

CTC Graduate Field Report

Subject: Ceramic Tile – Missing In Action on the Green Building Front

**By
Anthony Bogo CTC**

Recycled Content is Not All There is to Being Green

Our office fields numerous inquiries from, and on behalf of, the A/D community regarding our line of commercial ceramic tile products. In addition to the perennial question regarding ASTM C1028 (slip resistance), there is another, now familiar, line of questioning; "How much, if any, recycled content is present in your tile?"

With recycled content currently regaled as the Holy Grail trait of green products, the multitude of other people-healthy & environmentally positive characteristics of ceramic tile seem to be ignored.

Why is this? Why are all of the many outstanding relative qualities, inherent in all ceramic tiles, not considered? Why are we never asked about how ceramic tile enhances indoor air quality and thus, the health of the people that live and breathe in homes or businesses that have ceramic tile floors and other tiled surfaces? Why does the sustainability of ceramic tile, its longevity & durability, seem to not matter when these characteristics certainly contribute to reducing landfill waste?

The focus on one particular feature is a limited & narrow approach to qualifying a product as green and it does so without regard for the bigger picture. Referred to as Single Impact Certification, the method of testing and labeling for one positive product feature doesn't wholly consider the other potentially negative aspects of a product. While using recycled material in the manufacturing of products is commendable and an environmentally responsible practice, there are numerous other considerations to be aware of when selecting materials for building and living green.

As Tim Cole, 2009 Chair Elect of the US Green Building Council (USGBC) wrote in an article on the topic, *"It is common to hear companies promote the recycled content of their products and often the first thing pursued is a sustainable initiative. It is a great start, but not the be all and end all and, in many cases, has nothing to do with the product being environmentally friendly."* 1.

Alternative to the Single Impact approach to product evaluation is Life Cycle Analysis (LCA); an across-the-board study of a product that begins with the extraction of raw materials, the environmental impact of extraction, the manufacturing process, impact on factory workers and surrounding community, recycled content, transportation, application, use, effect on users & occupants, maintenance, end-of-usefulness, recycling or reusing or disposal impact on the environment. LCA is a comprehensive strategy for the evaluation of construction materials when the desired result is the safest, cleanest, healthiest, most durable and lowest impact building projects. It will produce the most honest & complete assessment of products; their healthfulness for users and the impact on the environment. We will continue to hear more about this as green building proponents turn to LCA for the most complete product assessment.

In the same article, Tim Cole goes on to say, *"If you were asked which you prefer, clean air or clean water, which would you choose? Most would say: 'I want both' or, 'Why do I have to choose?' The answer is that you should not have to choose, but that is what can happen when you make product purchasing decisions, specifically green product purchasing decisions, based on single-impact third-party certifications."*

U.S. Green Building Council

"The U.S. Green Building Council (USGBC) is a non-profit organization committed to expanding sustainable building practices. USGBC is composed of more than 15,000 organizations from across the building industry that are working to advance structures that are environmentally responsible, profitable, and healthy places to live and work. Members include building owners and end-users, real estate developers, facility managers, architects, designers, engineers, general contractors, subcontractors, product and building system manufacturers, government agencies, and nonprofits." 2.

Since its founding in 1993, U.S. Green Building Council has steadily worked to create standards by which buildings (and now, entire communities) qualify as green. A core group of dedicated individuals had a vision, set out to do the right thing and they've committed themselves to the ongoing refinement of the how to and what is truly building green. This is a really good thing for our country and global community as USGBC takes a leadership role in what looks like a revolutionary positive cultural shift in attitude toward personal lifestyle, healthy home and business settings, social responsibility and a long overdue accord with the environment.

"There are more than 80 USGBC chapters, nearly 18,000 organizational members and thousands of volunteers and an emerging World Green Building Council (WGBC) with 13 fully established councils and 38 more evolving. The LEED green building rating system launched as part of USGBC now includes more than 31,000 registered and certified buildings and 62,000+ LEED Accredited Professionals who support an industry that has 30% growth per annum. And this is in a recession," David Gottfried, Co-Founder of USGBC says. 3.

USGBC's Guiding Principles

"USGBC's Board of Directors has articulated 'guiding principles' that will help us all with the decisions we make every day about USGBC and its programs. In an industry predicated on innovation, the principles provide us with clarity and continuity, while also giving us the flexibility to grow and respond to a rapidly changing market." 4.

USGBC' six Guiding Principles are:

1. Establish Leadership
2. Promote the Triple Bottom Line (people, planet, profit)
3. Ensure Inclusiveness
4. Reconcile Nature with Humanity
5. Exhibit Transparency
6. Maintain Integrity

It is within this framework that USGBC, its leadership, staff and volunteer committees work to establish the standards, guidelines and programs that define green. USGBC is the "go to" authority on what is defined as green building and the A/D community relies on the references and documentation that USGBC generates to guide product selection in the pursuit of green building certification.

In the months and years ahead, it isn't unrealistic to expect that consumers will also come to recognize USGBC (and it's programs geared towards homes and neighborhoods) as *the* authority and a trusted source from which they can learn about making their homes, businesses and communities safer, cleaner, healthier, more durable and environmentally responsible.

This is all good for the ceramic tile industry, but we must get busy and participate actively to help establish the whole truth, and the rules, about what is green and what isn't.

What is LEED® and What Role Does it Play?

Probably the most recognizable component of USGBC is LEED (Leadership in Energy and Environmental Design). Even though it isn't widely understood, there are very few in the tile business that are not affected by it in one way or another, especially distributors with a focus on specifications and commercial products.

Let's get something straight from the very beginning: There is no such thing as a LEED certified product.

And that includes ceramic tile and every other material used in the construction of buildings. The U.S. Green Building Council established the LEED Green Building Rating System as a rating system for buildings. It is not a system by which products or materials are analyzed, tested or certified as green.

"LEED is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality." 5.

In other words, the LEED program is a checklist of criteria that guide construction professionals in the building of structures to meet requirements for green certification of buildings and developments. It is at the discretion of the design and construction team to choose appropriate materials that will assist in meeting the objectives outlined by the LEED program. LEED and US Green Building Council do not endorse or promote any products or brands. For further emphasis, USGBC makes a clear statement in the FAQ's on its web site:

"Can products be certified under LEED?"

No, LEED applies to green building projects. Individual products can contribute to points under the certification system; LEED criteria are performance-based. In attempting to meet these requirements, LEED practitioners identify products that have desired attributes. However, some LEED criteria do require specific product data as a part of a successful submittal." 6.

The LEED® Program; Described as a Familiar Analogy

We'll use a college education as the analogy. The LEED program is similar to the process of attaining a degree. Successful completion of a 3 credit class doesn't get you your degree; it's the accumulation of numerous 1, 2, 3 and 4 credit classes, in a wide variety of subjects, in a specified course of study, which ultimately qualifies you for a college degree.

LEED certification is comparable. There are 4 levels of certification, much like the various levels of college degrees. The desired level of LEED certification - Certified, Silver, Gold or Platinum - is determined by project managers & owners. Each successive certification level requires a greater number of points (credits); similar to university degree programs.

To address the varied scenarios inherent in construction projects, individual Rating Systems are established for a range of typical construction project types:

- New Construction
- Existing Buildings
- Commercial Interiors
- Core & Shell
- Schools
- Retail
- Healthcare
- Homes
- Neighborhoods (in pilot at this writing)

For the majority of the Rating Systems, there are 5 Key Categories common among all, although some Rating Systems do have additional categories. Each category is broken down into a list of specific criterion. Criteria in each Key Category are worth points. As each criterion is met, points (like college credits) are awarded.

Each Rating System has individual point requirements for certification. The required number of points range from 26 for Certified up to 136 for Platinum. The accumulation of points is tallied at the completion of the project and the level of certification is determined and awarded. It's a lot like a very specific "to do" list that prescribes the necessary actions required to construct a green building.

The 5 Key Categories, typical among the Rating Systems (construction project types) are:

1. Sustainable Site Development
2. Water Efficiency
3. Energy Efficiency
4. Materials & Resources
5. Indoor Environmental Quality

How Does Ceramic Tile Fit into the Current LEED® Point System?

The truth is, it really doesn't. We've been trying to force fit ceramic tile into specifications written with other materials in mind; many with far fewer naturally environmentally friendly & people healthy characteristics.

Patti Fasan, in an article published in Tile Today Global said, ".....the environmental assets of ceramic tile are quickly discounted by the architectural community due to the high embodied energy required to produce and transport imported tile and the lack of claimed recycled content deemed to be the recognizable flag by which sustainable products are judged....a general and widely held opinion regarding compliance to LEED designed projects that does not particularly favor the use of tile. Nor has the sustainable validity of non-durable finishes (surfacing materials) been questioned, especially if the products are produced locally and include recycled content..." 7.

As stated earlier, a LCA (Life Cycle Analysis) approach to evaluating building materials would likely put much of this to rest. Yes, ceramic tile production and transportation consumes energy, but the same is true of all building materials, including less durable surfacing materials. Even the recycling of less durable materials, like carpet & resilient flooring that wear out decades before tile, consumes energy in processing and transportation to and from the manufacturing facility.

In essence, the same carpet or resilient floor could be reprocessed dozens of times before a tile floor wears out. And what about the petrochemical content in carpets, resilient and other engineered flooring materials? This is not only an energy and sustainability problem, it is a serious detriment to indoor air quality and a health threat to the people that live with these materials.

Below, we see the Rating System for Commercial Interiors and two of its key categories; Materials & Resources and Indoor Environmental Quality. 8.

LEED® COMMERCIAL INTERIORS Version 2.0

Materials & Resources

Prerequisite 1	Storage and Collection of Recyclables
Credit 1.1	Tenant Space, Long-Term Commitment
Credit 1.2	Building Reuse, Maintain 40% of Interior Non-Structural
Components	
Credit 1.3	Building Reuse, Maintain 60% of Interior Non-Structural
Components	
Credit 2.1	Construction Waste Management, Divert 50% From Landfill

Credit 2.2	Construction Waste Management, Divert 75% From Landfill
Credit 3.1	Resource Reuse, 5%
Credit 3.2	Resource Reuse, 10%
Credit 3.3	Resource Reuse, 30% Furniture and Furnishings
Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)
Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer)
Credit 5.1	Regional Materials, 20% Manufactured Regionally
Credit 5.2	Regional Materials, 10% Extracted and Manufactured
Regionally	
Credit 6	Rapidly Renewable Materials
Credit 7	Certified Wood

In Materials and Resources, it's conceivable that ceramic tile can help attain Credits 1.2 and 1.3 - both related to preserving existing building components. Tile can surface existing building components and thus contribute to reuse.

Credits 2.1 and 2.2 could lend themselves to the use of tile. Excess tile can be repurposed, sold or donated to charitable organizations. Tile waste can be used for clean fill and road beds, for example; but what infrastructure is in place to facilitate the use of tile waste?

Credit 3.1 and 3.2 can be positively affected by the use of salvaged, reclaimed or reused ceramic tile.

Credit 4.1 and 4.2 address recycled content; however, not all ceramic tile has recycled content. Credit 5.1 and 5.2 reward regional materials; it is commonly known that many ceramic tile products sold in the U.S. are imported.

Domestic manufacturers are capitalizing on 4.1, 4.2, 5.1 and 5.2 with fully developed product lines, third party certification and marketing strategies that reflect this. Instead of influencing at the policy making level, domestic manufacturers chose to play by the rules presented to them.

Indoor Environmental Quality

Prerequisite 1	Minimum IAQ Performance
Prerequisite 2	Environmental Tobacco Smoke (ETS) Control
Credit 1	Outdoor Air Delivery Monitoring
Credit 2	Increased Ventilation
Credit 3.1	Construction IAQ Management Plan, During Construction
Credit 3.2	Construction IAQ Management Plan, Before Occupancy
Credit 4.1	Low-Emitting Materials, Adhesives and Sealants
Credit 4.2	Low-Emitting Materials, Paints and Coatings
Credit 4.3	Low-Emitting Materials, Carpet Systems
Credit 4.4	Low-Emitting Materials, Composite Wood and Laminate
Adhesives	
Credit 4.5	Low-Emitting Materials, Systems Furniture and Seating
Credit 5	Indoor Chemical and Pollutant Source Control
Credit 6.1	Controllability of Systems, Lighting
Credit 6.2	Controllability of Systems, Temperature and Ventilation
Credit 7.1	Thermal Comfort, Compliance
Credit 7.2	Thermal Comfort, Monitoring
Credit 8.1	Daylight and Views, Daylight 75% of Spaces
Credit 8.2	Daylight and Views, Daylight 90% of Spaces
Credit 8.3	Daylight and Views, Views for 90% of Seated Spaces

It is within Indoor Environmental Quality that ceramic tile can be most helpful in creating a healthy environment for people; and yet in review of the credits listed above, it is clear that other surfacing materials widely known to off gas and emit V.O.C.'s (Volatile Organic Compounds) are addressed and ceramic tile, an inert and non-emitting material, is not referenced in any way.

This is misleading. The absence of tile can be interpreted as though it isn't a green option at all, when in reality, it is likely the best choice above all other flooring materials for healthy indoor environmental quality.

This is why our industry must step up to the plate and take the initiative to set the record straight.

Who Established These LEED Rating Systems?

As mentioned earlier, USGBC is an open and transparent organization. Anyone can join. Individuals can join at the local level through Chapter membership. Corporate members apply directly to the national organization. Any member in good standing can participate in committees and volunteer their time contributing to policy and programs. For more information on USGBC Committees, please review the web site. 9.

LEED Rating Systems are first tested in a "pilot program". This is a means to assess the theories and practices and make corrections before publishing the Rating Systems for public use. Additionally, there are opportunities for members and the public at large to submit comment on the Rating Systems while they are in the development process. This ensures the Rating Systems are developed with integrity in an open, inclusive and transparent process as outlined in the USGBC Guiding Principles.

In review of the people & entities that are actively involved in supporting, sponsoring and influencing the policies and decisions, it is clear that the ceramic tile industry has been absent, without representation. However, products that compete directly with ceramic tile are well represented and highly visible.

Tim Cole, USGBC Board of Directors Chair Elect 2009, is a 15 year veteran employee of Forbo, the European linoleum manufacturer. His role at Forbo is North American product management, training development and maintaining LCA, IAQ (Indoor Air Quality) and other environmental issues. He is also Vice Chairman of the ASTM F6 Resilient Flooring Committee and a committee member of the ISO TC 219 Flooring Committee. 10.

Another Board Member, Elizabeth Whalen, USGBC Product Manufacturers Seat, is the Director of Corporate Sustainability at Columbia Forest Products in Portland, Oregon and the former manager of CFP's Brand Strategy & Development. She lists "regulatory environments and political lobbying" among her specialties. Columbia Forest Products web site indicates the company produces laminate, engineered and solid wood flooring. 11.

At the USGBC Executive staff level, Michelle Moore, is Senior Vice-President, Policy & Public Affairs. Ms. Moore "is from a small town in southern Georgia that has the distinction of being the carpet tile capital of the world". She is a former employee of Interface (carpet manufacturer), Director of E-Business. Her role at USGBC is, in part, "...defining the mainstream by leading the organization's outreach efforts, including marketing and communications, public policy, development, and residential programs." 12.

Past sponsors of Greenbuild, the USGBC annual tradeshow devoted to the green building industry, among many other product manufacturer categories, include:

- Antron Carpet Fibers
- Armstrong Ceiling & Flooring
- Exotic Hardwoods & Veneers
- Forbo Linoleum
- Interface FLOR
- LG Floors
- Mannington Mills
- Milliken Contract
- Sustainable Forestry Initiative

The majority of other Board Members, Executive Staff and Sponsors come from a broad spectrum of disciplines; architecture, engineering, information technology, environmental activism, science, education, non-profits and other building product categories. There is no sign of the ceramic tile industry taking part in the leadership that guides the decisions in USGBC and its programs.

As a speaker on this topic at the November 2008 CTDA (Ceramic Tile Distributors Association) conference said,

"If you don't have a seat at the table, you're on the menu".

Let Us Count the Ways

"Greenwashing is the practice of making an unsubstantiated or misleading claim about the environmental benefits of a product, service, technology or company practice. Greenwashing can make a company appear to be more environmentally friendly than it really is. It can also be used to differentiate a company's products or services from its competitors by promising more efficient use of power or by being more cost-effective over time." 13.

There is nothing deceptive about the long list of ceramic tile positive attributes. It isn't marketing fluff. It isn't a lame attempt to convince specifiers & consumers to choose ceramic tile over other surfacing materials. It isn't *greenwashing*. It is a registry of common traits, shared by all ceramic tile. No singular brand of ceramic tile can claim exclusive rights to the list of positives; although the recent marketing text of some ceramic tile manufacturers is ripe with this innuendo in their effort to claim market share. Those of us in the ceramic tile industry know better, but as we are learning, our target market does not.

In a recent informal survey of acquaintances not associated with the tile industry, we asked if they viewed tile as a green product. All that understood the context said it would be if the tile has recycled content. One said green tile made him think of algae and mold, in reference to the color green, not understanding the environmental association. Others said it is more high maintenance than carpet because it "shows the dirt". Others that it makes them think of dirty shower stalls. Clearly, we still have a lot of work to do.

As a reminder, a review of the persistent green features of ceramic tile:

Flame & Fire Resistant

Ceramic tile is non-flammable and can provide protection for underlying substrates and structures.

Synthetics and wood cannot provide this defense and do release toxins when in flame.

Non-Toxic

Ingredients are clay, sand, carbonate and feldspars, plentiful natural and non-toxic.

Synthetic ingredients in other surfacing materials and the adhesives used to install them are composed of petroleum, vinyl, plastic and other harmful chemicals. As suspected carcinogens, all of these substances off gas in an indoor environment, this means occupants breathe and ingest the chemical by-products.

Inert & Non Emitting

Ceramic tile does not emit toxic chemicals. It is inert, including as waste in landfill.

Carpet, laminates, resilient and manufactured wood products emit chemicals into the indoor environment.

Non-Absorbent

Odors, smoke, liquids, chemicals, bacteria and viruses are not absorbed. Ceramic tile is not a "sink" or receptacle for other construction materials that do emit or off gas.

Contaminants rest on the impervious surface until they are cleaned off.

Chemical Resistant

Most ceramic tile is resistant to household chemicals; solvents, harsh cleaners & pool chemicals.

Color Permanent

Tile is unaffected by UV light and does not fade with exposure to sunlight. As long as tile from the same production is used for repairs and newly tiled areas, the flooring blends seamlessly.

Passive Solar Battery

Tile floors function as a passive battery and when it is situated for sunlight exposure during the day, it will absorb & store heat and later release the warmth at night, reducing energy consumption and helping to maintain indoor temperatures.

Cool in Warm Climates

As a masonry material, tile functions as a battery and effectively retains and stores cool temperatures from the surrounding environment, making it an effective surfacing material in warm climates, which can help maintain indoor temperatures and reduce energy consumption.

Recyclable and Re Usable

Waste can be used for road beds, tennis courts, and other paving. The longevity of tile permits the possibility of re-use. Antique tile is often re-claimed from historic properties and reused elsewhere. Wood and stone flooring are the only other candidates for reuse.

Insect Resistant

Termites and carpenter ants cannot feed on or live in ceramic tile. Silver fish, fleas, ticks and dust mites have no place to hide and are easily vacuumed or washed away. Wood and carpet harbor all of these destructive and health hazardous pests.

Moisture Resistant

Ceramic tile is not affected by water exposure and is ideal in wet environments.

Mold, Mildew & Fungal Resistant

The composition of tile does not provide a food source for fungi & mold, nor is tile destroyed by its presence. These organisms are easily avoided or removed with regular cleaning.

Frost Resistant

Many ceramic tiles are frost resistant and can be used exterior and interior. Other materials quickly degrade in the outdoors.

Low Maintenance

Cleans easily with water and mild cleaners, no harsh chemicals are necessary, nor is twice annual professional cleaning. The good thing about tile is that dirt rests on top of the surface. It doesn't soak in, settle to the bottom or stain the tile.

Sustainable

Installed properly, good quality tile can last 50 to 100 years or more. The key to style longevity is avoiding trends and sticking with classic, timeless looks. Tile is not a disposable surfacing material that needs to be replaced every 5 to 7 years.

Tear & cut proof

Tile floors are easily repaired without requiring entire replacement. Chipped or broken tile can be individually removed and replaced, as long as the owner has planned ahead and set aside extra tile for this purpose.

Installs with non-toxic setting materials

Low V.O.C. cementitious setting materials are readily available. Grout can be sealed with water based, non-toxic low V.O.C. penetrating sealers.

Does not require sealing or chemical stripping

Glazed ceramic tile is impervious and does not require sealers.

Does not require professional cleaning when cared for properly

Regular sweeping and occasional mopping are all that is required. Twice annual professional cleaning is not necessary.

Lowest long term cost of all floor surfacing materials

According to a 2005 study prepared by the Tile Council of North America, ceramic tile is the most cost effective and durable of all flooring materials.

Third Party Certification

Third Party Certification is the testing, analysis and verification of product claims by an outside, independent agency or laboratory with no ties to the product manufacturer or its industry. This type of certification provides legitimacy, void of marketing content or the dissemination of misleading information regarding the true nature of the product.

The A/D community relies on third party certification to verify the "green-ness" of products. There aren't relative test standards for most of the green features of tile. Ironically, it is the lack of need for these standards (because tile does not present the hazards or health threats of other materials) that causes the absence of tile in LEED Rating Systems. And this absence is being misinterpreted.

The certification process is costly, into the tens of thousands of dollars, and usually requires on-going annual fees to maintain certification and the right to use the certification logos in product marketing materials and packaging. This is a likely reason why most tile manufacturers haven't pursued certification. Additionally, testing ceramic tile for chemical emissions is practically irrelevant. A few domestic tile and setting material producers have taken steps to certify their products for chemical emissions and recycled content.

Greenguard

The GREENGUARD Environmental Institute is a non-profit agency that provides certifications for improving indoor air quality. GREENGUARD Certified products are tested for their chemical emissions performance. 14

Green Seal

Green Seal is a non-profit agency that utilizes a LCA (life-cycle analysis) approach to evaluate products and services, including on site plant visits. A review of the web site indicates primary product categories are adhesives, cleaning agents, sealers, soaps and paper goods. Currently, ceramic tile is not category of products that are evaluated by Green Seal. 15

Scientific Certification Systems

SCS, a California corporation, certifies recycled content and indoor air quality for products used within enclosed environment, including hard surface flooring. 16

And the Good News Is...

Fortunately, it appears there are positive changes on the horizon.

1. USGBC seems to be headed toward a more comprehensive approach to the evaluation of materials; Life Cycle Analysis.
2. Greater emphasis is being placed on Indoor Environmental Quality.
3. CTDA (Ceramic Tile Distributors Association) has formed a Green Building Committee with the purpose: "to educate the (ceramic tile) industry on the green building movement and to influence the way in which ceramic tile is viewed within the green building movement." 17.
4. TCNA (Tile Council of North America) has formed its Green Initiative Committee and indicates it will work collaboratively with CTDA to further advance the use of ceramic tile in green building projects. 18.

We must recognize & seize the opportunity that the green building movement presents our industry, above and beyond many other competing surface materials. As an industry, we must direct our energy on educating the American public with regard to what makes tile a wise choice for the health & benefit of our homes and businesses. We preach to ourselves within the confines of our own trade journals, when we should be aiming our message at a greater audience. We have assumed our market would spontaneously understand the nature of our product category, but it does not. Americans, unlike Europeans and other cultures, do not have a historical reference or traditional connection to tile. It's our responsibility to get the correct and truthful information into their hands.

Our products truly help end users to solve real problems and create healthier work places and homes. We can feel good about being part of the solution.

The preceding article was researched and written by Anthony Bogo, CTC, a graduate of the CTIOA Inc. Ceramic Tile Consultant Course.

References

1. Awareness Into Action; <http://www.awarenessintoaction.com/article.php?url=single-impact-certifications-sustainability-third-party-certifications>
2. USGBC; <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=124>
3. USGBC; <http://communicate.usgbc.org/2008/>
4. USGBC; Guiding Principles; http://communicate.usgbc.org/usgbc/2006/08.15.06_guiding_principles/guidingPrinciples/
5. USGBC; <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222>
6. USGBC; <http://www.usgbc.org/ShowFile.aspx?DocumentID=3330>
7. Tile Today Global; Issue 1, pg 52 – 58
8. USGBC, LEED Rating Systems, Commercial Interiors Version 2.0; <http://www.usgbc.org/ShowFile.aspx?DocumentID=684>
9. USGBC, Committees; <http://www.usgbc.org/ShowFile.aspx?DocumentID=1905>
10. USGBC, Tim Cole; <http://www.usgbc.org/AboutUs/BoardMemberBio.aspx?BoardMember=48>
11. USGBC, LinkedIn.com, Elizabeth Whalen; <http://www.linkedin.com/pub/5/57b/939> , <http://www.usgbc.org/AboutUs/BoardMemberList.aspx?CMSPageID=131>
12. USGBC, Michelle Moore; <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=61&#mmoore>
13. Greenwashing definition; http://searchcrm.techtarget.com/sDefinition/0,,sid11_gci1272594,00.html
14. Greenguard; <http://www.greenguard.org/>
15. Green Seal; <http://www.greenseal.org/>
16. Scientific Certification Systems; <http://www.scscertified.com/>
17. CTDA; <http://www.ctdahome.org/board/index.shtml#green>
18. TCNA; <http://www.tileusa.com/>