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Commissioner Douglas:

I would like to thank you for the opportunity to comment on proposed revisions to the 2013 Building Energy Efficiency Standards. SAGE Electrochromics is the world leader in dynamic glazing for the architectural market. Dynamic glazing is a product category that offers significant energy savings and peak load reductions compared to traditional "static" glazing by being able to dynamically and optimally control solar heat gains and daylighting. As such, dynamic glazing is a key aspect of the Department of Energy's Zero Energy Building initiative, and has been strongly supported by research at Lawrence Berkeley National Laboratory and the National Renewable Energy Laboratory. Not only should its use be encouraged, but barriers to its use must be removed. Dynamic glass has been available on the market for more than 7 years now and manufacturing expansions which will come on line in 2012 will provide larger pane sizes at higher volumes at lower prices which will allow broader market penetration and more state- and country-wide energy savings to be captured.

Dynamic glazing has the ability to reversibly change properties such as SHGC and VT. This allows the glazing to be integrated into control systems to optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. For example, unlike traditional glazing with fixed properties, dynamic glazing can be operated in a lower SHGC state during summer to reduce cooling loads, and a higher SHGC state during winter to reduce heating loads. Dynamic glazing also offers the ability to change VT throughout the day to properly balance daylighting and glare conditions. All this can be done without losing the view to the outside or sacrificing daylight energy savings when blinds are closed to block glare and remain shut.

I can provide your staff references of extensive research conducted by Lawrence Berkeley National Laboratory proving the benefits of electrochromic glazing, but a very good example exists at Chabot College in Hayward, CA. In this case study, they were able to provide a naturally ventilated space (no HVAC) in a cooling dominated climate zone in a highly glazed atrium, but only because they used electrochromic dynamic glazing.

Because of the importance of dynamic glazing to the future of buildings, it is very important that unintentional barriers to the use of this new technology be removed in

building codes. Similar barriers have already been removed in the IECC 2012 and ASHRAE 90.1 – 2010. As such, we have suggestions regarding the proposed language.

Definition and SHGC language

First, there is an NFRC label for dynamic glazing and it includes two values for SHGC. As a result, direction must be given on how to interpret the dynamic glazing label to aid enforcement by the building code official. Both the 2012 IECC and ASHRAE 90.1-2010 now include the NFRC definition for dynamic glazing as well as compliance language similar to the following:

> **DYNAMIC GLAZING.** Any glazing system/glazing in-fill that has the fully reversible ability to change its performance properties, including U-factor, SHGC, or VT. This includes, but is not limited to, shading systems between the glazing layers and chromogenic glazing.

(and then in the appropriate sections 140.3 and 150.1 …)

> For fenestration containing *dynamic glazing*, the lower labeled *SHGC* shall be used to demonstrate compliance with this section. *Dynamic glazing* shall be considered separately from other *fenestration*, and area-weighted averaging with other *fenestration* that is not *dynamic glazing* shall not be permitted.

We suggest this also be adopted into Title 24.

VT requirement

Second, the proposed minimum VT would impose a barrier to the use of dynamic glazing, and we feel needs adjustment. On a broad level, I am concerned that VT is not a good single measure of daylighting, as glare and other design factors must be considered. A fixed VT is especially inappropriate for dynamic glazing, which has the ability to modify VT over a very broad range throughout the day in response to the solar and glare condition, and in doing so can maximize the daylight harvesting compared to static glazing. The proposal sets a single fixed minimum VT criteria that must be met, which doesn't account for the dynamic nature of dynamic glazing.

The CASE report seems to acknowledge the value of dynamic glazing, but at the same time ignores the problem by stating dynamic glazing "would almost certainly never have used the Prescriptive Envelope Component Approach for compliance." This is not true. In our experience, our EC glass has been used in a lot of smaller projects which are more likely to use the prescriptive path than the performance path. We have seen our dynamic glass installed in smaller projects that use the prescriptive path.

We do not want to discourage the use of dynamic glazing in any path – prescriptive or performance – so we strongly believe that the language should be corrected to remove any unintentional barriers to adoption of this breakthrough energy saving technology. We have concerns that a minimum VT is not the optimum way to specify daylighting and

should be reconsidered, but at a minimum, we would request that language should be included to either provide an exemption for dynamic glazing or provide an instruction to use the higher labeled VT (on the NFRC label) to demonstrate compliance with this section.

Please contact me with any questions, and I would be happy to discuss this further with you or your staff.

Best regards,

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