LEED v4

IMPACT CATEGORY AND POINT ALLOCATION DEVELOPMENT PROCESS

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Introduction

When the U.S. Green Building Council launched LEED over a decade ago, it created a foundation for sending market signals to the building industry to move toward sustainable alternatives. LEED provided a way to quantify benefits that had previously been considered too difficult to quantify in a consistent manner, putting things like energy and water efficiency, green materials and indoor air quality on the radar screen of building projects around the country and the world. These market signals opened up potential for new products and services, and incentivized new measures.

The point allocation process employed by the LEED Rating System serves as a method for producing a simplified guide for building project teams to navigate complex and competing issues affecting us on a global scale. When developing a single rating system that addresses sustainability across all building systems, professional disciplines and environmental and social impacts, the relative weight given to different types of strategies becomes a complex issue. This issue has become critically important as green building has expanded as both a science and an industry. The USGBC has been keenly focused on the issue of relative weighting, and its level of sophistication in addressing it has continued to evolve.

This paper reviews the weighting structure and process that was developed for LEED version 4, and highlights key findings based on statistical analysis of the results.

Background

Early versions of LEED allocated points based on the professional judgements of members of the Technical Advisory Committees for each of the main categories of LEED. While this approach may have been ad hoc, it developed a platform of both stability and flexibility.

LEED 2009 introduced a new innovation, a weighting system that allocated points across the system as a whole based on their ability to reduce environmental problems. This approach added an analytical framework that was more transparent and robust, focusing attention on performance. The impact categories that were used for LEED 2009 were derived from the Environmental Protection Agency's TRACI categories, which are widely used to conduct Life Cycle Assessments. These categories, which list specific environmental problems, were designed for evaluation of individual materials, not for whole buildings. In addition, they do not fully represent a comprehensive look at sustainability. The categories were therefore modified to add in issues of human health, and were ranked in order to reflect applicability to the built environment.

LEED v4 takes the analytical framework developed for 2009 and applies a new set of criteria developed specifically for the built environment. After surveying a wide variety of other rating systems, programs and policies to see how others have addressed this issue, it was determined that there was no other existing system, analogous to the TRACI categories that adequately addressed the goals of the USGBC. Therefore, a new system was needed.

The LEED Steering Committee approved a set of new Impact Categories that focus on the social, environmental and economic goals of LEED and measure each strategy according to their ability to meet those goals. Rather than focusing on environmental problems and how they can be reduced, as LEED 2009 did, the LEED v4 system asks a critical question: "What should a LEED project accomplish?"

In addition to defining new LEED Impact Categories that are tailored to the built environment and focused on positive outcomes, LEED v4 also generated another innovation—a web-based tool that enables multivariate associations between strategies and impacts. The new LEED Weightings Tool not only allows for these detailed associations to be made for each credit in the LEED system, it also enables statistical analysis of the results. This generates not only greater analytical rigor, but also the ability to better understand how the system is behaving, where USGBC goals are being met (both at the Impact Category and strategy level), and how to make improvements over time.

The LEED Rating System allocates points to incentivize building project teams to comply with requirements that best address the social, environmental, and economic outcomes identified by USGBC. Points are allocated through a weightings process where a credit receives one or more LEED points based on each credit's relative effectiveness at accomplishing the goals defined for the system, . The more effective the credit requirements are at addressing the goals of the system, the more recognition (or points) it receives. The point allocation process will help to shape the dominant discourse of the buildings industry. This paper explores this process for LEED v4, and discusses opportunities, and challenges associated with the U.S. Green Building Council's prioritization of these issues within LEED.

Overview of LEED Structure

The LEED Rating System is a voluntary, consensus driven, internationally recognized green building certification system providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across metrics such as energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and resource stewardship.

LEED provides building owners, design teams, and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. Project teams use LEED as both a design guide and verification system to measure progress towards defined performance goals.

LEED is structured to encourage interdisciplinary project teams to engage in an integrated project delivery process. By combining mandatory and optional strategies in a framework that rewards successful projects with a third party certification, LEED motivates project teams to take action which results in higher performing buildings. LEED is organized to promote action in 6 key areas, known as credit categories:

- Location and Transport
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality

Under each of these credit categories are a collection of mandatory and optional strategies. Mandatory strategies are deemed "prerequisites" for entering the system, while optional strategies are referred to as "credits". Each prerequisite and credit has a stated "intent" and a set of requirements. To achieve certification, projects must document compliance with all prerequisites and a sufficient number of credit requirements to amass 40 of the available 100 points in LEED. Higher levels of achievement are rewarded with higher levels of certification:

- 40 points - LEED Certified
- 50 points - LEED Silver
- 60 points - LEED Gold
- 80 points - LEED Platinum

LEED System Goals

As a market transformation instrument, LEED engages building project teams in a way that connects strategies to a defined set of goals. LEED's system goals are referred to as "Impact Categories." Seven

Impact Categories were developed and approved by the LEED Steering Committee for incorporation into LEED v4. These Impact Categories answer the question: “What should a LEED project accomplish?”

- Reverse Contribution to Global **Climate Change**
- Enhance Individual **Human Health** and Well-Being
- Protect and Restore **Water Resources**
- Protect, Enhance and Restore **Biodiversity** and Ecosystem Services
- Promote Sustainable and Regenerative **Material Resources** Cycles
- Build a **Greener Economy**
- Enhance Social Equity, Environmental Justice, and **Community** Quality of Life

Figure 1: LEED v4 Impact Categories

The Impact Categories set out an ambitious agenda for the buildings industry that is actionable only when put into a simple framework of attainable prerequisites and credits. Projects complying with credit and prerequisite requirements are positioned to deliver a set of performance outcomes that cross-cut the Impact Categories in an integrated way. The certification structure is set up to incentivize progressively higher credit achievement and thus, progressively higher compliance with credits whose outcomes accomplish the system goals.

Point Allocation Methodology

LEED is designed to be flexible and allows building project teams to select their credits based on their unique needs, rather than comply with all aspects of the system. There are roughly 50 credits in the proposed draft of LEED for New Construction. For LEED to be successful in driving the market toward certain priorities while still maintaining flexibility, credits that significantly contribute to accomplishing the system goals of the seven impact categories are given more emphasis by being assigned more points. This is accomplished using a multi-criteria analysis approach, where we evaluate LEED credits based on the expected outcome they will have on each of the impact categories. Figure 2 illustrates this basic concept.

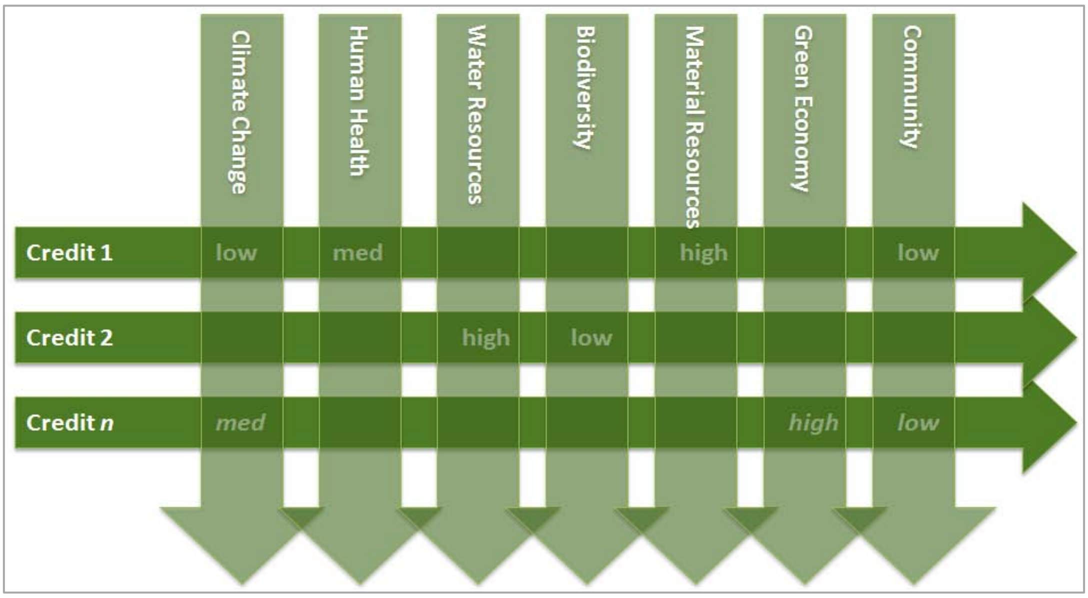


Figure 2: An illustration of how the impact categories are used to evaluate each credit in the rating system

The specifics of the methodology are discussed in later sections, but the basic approach is that each of the LEED credits are independently evaluated along each of the seven impact categories, in a matrix style format (see Table 1) with credits as rows, impact categories as columns, and associations between credits and impact categories as individual cells. For each cell, an association between credit and impact category is determined and given a weight that depends on the relative strength of that association (i.e. credit outcome weighting). A cell with a "0" indicates there is no association between the outcome of the credit and the impact category. (see Credit Outcome Weighting)

At the column level, each impact category is then weighted relative to the other impact categories (i.e. impact category weighting). These weights are layered unto each of the associations and normalized to deliver the final 100 -point scorecard (see Impact Category Weighting Layer)

Table 1: Simplified illustration of the multi-criteria approach for weighting credits based on outcomes in defined impact categories

Impact Category Weight >>	50%	25%	25%
	Impact Category- Climate Change	Impact Category – Human Health	Impact Category – Water Resources
Credit 1	65	0	0
Credit 2	10	50	20
Credit 3	10	15	75
Credit 4	15	35	5
	100	100	100

Impact Category Weighting Layer

Impact category weighting layer was applied to the overall weighting process because it was recognized that each of the LEED's Impact Categories vary in scale, scope, severity, and relative contribution from the built environment to these impacts. The final impact-category level weighting layer is illustrated in Table1 as the blue 'Impact Weight' row along the top.. Figure 2 shows the relative weights of the impact category weighting layer that way applied to the overall process.

The decision to weight these impact categories was a consensus driven process and had a similar outcome to the approach taken in the LEED v2009 weighting. For instance, a severe, global problem that the built environment strongly contributes to like Climate Change is given a larger percentage of the 100 total points relative to other Impact Categories. Comparatively, the effects resulting from other Impact Categories may be less severe, less certain, operate at a smaller scale, or perhaps the built environment has less of an ability to solve the defined problem. Impact Categories in this situation will be assigned a smaller proportion of the 100 total points to distribute to credits associated with them.

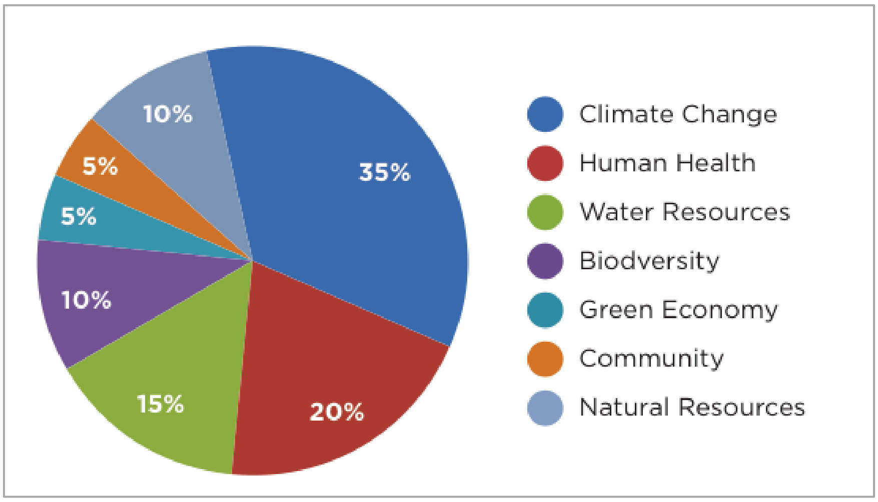
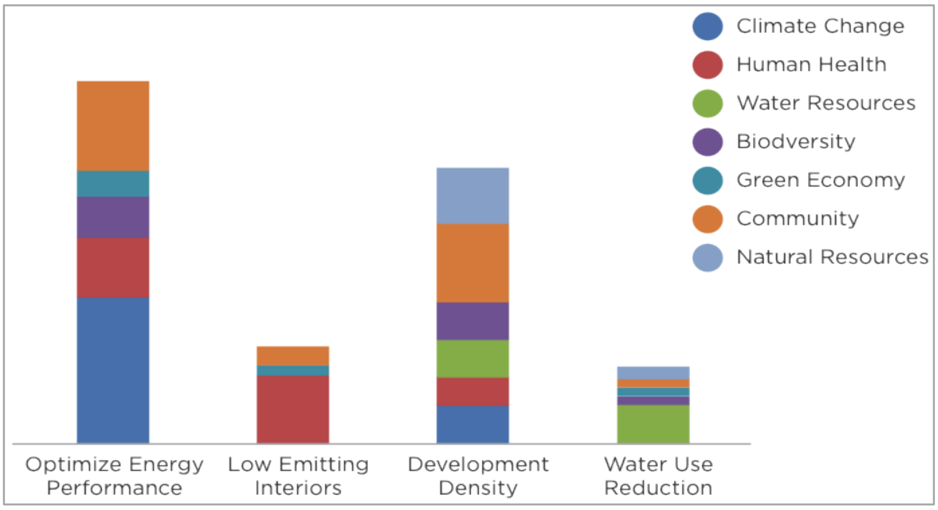


Figure 3: Weighting of the LEED v4 Impact Categories to account for differences in scale, scope, severity and relative contribution of the built environment to the impact

Credit Outcome Weighting

The relative strength of a relationship, or association, between a credit outcome and goal within an Impact Category contributes to each credit's point value. The method used to establish these relationships varies. Determining the relative importance of credit achievement to the system goals is often a quantitative exercise. Consider the Climate Change Impact Category, where it is possible to assume a boundary within which each project's CO_{2e} footprint can be defined. In these instances, the ranking of credit outcomes in a given Impact Category is data driven. For other Impact Categories, associations are driven by qualitative associations, such as a simple low, medium, high ranking. The social equity and green economy Impact Categories are examples of this approach, as metrics are not as well defined.

Figure 4: Example Point Allocation



More than 4,000 associations relative to the efficacy, duration, and control of the benefit are made to accomplish this task. A set of bounding assumptions is defined for each impact category to avoid double counting impacts. The weights are then compiled to generate a scorecard based on the desired amount of total points (100 points for LEED v4) and the minimum number of points for each credit (1 point minimum for LEED v4).

LEED Scorecard Development

Impact Category Definitions

To meaningfully complete the association process, the impact categories must be well defined and clearly bound. Significant consideration went into the development of each impact category, and they will continue to evolve as we learn how the impact categories drive the rating system priorities. The conceptual definition behind each Impact Category is very broad, and for improved clarity in the association making process, the impact categories are broken down into key indicators, which are referred to as components for LEED v4. The weighting associations are made with the components which allow for a more direct correlation between credits and outcomes. The organization of the impact categories and their respective components are shown below. Detailed system boundaries, definitions, and examples for each component are shown in Appendix A.

<u>Reverse Contribution to Global Climate Change</u>

- GHG Emissions Reduction from Building Operations Energy Use
- GHG Emissions Reduction from Transportation Energy Use
- GHG Emissions Reduction from Materials and Water Embodied Energy Use
- GHG Emissions Reduction by Embodied Energy of Water Reduction
- GHG Emissions Reduction from a Cleaner Energy Supply
- Global Warming Potential Reduction from Non-Energy Related Drivers

<u>Enhance Individual Human Health and Well-Being</u>

- Support Occupant Comfort and Well-Being
- Protect Human Health from Direct Exposure to Negative Health Impacts
- Protect Human Health Globally and Across the Entire Built Environment Life Cycle

<u>Protect and Restore Water Resources</u>

- Water Conservation
- Water Quality Protection
- Protection and Restoration of Water Regimes and Natural Hydrological Cycles

<u>Protect, Enhance and Restore Biodiversity and Ecosystem Services</u>

- Local Biodiversity, Habitat Protection and Open Spaces
- Global Biodiversity, Habitat Protection and Land Preservation
- Sustainable Use and Management of Ecosystem Services

<u>Promote Sustainable and Regenerative Material Resources Cycles</u>

- Reduce Raw Material Resources Extraction
- Move to Cyclical, Non-Depleting Material Cycles
- Reduce Negative Environmental Impacts throughout the Materials Life-Cycle

<u>Build a Greener Economy</u>

- Enhance the Value Proposition of Green Building
- Strengthen the Green Building Industry and Supply Chain

- Promote Innovation and Integration of Green Building Products and Services
- Incentivize Long Term Growth and Investment Opportunities
- Support Local Economies

Enhance Social Equity, Environmental Justice, Community Health and Quality of Life

- Create a Strong Sense of Place
- Provide Affordable, Equitable and Resilient Communities
- Promote Access to Neighborhood Completeness Resources
- Promote Human Rights and Environmental Justice

Association Factors

Using the above categories and components, associations between LEED credit requirements and Impact Category goals are measured and scaled (quantitatively if possible, qualitatively if not) to each component through three distinct lenses. These lenses are known as the association factors, and are described below. Each association between impact category component and credit is made up of these three association factors, which are multiplied together to produce the single association weight. The three factors are:

Relative Efficacy - A measure of whether a credit outcome is associated with a given Impact Category component, and how strong that association is

- Is the credit outcome related to the component?
- If yes, how strong, weak, or negative is the credit outcome linked to the component relative to other credits?
    - No association
    - Low association
    - Medium association
    - High association
    - Negative association

Duration - This is a measure of how long the benefits or consequences of the credit outcome can be expected to last.

- 1-3 Years
- 4-10 Years
- 11-30 Years
- 30+ Years (Building/Community Lifetime)

Control - This indicates which individual or actor is most directly responsible for ensuring that the expected outcome of the credit outcome is actually achieved. It is assumed that when the expected outcome of a credit is dependent on Occupants (e.g. biking to work because of the availability of bicycle racks), the certainty of the outcome is lowest and therefore the association weight is discounted the most heavily. If the outcome is not dependent on an individual (e.g. thermal mass as a passive heating/cooling strategy), then the certainty of that outcome is assumed to be the highest, and is then not discounted at all.

- Occupants
- Operation and Maintenance Staff (or construction crew)
- Owner (or Developer)
- Passive

Figure 5 shows the completed association between the Site Assessment LEED credit and the ‘Protection and Restoration of Water Regimes and Natural Hydrological Cycles’ impact category. In this case, it was determined that achieving the Site Assessment LEED credit had a medium level of relative efficacy in protecting water regimes and natural hydrological cycles. The duration of this impact was set to 30+years (i.e. the minimum lifetime of the project) because generally the project site itself will remain relatively unchanged once developed. Finally, it was considered a passive measure, because once developed, the site will passively remain as such without necessarily needing active engagement.

Figure 5: Example Associations in Weightings Tool

Scorecard Rules

The scorecard is used as a straightforward way to enable project teams to make decisions about complex and oftentimes overlapping and competing issues. USGBC has instituted conventions aimed at simplifying the output of the weightings process and into a scorecard:

- 100 base points – the base LEED Rating System is a 100 point system.
- 1 point minimum - All credits in the rating system are worth at least one point.
- Whole points - Rounding conventions are used to ensure that fractional credit values are rounded to the nearest whole point.

Following these conventions, the resultant LEED scorecard is clean and reasonably easy for project teams to understand and implement.

Conclusion: Lessons Learned

USGBC has deeply engaged itself in the point allocation process for the LEED v4 Rating System scheduled to be launched in mid-2013. Several important lessons have been learned during this process that will benefit the new release of the LEED Rating System as well as other products and tools being developed by the USGBC. Some of these lessons and resulting opportunities are discussed below.

A more robust and transparent articulation of USGBC goals

Since its inception the USGBC has had broad aspirations for LEED as a market transformation tool, which included aspects of the environment, human health, social equity, and local economy. The development of the LEED v4 impact categories and components created and impetus for the organization to more explicitly define these goals. In order to measure success, and to design for improvement, the first step must be to define what success means. The development of these impact categories was able to accomplish that.

Ability to measure current and future success of the LEED rating system

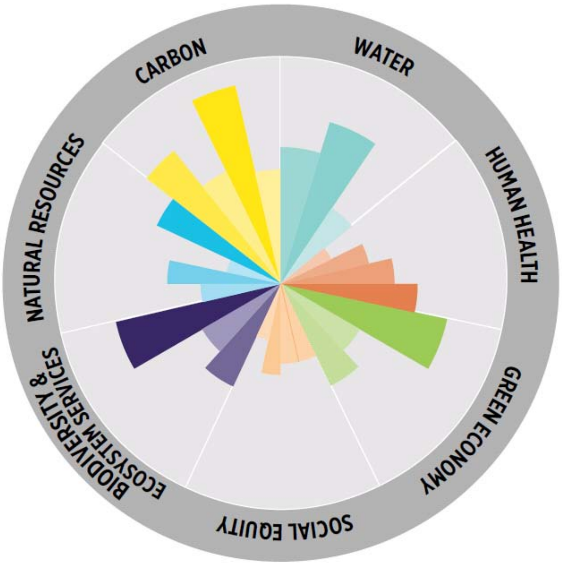
The results of the weightings process has shown that in its current iteration, LEED is not equally effective at addressing all of its goals and aspirations. This is particularly relevant in areas related to human health, community, and social equity, where the aspirations for LEED are not necessarily met with practical strategies (credits) to accomplish these goals. Other areas such as in: reducing the contribution to climate change, conserving energy, and conserving water, LEED is particularly effective and well suited to address in its current form. This is taken into account when weighting Impact Categories against one another. As the LEED rating system continues to evolve, it will be better positioned to tackle all of these issues.

Technical Development Agenda

An understanding of LEED's current effectiveness and where it can be improved results in a focused research and development agenda for future technical revisions. This process offers a significant addition to advancing discourse around the evolution of green building rating systems worldwide.

Figure 6, below, shows an example of how the weightings tool can be used to understand the extent to which LEED addresses its system goals. System goals that have fewer overall or weak associations could be prioritized for future research and analysis of the ideal role LEED couple play in reaching the system goal.

Figure 6: Example Assessment of LEED's Efficacy at Addressing System Goals



Importance of Prioritization

Given the variety of impacts that the built environment has on environmental, social, and economic outcomes, it is necessary to make educated, but difficult and admittedly subjective decisions about how LEED should prioritize its goals. This is perhaps the most challenging decision USGBC makes throughout the rating system development process. Prioritizing seven fundamentally interdependent issues is possible only when careful and thorough consideration is given to a variety of common factors with which each impact can be assessed. The importance of this cannot be overstated. In a world where it is increasingly challenging to find solutions for complex problems, LEED provides the market with a simple way to maximize the change needed to realize critical goals. As future iterations of the rating system are developed, it is key that any new strategy integrated into LEED deeply address one or more of the system goals.

Simplicity to the User

LEED credit weighting and rating system development are necessarily complicated, focused endeavors. Arriving at an endpoint that can be implemented by project teams helps to accomplish the USGBC mission and is of paramount importance. USGBC has always sought to balance the technical complexity necessary for LEED to be an effective environmental assessment methodology with a market focus enabling widespread adoption. By underpinning the market friendly "face" of LEED with a robust, scientifically grounded and academically respected prioritization process, USGBC hopes to further the market uptake LEED has experienced, but with a rating system that is increasingly more informed and effective at accomplishing the goals it was created to accomplish.

USGBC's LEED Green Building Rating System has been in the market for more than a decade. In that time it has arguably become the most important instrument in the world for transformation of the buildings industry towards a more sustainable paradigm. With more than seven billion square feet of buildings actively participating in LEED, the market power of the rating system is undeniable. In this capacity, evolution of the LEED Rating System perhaps represents the single biggest opportunity to impact the development trajectory of the built environment that currently exists. Focusing this potential in a clear direction with definable goals and attainable strategies is critical to pushing the market in a positive direction, poised to transform our social, environmental, and economic systems.

LEED Customization – Multiple Lenses of Sustainability

The concept of sustainability means something slightly different to every individual and every organization. The USGBC has defined sustainability for the LEED rating system in terms of the seven impact categories. The prioritization of these impact categories were then tailored to best fit the design intent of the rating system and to accommodate the full spectrum of projects that apply for certification under the LEED rating system.

For simplicity to the user, the evaluation of the credits along each of the impact categories are rolled up to deliver a single scorecard that prioritized credits based on total points earned. However we can disaggregate the single scorecard into seven unique scorecards, each with points that are based on an individual impact category. For example, scorecards can be generated that only consider an individual impact category (e.g. a Water Resources scorecard), OR rearrange the weighting of the impact categories to accommodate alternative sustainability goals. Project teams would then be able to make decisions on which credits to pursue based on these alternative set of sustainability objectives that better fit their own goals.

Taking this one step further, entirely new impact categories or components could be created that address very specific enterprise-level goals. As the precision of performance data from LEED projects continues to expand, it will be possible to quantify achievement with increasing accuracy, using targeted indicators, such as: reduction in GHG emissions; annual gallons of water saved; vehicle miles travelled educed, etc. These concepts and tools are actively being pursued by the USGBC, and will continue to push the pace of market transformation in the green building industry.

Appendix A – Detailed Impact Category and Components Purpose

In order to make accurate and consistent decisions on the associations between LEED credits and impact category components, detailed definitions and system boundaries were needed for each component. These component descriptions were then discussed among the association volunteers until we arrived at a general consensus and understanding of how each component should be interpreted.

Many of the impact categories are potentially overlapping with one another (e.g. water regime protection and ecosystem protection) and so it was important to draw clear distinctions on what should and should not be considered within the scope of a particular component. The objective of this system was to capture the co-benefits of LEED credits, but to avoid double counting the same benefit simply because it could be categorized within more than one component.

The following definitions and system boundaries were used for the LEED v4 weighting system. The numbering and ordering of impact categories and components is arbitrary. The weighting percentage of each impact category relative to the others is shown in parentheses after the impact category name. Within each impact category, the weighting percentage of components is shown relative to other components within that impact category. The default component-level weighting was to equally weight all components within a category, however in some cases it was necessary to adjust this when it was clear that the majority of benefits or impact fell into a single component.

Reverse Contribution to Global Climate Change

Reverse contribution to the primary drivers of climate change that are within the control of the building industry and addressable through the LEED rating system. The reduction of fossil-fuel based energy consumption is the most impactful way that a project can help to reverse contribution to climate change. The following components break this down to the particular areas where a project can effect change.

GHG Emissions Reduction from Building Operations Energy Use

To target energy use reductions directly associated with building operations. This includes all building systems and operations within the building or associated grounds that rely on electricity or other fuel sources for energy consumption.

GHG Emissions Reduction from Transportation Energy Use

To target energy use reductions associated with the transportation of building occupants, employees, customers, visitors, business travel, etc.

GHG Emissions Reduction from the Embodied Energy of Materials and Water Use

To target GHG-emissions reductions associated with the energy use and processes required in the extraction, production, transportation, conveyance, manufacturing, assembly, distribution, use, post-treatment, and disposal of materials, products and processed water. Any measures that directly reduce the use of potable water, non-potable water, or raw materials (e.g. reduced packaging, building reuse) will indirectly reduce energy as well because of the embodied energy associated with these product life cycles.

GHG Emissions Reduction from a Cleaner Energy Supply

To target actions and measures that support a cleaner, less GHG-emissions intensive energy supply and a greater reliance on renewable sources of energy

Global Warming Potential Reduction from Non-Energy Related Drivers

To address the non-energy related climate change drivers (e.g. albedo, carbon sinks, non-energy related GHG emissions) and identifies actions that reduce these contributions to climate change (e.g. land use changes, heat island reduction, reforestation, refrigerant purchases).

Enhance Individual Human Health and Well-Being

Protect and improve individual human health through changes in how we design, construct and operate within the built environment.

Support Occupant Comfort and Well-Being

To support the mental health, well-being and vitality of building occupants. Examples of included measure are: improved daylighting, indoors acoustics, greater access to the outdoors, closer proximity to community services, increased ventilation, etc. The scope of this component is focused on the building use phase of the building cycle, and within the project boundary.

Protect Human Health from Direct Exposure to Negative Health Impacts

To focus on measures that can lead to improved general health and a reduction of factors (e.g. toxicity levels, carcinogenic substance levels, accidents/injury) that contribute to increased rates of morbidity and/or mortality for building occupants and construction workers. Examples of these might include low VOC building materials, pre-occupancy flush outs, improved construction management practices, improved ventilation rates. The scope of this component includes: building occupants and design & construction crew during the construction phase and use phase of the building cycle, within the project boundary and its immediate surroundings.

Protect Human Health Globally and Across the Built Environment Life Cycle

To focus on measures that can lead to improved general health and reduce factors that contribute to increased rates of morbidity and/or mortality for all those who are involved or are affected by the impacts of a building project during its product life cycle. This component includes any impacts upstream or downstream of the construction and use phases of a building but excludes the use phase and construction phase because these impacts are accounted for in the other components of the Human Health impact category. Examples of included measures are: (1) the reduction on the reliance of fossil fuels that, through their extraction (i.e. mining) and processing (e.g. as an energy source, or other product), result in localized pollution and harmful human health effects; (2) the use of building materials that minimize the use of harmful chemical and substances during its production, manufacturing, and distribution (3) building materials that are manufactured in a socially responsible way that do not jeopardize the health and working conditions of employees.

Protect and Restore Water Resources

Protect and restore the water resources and the important ecological, social and economic services that they provide.

Water Conservation

To focus on the reduction of overall water consumption within a building and its associated grounds. The scope of this component is water use within the project boundary during construction and use phase of the building life cycle. Examples would include reduction of indoor potable water use.

Water Quality Protection

To focus on water quality protection of potable water supplies on local and regional scales. This includes measures that can affect potable water quality of runoff and wastewater that leaves the project and re-enters the watershed. The scope of this component includes local and regional water bodies that are upstream and downstream of the project during the construction and use phase of the building life cycle. Examples would include wastewater treatment and storm water runoff reduction.

Protection and Restoration of Water Regimes and Natural Hydrological Cycles

To address water regimes and hydrological cycles on a global scale. This component considers the entire building life cycle, and how each phase of that cycle impacts water resources and natural hydrological cycles at local, regional scales, across the globe (as opposed to at the project site). Scope that is included in the other water resources components is excluded here. Examples of measures that impact water regimes at this scale include: off-site habitat protection; sustainable food purchasing that reduces harmful agricultural runoff, non-water-intensive energy production, purchasing of building materials that rely on sustainable mining practices, decreased reliance on fossil fuels whose extraction and processing can negatively impact water regimes.

Protect, Enhance and Restore Biodiversity and Ecosystem Services

Protect, enhance and restore biodiversity and habitat, and the vital ecosystem services that they provide. This includes habitat and ecosystems that are local and regional in relation to the project, as well as a global perspective on the built environment's ability to impact ecosystem function, biodiversity and habitat.

Local Biodiversity, Habitat Protection and Open Spaces

To protect, restore and enhance biodiversity, habitat and open space within and surrounding the project site. The scope of this component pertains to the full project life cycle. Examples of this would include selecting native vegetation, local species sensitivity during site selection and design, open space protection and onsite habitat protection, infill/brownfield development, etc.

Global Biodiversity, Habitat Protection and Land Preservation

To protect, restore and enhance biodiversity, habitat, and land preservation from a global perspective. The scope of this component pertains to the full project life cycle. Examples of this would include offsite habitat protection, sustainable forestry products, avoidance of chemical that have high levels of known ecosystem toxicity, responsible mining practices.

Sustainable Use and Management of Ecosystem Services

To support and promote the sustainable management of all ecosystem services and resources provided to society by the environment. The scope of this component pertains to the full project life cycle on a local, regional and global scale. There will be significant overlap between this component and the other two components of this impact category because in most cases, the protection of biodiversity and ecosystems provide multiple benefits to economy and society. Examples of measures that preserve vital ecosystem services include: storm water management, urban forests, erosion controls, open spaces, sustainable food purchasing, etc.

Promote Sustainable and Regenerative Material Resource Cycles

Promote sustainable and regenerative material resource cycles that conserve natural resources, minimize negative environmental impacts throughout the materials cycle, and initiates a shift to materials cycles that become a positive contributor to the environment and human health.

Reduce Raw Material Resources Extraction

To reduce the overall demand of raw materials and natural resources that building materials and products are derived from. Energy fuels are excluded from this component as the conservation of fuels is captured within the climate change impact category. Examples of this would include whole building reuse, building interiors reuse, recycling, extended product lifecycles, etc.

Move to Cyclical, Non-Depleting Material Cycles

To shift to materials cycles that become a positive contributor to the environment and human health. Materials cycles should be fully closed loop and eventually fully integrated with the natural system cycles that govern our planet and life on it.

Reduce Negative Environmental Impacts Throughout the Materials Life-Cycle

To reduce the life cycle environmental and human health impacts that are associated with the materials cycle. Examples of this would include a reduction of ozone-depleting refrigerants, sustainable and socially responsible purchasing of materials, landfill diversion, etc.

Build a Greener Economy

Build and foster a green economy that views green building practices and overall sustainability as a central component of continued growth and long-term profit. To ensure that sustainability is properly recognized and valued, and the hidden costs of environmentally and socially negligible building practices are accounted for so that financially sound decision-making and sustainability driven decision-making can be fully compatible.

Enhance the Value Proposition of Green Building

To actively engage the building industry, building occupants, facility managers, visitors, and all others who interact with buildings to better understand and recognize the importance and value of green buildings. Green building strategies that are tangible, highly visible, quantifiable, improve our ability to more accurately measure progress, educate, or otherwise to help to communicate the importance of green building are included in this component. Examples of these include: green building education, measurement &verification, advanced building metering, on-site renewable energy systems, advanced lighting systems, mixed use developments, open spaces, daylighting, etc.

Strengthen the Green Building Industry and Supply Chain

To support the variety of green building services, products, materials and knowledge-base that supply the on-going market transformation to truly sustainable built environment practices. Examples include: high efficiency water technology products, low-emitting materials, green cleaning products, integrative design services, building commissioning services, recycled products, etc.

Promote Innovation and Integration of Green Building Products and Services

To identify and promote new innovation in green building products, technologies, materials, services and processes in order to continually pull the market forward. Integration of existing and new technologies, services and the project teams that support these are critical for successful implementation of innovation. Examples include: integrated design services, charrettes, advanced building performance monitoring, on-going commissioning, building occupant feedback and response systems, zero net energy, zero net water, passive cooling and heating, shared facilities

Incentivize Long Term Growth and Investment Opportunities

To highlight green building strategies that represent a strong return on investment opportunity or clearly contribute to an increase in the overall financial value of a building or property, including enhanced productivity of occupants. Identifying building practices that are both financially and environmentally/socially synergistic is an important aspect of sustainability. Examples include: energy efficiency improvement measures, water efficiency improvement measures, daylighting, enhanced ventilation, proximity to services and public transit.

Support Local Economies

To support the local economies surrounding a project site. Green building should contribute to healthier more prosperous communities and help to build green economies from the ground up.

Enhance Social Equity, Environmental Justice, and Community Quality of Life

Support the long-range vision for the future growth and development of community that provides universally accessible economic opportunities, supports environmental justice and human rights, addresses issues of social equity, improves quality of life, and nurtures cultural vitality. This category explores the importance that buildings have in the context of the greater community that surrounds them, and how they can powerfully shape the culture, politics, values, prosperity, health, and happiness of the citizens that are unavoidable affected by them.

Create a Strong Sense of Place
To create a strong sense of place in communities by focusing on human-scale environments that allow for seamless interaction and engagement of citizens with their environment and each other. A stronger sense of place provides means creating more opportunities for cultural, social and recreational interactions, improving community aesthetics, creating a strong sense of identity with the community and a greater sense of connectivity between members of that community. Examples of measures that contribute to sense of place include: light pollution reduction, tree-lined streets, quality views, ecologically-conscious landscaping, green roofs, open spaces, civic spaces, historical preservation, greater connection to the outdoors, pedestrian friendly communities, human scale environments, cultural expression and the freedom to express values/beliefs through building design.

Provide Affordable, Equitable and Resilient Communities
To provide affordable and equitable communities and neighbourhoods that address community-level economic, social and environmental problems. Neighborhoods should have an adequate supply of healthful, high-performing, affordable housing that is well connected to critical goods and services, public transportation, and employment opportunities.

Neighborhood development and redevelopment should focus on the management of community resources (including natural resources, ecosystem services, economic resources, civic resources, recreational resources, and social services) and enable local networks that will continue to foster and strong and diverse local economies, and benefits that feed back to the community. Communities should be built to be resilient and stable under shifting economic conditions, climatic conditions, and natural disasters. Examples of measures and policies include: affordable housing, diverse and mixed use communities, universal design, housing and jobs proximity, heat island reduction strategies, open and dense street grids, design for walkability and bikability.

Promote Access to Neighbourhood Completeness Resources
To promote development patterns that support diverse, accessible and proximate location to vital services including employment, education, healthcare, healthy food, recreation, civic and public spaces, retail, and other basic services. Examples include: proximity to diverse uses, community services and public transit, compact development patterns, mixed use buildings, walkability, bikability, proximity to open spaces and civic spaces, open and accessible parks and recreational facilities, proximity to high quality public education facilities and resources, local land conservation and natural resources protection, protection of local water bodies high performance and high quality design of public buildings.

Promote Human Rights and Environmental Justice
To promote basic universal human rights as they pertain to the built environment, and enable communities to uphold environmental justice. Examples include: reclaiming and repurposing vacant, obsolete or contaminated land and buildings, Strengthening local and regional food supply chains, implementing sustainable cleaning, purchasing and facility management policies, ensure safe drinking water quality, indoor air quality, indoor environmental quality, support community and city involvement through the provision of civic and public spaces, designing buildings that are climate adaptable and durable.