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DRAFT IN PROGRESS

Market Transformation:

How the U.S. Green Building Council revolutionized the building industry

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I. What problem does the standard address?

The construction sector is the single largest industry on the planet and by a variety of measures it is also the most environmentally destructive. In the US alone the building industry was worth over $1.188 trillion annually[1]. Worldwide, the industry and the buildings it creates are responsible for 30-40% of all primary energy usage[2]. The US Energy agency puts buildings share of domestic energy at 35%, with transportation as the second biggest use at roughly 28[3]. Further, it is claimed by the United States Green Business council that buildings account for 65% of electricity consumption, 30% of greenhouse gases, 30% of waste and 30% of natural resource usage.[4]

Residential construction is responsible for the largest share of construction in most countries[5] but business related construction is still a very large piece. Private non-residential use buildings makes up 27% of US construction spending[6] while construction and operation of non-residential buildings is responsible for 8.7% of all energy consumption in Europe[7].

From an environmental perspective "greening" the construction industry offers the single largest opportunity for conservation. Industry convention has been for construction project bids to compete overwhelmingly on "first costs", which only consider costs for actually putting up a building and ignore operating expenses. In other words, construction firms competing for a job are rewarded for using the most inexpensive materials and components that meet building codes even when this significantly increases building operating costs.

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[1] (March 2007, http://www.reuters.com/article/economicNews/idUSN2737051020070430)
[2] (UNEP, 2007)
[3] %(UNEP, 2007)
[4] (USGBC.org).
[5] (UNEP 2007)
[6] (March 2007 http://www.reuters.com/article/economicNews/idUSN2737051020070430)
[7] (UNEP 2007)

In the early 1990's there was a very small but growing number of forward thinking organizations interested in building more environmentally friendly structures for reasons ranging from ethical to economic. The problem, as the United States Green Building Council (USGBC) saw it in the early 1990's, was that "greenness" or "sustainability" meant something different to everyone and there was no objective way to measure it. Therefore the industry with perhaps the greatest potential to reduce environmental impact suffered from market imperfections impeding its incentives and ability to clean up.

II. How does the standard solve the problem?

Seeing this confusion as a barrier to rapid progress and in order to give construction decision makers a way to plan, verify and communicate the "greenness" level of new construction projects, the USGBC was formed in 1993 and launched an effort to create a standards based point-system called Leadership in Environmental and Energy Design (LEED) in 1995 (reconcile with 1999 pilot and 2000 found here: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1442). By creating the LEED standard, the USGBC both increases the incentive for organizations to construct less environmentally destructive structures and provides a tool for them to do so. The voluntary standard, as created, awards "credits" to new construction projects for utilizing designs, processes, materials and technologies that minimize environmental impact and maximize energy efficiency. Achieving certain point levels qualifies a project for one of four progressively 'greener' rating levels: LEED certified Bronze, Silver and Gold.

The LEED manual sets out objective technical requirements to qualify for each point. After the completion of a building project, the design team submits documentary evidence to the USGBC's reviewers who determine the number of points to be awarded and bestow a rating. The LEED system solves the two biggest obstacles to a greener construction industry. First, it defines, in great detail, specific technical criteria for what exactly constitutes a sustainable or green building. Although two different projects can qualify for the same certification level in different ways, LEED leaves no doubt as to precisely what 'green' means and how to achieve it (at least according to the USGBC's definition). Secondly, the standard enables 'greenness' to be objectively communicated, forecasted, measured, certified and advertised. The certification process distills thousands of pages of complex documentation that construction and design teams must submit for certification, into a simple 1 through 69 point score and four level grading system.

By defining, quantifying, and verifying a buildings environmental impact, LEED helps empower all actors in the construction process to build greener while simultaneously increasing their incentives to do so. The most technically ignorant CEO can demand the new corporate headquarters meet "Gold" level certification and the HVAC systems engineer will understand what the requirements are for her area of responsibility. Table 1 outlines the benefits of quantification and verification services the USGBC provides.

TABLE 1 HERE- Benefits of quantifiability and verifiability by actor

III. What does the standard cover?

LEED originally focused on environmental impact and energy efficiency for new buildings. It has since expanded scope to six categories: sustainable site development, water savings, energy and atmosphere, materials and resources, indoor environmental quality, and innovation and design. Its reach has also been broadened from strictly new construction to include major renovations of existing buildings, commercial interiors, neighborhood developments, homes, schools, and existing building operations and maintenance.

The current LEED new construction standard (version 2.2) includes 69 possible points with a minimum of 26 points needed for 'LEED certified' level and 52 required to obtain Platinum certification. See Appendix II for a list of LEED New Construction 2.2 points.

IV. How is the standard verified?

The LEED certification process is notoriously bureaucratic.[8] The process is composed of a series of formalized procedures consisting of structured exchanges of written documents and letters, sometimes supplemented by direct email or phone contact. There are no site inspections.

Building project that aspires to achieve LEED certification must register with the USGBC ($750?). Membership in USGBC is strongly encouraged as it offers members lower fees and a more streamlined certification process[9]. Registration gives design teams access to resources such as the 323 page (source?) resource guide for new construction to help them select and integrate the desired number of LEED points into the project plans. Each point has specific

[8] Reference "Fixing LEED"
[9] See section ___ for more on membership.

guidelines and detailed documentation requirements to prove compliance with the credit. During the design phase, the project team can formally request specific clarification as to whether a plan meets the criteria of an individual point via a written request called a Credit Interpretation Report (CIR) for a fee of $220. All past CIRs and their resulting interpretations are accessible by members or registered project designers on the LEED online system. At the time of writing, the USGBC website reported that more than 6,400 commercial buildings and 5,900 homes have completed registration.[10]

Only after construction is complete may an application for certification be submitted. Documentation is sent by mail or online (the proposed LEED 3.0 will be online only - source?). In written form the application can be more than one thousands pages contained in multiple binders weighing 20 plus pounds.[11] At the time of writing, 824 commercial buildings and 194 homes have completed certification according to the USGBC website.[12]

The application is reviewed by a "LEED review team" who issues a preliminary ruling within 30 (?) days of either accepted, rejected or pending on each credit applied for and chooses up to 6 points to audit, requiring additional documentation. The design team has 30 days to respond with audit documents and any corrections and/or additional supporting documents. Final decision as to which credits is granted is made within 3 weeks or a second audit can be performed if two or more of the audited credits are rejected. Registrants dissatisfied with the review teams ruling can appeal within 30 days for a fee of $500 per credit being challenged. A different review team then issues a final ruling on the disputed credit(s) within 30 days of the appeal.

[10] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1442
[11] Reference "Fixing LEED"
[12] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1442

Review teams are often referred to as "independent" in USGBC literature although USGBC staff was hesitant to respond to inquiries about the nature, qualifications, selection process, compensation, and exact relationship of reviewers to the USGBC.[13] According to Dean DiPiettro, LEED customer service representative, "independent" means that reviewers with a conflict of interest with respect to the project being reviewed are not permitted to carry out the review. He reported that reviews are carried out by a combination of in-house reviewers and outside contractors. DiPiettro explained further that there are roughly a dozen in-house reviewers, they do not specialize in a specific standard, and applications are assigned to reviewers and/or contractors based on availability and work volume. Regarding contact between the reviewers and project teams submitting the application, DiPiettro said that it is not uncommon for reviewers to contact the project team by email or phone to clarify information in an application, especially in the second stage "where there is more of a back and forth"; project teams are reportedly not able to contact reviewers and consultants do not contact project teams.

A former LEED board member explained that LEED very often contracts out its application review to current and former LEED board members or their firms. This source also indicated that the USGBC intends to move in the direction of truly independent third-party verification system in the future. LEED Steering Committee minutes corroborate this, intended as an efficient way to build up review capacity.[14]

[13] When the USGBC employees I spoke to were asked if the organization had a transparency or conflict of interest policy (which do exist and are two of the six USGBC guiding principles) they said no. They also denied requests for the organizations financial information. One representative explained that since the USGBC was not a public company it did not have to share it's financial information with the public. In fact, 501(c)3 organizations *are* required to make their tax returns (IRS form 990) available to the public. This information is readily accessed for all 501(c)3 organizations, including the USGBC's, via a few web sites that collect this data from the IRS (See Appendix X for USGBC's 2005 IRS form 990).

[14] Find which minutes.

In general, criticism of LEED's certification process is not difficult to find although accusations of impropriety or mis-application of the standard have not been uncovered. The most common gripe is that the process is to rigidly bureaucratic and not flexible enough. Review teams have a reputation for sticking to the letter of the credit requirements, even when the spirit of the credit is clearly satisfied. It has been pointed out that this inflexibility can distort designer's incentives who at times are go further but not be recognized for it.[15] For example, one architect explained his frustration with an elusive credit that is granted in buildings where all non-perimeter work spaces are given local control of the air conditioning and heating system. The architect was able to go one step further and entirely eliminate non-perimeter space, but the reviewers ruled that this did not meet the credit requirement.[16] It should be noted that there are a finite number of "Innovation" credits that allow for recognition of novel building features, although there is a maximum for each standard (four for LEED New Construction 2.2).

The formality and stricture of the LEED certification is in essence a tradeoff in favor of reliability and fairness over flexibility and validity. By eliminating site inspections and limiting reviewers ability to stray from the written code, the risk of impropriety is conceivably reduced (thereby increasing public confidence). This is at the expense of under-rating some projects that are more sustainable but don't fit the credit exactly. Similarly, the choice to keep the process document based has its advantages and disadvantages. It forces the standard to focus on overtly "provable" features of the building rather than transient aspect more given to hands-on monitoring (such as *actual* energy usage).

[15] Reference fixing leed and others from fixing leed's works cited
[16] ""

V. How is the organization governed?

USGBC founders approached their objective of promoting green building from the view that the problem was not so much ethical as it was structural. The goal of the USGBC is stated as "market transformation". In order to insure their organization and its standards achieved widespread acceptance, support, and buy-in from this enormous and diverse industry, it was decided that the USGBC needed to be an inclusive forum for multiple stakeholders within the building sector to work together and represent their interests. However of central concern to the founders and indeed this author is how an organization with a socially responsible agenda can incorporate industry stakeholders without allowing the organizations principles to be compromised. The USGBC's attempt to limit this potential can be seen in the membership structure and conflict of interest, balance, and voting policies.

The council was established as a 501(c)3 membership organization and at the time of writing there were 12 defined membership categories (see Table 3) and over 9000 member organizations (a ten-fold increase since 2000)[17]. Membership dues scales are defined for each member category and relate on a sliding scale to the relevant indicator of affordability for that organization type (See Appendix V). Annual dues range from the minimum of $300 for K-12 schools, contractors with under $250,000 in revenue and NGO's with a budget under $15 million, up to the $12,500 for the largest category of product manufacturers, with revenues in excess of $10 billion[18]. Membership revenues collected in 2005 were reported in the USGBC's IRS form 990 filing[19] as $5,172,589. This corresponds to roughly one third of the council's revenues for the year and averages out to roughly $1000 per member[20].

[17] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1442
[18] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=56&, See Appendix X
[19] Required of for 501(c)3 organizations, accessed on http://www.guidestar.org
[20] Based on annual revenues of $15,991,587 and authors interpolation of 5,000 members at the time.

Balance across membership categories in committee representation is governed by the by-laws and includes the following rules: (i) each committee must be represented by a member from at least five categories of membership (ii) no category of membership may have voting control of the committee, (iii) where multiple views on an issue are central to the work of a committee, such views must be represented, as practicable, and (iv) committee leaders must avoid the perception of conflict.

Interestingly, USGBC founders originally defined the membership categories such that trade associations were not represented, feeling that their unique ability to influence the organizations would be a threat to USGBC objectives. However an amendment to create an additional membership category for trade associations was passed in 2005[21]. When USGBC co-founder and current President and CEO Rick Fedrizzi was asked by Healthy Building News correspondent, Bill Walsh, why he pushed for the inclusion of trade unions after they were initially barred he responded:

> *"USGBC's core values state a commitment to an open, participatory and rigorous process. Opening our doors to associations is being true to those core values. Mostly, [allowing associations membership] seemed to me almost like a box that we needed to check off in order to move forward. One reason we excluded association membership 12 years ago was because as a new and small organization we wanted to engage their member companies directly. Now that we have nearly 6,000 of our own member companies and organizations that dynamic has changed. Many associations actually play an important role in educating their membership about the growing importance of the green building movement and sustainability to their*

[21] http://www.healthybuilding.net/news/fedrizzitrade-092105.html

individual businesses. Some associations, such as ASLA (3), ASID (4) or IIDA (5), represent a profession, not companies, and have already been working in partnership with the USGBC.

Over time a perception evolved in some quarters that their exclusion from USGBC membership preempted a full partnership, even though from our point of view that was not the case. It became like a small tear in the fabric of our core values that some of our critics were using to distract us from our mission of market transformation towards sustainability. The federal government is an important customer for us, and they began to question the exclusion as well. These concerns are now removed."[22]

During an interview with a former director of USGBC, a more candid explanation was offered, reporting that trade associations had put pressure "directly on the white house" which put federal government adoption of LEED by the General Service Administration in jeopardy if trade association's were not given a seat at the table. Although the 'balance' policies outlined above are meant to keep a single membership category from having undue influence, the source expressed his fears that trade associations would influence future standards by using their "limitless resources" to flood the USGBC with an unmanageable quantity of biased research in their favor.

Is this case instructive of the council's willingness to compromise on its ideals in the face of heavy pressure? If so, it does not bode well for the USGBC's future as this is likely not the last time entrenched polluting interests threatened by the growth of LEED will avail of political ties to turn up the heat. Or should one have faith in Mr. Fedrizzi's

[22] ttp://www.healthybuilding.net/news/fedrizzitrade-092105.html

assertion that "Our organization is now large enough, mature enough and increasingly improving its operations such that honest dissent can be addressed as we move forward. It's not in the interest of the vast majority of our members to condone conduct that can be perceived as detrimental to the organization."

To bring an illustrative example to bear, let us consider a timely case of the council's reaction to industry pressure. In 2000, while developing the "LEED for Commercial Interiors" standard, a credit was proposed to reward projects that did not use PVC materials due to the materials severely negative environmental and human health impacts. Challenges were raised from vinyl[23] industry groups who claimed that there was no scientific basis for such a credit. The credit was put on hold and USGBC's Technical Scientific Advisory Committee (TSACE) established the PVC Task Group in November 2002 to review the evidence offered by "stakeholders and independent sources" and report to the Steering Committee on the "quality and availability of evidence as a basis for a reasoned decision about the inclusion of a PVC-related credit in the LEED rating system."[24] The TSAC held a public meeting for PVC stakeholders in February of 2004 to solicit feedback on the Task Group's proposed methodology. In December 2004 a draft report of the Task Groups findings were published for public comment and received 562 detailed comments (non-Vinyl industry commentators were very critical). After reportedly addressing the comments and soliciting further public feedback, the final report was released in February 2007 and concluded that although PVC is worse than all alternative building materials in most of the environmental and health impact categories (i.e. cancer, climate change, environmental toxicity) for most applications (flooring, siding, etc.) it is

[23] 'Vinyl' and 'PVC' are used interchangeably in this paper.
[24] https://www.usgbc.org/ShowFile.aspx?DocumentID=2379

not the worst in all categories in all application. The Taskforce recommended that LEED avoid using a "blunt" incentives that penalizes all uses of PVC when in some circumstances and categories this could lead to substitution of an even worse material. It recommends alternatively incentivizing the use of materials that demonstrably outperform all others in all categories for a specific application. Ultimately, the USGBC's response to the Task Group's report, and the fate of the "no-PVC" credit will rest with the LEED Steering Committee with any changes put to a membership wide vote (see below).

Supporters of green building have been heavily critical of the Task Groups findings.[25] One major source of contention was the methodology used to quantify and compare relative environmental impacts: a hybrid of Life Cycle Analysis (LCA) and Risk Assessment (RA). Critics (source?) point out that LCA is associated with decades of tobacco industry reports and has been widely employed in the "Bush administration efforts to weaken environmental standards."[26] Risk Assessment is said to value the trade off of shorter human life spans with other "benefits". And the unique approach that the Task Group takes by combining the two to make up for holes in the data is claimed to be worse than either method separately.[27]

At issue as well was the reports overwhelming reliance on PVC and chemical industry supplied research and data. Finally, the report is said to ignore the precautionary principal, a core value of the environmental movement. The UN's 1992 Rio Declaration on Environment and Development stated that the precautionary approach needed to be widely applied if we were to avoid serious irreversible damage to the earth's living systems.

[25] http://www.healthybuilding.net/usgbc/tsac.html
[26] Cite.
[27] Cite.

It is also one of six guiding principles[28] of the USGBC constitution. The precautionary principle states that: "When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established."[29] A read of the LEED Steering committee minutes in the weeks following the PVC report's release shows a motion was approved to make more specific reference to the precautionary principal in the PVC Task Group report.[30] The Task Group reports findings are also accused of contradicting a growing consensus of findings by a number of governments, international treaties and institutions that conclude that elimination of the use of PVC should be a top priority.[31]

This case demonstrates a few salient points. First we see that years before trade associations were formally extended membership, and regardless of the no-PVC credit's ultimate fate, the PVC industry was quite capable of triggering a reconsideration of the PVC credit that has lasted seven years and counting. In the interim the credit has been excluded from all standards pending the review process, a *de facto* injunction. While it would be beyond the scope of this paper to determine the extent to which the process was intentionally delayed and influenced by PVC stakeholders 'flooding' the Task Group with overwhelming amounts of research, it's clear that the incentive and capability to do just that are quite real, given the nature and openness of the review process coupled with the Task Group's commitment to dutifully review *all* submitted research.

Secondly one can observe that the process was conducted with a very high degree of transparency and openness. The final report is more than 200 pages long and all data used

[28] cite
[29] Cite.
[30] http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1637
[31] http://www.healthybuilding.net/pvc/tsac/TSAC_CmntF-ADPSR-final.pdf

is posted on the USGBC's website for public access and comment. In the event that a review such as the PVC Task Group report is unduly influenced by economic interests or political pressure from a specific industry group, USGBC procedures are well set up to at minimum, make this observable. Indeed the harsh criticism the PVC report received attests to a healthy constituency of green building enthusiasts who would serve as a "fire-alarm".

Third, in a review of LEED Steering Committee minutes between February and May of 2007, the author notes that many public criticisms of the report are addressed by the committee either moving to add clarifying language to the PVC report or commissioning further study.

So what is the upshot of this digression into the PVC case? We see potential for a polluting industry to influence LEED policy, at minimum delaying a credit detrimental to their interests, at worst, swaying a committees findings through biased research and a deluge of comments. However confidence in LEED is saved by virtue of the transparency of the process which allows the thousands of LEED-invested followers to push back and make their voices heard. It will be interesting to see how the case plays out in the coming months. It seems unlikely at this point that the no-PVC credit will be either reinstated as-is *or* quietly dropped. A probable outcome is that a more sophisticated and nuanced credit will result that reduces the environmental impacts which inspired the PVC credit while more efficiently spreading the burden to other materials besides PVC on the basis of their relative performance for each application. Were the PVC industry not so demonized in green building circles, one might be tempted to pronounce such an outcome a win-win.

(Another interesting case is the reaction of the wood industry…)

The board of directors is set up to include a minimum of one and a maximum of two directors from each membership category, a representative of each of the USGBC's eight regional chapters, three appointed "at-large" directors plus three appointed directors who represent special perspectives, one of which is allocated to home builders. Per the by-laws, the board of directors has the discretion of putting decisions up to a membership-wide vote, for which a ten percent quorum is required (more on standard related voting rules below).

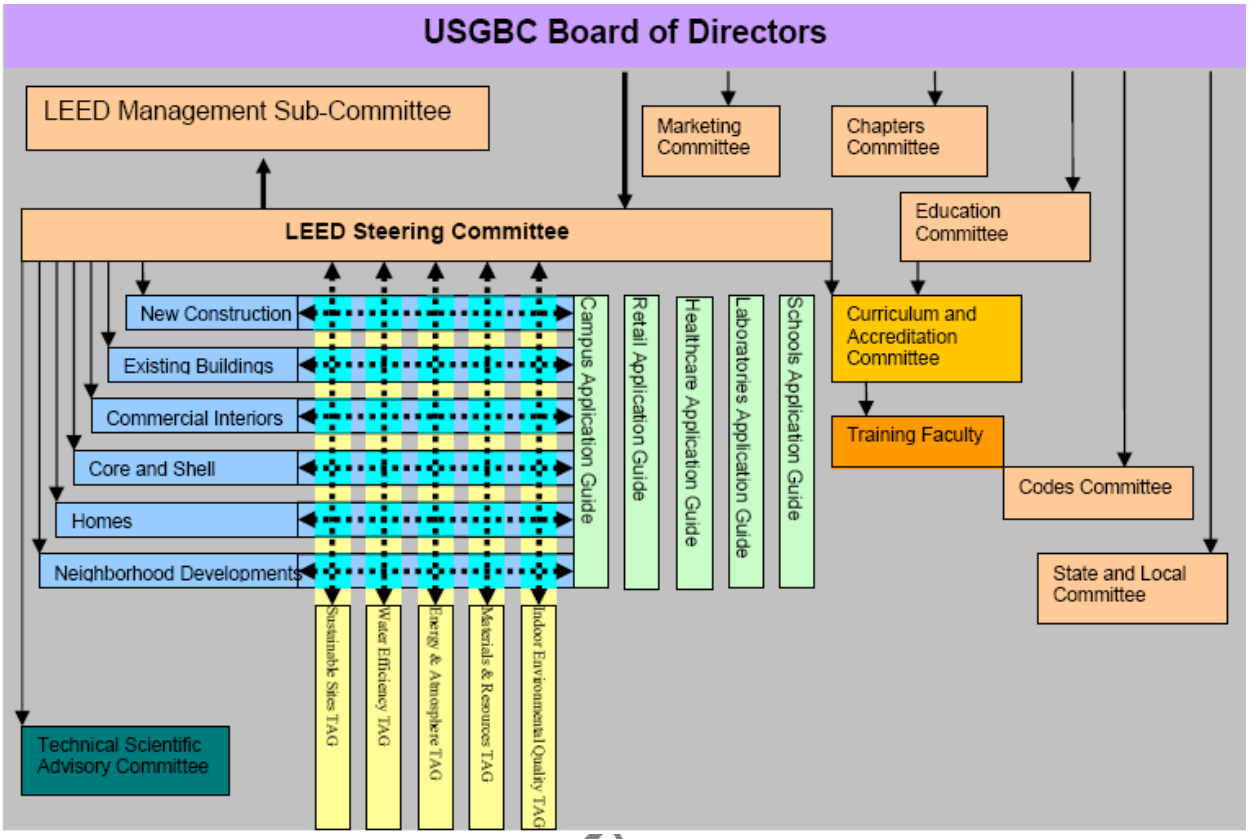
The council's conflict of interest policy is of specific interest given that directors and committee members are very rarely disinterested parties with regard to the standards being conceivably, many are chosen to serve *because* of the interests they represent. The board of directors is charged with setting the conflict of interest policy per USGBC by-laws. The current policy[32] mandates disclosure of conflicts and abstention from motions and voting that "directly or predominantly involve the matter of conflict". However the leader is "encouraged to continue serving on the committee… offering her unique insights". The policy also allows for the leader to make a case in writing to the board if she feels that her vote should be allowed.

VI. How is the standard set?

The LEED standard is intended to transform the building market. It is a standard designed to be reliable yet under ongoing development as it expands into new product categories and adapts to changing technology and environments.

[32] Approved August 31, 2001.

The LEED Steering Committee oversees development and delivery of the LEED product line and delegates and overseas all LEED committee activities. LEED committees mainly consist of "horizontal" and "vertical" market committees and Technical Advisory Groups (in diagram below: shown in light blue, light green and light yellow, respectively). Horizontal committees exist for each LEED product line (i.e. New Construction, Commercial Interiors, Homes, etc., see Diagram below) and are charged with overseeing the development, launch, marketing, business and operations of that product. Vertical Committees exist for each special user class (i.e. Campuses, Healthcare Facilities, Retail, etc.) and have subcommittees responsible for publishing guides and informing standard development for each relevant product line examining special issues, adaptations and special treatment required for their vertical market. Finally, Technical Advisory Groups (TAG) exist for each impact area (i.e. Indoor Environment, Materials and Resources, Energy and Atmosphere, etc.) covered by the LEED products. The TAGs are responsible for developing the individual credits within their impact area for each standard. TAGs also respond to Credit Interpretation Rulings (see above).



Any new LEED products or modifications thereof are directed from the LEED steering Committee to general membership for a public comment and revision process followed by a vote. After publication of the proposed action, comments are solicited for a 30-60 period (via website). A minimum of 30 days is allowed for comments to be collated and responses written. Resulting changes to the action must then be approved by the steering committee. A summary of public comments and highlights of changes made are next published on the website for review and comments related to the changes for a period of fifteen days. These comments are then considered for up to 60 days. At any point in the process, the Steering Committee or Executive Board can remand the action or a part thereof back to the originating committee or membership for further comment. The action is then balloted and 30 days given for members to cast their votes. Two-thirds affirmative vote and a ten percent quorum are required for passage.

VII. Costs and Benefits of Compliance

Estimates of the relative cost of building a LEED certified building average about an extra 2-4% although this is contested by some.[33] One study by a private consulting firm looking at a database of 600 projects found that while costs of building green vary widely, there is no significant difference between LEED certified and others buildings when controlling for building location, type, purpose, size, etc.[34] The study did not account for so-called "soft-costs" such as design. A GSA[35] study looked at the cost differential for two common building federal building projects: putting up a new mid-rise federal courthouse of around 250,000 square feet and renovation of an existing 308,000 square foot office building. The findings put the premium range at -.04% to 8.1% for various levels of LEED certification. A study commissioned by California State's Sustainable Building Taskforce found the "green premium" to cost about 2%.[36]

Why then are organizations, increasingly (albeit still a small fraction[37]) exhibiting a preference to build green? Users of the LEED standard are almost evenly divided into four categories: governments, businesses, non-profits and institutions. While incentives naturally for each category this research focuses on incentives for businesses. A broad list of incentives for businesses include the desire to reduce environmental impacts, decreased operating and maintenance costs, increased building value, higher human productivity, public relations/green reputation, health of employees, tax incentives, and regulatory incentives.

[33] Cite 30% anecdotal criticism
[34] http://www.ecy.wa.gov/programs/swfa/greenbuilding/pdf/costinggreen.pdf
[35] U.S. government's General Services Administration.
[36] http://www.ecy.wa.gov/programs/swfa/greenbuilding/pdf/KatsReport.pdf
[37] Find fraction.

Operating savings from building LEED certified or higher buildings is consistently estimated as far outweighing the cost of building green.[38] A study by an independent sustainability consultant[39] commissioned by the California Sustainable Buildings Taskforce in 2003 looked at 33 LEED certified or higher buildings in 19 (?) states.[40] The study found that building green costs from 1-8% more with an average of 1.84% or $3-$5 per square foot. The direct financial benefits of building green that stem from lower energy, water and costs were found to be $4-$6 per square foot based on a 20-yr net present value calculation employing a 5% real discount rate. Less straight forward to estimate are the benefits from increases in worker productivity and health. The report explains that a number of studies have found these to be significant (non-zero) but estimates range widely.[41] Using reportedly conservative estimators, the California study put the health benefits at $35-55 per square foot. Therefore on energy costs alone, the report finds that building sustainably with LEED pays for itself (albeit not at higher discount rates), and with productivity and health benefits, the return on investment is many times over.

Figure ES-1. Financial Benefits of Green Buildings
Summary of Findings (per ft²)

Category	20-year NPV
Energy Value	$5.79
Emissions Value	$1.18
Water Value	$0.51
Waste Value (construction only) - 1 year	$0.03
[illegible] Value	$8.47
Productivity and Health Value (Certified and Silver)	$36.89
Productivity and Health Value (Gold and Platinum)	$55.33
Less Green Cost Premium	($4.00)
Total 20-year NPV (Certified and Silver)	$43.87
Total 20-year NPV (Gold and Platinum)	$57.31

Source: Capital E Analysis

Regulatory and tax incentives have arisen rapidly in the past few

[38] Multiple citations to be included.

[39] NAME

[40] Link here

[41] Heschong Mahone Group, "Daylighting in Schools: An Investigation into the Relationship Between Daylight and Human Performance," 1999. Available at: http://www.h-m-g.com; Follow up studies verified the rigor of analysis and subsequent research continues to show positive correlation between daylighting and student performance;
Judith Heerwagen, "Do Green Buildings Enhance the Well Being of Workers?" Environmental Design and Construction Magazine. July/August 2000. Available at: http://www.edcmag.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,4118,19794,00.html;William Fisk, "Health and Productivity Gains from Better Indoor Environments," summary of prior publications (see Appendix J), with figures inflation-adjusted for 2002 dollars and rounded. "CEC Environmental Performance Report." Available at: http://www.energy.ca.gov/reports/2001-11-20_700-01-001.PDF.

years. umpteen states have now passed green building legislation as well as dumpty two municipalities and cities. Nevada for example gives…

VIII. Conclusion

In the Darwinian competition of voluntary competing standards, only the fittest survive. The right combination pragmatism and ideological rigidity combined with a workable business model will be the winning combination. The challenge…

IX. Discussion Questions

1. What kind of environmental pressures does the U.S. construction industry face? What is the problem that the U.S. Green Building Council faces in engaging multiple stakeholders into its initiatives? Does expanding its membership help promote sustainable construction or does it detract from it? What pressures does the U.S. Green Building Council faces in limiting membership?

2. How sound to you find The U.S. Green Building Council's certification process? How can the Council ensure that buildings do indeed conform to code when it does not conduct on-site audits? What are the advantages of having a bureaucratic certification process with heavy paperwork and documentation? Is this process better than on-site audits? Why or why not?

3. The author states that the U.S. Green Building Council's LEED standards represent a tradeoff between fairness and flexibility. Do you feel that its rigid standards are sufficient enough to promote green building across multiple stakeholders? Or does it ultimately detract innovation from green leaders?

4. Evaluate the credibility and transparency of this organization with regards to the PVC case. Can the U.S. Green Building Council realistically lie upon green building watchdogs to sanction transgressions? What mechanisms should the Council adopt in order to ensure that the organization abides by its precautionary principle?

5. Examine Appendix II and assess how LEED allocates its construction credits. Is this a practical way of certifying green building? Play around with the checklist and come up with two "green" buildings comprised of different characteristics that arrive at the same number of total credits. Does one seem more "green" than the other?

6. What information would convince a consumer of the "greenness" of a building? Whether it was built with green materials? Green processes? Or whether its green design will result into more energy and waste reductions? In what ways does the LEED standard address these issues? In which ways does it fall short?

X. Appendix

Appendix I: USGBC Report Card

Average Score:	**2.9**
Autonomy from Target of monitoring:	1
Organizational Strength:	4

Capacity to carry out monitoring is uncertain as organization is hesitant to give details about staff.

Monitoring practice:	4
Sources of information:	2
Standards vs. Monitoring:	3
Evaluations:	3

Uncertain. Organization would not give anything but extremely vague information on frequency of denial.

Sanctions:	NA

It is a voluntary standard with no sanctions for non-compliance.

Transparency of Monitoring organization:	3

Highly transparent in governance and standard making process, low transparency in standard verification and among employees.

Shadow of the state:	3

Standard is voluntary although relies on government in some situations to provide incentives for compliance.

Appendix II: LEED New Construction Credits

LEED for New Construction v2.2
Registered Project Checklist

Project Address:

Yes	?	No			
			Sustainable Sites		**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
			Credit 1	**Site Selection**	1
			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
			Credit 4.1	**Alternative Transportation** , Public Transportation Access	1
			Credit 4.2	**Alternative Transportation** , Bicycle Storage & Changing Rooms	1
			Credit 4.3	**Alternative Transportation** , Low-Emitting & Fuel-Efficient Vehicles	1
			Credit 4.4	**Alternative Transportation** , Parking Capacity	1
			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
			Credit 5.2	**Site Development,** Maximize Open Space	1
			Credit 6.1	**Stormwater Design,** Quantity Control	1
			Credit 6.2	**Stormwater Design,** Quality Control	1
			Credit 7.1	**Heat Island Effect,** Non-Roof	1
			Credit 7.2	**Heat Island Effect,** Roof	1
			Credit 8	**Light Pollution Reduction**	1
Yes	?	No			
			Water Efficiency		**5** Points
			Credit 1.1	**Water Efficient Landscaping** , Reduce by 50%	1
			Credit 1.2	**Water Efficient Landscaping** , No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
			Credit 3.1	**Water Use Reduction** , 20% Reduction	1
			Credit 3.2	**Water Use Reduction** , 30% Reduction	1
			Energy & Atmosphere		**17** Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
			Credit 1	**Optimize Energy Performance**	1 to 10
				10.5% New Buildings or 3.5% Existing Building Renovations	1
				14% New Buildings or 7% Existing Building Renovations	2
				17.5% New Buildings or 10.5% Existing Building Renovations	3
				21% New Buildings or 14% Existing Building Renovations	4
				24.5% New Buildings or 17.5% Existing Building Renovations	5
				28% New Buildings or 21% Existing Building Renovations	6
				31.5% New Buildings or 24.5% Existing Building Renovations	7
				35% New Buildings or 28% Existing Building Renovations	8
				38.5% New Buildings or 31.5% Existing Building Renovations	9
				42% New Buildings or 35% Existing Building Renovations	10
			Credit 2	**On-Site Renewable Energy**	1 to 3
				2.5% Renewable Energy	1
				7.5% Renewable Energy	2
				12.5% Renewable Energy	3
			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

continued…

Yes	?	No			
			Materials & Resources		**13** Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse** , Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse** , Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse** , Maintain 50% of Interior Non-Structural Elements	1
			Credit 2.1	**Construction Waste Management** , Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management** , Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse** , 5%	1
			Credit 3.2	**Materials Reuse** ,10%	1
			Credit 4.1	**Recycled Content** , 10% (post-consumer + pre-consumer)	1
			Credit 4.2	**Recycled Content** , 20% (post-consumer + _ pre-consumer)	1
			Credit 5.1	**Regional Materials** , 10% Extracted, Processed & Manufactured Regionally	1
			Credit 5.2	**Regional Materials** , 20% Extracted, Processed & Manufactured Regionally	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1
Yes	?	No			
			Indoor Environmental Quality		**15** Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
			Credit 3.1	**Construction IAQ Management Plan** , During Construction	1
			Credit 3.2	**Construction IAQ Management Plan** , Before Occupancy	1
			Credit 4.1	**Low-Emitting Materials** , Adhesives & Sealants	1
			Credit 4.2	**Low-Emitting Materials** , Paints & Coatings	1
			Credit 4.3	**Low-Emitting Materials** , Carpet Systems	1
			Credit 4.4	**Low-Emitting Materials** , Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
			Credit 6.1	**Controllability of Systems** , Lighting	1
			Credit 6.2	**Controllability of Systems** , Thermal Comfort	1
			Credit 7.1	**Thermal Comfort** , Design	1
			Credit 7.2	**Thermal Comfort** , Verification	1
			Credit 8.1	**Daylight & Views** , Daylight 75% of Spaces	1
			Credit 8.2	**Daylight & Views** , Views for 90% of Spaces	1
Yes	?	No			
			Innovation & Design Process		**5** Points
			Credit 1.1	**Innovation in Design** : Provide Specific Title	1
			Credit 1.2	**Innovation in Design** : Provide Specific Title	1
			Credit 1.3	**Innovation in Design** : Provide Specific Title	1
			Credit 1.4	**Innovation in Design** : Provide Specific Title	1
			Credit 2	**LEED® Accredited Professional**	1
Yes	?	No			
			Project Totals (pre-certification estimates)		**69** Points

Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points

Appendix III: USGBC IRS Form 990

Appendix IV: USGBC Conflict of Interest Policy

Appendix V: USGBC membership dues schedule

Appendix VI: State and municipal green building legislation