas—such as in air quality and land use—there is no overall criteria for ensuring that actual energy performance beats that of a non-certified building, nor is there a comprehensive feedback and evaluation component to continue measuring building performance over time, said Edward Keegan in the October 2008 *Architect Magazine*. He added that experts say building design, life-cycle of materials and fuels used within the building and during its operation, and other factors must be considered.

Studies of the LEED system have raised these and other issues in the *ASHRAE Journal*, *Architect Magazine* and other venues.

Worden. “You’re also seeing more watchdog groups putting pressure on corporations to green their buildings and product streams and reduce their carbon footprints.”

You spend more time and money to build green. Yes and no. Certainly, it takes time to research various green options. Working with an architect or contractor with experience in green building practices and materials can keep the project moving along. Still, the construction schedule may require some minor adjustments.

At Cove Point, for example, LEED criteria required the building to be flushed with fresh air for a full two weeks before occupancy. “Even though green building usually calls for the use of low-emitting adhesives, there are still fumes to flush out to ensure the indoor air quality,” says Frederick. “That’s rarely done with conventional buildings, so all the emissions are trapped inside.”

And the price tag? Conventional wisdom says a green building shouldn’t cost more if all the green features are integrated into the design from the start. More typically, says Ashley Katz, “The up-front costs for a green building average 1 to 2 percent of the overall budget, depending on how many high-end and highly efficient systems you include.”

Between 2004 and 2008, the number of LEED-registered commercial buildings—new projects that intend to pursue certification upon completion—grew from 1,792 to 9,555. That’s a 433 percent increase.

Of course, once the building is done, you’ll start saving money on its operation. “The average return on investment is 20 percent over the building’s lifetime,” notes Katz. “People get skittish when they see the up-front costs, but the initial investment is recouped within the first one to two years the building is operational.”

Whatever the costs, Dominion’s Michael Frederick likes the resulting boost in productivity as well as less quantifiable savings. He says, “Our LEED-certified building is a fabulous, light-filled place to work in—not to mention the savings on the environment.”

SANDRA R. SABO is a freelance writer based in Mendota Heights, Minn.

For More Information

AGA’s Naturally Green Natural Gas Home Program—www.aga.org/NaturallyGreenHomes
These guidelines identify and explain the benefits of using natural gas in new home construction to reduce carbon emissions and cut energy consumption.

Energy Efficiency Fact Sheet—www.aga.org/EEFactSheet
Natural gas is three times more efficient than electricity in providing energy for end-use applications. While 90 percent of the energy content of natural gas is delivered to customers as useful energy, less than a third of the energy used in the production of electricity reaches homes and businesses.

Green Building Initiative—www.thegbi.org
GBI’s web site offers a free 30-day trial of the Green Globes online assessment tool. The organization’s technical committee is currently at work on making Green Globes the first ANSI-certified commercial green building standard.

U.S. Green Building Council—www.usgbc.org
The LEED rating system, introduced in 2000, was just updated in March 2009. Significant changes include regional points based on climate conditions and scientific recalculations of some credits to reflect their impact on environment and health. These recent changes inaugurated a predictable cycle of updates, with the next version of LEED expected in 2011 and every two years thereafter.