



LEED Pilot Credit Library

Pilot Credit 1: Life Cycle Assessment of Building Assemblies and Materials

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Applicable Rating Systems

This credit is available for pilot testing by the following LEED project types:

- New Construction
- Healthcare (when available)

(NOTE: If teams intend to apply for LEED credit, you must [register](#) to be considered, and receive approval in order to continue. The evaluation form will be provided upon approval and is required for STEP 4.)

STEP 1: Read the Credit Language and Reference Guide below, at a minimum, before beginning. [The LCA Credit Backgrounder](#) document is also very useful; it contains information about Life Cycle Analysis (LCA), the credit's context within LEED, and the methodology used to arrive at LEED point values.

STEP 2: Use the [Athena EcoCalculator](#) to calculate and compare the environmental impacts of various material assemblies. Follow the guidance provided by the Athena Institute when using the EcoCalculator. Create Environmental Impact Estimates for your final design assembly.

STEP 3: Log on to the [USGBC LEED Credit Calculator](#). Click on the LEED LCA Credit Calculator 2009 v6 file to begin (or select from your previously saved project files). Copy the results from the Eco Calculator's Summary Table page into the LEED LCA Credit Calculator for each impact category. The LEED LCA Credit Calculator will create LCA Impact Scores and generate the LEED Credits associated with your design(s).

IMPORTANT: The credit values derived from the LEED LCA Credit Calculator are for demonstration and testing purposes only during the Pilot period. All LEED 2009 projects that participate in the piloting of a credit or prerequisite will be awarded 1 point under the Innovation and Design credit 1 or Innovation in Operations credit 1 after completing the required documentation and uploading it through the IDc1/IOc1 form in LEED Online for verification.

STEP 4: If you intend to submit for a LEED ID point, you must complete and submit the LEED Pilot credit Library Evaluation Form, issued to registered projects, as part of your required documentation for the IDc1/IOc1 form in LEED Online.



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Intent

To encourage the use of environmentally preferable building materials and assemblies.

Requirements

Part 1: LCA of Structure and Envelope Assemblies *(Proposed as 5 post-pilot base points reallocated from MR Credit 1.1, MR Credit 4, and MR Credit 5. Pilot projects will only receive 1 point total for this credit.)*

Use an USGBC approved Environmental Impact Calculator¹ to identify and calculate environmental impact estimates for generic assemblies used in the project from the following assembly groups: columns and beams, floors, exterior walls, windows, interior walls, and roofs.² Transfer those impact estimates to the USGBC Credit Calculator to produce the LCA impact score and subsequent LEED points to be awarded. This credit is currently available only to projects located in the United States or Canada, since it is based on a database that addresses these regions.

- a. Define the basic building type (high- or low-rise), geographic region, and area (square feet) of assemblies in each category.
- b. If reusing portions of assemblies in-situ within a renovation of an existing building:
 - For each assembly specified in (a), indicate how many square feet are reused from the existing superstructure.
 - For each reused assembly, indicate the percent of the assembly's component materials that have been reused. Calculate the percent by estimated cost, as if installing a completely new version of the specific assembly. This will allow the Credit Calculator to give 100% credit for reused assembly components.

The Environmental Impact Calculator will:

- Report environmental impact metrics for assemblies specified
- Adjust for the benefits of assembly reuse within existing buildings (if applicable)

The USGBC Credit Calculator will:

- Apply USGBC-defined life cycle impact category weightings to those metrics
- Compare the results to the database average and best possible assemblies
- Provide an LCA score
- Calculate the number of possible LEED points.

¹ Current approved tool is the Athena Institute's Eco-Calculator for Assemblies available at <http://www.athenasmi.org/tools/ecoCalculator/index.html>. Further explanation can be found in the LCA Credit Background Document available to pilot projects.

² Additional information on LCA and the approach and methodology used in this credit can be found in the Background Document available to pilot projects.



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Project teams *are not required* to perform LCAs on materials or assemblies, or to analyze LCA results since the Credit Calculator performs these functions based on information provided by the project team.

The credit's LCA does not include the assemblies' impacts on energy use during the building's operation phase. Accordingly, project teams should closely coordinate assembly choices with EA credit 1, Energy Optimization.

Scoring for Credit Submittals that Specify All Assembly Groups

For a submittal that specifies an assembly in each of the Credit Calculator's assembly groups, an LCA score (between 0 and 100) will be calculated by the Credit Calculator based on the equation:

$LCA\ Score = 100 * (B - S) / (B - T)$, rounded to the nearest integer, where:

"B" (benchmark) is the sum, across all assembly categories, of the area-weighted environmental impact scores for the *average (mean) of all assemblies* in each of the assembly categories (area-weighted environmental impact score = area [square footage] of the specified assembly times the environmental impact score per square foot for the average of the assemblies in that group),

"T" is the sum, across all assembly categories, of the area-weighted environmental impact scores for the *best performing assembly* in each of the assembly categories (area-weighted environmental impact score = area [square footage] of the specified assembly times the environmental impact score per square foot for the best performing assembly in that group), and

"S" is the sum, across all assembly categories, of the area-weighted environmental impact scores for the *specified assembly* in each of the assembly categories (area-weighted environmental impact score = area [square footage] of the specified assembly times the environmental impact score per square foot for the specified assembly in that group).

The LCA score is converted into LEED points as follows (*this is theoretical for pilot projects*):

- LCA score 1-14: 1 point
- LCA score 15-28: 2 points
- LCA score 29-42: 3 points
- LCA score 43-56: 4 points
- LCA score 57-70: 5 points
- LCA score 71-84: 5 points + 1 LCA innovation point for exemplary performance
- LCA score 85-100: 5 points + 2 LCA innovation points for exemplary performance



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Scoring for Credit Submittals that Specify a Partial Set of Assembly Groups

In some cases, an assembly cannot be found in the Credit Calculator because it is not in the Credit Calculator's assembly database. This might occur with a new, innovative approach or material³. If a project team cannot find an exact match for an assembly in the Credit Calculator,

the area of the unspecified assembly(ies) must be entered into the "Other/Unspecified" line. The Calculator assumes that the LCA performance of an unspecified assembly is equal to the benchmark (average) level of performance for that assembly group. Since the LCA score is based on how much better than average the building's full set of assemblies performs, choosing "Other/ Unspecified" – the average – reduces the total possible LCA score.

Part 2: Materials Not Addressed by Part 1 (LCA) *(Proposed as 2 post-pilot base point. Pilot projects will only receive 1 point total for this credit.)*

An LCA approach is only being applied to structural/ envelope assemblies at this time; LCA for additional assemblies and/ or products might be pursued in future versions of the credit. Therefore, two points (one point each reallocated from MR credits 4 and 5) are available for use within this alternative compliance path, to reflect environmental benefits of recycled and regionally manufactured finishes and other products not addressed in Part 1 of this credit.⁴

- One point is available from this portion of the credit for those projects that use non-structural, non-envelope assembly materials that meet the requirements of MR credit 4 for recycled content and, in total, constitute x% of the total value of all materials in the project. The denominator is the same as in the conventional MR credit 4.
- One point is available for those projects that use non-structural, non-envelope assembly materials that meet the requirements of MR credit 5 for regional materials and, in total, constitute x% of the total value of all materials in the project. The denominator is the same as in the conventional MR credit 5.

Projects may use the default method of calculating total costs or may tally all materials costs (the tally must include all materials, structural and non-structural, in the project).

Aside from the exceptions noted above, instructions and requirements for achieving these points are provided under MR credits 4 and 5.

³It is possible to add new assemblies to the database underlying the LCA Credit Calculator but it can be a lengthy process. Requirements and the process for proposing new assemblies are available at [insert web address].

⁴Consistent with other MR credits, Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in the calculations. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7



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Credit Submittals

General:

1. [Register for Pilot Credit\(s\) here.](#)
2. Register a username at LEEDuser.com, and participate in online forum
3. [Submit feedback survey](#); supply PDF of your survey/confirmation of completion with credit documentation

Credit Specific:

- Athena username and password
- A general statement about the project team's relative understanding of LCA and why that was or was not important in this Pilot
- A screen shot of the LEED point results page from the LCA Credit Calculator. Add username and password for access to the online data file.
- A description of the specified assembly in each of the assembly groups (columns and beams, floors, exterior walls, windows, interior walls, and roofs).
- When claiming credit for in-situ assembly reuse within an existing building, provide a summary describing the reuse.

Additional Questions

- Did the Athena and USGBC web sites function easily and intuitively?
- Does this credit replace MR Credit 1.1, MR Credit 4, and MR Credit 5?
- In what ways will participation in this Pilot influence future design decisions?
- How would you improve the LCA Pilot process and why?
- In what ways are teams likely to apply life-cycle analysis or life-cycle type thinking to project decisions beyond this Pilot?