



A NEW PARADIGM EMERGES IN BUILDING FOR THE MASSES

PICTURE ARTIST GEORGIA O'KEEFFE in her New Mexico adobe, or Frank Lloyd Wright at his Taliesin West campus in Arizona. Reflections of these iconic visions of living at one with the desert can be seen in the Southwest's many high-end, custom homes.

But most buyers who move to the southwestern United States in search of sunshine, open vistas and a lower cost of living must hunt among conventional production houses to get the most air-conditioned square footage for their dollars. So developers continue to build thousands of tract houses to keep up with demand in this booming region. "Builders don't like to change anything," says developer John Suppes, founder of Palo Alto based-Clarum Homes, which is known for its energy-efficient, upscale developments in Northern California. "They think: 'If it's not broke, don't fix it.'"

Suppes, on the other hand, thinks that with rising energy costs the system is in need of fixing. "Their electric bills will be larger than their mortgages," he says. Suppes believes there is a market for environmentally friendly, aesthetically pleasing alternatives aimed at buyers of affordable, so-called "starter" homes. Style, convenience and environmental consciousness not only belong together, they belong to the masses, according to Suppes. To test that theory, he has joined forces with Arizona architect Michael Frerking, owner of Prescott-based Living Systems Architecture and Construction, who specializes in new forms and materials for building houses in the Southwest. They're betting that buyers are becoming more savvy about the direct and indirect costs behind the lower sticker prices of conventional tract homes, including rising utility bills, damage to the environment and the long-term health effects of some conventional materials and finishes.

They are testing their ideas in a cluster of four demonstration houses

Clarum Homes is building in the small Sonoran Desert town of Borrego Springs, California, about 85 miles northeast of San Diego.

Suppes and his company have an impressive record of environmentally innovative construction that goes back more than a decade and includes hundreds of homes in more temperate coastal California. He chose quaint Borrego Springs in part because of its extreme temperatures: The average daytime temperature in July is 107 degrees. December lows average 43 degrees. If the demonstration project's technology and building techniques deliver results under those conditions, they could prove attractive to builders of more conventional houses in other locations. Suppes is working on the Borrego Springs Zero-Energy Demonstration Project with a team of experts made available through Building America, a federal program devoted to harnessing market forces to make new homes more environmentally friendly.

Each of the Borrego Springs demonstration houses is designed with an individual menu of sustainable and energy-efficient features that includes some combination of heat-modulating, high-mass walls, thick insulation and super efficient air-conditioning units and photovoltaics. They'll be sold at market rates to buyers willing to have their energy use studied for one year after purchase. Suppes will publish the results, including cost data and performance records, online at clarumzeroenergy.com. "No one has ever done this before," says Suppes. "I know, because I've looked everywhere."

Says consulting engineer Rob Hammon of Pittsburgh, Pennsylvania-based ConSol Energy, "Instead of using it to gain market share, their plan is to share information. Everyone who wants to build in the Southwest can access this."

The numbers on the thermometer and the electricity meter will be important, but the broader impact of this project will also be in the beauty



BY CLAIR ENLOW

THE BOTTOM LINE

and livability of the houses. Thanks to Frerking, the design for the homes evokes images of Wright's solid, earthbound compositions of stone and concrete in natural settings. Working within the harsh discipline the desert climate imposes, Frerking's design encompasses style, ease and comfort.

Frerking's single-story plans for each house include a high-ceiling living and dining core flanked by bedrooms. Each of the bedrooms has a private patio that opens out onto gardens of native plants, dominated by palo verde and desert acacia. Inside, the engineered concrete walls, cool to the touch, will naturally absorb heat like their historic adobe predecessors. Poured concrete floors will also reduce the heat inside. Quiet, efficient air conditioning will ventilate as well as cool. The demonstration homes are intended to show that, with smart design, it should be possible to live comfortably, affordably and energy-efficiently in 110 degree weather.

For these houses, environmentally friendly and energy efficient green features are not a set of add-on options that buyers might find in a model home but cannot afford, says Suppes.

He and his consultant team are gearing up to build hundreds of market-rate houses in which sustainability is just part of their value and their beauty. The team has been perfecting these in several northern California communities that feature variations of Clarum Homes' Enviro-Home™ model, which combines energy efficiency with photovoltaic power generation to bring net electrical bills close to zero. Suppes and Frerking are working on plans for other zero-energy housing developments in Joshua Tree, California, and Prescott, Arizona, that will use lessons to be learned from the Borrego Springs project. "The bottom line is that if you create more value, it then creates a differentiation in the market," said Suppes. "And people are going to really look for value." ■

Shading strategies: "The first thing is shade," says architect Michael Frerking. "Deep roof overhangs and close integration with the landscape [are key] so that where the roof doesn't provide shade, the plantings do."

Thermal stacking: Frerking used another desert-friendly architectural feature: the multi-story thermal stack in the form of 7-foot-high light shafts positioned above the 10-foot-high central dining space. Topped with a skylight under a small roof cap that shields it from the noon sun, these shafts flood the center of the house with natural light, while allowing hot air to rise, cooling the rooms below.

Thermal mass: Two of the homes will be built with T-Mass walls developed by Dow Chemical (dow.com/Styrofoam) that sandwich a 4-inch core of Styrofoam between two layers of concrete. The inner layer of concrete, insulated from outside air, works on the same principle as a traditional adobe structure, absorbing heat from indoor air and people during the day. At night it is re-cooled by air conditioning, which runs at lower cost during off-peak hours. Floors do double duty with cooling coils under their stained concrete surfaces.

New air conditioning technologies: The project tests two new-generation air conditioning systems: the direct/indirect evaporative cooler whose efficiency is actually improved by hotter outdoor air, and the water-chilled outdoor condenser (freus.com) that works by cooling water instead of air inside the unit, then cooling indoor air indirectly through coils in the concrete floor.

Lighting: Well-insulated and airtight fluorescent lighting consume one-quarter to one-third the electricity of incandescent lights. These fixtures can deliver light as warm in tone as incandescent light, according to engineer Rob Hammon.