

The California House Tahoe City, CA

Case Study



Project Description

AA Fire Safe, Energy-Efficient Home

The California House is a custom-built residential home located in Tahoe City, California. Designed by local, full-service planning, design and engineering firm, Sagan Design Group, the home was built in the heart of a California Wildland Urban Interface (WUI) Zone. Like all homes situated within WUI areas, the California House would be considered at increased fire risk, and as such, needed to be built to achieve a high standard in fire protection, in compliance with the WUI fire code.

The goal: Meet strict fire and energy codes with a forward-thinking solution

There were several goals for the California House project that were important to homeowner and Sagan Design Group. First, it had to meet the customer's desire to create a certain aesthetic. Second, the home's assemblies had to meet the ever-tightening California Energy Code, as well as the stringent conditions set forth in the WUI fire code. Additionally, Sagan wanted an assembly that could also control any potential moisture. It was decided that ROCKWOOL's noncombustible stone wool insulation could assist in achieving all three primary goals, so the process was undertaken to have an assembly with ROCKWOOL approved by the authority having jurisdiction (AHJ).



The Challenge

Sagan Design Group, wanted to break from a status quo WUI solution to meet requirements for the exterior wall assembly (2016 CRC – R337.7.3). Typically, designers are limited to tested assemblies for various sidings (usually must use a rated assembly). Generally, those who do not wish to use a rated assembly must instead use 5/8-inch Type X gypsum sheathing under the exterior cladding to act as an ignition-resistant barrier in order to achieve WUI code compliance or have an alternative assembly/solution tested. Sagan Design Group sought to use a continuous layer of exterior mineral wool semi-rigid board insulation instead of Type X gypsum, highlighting another key builder challenge: compliance with all the various codes—in this case the WUI code and the Energy Code, which do not consider one another. Often, solutions will meet one code, but will not help address the simultaneous requirements of another.

In California and across the United States, energy codes have been growing stricter (and will continue to grow stricter still), requiring tighter building envelopes with lower U-values that address air leakage and thermal bridging respectively. Sagan Design Group was met with the challenge of achieving the 2016 Energy Standards, approximately 20-30% more stringent than the 2013 Standard, while also meeting R-values targets and satisfying WUI requirements. Tim Melin, P.E., a Civil Engineer with the firm, states that while a number of solutions exist, it is getting more difficult to satisfy all codes simultaneously. As a result, he notes that the design/build community will need to champion innovative approaches to meet more complex design challenges particularly since the State of California's move to Zero Net Energy in January 2020.

For low-rise residential buildings, U-values and R-values are outlined in the CA Energy Code Table 150.1-A. It notes that the prescriptive wall requirement in Climate Zone 16 requires a maximum U-value of 0.051. Yet, 2016 Reference Appendices state that, without continuous exterior insulation (2x6 @ 16-inch OC framing using R-25

cavity insulation), the lowest U-factor that can be achieved is 0.065 and is therefore, not acceptable. As a result, the ability to meet California Energy Code without continuous exterior insulation is becoming ever more difficult, and, in the future as codes tighten, continuous exterior insulation will become standard practice. When continuous exterior insulation is present, it is likely to be foam plastic insulation. While it can meet energy code, there is some debate about adding to a home's potential fuel load in WUI zones. Foam plastic products, when ignited, burn rapidly and produce both heat and toxic gases, contributing to the potential fuel load of a fire and allowing it to burn more intensely and for longer. Yet, foam insulation can be used within an assembly and still meet WUI requirements when covered with Type X gypsum. Although, it requires a wall system with more layers (foam insulation plus 5/8-inch type X gypsum).

Melin notes that's where the case for continuous exterior mineral wool sheathing board proves to be strong. The mineral wool continuous exterior insulation can simultaneously meet energy code and WUI compliance without the need for gypsum—eliminating a layer within the assembly and potentially reducing install time, labor, and costs.

The Solution

In making its case to local code officials, Sagan Design Group and ROCKWOOL demonstrated that the continuous exterior mineral wool sheathing board (ROCKWOOL Comfortboard® 80) provided the noncombustible, ignition-resistant performance benefits equivalent to Type X gypsum, while also delivering a wall system that reaches necessary R-values and contributes to the strict U-value rating.

The mineral wool continuous insulation also proved further advantageous, allowing for a wide variety of cladding options, a benefit that would also sit well with homeowners who often insist on specific materials to achieve a certain aesthetic. Additionally, it helps achieve a wall assembly that is breathable (vapor open) and hydrophobic, helping to guard against moisture issues.



Sagan Design Group worked directly with mineral wool insulation manufacturer ROCKWOOL, building a case filled with data, testing, documentation, code references, certifications and more to show building officials that not only could mineral wool sheathing boards meet WUI requirements, they could also replace Type X drywall all together under cladding in the exterior wall system. In the end, local officials approved what might end up being a trailblazing solution. Given the direction of energy codes and the need to satisfy both energy and WUI requirements in Wildlife Urban Interface Areas, it seems inevitable that the residential built environment may be on the cusp of change—driven largely by code compliance. It's undeniable that how we build, is in fact, changing. Surprisingly, however, in embarking on the approval process, the teams from Sagan Design Group and ROCKWOOL found that there were currently no approved assemblies utilizing continuous exterior insulation in existence in the WUI Building Materials Listing Program. Both the firm and the manufacturer have worked hard to amend that. Having undergone rigorous testing, ROCKWOOL stone wool insulation was the first residential insulation listed in the California Fire Marshall's Building Materials listing program. Full documentation is available outlining the approval and the full testing results for ignition resistance and 1-hour system testing on relevant assemblies using ROCKWOOL mineral wool for the California market.

"We need to build smarter to meet the more complex demands of today's building codes and standards," notes Melin. "We're now building for structure, energy, safety, moisture management and air/vapor considerations. Products need to be versatile. Mineral wool semi-rigid exterior board sheathing in the form of continuous insulation is a serious multi-tasker. With it, we can meet WUI requirements, we get energy performance, comfort, sound control, breathability, hydrophobic properties and compatibility with a wide range of other components."

With greater code challenges, builders will need to use their experience to continue to do what has always driven the built community forward: think beyond the status quo. Better solutions will also pay off for homeowners as well, with more durable, resilient buildings that require less maintenance and/or remediation down the road.

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- *Tim Melin, P.E., Civil Engineer*
Sagan Design Group

Project Data – The California House – WUI zone fire protection & energy efficient

Year:
2018

Location:
Tahoe City, CA

Architect & Designer:
Sagan Design Group

Builder:
Galletto Construction Inc.

Building Type:
Residential, single-family home
2016 Energy Standard, WUI Zone compliant

ROCKWOOL Product & Application:
Comfortboard® 80, Continuous Exterior Insulation & Building Envelope Fire Protection

Notable:
ROCKWOOL Comfortboard® 80 has now been added to the California State Fire Marshall's Building Materials Listing Program.

ROCKWOOL

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