

ILFI Program Analysis

ZERO CARBON VS ZERO ENERGY

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Prepared for:
Arlington County

Memorandum

To: Jessica Abralind, Arlington County
From: Philip Quebe, Cadmus
Subject: ILFI Program Analysis
Date: 4/16/2019

The following presents a comparison of ILFI’s Zero Carbon and Zero Energy certifications, detail on certification costs vs. LEED Platinum, and some additional background on embodied carbon and carbon credit treatment under the Zero Carbon certification.

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Summary

ILFI’s Zero Carbon Certification and Zero Energy Certification are similar in many respects with a few key differences:

- Zero Carbon accounts for embodied carbon (see section on embodied carbon below). Zero Energy does not.
- Zero Carbon offers more flexibility to use offsite renewables to meet requirements. Zero Energy requires onsite renewables unless you qualify for an offsite exemption, in which case the rules look very much like Zero Carbon.
- Zero Carbon has minimum energy efficiency requirements. Zero Energy does not unless you pursue an offsite exemption.
- Overall Zero Carbon is more comprehensive from a GHG perspective than Zero Energy.

Registration costs and associated fees are the same between programs. When compared with LEED, ILFI fees are significantly lower, however the overall cost of achieving certification is likely 5% to 19% higher than achieving LEED Platinum. Finally, Zero Carbon Certification is relatively new (launched in 2018) and documentation requirements are still under development. There been no Zero Carbon Certified projects to date.

Comparison Table

	Zero Carbon Certification	Zero Energy Certification	Main differences
Year Created	2018	2011	Zero Carbon is brand new, announced April of last year. No ZC case studies up on the website yet. Unclear that anyone has completed it.
Main Focus	Carbon , “recognizes the growing interest and focus on a broad-based tool for highlighting highly energy efficient buildings which are designed and operated to fully account for their carbon emissions impacts.”	Operational Energy Use , “allow projects to demonstrate zero energy performance”	Carbon vs. Site Energy
Registration Fee	ILFI Premium Membership: \$150 per year per organization Registration Fee: \$250 per project	ILFI Premium Membership: \$150 per year per organization Registration Fee: \$250 per project	None
Certification Fee	Single Family Residential: \$1250	Single Family Residential: \$1250	None

	Commercial, Institutional and Multi-family Residential: \$2000	Commercial, Institutional and Multi-family Residential: \$2000	
Standard	<ul style="list-style-type: none"> 100% of the operational energy use associated with the project must be offset by new on- or off-site renewable energy. 100% of the carbon emissions impacts associated with the construction and materials of the project must be disclosed and offset. 	<ul style="list-style-type: none"> 100% percent of the building's energy needs on a net annual basis must be supplied by on-site renewable energy. Certification is based on actual, not modeled, performance. 	Zero Carbon is more flexible on how, when, and where energy is procured, but includes <i>embodied carbon</i> of materials, which Net-Zero does not.
Covers Building Energy Use?	<p>Yes, via renewables.</p> <p>100% of the project's energy use must be offset by on- or off-site renewable energy on a net annual basis. The project must provide offsetting renewables which have the equivalent of 15 years of project power, provide additionality, and have durable ownership integrity associated with the project.</p>	<p>Yes, via renewables.</p> <p>100% of the building's energy needs on a net annual basis must be supplied by on-site renewable energy. No combustion is allowed.</p> <p>EXCEPT there are exceptions (see below)</p>	<p>Net-Zero must be <i>on-site (with many exceptions)</i>. On-site production must offset actual usage on annual basis.</p> <p>Zero Carbon can be on or off-site. Requires the purchase of 15 years' worth of power. Can purchase all 15 years upfront based on 1 measured year. Unclear how a 15-year upfront purchase works with the net-annual requirement. Potential chance for deviation between purchase and actual usage that does not exist under net-zero.</p>
Energy Use Requirements	Renewables shall meet the following criteria: 1.They shall provide additional renewables to the grid; i.e., not be existing renewables.	100% of the building's energy needs on a net annual basis must be supplied by on-site renewable energy.	High-level takeaway: If a project can build a renewable energy system

	<p>2. There shall be a durable ownership interest in the renewable production which is identifiable and assigned to the project.</p> <p>3. Renewable Energy Credits must be retained, unless allowed by Exception I06-E10 4/2015 – Government REC Sales.</p> <p>4. Acceptable forms of ownership interest in offsite renewables include (so long as they meet items 1), 2) and 3)): Outright ownership; Power purchase agreement; Community Solar; Renewable Energy Investment Fund; Other forms approved by the ILFI which are consistent with the intent of the certification. RECs are <u>not</u> an acceptable form of ownership.</p> <p>5. Directly owned renewables. Any directly owned renewables (on- or -off site) must operate during the performance period, and be metered to demonstrate output.</p> <p>6. Non-directly owned renewables. For renewables that are not directly owned, the output quantity must be contractually guaranteed by the provider. <u>The renewable output does not need to match the performance period, but the volume of the renewable electrical output at the renewables’ site shall be equal to 15 years of energy use of the project during its performance period. This volume may vary in actual term length so long as the volume is achieved; i.e. a project may purchase a 15-year contract with an annual volume equal to the energy demand of the project, or a contract with renewables equal to 15 times its annual energy use for a one-year period, or some other equivalent combination.</u></p>	<p><u>Exceptions:</u> Offsite renewable exception for buildings incapable of physically achieving net-zero if the following criteria are met:</p> <ol style="list-style-type: none"> 1. Tenant improvement projects where there is no ownership interest 2. Projects which even after the highest level of efficiency is attained are unable to offset their energy use onsite due to project density/height or inherently very high baseline EUI’s (such as a hospital or data center); or 3. Projects that are not able to provide on-site renewables due to substantial limitations of the local grid to absorb the generated energy, or jurisdiction-related limitations <p>In these cases, project may use offsite energy so long as it meets various additional criteria, including:</p> <ol style="list-style-type: none"> 1. Be located within the same regional grid; 2. Be located consistent with the sensitive sites criteria of the Limits to Growth Imperative, 3. Be located to meet the previously developed requirement of the Limits to Growth Imperative, or be installed in a way to allow continuation of ecologic or natural resource 4. Provide additionality, 5. Be physically identifiable (i.e., location and attributes known rather than a generalized power purchase) and specifically attributed or allocated to the project for a minimum of 15 years* through a recognized ownership structure such as a Power Purchase Agreement. 6. Be directly metered 7. Be clearly and visibly explained in detail at the LBC project site. <p>Projects claiming exception #2 must also:</p>	<p>onsite that is capable of providing 100% of the site’s energy needs, then Net-Zero is simple and straightforward.</p> <p>If not, then what you are likely comparing are the Net-Zero <i>exemption</i> pathways and the Zero Carbon basic requirements.</p> <p>Here is how those stack up:</p> <ul style="list-style-type: none"> • Both allow off-site ownership, PPAs and community solar. • Both require a 15-year purchase. • Both have additionality requirements. • Both have efficiency requirements <p>However, Net-Zero imposes many <i>additional requirements</i> that Zero Carbon does not, including:</p>
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		<ol style="list-style-type: none"> 1. Target and achieve a level of energy efficiency consistent with net zero energy projects of their building type and climate zone, based on ILFI approval of an energy professional's energy model for the project. 2. Provide a mechanism to reinforce the targeted level of energy efficiency. 3. Include solar photovoltaics on a minimum of 75% of the total roof area, using standard industry practice for PV installation and maintenance accessibility within that 75%. Systems shall be designed to provide a minimum TSRF of 75% and greater. <p>Projects claiming exception #3 must also:</p> <ol style="list-style-type: none"> 1. Advocate to the electrical utility to allow as much on-site generation as feasible. 1. Work with the utility in a good faith effort to investigate any identified technical, legal, financial, or policy limitations, and seek to implement all reasonable solutions. The results of the effort shall be provided in a local grid advocacy report. 2. Include the maximum renewables on-site allowed by the utility after the team's advocacy and technical work. 3. Achieve highly efficient energy use intensity based on either: <ol style="list-style-type: none"> a) A maximum energy usage calculation of net positive energy performance based on the amount of renewable generation technically feasible on site (absent utility constraints); or b) Target and achieve a level of energy efficiency consistent with net zero energy projects of their building type and climate zone, based on ILFI approval of an energy professional's energy model for the project. 	<ul style="list-style-type: none"> • Must be on same regional grid • Must meet site locations/use requirements • Must install onsite renewables on 75% of roof area OR as much as utility will allow after negotiation and advocacy <p>NOTE: Zero Carbon lists a "Renewable Energy Investment Fund" as an accepted solution. We have no data on what this actually is in practice. More research needed.</p>
Covers Building Materials?	Yes, the project must account for the total embodied carbon impact from its construction	No	Requirement unique to Zero-Carbon

	<p>and materials through a one-time carbon offset from an approved source. New projects must demonstrate a 10% reduction in the embodied carbon of the primary materials of the foundation, structure and enclosure compared to an equivalent baseline.</p>		
Embodied Carbon Requirements	<p>Project teams shall calculate the total embodied carbon emissions of the project by using an approved life-cycle assessment (LCA) tool.</p> <p>New projects must demonstrate a reduction of the embodied carbon of the primary materials utilized within the project scope, compared to an equivalent baseline. Through the process defined above, the project team must demonstrate the following:</p> <ol style="list-style-type: none"> 1. The embodied carbon emissions impact of the primary materials of the foundation, structure, and enclosure have been reduced by a minimum of 10%, compared to baseline scenario with equivalent material types, function and energy performance. 2. The total embodied carbon emissions of the project must not exceed 500 kg-CO₂e/m². <p>THEN</p> <p>One-time carbon offsets must be secured that are equivalent to the total embodied carbon emissions associated with the project scope.</p>	None	<p>Requirement unique to Zero-Carbon</p> <p>See section following table regarding Carbon Offsets</p>

	<p>Acceptable forms of carbon offsets include Certified Emission Reduction (CER) and Verified Emission Reduction (VER) carbon credits; Renewable Energy Certificates (RECs) are <u>not</u> acceptable.</p> <p><u>Carbon offsets must be certified by Green-e Climate (www.green-e.org), or an equivalent program.</u></p> <p>Carbon offsets may also be generated anywhere in the world; offsets do not have to be local, although local or community-based solutions that provide additional socioeconomic benefits are encouraged.</p>		
Has Minimum Efficiency Requirements?	Yes, over a one-year performance period (during which time the project must be occupied consistently with its stated use) , buildings must achieve a targeted energy efficiency level.	No, unless pursuing an offsite <i>exception</i> via options 2 or 3.	Requirement unique to Zero-Carbon, unless following a Net-Zero offsite exception pathway
Efficiency Requirements	28 kBtu/SF/year OR an EUI that is a 25% reduction from what would otherwise be achieved through compliance with ASHRAE 90.1-2010	N/A, unless pursuing an offsite exception via options 2 or 3. In that case, "Target and achieve a level of energy efficiency consistent with net zero energy projects of their building type and climate zone, based on ILFI approval of an energy professional's energy model for the project."	Requirement unique to Zero-Carbon, unless following a Net-Zero offsite exception pathway. Note: The Net-Zero requirement here is defined very broadly.
On site combustion allowed?	No, for new buildings.	No	None

Documentation Requirements	Requirements not yet available on website. ILFI confirmed when contacted that documentation requirements are under development.	<p>Must provide:</p> <ul style="list-style-type: none"> • General project info (name, location, floor area) • Schedule and occupancy details • Project photos • Energy performance data, including: <ul style="list-style-type: none"> ○ Copies of 12 months utility bills <ul style="list-style-type: none"> ▪ Or utility spreadsheet data with letter from utility certifying data ○ Metered data from renewable system with letter from engineer certifying data • Building design and systems details (insulation levels, window values, HVAC system details, lighting, ventilation, etc.) • Renewable system details (type, size, etc) <ul style="list-style-type: none"> ○ Drawings/schematics for system ○ Photos of system • Site plan 	
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Sources:

- Zero Energy Requirements: <https://living-future.org/net-zero/certification/#resources>
- Zero Energy Documentation Requirements: <https://living-future.org/wp-content/uploads/2018/03/ZE-Documentation-Requirements.pdf>
- Zero Energy Exceptions List: <https://living-future.org/wp-content/uploads/2018/04/Net-Zero-Energy-Offsite-Renewables-Exception.pdf>
- Zero-Carbon Requirements: <https://living-future.org/zero-carbon-certification/>
- Green-e Carbon Offset Certification Body: <https://www.green-e.org/programs/climate/documents>

- Green-e Carbon Offset Options: <https://www.green-e.org/certified-resources/carbon-offsets>

Total Cost Comparison vs. LEED

	Zero Carbon	Zero Energy	LEED Platinum
Registration Fee	<p>ILFI Premium Membership: \$150 per year per organization</p> <p>Registration Fee: \$250 per project</p>	<p>ILFI Premium Membership: \$150 per year per organization</p> <p>Registration Fee: \$250 per project</p>	<p>Registration Fee: \$1,500 (\$1,200 for members)</p>
Certification Fee	<p>Single Family Residential: \$1250</p> <p>Commercial, Institutional and Multi-family Residential: \$2000</p>	<p>Single Family Residential: \$1250</p> <p>Commercial, Institutional and Multi-family Residential: \$2000</p>	<p>Based on floor area. Minimum of \$3,420 up to \$33,000+ Appeals, expedited reviews, and signage also extra.</p>
Construction Cost Premium over LEED Platinum	<p>Unknown.</p> <p>Zero Carbon is brand new, announced April last year.</p>	<p>5% to 19% for taking an existing LEED platinum structure to net zero.</p>	<p>N/A</p>
Example Projects	<p>No case studies up on the website yet. Found press releases from 2019 listing a few folks who are trying, including: An architecture firm in Memphis and the Salesforce tower in Dublin.</p>	<p>There are 5 case studies for commercial ZE projects here: https://living-future.org/lbc/case-studies/?certs=zero-energy. No details on cost</p>	

Sources:

- Net Zero and Living Building Challenge Financial Study - <https://newbuildings.org/wp-content/uploads/2015/11/ZNECostComparisonBuildingsDC1.pdf>
- LEED Pricing - <https://www.usgbc.org/articles/leed-pricing-update-effective-december-1>

Regarding Carbon Offsets

Zero Carbon states that “acceptable forms of carbon offsets include Certified Emission Reduction (CER) and Verified Emission Reduction (VER) carbon credits; Renewable Energy Certificates (RECs) are not acceptable. Carbon offsets must be certified by Green-e Climate (www.green-e.org), or an equivalent program.”

“Carbon offsets generated under the Clean Development Mechanism (CDM) are called Certified Emissions Reductions (CERs). The CDM is one of the Flexible Mechanisms defined in the Kyoto Protocol (IPCC, 2007) that assist emissions reduction projects which generate CERs. CERs can be bought and traded by participants in mandatory compliance schemes around the world to meet their emissions targets.

Carbon offsets that are produced under a voluntary standard differ from those required by mandatory compliance schemes, and are called Verified Emissions Reductions (VERs).” Source: <https://nativeenergy.com/2017/12/certified-or-verified-carbon-offsets-which-should-you-choose/>

Green-e® Climate is a chain-of-custody certification for carbon offsets that requires project verification by Endorsed Programs (like the American Carbon Registry, the Climate Action Reserve, the Gold Standard, and the Verified Carbon Standard). Through the Green-e® Climate program, CRS takes oversight further by being the only program to monitor how offsets are transacted and advertised in the retail market, protecting both the buyer and the seller.” <https://www.green-e.org/programs/climate/endorsed-programs>

However, Green-e not longer certifies CDM. From their website:

“The CDM was an eligible Endorsed Program within Green-e® Climate between January 2008 and January 2014. However, due to a current lack of interest by carbon offset providers offering Green-e® Climate certified offsets, the Green-e® Governance Board has directed staff to defer endorsement of the CDM until sufficient commercial interest in the CDM warrants use of staff time to evaluate and monitor the CDM Program for compliance with the Green-e® Climate Standard. Accordingly, effective February 5, 2015, Green-e® Climate's endorsement of the CDM is suspended due to lack of use by program participants. The CDM must be reevaluated against the Green-e® Climate Standard in order for endorsement to be reinstated.” <https://www.green-e.org/programs/climate/endorsed-programs>

We reached out to both Green-e and ILFI for clarification. Green-e responded that they were relatively confident that ILFI was using VERs and CERs as blanket terms for all voluntary emissions reductions that are certified through Green-e Climate. ILFI said they had been unaware of the change in Green-e’s support of CDM and noted that they had accepted comparable alternatives in the past, but were working on a formal ruling on how to handle this moving forward across all ILFI programs.

Embodied Carbon

Embodied carbon is a term that captures the carbon dioxide emitted during the manufacture, transport, and construction of building materials. It sometimes also includes end of life disposal. Embodied carbon in new buildings is not insignificant. The embodied carbon of a typical building is equal to roughly the first 15 years of operational carbon. There is also a time-weighted carbon argument that says embodied carbon is worse than operational because it's released now (not later) and thus does more climate damage. There are also tradeoffs between adding more embodied carbon (example: insulation) to reduce operation carbon. Architecture 2030 has included zero embodied carbon in their 2030 challenge and it looks like the high-performance building industry is moving in that direction generally.

Sources:

- Architecture2030 embodied carbon - <https://architecture2030.org/new-buildings-embodied/>
- UN Environment & UN Global Status Report 2018 - <https://www.unenvironment.org/news-and-stories/press-release/buildings-and-construction-sector-huge-untapped-potential-emission>