WHAT MAKES TIMBER FRAMING SUSTAINABLE?

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The sustainable movement is like a tidal wave that is bringing change to how we live and how we do business. This has spurred a surge of interest from clients and their architects and designers to incorporate 'green' elements and techniques into their timber frame projects.

The sustainable nature of timber framing is not always readily apparent to them but it is actually one of the most sustainable building methodologies available on the marketplace. Key to that sustainability is looking at timber framing as a holistic process that begins with a good, solid, complete design and carries through the selection of wood to finishing the project.

So what is sustainable about timber framing? It all starts with the wood.

Wood is a natural, organic, non-toxic material; it is recyclable, biodegradable and waste efficient and it is renewable. This is important for a number of reasons. First, because it is completely natural, renewable, recyclable, biodegradable and waste efficient, its use has very little impact on the environment. Second, because it does not off gas toxins, it promotes a healthy environment in the home. Third, the metrics that the sustainable movement has embraced via the US Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system, the newly launched National Association of Home Builders's (NAHB) National Green Building Program (NGBP) rating system, the Green Globes system and others have specific, measurable criteria for materials selection and waste strategies that wood supports. For further information see www.usgbc.org (Commercial construction as well as new homes), ww.nahbgreen.org (homes only), and www.greenglobes.com.

Wood is a carbon-neutral material. According to the UK Timber Frame Association, the average tree absorbs approximately one metric ton of CO_2 (carbon dioxide) for each cubic meter of growth and exhales 0.7 metric tons of O_2 (oxygen). The 'C' or carbon, is sequestered/stored in the tree for the life of the tree AND the life of the building it goes into. The carbon that is 'sunk' in the timber equates to about 1.6 pounds of carbon for each board foot of growth. When the timber frame reaches its useful life – in several decades - the wood can be recycled into new products, refashioned into new building material or burned as a substitute for fossil fuels. This is becoming increasingly important as designers strive to calculate the carbon footprint of each structure they work with.

Sourcing timbers from sustainably managed forests has many positive effects on the environment. From a LEED standpoint, specifically in their commercial construction rating programs, it is important that wood be sourced from Forest Stewardship Council (FSC) certified sources. But there are other sources of certified sustainable wood including but not limited to SFI (Sustainable Forest Initiative), American Tree Farm, Canada's National Standard on Sustainable Forest Management Standard (CAN/CSA Z809) and Program for the Endorsement of Forest Certification Systems (PEFC); all of which are included in the NGBP rating system.

To varying degrees these third party rating organizations provide an impartial look at the management and sustainable practices in a particular forest. Obtaining certification means that rigorous standards are being followed in the forest; that no clear cutting has occurred, that forests are harvested and replanted and that the forests exhibit healthy environments for wildlife and plant life. Young trees rapidly metabolize CO2. Selectively harvesting older trees and replanting with young trees makes for a healthy, vigorous forest. For more information see: www.fscus.org, www.aboutsfi.org, www.treefarmsystem.org, www.certificationcanada.org.

Other environmentally friendly sources of wood include reclaimed and forest salvaged/standing dead material. These sources can be used in the LEED and NGBP systems for material and recycling credit. If the material is found within 500 miles for LEED and 300 miles for NGBP, it can also earn credits for local sourcing. Reclaimed wood is derived from a variety of sources including: the dismantling of old, unused barns and other farm structures, the dismantling of unused factories and large commercial buildings mostly mills and war time factories and from submerged logs and structures. This wood has a patina that can only be matched with age and can be found in dimensions that are rarely found in today's forests.

Sourcing from standing dead forests creates demand for wood that has been water, disease or bug killed; wood that would otherwise rot in the forest releasing its carbon store to the environment. Harvesting maintains that carbon store and creates open space for reforestation. Asking for visible proof (pictures) of the condition of the trees before using the timbers in a project allows the client to see the provenance of the material and provides necessary documentation for certification.

Good forest management contributes to the eco-system in many other ways including: maintaining stream and groundwater health by protecting the soil and reducing runoff, contributing to maintaining ecosystems and habitats for wildlife, and it supports healthy forests for the long term. This provides viable income to foresters thus reducing reliance on clear cutting for farming or overharvesting the forest.

Timber framing contains low embodied energy. Converting timbers into a frame takes far fewer greenhouse gases than mainstream alternatives such as stick framing and masonry construction. This is another hot topic in the sustainable movement. The energy used to transport, manufacture and deliver a product, including the energy used for all of its inputs, is the total embodied energy in a product. Depending on the methodology a particular framer employs to manufacture a frame, the total embodied energy runs the gamut of low to almost zero.

Timber frames are durable and have very long life spans. Choosing timber framing is a choice made for generations. In the LEED for Homes program, a durability plan is developed for the home that includes the probable life span of materials. In the NGBP a Life Cycle Assessment is completed that systematically compares the environmental burden of building materials prior to selection.

Many timber framers install a tight envelope of Structural Insulated Panels (SIPS) or other enclosure system around the entire frame that provides a high R-value and reduces air infiltration/ heat loss. This is extremely important to sustainability metrics. Under LEED for Homes and NGBP the house is measured to Energy Star requirements via blower door and duct blast testing methodologies. Failing these tests means not achieving a rating at all. That is important for a number of reasons. First, the homeowner or commercial owner may really want to achieve a certain certification level for personal or market-placement reasons. Second, independent testing has shown that structures built to LEED standards have substantial reductions in energy use when compared to traditional construction methodologies; and third, there is mounting data that shows that certified structures garner higher rents, are more fully occupied and have higher sales values than non-certified structures. One example of the financial impact of certification is Countrywide Home Mortgage offering a .125% deduction in its mortgage rate for certified homes.

Timber frames are usually crafted and pre-fitted off site, minimizing construction site waste and reducing construction time. This together with careful shop management reduces the overall waste effect of the frame. Manufacturing and precutting the SIPS at the factory further reduces site waste and construction time. Here is where having a good, solid, complete plan is key. Shop drawings that include window and door penetrations, mechanical, electrical and plumbing chases and locations and wall layouts enable the entire project to proceed apace and reduces waste.

Many timber framers use low to no-VOC adhesives, finishes and materials. These are a requirement for all the rating systems as they have a direct effect on the indoor air quality (IAQ) of the structure.

Many timber framers source their materials locally. Making a concerted effort to use local vendors for all materials supports local economies and the overall health of communities. This makes for a thriving community for employees and clients. It also meets the goal of local sourcing of materials in the rating systems.

So what is sustainable about timber framing? Just about everything from the nature of the wood to how the structure is enclosed, but timber framers can go beyond that by educating themselves and their clients about the sustainable movement.

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