

# From Splashy to Subtle

Development May Have Slowed, but Technology Never Sleeps—and It's Going Green

By Dees Stribling

While new construction has slowed, the interest in all things green among property owners, tenants, environmental activists and government departments continues to drive technological advances. Indeed, the latest green technologies offer new and in some cases cheaper options.

Emerging green-building technologies range from the splashy to the subtle. For instance, green-building technology companies are now rolling out such innovations as in-building wastewater treatment systems that recycle “blackwater” for non-potable uses (splashy, as

technologies. The glass in dynamic windows darkens or lightens with a press of a switch or signals from sensors, the better for a building to maximize daylight without overheating. According to a recent study by Lawrence Berkeley National Labs, dynamic windows can reduce energy usage by as much as 20 percent annually at a commercial property and reduce peak demand by 30 percent, compared with current low-e (low-emission) glass.

Making a window smart involves applying small amounts of electricity through complex, multi-layered glass. Such glass is “still too ex-

pect in the coming years. “We plan to ramp up hiring to where we have 130-plus employees by 2015,” said Alex Burney, its CEO. By then, the company will have a capacity to make 5 million square feet of the windows annually. Currently, the company employs 14 people.

Late last year, Colliers International Inc. inked a deal with Cypress Envirosystems, a subsidiary of Cypress Semiconductor Corp., to oversee the conversion of functional but outdated pneumatic (mechanical) thermostats to direct digital controls for the HVAC systems in older buildings. Digitally controlled HVAC is not new in and of itself, since commercial structures built in the past decade or so tend to employ the technology, which enables better control and optimization of HVAC. The movement now is to retrofit older buildings with digital controls, using less expensive methods than previously available.

“Retrofitting an existing facility from pneumatic to digital has been very invasive and expensive, with walls ripped open to run wire and replace actuators and tenants moved, possibly for months,” said David Roberts, director of marketing with Cypress Envirosystems. He further asserted that his company’s digital retrofitting—called Wireless Pneumatic Thermostat technology—which essentially modifies the existing thermostats without replacing them, costs 80 percent less than a conventional retrofit of \$2,000 to \$3,000 per thermostat.

Millennial Net Inc. is another company rolling out a version of wireless digital controls that modify, rather than replace, existing thermostats. “Wireless lends itself particularly well for retrofit of pneumatic buildings because no power or network cables are present at the thermostat,” wrote Mark O’Hearne, its vice president of business development, on AutomatedBuildings.com. “Early adopters have stepped up to demonstrate in pneumatic

**“Retrofitting an existing facility from pneumatic to digital has (until now) been very invasive and expensive.”**

—David Roberts, Cypress Envirosystems

these things go), but also paints that not only are low VOC but subtly sequester toxins from the surrounding atmosphere. Such a product by CertainTeed is being tested even now at the Oregon Sustainability Center.

Those kinds of products are well and good, but the holy grail of green building remains energy efficiency, both for cost control and the reduction of carbon emissions. And there is no shortage of energy-focused technologies—either new tech or old tech adapted in new ways—whose goal is to reduce energy consumption or find green ways to make energy.

## Energy-Saving Technologies Evolve

In the drive to make buildings more energy efficient, a major emerging green building technology is “dynamic” or “smart” windows, generic terms for a variety of new window

pensive to have much market penetration,” said Renee Loveland, who leads the built environment division of Gerding Edlen Sustainable Solutions. But it will not be long before that changes.

The race is on among U.S. manufacturers to make smart windows for commercial real estate applications, involving such established names as Sage Electrochromics and Soladigm but also newcomers such as Switch Materials, Pleotint and RavenBrick. Early adopters among real estate owners, such as the U.S. Department of Energy, have already had smart windows installed. Recently, the department installed 31 smart windows at its National Renewable Energy Laboratory, a LEED Platinum building in Golden, Colo.

The maker of the lab’s windows, RavenBrick, anticipates strong demand for the prod-

buildings that significant energy-efficient benefits can be achieved using wireless thermostats and sensors.”

### Self Generation

It is one thing for a building to save energy, but equally important in the new green world is its ability to make its own energy. For example, a new generation of micro-wind turbines have come on the market in recent years that are better suited to making wind power on or near buildings than more standard wind turbines seen in rural areas or offshore.

“There are many new types of micro-wind turbines on the market now in various forms,” said James Qualk, vice president of the sustainable solutions group at SSCRX, a green building specialist. “Some vertical-axis models don’t look anything like what one might envision as a wind turbine, and are being used as kinetic art, with the benefit of generating electricity.”

A little further into the future are methane biodigesters, or gasification units, for certain kinds of commercial buildings. This technology takes dry waste and decomposes or burns it, and the resulting gas is used in a fuel cell or turbine

to generate heat and produce electricity. The principle is old; more than 200 years ago, Sir Humphry Davy found that methane existed in cattle manure (and cow chips are a kind of dry waste). Even now, this kind of energy production is associated with farms.

By their nature, biodigesters might not be suitable for every kind of commercial property, but those that generate organic waste (certain industrial operations, retail and restaurants) might find such systems useful as the technology improves and becomes less expensive.

A few places already have biodigester systems, such as the Anheuser-Busch

and New Belgium breweries, as well as a Ben & Jerry’s ice cream factory in the Netherlands. However, “these are economically viable only at a large scale currently, not at the building scale,” said Gerding Edlen’s Loveland.

Fuel cells do not represent a new technology, but they are fairly new in providing energy to buildings. They work by converting chemical energy into electricity or heat via a chemical reaction, which reduces carbon dioxide emissions by 35 to 40 percent when compared to ordinary electricity production, according to fuel-cell makers. Often, natural gas is the fuel of choice for these cells when installed in buildings.

“People have been hearing about fuel cells since the ’60s at least, because the Apollo program used them,” observed Mike Upp, vice president of marketing at ClearEdge Power, a manufacturer of fuel cells. “Since then, the materials used in fuel cells have gotten a lot better and cheaper, to the point at which they can be part of an energy strategy for a building.”

Recently, ClearEdge Power installed a pair of fuel cells at the Palace Hotel, a renovation project that will provide apartments for foster youth aging out of the system. The cells will work in combination with photovoltaic solar panels to provide all of the property’s electricity needs. “Though each property’s configuration is unique, solar and fuel cell combinations typically see a payback period of five to eight years,” said Upp.

The effectiveness of fuel cells also depends on how electricity is generated in a particular market. “Fuel cells at the building scale typically run on natural gas, and because it’s a co-generation device, it can be effective in some markets,” said Loveland. “That’s especially true where rates are high and the local utility still generates a substantial portion of its electricity with coal.”

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