

Sprung Instant Structures - LEED® Credit Analysis

CREDIT SUMMARY

Introduction to LEED and Sustainable Buildings

<https://www.usgbc.org/LEED/>

LEED (Leadership in Energy and Environmental Design) is the most widely used and recognized green building rating system. LEED is a point-based system with four levels of achievement (Certified, Silver, Gold and Platinum) that are awarded based on the number of points earned. While LEED has no financial incentives attached to it, a LEED designation lends a higher profile to a building project. More importantly, LEED buildings realize considerable annual operating cost savings, providing a substantial payback on building upgrades.

LEED can also be a useful design tool - focusing design team attention to addressing each of the green issues covered by the system. A commitment to being a LEED building greatly expands the environmental issues addressed, beyond energy efficiency to include aspects of indoor air quality, the use of recycled and salvaged materials, and natural lighting, as three examples.

It is important to note that while the LEED rating system covers many of important factors to consider on a building project, it is by no means a conclusive list of environmental considerations. Beyond the prerequisites and credits of the United States Green Building Council (USGBC) rating system, there are many other opportunities for improving the environmental performance of a building project.

While this document focuses primarily on the characteristics of a Sprung structure which would impact the LEED performance of the project, there are many other green aspects to consider. Sprung structures utilize products that have significantly longer life cycles and are in many cases, reusable. Components of a Sprung structure are also designed for low maintenance and easy replacement at the end of their life cycle. Sprung Instant Structures has also given consideration to details such as the using formaldehyde free fiberglass blanket insulation in their structures.

Overall, the Sprung Instant Structure approach to building design and construction represents an improvement over conventional building practices in many respects. Details on how these improvements are recognized under the LEED rating system are presented below.

SPRUNG INSTANT STRUCTURES

Enermodal Engineering Limited

Enermodal Engineering Limited (www.enermodal.com) is an established consulting engineering firm providing sustainable building design with expertise in LEED design and certification, mechanical and electrical design, building science, commissioning and energy efficiency. Enermodal has a professional staff of 70 in our Kitchener, Calgary, Denver and Phoenix offices. We provide innovative solutions to reduce the environmental impact, energy and resource consumption of building designs.

Enermodal is one of North America's premier sustainability consultants, with staff who were Ontario's first LEED Accredited Professionals. Enermodal president, Stephen Carpenter, is a LEED Faculty member and chair of the LEED Canada Technical Advisory Group. We are currently working on sustainable projects worth nearly \$3.4 Billion, including more than 150 LEED buildings. While these projects are located across Canada and encompass all building types, they have one thing in common: they are designed to be cost effective, energy efficient and have a minimal environmental footprint.

Twenty-five of Enermodal's projects have been awarded formal LEED Certification – more LEED buildings than any other firm in Canada.

Enermodal is also a leader in the field of building energy simulations – a main component of LEED; having helped more than 150 projects meet, or exceed, the baseline LEED efficiency level. Furthermore, Enermodal was instrumental in the design of one of Canada's most energy efficient buildings: The University of Ottawa Biology Building which was independently verified to provide a 73% reduction in energy use relative to the National Energy Code.

Enermodal has been recognized numerous times for pushing the limits of sustainable design. Recent accolades include the 2004 NRCAN Energy Efficiency Award for New Buildings (University of Ottawa) and two ASHRAE Technology Awards for innovative commercial (Green on the Grand) and residential (Waterloo Green Home) building design.

SPRUNG INSTANT STRUCTURES

LEED Impact Summary

LEED is a performance based rating system for the whole building project, thus Sprung structures typically contribute toward particular aspects of the overall sustainable goal for a project. The following table identifies the credits within the USGBC LEED for New Construction rating system which a Sprung structure can achieve a LEED credit, contribute to a LEED credit or where Sprung could potentially offer value added services to help a project achieve a LEED credit. The key credits highlighted in the table below are discussed in further detail in the subsequent information pages.

Sustainable Sites		
SSp1	Erosion & Sedimentation Control	No direct impact
SSc1	Site Selection	No direct impact
SSc2	Development Density & Community Connectivity	No direct impact
SSc3	Brownfield Redevelopment	No direct impact
SSc4.1	Public Transportation Access	No direct impact
SSc4.2	Bicycle Storage & Changing Rooms	No direct impact
SSc4.3	Low Emitting & Fuel Efficient Vehicles	No direct impact
SSc4.4	Parking Capacity	No direct impact
SSc5.1	Protect or Restore Open Space	No direct impact
SSc5.2	Maximize Open Space	No direct impact
SSc6.1	Stormwater Design: Quantity Control	No direct impact
SSc6.2	Stormwater Design: Quality Control	No direct impact
SSc7.1	Heat Island Effect, Non-Roof	No direct impact
SSc7.2	Heat Island Effect, Roof	May achieve this credit
SSc8	Light Pollution Reduction	No direct impact

Water Efficiency		
WEc1	Water Efficient Landscaping	No direct impact
WEc2	Innovative Wastewater Technologies	No direct impact
WEc3	Indoor Water Use Reduction	No direct impact

Energy & Atmosphere		
EAp1	Fundamental Commissioning	No direct impact
EAp2	Minimum Energy Performance	Can contribute to this credit
EAp3	Fundamental Refrigerant Management	No direct impact
EAc1	Optimize Energy Performance	Can contribute to this credit
EAc2	On-Site Renewable Electricity	No direct impact
EAc3	Enhanced Commissioning	No direct impact
EAc4	Enhanced Refrigerant Management	No direct impact
EAc5	Measurement & Verification	No direct impact
EAc6	Green Power	No direct impact

SPRUNG INSTANT STRUCTURES

Materials & Resources		
MRp1	Storage & Collection of Recyclables	No direct impact
MRc1	Reuse Existing Building	No direct impact
MRc2	Construction Waste Management	Can contribute to this credit
MRc3	Materials Reuse	Can contribute to this credit
MRc4	Recycled Content	Can contribute to this credit
MRc5	Regional Materials	Can contribute to this credit
MRc6	Rapidly Renewable Materials	No direct impact
MRc7	Certified Wood	No direct impact

Indoor Environmental Quality		
EQp1	Minimum IAQ Performance	No direct impact
EQp2	Environmental Tobacco Smoke (ETS) Control	No direct impact
EQc1	Outdoor Air Delivery Monitoring	No direct impact
EQc2	Increased Ventilation	No direct impact
EQc3.1	Construction IAQ, During Construction	No direct impact
EQc3.2	Construction IAQ, Before Occupancy	No direct impact
EQc4.1	Low-Emitting Adhesives & Sealants	No direct impact
EQc4.2	Low-Emitting Paints & Coatings	No direct impact
EQc4.3	Low-Emitting Carpet Systems	No direct impact
EQc4.4	Low-Emitting Composite Wood and Agrifibre	No direct impact
EQc5	Indoor Chemical & Pollutant Source Control	No direct impact
EQc6.1	Controllability of Systems, Lighting	No direct impact
EQc6.2	Controllability of Systems, Thermal Comfort	No direct impact
EQc7.1	Thermal Comfort, Design	No direct impact
EQc7.2	Thermal Comfort, Verification	No direct impact
EQc8.1	Daylight 75% of Spaces	Can contribute to this credit
EQc8.2	Views for 90% of Spaces	Can contribute to this credit

Innovation & Design Process		
IDc1	Deconstructability	May achieve this credit
IDc1	Durable Building	Can offer value added services related to this credit

Sprung Instant Structures - LEED® Credit Analysis

SSc7.2 - HEAT ISLAND EFFECT: ROOF

Credit Intent

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Achieving the Credit

Use a roofing material having a Solar Reflectance Index (SRI) equal to or greater than 29 for a minimum of 75% of the roof area.

How Sprung Structures Help

Many of the membrane color options available for a Sprung structure represent dramatic performance improvements over traditional roofing materials in terms of Solar Reflectance. The color of the architectural membrane can reduce the use of dark, non-reflective surfaces on the project and contributes to lower cooling loads during the summer and decrease unwanted heating of surrounding areas. To prevent this heat absorption, the structural membrane (DuPont™ Tedlar®/Polyurethane architectural colored film) should have a high Solar Reflectance Index (SRI) equal to or greater 29 for a minimum of 75% of the roof area.

Sprung Instant Structures

May Achieve this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

EAP2/EAc1 - MINIMUM/OPTIMIZE ENERGY PERFORMANCE

Credit Intent

Achieve increasing levels of energy performance above the minimum to reduce environmental impacts associated with excessive energy use.

Achieving the Credit

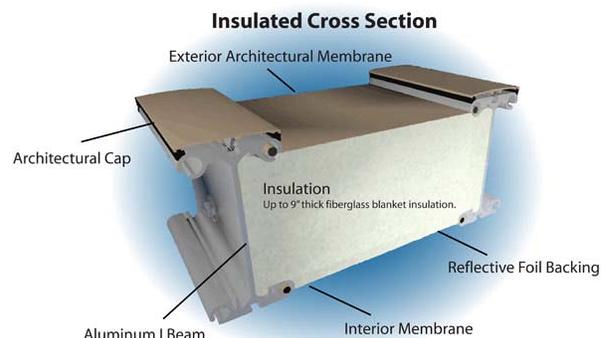
Reduce the design energy cost of the building compared to a reference building designed to meet model energy codes (MNECB OR ASHRAE/IESNA 90.1-1999). Improving energy performance beyond the baseline can earn a project up to 10 additional points in LEED.

How Sprung Structures Help

The building envelope (made up of the building's walls, roof, doors, and windows) has a large impact on energy performance. As the primary separation between the indoor and outdoor environments, the building envelope is required to act as a barrier to outdoor air and moisture. Additionally, the building envelope must resist the transfer of heat and work to keep the building warm in the winter and cool in the summer.

Sprung structures can be equipped with a comprehensive insulation package made up of a vapor barrier and up to nine-inch-thick Johns Manville Formaldehyde Free fiberglass blanket insulation with foil backing. Insulated Sprung structures exhibit improved energy performance requiring less energy to heat and cool the building. Lower heating and cooling requirements may also allow the heating and cooling equipment to be downsized resulting in capital cost savings and operational cost savings.

While other aspects of the building design will also impact the energy performance and the number of points achieved for this LEED credit, the building envelope provided by an insulated Sprung structure is an excellent starting point towards developing a comfortable and highly energy efficiency structure.



Sprung Instant Structures

Can Contribute to this Credit

Sprung Instant Structures - LEED® Credit Analysis

MRC2 - CONSTRUCTION WASTE MANAGEMENT

Credit Intent

Divert construction, demolition and land clearing debris from landfill disposal. Redirect recyclable resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Achieving the Credit

Develop and implement a waste management plan with the goal of diverting a minimum of 50% (1 point) or 75% (2 points) of construction, demolition and land-clearing waste from the landfill by recycling/salvaging materials. Examples of construction materials which may be recycled include; concrete, wood, gypsum wallboard, masonry, cardboard and metals.

How Sprung Structures Help

Conventional building construction is responsible for a large portion of the solid waste sent to landfills around the world. Waste generated during the construction of a typical building represents a significant portion of the overall landfill impact of a project.

Sprung structures are constructed entirely from pre-manufactured parts which results in a dramatic decrease in the amount of waste generated on-site. As a result, the overall quantity of construction waste material that must be diverted (either for recycling or reuse) is much less to achieve one or two points under MRC2 - Construction Waste Diversion. Additionally, landfill tipping fees will be reduced and the lifetime of current landfills will be extended.

Waste produced during the manufacturing process is collected and recycled with high efficiency at the factory. Because waste is minimized before materials are shipped to the project site, the pre-manufactured components used in a Sprung structure use less energy in transport.

Sprung Instant Structures

Can Contribute to this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

MRC3 - MATERIALS REUSE

Credit Intent

Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

Achieving the Credit

Use salvaged, refurbished or reused materials, products and furnishings for at least 5% (1 point) or 10% (2 points) of the total cost of building materials.

How Sprung Structures Help

In addition to the waste impacts of new construction, the energy and materials used in the manufacturing of building products has a significant environmental impact. Reuse strategies aim to extend the lifespan of building components while at the same time decreasing waste and eliminating the need for manufacturing.

Because the extruded aluminum components of Sprung structures have an extended lifespan (30 year pro-rata guarantee), the aluminum components are designed with deconstructability and reuse in mind. When a structure is disassembled, the aluminum components can be reused in another Sprung structure. When a LEED project includes aluminum reused from a previous structure, the value of the substructure would contribute toward the reused materials supported in this credit. Likewise, windows and doors reused from an existing building could also be considered under this credit.

Sprung Instant Structures

Can Contribute to this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

MRC4 - RECYCLED CONTENT

Credit Intent

Increase demand for building products that incorporate recycled content materials therefore reducing impacts resulting from extraction and processing of new virgin materials and by-passing energy and greenhouse gas intensive industrial and manufacturing processes.

Achieving the Credit

Use materials with recycled content such that the sum of the value of the recycled content represents 7.5% (1 point) or 15% (2 points) of the total value of materials in the project. Post-consumer recycled content (e.g. from residential and commercial recycling programs) is worth full value and post-industrial recycled content (e.g. waste from a manufacturing process) is worth half value.

How Sprung Structures Help

Incorporation of recycled content materials reduces the demand for virgin materials and by-passing energy and greenhouse gas intensive industrial and manufacturing processes. Using recycled content materials also helps to promote recycling efforts and grow the marketplace for recycled products.

Sprung structures incorporate recycled content in a variety of the building components. For example, Johns Manville's fiberglass building insulation is certified by Scientific Certification Systems (SCS) to have a minimum recycled content of 25% comprised of 20% post consumer bottle glass and 5% post industrial glass. Additionally, a number of the accessories including windows and doors contain portions of recycled content which contribute towards this credit.

Sprung Instant Structures

Can Contribute to this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

MRC5 - REGIONAL MATERIALS

Credit Intent

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Achieving the Credit

Specify that 10% (1 point) or 20% (2 points) of building materials and products, by cost, be extracted and manufactured within 800 km of the project site. If materials are shipped by rail or water, the allowable radius is 2400 km.

How Sprung Structures Help

The environmental impact of a building project includes the pollution related to the transportation of building materials. It is important to consider both the transportation of raw materials to the point of manufacture and the subsequent transportation of completed building products to the project site.

Depending on the location of the building project, a Sprung structure may contribute towards the regional content of the building project. Detailed information on the extraction and manufacturing locations (as well as the delivery mode of transportation) of the building components and accessories is available to assist in quantifying the amount of regional content used in a building project.

Sprung Instant Structures

Can Contribute to this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

EQc8.1 - DAYLIGHTING

Credit Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight into the regularly occupied areas of the building.

Achieving the Credit

Provide a 2% daylight factor (the ratio of the amount of daylight within the building compared to the amount of daylight outside the building) or at least 250 Lux (25 footcandles) of daylight, in 75% of regularly occupied spaces.

How Sprung Structures Help

Daylighting can significantly reduce the need for artificial lighting which can lead to decreased energy costs. Daylighting has also been shown to improve occupant comfort levels and satisfaction with the space.

Sprung structures include a highly-translucent skylight section along the apex of the structure, adding an attractive source of natural light. The skylight in a Sprung structure provides high quality daylighting without glare due to the translucent nature of the architectural membrane. Depending on the layout within the structure, this source of daylighting can contribute dramatically toward achieving this LEED credit. Additionally, light admitted through the translucent skylight may allow internal lighting systems to be dimmed or turned off entirely resulting in energy savings.

Sprung Instant Structures

Can Contribute to this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

EQc8.2 - VIEWS

Credit Intent

Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of views into the regularly occupied areas of the building.

Achieving the Credit

Provide a direct line of sight to vision glazing from 90% of regularly occupied areas via perimeter windows arranged to have a window-to-floor area ratio of at least 0.07.

How Sprung Structures Help

Research indicates that views to the outdoors improves occupant's productivity and reduces absenteeism and illness. Sprung structures can be designed with a variety of windows, glazing walls and seasonal openings to help achieve the view requirements of this LEED credit.

Sprung Instant Structures

**Can Offer Value Added Services
Related to this Credit**

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

IDc1 - INNOVATION IN DESIGN: DECONSTRUCTABILITY

Credit Intent

Minimize material and resource waste by including building components designed to be easily disassembled (and potentially reused) at the end of the structure's design life.

Achieving the Credit

The LEED rating system includes a series of credits designed to reward innovations in building design which have a positive environmental impact. This would be a proposed Innovation Credit that will eventually require a CaGBC (LEED's governing body) to rule on its acceptability.

How Sprung Structures Help

The design of a Sprung structure considers the entire lifespan up to and including its deconstruction. Through careful design, the components of a Sprung structure are built and assembled in a manner which will facilitate non-destructive disassembly and wherever possible, reuse of building components.

Sprung Instant Structures

May Achieve this Credit

<https://www.usgbc.org/LEED/>

Sprung Instant Structures - LEED® Credit Analysis

IDc1 - INNOVATION IN DESIGN: DURABLE BUILDING

Credit Intent

Minimize materials use and construction waste over a building's life resulting from premature failure of the building and its constituent components and assemblies.

Achieving the Credit

Engage a Building Science Professional to develop and implement a Building Durability Plan in accordance with the principles in the CSA standard - Guideline on Durability in Buildings.

How Sprung Structures Help

Durable buildings perform their required functions over a period of time without unforeseen costs for maintenance and repair. Considering the design service life of building components can help projects extend the useful life of their facilities and minimize costs associated with future repairs.

The components of a Sprung structure are designed to maximize their respective lifespans and minimize maintenance over the life of the structure:

- The aluminum substructure has an indefinite life expectancy and a 30 year pro-rata guarantee, while the architectural membranes (DuPont™ Tedlar® coated) have a life span up to 30 years and are pro-rata guarantee up to 20 years. Comparable membranes typically have a 5 year life.
- Outer DuPont™ Tedlar® architectural colored film blocks UV rays, is chemical and weather resistant, self-cleaning, resist dirt and is virtually maintenance free.
- The outer film does not contain any plasticizers; hence, it has good aging properties and remains tough and flexible over a broad range of temperatures.

In addition to the design features that deliver the long life expectancies and low maintenance discussed above, the architectural membrane can be replaced at the end of its lifespan allowing the structure to be renewed.

Sprung Instant Structures

**Can Offer Value Added Services
Related to this Credit**

<https://www.usgbc.org/LEED/>