

# LEED v4 SUBMITTAL TIPS



LEED<sup>®</sup> for Interior  
Design and Construction

# LEED for Interior Design and Construction

## PROJECT SUBMITTAL TIPS

These tips are provided from GBCI® reviewers and are based on experience with LEED® v4 project submittals. The tips are meant as a useful resource to consider during the course of preparing your submittal documentation. As presented, this list is not exhaustive in nature and projects are responsible for being familiar with, and adhering to, all applicable LEED documents published prior to the project’s registration date.

These tips, which are also available in the [LEED Credit Library](#), will be updated periodically.

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## GENERAL SUBMITTAL

Once your application is prepared and you have uploaded your completed materials to LEED Online, make sure to perform a rigorous quality check of your entire application before submitting for review. It's suggested that you open each form and check that you have included all required information. Then open each additional file to verify that you have submitted the correct document and that they are logically named. Cross-check credits and prerequisites to make sure that you have reported common data points, such as gross square footage, occupancy, and total materials cost consistently. Here are some characteristics common among high quality submissions:

- Relevant prerequisite/credit information is clearly highlighted within the submission.
- File attachments are clearly and intuitively labeled.
- The required documentation is submitted, but no more. If only a few pages of a large report are needed to provide the required credit information, highlight or provide the relevant sections only.
- Concise narratives are included to describe project-specific circumstances (these are really helpful for the GBCI reviewer).

## PROJECT INFORMATION

- Be sure that the project scope is indicated in the floor plans provided, and that the project title clearly reflects the portion of the building/space seeking LEED-CI certification. Find Minimum Program Requirement: Must Use Reasonable LEED Boundaries [here](#).

## INTEGRATIVE PROCESS

- The worksheet must be complete and reflect the site selection analysis performed during the discovery phase.

## LOCATION AND TRANSPORTATION

### LT Credit: LEED for Neighborhood Development Location

- Make sure to indicate the associated LEED ND project name, ID, rating system version, certification level, and certification date.
- Highlight both the LEED project boundary and the LEED ND project boundary in an uploaded map to confirm a compliant location.
- Ensure that an eligible LEED ND certification has been achieved at the project location.
- Remember not to attempt other Location and Transportation credits if pursuing this credit.

# LT Credit: Surrounding Density and Diverse Uses

## ► Option 1: Surrounding Density

- The required vicinity map must clearly label the project boundary, the density offset (which includes surrounding land one-quarter mile (400 meters) from the project boundary) and the location of existing residential and non-residential buildings. Note that the area of surrounding density is NOT measured as a circular radius from the project's geographic center.
- Ensure that all buildable land within one-quarter mile from the project boundary (the density offset) is included within the denominator of the density calculations, less noted exceptions.
- The density claimed toward compliance must be existing, rather than zoned.

## ► Option 2: Diverse Uses

- Ensure that all contributing diverse uses are existing and available to the public. For any uses where public availability may not be clear to reviewers (e.g. fitness or library facilities within a campus), provide a narrative to confirm compliance.
- To be eligible, uses that are planned but not currently operating must be occupied within one year of the date of the LEED project's initial certificate of occupancy.
- Measure walking distances along infrastructure that is safe and comfortable for pedestrians, including sidewalks, all-weather-surface footpaths, crosswalks, or equivalent pedestrian facilities.
- Ensure that the counted uses represent at least three of the five categories listed in Appendix 1, Use Types and Categories, exclusive of the project building's primary use.
- A use may be counted as only one type. For example, a supermarket that also contains a pharmacy may contribute only once as either a supermarket use type or a pharmacy use type, at the project team's discretion.
- No more than two uses in each use type may be counted. For example, if five restaurants are within walking distance, only two may be counted.
- Remember that uses without a stationary postal address (e.g. mobile food vendors), automobile-oriented services (e.g. gas stations, repair shops) and automated facilities (e.g. ATMs, vending machines, touchscreens) do not contribute.

# LT Credit: Access to Quality Transit

- Measure walking distances along infrastructure that is safe and comfortable for pedestrians, including sidewalks, all-weather-surface footpaths, crosswalks, or equivalent pedestrian facilities.
- Keep in mind that only transit that provides regular service in both directions along a set route (paired route service) can contribute. Note that private shuttles can't be used to comply with the credit requirements.
- Ensure that the documentation confirms the transit frequency for each contributing service type. If formal, published frequencies are not available, supplemental information confirming how the frequencies were determined is acceptable.

- Ensure that contributing stops are totaled correctly. For each qualifying transit route, only trips in one direction are counted toward the threshold. If a qualifying transit route has multiple stops within the required walking distance, only trips from one stop are counted. Note that weekend trips are not included in the calculations for LEED BD+C: Schools projects.
- Future transit stops may be counted if they are sited, funded, and under construction by the date of the certificate of occupancy and are completed within 24 months of that date.

## LT Credit: Bicycle Facilities

### ► Case 1. Commercial or Institutional Projects

- Ensure that project occupancy is reported consistently throughout all documentation. If a portion of the building population is excluded from the calculations for this credit (e.g. hospital patients, young children), verify the number excluded and the reason for exclusion.
- Note that the minimum quantity of bicycle storage facilities must be met for both long and short term occupants.
- Note that shower requirements are measured up to the next occupancy threshold (e.g. LEED-NC projects must provide one shower for up to 100 occupants, two for up to 250, three for up to 400, etc.)
- Ensure that the documentation shows that the long-term bicycle storage is covered to protect bicycles from exposure to the elements. Short-term storage may be covered or exposed.
- Bicycle storage facilities must be within 100 feet (30 meters) of the building entrance (main entrance for short-term, any functional entrance for long-term) even if they are inside the building or outside the LEED Project Boundary.
- Bicycle storage and shower facilities outside the LEED Project Boundary that are shared with other users must be sized to meet the needs of all possible users. Alternatively, facilities may be reserved for LEED project users.
- Shower facilities outside the LEED Project Boundary must be fully accessible to project occupants. For example, showers provided within the base building for LEED-CI occupants must be available during all project operating hours.
- Qualifying diverse uses accessible by the bicycle network are the same as in LTc Surrounding Density and Diverse Uses. Qualifying public transit accessible by the bicycle network are the same as in LTc Access to Quality Transit. Employment centers are defined as a nonresidential area of at least five acres with a job density of at least 50 employees per net acre.
- Retail projects must provide documentation of bicycle maintenance or route planning assistance programs.
- Bicycle maintenance assistance must be available to employees and route planning assistance must be available to both employees and customers.

### ► Case 2. Residential Projects

### ► Case 3. Mixed-Use Projects

- For mixed-use projects, the requirements must be met independently for each space type in the building.

## LT Credit: Reduced Parking Footprint

- ▶ **Case 1. Baseline location, Parking Provided**
- ▶ **Case 1. Baseline location, No Parking Provided**
- ▶ **Case 2. Dense and/or Transit-Served Location, Parking Provided**
- ▶ **Case 2. Dense and/or Transit-Served Location, No Parking Provided**
  - Ensure that the total parking capacity includes all the off-street spaces available to the project building's users. If parking is shared with other buildings, located outside the LEED Project Boundary, or otherwise not clearly dedicated to the project building, it is strongly recommended that a brief narrative clarifying how the total capacity was determined be provided.
  - Signage or pavement markings reserving the preferred parking spaces for carpool vehicles must be clear and permanently installed.
  - If the parking area is subdivided for different kinds of building users (e.g. customers and employees, staff and students, ranking military officials), preferred parking spaces may be distributed proportionally across each parking area. Alternatively, one general preferred parking area with enough spaces for all user types (based on total parking capacity) may be provided.
  - If a project has multiple main entrances or entrances for different groups, preferred spaces should be distributed.
  - Be sure to select the appropriate project category to calculate the base ratio. For mixed-use projects with multiple space types, calculate and separately track the base ratio for each use.
  - Be sure to select the appropriate project category to calculate the base ratio. If the appropriate category cannot be found within the table, or a tenant has not yet been selected for an incomplete space, select the best approximation and provide a narrative supporting that option.
  - Projects that are not adding new parking must demonstrate that the existing parking meets the base ratio reduction requirements. The "No New Parking" option available in LEED v2009 is no longer available in LEED v4.

## WATER EFFICIENCY

### WE Prerequisite: Indoor Water Use Reduction

- LEED ID+C projects with no fixtures, appliances, or process water within the tenant space are exempt from this prerequisite.
- Ensure that manufacturer documentation/cut sheets confirm the fixture model and flush or flow rates of the installed fixtures.
- Ensure that all newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling are WaterSense labeled (or a local equivalent for projects outside the U.S.). Note that the WaterSense label requirement does not apply to fixtures unlabeled by WaterSense when the LEED v4 rating system was published, including flushometer toilets, waterless urinals, composting toilets, kitchen sinks, and public lavatories.

- Ensure that all fixtures within the LEED project scope (existing and new) are included in the documentation.
- Ensure that manufacturer documentation/cut sheets confirm that the appliances and process water comply with the requirements.
- Although the CEE Commercial clothes washer specification has been suspended since 2013, LEED v4 projects must still demonstrate compliance with the [CEE Tier 3A commercial clothes washer criteria](#) (MEF of 1.80, WF of 7.5) that was in effect at the time the LEED v4 rating system was published.
- LEED v4 projects may still choose a washer from the [qualifying product list](#), if available. Alternatively, project teams may demonstrate compliance with the CEE Tier 3A commercial clothes washer criteria (MEF of 1.80, WF of 7.5). Note that commercial clothes washers that comply with the current ENERGY STAR specification (v7.1) meet the CEE Tier 3A criteria.
- Ensure that all appliances and process water within the LEED project scope are included in the documentation.
- Ensure that occupancy is consistent throughout the submittal and that the water use calculations use daily average occupancy values.
- Ensure that the default gender ratio of 1:1 male to female is used. Refer to the Further Explanation, Gender Ratio section of the LEED BD+C and ID+C v4 Reference Guides for information regarding acceptable special gender circumstances.
- Make sure to use the most up-to-date version of the Indoor Water Use Calculator.
- For projects that do not include urinals in every male (or unisex) restroom, ensure that the percent of males expected to use restrooms with urinals in the Indoor Water Use Calculator is revised to reflect the anticipated usage.
- Ensure that the default uses outlined in the LEED ID+C v4 Reference Guide are used in the calculations and that all occupants (100%) are included in the calculator for each fixture type.
- Use the default uses outlined in the LEED ID+C v4 Reference Guide unless there are special circumstances to justify modifications. If project-specific conditions exist to justify different usage rates, provide a narrative and documentation/calculations to justify any special circumstances. Ensure that fixtures are not double-counted in the calculations (i.e. listed multiple times in the Indoor Water Use Reduction calculator as being used by 100% of occupants).
- Ensure that the flow rate listed in the calculator is consistent with the manufacturer data. If aerators are used, ensure that the cut sheet for the aerator model that is compatible with the specified faucet is provided.
- Ensure that the flush rate listed in the calculator is consistent with the manufacturer data.
- Ensure that the calculations use the default durations outlined in the LEED reference guide. Please note that preset, shorter durations specified by a manufacturer may not be used for LEED calculation purposes since these duration settings may not reflect typical usage patterns, given the variability in occupant behavior. Projects can still use metering or autocontrol faucets with any preset, shorter duration. If there are special circumstances to justify modifications, clearly explain the special circumstances and provide the published data/studies justifying an alternate usage duration.

- Ensure that metering faucets are listed in the calculation using the flow rate in gallons per minute (gpm) or liters per minute (lpm) instead of gallons or liters per cycle. Duration-based savings from autocontrol faucets are no longer allowed in LEED v4.
- “Private” is defined as fixtures in residences, hotel or motel guest rooms, and private rooms in hospitals. Fixtures used by residential occupants and fixtures used by residential-type occupants who use the building for sleeping accommodations fall into the private classification. Resident bathrooms in dormitories, patient bathrooms in hospital and nursing homes, and prisoner bathrooms are considered private use. All other applications are deemed to be public.
- Ensure that private (residential) flow fixtures are selected for any fixture groups that include residential occupants. Residents include hospital inpatients, nursing home residents, apartment or dormitory residents, hotel/motel guests, prisoners, and any other people who use the building for sleeping accommodations. Ensure that public lavatories and non-residential flow fixtures (kitchen sink and shower) are also selected for any fixture groups that include non-residential occupants (FTE, Visitors, Retail Customers, Students).
- Ensure that the design case flow rate used in the water use calculations reflects the same rated pressure as the baseline case rated pressure stated in the rating system. Supply water pressure varies throughout the world, and the underlying assumptions must remain consistent between the baseline and design cases.
- For non-Core and Shell projects with incomplete spaces, ensure that all anticipated plumbing fixtures and occupants, including the future occupants and fixtures within the incomplete spaces, have been included in the water use calculations. Future tenant installed fixtures must be included in the calculations as neutral unless supported by a legally binding tenant sales or lease agreement.

## WE Credit: Indoor Water Use Reduction

- Remember that projects following the Prescriptive Achievement path in the prerequisite are not eligible for the credit.
- The credit calculations must include fixtures and fittings necessary to meet the needs of the occupants. Some of these fittings and fixtures may be outside the tenant space (for Commercial Interiors) or project boundary (for New Construction).
- The related prerequisite must be earned in order for the credit to be earned.
- If applying alternative water in the credit, provide alternative water system design drawings, a narrative describing the alternative source, and calculations confirming the alternative water quantity. Include climate data and storage size/use calculations.
- Retail, Hospitality, Healthcare, and Schools projects can earn additional credit for meeting the appliance and process water requirements of any one table. Schools, Retail, and Healthcare projects can earn a second point for meeting the requirements of two tables.

# ENERGY AND ATMOSPHERE

## EA Prerequisite: Fundamental Commissioning and Verification

- Ensure the Commissioning authority experience has been provided.
- Ensure that all required commissioning activities are complete.
- Ensure all energy related systems (mechanical, electrical, plumbing, and renewable energy systems and assemblies), including base building systems that are modified or relocated as a part of the tenant fit-out, have been included in the commissioning scope.
- Ensure the Current Facilities Requirements (CFR) and Operations and Maintenance (O+M) Plan table of contents has been uploaded.
- Ensure that the Current Facilities Requirements (CFR) and Operations and Maintenance (O+M) Plan all of the following required elements: a sequence of operations for the building; the building occupancy schedule; equipment run-time schedules; setpoints for all HVAC equipment; set lighting levels throughout the building; minimum outside air requirements; any changes in schedules or setpoints for different seasons, days of the week, and times of day; a systems narrative describing the mechanical and electrical systems and equipment; a preventive maintenance plan for building equipment described in the systems narrative; and a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities.
- Ensure the Commissioning plan table of contents has been provided and it includes a program overview and information on the commissioning team and process activities.
- Ensure at least one complete functional performance test for each of the applicable systems has been provided. Refer to the functional performance test section of the Further Explanation section of the LEED reference guide for details pertaining to expected test elements.
- Ensure the commissioning report executive summary has been provided and it includes a list of systems commissioned and by whom, a summary of issues corrected, and a list of major outstanding/unresolved issues.
- Ensure the commissioning authority (CxA) was engaged with the project during design development.

## EA Prerequisite: Minimum Energy Performance

### ► Option 1. Whole Building Energy Simulation

- Ensure that the total building area is reported consistently throughout the LEED submittal.
- Remember to set an energy goal for the project early in the design process, as required to earn points under EAc Optimize Energy Performance. Consider using ENERGY STAR's Target Finder to develop the energy use intensity (EUI) goal. Ensure the target is established as kBtu per square foot-year (kW per square meter-year) of source energy use.
- If using an energy model to demonstrate compliance, ensure that the Target Finder results (where applicable) are uploaded and are within 10% of the energy modeling results, or a supplemental narrative is provided to justify the discrepancy.

► **Option 1. Whole Building Energy Simulation (Envelope)**

- Ensure that the proposed case U-value descriptions within the Minimum Energy Performance Calculator are complete, describing both insulation within framed wall elements and continuous insulation where applicable (e.g. steel-framed R-13, U-0.124).
- Be sure that the U-factors modeled in the Proposed Case building are consistent with ASHRAE 90.1-2010 Appendix A.
- Remember that Baseline Case U-factors for unrenovated exterior wall, roof, and floor/slab constructions are consistent with the appropriate Table in Chapter 5 (Table 5.5-XX, where XX corresponds with the project's climate zone).
- Ensure that the Baseline Case slab-on-grade floors are modeled with the F-factor for unheated slabs consistent with Table G3.1.5 (Baseline) (b).
- Be sure that the Proposed Case roof solar reflectance and thermal emittance is modeled in accordance with Section 5.5.3.1.1(a) or 0.3/0.9 per Table G3.1#5(c).
- Ensure that the Baseline Case vertical fenestration is modeled using the SHGC values from Table 5.5-XX, where XX corresponds with the project's climate zone.
- Ensure that the Proposed Case window framed assembly U-values reported in the Minimum Energy Performance Calculator account for the impact of the window frames, and the calculator describes the method by which the U-factors were determined.
- Ensure the Baseline building results for all four cardinal orientations are reported within the Minimum Energy Performance Calculator as required by Table G3.1.5 (baseline) (a), or describe within the calculator how one of the exceptions to the rotation requirement is applicable.
- Ensure that the Proposed Case does not model credit for manually blinds or shades. Permanent shading devices shall be modeled within the Proposed Case.

► **Option 1. Whole Building Energy Simulation (Interior Lighting)**

- Ensure that the interior lighting calculations within the Minimum Energy Performance Calculator are complete and utilize either the Building Area Method or the Space-by-Space Method. The Baseline building design is to utilize the same method as used by the Proposed Case.
- If utilizing the Space-by-Space lighting power calculations within the Minimum Energy Performance Calculator, ensure that the lighting power density per space function as well as the overall weighted average lighting power density for both the Baseline and Proposed Case.
- Since interior lighting power in dwelling units is not regulated by ASHRAE 90.1-2010, ensure the Baseline and Proposed Case are modeled identically unless savings are justified via the exceptional calculation method. Note that the Energy Star Multifamily High Rise Program Simulation Guidelines (Version 1.0, Revision 02, September 2013) are an acceptable methodology for documenting savings for space lighting within the dwelling units.
- Ensure that either the Building Area Method and the Space-by-Space Method is utilized for the entirety of the space.
- Ensure that no additional lighting power is modeled within the Baseline Case beyond the standard calculated allowance, unless this additional lighting power meets the requirements of Section 9.6.2 of ASHRAE 90.1-2010, and has been documented within the Minimum Energy Performance Calculator.

- Be sure that the Baseline and Proposed case lighting equivalent full load hours (determined by dividing the total annual fan consumption by the input total fan power) are reasonable given mandatory controls from Section 9 of ASHRAE 90.1-2010, and the anticipated schedule of operation for the building.
- Ensure that credit is not taken where occupancy sensors are required in accordance with Section 9.4.1.1 and indicate where occupancy sensor controls are modeled for credit (if any) within the Minimum Energy Performance Calculator, verifying that this credit aligns with ASHRAE 90.1-2010 Table G3.2 and is only applied to fixtures controlled by occupant sensors.
- If daylighting controls are included within the Proposed design, ensure a narrative is provided within the Minimum Energy Performance Calculator, describing the controls and how they are implemented to conform to Table G3.1.6 (proposed) (f).
- Ensure that the lighting demand reflected in the model outputs (and reported in the Performance Outputs tab of the Minimum Energy Performance Calculator) does not exceed the Baseline lighting power allowance reported within the Lighting tab of the calculator.

► **Option 1. Whole Building Energy Simulation (HVAC)**

- Confirm that the Baseline system was modeled consistent with the system mapping from Table G.3.1.1.A of ASHRAE 90.1-2010. The system selection must be based on the base building type, size, and heat source and not only the LEED project space.
- Ensure that Secondary HVAC systems ARE NOT specified in the Baseline building unless exception(s) to G3.1.1 of ASHRAE 90.1-2010 are applicable.
- Ensure that Secondary HVAC systems ARE specified in the Baseline building when exception(s) to G3.1.1 of ASHRAE 90.1-2010 are applicable.
- Ensure that thermal zoning has been modeled the same in the Baseline and Proposed Cases as required by Table G3.1.7 of ASHRAE 90.1-2010.
- Ensure that the HVAC Modeling Requirements tables at the bottom of the Minimum Energy Performance Calculator General HVAC tab are completed.
- Where no cooling system exists or no cooling system has been designed for a conditioned space, ensure a cooling system is modeled identical to that of the Baseline building design per Table G3.1.10(proposed)(d) of ASHRAE 90.1-2010.
- Ensure that there is no electric heating energy consumption end-use reported for Baseline system types 1, 3, 5, and 7. For System type 3, there should be no crankcase heating or electric space heaters modeled, and for System types 1,5, and 7, the hot water boiler must be modeled as a natural draft boiler and there should be no electric space heaters
- If the Proposed design includes heating only systems for the space types noted in exception (e) to G3.1.1 of ASHRAE 90.1-2010, ensure that the Baseline case includes System type 9 or 10 (based on the heating source). Note that if the project is served by a District Energy System and is following Option 1, Path 1 (ASHRAE 90.1-2010), the heating source in the Baseline case must be the same as the Proposed case, and a single zone constant volume air handler with purchased hot water (or steam) heating should be modeled.
- Ensure that HVAC pumping energy consumption is not modeled for Baseline system types 2, 3, 4, and 6.

- Ensure that the reported unitary cooling and heating efficiencies are entered into the model at ARI-rated conditions and that the part-load performance curves appropriately reflect the part-load performance of the installed equipment at the temperature range that the equipment is anticipated to operate at.
- Ensure that the Baseline Case fan power was modeled in accordance with Section G3.1.2.10 of ASHRAE 90.1-2010.
- Be sure that all Proposed Case fan part-load efficiency curves for variable volume fans have been modeled identically to the Baseline Case curves for variable volume fans, or provide details (bottom of General HVAC tab within the Minimum Energy Performance Calculator) confirming that the Proposed curves are representative of the actual design.
- Ensure that pressure drop adjustments for Baseline Case systems are calculated consistently with the methodology prescribed within the Air-Side HVAC tab of the Minimum Energy Performance Calculator, the pressure adjustments are only claimed for elements that are reflected within the as-designed building, and the adjustment calculation only accounts for the air flow rate through each applicable device.
- Ensure the Baseline equipment capacities (i.e. system coil capacities) were based on sizing runs and oversized by 25% for heating and 15% for cooling.
- Be sure that all HVAC system parameters (e.g. fan volumes, fan powers, efficiencies, heating/cooling capacities, etc.) are consistent with the design documents.
- Ensure that where efficiency ratings, such as EER and COP, include fan energy, the descriptor shall be broken down into its components so that supply fan energy can be modeled separately. While most energy simulation software programs have the capability to perform this step automatically, projects may optionally apply to addendum bl to ASHRAE 90.1-2010 for an alternative methodology.
- Ensure that the Baseline case has been modeled with the same number of thermal blocks as the Proposed case and that each Baseline case thermal block is modeled with a separate packaged single zone system (where applicable for Systems Types 1-4).
- Ensure the Baseline model reflects the specified temperature reset controls for chilled water, hot water, condenser water, and supply air per Sections G3.1.3.9, G3.1.3.4, G3.1.3.11, and G3.1.3.12 respectively of ASHRAE 90.1-2010.
- Ensure the Baseline hot water loop is modeled with variable primary flow (two way valves) with variable speed drives (or constant speed pump riding the curve for systems serving less than 120,000 sf) in accordance with G3.1.3.5 and operating between 180F and 130F as required by G3.1.3.3. Additionally, verify that the pump power complies with the requirements of section G3.1.3.5 (19 W/gpm).
- Ensure that the baseline chilled water loop is modeled with constant primary / variable secondary flow, with the number of primary pumps matching the number of chillers, and with variable speed secondary pumps as required by G3.1.3.10, and operating between 44F and 56F as required by G3.1.3.9.
- Ensure that the 22 W/gpm Baseline Case chilled water pump power is representative of the total pump power, and not applied individually to both the primary and secondary pumps separately. Refer to LEED interpretation 10299.

- Confirm that the Baseline condenser water loop is modeled with separate condenser water pumps interlocked to operate with the associated chiller as required by G3.1.3.11, the condenser water loop setpoint is 85F or 10F approach to design wet-bulb temperature, whichever is lower, and the pump power complies with the requirements of section G3.1.3.11 (19 W/gpm).
- When the minimum outdoor air intake flow in the Proposed Case is significantly greater than the amount required by the rating authority (GBCI - ASHRAE 62.1-2010 Ventilation Rate Procedure) or building official, ensure that the baseline is modeled per Section G3.1.2.6 exception c, and the Baseline minimum outdoor air intake flow is modeled as the greater of the outdoor airflow rate required by the rating authority or the building official, and will be less than the Proposed Case.
- Ensure that outside air is modeled with zero flow in both the Baseline and Proposed Case during unoccupied periods when fans are cycled on to meet unoccupied setback temperatures.
- Ensure that exhaust air energy recovery is modeled in the Baseline case per Section 6.5.6.1 and G3.1.2.11 of ASHRAE 90.1-2010.
- Be sure that Demand Controlled Ventilation (DCV) is modeled within the Baseline Case where required by Section 6.4.3.9 of ASHRAE 90.1-2010.
- Ensure that the minimum volume setpoints for VAV reheat terminals are modeled at 30% of zone peak air flow, unless this reduces the outside air rate below the minimum value.
- Ensure that all baseline heat pumps modeled with electric auxiliary heat only energized below 40°F (4°C) and as the last thermostat stage per G3.1.3.1 (compressor still enabled below 40°F (4°C)).
- Ensure that the Baseline and Proposed case fan equivalent full load hours (determined by dividing the total annual fan consumption by the input total fan power) are reasonable given the system type modeled and the anticipated schedule of operation for the building.
- Ensure that the fan demand reflected in the model outputs (and reported in the Performance Outputs tab of the Minimum Energy Performance Calculator) does not exceed the Baseline fan power allowance reported within the Air-Side HVAC tab of the calculator.

► **Option 1. Whole Building Energy Simulation (Service Water Heating)**

- If energy savings are claimed for service water heating, ensure the inputs within the Service Water Heating tab of the Minimum Energy Performance Calculator justify the savings through efficiency improvements or flow reduction.
- Ensure that the service water heating fuel source used in the Baseline building is consistent with that utilized in the Proposed Case, per Table G3.1.11.
- Ensure that the service water heating inputs of the Minimum Energy Performance Calculator are complete.
- Be sure that service hot water systems are included within the energy models if utilized within the building, or if these systems are expected to be utilized by future tenants of the building.

► **Option 1. Whole Building Energy Simulation (Process Energy)**

- Ensure that unregulated loads are modeled accurately to reflect the actual expected energy consumption of the building, and are not arbitrarily set to 25% of the Baseline building cost.

- Ensure the Proposed and Baseline Case models reflect the actual unregulated inputs (such as receptacle loads, kitchen loads, elevator loads, refrigeration equipment, etc.) in the appropriate spaces, and that these loads are described within the Process Loads tab of the Minimum Energy Performance Calculation.
- Nonregulated energy loads (e.g., manufacturing process loads) must be modeled identically within the Proposed and Baseline Case models unless savings for these items are justified via the exceptional calculation method. A narrative describing all baseline and proposed assumptions, the calculation methodology used to determine the savings, and a document verifying that the efficiency measure is not conventional practice (refer to the Further Explanation section of the LEED ID+C v4 Reference Guide for additional details).

► **Option 1. Whole Building Energy Simulation (Simulation Outputs)**

- Ensure that the savings for all energy end-uses are justified given the energy inputs reported in the Minimum Energy Performance Calculator. As is requested within the Performance\_ Outputs tab of the calculator, a narrative to justify the savings of the three largest end use contributors to the cost savings is required. This narrative is expected to identify the energy conservation measures which contribute to the savings claimed.
- Ensure the number of unmet load hours for all models does not exceed 300 hours per ASHRAE 90.1-2010 Section G3.1.2.3, or, alternatively, provide sufficient justification (describing the source of the unmet load hours) that the accuracy of the simulation is not significantly compromised.

► **Option 2. Prescriptive Compliance Path**

- Check that the project has a minimum lighting power reduction of 5% and has installed a minimum of 50% ENERGY STAR equipment and appliances.
- Ensure that the lighting power calculations reflect the designed/installed lighting power and include the total luminaire wattage, such as power for ballasts, where applicable.
- Check that the area in the lighting power calculations reflects the complete LEED-CI project space and that the area is reported consistently throughout the LEED submittals.
- If using additional lighting power allowance in accordance with ASHRAE 90.1-2010 Section 9.6.2, ensure that the lighting associated with the allowance is automatically controlled, separately from the general lighting, and to be turned off during nonbusiness hours.
- Ensure that track lighting power has been calculated in accordance with ASHRAE 90.1-2010 Section 9.1.4 c and d, as applicable.
- Check that task lighting that does not meet Exception p to ASHRAE 90.1-2010 Section 9.2.2.3, is included in the installed lighting power.
- If using the space-by-space method to calculate the lighting power allowance, ensure all space types in the project are accounted for with the appropriate LPD.
- Review the ENERGY STAR equipment and appliances to ensure that all eligible items are included e.g., UPS, servers, routers, vending machines, water coolers, and commercial kitchen equipment). Note that the eligibility requirements are listed in the Program Requirements for each item under the [Scope section](#).

- Projects outside the U.S. may install products that are not labeled under the ENERGY STAR program if they meet the ENERGY STAR product specifications, available on the ENERGY STAR website. All products must meet the standards of the current version of ENERGY STAR as of the date of their purchase.

## EA Prerequisite: Fundamental Refrigerant Management

- Ensure that the project, including district energy systems (DES) serving the project, utilize equipment that is chlorofluorocarbon (CFC) free. If reusing existing HVAC&R equipment on-site, ensure a comprehensive CFC phase-out conversion is completed before the project substantial completion. For projects served by DES that contain CFC equipment, ensure a phase out plan is in place with a firm timeline of five years from substantial completion of the LEED project.
- Ensure that the project utilizes equipment that is chlorofluorocarbon (CFC) free. If reusing existing HVAC&R equipment on-site, ensure a comprehensive CFC phase-out conversion is completed before the project substantial completion. Projects are not required to address CFCs contained in base building or upstream district energy systems (DES) equipment for this prerequisite; rather, only CFC-based HVAC&R equipment currently serving the ID+C space and within the purview of the project.

## EA Credit: Enhanced Commissioning

### ► Option 1. Path 1/2

- Ensure that the commissioning documentation submitted for this credit as well as that submitted within EAp Fundamental Commissioning and Verification (i.e., commissioning plan table of contents, commissioning report summary) consistently communicate that all requirements of EAc Enhanced Commissioning are complete.
- Be sure that the On-going Commissioning Plan addresses all required elements as indicated within the Step-by-Step guidance of the LEED ID+C Reference Guide.
- Ensure that a single CxA leads, reviews and oversees the Cx process for all systems, including both Fundamental and Enhanced commissioning activities if Enhanced Commissioning is pursued.

### ► Option 2. Envelope Commissioning

- Be sure that the On-going Commissioning Plan addresses all required elements as indicated within the Step-by-Step guidance of the LEED ID+C Reference Guide.

## EA Credit: Optimize Energy Performance

- If using Option 1 to pursue points in EAc Optimize Energy Performance, ensure the project analyzes efficiency measures during the design process and accounts for the results in design decision making.

- If using the ASHRAE 50% Advanced Energy Design Guides (AEDG) prescriptive path for building envelope and/or HVAC systems, ensure the AEDG is selected based on the base building and the scope of the guide selected is applicable.
- If pursuing Appropriate Zoning and Controls, verify that all interior private offices and interior non-densely occupied specialty occupancy spaces have been provided with a separate thermal control.
- If pursuing Appropriate Zoning and Controls, verify that perimeter private offices and all densely occupied specialty occupancy spaces have been provided with active controls that are capable of sensing space use and modulating the HVAC system in response to space demand, such as demand controlled ventilation or occupancy responsive HVAC controls.
- If pursuing Daylighting Controls, ensure that daylight-responsive controls are installed in all regularly occupied daylit spaces within 15 feet (4.5 meters) of windows and under skylights for at least 25% of the connected lighting load. Verify that the daylight controls switch or dim electric lights in response to daylight illumination in the space.
- If pursuing Occupancy Sensor Lighting Controls, ensure that at least 75% of the connected lighting load is controlled by the sensors, and that night lighting or emergency lighting that is unswitched is not included in the calculation.

## EA Credit: Advanced Energy Metering

- Ensure that the energy source coming from base building plant (with the exception of service hot water) is metered.
- Ensure energy usage of indoor FCUs, fan powered VAV terminals, and VRF indoor units exclusively serving the project is metered. Tenant-level metering is not required for air handling units or dx units serving both the project space and areas outside of the project space.
- Ensure that the applicable meters and data collection system have all the required the advanced characteristics (i.e., recording interval, ability to record consumption and demand (electrical meters), data transmission capability, data collection and storage, remote data retrieval).
- Ensure that on-site energy generating systems dedicated to the tenant space are provided with advanced metering.
- For tenant spaces served by shared Air Handling Units serving spaces outside of the project boundary, the base building must meet the LEED BD+C EAc Advanced Energy Metering credit requirements.

## EA Credit: Renewable Energy Production

- Ensure that the project building's energy rate has been appropriately entered based on the Option selected in EAp Minimum Energy Performance.
- Ensure that the anticipated annual energy costs have been appropriately determined.
- Ensure that the system description and/or energy generation calculations are consistent with the design and that all relevant system variables are submitted.

- Ensure that the contract documentation has been provided to justify third party and community owned renewable energy systems have transferred the renewable energy benefits to the project.
- If the project is served by a district energy system (DES) using renewable energy, ensure the equivalent cost has been determined based on the percentage of DES energy delivered to the building.
- Be sure that the claimed energy source is an eligible renewable energy system (i.e., photovoltaic, solar thermal, wind, biofuel (in some cases), low-impact hydroelectricity, wave and tidal energy, geothermal energy (in some cases)).
- Ensure that the system is located within the same utility service area as the facility claiming the use.
- Ensure that the renewable energy system rated capacity has been reported consistently throughout the LEED submission.

## EA Credit: Enhanced Refrigerant Management

- Note that no deviations are allowed from the default assumption that the refrigerant leakage rate (Lr) must be assumed to be 2%.
- Ensure that the default equipment life values from Table 2 of the LEED ID+C Reference Guide (for both new and existing systems), are utilized unless manufacturers' documentation is provided to substantiate alternative life values.
- If pursuing Option 1. No refrigerants or low-impact refrigerants, provide a narrative in the LEED form that confirms that only no or low-impact refrigerants are used.
- Confirm that the refrigerant impact for each HVAC&R systems has been appropriately calculated.
- If projects containing VRF systems are designed, ensure that calculations are provided for systems to demonstrate how the refrigerant charge was calculated, and is inclusive of the combination of indoor units, outdoor units, and interconnecting piping.
- Ensure that buildings with commercial refrigeration systems applying the prescription path for demonstrating credit compliance (optional for non-retail projects), that the equipment is tested for leaks according to the procedures outlined in GreenChill's Best Practices Guideline for Leak Tightness at Installation or certified through US EPA GreenChill's certification program.
- If the project is served by a district energy system (DES), ensure all upstream refrigeration equipment has been included within the calculations for this credit.

## EA Credit: Green Power and Carbon Offsets

- Ensure that a contract is provided indicating the amounts of green power, RECs, and/or carbon offsets purchased. Note that a single bulk purchase for the 5 year term is permitted.
- Ensure that the contract (or other documentation) confirms the green power, RECs, and/or carbon offsets are Green-e Energy/Climate certified products.

- Ensure that a minimum of 50% of the required energy must be provided by green power, RECS, or Carbon Offsets.
- Ensure that when a tenant-level energy simulation (Option 1) is pursued within EA Minimum Energy Performance/EA Optimize Energy Performance, that the annual energy consumption from the proposed case model is the basis of determining the required green power and carbon offset purchase.
- If the prescriptive path is pursued, ensure that the project square footage values are reported consistently across all LEED documentation.

## MATERIALS AND RESOURCES

### MR Prerequisite: Storage and Collection of Recyclables

- Even if recycling service is not available for a particular material, all required recyclable waste streams must have dedicated storage areas in anticipation of future service.
- Safe storage and collection must be provided for two or more of the following material types: batteries, mercury-containing lamps, and e-waste.
- When a recycling storage area is shared by buildings or spaces in addition to the LEED project, demonstrate that the central recycling storage space is adequately sized to accommodate all the buildings or spaces it serves.
- If unable to describe the project's dedicated recycling storage areas because a building owner manages the recycling program, providing a letter from the landlord outlining the building's recycling program is encouraged.
- If all recycling collection areas are located outside of the LEED project, a narrative confirming that they are sized appropriately to handle any recycling from the base building, as well as the recycling from the LEED project space, must be provided. Ensure that the narrative also confirms that the occupants in the LEED project have easy access to recycling collection bins so that recycling is convenient.
- Describe the waste stream audit conducted for a project in an existing location or the waste projections based on historical data for similar establishments. Ensure that the top-five recyclable waste streams are identified and the top-four waste streams for which collection and storage space will be provided are listed.

### MR Prerequisite: Construction and Demolition Waste Management Planning

- Be sure that excavated soil, land clearing debris, and alternative daily cover (ADC) are excluded from the calculations.
- Ensure that the construction waste management plan (CWMP) identifies at least five different materials for diversion and includes the anticipated percentage of total waste that the material streams represent. Include on-site diversion strategies or explain why on-site diversion strategies are not available.

- In the construction waste management plan (CWMP), make sure to address soil, land clearing debris, hazardous materials, and other materials not contributing to the diversion. Even materials that cannot be used toward credit compliance must be addressed in the CWMP.
- When materials are donated or given away, be sure that the construction waste management plan indicates how the materials will be tracked (including how much is received and information about where the materials are going).

## MR Credit: Long Term Commitment

### ► The Project is Owned by the Occupant

- Ensure that the owner letter indicates a commitment to remain in the project space for at least ten years. The letter must be on the owner's letterhead and be signed and dated by the owner. It must also state the address of the property and the effective dates of the commitment. Ownership must be effective at the time the project is submitted for review.

### ► The Project is Leased by the Occupant with a Term of No Less Than 10 years

- For tenants seeking this credit, an excerpt of the lease agreement is required; a commitment letter is insufficient. The excerpt must state the address of the property (consistent with the registration details of the project), be signed by both parties, and state the effective dates of the term. Other information may be redacted as necessary.
- Agreements for less than ten years with an option to renew do not satisfy the credit requirement.

## MR Credit: Interiors Life-Cycle Impact Reduction

### ► Option 1: Interior Reuse

- All existing nonstructural interior elements must be included in the credit calculations, such as existing and finished ceilings, flooring, interior wall partitions, doors for interior walls, non-structural exterior and party walls, and built-in case goods.
- Nonstructural roofing material and window assemblies must be excluded from the credit calculations.

### ► Option 2: Furniture Reuse

- To qualify as reused, salvaged furniture taken from the owner's previous facility or location must have been purchased at least two years before the date of project registration.
- Furniture that is leased must have been in service for at least two years before being installed in the current project.

### ► Option 3: Design for Flexibility

- Include a brief narrative outlining the flexibility strategy employed on the project.

# MR Credits for Building Product Disclosure and Optimization

## ► All Options

- Remember to upload the completed BPDO Calculator.
- Ensure that the products listed in the BPDO Calculator fall only under Construction Specifications Institute (CSI) 2012 MasterFormat Divisions 3-12, 21-28, 31 (section 31.60.00 Foundations), and 32 (sections 32.10.10 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting).
- Ensure that all Division 12 items are included in the calculation and are consistently reported in all cost-based credits.
- Be sure that there are no active elements of the MEP systems in Divisions 11 and 21-28 or special equipment included in the numerator for Option 2.

## MR Credit: Building Product Disclosure and Optimization—Environmental Product Declarations

### ► Option 1. Environmental Product Declaration

- Documentation must highlight or call-out the Manufacturer Name, Description of Material, EPD Program Operator, and EPD Type. Be sure that the EPD or EPD summary clearly indicates the impact method used (e.g. TRACI, CML).
- Be sure the EPD type entered into the calculator corresponds to the information on the supporting documentation.
- Because EPDs vary, verify that all EPDs included are a cradle-to-gate scope and highlight this information in the documentation.
- Be sure that the product EPDs comply with the relevant referenced standards and that the relevant information in them has been highlighted. The EPD must comply with ISO 14025, ISO 14040, and ISO 14044; the PCR must comply with EN 15804 or ISO 21930. Either the full EPD or an EPD summary and a link to the full Environmental Product Declaration (EPD) must be provided. If the link is separate from the summary, be sure to cross check that the same product is referenced on both.
- Note that LEED Interpretation 10425 states that a single industry-wide (generic) EPD can be used for up to 10 products listed within the industry-wide EPD, provided that each application has separately reported impacts within the EPD.

### ► Option 2. Multi-Attribute Optimization

- Ensure that structure and enclosure materials do not constitute more than 30% of the value of compliant building products.

- Note that LEED Interpretation 10415 states that in addition to the option outlined in the credit language, products that meet any of the following requirements can also contribute towards Option 2:
  - Demonstrate reduced impact with a product-specific EPD against an industry-wide generic EPD, provided the manufacturer was part of the study and the two conform to the same PCR.
  - Demonstrate reduced impact of the same product, over time, with two product-specific EPDs.

## MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials

### ► Option 1. Raw Material Source and Extraction Reporting

- Verify that the CSR Types reported on the calculator (Sourcing of Raw Materials tab, column F) for each contributing product (Third-party verified, or Manufacturer-declared) are consistent with the types of reports provided.
- Show that at least 90% of the contents of each product are from raw materials covered by a compliant report.
- Ensure that the relevant information has been highlighted on all of the sourcing disclosure reports. This includes, the extraction locations(s) of the raw material, the commitment to long-term ecologically responsible land use, the commitment to reducing environmental harms from extractions and/or manufacturing processes, and the commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.

### ► Option 2. Leadership Extraction Practices

- Verify that the actual materials cost has been used in the calculator, rather than the default materials cost.

### ► Legal Wood

- Ensure that that the Legal Wood calculator, the copy of the Pilot Credit registration confirmation email, and a copy of the Pilot Credit survey confirmation email are provided.

### ► Extended Producer Responsibility

- The manufacturer brochure for each contributing product must describe the EPR program, including contact information and proof that the product is included in the program or describing the recycling process and stating the average rate of return for the material.

### ► Bio-Based Materials

- Ensure that the products either have a Rainforest Alliance Certified™ seal (for products other than wood) and were grown on farms that meet the Sustainable Agricultural Network (SAN) Standard, or have been documented in accordance with the Alternative Compliance Path.

### ► Certified Wood

- Ensure that an invoice from each final CoC certificate holder has been provided for all FSC certified non-custom wood products.

- Be sure that each invoice includes the vendor's CoC certificate code, an itemized list of FSC-certified products and specific FSC claims, the entity being invoiced, and an indication that the delivery is intended for the LEED project.
- If there are contributing custom wood products, ensure that documentation from the woodworker (in addition to the invoice) details the FSC-certified wood materials used and includes a total cost to the end-user/project of wood materials used.
- FSC certified recycled content may not be counted as both FSC certified and recycled content. FSC 100% products must be listed as meeting the FSC criterion only, while FSC Recycled products must be listed as meeting only the post-consumer recycled content criterion. Additionally, FSC Mix products must be listed as either compliant with the FSC criterion OR one of the recycled content criterion, but not both (unless manufacturer documentation is provided confirming the minimum thresholds for both the FSC criterion and one of the recycled content criteria are met).

## MR Credit: Building Product Disclosure and Optimization – Material Ingredients

### ► Option 1. Material Ingredient Reporting

- Confirm that each material ingredient report demonstrates the chemical inventory of the product to at least 0.1% (1000 ppm).
- Note that materials defined as trade secret or intellectual property in a manufacturer's inventory may withhold the name and/or Chemical Abstract Service Registry Number (CASRN) but must disclose the role, amount and GreenScreen benchmark, as defined in GreenScreen v1.2 or globally harmonized system for the classification of chemicals. GreenScreen doesn't screen products, it screens chemical ingredients. So, along with a GreenScreen assessment, the bill of materials for the product down to 1,000 part per million must be provided for Option 1 of this credit.
- Note that Material Safety Data Sheets (MSDS) are usually not compliant, because the manufacturers are not required to go beyond 99% of the ingredients. Often, a much lower percentage of the ingredients are listed. When the MSDS confirms that the manufacturer had verified that they reported down to 1,000 parts per million, the documentation is compliant. If there are ranges – the lowest ranges must add up to 99.9%.
- Be sure that components are broken down to their ingredient level. For instance for carpet or fabrics, expect to see the dyes broken out from the material, cotton, nylon 6, etc. Nylon 6 will have its own chemical components.
- The HPD Collaborative has provided information on their [website](#) for use when assessing HPDv1 and HPD v2 documentation.
- Remember that the Declare labels must indicate that all ingredients have been evaluated and disclosed down to 1,000 ppm.

► **Option 2. Material Ingredient Optimization**

- Materials defined as trade secret or intellectual property in a manufacturer's inventory may withhold the name and/or Chemical Abstract Service Registry Number (CASRN) but must disclose the role, amount and GreenScreen benchmark, as defined in GreenScreen v1.2. GreenScreen doesn't screen products, it screens chemical ingredients. So, along with a GreenScreen assessment, the bill of materials for the product down to 100 part per million must be provided for Option 2 of this credit.

► **Option 3. Product Manufacturer Supply Chain Optimization**

## MR Credit: Construction and Waste Demolition Waste Management

► **Option 1. Waste Diversion**

- Ensure that the calculations showing the waste diverted from landfill are provided.
- Be sure that at least three material streams are documented.
- When materials have been sent to a Waste to Energy facility, be sure that the facility meets the relevant EN standards. Waste to Energy is only acceptable if there are no other diversion methods available and the project explains that reuse and recycling methods are not readily available in the project's location.
- Ensure that alternative daily cover (ADC) has not been included as diverted waste in the calculations. If using the facility average diversion rate, ensure that the documentation to support the facility average confirms that the ADC has not been included in the facility diversion rate.
- Ensure that supporting documentation for commingled waste confirms the project specific diversion rates (by material) or the average annual recycling rate for the facility. If claiming the average annual recycling rate, the facility must be regulated by a governing authority.

► **Option 2. Reduction of Total Waste Material**

- Verify that the project's gross area is consistent with the gross area used throughout the submittal.
- Be sure that materials reused on-site have not been included within the calculations for Option 2. While projects using Option 1 may include items reused on-site in the calculations, this does not apply to Option 2.

## INDOOR ENVIRONMENTAL QUALITY

### EQ Prerequisite: Minimum Indoor Air Quality Performance

- Ensure the Ventilation Rate Procedure (VRP) calculations provided are consistent with the ventilation system design (i.e., Single-Zone System calculations provided for systems truly serving single ventilation zones; 100% Outdoor Air System calculations provided for systems

that provide only outdoor air directly to the ventilation zone (and not to the return of FCU, HP, indoor VRV unit); and Multiple-one Recirculating System calculations are provided when a mixture of outdoor air and recirculated air are provided to more than one ventilation zone).

- Ensure that the worst case ventilation condition (the one that results in the highest outdoor air intake rate), is analyzed within the Ventilation Rate Procedure (VRP) calculations. For VAV systems, this means that the airflow rates to the critical zones, in the condition analyzed, are the lowest that can reasonably be expected to occur when the zone is fully occupied for the cooling condition, and the minimum primary air flow to the zone in the heating condition.
- Ensure that the appropriate value for Ez (zone air distribution effectiveness) from Table 6-2 of ASHRAE 62.1-2010 is used in the ventilation rate procedure (VRP) calculations (i.e, 0.8 for an overhead distribution system in heating mode).
- Be sure that all occupiable areas (as defined by ASHRAE 62.1-2010) are addressed by the Ventilation Rate Procedure (VRP) calculations.
- Ensure that a Demand Controlled Ventilation (DCV) strategy to reduce outdoor air intake rates below the calculated minimum level, which includes only return air duct CO<sub>2</sub> sensors in a multiple-zone VAV air handling unit system, is not implemented. CO<sub>2</sub> levels sensed in the return air duct of multiple-zone systems will measure the system average CO<sub>2</sub> concentration, and controlling to this system average will not ensure that the required ventilation rate to the critical zone(s) of the system are met. This does not comply with ASHRAE 62.1-2010. Refer to the guidelines from ASHRAE Research Project Report 1547-RP CO<sub>2</sub> Based Demand Controlled Ventilation for Multiple Zone HVAC Systems and the article “Dynamic Reset for Multiple-Zone Systems” ASHRAE Journal, March 2010, which provide strategies for dynamic reset control approaches. ASHRAE 62.1-2010 Section 6.2.7.1 describes additional considerations including a requirement that the minimum breathing zone outdoor airflow is reset no lower than the building area component ( $R_a * Area$ ) of the DCV zone (Section 6.2.7.1.2).
- Ensure that the Ventilation Rate Procedure (VRP) calculations analyze the peak simultaneous number of occupants within the area served by the ventilation system, and that the total occupancy analyzed within the calculations is not less than the peak occupancy reported elsewhere with the LEED documentation.
- Ensure that dwelling units comply with the additional residential only rating system requirements regarding appliance venting, carbon monoxide monitors installed on each floor of the unit (even in all electric units), and radon-resistant construction for high-risk areas.
- Ensure the exhaust requirements (defined as air discharged to outdoors) of ASHRAE 62.1-2010 Table 6-4 are met for ventilation zones such as residential kitchens, parking garages.
- Ensure the exhaust requirements (defined as air discharged to outdoors) of ASHRAE 62.1-2010 Table 6-4 are met for ventilation zones such as residential kitchens, parking garages.
- Indicate whether the project is located in an area where the national standard or guideline for Particulate Matter small than 2.5 micrometers (PM<sub>2.5</sub>) is exceeded, and if so, confirm that filters with minimum efficiency reporting values (MERV) of 11 are installed per Section 6.2.1.2 of ASHRAE 62.1-2010.
- Indicate whether the project is in an area where ozone exceeds the most recent three-year average, annual fourth-highest daily maximum eight-hour average ozone concentration of 0.107 ppm, and if so, confirm that the project has or will have air-cleaning devices for ozone or meets one of the exceptions per Section 6.2.1.3 of ASHRAE 62.1-2010.

- Ensure that potentially critical zones analyzed within multiple-zone Ventilation Rate Procedure (VRP) calculations are analyzed based on the individual worst case condition of the potentially critical zones, and not the average/combined/grouped performance of similar zones.
- Ensure that mechanically ventilated systems are configured with outdoor airflow monitoring devices (i.e., direct outdoor airflow monitoring devices for VAV systems AND current transducers, airflow switches, or similar monitors for constant volume systems).

## EQ Prerequisite: Environmental Tobacco Smoke Control

- Ensure that the signage text and signage graphics correspond with the selected exterior smoking policy. For instance, if the exterior smoking policy is to prohibit smoking on-site, ensure that that signage text and graphics communicate that policy.
- Ensure that permanent signage indicating the exterior smoking policy is provided within ten feet (three meters) of every building entrance.
- Ensure that the smoking policy letter addresses enforcement and implementation and includes the owner's signature.
- Note that code exemptions will only be granted for code requirements truly prohibiting a 25 foot no smoking policy. Provisions or regulations that are simply different from or less stringent than LEED will not be accepted.
- Ensure that spaces located outside of the property line and/or LEED project boundary, but still within 25 feet (7.5 meters) of a LEED project entrance, are still addressed by the exterior smoking policy of the LEED project. This includes public sidewalks and business purpose space (including, but not limited to: outdoor seating, banking kiosks, courtyards, and outdoor stadium areas).
- If there are smoking areas on terraces, patios, rooftops, and balconies, ensure that they are located 25 feet (7.5 meters), horizontally and vertically, from entries, outdoor air intakes, and operable windows.
- If the base building does not have sufficient exterior smoking signage, a request to the owner or landlord for the installation of such signage must still be made.

## EQ Credit: Enhanced Indoor Air Quality Strategies

### ► Option 1. Enhanced IAQ Strategies - Mechanically Ventilated Space(s)

- Ensure that entryway systems are installed at all regularly used exterior entrances.
- Ensure that documentation is provided that demonstrates the spaces have been designed for sufficient exhaust and separation. The documentation must include a list of spaces, exhaust rates, and a description of the separation strategy.
- Ensure that all ventilation systems that supply outdoor air to occupied spaces have filtration with a minimum rating MERV 13 (Class F7), and that supporting design documentation (e.g., mechanical schedules, specifications) confirms compliance.

► **Option 2. Additional Enhanced IAQ Strategies - Mechanically Ventilated Space(s)**

- If the Increased ventilation is pursued and Demand Controlled Ventilation is included within the system design, ensure the CO<sub>2</sub> setpoints are consistent with the expectations of providing 30% increased ventilation air to the zone. Ensure that documentation is provided that demonstrates the spaces have been designed for sufficient exhaust and separation. The documentation must include a list of spaces, exhaust rates, and a description of the separation strategy.
- Ensure that CO<sub>2</sub> sensors are installed within each densely occupied zone. Confirm that occupant density is reported consistently with the EQp Minimum IAQ Performance Calculator submitted within EQp Minimum IAQ Performance.

## EQ Credit: Low-Emitting Materials

- Ensure that the appropriate category and/or product type is selected for each material listed in the Low-Emitting Materials Calculator (Products tab).
- For the Budget Calculation Method, ensure that the assembly name provided on the Low-emitting Materials Calculator is a unique identifier for the assembly in which the product is a part (e.g. Wall Type 1A). Note that each product within an assembly will have the same assembly name. This will enable the grouping of the assembly in the calculation. If a product is included within more than one assembly, it may be listed more than once.
- Ensure that all of the flooring, ceiling, wall, thermal, and acoustic insulation assemblies used on the project have been included in the Low-Emitting Materials Calculator. To ensure that all installed products are listed, cross check the project specifications, Calculator, and general project documents (floor and ceiling plans, elevations, connection details, photographs, etc.). Each assembly should have several components listed.
- Confirm that the descriptions of materials in the Low-Emitting Materials Calculator (Products tab) match the manufacturers' naming conventions of the products or materials.
- Ensure that manufacturer or testing documentation demonstrates that the applicable sustainable criteria are met for each product.
- For projects outside of the U.S. including products tested using AgBB or ISO methods, ensure that manufacturer documentation demonstrates that the products meet the French VOC emissions class labeling of A+ or do not exceed a formaldehyde limit of 10 µg/m<sup>3</sup> at 28 days.
- Ensure that the general emissions evaluation reports state the exposure scenario used to determine compliance and the measurement of TVOCs.
- Ensure that the VOC content documentation states that testing follows the test method specified in the applicable regulation and that this information is highlighted.
- For wet-applied products in the VOC content section of the Low-Emitting Materials Calculator, ensure that the volume used has been included for every wet-applied product (unless 100% of the products are compliant). Alternatively, the "volume used" column may be completed for enough of the wet-applied products to determine budget compliance.

## EQ Credit: Construction Indoor Air Quality Management Plan

- Ensure that the construction IAQ management plan prohibits the use of tobacco products inside the building and within 25 feet (7.5 meters) of the building entrance during construction.
- Ensure that the construction IAQ management plan meets or exceeds the SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd edition, 2007, ANSI/SMACNA008-2008, Chapter 3. SMACNA guidelines can be found in the LEED reference guide.
- Confirm that narratives adequately describe the filtration for air handling units (if air handlers were used during construction) and the methods in which absorptive materials were protected from moisture damage during the construction and preoccupancy phases.
- Confirm that the construction IAQ management plan for the project has been uploaded.
- Be sure that photographs or a narrative document each of the IAQ measures implemented, as well as the methods employed to protect absorptive materials from moisture damage during construction and pre-occupancy. Photographs should be annotated to indicate the IAQ measure depicted and the general location of the photograph.
- If permanently installed air-handling equipment is used during construction, ensure that MERV 8 or F5 (or higher) filters are used. Filters must be replaced immediately prior to occupancy.

## EQ Credit: Indoor Air Quality Assessment

### ► Option 1: Flush-out

- Ensure the Gross Floor Area (i.e., all spaces - including unoccupied spaces) of the project is accounted for in determination of the flush out volume of air needed.
- Ensure that all interior finishes, movable furnishings, and major VOC punch list items were installed and complete before the [flush-out/air testing] commences.
- Ensure that the description of the flush-out procedure includes the flush-out date(s), occupancy date, outdoor air delivery rates, internal temperature, and relative humidity.
- Ensure that the date of occupancy reported within the submittal documentation is reported consistently within other prerequisites/credits.

### ► Option 2

- Ensure testing for each contaminant is performed using an approved test method. Additionally, ensure the chemical analysis of formaldehyde and the volatile organic compounds is performed by a laboratory accredited under ISO/IEC 17025 for the test method used.
- If the project is located in an EPA (or local equivalent) nonattainment area for PM2.5 or Ozone, ensure those contaminants are included in the air testing.

# EQ Credit: Thermal Comfort

## ► Thermal Comfort Design

- Ensure the air speed reported is the air speed experienced by the occupant and not the outlet velocity from the diffuser.
- Ensure that the compliance approach utilized is consistent with the applicable limits of the approach as defined by ASHRAE 55-2010. For example the Graphical Method applicability is for Met rates between 1.0 and 1.3, Clo between 0.5 and 1.0, 0.012 lb/lb humidity ratio limit, airspeed not greater than 0.20 m/s (40 fpm), unless adjustments for factors such as elevated air speed (per Section 5.2.3) or intermediate values of clo (per 5.2.1.1) have been applied.
- Ensure that all unique space types and/or spaces with unique design parameters are included separately in the thermal comfort analysis
- Confirm that the compliance documentation includes all applicable design parameters and personal/environmental factors (e.g., clo, met, operative temperature, humidity, air speed).
- For naturally conditioned spaces, ensure that the documentation demonstrate that 100% of occupied hours are within the 80% threshold limits of adaptive model chart (Figure 5.3). Documentation must include the worst case outdoor conditions and the worst case indoor conditions derived from a thermal comfort simulation) for each month.

## ► Thermal Comfort Control

- Note that compliance with both the Thermal Comfort Design and Thermal Comfort Control elements of the credit are required to earn the credit.
- Ensure that the individual occupant spaces and shared multioccupant spaces are appropriately classified. For example, open office spaces must count the workstations as individual occupant spaces.
- Ensure that the thermal controls allow the occupants to adjust their local thermal environment.
- Ensure that the number of individual occupant spaces aligns with the project full-time equivalent (FTE) reported elsewhere in the submission (e.g., WE Prerequisite: Indoor Water Use Reduction) in cases where the vast majority of FTE are reasonably expected to have individual workstations.
- Ensure that the quantity of individual occupant spaces and multioccupant spaces are consistent among all submittals, in particular, EQ Interior Lighting.

# EQ Credit: Interior Lighting

## ► Option 1: Lighting Control

- Ensure that the quantity of individual workstations and multi-occupant spaces are consistent among all submittals, in particular, EQ Thermal Comfort.
- Be sure that the individual occupant spaces and shared multi-occupant space are appropriately classified. For example, open office spaces must count the workstations as individual occupant spaces.

### ► Option 2: Lighting Quality

- Make sure you are using the latest Interior [Lighting Calculator](#).
- Remember that a minimum of four of the eight strategies need to be demonstrated, in order to be awarded the credit.
- Make sure the regularly occupied spaces reported in this credit are reported consistently with those reported in other credits.
- When considering Option 2a, remember that luminance of less than 2,500 cd/m<sup>2</sup> is only required between 45 and 90 degrees, for all regularly occupied spaces.
- For Options 2b and 2c, remember that cut-sheets for all lamp types within regularly occupied spaces must note the CRI values and rated life in hours.
- For Option 2d, ensure that the total connected lighting load shown within this credit has been coordinated with the total connected lighting load shown within EAp Minimum Energy Performance.
- Remember that 10% of the regularly occupied floor area may be excluded for Option 2e.

## EQ Credit: Daylight

- Be sure that the floor plans highlight regularly occupied spaces and daylit areas/zones. Reference the EQ Overview section of the LEED reference guide for examples of regularly occupied versus non-regularly occupied spaces. For LEED for Healthcare projects, the entire floor plate (except for the core) should be considered regularly occupied space.
- Remember to provide the Supplemental Daylight and Views Calculation Spreadsheet and confirm that the results have been correctly input into the LEED Form.
- Describe all glare control devices provided for all regularly occupied spaces and specify whether each device is manually controlled or automatic with manual override. If automatic with manual override, ensure the sequence of operation is described.

### ► Option 1. Simulation: Spatial Daylight Autonomy

- The daylight simulations should use the same building information and methodology, be performed at 30 inches above the floor (or at appropriate desk/work height for the space) at a two-foot or less calculation interval, and include permanent interior obstructions.
- For LEED ID+C projects, describe the attached and movable furniture systems and partitions included in the simulations.

### ► Option 2. Simulation: Illuminance Calculations

- The daylight simulation model should be performed with clear sky conditions at 9 a.m. and 3 p.m. within 15 days of each equinox, using the project's geographic location, and at 30 inches above the floor (or at appropriate desk/work height for the space) at five-foot or less calculation interval. Illuminance intensity for sun and sky should be calculated using typical meteorological year data for the nearest weather station (average of the hourly value for both equinox 15-day window). Permanent interior obstructions should be included but blinds/shades should be excluded.

### ► Option 3. Measurement

- Project drawings should include the recorded daylight measurements and show they were conducted at 30 inches above the floor (or at appropriate desk/work height for the space). Furniture, fixtures, and equipment must be in place during the testing.

## EQ Credit: Quality Views

- Be sure that the floor plans highlight regularly occupied spaces and daylit areas/zones. Reference the EQ Overview section of the LEED reference guide for examples of regularly occupied versus non-regularly occupied spaces. For LEED for Healthcare projects, the entire floor plate (except for the core) should be considered regularly occupied space.
- Remember to provide the Supplemental Daylight and Views Calculation Spreadsheet and confirm that the results have been correctly input into the LEED Form.
- Be sure that applicable project documentation shows the line of sight from interior spaces through exterior windows in both plan and sectional views, with glazing elements, and confirms that views are not through permanent interior obstructions, opaque walls, partitions, or doors.
- Remember that glazing must provide a clear view to the outdoors. Views cannot be obstructed by frit, fibers, patterned glazing, or added tints that distort the color balance. Some patterns and lightly tinted glazing is acceptable if they preserve the view.

## EQ Credit: Acoustic Performance

- Non-dBA sound rating methods are acceptable; however, an equivalency narrative must also be provided to confirm that the resulting rating is better than or equal to 40 dBA.
- Ensure that STCc ratings are presented as composite ratings. It may be necessary to select acoustically compliant assemblies early in the design process because acoustic requirements may be more stringent than fire rating requirements in some cases.
- Highlighting assembly locations in a floor plan and including notations directing toward other uploaded documentation relevant to STCc can aid the reviewer in piecing together the source of STC data.
- Keep in mind that sound transmission requirements must be achieved plane-by-plane. If prescriptive STCc minimums cannot be met, the field testing option may be more appropriate.
- Floor-ceiling assemblies are often overlooked but must meet STCc ratings just like wall assemblies.
- Non-dBA sound rating methods are acceptable; however, in such cases, an equivalency narrative must confirm that the resulting rating is better than or equal to 40 dBA.

# INNOVATION

## IN Credit: Innovation

### ► Option 1: Innovation

- Remember that an Innovation strategy must be comprehensive (more than one product or process), include quantitative performance improvements (comparing a baseline and design case), and be significantly better than standard sustainable design practices.
- Ensure that the Innovation strategy is specific to the LEED project under review.

### ► Option 2: Pilot Credit

- Projects can earn up to three points using Pilot Credits. Visit [usgbc.org/pilotcredits](https://usgbc.org/pilotcredits) for a complete list.

### ► Option 3: Exemplary Performance

- Be sure to check the Exemplary Performance criteria for each credit.
- No more than two points can be awarded for exemplary performance strategies.
- One point is reserved for Pilot Credits and one for Innovation. To use all five points, projects must use at least one pilot credit and one innovation credit.

## IN Credit: LEED Accredited Professional

- Confirm that a copy of the certificate (scanned image) for the LEED AP on the project team has been uploaded to that individual's team member profile within LEED Online.
- The LEED AP on the project must have a specialty that matches the rating system family of the project.

