



This Historical Estate was meticulously restored and upgraded for energy efficiency.

Photo by Jim Bartsch

Building for a low-carbon future

BY DENNIS ALLEN

As the reality of climate change hits home, we must react with the most immediate and impactful counterstrategies possible. The building sector, which accounts for 40 percent of annual global emissions, has put forward three top strategies:

Repurpose buildings wherever possible rather than demolish and build new.

Aggressively reduce the operating emissions of existing buildings by transitioning buildings to zero-net-energy.

Build with low-embodied carbon materials, and, ideally, with carbon-storing materials.

The third point is of growing importance. While a zero-net-energy building reduces carbon emissions, most of the impact is in future years, a little each year over the 50 year or so life of the building. On the other hand, if the up-front embodied carbon emissions from the harvesting, manufacture, and transport of a building's materials is zero or even negative, the impact on the climate is immediate and powerful. Emissions that are avoided today do more to slow climate change than those averted in the future.

Which materials are carbon storing? The

most potent ones are plant based, because they absorb carbon during growth and lock up that carbon when turned into building materials, storing it for the life of the building. Some examples:

Cross-laminated timber panels are made up of alternating layers of perpendicular boards. Because small-diameter trees, pest-damaged trees, and even trees killed by wildfires are used in fabricating these panels, forest resources are more fully utilized. CLT panels are strong, stiff, stable, relatively lightweight, highly fire resistant, and often big (20 inches thick and 60 feet long). They can often be substituted for steel and concrete in high-rise construction.

All bamboo building materials. When laminated into posts, beams, glue lams, and trusses (trade name Lamboo), it rivals the strength ratio of steel.

CalStar bricks and pavers. These are manufactured from fly ash, a waste product, using a small fraction of the energy needed to fabricate other masonry products.

Hemp products are resistant to fire, mold and insect damage. They are made from the

woody core of the cannabis plant combined with lime and water and have received the top negative carbon rating of any material. Hemp composite blocks (developed by JustBioFiber) are structural. Hempcrete is an insulation.

Other low-carbon insulating materials include cellulose, fiberboard (Gutex Multitherm), recycled denim, and mushroom insulation.

Ecosmart drywall. This product uses less energy, resources and water to manufacture, is fire-resistant and lighter in weight, thus requiring less energy to transport.

Green concrete. Cement accounts for around six percent of greenhouse gas emissions. Green concrete focuses on substituting recycled waste materials (fly ash, rice hulls, or blast-furnace iron slag) for cement and aggregates. Some mixes sequester carbon for curing.

These carbon-storing materials are widely available, mostly cost-competitive with traditional materials, and don't require learning new construction skills.

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