

Testimony of Dr. Helen Sanders, of SAGE Electrochromics

July 14, 2011

Chairwoman Stabenow, Ranking Member Roberts, and members of the Committee, thank you for the opportunity to testify today on the role SAGE Electrochromics is playing in creating economic opportunity, and strengthening the green economy, in rural America.

My name is Helen Sanders. I have a doctorate in Surface Science from the University of Cambridge, in England. I serve as the Vice President for Technical Business Development for SAGE Electrochromics, in Faribault, Minnesota, located in rural Rice County.

I. SAGE Electrochromics

SAGE is creating glass for windows that go beyond the traditional idea that a window is simply a piece of glass in the wall. What is unique about our glass is that, using a technology called “electrochromics,” it can be made highly tinted, or made highly transparent, or stopped at any tint level in between, all at the push of a button. In, this way it allows the right amount of light and heat to be admitted depending on the exterior environment and the needs of the building occupant. This reduces the load on the heating, ventilation and air conditioning (HVAC) systems, and improves occupant thermal and visual comfort.

At SAGE we like to think of windows as a high tech appliance in the wall that allows occupants to actively manage the amount of sunlight entering a building. This allows occupants to keep out excessive heat and glare without resorting to using shades or blinds, and so maintaining a connection to the natural light and the outdoors – which was why they put the window in the building in the first place.

SAGE is the world's leader in the commercialization of electrochromic, or EC, glass for buildings, supplying EC glass for commercial, institutional and residential windows. This EC glass provides daylighting and energy management solutions for a wide variety of buildings such as commercial offices, art galleries, museums, atria, religious buildings, high tech buildings, college dormitories and student centers, and health care facilities.

The Lawrence Berkeley National Laboratories found that by actively managing lighting and cooling, these “smart windows” could reduce peak electric loads by 20-30% in many commercial buildings, and potentially enhance human comfort and productivity by maintaining access to natural light.¹ The Department of Energy has determined that the use of EC glass in windows can save 10-28% of energy in most climate zones through reduced air conditioning demand and increased use of natural day lighting, making it a huge part of the energy efficiency equation. In fact, variable solar control, such as that provided by electrochromic glass, is one of the key building envelope technologies cited on DOE's roadmap to achieve Zero Energy Commercial Buildings in 2030.

II. Energy Efficient Upgrades to SAGE Facilities

SAGE has advanced the technology to the point at which it is expanding its manufacturing facility. The company is constructing a 300,000 square foot plant in Faribault, Minnesota, that has already created over 200 construction jobs, and will create about 160 permanent green jobs.

¹ E.S. Lee et. Al. “The Energy Savings Potential of Electrochromic Windows in the US Commercial Buildings Sector” LBNL 54966 4/30/2004. Lee et al. 2002. “Active Load Management with Advanced Window Wall Systems: Research and Industry Perspectives.” *High Performance Building Systems*. http://buildings.lbl.gov/cec/pubs/E3_50855.pdf

The project is to be financed in part by a loan guarantee provided by the Department of Energy. Senator Klobuchar was instrumental in helping to secure that loan guarantee. Another element of the funding is a loan from our local electric cooperative, funded through a USDA loan program (similar to the RUS program that would be established by the bill Senator Merkley plans to introduce.)

The USDA financing provides a valuable contribution to this project. It will support the cost of energy efficiency enhancements to our factory, including, for example, the implementation of energy efficient lighting systems using T8 lights and dimmable lighting controls, which, in combination with the unusually large number of windows and skylights throughout the manufacturing facility, will provide natural daylight and offset the need for conventional electric lighting. In addition, the HVAC and chilled water systems will use free cooling from outside air, and there will be a hot water reclamation system from the compressed air equipment to provide plant heating. Waste and rain water reclamation systems are also going to be implemented for water conservation. As a result of these and other energy saving implementations, the energy performance of the facility is projected to be 28% better than the ASHRAE 90.1 baseline – a key national energy standard for commercial buildings today and SAGE will be pursuing Leadership in Energy and Environmental Design (LEED) certification for the building.

By constructing a plant that is as energy efficient as possible, SAGE expects to substantially reduce its air conditioning bill, in particular by reducing its cooling load during peak demand periods. By the use of large numbers of skylights and windows, SAGE will reduce electricity costs through utilization of natural daylight. The energy savings will be further increased when SAGE replaces the high performance triple silver low-e glass which will be

initially glazed in the windows with its own EC glass, after bringing the manufacturing plant on line. Incidentally, a side benefit of the abundance of natural daylight is happier, healthier and more productive employees – a benefit proven through numerous studies. Finally, by having a green building, SAGE will be better able to attract the absolute best employees.

III. Promoting Energy Efficiency Creates a Virtuous Cycle

Now that SAGE has been able to make these energy efficiency improvements, we will be able to make further investments in our company to make our product available at increasingly affordable prices to our customers, which will allow consumers to increase the energy efficiency of their buildings. The faster that SAGE is able to ramp down the manufacturing cost of this new innovative product, the faster the technology will be adopted in the market and the faster the nation can capture the significant energy savings potential in both new construction and in renovations of the existing building stock, and move closer to the goal of low energy or zero energy buildings.

Thank you for the opportunity to testify. I look forward to answering your questions.