SageGlass®

THE FUTURE OF ARCHITECTURE: CLIMATE-RESPONSIVE DESIGN

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Today's architects and builders are increasingly focused on how to create structures that have less impact on the natural environment. Climate-responsive architecture is a design practice centered on creating buildings that function in lockstep with the local climate, not in spite of it. It is simple in concept but more complex in execution. While every project is unique, especially when it comes to the site-specific environmental conditions, there are several best practices to follow for designing a climate-responsive building.

CLIMATE-RESPONSIVE ARCHITECTURE

The goal of climate-responsive architecture is to create a comfortable interior while reducing the building's reliance on artificial energy. A climate-responsive building design reflects the weather conditions in the precise area where the building is constructed. The design utilizes data on the region's weather patterns and accounts for factors like seasonality, intensity of the sun, wind, rainfall and humidity.

Several elements play a role in limiting a building's energy use based on its site-specific conditions. For example, the building envelope is an important mediator between the indoor and outdoor condition. Envelopes in different climate zones require different assemblies to minimize unwanted energy loss. In the United States, local building codes aim to reduce new buildings' energy use, designating which construction materials and envelope assemblies may be used.

True climate-responsive architecture goes well beyond adherence to code. Smart glazing systems, for example, offer opportunities to further the practice. Electrochromic glass actively controls how much solar light and heat transfer into an interior space. Areas in the West and Southwest United States, for example, experience strong sun and many clear-sky days with bright sunlight. SageGlass minimizes solar heat penetration in summer months to reduce a building's cooling load; conversely, it can be used to maximize solar heat gain during winter months to help reduce the amount of energy needed to heat the building. Though glazing causes more heat transfer than a wall surface, a high-performing system like SageGlass helps climate-responsive projects effectively manage heat gain while capitalizing on the many benefits that a glazed exterior has on a building's occupants.

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SOLAR CONTROL

Strategic building orientation and data-informed fenestration are critical to maximizing the climate-responsive abilities of smart glass. In general, in the Northern Hemisphere, the east direction receives maximum solar radiation in the morning. Around noon, most light is directed onto the south façade, and by the afternoon, direct light is on the west façade. In colder climates, it follows that a building with more of its windows on the southern-facing façade will benefit from passive heating. Using fenestration to access high-quality daylighting can also reduce the amount of energy a building expends on artificial lighting.

Yet general guidelines like these are only so helpful. The altitude of a project site will affect glare and daylight levels, as will the season and the ever-changing sky condition, which is contingent on cloud cover and the probability of precipitation. Solar angle and sky condition are dynamic features, and only a dynamic window system has the ability to respond to this in real time. SageGlass can automatically change its tint pattern to block glare, balance daylight levels and manage solar heat gain. SageGlass can be programmed to automatically respond to changing environmental conditions or can be changed manually based on user need.

SITE-SPECIFIC ANALYSIS

Many variables come into play when considering how climate, orientation and site-specific conditions will affect a building's comfort and energy use. Consequently, the most effective implementation of climate-responsive architecture is achieved using project-specific insights developed through a series of detailed analyses. An environmental analysis, for example, includes a review of the project's local weather data. The environmental analysis looks at historical temperature, humidity level, solar radiation and sky condition to inform decisions made during the schematic design phase and to improve the climate-responsive features of the building.

Other types of analyses can help solve, or avoid, problems affecting how occupants will experience the building. A glare analysis of the interior space helps to determine the areas that will be subject to direct sun glare and the duration of time that glare exists. Glare analysis is very important for the areas where occupants spend long hours, like office spaces. Staying for long hours in spaces that are not visually or thermally comfortable can affect occupant health and productivity.

Glare analysis is also helpful to accurately determine areas of the project that require some type of shading strategies. Without a detailed analysis, solar control may be specified only on the south façade. Yet depending on the specific conditions of the site, the glare analysis may show there are other areas of the building where occupants will experience glare as well.

In addition to glare analysis, SageGlass experts provide project-specific insights through daylight analysis, thermal comfort analysis and energy analysis.

Building owners and architects can use project-specific data to make more evidence-based design decisions in response to the environmental conditions a building will experience. Ultimately, wherever the building and whatever the orientation, SageGlass ensures the indoor environment is comfortable at all times and contributes to around-the-clock energy savings by dynamically changing with the environment.

CONTACT US
To discuss how SageGlass can be an integral part of your design.
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