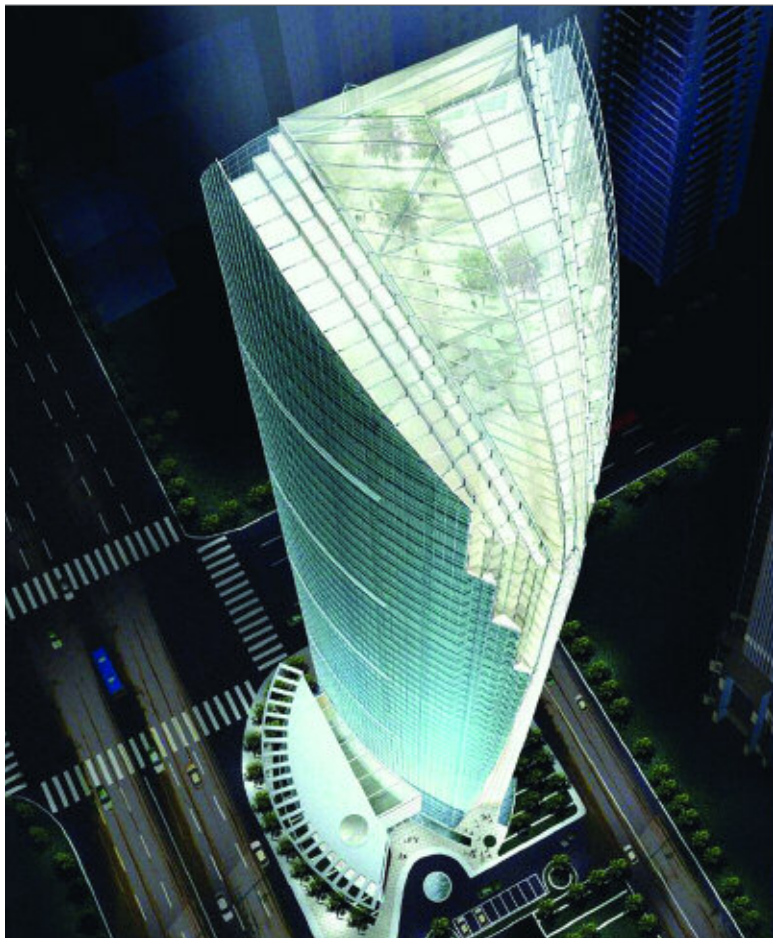


Exporting green

BY JEFF STEPHENS

U.S. COMPANIES FIND CUSTOMERS ABROAD

AS GREEN BUILDING TAKES OFF IN THE UNITED STATES, aspiring manufacturers and service providers are looking overseas for the next big business opportunity. What they're finding is a relatively untapped market with eager customers; a booming construction trade; and a fully developed, yet little known, export assistance program. A program of the Washington, D.C.-based U.S. Department of Commerce, U.S. Commercial Service boasts government officials eager to make introductions, schedule appointments and serve as trade tour guides in foreign countries. • Despite cultural differences and logistical challenges, every U.S. business offering green-building products and services should evaluate the potentially lucrative export market.



▲ THE ZHONGRONG JASPER TOWER will be located in the Lu Jia Zui Financial District of Shanghai. The building consists of an office tower and podium building that will provide leased spaces for international financial institution tenants and private corporate office suites. Four floors will be connected by sky atriums with cascading gardens and spectacular views of the river and city.

GOVERNMENT ASSISTANCE

In fiscal year 2006, U.S. Commercial Service helped more than 69,000 exporters achieve more than \$63 billion in export sales across all categories. U.S. Commercial Service trade specialists in 107 U.S. cities (via Export Assistance Centers) and in more than 80 countries help companies get started in exporting or increasing sales to new global markets. The service provides market research, trade missions that promote specific products or services to qualified buyers, introductions to qualified buyers and distributors, counseling and advocacy. Some offices provide additional assistance tied to events, such as Commercial Service Vancouver, which is helping U.S. companies find market opportunities related to the 2010 Olympic and Paralympic Winter Games. For information about how you can get involved, visit www.buyusa.gov/canada/en/vancouverolympics.html.

Mark Wells, senior international trade specialist for U.S. Commercial Service, focuses on the green-building sector and notes the program can help companies promote a variety of goods and services, including architecture/engineering/construction services, sustainable design and construction, building information modeling, building products, urban planning and district energy, among others. Targeted business sectors include health care, airports, commercial buildings, water and wastewater, transportation/roads, tourism, real estate and energy.

"There are huge export opportunities for green building and sustainable products in overseas markets, particularly in developing countries, and the U.S. Commercial Service can help firms identify project opportunities and establish business partnerships in their target markets," Wells says.

CHINA

Asia is the world's biggest construction market, and China accounts for the bulk of construction projects. The Washington, D.C.-based World Bank estimates by 2015 roughly half the world's new-building construction will take place in China. U.S. Commercial Service estimates China's market for



architecture, engineering and construction services is \$315 billion. Therefore, the potential for green-building products and services in China is limited only by a firm's imagination.

There are, however, some barriers to success in China. Extensive capital and personnel requirements limit construction projects to only the largest and most established foreign firms. Also, only licensed firms can stamp engineering drawings, and it is rather difficult for foreign firms to obtain licenses. Firms in China also are not allowed to specify products by name in their designs, providing contractors the opportunity to substitute inferior materials without the written approval of a designer or owner. Partnering with local firms is a must. Luckily, U.S. Commercial Service has six offices in China, including Beijing, Chengdu, Guangzhou, Hong Kong, Shanghai and Shenyang.

CANADA

According to U.S. Commercial Service, there is a pent-up demand for green buildings in Canada, and numerous real-estate developers are applying to have their projects certified through the Ottawa, Ontario-based Canada Green Building Council's LEED program.

In September 2006, U.S. Commercial Service organized the U.S.-Canada Architectural/Engineering Partnering Seminar in Toronto and Vancouver. Participating architectural/engineering firms gained direct access to Canadian architects and green-building industry contacts interested in business partnerships to pursue projects in Canada, the United States or other international markets.

The U.S.-Canada Intelligent Building Conference and Partnering Event planned for

▲ DALIAN-GILSON HOSPITAL currently is being constructed in Dalian, China. Nashville, Tenn.-based Gresham, Smith and Partners partnered with Dr. Albert Gilson, president of U.S.-based Healthcare Solutions International and Jiang Changloin, chief executive officer and professor of the Second Affiliated Hospital of Dalian Medical University. Gilson and Changloin fuse the best of western medicine with the culture and expertise valued by the Chinese people.

[LEFT] Schematic design for the HANGZHOU INTERNATIONAL CO+EX CENTER, Hangzhou, China, is complete. Gresham, Smith and Partners won this project by participating in an international competition in June 2001. The project is a mixed-use development in a tourist zone and has an estimated cost of 3.3 billion yuan (\$400 million).

May 30 in Toronto will enable U.S. firms specializing in building automation products and services to showcase their company's achievements and expertise to senior Canadian business leaders. Participants make 20-minute presentations to Canadian architectural, engineering and property-management firms, as well as building owners. Attendees receive briefings from Canadian public/private sector experts about trends, opportunities, changing regulations and financial strategies affecting the industry. Acting as a diplomatic matchmaker, the U.S. Consulate is providing networking opportunities with key Canadian government and business

representatives. For more information, contact Viktoria Palfi at viktor.palfi@mail.doc.gov or (416) 595-5412, ext. 229.

In addition, U.S. Commercial Service is hosting a Green Building Products Trade Mission to Hong Kong, the Philippines and Singapore, June 4-12. The mission offers opportunities to tap into some of the fastest-growing markets for U.S. green building products and services. For attendance information, visit www.buyusa.gov/downtownlosangeles/greenbuild_asia.html, or contact Amy Magat at amy.magat@mail.doc.gov or (213) 894-3966.

MEXICO

Mexican officials have realized sustainable-building practices represent a viable way to reduce Mexico's energy consumption and dependence on nonrenewable energy. According to U.S. Commercial Service, commercial and office-building construction and especially tourism infrastructure represent a potential green-building market in Mexico. Residential and nonresidential building envelope systems, building materials, and water- or energy-saving products are the best prospects in the Mexican market.

Establishing joint ventures with Mexican developers to create products and services in accordance with Mexican construction techniques is the suggested way to enter the market. Because personal relationships in Mexico are crucial, service providers can benefit by providing educational seminars to build awareness within the market.

SUCCESS STORIES

Many firms have successfully tapped into U.S. Commercial Service's resources. One example is Gresham, Smith and Partners, Nashville, Tenn. The firm worked closely with the Nashville Export Assistance Center and more than 12 overseas Commercial Service offices. GS&P now is the lead architect on various Chinese projects, including the Zhongrong Jasper Tower, Pudong district, Shanghai; Dalian-Gilson Hospital, Dalian; and Shenzhen Eye Hospital, Shenzhen. The firm also worked on the Hangzhou International CO+EX Center, Hangzhou. GS&P also has completed international projects in

Korea and Latin America and is pursuing new opportunities in the European market.

In 2005, the U.S. Green Building Council organized a 14-member trade mission to Shanghai and Beijing. According to Jervy Zhu of GBBN Architects, Cincinnati, "The trade mission provided essential business opportunities and possibilities. Being a part of the delegation gave us credibility and instant respect in China."

At the local level, Ori Sivan, co-founder of GreenMaker Supply, a Chicago-based green-building supply company, recently participated in a trade mission organized by the state of Illinois that visited four cities in China to promote Illinois products and services. According to Sivan, the trip helped establish local contacts enabling GreenMaker Supply to go direct to Chinese suppliers to control costs and ensure the environmental quality of products. Sivan also sees long-term potential for his business in China. Other states with green-building export programs include Arizona and Maryland.

FUTURE EXPANSION

By all accounts, U.S. green building has finally come of age. Building owners and managers are embracing it to provide lower ongoing costs. Architects, designers and contractors better understand certification schemes and environmental claims. Product manufacturers are responding with new and innovative offerings that meet market needs. The next green-building frontier is the international

market. With Export Assistance Centers in more than 100 U.S. cities, tapping into the lucrative green-building export market may be as easy as picking up the phone. 🌱

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Jeff Stephens is principal of Oakland, Calif.-based Planet Relations, a public-relations consultancy for Earth-minded businesses. He can be reached at jeff@planetrelations.com or (510) 663-4462.

RESOURCES

- U.S. Commercial Service, Washington, D.C., www.export.gov
 - Mark Wells, senior international trade specialist, (202) 482-0904, mark.wells@mail.doc.gov
- Evergreen Building Products Association, Portland, Ore., x.ep.org
- U.S.-China Build, Portland, x.uschinabuild.org
- Canada Green Building Council, Ottawa, Ontario, Canada, www.cagbc.org
- Mexico Green Building Council, Monterrey, Mexico, www.mexicogbc.org
- World Green Building Council, www.worldgbc.org



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Leading the Way

FREIBURG BUILDS A SUSTAINABLE LEGACY

SUNLIGHT REFLECTS OFF A SOLAR PANEL SUNSHADE on the side of a department store in Freiburg, Germany. This is the final stop on my tour through northern Europe in search of sustainable buildings. Sunny weather and an aggressive solar agenda have catapulted this city to the status of Germany's solar capital. • Photovoltaic panels and solar thermal-energy collectors aren't limited to a handful of flagship projects touting the banner of sustainability amidst blocks of unsustainable buildings. Everywhere you go you see roofs, façades and sunshades with PV panels or glass-integrated PV laminates. This trend is becoming common throughout Germany, and Freiburg has led the way. There are two reasons for this trend: Germany is home to a culture that takes sound environmental policy seriously, and the national government has been instrumental in the trend, offering large incentives for installing PV systems.

INCENTIVES

Freiburg's incentives are known as feed-in tariffs. The electric company, BADENOVA, installs an electric meter for the energy a household or commercial building takes from the grid and a separate one for the energy produced by its solar array. Every month, the building owner pays the electric bill dictated by the first meter. At the end of the year, the energy produced by the solar array is paid back to the owner at an increased rate. Currently, an owner pays approximately 16 euro-cents (21 U.S. cents) per kilowatt hour of electricity purchased from the electric utility and is paid 49.2 euro-cents (65 cents) per kWh of energy the solar array produces. This is a fixed rate for 20 years.

BADENOVA is a quasi-public corporation. Feed-in tariffs are paid through tax money used to promote private investment in solar power. However, subsidies for solar, biomass and small hydropower installations are provided through BADENOVA company revenue. The subsidies paid out since 2001 are around 4 million euros (\$5.3 million) and are based on a payment of 300 euros (\$400) per kW peak installed. Prices in Germany per kW peak system installed are around 5,000 to 6,000 euros (\$6,650 to \$7,980) with each kW installed providing some 1,000 kWh of electricity per year.

SOLAR PROJECTS

Freiburg is home to some notable flagship projects worth exploring. The Solar Info Center is

a building that houses many firms working in the sustainable design and building industry. Within the center, you'll find the city's Solar Region Map, which shows 30 projects developed within Freiburg city limits, ranging from solar power stations to solar research facilities to solar thermal heating and cooling installations.

One example is the Euregio Solar Education Centre located on the campus of the Richard Fehrenbach Technical College. This building serves as a practical tool for training electricians in the installation of solar-energy systems. It has many renewable energy systems on display

outside of the classroom, thus providing information accessible to the general public.

In the southwest corner of town, the Solar Fabrik is an impressive building. At first glance, it doesn't resemble a PV panel producing factory. A south-facing inclined glass curtainwall enters into a modern office building bathed in natural light. The numerous curtainwall and roof-mounted PV laminates are silently generating electricity. One-fifth of the energy used by this plant comes from PV panels. The rest is produced by a co-generator (producing heat and electricity) fueled by pure rapeseed oil.



▲ THE EUREGIO SOLAR EDUCATION CENTRE serves as a practical tool for training electricians in the installation of solar-energy systems. It has many renewable energy systems on display outside of the classroom, thus providing information to the general public.



freiburg (continued from page 68)

▲ The houses in the Plus Energie Schlierberg Solar Estate are significantly more expensive than standard housing in Freiburg. This is mainly because of current prices on solar photovoltaic cells. The solar estate takes advantage of feed-in tariffs. As a plus energy building, the owners receive an income from the electric utility for the energy they produce yearly.

[RIGHT] Solar Fabrik, a PV-producing factory, has created an emissions-free industrial building.

Solar Fabrik is oriented to take advantage of the sun's energy with large windows on the south and small windows on the north to minimize heat and cooling loss. The shades on the glass curtainwall block the building from direct sunlight during summer months but allow that sunlight in when the sun is lower on the horizon in winter.

Additional heating and cooling is provided by a geothermal system that pulls air from outside through a network of pipes to condition the air to a 16 to 18 C (61 to 64 F) constant ground temperature. The air then is pulled into the building through normal air currents. Windows at the top of the glass curtainwall open and close automatically, using input from heat sensors inside the building. This provides a cool

breeze of earth-cooled air into the building and pushes hot air out the top of the curtainwall.

Renewable energy use isn't the only thing sustainable about Solar Fabrik. All rainwater collected on roof surfaces is stored in a 50 m³ (1,766 cubic feet) cistern to be used for irrigation and as flush water in the bathrooms. Polyvinylchloride was avoided in all building materials because of its harmful production process and offgasing concerns. In addition, the process by which Solar Fabrik creates solar panels is carbon-dioxide neutral. In the complete cycle, Solar Fabrik has created an emissions-free industrial building.

Other exciting developments are happening in the Vauban district. This neighborhood of 5,000 residents also is home to businesses that occupy the bottom floors of many mixed-use buildings. When development started in 1994, the buildings were required to meet all their heating energy needs with 65 kWh/m². This now is almost standard in Germany; the heating energy code limit is 70 kWh/m².

This area also produced some very innovative projects involving passive house

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construction and “plus energy buildings.” The Plus Energie Schlierberg Solar Estate is a project that takes advantage of the feed-in tariffs. As a plus energy building, the owners receive an income from the electric utility for the energy they produce yearly.

The houses in the Plus Energie Schlierberg Solar Estate are significantly more expensive than standard housing in Freiburg. Typical housing in Freiburg costs from 2,000 to 2,300 euros per square meter while the plus energy houses cost upwards of 3,000 euros per square meter. This is mainly because of current prices on solar PV cells.

However, other Vauban projects that feature passive design to save energy are quite a bit more accessible in price. For example, the “Passivhaus”-style townhouses designed by Freiburg-based architectural firm Meinhard Hansen achieve a very high level of energy efficiency through passive solar orientation, fenestration design, and a very tight and highly insulated building envelope. For an initial cost of 10 to 15 percent above traditional construction,

the buildings save 90 percent on heating and cooling each month.

Sitting in Meinhard Hansen’s flat in one of his Passivhaus buildings, I notice how comfortable the interior is. It’s not extremely cold outside, maybe 13 C (55 F), but it’s raining. The inside of the house is a comfortable 22 C (72 F). The temperature inside is maintained solely by the heat exchanger in the ventilation system that transfers heat from outgoing air to incoming air. The energy required by the ventilation system is approximately the same as that required by one

>> FOR MORE INFORMATION
about what’s happening in Freiburg,
Germany, in solar-energy
construction, check out
www.solarregion.freiburg.de.

To view case studies of
sustainable buildings Joe
Karten has toured, visit
www.greenbuildingworldwide.com.

light bulb running continuously. On very cold days, a heating element kicks on but only for a short amount of time. The building insulation retains heat well. Higher initial costs are caused by the high-performance triple-glazed windows and 40-cm- (16-inch-) thick polystyrene insulation used in all exterior walls, but the majority of the savings come from the passive solar orientation.

This energy savings isn’t even what sells the flats. Hansen finds that people are more likely to buy the flats for their design and their popular acceptance in the neighborhood. The energy efficiency of the flats is just an additional reason to make the investment. Freiburg is testimony that sustainable buildings are achievable and affordable. 🌱

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Joe Karten, LEED AP, received the Regnier Traveling Fellowship from the American Council of Construction Education, San Antonio, to report about what’s happening in sustainability around the world. He can be reached at joe.karten@gmail.com.



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BIM supports sustainability

BUILDING-INFORMATION
MODELING CAN DECREASE
WASTE IN THE BUILDING
INDUSTRY

BY SAM BACHARACH

A **BUILDING-INFORMATION MODEL** is a cumulative digital representation of physical and functional characteristics of a building. It is much more than the building's assembled 2-D or 3-D computer-aided design and facilities-management drawing files. A BIM is a shared knowledge resource containing many different kinds of information about a building, such as site plan, CAD drawings, connections to subsurface infrastructure, building system and component specifications, tenant information and building evacuation plans. It provides a reliable basis for decisions during the building's entire life cycle. Different stakeholders at different phases of the building's life cycle insert, extract, update or modify information in the BIM. • On Dec. 7 and 8, 2006, the Herndon, Va.-based Open Geospatial Consortium Inc. held a public demonstration of the results of a seven-month interoperability testbed, OGC Web Services 4, that included a BIM standards component. The demonstration was focused on disaster management, but it also addressed the usefulness of BIM for design and construction of sustainable buildings.

BIM BACKGROUND

OGC is an international industry consortium of 335 companies, government agencies and universities participating in a consensus process to develop publicly available interface specifications. These specifications support interoperable solutions that "geo-enable" the Web, wireless and location-based services, as well as mainstream information technology. The specifications empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications.

Interoperability is the ability of diverse kinds of digital information systems to operate together and is a necessity for participants in the BIM standard effort. The basic BIM standard is a product of the National BIM Standard Project Committee of the Facility Information Council of the National Institute of Building Sciences, Washington, D.C., and the Building Smart Initiative of the International Alliance for Interoperability, which also is a NIBS Council. OGC is assisting these groups

with geospatial knowledge and support for CAD-Geospatial-3-D integration.

These cooperating standards groups recognize computing is becoming more network-centric. The Internet connects countless systems and devices that are "loosely coupled" through their implementation of open, standard interfaces, protocols and encodings. Internet-based distributed computing is leading building professionals away from a conscious focus on discrete drawings and data files that belong to specific software systems and specific projects. We are headed toward applications that draw in a seemingly spontaneous manner from information and software services that reside on countless servers on the Web.

The Gaithersburg, Md.-based National Institute of Standards and Technology and Cincinnati-based Construction Users Roundtable reports ("Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry" and "Construction Users Roundtable Report on Collaboration, Integrated Information, and the Project Lifecycle in Building

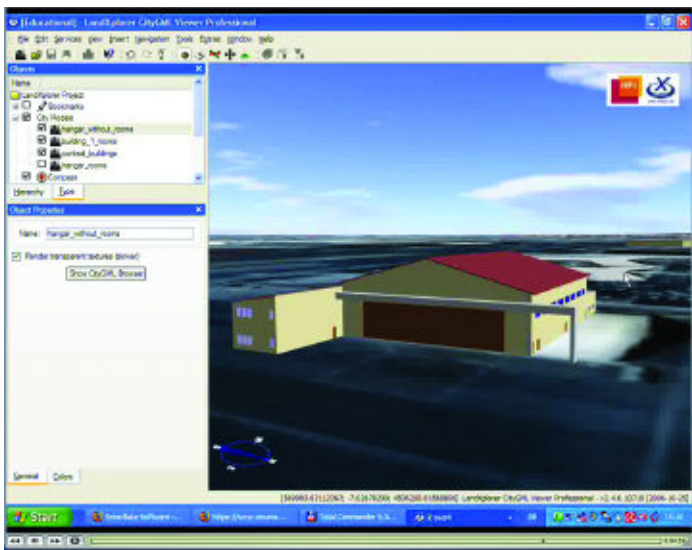
Design, Construction and Operation," respectively) highlight 30 percent waste in building projects, which amounts to about \$15 billion in U.S. federal projects alone. This waste also translates into wasted natural resources and unnecessary pollution and greenhouse-gas emissions. Thus, sustainability is another major benefit of BIM. Many BIM proponents are, therefore, focused, quite appropriately, on the financial benefits of BIM for planners, architects, lenders, owners, occupants, insurers and others.

BIM AND SUSTAINABILITY

Kimon G. Onuma, AIA, president and director of technology for Pasadena, Calif.-based Onuma Inc., one of the OWS-4 participants, points out that waste begins in the early planning stages when lack of access to previously acquired information leads to unnecessary travel, meetings and document preparation.

Using BIM and other integrated tools that were demonstrated in OWS 4, a building's various stakeholders can dramatically reduce the 30 percent waste that occurs at each stage in the building life cycle. For example, BIM can help architects design buildings that stay within budget and help them avoid errors and omissions that occur in construction documentation. BIM reduces coordination errors of nonintegrated processes, inefficiencies in communications among consultant teams, change-order requests during construction, and design errors that make it all the way into construction and then have to be maintained by owners.

Onuma explains: "The construction industry is collectively one of the largest in the world. The architect is in the pilot's seat driving the decision-making process that triggers construction. By keeping the status quo of the current process with the 30 percent built-in waste factor, we are in a way one of the worst offenders in the impact on global warming. This is a crisis. Regardless of whether it makes economic sense to change our process to be more integrated, we have a moral obligation to change just for the sake of changing the impact on the environment and the future of the planet. There is no need to do an economic analysis or a risk-reward study or a potential-liability study to see the need for that change. We are obligated to humanity to make this change now."



▲ In the OWS-4 DEMONSTRATION's hypothetical scenario, a bomb containing highly toxic radioactive material explodes at a wharf in the New York area. Building-information models made it possible to quickly find a building suitable for an emergency field hospital and rapidly modify it for use.

Another participant in the OGC's OWS-4 testbed, San Rafael, Calif.-based Autodesk, announced in November 2006 a partnership with the U.S. Green Building Council, Washington. Autodesk and USGBC plan to explore ways of integrating the LEED rating system into its Revit platform for BIM.

According to Phil Bernstein, FAIA, Autodesk vice president of building industry strategy and relations, the initiative will "democratize and make more accessible sustainable design tools." He believes this ultimately will reduce the causes of climate change by increasing the number of green buildings that emit less carbon dioxide.

BIM alone is not the answer but a part of the answer, and it has to be linked to other data that relates to the environment. It is all about connecting the dots. In early planning, BIM integrated with geospatial data can inform basic thinking about and enhance the analysis of a building's purpose and program requirements. It does this by providing richer data about the site and enabling better modeling of a building's function and environmental impact relative to surrounding activities, structures and resources.

Sam Bacharach is executive director and focuses on outreach and communications for the Open Geospatial Consortium Inc., Herndon, Va. He can be reached at sbacharach@opengeospatial.org or (703) 352-3938.

>> TO LEARN MORE about how your organization can participate in Herndon, Va.-based Open Geospatial Consortium Inc.'s BIM standards effort, contact Sam Bacharach at sbacharach@opengeospatial.org or visit www.opengeospatial.org.

