Summary by Vivian Loftness: Re-materalization: the future of material use in building

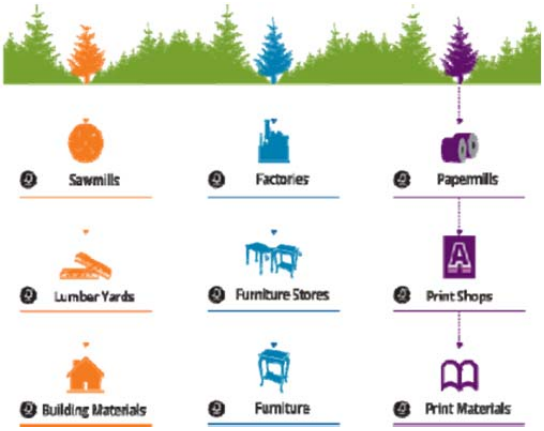
$$\frac{M^3 dM^3 Q}{we*re*xe*T} \quad <<< 1$$

The building community must purchase, use and reuse materials with a far greater awareness of reducing harm and maximizing benefits. The 1st Holcim Roundtable on de-materialization revealed a clear set of harms and benefits that can be both quantified and qualified to help the building community achieve truly sustainable material decisions. Whether the country is poor or rich, the setting urban or rural, the climates and cultures diverse, every material and assembly has a story that should be told:

1. Reduce harm (make the numerator small)

M^3 – the source of materials matter

Triple top line economics (^{3}) have to be pursued in the selection of materials, capturing the economic, environmental and human cost-benefits of the extraction and production of materials and assemblies. While the first bottom line, profit, typically takes care of itself, the quantification of *who* gets the profit should be included in the human bottom line. Do the workers have a safe and healthy work environment, living wages, and health care? Then, the environmental bottom line (an LCA at the factory) celebrates: non-toxic materials; abundant materials that will not be depleted; and materials that are extracted or produced without environmental devastation, in a way that *regenerates* the resource itself, the land, the water, and the air.



The source of materials matter - even if wood is good, the **chain of custody** ensures humanitarian practices and environmental content from source to use.

d - distance matters

There are substantial energy, environmental, and human costs to flying, shipping, and trucking materials long distances. When comparing materials choices, nearby materials that meet the environmental and human goals will always be preferable over materials brought in from afar. Local materials, like local foods, also catalyze the local economy providing more jobs for local residents, building on local expertise and skills. Finally, local materials are often most environmentally suited to local climates, withstanding climate variability and supporting natural conditioning.

Distance matters - Comparing two modern bridges, the one on the right uses a dominance of local materials, advances local skills and ensures a long life.

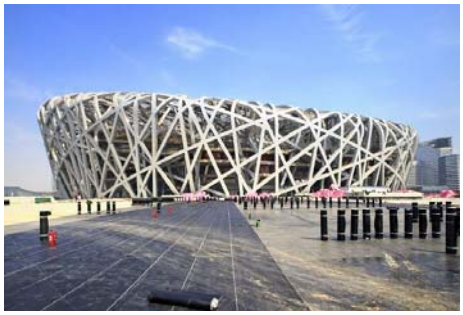
M3 - material uses on site matter

Again, triple top line economics ([3]) have to be pursued in the assembly of materials on site, capturing the economic, environmental and human cost-benefits of the selecting and assembling materials. While the first bottom line, profit, typically takes care of itself, the quantification of *who* gets the profit should be included in the human bottom line. Do the workers have a safe and healthy work environment, living wages, health care? Then, the environmental bottom line celebrates the selection of: non-toxic materials that ensure indoor environmental quality; abundant materials that will not be depleted; materials that are assembled without excess energy, water or waste; and materials that support reconfiguration and reuse.

Material use on site matters - while one school supports safety in a cyclone as its major contribution, the most effective materials and assemblies celebrates local materials that will not be depleted and engages the entire community in a sustainable solution.

Q - quantities matter

If a material or assembly is renewable in a time frame that is shorter than the life of its utilization, you can celebrate the creativity afforded by abundance. If a material or assembly has the life of centuries, or multiple lives through disassembly and reassembly, then you can celebrate the creativity of plenty. However, if the material or assembly has any shortcomings in its production (M^3) or use on site (M^3), then using less is key. Buckminster Fuller once asked: *how much does your building weigh?* as an indicator of the importance of solving design challenges without material excesses.



Quantities matter: Comparing two iconic Olympic stadia, reveals the Birds Nest (left) consumes 10x more material than needed.

<u>Maximize benefits (make the denominator large)</u>

we* - humans matter

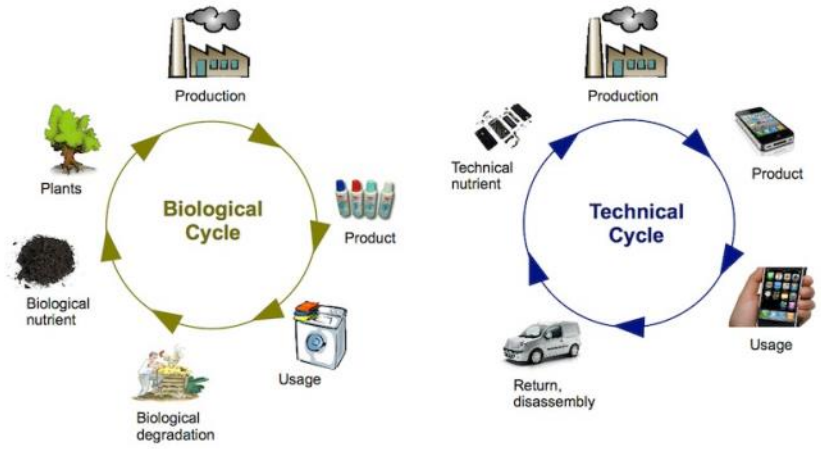
When materials are sourced and used to provide viable skills and empowerment, build capacity and provide living wages, they gain measurably in value. When materials are sourced and used to support community and engender pride and joy, they gain measurably in value. When the selection of materials and their assembly heals individuals and communities, and when it celebrates local abundance, culture and natural response to climate, they gain measurably in value.

Engaging humans is key – the future includes “enterprise” kits that enables people to become an integral part of the material value chain (eg micro concrete roofing tiles).

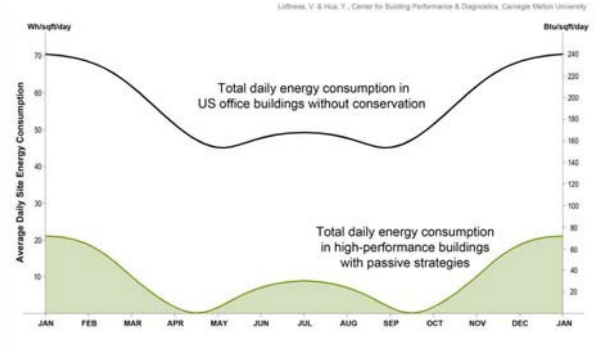
re* - environmental regeneration matters

When materials are sourced and used to regenerate environments – the resource itself, the water, the air, the land and its landscape – they gain measurably in value.

When all sourcing, use and reuse of materials eliminates the concept of waste by generating agricultural and industrial nutrients, they gain measurably in value. When materials and assemblies support environmental surfing for heating, cooling, lighting, ventilation, water and mobility, they gain measurably in value.



Environmental regeneration matters – designing material use from ‘cradle to cradle’ eliminates the concept of waste.



Environmental regeneration matters – materials and assemblies must maximize conservation and environmental “surfing” using natural ventilation, daylighting, and passive heating and cooling energies.

xe* - innovation matters

When materials and assemblies serve multiple purposes, providing integrated performance with less material, they “tunnel through the cost barriers”. Innovation can also increase quality with less quantity, extend the assembly life, and eliminate waste. With either of these technological cost-benefits, the addition of significant human and environmental benefits will double the value of the materials selected.

Innovation matters - building lightweight unreinforced concrete slabs by learning from the Guastavino vaults eliminates 70% of the material and energy while enabling passage for thermal conditioning or networking.

Innovation matters – building only the core home tunnels through the cost barrier and enables self-help for change and personalization.

T - time matters

The longer a material or an assembly provides service, the better the re-materialization. The easiest measure of time is the life of the building, with centuries always better than decades. If the building is designed for change, however, the measure of time is based on the life of subset materials and assemblies to support successive disassembly and reassembly without down-cycling or waste (design for disassembly).

Reducing materials to the provision of core services while enabling occupants to introduce changes and additions over time also provides strategic advantages in the re-materialization of buildings. Finally, resiliency is the final test of time – the ability to sustain life in the face of natural and man-made crises – with significant value for resilient solutions that support life, withstand the crises and support rebuilding.

Time matters - If the building is designed for seasonal dynamics, maintenance and change, materials and assemblies support successive disassembly and reassembly without down-cycling or waste.