

Dynamic glass offers growing revenue stream

Greater commercialization ahead for electrochromic and thermochromic windows

By Jenni Chase

Driven in large part by the green building movement, the dynamic glass market will grow substantially over the next several years, with electrochromic glass revenues hitting the billion-dollar mark in 2017, according to a new report from Nanomarkets, www.nanomarkets.net. Thermochromic glass revenues also will increase dramatically, climbing from \$30 million in 2011 to nearly \$197 million by 2017, the report states.

While its predictions are lower, Lux Research, www.luxresearchinc.com, also forecasts significant growth for dynamic window technologies, anticipating they will represent a \$418 million market by 2020. That market could grow to more than \$1.4 billion, Lux analysts say, depending on how quickly costs come down.

Cost, of course, is the major challenge that all dynamic glass manufacturers face. Yet, prices are coming down, materials are getting better, and companies are raising more money, opening up opportunities for greater commercialization of electrochromic and thermochromic technologies, Nanomarkets analysts say.

Late last year, for example, Saint-Gobain, www.saint-gobain.com, invested \$80 million in Sage Electrochromics, www.sageglass.com, to make electronically tintable, dynamic glass an affordable, mass-market product. That investment, along with a loan guaranteed by the Department of Energy, enabled Sage to begin construction in Faribault, Minn., of the world's largest and most advanced electrochromic glass manufacturing facility, according to Sage officials. The plant is expected to come online in fourth quarter 2012, says Andrew Hulse, vice president, sales and business development.

"Even today, we are first-cost-competitive for solar-control solutions," Hulse says. "Because of the ability to lower peak demand, this technology also helps lower HVAC usage. It offers ongoing operating cost savings.

"We're seeing a lot of interest from architects," Hulse reports. "Once they see the flexibility SageGlass gives them, they realize that they are able to use the glass essentially like a valve to regulate the amount of solar energy and light entering a building."

SUMMARY FORECAST

ELECTROCHROMIC TECHNOLOGY

	2011	2012	2013	2014	2015	2016	2017	2018
Electrochromic Window Glass Volume (<i>Million Square Meters</i>)	0.19	0.35	0.61	0.96	1.49	2.30	3.54	5.48
Average Cost per Square Meter (\$)	700.0	609.0	529.8	461.0	401.0	348.9	303.5	264.1
Electrochromic Glass Revenues (\$ Million)	136.0	213.5	321.7	443.9	597.8	800.9	1075.2	1446.3

THERMOCHROMIC TECHNOLOGY

	2011	2012	2013	2014	2015	2016	2017	2018
Thermochromic Window Glass Volume (<i>Million Square Meters</i>)	0.07	0.10	0.14	0.26	0.48	0.76	1.06	1.48
Average Cost per Square Meter (\$)	400.0	352.0	309.8	272.6	239.9	211.1	185.8	163.5
Thermochromic Glass Revenues (\$ Million)	30.0	35.7	42.4	71.8	114.9	160.5	196.9	242.3

Source: "Next-Generation Smart Windows: Materials and Markets: 2011," available from Nanomarkets, www.nanomarkets.net.

Similarly, electrochromic glass manufacturer Soladigm, www.soladigm.com, raised \$40 million in equity financing earlier this year to further its development of dynamic glass products.

On the thermochromic side, RavenBrick, www.ravenbrick.com, completed its inaugural RavenWindow installation at the Department of Energy's Research Support Facility on the campus of the National Renewable Energy Lab Headquarters Building in Golden, Colo., in August 2011. The company is currently in the process of setting up an automated production line with a 5 million-square-foot annual capacity, funded in part by the City of Denver and the Colorado Governor's Energy Office. Its RavenWindow technology allows free solar heat into the building when desired, and at a set temperature, transitions to a tinted state to block unwanted solar heat gain.

Prices are coming down, materials are getting better, and companies are raising more money, opening up opportunities for electrochromic and thermochromic technologies.

"We believe that both the electrochromic and thermochromic dynamic window market will continue to grow at a fast pace in the coming years," says Chris Ketchum, vice president of sales, RavenBrick. "Thermochromics will garner the lion's share of the market due to the substantially lower cost providing a shorter payback period, ease of installation and a simple integration into the IGU fabrication process."

Also gaining ground is the Sunlight Responsive Thermochromic interlayer technology from PleoTint, www.pleotint.com, a lightly tinted film that warms up and darkens in direct sunlight to prevent undesirable heat load. In the absence of direct sunlight, the SRT window clears to allow much of the indirect sunlight into the building. This September, company officials announced that Pleotint and PPG Industries, www.ppg.com, had agreed to jointly market a commercial window glass system that combines Pleotint's SRT interlayer technology with PPG's Solarban low-E glass and other glasses to control solar heat gain and reduce energy costs in buildings.

"This is a revolutionary technology that makes the building come alive," says Fred Millett, director of sales and marketing, Pleotint. The PPG and Pleotint agreement adds more credibility to dynamic glazing, he says. "It's a validation of our technology."

Nanomarkets offers in-depth analysis of electrochromic and thermochromic technologies and market opportunities in its new report, "Next-Generation Smart Windows: Materials and Markets: 2011," available for purchase at www.nanomarkets.net. The 59-page report also provides eight-year forecasts by window type, in addition to examining market opportunities for self-cleaning windows. ■



Window systems with dynamic Sunlight Responsive Thermochromic inter-layer technology by Pleotint, LLC, adjust to changes in direct sunlight by darkening to a neutral-gray tint (left) as heat loads increase, then returning to their clearest state (right) as direct sunlight decreases.



In the clear state (left), RavenBrick LLC's RavenWindow thermochromic product allows solar heat in when desired. In the tinted state (right), it blocks unwanted solar heat.



As this demonstration at Greenbuild 2011 shows, SageGlass electronically tintable glass from Sage Electrochromics allows users to select preset tint levels between the low and high ends of the glass's dynamic range.