



Rebuild Green Expo
Build your healthy, low-carbon future

Friday, February 22, 11-7
 Santa Rosa Veteran's Memorial Building
 FREE to the public

Contact:
 Sarah King, Ecological Building
 Network
sarah@ecobuildnetwork.org
 415.491.4802

Fire-Safe Construction – Concrete vs. Other Options

By Ann Edminster, M.Arch.

Fire survivors are understandably concerned about rebuilding in a way that's as fire-safe as possible. A recent Press Democrat story featured a number of builders and homeowners who are choosing insulated concrete forms (ICFs) over traditional wood framing, because of concrete's non-flammability. I asked David Arkin of Arkin Tilt Architects and Larry Strain of Siegel & Strain Architects—firms known for green design—for their thoughts on the subject.

How would you rate ICFs as a green product – somewhat green, very green, uber-green?

David: Durability is an important aspect of green building, and ICFs are durable, so on that count they are green. However, the life cycle impacts as well as performance and the appropriateness of a material are important considerations. In the case of ICFs, while they are durable, the thermal mass (concrete) is trapped between layers of insulation. In the simplest of terms, an ideal wall will have insulation in the middle [to minimize 'thermal bridging' – a connection from exterior to interior of a more thermally conductive material, such as structural framing members], thermal mass (a heavy material) at the interior surface, and a protective layer (weather- and fire-resistant) on the outside.

You mentioned life cycle impacts and appropriateness as issues; what are those issues for ICFs?

David: Both the concrete and the steel used for reinforcing are extremely high in embodied carbon. In other words, large amounts of greenhouse gas emissions are created due to the higher energy needs of their production processes. We try to build with materials that have much lower climate change impacts, or even sequester carbon – typically, wood, earth, and straw.

Larry: I have always avoided ICFs because of the foam insulation. Many foams have high greenhouse gas emissions, but even if they don't, the foam is on the outside of the concrete, so you need to protect it from burning with drywall and stucco. Foam is pretty toxic when it burns, even without flame retardants – which are also toxic – and I don't believe for a minute that the flame retardants will withstand a firestorm of the intensity that we've been seeing recently in Northern California.

Would you see ICFs as being more green in some circumstances than in others?

David: We've used ICFs, mostly for living spaces below grade in retaining conditions, but also recently in Santa Fe, where the 'Pueblo Style' was mandated – without overhangs and with parapets. The system can perform well thermally in many climates. It's one of many 'tools in the toolbox' but, like Larry, we now use non-foam products wherever possible.

What alternatives to ICFs would you offer to those seeking optimal materials for rebuilding in zones where fire has struck – in some cases, repeatedly?

David: One system is non-load-bearing strawbale walls under a wood-framed, unvented roof, with a lime, lime-cement, or clay plaster exterior wall finish. Strawbale walls don't readily ignite; for example, a lime-plastered wall built with 3-string rice straw bales on edge [laid on their sides] has been tested to meet a two-hour fire rating; most homes have walls that don't meet a one-hour rating. Several of our projects have survived recent wildfires in locations where nearly all neighboring structures were lost, due in part to their fire-resistive strawbale walls, but also to noncombustible roofs (typically metal), defensible space, and other details.

Larry: An insulated rammed earth system is another possibility – for example, SIREWALL (Structural Insulated Rammed Earth), which has insulation in the middle of the wall – but these are pricier alternatives.

Is there any way to reduce the negative impacts of ICFs, for those who are committed to using them?

Larry: Yes, the impacts can definitely be reduced through the use of low-carbon concrete mixes. One excellent resource is the book, *Making Better Concrete*, by local engineer Bruce King. Foam can also be a big emitter of greenhouse gasses. Look for foams with lower global warming potential (GWP). The GWP for blowing agents can vary from 5 to over 10,000, with extruded polystyrenes (XPS) typically higher than expanded polystyrenes (EPS). The blowing agent for EPS products is often pentane, which has a GWP of 5.

David Arkin <david@arkintilt.com> is available for interviews and can also provide photos of Arkin-Tilt projects that have survived fires.

About the Rebuild Green EXPO

Come get answers on how to build more sustainably, with an eye towards resilience at the Rebuild Green EXPO, February 22, at the Santa Rosa Veterans Memorial Building. The Expo will be open from 11 am to 7 pm. See the possibilities, meet the professionals, and learn about green made easy. There will be something for everyone, from homeowners seeking clarity about what green building is, to professionals looking to learn about the nuts and bolts.

For more information about the Expo visit: www.rebuildgreenexpo.com

###