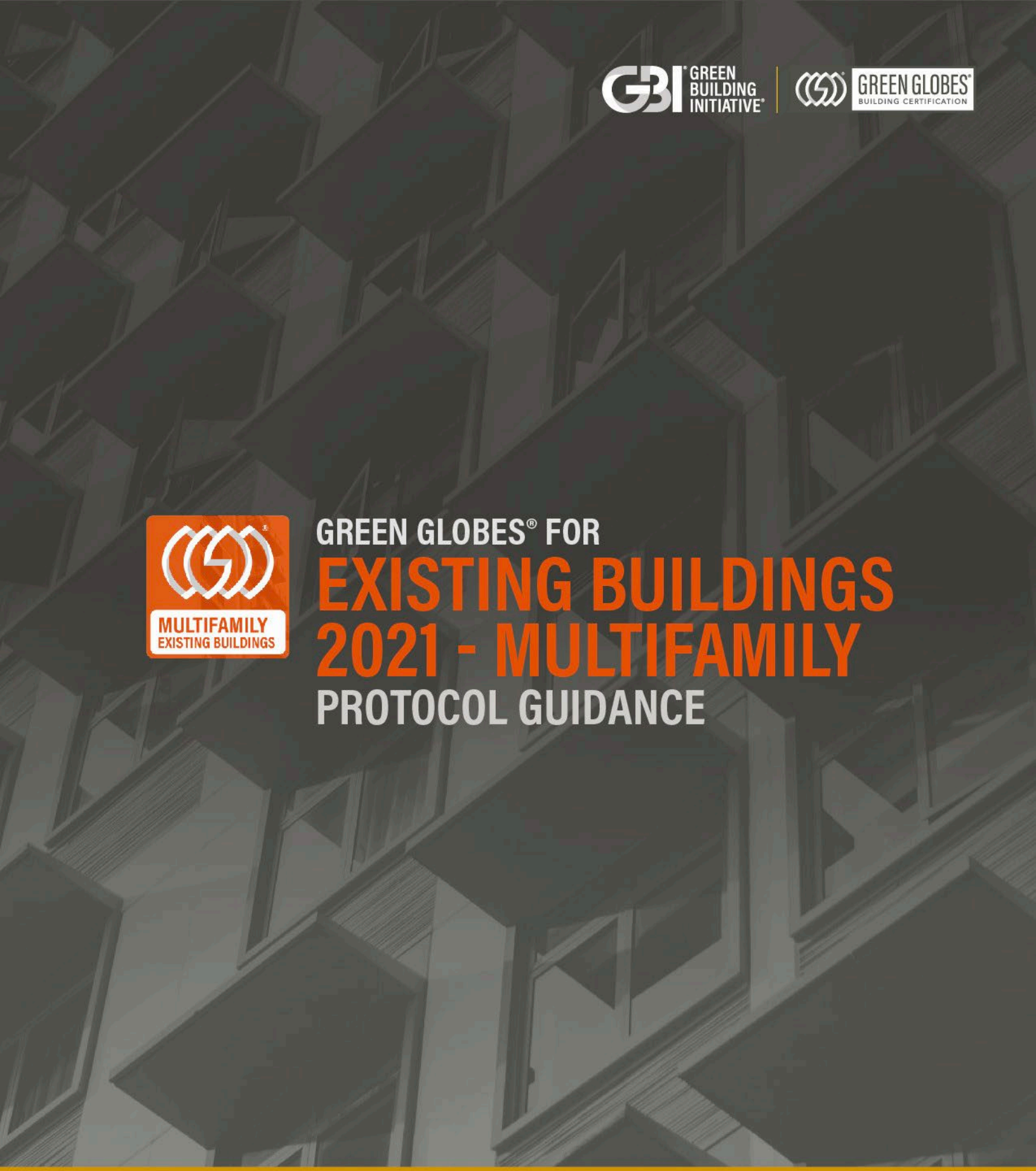

GREEN GLOBES® FOR

EXISTING BUILDINGS 2021 - MULTIFAMILY

PROTOCOL GUIDANCE

VERSION 2.2 | JULY 2022

PREFACE FROM GREEN BUILDING INITIATIVE

The Green Building Initiative (GBI) is a 501(c)3 nonprofit organization and American National Standards Institute (ANSI) Standards Developing Organization (SDO) dedicated to accelerating the adoption of green building best practices. GBI is nimble and entrepreneurial in nature, believing that the market benefits from multiple pathways to integrate sustainability into the built environment. Creating credible, practical, third-party auditable assessment programs has been a priority since GBI was founded in 2004.

For many industry members, the expectation has been that achieving sustainable building certification must be costly and bureaucratic to be effective. GBI rejects that concept and has crafted an assessment program that is time- and cost-effective through Green Globes. Paperwork does not have to be laborious when a well-qualified Assessor visits the site and visually verifies the attributes of a building. A building team can have peace of mind knowing that their client service team will be supportive and transparent throughout the entire certification process. Green Globes is developed by the building industry for the building industry and has been deemed equivalent to other leading rating systems by the U.S. General Services Administration, Department of Energy, and Department of Defense. Large, progressive portfolio owners across the United States use Green Globes with the understanding that they can achieve improved sustainability results through a simple and seamless process. Green Globes provides a platform for teams to engage in the sustainability conversation and continue learning during the certification process.

Green Globes Multifamily for Existing Buildings 2021 (Green Globes Multifamily EB 21) provides a certification option that meets the needs of owners and project teams with multifamily projects. Green Globes Multifamily EB 21 includes:

- Minimum requirements for energy efficiency that ensures resource conservation through operations and tenant best practices
- Flexibility and multiple pathways to success
- A question set that prompts users to think critically about their project
- Third-party Assessor onsite review providing assurance of certification claims
- GBI customer service and technical support for step-by-step guidance

These attributes make Green Globes the first choice for multifamily existing buildings. By engaging with Green Globes and reading through the question set in this manual, you will discover new ways to adopt green building best practices in your multifamily project.

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Introduction

Green Globes® Multifamily for Existing Buildings 2021

Green Globes is a well-established green building guidance and assessment program that offers a practical and affordable way to advance the environmental performance and sustainability of a wide variety of building types. Originally launched in 2007, Green Globes for Existing Buildings (Green Globes EB) is a rating system designed specifically for operation and management of existing buildings and minor renovations. Green Globes Multifamily for Existing Buildings 2021 (Green Globes Multifamily EB 21) continues to address ultimate performance goals for all existing buildings, and includes new and/or expanded sections on Energy and Water Performance, Resilience, Health and Wellness, Cycle Renovations, Environmental Purchasing, Recycling & Waste, a new Site environmental assessment area, and many other updates that significantly advance it beyond GBI's original Green Globes for Existing Buildings rating system.

Green Globes Multifamily EB 21 is an ideal assessment and certification tool for all types of commercial buildings owing to these three key attributes:

- Green Globes Multifamily EB 21 is a comprehensive three-in-one benchmarking and certification program evaluating the environmental sustainability, health and wellness, and resilience of an individual building or entire portfolio;
- The Green Globes software prompts users to think critically about their projects and can be used independently to track progress or as part of an assessment in pursuit of Green Globes certification;
- Green Globes Assessors evaluate the project and provide personalized recommendations that provide project teams with choices when considering capital improvements or implementation of best practices.

Revisions to Green Globes Multifamily EB 21 includes alignment with *ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings*, published in June 2019.

Objectives of the Program

The objectives of the Green Globes Multifamily EB 21 program are:

- Decrease carbon emissions and support growth of carbon neutral buildings;
- Evaluate environmental performance of buildings and establish benchmarks necessary for goal-setting;
- Empower responsible consumption, production, and purchasing by leveraging data and life cycle thinking to achieve zero waste goals;
- Improve water efficiency through strategies that include reducing consumption, increasing recycling, and using alternative sources of water;
- Promote health and well-being through excellence in planning for design, construction, use, accessibility, operations, maintenance, and low impact deconstruction of buildings;

- Provide action plans for improvement where needed;
- Provide certification and recognition for building operation and management.

Green Globes Multifamily EB 21 is both a guide to integrating green building operation/management principles and an assessment tool, providing options when considering implementation of best practices. Green Globes Multifamily EB 21 serves as a benchmarking tool designed to help building owners and facility managers establish baselines, identify improvement areas, achieve operational savings, and improve occupant health and comfort.

Green Globes for Existing Buildings Process

Online Questionnaire

Green Globes' cloud-based software allows various project team members to personally access and upload information. This minimizes your coordination time and shares documentation tasks among a variety of disciplines.

The questions are grouped into six environmental assessment areas: ESG Management, Site, Energy, Water, Materials, and Indoor Environmental Quality. The first step of the assessment process is to register the project and purchase access to the online questionnaire. On its own, the questionnaire is a helpful tool for individual buildings or entire portfolios, but the strength and benefits of Green Globes are best achieved when completing the questionnaire in tandem with a third-party onsite assessment.

Onsite Assessment & Verification

Third-party verification of the questionnaire responses is required for Green Globes certification. A contracted Green Globes Assessor will interview the client (building owner/operator or project team), perform a walk-through of the facility, and review supporting documentation to verify the claims made in the questionnaire.

While completing the questionnaire, the client should gather all documentation available to support the responses. When the questionnaire is complete, the client will contact GBI to schedule the onsite assessment (site visit). GBI will assign a third-party Green Globes Assessor, introduce the assessor to the client, and schedule the onsite assessment when both parties are available. The letter includes contact information for both parties to facilitate direct contact. Please note that site visit scheduling typically requires at least 30 days' notice. In the weeks leading up to the site visit, the assigned assessor will contact the client to discuss the itinerary and specific details of the assessment.

Typically, the Onsite Assessment begins with an introductory meeting in which the assessor can interview the key project players (Facility Manager/Owner, Facility Team Members, General Contractor, etc.). Then, a few team members can guide the assessor through the building. Someone knowledgeable about all aspects of the facility should be onsite during the entire visit to ensure the assessor receives the information and access needed to perform a comprehensive assessment. If any follow-up documentation is requested during the site visit, it should be sent to the assessor within one week.

The duration of the site visit varies considerably based on the scope, size, and complexity of the facility. Please allow 4-6 hours for the assessor to review documentation onsite, conduct a thorough walk-through, and interview personnel.

Following the onsite assessment, the assessor will create a detailed report of his/her findings that contains the recommended score and rating. Green Globes certification requires a minimum overall score of 35% of the total applicable points, and certified projects are assigned a rating of One to Four Green Globes. GBI will review, approve and issue to the client the assessor's report including the final score, rating and certificate. The client may order recognition items to help celebrate and market the achievement.

Figure 1: Questionnaire Review / Onsite Assessment Process Flowchart

Green Globes Program Features

One of the defining qualities of Green Globes is its flexibility. The goal of the program is to promote the adoption of green building practices on a comprehensive scale by providing a flexible rating system that can be applied to a wide range of building types. To achieve this goal, Green Globes makes use of several important features and concepts, as follows.

Weighted Criteria

The Green Globes 1000-point scale allows for weighted criteria, wherein the assigned number of points for individual criteria reflects their relative impact and/or benefit on the sustainability of the building. For example, energy is considered to be the most important area affecting the sustainability of a building, so it carries the highest point value of all the Green Globes assessment areas within the New Construction (NC), Existing Building (EB), and Sustainable Interiors (SI) programs. This method emphasizes sustainable design while minimizing unnecessary "'point chasing" for criteria that are outside of the project scope or provide relatively little environmental benefit.

No Prerequisites

Prerequisites are contrary to the objectivity and scientific accuracy of the Green Globes programs. They can be penalizing and result in building projects being excluded from green building assessment and certification. Green Globes aims to be inclusive and recognize sustainable achievements in all areas. A building is eligible for Green Globes certification once it reaches the 35% point threshold out of the 1,000 total points (less non-applicable points).

Third-Party Assessor

Green Globes Assessors are sustainability experts, generally with more than 10 years of applicable industry experience, who have successfully completed GBI's Green Globes Assessor training program. Once certified, Green Globes Assessors are authorized to perform Green Globes and Guiding Principles Compliance assessments for GBI as independent contractors. Their professional judgment is critical in the

assessment process to verify point awards, determine criteria applicability, and provide sustainability recommendations within their assessment report. Once assigned, the client has direct access to contact the assessor for assessment guidance. Although GBI assigns Green Globes Assessors to projects, the assessor's decisions and recommendations are not revised or redirected by GBI, thus ensuring assessor autonomy and their third-party status.

Non-Applicable Criteria

Within the Green Globes questionnaire, many criteria include a "non-applicable" (N/A) response selection. This provision increases the flexibility of the tool as points that are impossible or unreasonable for a building to achieve do not result in a penalty as they would if the criteria yielded a "No" response. This feature encourages a more regional approach and recognizes differences—and potential conflicts—between various local codes and standards.

The user should only select an available N/A response within the questionnaire when there is a compelling, technical reason to do so. The non-applicable provision is not to be used when project teams/clients decide not to incorporate sustainability items that are part of the criteria measured in the assessment. In those cases, the client should select a "No" response or reconsider incorporating more sustainable features and answer the question accordingly.

The Green Globes third-party assessor will validate all "N/A" responses during the third-party assessment based on four primary justifications: 1) Regional/climatic applicability; 2) Jurisdictional/code conflict or inconsistency; 3) Building occupancy type; and 4) Criteria that address a facility, design feature, or building appurtenance that is not designated or used for that particular project space or is completely outside the control or influence of the client. Utilizing these four justifications, the Green Globes Assessor has the flexibility to use his/her professional judgment to categorize additional criteria as non-applicable.

Incremental Point Awards & Partial Credit

For some Green Globes criteria, there are threshold values, which allow the incremental award of points depending on the level of achievement. In these cases, reaching a higher threshold earns relatively more points. The third-party assessors are permitted to use their professional judgment to award partial credit where deserved, even when the thresholds don't exist within the program.

The incorporation of these flexibility features—1000-point scale, weighted criteria, no pre-requisites, non-applicable criteria, incremental point awards, and partial credit—result in the highest possible accuracy of the final Green Globes score and rating. This flexibility recognizes the vast differences in building types and the nuances of tenant improvement projects.

Environmental Assessment Areas & Point Allocation

Green Globes Multifamily EB 21 ensures that environmental impacts and key sustainability issues are comprehensively assessed using a 1,000-point scale among six environmental assessment areas: ESG Management, Site, Energy, Water, Materials, and Indoor Environmental Quality. Each environmental assessment area use weighted criteria assigning points to criteria based upon the impact to sustainability and efficiency.

Table 1: Environmental Assessment Areas, Sections, and Point Allocations

ID#	AREA / Section	Max Pts
1	**ENVIRONMENTAL, SOCIAL, & GOVERNANCE (ESG) MANAGEMENT**	**105**
1.1	Operations & Maintenance	47
1.2	Resilience	52
1.3	Social Management	6
2	**SITE**	**95**
2.1	Site Decontamination	30
2.2	Site Improvement	65
3	**ENERGY**	**310**
3.1	Energy Performance	100
3.2	Prescriptive Energy Measures	94
3.3	Energy Maintenance & Management	84
3.4	Sustainable Energy	32
4	**WATER**	**185**
4.1	Water Performance	65
4.2	Prescriptive Water Measures	120
5	**MATERIALS**	**100**
5.1	Renovations & Procurement	45
5.2	Recycling & Waste	55
6	**INDOOR ENVIRONMENTAL QUALITY**	**205**
6.1	IEQ Systems & Measures	67
6.2	IEQ Management	34
6.3	Hazard Prevention	30
6.4	Lighting	36
6.5	Comfort, Health, & Wellness	38

Minimum Requirements for Green Globes Multifamily EB 2021 (v2.2)

To be certified through Green Globes Multifamily for Existing Buildings, projects must achieve all Energy Minimum Requirements In addition, projects must also achieve a minimum 35% total score out of all applicable points in the Green Globes Multifamily program. Minimum Requirements are required to be eligible for the program but are separate from the criteria used in the assessment.

ENERGY MINIMUM REQUIREMENTS

Demonstrate greater than 15% energy consumption savings over respective established baseline and meet all three (3) Energy Minimum Requirements.

1. Energy Performance

Meet the ENERGY STAR® Portfolio Manager Path, or the Energy Consumption Savings Path if not ENERGY STAR eligible, and document the energy savings.

1.A ENERGY STAR® Portfolio Manager Path

Input energy use and building characteristics into ENERGY STAR Portfolio Manager and complete Option 1 if eligible for an ENERGY STAR Score.

- **Option 1: ENERGY STAR® Score** - For multifamily properties with 20 or more units. Achieve an ENERGY STAR energy performance score of 78 or greater using the Portfolio Manager program.

OR

- **Option 2: EUI Reduction** - If not eligible for an ENERGY STAR Score. Demonstrate greater than 15% reduction of energy use intensity (EUI) compared to the national median source EUI.

1.B Energy Consumption Savings Path

For multifamily properties with less than 20 units and no energy model, demonstrate greater than 15% energy consumption savings over respective established baseline. Compare whole building energy data from previous 12 months against 3 contiguous years of energy consumption use within the previous 9 years (normalized for climate and occupancy). All data must be input into ENERGY STAR Portfolio Manager.

2. Energy Efficient Equipment & Products

Confirm Operations & Maintenance (O&M) policy to install ENERGY STAR-labeled and/or FEMP-designated energy efficient products and appliances (including clothes washers, dishwashers, and refrigerators), when such products and/or appliances are being replaced. Put into place an O&M policy for energy efficient equipment and products if there is no policy.

ENERGY STAR Qualified Product Lists: http://www.energystar.gov

Federal Energy Management Program (FEMP) Energy and Water Efficient Products: http://www1.eere.energy.gov/femp

3. Energy Performance Monitoring & Tracking

Confirm that the local utility or onsite master energy meter(s) provide, at a minimum, aggregated whole-project energy consumption data for each energy utility type. Where local utility or current meters do not provide such data, install energy meters that do.

Commit to entering energy consumption data into ENERGY STAR Portfolio Manager to track ongoing performance and sharing of that data with Green Building Initiative. Document for future performance verification.

Required Documentation – upload to Green Globes "v3" Software:

- ☐ Completed Minimum Requirement Survey
- ☐ ENERGY STAR Portfolio Manager Statement of Energy Design Intent (SEDI), or screenshot of ENERGY STAR Score
- ☐ Energy model outputs

***Note on Whole Building Consumption Data**

An energy model may be developed if you don't have 12 months of energy data to use as your baseline, including scenarios where it is not possible to access all tenant utility data. The energy model must include the following systems:

1. All mechanical systems;
2. Domestic hot water systems;
3. Lighting;
4. Renewable sources of energy, as applicable;
5. Pool equipment pumps and spas, as applicable.

Exception Policy

GBI reserves the right to issue energy exceptions on a case-by-case basis as needed for unique circumstances, e.g., function of the building requires a limited amount of high flow fixtures. Multifamily projects must still meet the greater than 15% energy consumption savings requirement.

1.0 Environmental, Social, & Governance (ESG) Management (Total Points: 105/1000)

1.1 Operations & Maintenance (47 points)

1.1.1 Environmental Management System (EMS) Documentation (35 points)

1.1.1.1 Criteria:
Is there an integrated team and process that regularly reviews the Environmental Management System?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
Ongoing building operations and maintenance should be assessed on a regularly scheduled basis by an Integrated team. The EMS frequency of scheduled reviews to be defined by the building owner and the documentation is to include the established timeframe. It is recommended that the review be minimally completed annually. An "integrated team" is comprised of multi-disciplinary expertise in operations, facilities, design, and other related departments and/or consultants.

1.1.1.2 Criteria:
Is there a comprehensive written and fully implemented building environmental management plan and program, including a policy statement and a comprehensive structure based around an Environmental Management System (EMS)?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
The program and policy should be a public document that is easily accessible to all staff, visitors, and stakeholders. The fourteen key elements of an EMS, as defined in the USEPA guidance should be addressed. It should also be officially promulgated and signed by senior management of the occupying organization. Sign-off to be updated concurrently on an established schedule with regular program and policy updates.

For Federal buildings, the program and policy should also specify a verification system for post-occupancy assessment of the building to demonstrate continued energy and water savings at a minimum every four years after initial occupancy.

References:

- *Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations (PDF, U.S. Environmental Protection Agency)*

- *Guide to Developing an Environmental Management System (U.S. Environmental Protection Agency)*

1.1.1.3 Criteria:
Are there building related goals and targets documented in the building environmental management plan, including the following:

Assessment Guidance:
Goals and specific targets to improve or maintain the facility's environmental performance should be documented as part of meeting the "environmental goals" for the building.

For Federal buildings, the documented building related goals and targets should also specify a verification system for post-occupancy assessment of the building to demonstrate continued energy and water savings at a minimum every four years after initial occupancy.

- **1.1.1.3.1:** Energy conservation?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **Assessment Guidance:** For Federal buildings, the documented building related goals and targets should also specify a verification system for post-occupancy assessment of the building to demonstrate continued energy and water savings at a minimum every four years after initial occupancy.
- **1.1.1.3.2:** Water conservation?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **Assessment Guidance:** For Federal buildings, the documented building related goals and targets should also specify a verification system for post-occupancy assessment of the building to demonstrate continued energy and water savings at a minimum every four years after initial occupancy.
- **1.1.1.3.3:** Waste Reduction and recycling?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
- **1.1.1.3.4:** Environmental purchasing?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)

- **1.1.1.3.5:** Schedule for regular checks on air-handling units, cooling towers, boilers, chillers, and/or applicable HVAC system(s) and other significant energy consuming equipment?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
- **1.1.1.3.6:** Indoor Air Quality (IAQ)?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
- **1.1.1.3.7:** Reduction in use and proper handling of toxic or hazardous products?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no toxic or hazardous products, mark N/A.
- **1.1.1.3.8:** Training and education?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)

1.1.1.4 Criteria:
Are there action plans based, on measurement and performance data, operational controls and monitoring and incident records to improve the environmental and energy performance of the building?

Answers:
- Yes (5 points)
- No (0 points)

Assessment Guidance:
The action plans should outline implementation strategies, timelines, training and resources needed to achieve stated targets. They should be reviewed, revised, and updated on a regular, scheduled basis.

For Federal buildings, action plans should also specify a verification system for post- occupancy assessment of the building to demonstrate continued energy and water savings at a minimum every four years after initial occupancy.

1.1.1.5 Criteria:

Is there a preventive maintenance program for building systems, which takes into account service life?

Answers:

- Yes (3 points)
- No (0 points)

Recommended Documents:

- Building service life plan

1.1.1.6 Criteria:

Are there regular procedures for checking and fixing water leaks?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:

Periodic checks for water leaks can be done by recording the water-meter reading before and after any long period when there is no water use, for example, late at night and again in the early morning to verify it there are leaks during the low or no use timeframes.

1.1.1.7 Criteria:

Is there a regular maintenance and cleaning program for the cooling tower(s) that includes monthly inspection for evidence of mold, dirt, or slime?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

References:

- *ASHRAE Guideline 12-2000: Minimizing the Risk of Legionellosis Associated with Building Water Systems*
- *ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems*

1.1.1.8 Criteria:

Is there a regular maintenance schedule and cleaning policy for light fixtures?

Answers:

- Yes (2 points)
- No (0 points)

Impact Statement:

Regular maintenance schedule of light fixtures has two purposes – related to lamping is the energy and light levels and for the utilization of indoor environmental quality, keeping the light fixtures cleaned impacts health and wellness outcomes.

Assessment Guidance:
Documentation to include the timeframe for the regular scheduled maintenance within the cleaning policy for light fixtures.

References:

- *RP-36-15 IES/NALMCO Recommended Practice for Lighting Maintenance*

1.1.1.9 Criteria:
If spray humidification is used, is there a regular maintenance schedule for cleaning the system and verifying that it is free of rust, algae, or loose contaminants of any kind?

Answers:

- Yes (1 point)
- No (0 points)
- N/A

Assessment Guidance:
If a steam humidification system or no humidification is used mark this as "not applicable". Because of the risk of microbial contamination associated with spray humidification, steam is a preferred method for providing humidification.

1.1.1.10 Criteria:
For public restrooms:

- **1.1.1.10.1:** Is there a regular cleaning schedule available and posted for the public restrooms that includes a verification system?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Regular cleaning of public restrooms reduces opportunity for spread of infection and disease. Verification can include electronic or manual means / reporting.
    - **References:**
        - *Fitwel Section 8: Shared Spaces (8.1)*
- **1.1.1.10.2:** Are there signs posted to promote handwashing in public restrooms?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)

- N/A

- **Assessment Guidance:** Proper hand hygiene is a primary prevention method for reducing the spread of infection and disease.
- **References:**
  - *Fitwel Section 8: Hand-Washing Signage (8.2)*

1.2.1 Operations & Maintenance Training (12 points)

1.1.2.1 Criteria:
Is there a formal building operation and energy conservation training program set up for facility staff members and new hires?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
Operational manual(s) to be the basis for formal, required education and training programs completed in-person or electronically available for all staff members. The program should be developed at various levels dependent upon departmental responsibilities. For example, general information on sustainability and building operations to be provided to all staff, while those responsible for power plants and HVAC systems would have detailed training on equipment, controls, and the building automated system. Human resources to work with equipment/system vendors, consultants, and inhouse staff to complete an education and training program.

1.1.2.2 Criteria:
Is there reoccurring training received by facility staff members that includes updates about building operations and energy conservation measures implemented and recorded?

Answers:
- Yes (3 points)
- No (0 points)

1.1.2.3 Criteria:
Is building management and relevant staff trained to implement an Indoor Environmental Quality (IEQ) program that includes identifying, preventing, and solving indoor air quality (IAQ) issues and addresses thermal, acoustic, and lighting comfort based upon building occupant concerns?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:

This type of training would be included within the overall education program for identified staff that are responsible for indoor air quality and controls within the building. This training would be a subset of the overall education and training program included in 1.1.2.1 above.

1.1.2.4 Criteria:
Is education and training provided for management, staff, and contractors working with chemicals, toxic products, or hazardous materials?

Answers:

- Yes (3 points)
- No (0 points)
- N/A

Assessment Guidance:
Not applicable if there are no chemicals, toxic products, or hazardous materials.

1.2 Resilience (52 points)

1.2.1 Risk Assessment & Facility Adaptation (10 points)

1.2.1.1 Criteria:
Have the following been performed as part of a multi-hazard risk assessment for the building and location:

- **1.2.1.1.1:** The assessment includes current and future risks or hazards?

  Answers:
  - Yes (3 points)
  - No (0 points)

  Check all risks and hazards (current and future) that apply to the building and location:

  - ☐ **1.2.1.1.1A:** Flood (coastal storm surge, tidal, pluvial/storm water, or fluvial/riverine);
  - ☐ **1.2.1.1.1B:** Seismic events (earthquake, vulcanism, and resulting tsunami);
  - ☐ **1.2.1.1.1C:** Landslides and avalanches;
  - ☐ **1.2.1.1.1D:** Severe weather (wind, tornado, hail, lighting, snow, ice-storms, drought, or severe heat or cold);
  - ☐ **1.2.1.1.1E:** Wildfires;
  - ☐ **1.2.1.1.1F:** Man-made risks (explosion, terrorisms, or poison release)
  - ☐ **1.2.1.1.1G:** Health issues (e.g. pandemics, or sanitation issues in the aftermath of a disaster);
  - ☐ **1.2.1.1.1H:** Infrastructure disruption (loss of energy, water, sanitation, transportation or communications service);

Assessment Guidance:
The Disaster Resilience Scorecard for Industrial and Commercial Buildings (developed by UN ARISE) adapts the United Nations Office for Disaster Risk Reduction (UNDRR)'s City Disaster Resilience Scorecard, and is intended for use by building owners, operators, and managers. The Disaster Resilience Scorecard is structured around "Ten Essentials" for Disaster Risk Reduction:

- **Essential 1:** Organize for Resilience [Governance]
- **Essential 2:** Identify, Understand and Use Current and Future Risk Scenarios [Integrated Planning and Preparation]
- **Essential 3:** Strengthen Financial Capacity for Resilience [Governance]
- **Essential 4:** Pursue Resilient Urban Development [Integrated Planning and Preparation]
- **Essential 5:** Safeguard Natural Buffers [Integrated Planning and Preparation]
- **Essential 6:** Strengthen Institutional Capacity for Resilience [Integrated Planning and Preparation]
- **Essential 7:** Increase Social and Cultural Resilience [Integrated Planning and Preparation]
- **Essential 8:** Increase Infrastructure Resilience [Integrated Planning and Preparation]
- **Essential 9:** Ensure Effective Disaster Response [Response/Recovery]
- **Essential 10:** Expedite Recovery and Build Back Better [Response/Recovery]

References:

- *GRESB Resilience Module*
- *Federal Energy Management Program (FEMP) - Technical Resilience Navigator*
- *U.S. Army Climate Resilience Handbook (PDF)*
- *U.S. Army Corps of Engineers (USACE) Public Tools*
- *NIST EDGe$ (Economic Decision Guide Software) Online Tool*
- *NIST Community Resilience Planning Guide for Buildings and Infrastructure Systems (Guide and companion Playbook)*
- *NAVFAC Installation Adaptation & Resilience Climate Change Planning Handbook*
- *Disaster Resilience Scorecard for Industrial and Commercial Buildings (UN ARISE), UN Office for Disaster Risk Reduction (UNDRR)*
- *United Nations Sustainable Development Goals*
- *U.S. Climate Resilience Toolkit*
- *National Centers for Environmental Information, U.S. National Oceanic and Atmospheric Administration (NOAA)*
- *Hazard Identification and Risk Assessment, U.S. Federal Energy Management Agency (FEMA)*

- **1.2.1.1.2 Criteria:** Has a risk analysis been completed for 1.2.1.1.1 for each climate change associated risk or hazard, current and future?
  - **Answers:**
    - Yes (4 points)
    - No (0 points)

- **Assessment Guidance:** The Disaster Resilience Scorecard for Industrial and Commercial Buildings adapts the United Nations Office for Disaster Risk Reduction (UNDRR)'s City Disaster Resilience Scorecard, both of which ask for two scenarios: "worst case" and "average case," to address the risks and hazards that apply to the building and area in question. Building owners and managers should define both scenarios for each applicable risk or hazard, but focus first on aligning with worst-case scenarios.

  Building owners/managers are encouraged to use the Disaster Resilience Scorecard's indicative measurement scale for each risk and hazard.

  For example, the following indicative measurement scale for threat and risk analysis ("TRA") of the impact of climate change and sea level rise:
  - 5 – The impact of climate change and sea level rise (as applicable) is assessed over the full expected life of the building and fully assimilated into the TRA.
  - 4 – The impact of climate change is broadly assimilated over the full expected life of the building with some minor omissions.
  - 3 – The impact of climate change is considered, but over the full expected life of the building and not fully included in the TRA.
  - 2 – Climate change is only referenced in outline with no consideration of specific impacts over the life of the building.
  - 1 – Climate change is not considered in the TRA.
  - 0 – No TRA.
- **References:**
  - *Disaster Resilience Scorecard for Industrial and Commercial Buildings (UN ARISE), UN Office for Disaster Risk Reduction (UNDRR)*

- **1.2.1.1.3 Criteria:** Does the assessment evaluate critical mission and building functional requirements, and prioritizes accordingly for future facility adaptation?
  - **Answers:**
    - Yes (3 points)
    - No (0 points)

1.2.2 Emergency Procedures, Response, & Facility Upgrades (30 points)

1.2.2.1 Criteria:
Are the following emergency response procedures in place:

Assessment Guidance:
Procedures must be detailed for quick and effective action in the event of an emergency including a communication plan. They should include up-to-date contacts to obtain assistance promptly and to report the emergency. There should be a protocol to assess the risks of re-occupying a building in case of evacuation.

- **1.2.2.1.1:** Documented procedures readily available in case of emergency?
  - **Answers:**
    - Yes (2 points)

        - No (0 points)
    - **Assessment Guidance:** Operational resilience is both a process and a characteristic of an organization to adapt quickly to changing environments and needs. It is an organizational component that allows a business to carry out its mission despite the presence of operational stress and disruption. In locations with recognized potential for hurricanes, tornadoes, flooding, earthquakes, drought, or other regional natural or manmade disasters, the need to protect life safety is paramount. A procedure should include identification of safe areas of refuge and standards for protective measures required to protect those areas of refuge. Assessing existing facilities to understand the likelihood of loss of power, gas, water, and communications under various scenarios, action to be taken if services are lost, and identify quantity and types of supplies needed based upon anticipated days of an event is recommended to be included as part of the policy and procedures. A Service Live Plan can help identify and avoid unexpected failures.
    - **References:**
        - *International Standards for Service Life Planning of Buildings, National Institute of Standards and Technology (NIST), U.S. Department of Commerce*
- **1.2.2.1.2:** Staff trained to deal with and obtain prompt assistance for emergencies such as fire, spills, power failures and illness?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
    - **Assessment Guidance:** This training and education should be part of an overall program usually directed by Human Resources and be required to be completed by all staff within the building.
- **1.2.2.1.3:** An automated emergency notification system?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
    - **References:**
        - *Fitwel Section 12: Emergency Address Notification (12.4)*
- **1.2.2.1.4:** A current schedule for a designated first responder to be available during work hours?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
    - **References:**
        - *Fitwel Section 12: Certified First Responders (12.3)*

1.2.2.2 Criteria:
Do the emergency plans refer to all applicable legislation regarding emergency procedures, reporting and record-keeping?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
The emergency response plan must ensure compliance with applicable regulations. A first step is to define accountability with respect to permits, record-keeping and reporting and provide a regularly scheduled review and update.

1.2.2.3 Criteria:
Is there a readily available database of onsite equipment to deal with environmental emergencies and business interruption?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
The environmental emergency response plan should require that equipment such as spill control kits, absorbents, and personal protection equipment be onsite for quick and easy access.

References:
- *Fitwel Section 12: Emergency Preparedness Plan (12.1)*

1.2.2.4 Criteria:
Is there a plan in place for continuation of building mission and operation based on identified risks?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
Planning for utility failures should address the following elements: communication to building occupants; security; provision emergency power and water; business interruption; and, if necessary, evacuation.

1.2.2.5 Criteria:
Is there a site map showing the location of environmentally significant features that are a potential risk to building occupants?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Site plans should identify environmentally significant features such as hazardous waste storage rooms, PCB-containing equipment, sanitary and storm sewer lines, CFC equipment, storage tanks, location of emergency equipment, and utility shutoffs.

1.2.2.6 Criteria:
Is there a regularly inspected Automated External Defibrillator (AED) installed within the building?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
The emergency response plan and training to include the utilization of an AED as required by a building occupant or visitor emergency.

References:
- *Fitwel Section 12: Automated External Defibrillator (AED) (12.2)*

1.2.2.7 Criteria:
Have the following taken place in response to current and future risks or hazards?

Assessment Guidance:
Must include consideration for short-term and long-term utility failures and interruption to business.

- **1.2.2.7.1:** Funding is available to minimize risks and hazards as identified in a current multi-risk hazard assessment?
  - **Answers:**
    - Yes (3 points)
    - No (0 points)
  - **Assessment Guidance:** Funding to mitigate risks and hazards should also prioritize according to critical mission and building functional requirements. There must be a multi-risk hazard assessment in place (see 1.2.1.1).
- **1.2.2.7.2:** Schematics, and/or construction documents for facility adaptation?
  - **Answers:**
    - Yes (3 points)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** If current multi-hazard risk assessment shows no need for facility adaptation upgrades, renovations, or other fixes, mark N/A.
- **1.2.2.7.3:** Facility adaptation upgrades and renovation(s) have been completed that minimize the risk of hazards?
  - **Answers:**
    - Yes (4 points)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** If current multi-hazard risk assessment shows no need for facility adaptation upgrades, renovations, or other fixes, mark N/A.

1.2.3 Building Occupant Environmental Training & Communications (12 points)

1.2.3.1 Criteria:
Is there a communications strategy with building occupants and applicable visitors regarding environmental and health and wellness initiatives and practices in their building and a process to respond to building occupant and applicable visitors' concerns?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
Building management must have in place a well-understood system for communicating with building occupants and applicable visitors on environmental and health and wellness issues specific to the building. Building occupants and applicable visitors should be provided with information, and should have a process and opportunity to discuss their environmental concerns and a response framework for resolving their concerns.

"Applicable visitors" depends on the building type and use. For example, many healthcare buildings require environmental and safety communications plus data collection to include visitors.

References:
- *Fitwel Section 8: Stakeholder Collaboration Process (8.13)*

1.2.3.2 Criteria:
Are there communications to building occupants on the environmental measures that they can implement in the building to contribute to:

- **1.2.3.2.1:** Energy conservation?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** An inexpensive way to reduce energy costs is by developing energy efficiency procedures and encourage building occupant behavior that encourages energy conservation. Provide information to building occupants on energy use and means of saving energy (such as information on reducing plug loads, use of energy saving modes for copiers, computers, monitors, etc., turning off lights in unoccupied spaces, after normal office hours and the correct use of blinds to reduce heat gain).
- **1.2.3.2.2:** Waste reduction and recycling?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** This can include promotional materials such as electronic bulletins and newsletters to keep building occupants informed about how they can

reduce the amount of waste being sent to landfill by recycling and composting. It is important to explain the types of material streams that are recyclable and compostable at the end of their useful life based upon the geographic location and available collection services and/or inhouse programs.

- **1.2.3.2.3:** Proper handling, storage and disposal of toxic or hazardous products?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** Information on handling, storing, and disposing of toxic or hazardous materials (such as batteries, compact fluorescent light bulbs or medical waste) to be included in operational training program for building occupants and included in notifications and communications to building occupants, including but not limited to newsletters, postings on bulletin boards, signage, or memos that address environmental stewardship and building occupant safety. For healthcare projects, industrial hygienist, infection preventionist, and/or environmental services to be trained and responsible for including manifests for hazardous medical waste.

1.2.3.3 Criteria:
Has a building occupant and/or visitor satisfaction survey been completed in the last 3 years?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
A building occupant and/or satisfaction survey should include feedback on thermal, lighting, and acoustic comfort, indoor air quality (IAQ), building cleanliness and maintenance, and other general occupant concerns and feedback. The satisfaction survey results enable property managers and building owners to prioritize efforts to maximize the performance of their built assets and provides an opportunity for employers to better understand staff concerns that contribute to absenteeism, attrition, and/or retainage.

References:

- *Fitwel Section 8: Occupant Satisfaction Survey (8.12)*

1.3 Social Management (6 points)

1.3.1 Equity & Inclusiveness (2 points)

1.3.1.1 Criteria:
Does ownership/stakeholders have a written policy in place to support diversity, equity, and inclusion?

Answers:

- Yes (1 point)

- No (0 points)

Assessment Guidance:
Examples of policies supporting diversity, equity, and inclusion include the following:

- Having external spaces accessible to all members of the public.
- Hiring women, minority, LGBTQ+, and veterans in the building owner's operations, facilities, design and related departments.
- Contracting with women, minority, LGBTQ+, and veteran owned business consultants or vendors.
- Requiring a certain number of tenants to be women, minority, and veteran owned businesses or occupants.

This is not an exhaustive list of examples, and policies will vary depending on location, building type, space use, and other factors.

1.3.1.2 Criteria:
Does ownership/stakeholders invest in the local community?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Community investments can come in the form of charitable gifts, community partnerships, volunteer hours, donation of services/equipment/space, and hiring/contracting locally.

1.3.2 Social & Governance (4 points)

1.3.2.1 Criteria:
Does ownership/stakeholders engage in social and governance best practices?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Social and governance best practices include but are not limited to the following:

- Provide safe working conditions, inclusivity and fair living wages to all employees;
- Incentivize purchasing locally and/or from small businesses;
- The company has a stated purposed linked to societal benefit for their core business (e.g. designated B Corp or JUST company);
- Annual and ongoing performance evaluations for all employees;
- Ongoing governance and social training (e.g. cybersecurity, code of ethics, overview of benefits and resources, health & wellness programs, etc.).

1.3.2.2 Criteria:

Does your organization issue a CSR (Corporate Social Responsibility) or ESG (Environmental, Social, Governance) report on an annual or regular basis?

Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
Provide a link to the report, if publicly available. If not publicly available, provide an electronic copy.

1.3.2.3 Criteria:
Is the CSR or ESG report publicly available?

Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
Provide a link to the report.

1.3.2.4 Criteria:
Does the report align with an industry standard for disclosures and include a materiality and climate risk or resilience assessment?

Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
Examples of industry standards for disclosures include (but not limited to) the following:

- GRI (Global Reporting Institute);
- DJSI (Dow Jones Sustainability Indices);
- Sustainable Accounting Standards Board (SASB);
- Carbon Disclosure Project (CDP);
- UN Principles of Responsible Investing (UNPRI).

2.0 Site (Total Points: 105/1000)

2.1 Site Decontamination (30 points)

2.1.1 Site Pollution (30 points)

2.1.1.1 Criteria:
Is the existing building site free of contamination?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
A Phase I Site Assessment per ASTM standards prepared by an environmental professional is the industry accepted standard for determining if a site is free of contamination.

Alternatively, a document search can be conducted to identify whether the site is contaminated (e.g. it has never had underground storage tanks (USTs) or outside storage tanks (OSTs), it was always an office or other facility that did not use chemicals, it is not situated near gas stations or other problem industries, there have been no previous potential problem businesses on the site).

2.1.1.2 Criteria:
What is the site is known to be free of contamination based on?

Answers:

- Phase 1 Environmental Assessment (15 points)
- Confirmation Phase 2 Clean Site or Phase 3 Clean Up Report (10 points)
- Internet/Document Search (5 points)
- It is not known whether the site is free of contamination (0 points)

Assessment Guidance:
A Phase I Site Assessment per ASTM standards prepared by an environmental professional is the industry accepted standard for determining if a site is free of contamination.

Alternatively, a document search can be conducted to identify whether the site is contaminated (e.g. it has never had underground storage tanks (USTs) or outside storage tanks (OSTs), it was always an office or other facility that did not use chemicals, it is not situated near gas stations or other problem industries, there have been no previous potential problem businesses on the site).

References:

- *EPA Report on the Environment: Contaminated Land*

2.1.1.3 Criteria:
If the site is known to be contaminated are efforts being made to clean it up?

Answers:

- Yes (5 points)
- No (0 points)
- N/A

Assessment Guidance:
If the site is known to be uncontaminated mark N/A.

2.1.1.4 Criteria:
Are roof drains disconnected from sanitary or combined sewers?

Answers:

- Yes (5 points)
- No (0 points)
- N/A

Assessment Guidance:
Disconnecting roof drains from sanitary or combined sewers avoids unnecessarily loading of the community wastewater treatment facilities.

2.2 Site Improvement (65 points)

2.2.1 Site Enhancement (20 points)

2.2.1.1 Criteria:
Are there indications that the site has been enhanced, such as an increase of indigenous species, the re-establishment of vegetation corridors including wildlife habitat, or filtration or reduction of stormwater runoff?

Answers:

- Yes (5 points)
- No (0 points)
- N/A

Assessment Guidance:
The ecological value can be enhanced by increasing the rooftop vegetation, number of indigenous plant species, "lights-out" policies and programs to protect birds, or establishing a natural habitat on the site. If the building occupies over 80% of the site mark this N/A.

2.2.1.2 Criteria:
Has the site achieved certification from nationally or regionally recognized site certification program within the last four years?

Answers:

- Yes (5 points)
- No (0 points)

2.2.1.3 Criteria:
Has a comprehensive site plan been developed that includes all areas of site improvement, including access to walking trails, bike paths, outdoor respite and outdoor community spaces (i.e. community gardens, farmers' markets, etc.) on or adjacent to the building or campus?

Answers:
- Yes (5 points)
- No (0 points)

Assessment Guidance:
A comprehensive site plan must include a project plan for a specified time period (e.g. 5 years). The inclusion of spaces that support physical activity, positive mental state, and social connection have found to be beneficial to building users and stakeholders overall wellbeing. Outdoor features that support physical health and wellbeing include ergonomic support, access to healthy food, outdoor walking paths, visible opportunities for exercise and fitness, etc.

References:
- *Doing the Right Thing: Measuring Well Being for Public Policy. International Journal of Wellbeing Vol.1, No. 1. (2011), Seligman, Martin E.P*
- *Buildings and Health, Sustainable Facilities Tool, U.S. General Services Administration (GSA)*
- *Fitwel Section 3: Fruit and Vegetable Garden (3.6)*
- *Fitwel Section 3: Farmers Market (3.5)*
- *Fitwel Section 3: Restorative Garden (3.4)*
- *Fitwel Section 3: Outdoor Fitness Area (3.3)*
- *Fitwel Section 3: Walking Trail (3.2)*
- *Fitwel Section 3: Outdoor Space Amenities (3.1)*

2.2.1.4 Criteria:
Are permeable strategies used to reduce water run-off from roofs and hardscaping?

Answers:
- Yes (5 points)
- No (0 points)
- N/A

Assessment Guidance:
Measures include allowing the water to soak into the ground or collecting and re-using it. If the building covers more than 80% of the site mark N/A.

2.2.2 Existing Sites (45 points)

2.2.2.1 Criteria:
Has a transportation assessment been completed?

Answers:

- Yes (5 points)
- No (0 points)
- N/A

Assessment Guidance:
A transportation assessment should address occupant needs for alternative transportation such as cycling, walking, van and car pools, public transportation - all relative to minimizing single-vehicle occupancy.

References:
- *Fitwel Section 2: Commuter Survey (2.2)*

2.2.2.2 Criteria:
What is the distance to the closest public transit stop?

Answers:
- Within 0.5 miles (0.8 km) (5 points)
- Within 1 mile (1.6 km) (2 points)
- Further than 1 mile (1.6 km) (0 points)
- N/A

Assessment Guidance:
For unoccupied buildings, mark N/A.

References:
- *Fitwel Section 1: Location (1.4)*

2.2.2.3 Criteria:
Is there a main or secondary building entrance located accessibly to pedestrian traffic and public transit stop(s)?

Answers:
- Yes (4 points)
- No (0 points)
- N/A

Impact Statement:
Ease of access to pedestrian friendly walkways and transit stops increases potential use of public transit and employees walking - all contributing to building occupant exercise.

References:
- *Fitwel Section 4: Main Pedestrian Entrance (4.2)*
- *Fitwel Section 2: Pedestrian Route to Transit (2.1)*

2.2.2.4 Criteria:
Is there public or private transit service available for building staff for commuting?

Answers:

- Yes (3 points)
- No (0 points)
- N/A

Assessment Guidance:
Commuters expect public transport services at least every 15 minutes during rush-hour periods. For universities/colleges, this would include buses.

2.2.2.5 Criteria:
Are there any of the following included in the project based upon an annual occupant commute survey:

1. Bike racks for minimum 5% of occupants,
2. Bike paths,
3. Bike shelters,
4. Changing facilities,
5. Lockers, and/or
6. Showers?

Answers:

- 100 are incorporated (5 points)
- 50% - 99% are incorporated (3 points)
- Less than 50% are incorporated (1 points)
- None are incorporated or a survey wasn't completed (0 points)
- N/A

Assessment Guidance:
Providing bicycle facilities for min 5% of occupants at destinations encourages cycling to work and additionally promotes occupant health and wellness.

Although cyclists and joggers can change in restrooms and store their clothes in the workplace, dedicated facilities do more to encourage use of bicycles for regular commuting. Provide changing facilities and showers for min of 5% of occupants.

References:

- *Fitwel Section 2: Active Commuter Showers (2.4)*
- *Fitwel Section 2: Bicycle Parking (2.3)*

2.2.2.6 Criteria:
Are there other measures to reduce car dependency (e.g. car-pooling, purchase of transit passes)?

Answers:

- Yes (5 points)
- No (0 points)

- N/A

Assessment Guidance:
Other measures include providing a database where staff and building occupants can share postal code information enables them to make carpooling arrangements. Building-wide purchase of transit passes can provide public transportation at reduced rates. Improving the site access for pedestrian and bikes through signage and/or landscaping can also help to decrease car dependency.

References:

- *Fitwel Section 2: Efficiency Parking (2.6)*
- *Fitwel Section 2: Incentivizing Transit (2.5)*

2.2.2.7 Criteria:
Green Globes provides three pathways for assessing a site's walkability:

- **Path A: Walk Score®** - up to 5 points
- **Path B: State of Place Index** - up to 5 points
- **Path C: AARP Livability Index** - up to 5 points

Points cannot be combined between paths. Please select a path.

Assessment Guidance:
If building is unoccupied, select a Path and mark N/A.

2.2.2.7A.1: Path A: Walk Score®

What is your Walk Score?

Answers:

- 90 - 100 (5 points)
- 80 - 89 (4 points)
- 70 - 79 (3 points)
- 60 - 69 (2 points)
- 50 - 59 (1 points)
- Less than 50 (0 points)
- N/A (0 points)

Assessment Guidance:
Go to https://www.walkscore.com to determine the Walk Score® of the building. Walk Score is used by the real estate industry to provide an approximation of the walkability to various amenities and services from a certain location. This is not an evidence-based metric.

Not applicable if there are no building occupants.

References:

- Fitwel Section 1: Walkability (1.1, 1.2, 1.3)

2.2.2.7B.1: Path B: State of Place Index

What is your State of Place Index score?

Answers:

- 90 - 100 (5 points)
- 80 - 89 (4 points)
- 70 - 79 (3 points)
- 60 - 69 (2 points)
- 40 - 59 (1 points)
- Less than 40 (0 points)
- N/A (0 points)

Assessment Guidance:
Go to http://www.stateofplace.co/indexguide to determine the State of Place Index for the building (subscription required). The State of Place Index is based on the Irvine Minnesota Inventory (IMI) audit tool, which is an objective measure of the built environment features that impact physical activity and recreational walking.

Not applicable if there are no building occupants.

References:

- State of Place Index

2.2.2.7C.1: Path C: AARP Livability Index

What is your Livability Score?

Answers:

- 90 - 100 (5 points)
- 80 - 89 (4 points)
- 70 - 79 (3 points)
- 60 - 69 (2 points)
- 50 - 59 (1 points)
- Less than 50 (0 points)
- N/A (0 points)

Assessment Guidance:
Go to https://livabilityindex.aarp.org/ to determine your Livability Score for the building (free). The Livability Index by AARP (American Association of Retired Persons) rates the overall livability of a neighborhood based on seven categories, which are averaged to create the overall livability score: housing, neighborhood, transportation, environment, health, engagement, and opportunity (https://livabilityindex.aarp.org/how-are-livability-scores-determined). Average communities score 50, with above-average scoring higher and below-average scoring lower.

Not applicable if there are no building occupants.

References:

- How are Livability Scores Determined? (AARP Livability Index)
- AARP Livability Index

2.2.2.8 Criteria:
Are there electric charging stations available based upon the annual transportation assessment results?

Answers:

- Yes (4 points)
- No (0 points)
- N/A

Assessment Guidance:
Providing electric charging stations promotes the utilization and purchase of electrically powered vehicles versus combustion engines utilizing gasoline reduces emissions and reduces global warming / climate change. Provisions for electric bikes, scooters, etc. should be designed to keep walkways free from e-transport litter and tripping hazards.

2.2.2.9 Criteria:
Has the building and/or associated site completed any ADA-compliant upgrades?

Answers:

- Yes (4 points)
- No (0 points)
- N/A

Assessment Guidance:
If building is fully ADA-compliant, mark N/A.

2.2.2.10 Criteria:
Is there a management policy in place to employ bird-safe measures?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
Estimates put the number of annual bird deaths attributed to buildings at 500 million to 1 billion. Due to migratory patterns, certain cities and locations have a higher likelihood for bird collisions. Birds collide with glass for a variety of reasons, and there are many bird-safe measures that can be employed to minimize the number of bird collisions.

Bird-safe measures include:

- Install bird-safe windows or bird-safe glass .

- Apply external screens, film and/or art treatment, decals, netting, or other devices on external window surfaces that are transparent or reflective glass .
- Limit the duration, location, and timing of exterior lighting .
- Reduce interior lighting visible to the exterior .
- Turn off interior lighting at night, or close curtains or blinds .
- Minimize exterior landscaping reflected in windows .
- Install bird feeders either directly next to windows or over 50 feet away from windows.

References:

- *Chicago Bird Collision Monitors (CBCM) - Products*
- *The Humane Society of the United States - Make Your Windows Bird-Safe*
- *American Bird Conservancy - Glass Collisions Downloadable Resources*
- *The Cornell Lab - Study Names Top Cities Emitting Light that Endangers Migratory Birds*
- *San Francisco Planning - Standard for Bird-Safe Buildings (Adopted July 14, 2011)*

3.0 Energy (Total Points: 310/1000)

Minimum Requirements for Green Globes Multifamily EB 2021

To be certified through Green Globes Multifamily for Existing Buildings, projects must achieve all Energy Minimum Requirements In addition, projects must also achieve a minimum 35% total score out of all applicable points in the Green Globes Multifamily program. Minimum Requirements are required to be eligible for the program but are separate from the criteria used in the assessment.

ENERGY MINIMUM REQUIREMENTS

Demonstrate greater than 15% energy consumption savings over respective established baseline and meet all three (3) Energy Minimum Requirements.

1. Energy Performance

Choose either the ENERGY STAR® Portfolio Manager Path or the Energy Consumption Savings Path.

1.A ENERGY STAR® Portfolio Manager Path

Projects following the ENERGY STAR® Portfolio Manager Path must choose one of the following two options:

- **Option 1: ENERGY STAR® Score** - For multifamily properties with 20 or more units. Achieve an ENERGY STAR energy performance score of 78 or greater using the Portfolio Manager program.

OR

- **Option 2: EUI Reduction** - Demonstrate greater than 15% reduction of energy use intensity (EUI) compared to the national median source EUI.

1.B Energy Consumption Savings Path

For multifamily properties with less than 20 units and no energy model, demonstrate greater than 15% energy consumption savings over respective established baseline. Compare whole building energy data from previous 12 months against 3 contiguous years of energy consumption use within the previous 9 years (normalized for climate and occupancy). All data must be input into ENERGY STAR Portfolio Manager.

2. Energy Efficient Equipment & Products

Confirm Operations & Maintenance (O&M) policy to install ENERGY STAR-labeled and/or FEMP-designated energy efficient products and appliances (including clothes washers, dishwashers, and refrigerators), when such products and/or appliances are being replaced. Put into place an O&M policy for energy efficient equipment and products if there is no policy.

ENERGY STAR Qualified Product Lists: http://www.energystar.gov

Federal Energy Management Program (FEMP) Energy and Water Efficient Products: http://www1.eere.energy.gov/femp

3. Energy Performance Monitoring & Tracking

Confirm that the local utility or onsite master energy meter(s) provide, at a minimum, aggregated whole-project energy consumption data for each energy utility type. Where local utility or current meters do not provide such data, install energy meters that do.

Commit to entering energy consumption data into ENERGY STAR Portfolio Manager to track ongoing performance and sharing of that data with Green Building Initiative. Document for future performance verification.

Required Documentation – upload to Green Globes "v3" Software:

- ☐ Completed Minimum Requirement Survey
- ☐ ENERGY STAR Portfolio Manager Statement of Energy Design Intent (SEDI), or screenshot of ENERGY STAR Score
- ☐ Energy model outputs

*Note on Whole Building Consumption Data

An energy model may be developed if you don't have 12 months of energy data to use as your baseline, including scenarios where it is not possible to access all tenant utility data. The energy model must include the following systems:

1. All mechanical systems;
2. Domestic hot water systems;
3. Lighting;
4. Renewable sources of energy, as applicable;
5. Pool equipment pumps and spas, as applicable.

Exception Policy

GBI reserves the right to issue energy exceptions on a case-by-case basis as needed for unique circumstances, e.g., function of the building requires a limited amount of high flow fixtures. Multifamily projects must still meet the greater than 15% energy consumption savings requirement.

3.1 Energy Performance (100 points)

3.1.1 Energy Consumption (100 points)

Green Globes provides three paths for assessing energy consumption:

- **Path A: Improvement over Baseline** - up to 100 points
- **Path B: ENERGY STAR® Benchmarking** - up to 100 points
- **Path C: Alternative Building Energy Performance Metric** - up to 100 points

Please select a path.

Assessment Guidance:
If the building is eligible for an ENERGY STAR Score, then Path A (Improvement Over Baseline) or Path B (ENERGY STAR Score) must be pursued. If not, then Path C (Alternative Building Energy Performance) can be pursued. Please note, manufacturing/industrial plants are eligible for an ENERGY STAR Score.

Buildings may also make a regression to other sources of peer data such as CBECS, I2SL, or industry group data for an ENERGY STAR equivalency by pursuing Path C.

3.1.1A.1 Criteria: Path B: ENERGY STAR® Benchmarking
What is the building's energy reduction over 5-year or 6-10-year benchmarking baseline?

(Complete one field for either 5-year or 6-10-year benchmarking baseline)

Assessment Guidance:
Compare most recent 12 months of data to previous years of building to show energy reduction. Baseline energy use may be established from three contiguous years of data between five and ten years prior to the current year. Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to previous years of energy consumption.

Complete the appropriate field input below for either a 5-year benchmarking baseline or 6-10 year benchmarking baseline.

Total available points are reduced for 6-10 year benchmarking baseline: only 80 points are available out of 100 maximum for 3.1.1 Energy Consumption.

- **3.1.1A.1.1:** What is the building's energy reduction over 5-year benchmarking baseline? *(input whole numeral, between 0 - 100, for percentage reduction)*
  - **Answers:**
    - 50-100 (100 points)
    - 49 (98 points)
    - 48 (95 points)
    - 47 (92 points)
    - 46 (89 points)
    - 45 (86 points)

        - 44 (83 points)
        - 43 (80 points)
        - 42 (77 points)
        - 41 (74 points)
        - 40 (71 points)
        - 39 (68 points)
        - 38 (65 points)
        - 37 (62 points)
        - 36 (59 points)
        - 35 (56 points)
        - 34 (53 points)
        - 33 (51 points)
        - 32 (48 points)
        - 31 (45 points)
        - 30 (43 points)
        - 29 (40 points)
        - 28 (37 points)
        - 27 (34 points)
        - 26 (31 points)
        - 25 (28 points)
        - 24 (25 points)
        - 23 (22 points)
        - 22 (19 points)
        - 21 (16 points)
        - 20 (13 points)
        - 19 (10 points)
        - 18 (8 points)
        - 17 (7 points)
        - 16 (6 points)
        - 15 (5 points)
        - 0-14 (0 points)
    - **Assessment Guidance:** Compare most recent 12 months of data to previous years (within 5 years) of building to show energy reduction. Baseline energy use may be established from three contiguous years of data between five and ten years prior to the current year. Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to previous years of energy consumption.

- **3.1.1A.1.2:** What is the building's energy reduction over 6-10-year benchmarking baseline?
  (input whole numeral, between 0 - 100, for percentage reduction)
    - **Answers:**
        - 50-100 (80 points)
        - 49 (77 points)
        - 48 (74 points)
        - 47 (71 points)
        - 46 (68 points)
        - 45 (65 points)

- 44 (62 points)
- 43 (59 points)
- 42 (56 points)
- 41 (53 points)
- 40 (50 points)
- 39 (47 points)
- 38 (44 points)
- 37 (41 points)
- 36 (38 points)
- 35 (35 points)
- 34 (32 points)
- 33 (29 points)
- 32 (26 points)
- 31 (23 points)
- 30 (20 points)
- 29 (18 points)
- 28 (17 points)
- 27 (15 points)
- 26 (14 points)
- 25 (12 points)
- 24 (11 points)
- 23 (9 points)
- 22 (8 points)
- 21 (7 points)
- 20 (6 points)
- 19 (5 points)
- 18 (4 points)
- 17 (3 points)
- 16 (2 points)
- 15 (1 points)
- 0-14 (0 points)

  - **Assessment Guidance:** Compare most recent 12 months of data to previous years (within 6 - 10 years) of building to show energy reduction. Baseline energy use may be established from three contiguous years of data between five and ten years prior to the current year. Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to previous years of energy consumption.

3.1.1B.1 Criteria: Path B: ENERGY STAR® Benchmarking
What is the ENERGY STAR score for the building?

Answers:

- 97-100 (100 points)
- 96 (96 points)
- 95 (92 points)
- 94 (88 points)

- 93 (84 points)
- 92 (80 points)
- 91 (76 points)
- 90 (72 points)
- 89 (68 points)
- 88 (64 points)
- 87 (60 points)
- 86 (58 points)
- 85 (56 points)
- 84 (52 points)
- 83 (50 points)
- 82 (48 points)
- 81 (46 points)
- 80 (44 points)
- 79 (40 points)
- 78 (36 points)
- 77 (34 points)
- 76 (32 points)
- 75 (24 points)
- 0-74 (0 points)

Assessment Guidance:
Provide ENERGY STAR® Score verification to Green Globes Assessor. Pursue this option if the building is eligible for an ENERGY STAR score. Please reference the ENERGY STAR website to identify an updated list of which building types are eligible.

References:

- *Benchmarking starter kit for Portfolio Manager, ENERGY STAR, U.S. Department of Energy (DOE)*
- *U.S. Environmental Protection Agency (EPA) - Portfolio Manager*

3.1.1C.1 Criteria: Path C: Alternative Building Energy Performance Metric
What is the building's current standing as compared to average performance for the building type?

(Input whole numeral, with "50" representing average consumption for that building type. See assessment guidance for more details.)

Answers:

- 97-100 (100 points)
- 96 (96 points)
- 95 (92 points)
- 94 (88 points)
- 93 (84 points)
- 92 (80 points)

- 91 (76 points)
- 90 (72 points)
- 89 (68 points)
- 88 (64 points)
- 87 (60 points)
- 86 (58 points)
- 85 (56 points)
- 84 (52 points)
- 83 (50 points)
- 82 (48 points)
- 81 (46 points)
- 80 (44 points)
- 79 (40 points)
- 78 (36 points)
- 77 (34 points)
- 76 (32 points)
- 75 (24 points)
- 0-74 (0 points)

Assessment Guidance:
Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to other similar building type(s), with "50" representing average consumption for that building type. Also provide what industry group data was used for the benchmarking.

To show compliance, compare building to another source of peer data, such as CBECs or other industry group data to show better than average performance. If a laboratory, suggested use of International Institute of Sustainable Laboratories (I2SL).

References:

- *International Institute for Sustainable Laboratories*

3.2 Prescriptive Energy Measures (94 points)

3.2.1 Envelope (15 points)

3.2.1.1 Criteria:

Is there an energy-efficient opaque envelope?

Answers:

- 25% lower U or C value (4 points)
- 10% lower U or C value (2 points)
- Meets U or C value (1 points)
- No (0 points)

Assessment Guidance:

The opaque envelope must exhibit thermal performance that meets or exceeds the Prescriptive Requirements of Section 5.5 of ANSI/ASHRAE/IES Standard 90.1-2010.

References:

- *ANSI/ASHRAE/IES Standard 90.1-2010*

3.2.1.2 Criteria:
Are there energy-efficient windows?

Answers:

- Yes (4 points)
- No (0 points)

Assessment Guidance:
For ASHRAE Climate Zones 1 - 3, the windows must be at least double pane tinted.

For ASHRAE Climate Zones 4 - 7, the windows must be at least double pane low-e.

References:

- *ASHRAE Weather Data Center*

3.2.1.3 Criteria:
Has the current performance and condition of the building envelope been assessed?

Answers:

- Yes (4 points)
- No (0 points)
- N/A

Assessment Guidance:
The condition of the building envelope is critical to the building performance. An assessment of the current performance and condition of the envelope should consider:

- The condition and performance of the envelope relative to its as-new condition.
- The appropriateness of the envelope performance relative to climate and building type in the context of current performance norms.
- The practical and economic viability and appropriateness of envelope upgrading in the context of its life cycle.

A building envelope assessment is recent or has been updated within the past 5 years. For buildings less than 8 years old, mark N/A.

3.2.1.4 Criteria:
Has the building undergone envelope commissioning, retro-commissioning, or recommissioning?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
Envelope commissioning during construction provides a level of assurance that the as-built condition achieves the performance expectations of the envelope design through the initial years of operation. Retro-commissioning occurs at some point post-construction, as does recommissioning.

The building envelope must have been commissioned during construction (for buildings constructed within the last 10 years), or retro-commissioned or recommissioned within the last 8 years.

3.2.2 Lighting (20 points)

Green Globes provides two paths for assessing lighting efficiency:

- **Path A: Commercial and Institutional** - up to 20 points
- **Path B: Residential and Hospitality Buildings** - up to 20 points

Please select a path.

3.2.2A.1 Criteria: Path A: Commercial and Institutional
What percentage of the building interior is installed with LED and/or fluorescent lighting (quantified by floor area)?

Answers:

- 100% LED (20 points)
- 90% - 99% LED, 10% or less fluorescent (18 points)
- 80% - 89% LED, 20% - 11% fluorescent (16 points)
- 70% - 79% LED, 30% - 21% fluorescent (14 points)
- 60% - 69% LED, 40% - 31% fluorescent (12 points)
- 50% - 59% LED, 50% - 41% fluorescent (10 points)
- 40% - 49% LED, 60% - 51% fluorescent (8 points)
- 30% - 39% LED, 70% - 61% fluorescent (6 points)
- 20% - 29% LED, 80% - 71% fluorescent (4 points)
- 10% - 19% LED, 90% - 81% fluorescent (2 points)
- Less than 10% LED, More than 90% fluorescent (0 points)

Assessment Guidance:
Exclude up to 3% of floor area installed with incandescent or halogen lighting. Each percent of floor area installed with incandescent or halogen lighting over 3% results in a deduction of 1 point from the LED/Fluorescent percentage score. Provide percentages to your Green Globes Assessor.

3.2.2B.1 Criteria: Path B: Residential and Hospitality Buildings
What percentage of the common and amenity areas are installed with LED and/or fluorescent lighting (quantified by floor area)?

Answers:

- 100% LED (10 points)
- 90% - 99% LED, 10% or less fluorescent (9 points)

- 80% - 89% LED, 20% - 11% fluorescent (8 points)
- 70% - 79% LED, 30% - 21% fluorescent (7 points)
- 60% - 69% LED, 40% - 31% fluorescent (6 points)
- 50% - 59% LED, 50% - 41% fluorescent (5 points)
- 40% - 49% LED, 60% - 51% fluorescent (4 points)
- 30% - 39% LED, 70% - 61% fluorescent (3 points)
- 20% - 29% LED, 80% - 71% fluorescent (2 points)
- 10% - 19% LED, 90% - 81% fluorescent (1 points)
- Less than 10% LED, More than 90% fluorescent (0 points)

Assessment Guidance:
Exclude up to 10% of floor area installed with incandescent or halogen lighting. Each percent of floor area installed with incandescent or halogen lighting over 10% results in a deduction of 1 point from the LED/fluorescent percentage score.

3.2.2B.2 Criteria:
What percentage of the residential units and/or hotel rooms are installed with LED and/or fluorescent lighting (quantified by installed wattage)?

Answers:
- 100% LED (10 points)
- 90% - 99% LED, 10% or less fluorescent (9 points)
- 80% - 89% LED, 20% - 11% fluorescent (8 points)
- 70% - 79% LED, 30% - 21% fluorescent (7 points)
- 60% - 69% LED, 40% - 31% fluorescent (6 points)
- 50% - 59% LED, 50% - 41% fluorescent (5 points)
- 40% - 49% LED, 60% - 51% fluorescent (4 points)
- 30% - 39% LED, 70% - 61% fluorescent (3 points)
- 20% - 29% LED, 80% - 71% fluorescent (2 points)
- 10% - 19% LED, 90% - 81% fluorescent (1 points)
- Less than 10% LED, More than 90% fluorescent (0 points)

Assessment Guidance:
Exclude up to 10% of wattage installed with incandescent or halogen lighting. Each percent of wattage installed with incandescent or halogen lighting over 10% results in a deduction of 1 point from the LED/fluorescent percentage score.

3.2.3 Building Automation System (BAS) & Controls (6 points)

3.2.3.1 Criteria:
Is there a central BAS that encompasses all systems that affect building energy performance, lighting (may be a standalone control system), and thermal comfort?

Answers:
- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
For Residential, Hospitality, and buildings under 20,000 ft2, mark N/A.

3.2.3.2 Criteria:
Is temperature setback based on occupancy used?

Answers:
- Yes (2 points)
- No (0 points)

3.2.3.3 Criteria:
Is HVAC operation (e.g. fans, pumps) scheduled based on occupancy, either through the BAS or local control?

Answers:
- Yes (2 points)
- No (0 points)

3.2.4 Cooling Systems (15 points)

3.2.4.1 Criteria:
Does the cooling equipment base efficiency meet or exceed ANSI/ASHRAE/IES Standard 90.1-2010 efficiency requirements with respect to COP, EER, IEER, and SEER?

Answers:
- Performance exceeds ANSI/ASHRAE/IES Standard 90.1-2010 by 5% or more (5 points)
- Performance meets ANSI/ASHRAE/IES Standard 90.1-2010 (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Compare the cooling unit efficiency against Table 6.8.1 for the type(s) of equipment installed. A weighted average may be used if many types of cooling equipment are present. Systems that are less than 5% of the total capacity may be omitted.

References:
- *ANSI/ASHRAE/IES Standard 90.1-2010*

3.2.4.2 Criteria:
Do cooling systems that use hydronic cooling and/or heat rejection systems employ the following:

- **3.2.4.2.1:** Variable speed chilled water pumping?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)

        - N/A
    - **Assessment Guidance:** If there is no hydronic cooling and/or heat rejection, mark N/A.
- **3.2.4.2.2:** Multi-speed cooling tower or air-cooled condenser fans?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there is no hydronic cooling and/or heat rejection, mark N/A.
- **3.2.4.2.3:** Non-compressor "free cooling" capability?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there is no hydronic cooling and/or heat rejection, mark N/A.

3.2.4.3 Criteria:
What is the status of Ozone Depleting Potential (ODP) of cooling refrigerants onsite?

Answers:
- Zero ODP onsite (5 points)
- Phase-out plan is being implemented, including budget(s) and technical feasibility (3 points)
- There is ODP onsite, and no phase-out plan is being implemented (0 points)
- N/A
-

Assessment Guidance:
The ODP for a substance is the measure of its contribution to ozone depletion relative to that of CFC11 - the higher the value, the more damaging it is to the ozone layer. If there are no refrigerants or cooling systems where one would be expected, choose N/A.

3.2.5 Heating Systems (15 points)

3.2.5.1 Criteria:
Does the base heating system efficiency meet or exceed the ANSI/ASHRAE/IES Standard 90.1-2010 efficiency requirements?

Answers:
- Performance exceeds ANSI/ASHRAE/IES Standard 90.1-2010 by 5% or more (5 points)
- Performance meets ANSI/ASHRAE/IES Standard 90.1-2010 (3 points)

- Electric resistance heating (0 points)
- N/A

Assessment Guidance:
Include the effect of heat recovery or other options to improve the system efficiency in the plant.

Compare the heating unit efficiency against Table 6.8.1 for the type(s) of equipment installed with respect to AFUE, Ec, Et, HSPF, or COPH as appropriate to the specific equipment. A weighted average may be used if many types of heating equipment are present. Systems that are less than 5% of the total capacity may be omitted.

If the building does not use heating, mark N/A.

3.2.5.2 Criteria:
Do heating systems that use steam boilers employ the following:

Answers:
- Steam condensate return is greater than 90% (2 points)
- Steam condensate return is greater than 60% (1 points)
- Steam condensate return is 60% or less (0 points)
- N/A

Assessment Guidance:
If there are no steam boilers, mark N/A.

3.2.5.3 Criteria:
Do heating systems that use hot water boilers employ the following:

- **3.2.5.3.1:** Modulating or multi-stage burners, or multiple staged boilers?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there is no hot water heating, mark N/A.
- **3.2.5.3.2:** Variable speed pumping?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there is no hot water heating, mark N/A.
- **3.2.5.3.3:** Supply water temperature reset?
    - **Answers:**
        - Yes (1 point)

- No (0 points)
- N/A

- **Assessment Guidance:** If there is no hot water heating, mark N/A.

3.2.5.4 Criteria:
Do furnace heating systems modulate?

Answers:
- Yes (2 points)
- No (0 points)

3.2.5.5 Criteria:
What are the heating system NOx levels?

Answers:
- 30 ppm or less (1 points)
- 60 ppm or higher (0 points)

3.2.6 Hot Water (3 points)

3.2.6.1 Criteria:
Does the building have high-efficiency water heating equipment?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Equipment may consist of condensing water heaters, "tankless" (instantaneous) water heaters, heat pump water heaters or solar water heating technology. Note that ASHRAE 90.1B IES tanks are not considered high efficiency for this assessment.

3.2.6.2 Criteria:
Are there hot water saving devices such as low-flow or automated faucets?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Devices that reduce the rate and duration of water-flow in faucets can lower hot water costs.

3.2.6.3 Criteria:
Is the domestic hot water (DHW) system monitored or controlled by a Building Automation System (BAS) or similar standalone controls?

Answers:

- Yes (1 point)
- No (0 points)

3.2.7 Simultaneous Heating & Cooling (8 points)

Green Globes provides two paths for assessing simultaneous heating and cooling:

- **Path A: HVAC Compartmentalization** - 8 pts
- **Path B: Complies w/ ASHRAE 90.1** - 5 pts

Please select a Path.

Assessment Guidance:
HVAC design must minimize or eliminate simultaneous heating and cooling through one of the following strategies:

Path A: HVAC Compartmentalization
OR
Path B: Complies w/ASHRAE 90.1

3.2.7A.1 Criteria: Path A: HVAC Compartmentalization

Does the HVAC design incorporate a configuration/strategy that eliminates reheat and re-cool by using thermal and ventilation compartmentalization, with heating, cooling, and ventilation provided independently for each zone?

Answers:

- Yes (8 points)
- No (0 points)

Assessment Guidance:
Examples include fan coil systems, distributed heat pumps, and single-zone systems.

3.2.7B.1 Criteria: Path B: Complies w/ ASHRAE 90.1

Does the HVAC design comply with Section 6.5.2 of the ANSI/ASHRAE/IES Standard 90.1-2010 (or more stringent)?

Answers:

- Yes (5 points)
- No (0 points)

3.2.8 Air Handling Equipment & Ventilation (10 points)

3.2.8.1 Criteria:

Does the HVAC system use ventilation heat recovery?

Answers:

- Yes (5 points)
- Partially (3 points)
- No (0 points)

Assessment Guidance:
Energy recovery ventilation systems reclaim waste energy from the exhaust air stream and use that heat to condition the incoming fresh air.

3.2.8.2 Criteria:
Does the HVAC system use air-side economizers?

Answers:

- Yes (2 points)
- Partially (1 point)
- No (0 points)
- N/A

Assessment Guidance:
In a larger system, this would be integrated with the air handling system. In a residential or hotel building, this would be considered the ability to open a window for fresh air.

3.2.8.3 Criteria:
Do the HVAC systems use supply air temperature reset?

Answers:

- Yes (1 point)
- No (0 points)

3.2.8.4 Criteria:
Are there other energy-saving HVAC systems or measures being used?

Answers:

- Yes (2 points)
- No (0 points)
- **3.2.8.4.1:** Describe:

Assessment Guidance:
Describe any other energy-saving systems or measures (e.g. deep lake cooling, displacement ventilation, underfloor air distribution, dehumidification methods, advanced guest room controls, etc.) used to innovatively save energy.

3.2.9 Vertical Transportation (2 points)

3.2.9.1 Criteria:

Do elevators and escalators use energy reduction measures?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Elevators energy reduction measures include:

- Regenerative braking
- Machine Roomless (MRL) elevators
- Advance operational and/or dispatch controls

Escalator energy reduction measures include slow-down or stop operation.

If there are only elevators or escalators, answer for what is present. If there are no regularly used elevators or escalators, mark N/A.

3.3 Energy Maintenance & Management (84 points)

3.3.1 Energy Maintenance Program (15 points)

3.3.1.1 Criteria:
Is there a comprehensive energy maintenance program addressing energy-related systems and equipment operations applicable to the building?

Answers:

- Yes (10 points)
- Partially (5 points)
- No (0 points)

Assessment Guidance:
A comprehensive energy maintenance program addressing energy-related system and equipment operations applicable to the building such as:

- Boiler or furnace efficiency and operation
- HVAC controls operations and setpoint review and verification
- Air filter loading
- Refrigerant leak detection and/or testing/top-up
- Expeditious “trouble” resolution

3.3.1.2 Criteria:
Are there operating manuals covering standard control settings and operating instructions for all services equipment that affect energy consumption?

Answers:

- Yes (5 points)

- No (0 points)

Assessment Guidance:
A user-friendly manual listing all the building services and describing their function with operating instructions, standard control settings, and basic trouble-shooting makes it possible to handle minor problems and make adjustments without interrupting the service or having to call in the contractor.

3.3.2 Energy Audits (20 points)

3.3.2.1 Criteria:
Have one of the following energy audits been completed to assess energy consumption by the building and associated site?

(Answer one of the following. Points cannot be combined between 3.3.2.1.1, 3.3.2.1.2, and 3.3.2.1.3)

Assessment Guidance:
An energy assessment audit identifies areas that unnecessarily consume excessive amounts of energy and provides the most cost-effective solutions with costs, savings and payback period. In all cases the preparer should be a qualified person as determined by a combination of experience, education and certification(s).

References:

- *ASHRAE Position Document on Energy Efficiency in Buildings (PDF)*
- *CEMs and CEAs Qualified under ASHRAE Standard 211*
- *ASHRAE Standard 211-2018*

- **3.3.2.1.1:** A comprehensive analysis of the building's operations and energy usage has been completed, including detailed life-cycle cost analysis (LCCA).
  - **Answers:**
    - Yes (15 points)
    - No (0 points)
  - **Assessment Guidance:** In addition to a full energy audit, this assessment will include in-depth engineering analysis, modeling, schematic design, life-cycle cost analysis (LCCA), breakdown of areas for improvement, identification of capital improvements, and comparison of energy and operational savings pre- and post-implementation. This audit is roughly comparable with ASHRAE Standard 211-2018, Level 3.
  - **References:**
    - *CEMs and CEAs Qualified under ASHRAE Standard 211*
    - *ASHRAE Standard 211-2018*

OR

- **3.3.2.1.2:** An audit of the building's operations and energy usage has been completed.

- **Answers:**
  - Yes (10 points)
  - No (0 points)
- **Assessment Guidance:** The purpose of this assessment is to audit the building's energy consumption and provide site-specific energy efficiency recommendations. This is a full energy audit and would include a report with low-cost changes and those requiring significant capital investment, estimated implementation costs, and simple payback and return on investment. This audit is roughly comparable with ASHRAE Standard 211-2018, Level 2.

  Points cannot be combined between 3.3.2.1.1, 3.3.2.1.2, and 3.3.2.1.3.
- **References:**
  - *CEMs and CEAs Qualified under ASHRAE Standard 211*
  - *ASHRAE Standard 211-2018*

OR

- **3.3.2.1.3:** A basic, high-level assessment of the building's operations and energy usage has been completed.
  - **Answers:**
    - Yes (6 points)
    - No (0 points)
  - **Assessment Guidance:** The purpose of this assessment is to provide a current snapshot of the building compared against similar buildings, and identification of major areas of energy inefficiency with a brief, low-cost, qualitative study. This level of energy assessment can include a site walkthrough, review of utility bills, and interviews of key operations personnel.

    The audit must include a report detailing low or no cost changes to the building, and any potential capital improvements requiring further study. This audit is roughly comparable with ASHRAE Standard 211-2018, Level 1.

    Points cannot be combined between 3.3.2.1.1, 3.3.2.1.2, and 3.3.2.1.3.
  - **References:**
    - *ASHRAE Standard 211-2018*

3.3.2.2 Criteria:
Has a detailed, written action plan, including timeline and finance requirements, for implementing the findings of an energy assessment audit been developed?

Answers:
- Yes (5 points)
- Partially (4 points)
- No (0 points)
- N/A

Assessment Guidance:
If the energy audit is current and there are no recommendations, mark N/A.

3.3.3 Commissioning (18 points)

3.3.3.1 Criteria:
Were the building systems commissioned during construction, or has retro-commissioning or recommissioning been conducted within the last 8 years?

Answers:
- Yes (5 points)
- Partially (8 points)
- No (0 points)

Assessment Guidance:
Commissioning during construction provides a level of assurance that the as-built condition achieves the performance expectations of the building design through the initial years of operation. Retro-commissioning occurs at some point post-construction, as does recommissioning. Any x-commissioning should include full functional testing and verification of major building MEP systems. Envelope commissioning can be included as per 3.2.1.4.

References:
- *U.S. General Services Administration (GSA), Commissioning Guide*
- *EPA Facilities Manual - Building Commissioning Guidelines*
- *Whole Building Design Guide (WBDG): Building Commissioning*

3.3.3.2 Criteria:
Have commissioning baseline readings been used to generate an informed, preventative maintenance/monitoring schedule?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
Examples include pump bearing temperatures and/or current amperage readings that can be used by maintenance personnel to assess the condition of the equipment on an ongoing basis.

References:
- *U.S. General Services Administration (GSA), Commissioning Guide*
- *EPA Facilities Manual - Building Commissioning Guidelines*

3.3.4 Energy Monitoring, Policy, & Management (31 points)

3.3.4.1 Criteria:
Is energy use being monitored at the site level?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
Monitoring should be reviewed, trended, and reported monthly. Data is reviewed against historic performance data and peer buildings by use of a program like ENERGY STAR Portfolio Manager.

References:

- *U.S. Environmental Protection Agency (EPA) - Portfolio Manager*

3.3.4.2 Criteria:
What percentage of annual site energy is submetered and monitored as part of a comprehensive energy submetering approach by end-use (lighting, hot water, motors, steam, etc.), department, apartment unit, and other applicable data?

Answers:

- 75% or more of building energy use (7 points)
- 50% - 74% of building energy use (5 points)
- 25% - 49% of building energy use (2 points)
- Less than 25% of building energy use (0 points)

- ☐ **3.3.4.2.1:** Lighting
- ☐ **3.3.4.2.2:** Hot Water
- ☐ **3.3.4.2.3:** Motors
- ☐ **3.3.4.2.4:** Steam
- ☐ **3.3.4.2.5:** Other (describe)
    - **Assessment Guidance:** Describe any other energy uses that are being sub-metered.

Assessment Guidance:
Submetering not only encourages energy conservation by tenants; it also enables the owner to charge them fairly. Submetering major energy end uses make it possible to establish a building-load profile and demand structure.

3.3.4.3 Criteria:
Does energy submetering and monitoring include trending of major equipment?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:

Trending data provides another level of insight in how the building is using energy and provides insight into potential energy conservation measures as well as identifying potential operational anomalies.

3.3.4.4 Criteria:
Is there an energy policy and monitoring plan with energy usage targets endorsed by senior management?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
This should be a public document that expresses a commitment to energy targets, assign responsibilities, monitor performance, and undertake an annual review and report.

3.3.4.5 Criteria:
Is there evidence of progress?

- **3.3.4.5.1:** Meeting energy targets over time?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
- **3.3.4.5.2:** Implementation of energy efficiency measures?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
- **3.3.4.5.3:** Documentation of energy conservation measures implemented?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)

3.3.4.6 Criteria:
Have steps been taken to analyze and reduce peak energy demand?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
This means monitoring total monthly energy use and peak demand in 15-30 minute increments using an interval meter on a week day and weekend-day for each season. Finding measures to

flatten the load profile destresses the electrical grid and makes the facility more attractive to power vendors.

3.3.4.7 Criteria:
Is there an energy management or capital plan in place to fund energy efficiency projects?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
This could be an energy efficiency improvement budget, participation in a program that provides financial assistance for energy upgrades, or a green revolving fund where the savings and incentives from one energy efficiency project is used for the next energy efficiency project.

3.3.4.8 Criteria:
Have financial incentives and rebates been leveraged to meet energy efficiency goals?

Answers:

- Yes (1 point)
- No (0 points)
- N/A
- **3.3.4.8.1:** Describe such financial incentives and/or rebates.

Assessment Guidance:
This could be a range from utility programs or participation in other energy efficiency programs.

If there are no available appropriate programs, mark N/A.

3.4 Sustainable Energy (32 points)

3.4.1 Renewable & Alternative Energy (32 points)

3.4.1.1 Criteria:
Is “green electricity” continually purchased?

Answers:

- 100% (10 points)
- 75% - 99% (6 points)
- 50% - 74% (4 points)
- 25% - 49% (2 points)
- 0% -24% (0 points)

Assessment Guidance:
Many energy retailers now offer energy produced from certified solar, water, wind and recovery technologies. Green Power and Renewable Energy Credits are recommended to be Green-e Energy certified or equivalent.

References:

- *Green Power Partnership Program Initiatives - U.S. Environmental Protection Agency (EPA)*
- *U.S. Environmental Protection Agency (EPA) - Renewable Energy Certificates (RECs)*
- *U.S. Environmental Protection Agency (EPA) - Green Power Markets*
- *U.S. Environmental Protection Agency (EPA) - Clean Energy Programs*

3.4.1.2 Criteria:
Are renewable onsite energy sources being used?

Answers:

- Yes (8 points)
- No (0 points)

Assessment Guidance:
Renewable energy sources do not deplete natural resources. These include active solar, wind, photovoltaic, bio-mass, and more.

3.4.1.3 Criteria:
What percentage of the building's total energy is provided by renewable onsite energy sources?

Answers:

- 25% or more (14 points)
- 20% - 24% (12 points)
- 15% - 19% (10 points)
- 10% - 14% (8 points)
- 5% - 9% (6 points)
- 1% - 4% (3 points)
- None (0 points)

4.0 Water (Total Points: 185/1000)

4.1 Water Performance (65 points)

4.1.1 Water Consumption (65 points)

Green Globes provides three paths for assessing water performance:

- **Path A: Peer Benchmarking** - 65 points
- **Path B: EPA Water Score for Multifamily Housing** - 65 points
- **Path C: Prescriptive Water Performance** - 50 points

Please select a path.

Assessment Guidance:
Path B is for property types that are at least 75% multifamily and receive an EPA Water Score. Path A and Path C are for all other property types

4.1.1A.1 Criteria: Path A: Peer Benchmarking
What is the building's current standing as compared to average performance for the building type?

Answers:

- 97-100 (65 points)
- 96 (63 points)
- 95 (61 points)
- 94 (59 points)
- 93 (57 points)
- 92 (55 points)
- 91 (53 points)
- 90 (51 points)
- 89 (49 points)
- 88 (47 points)
- 87 (45 points)
- 86 (43 points)
- 85 (41 points)
- 84 (39 points)
- 83 (37 points)
- 82 (35 points)
- 81 (33 points)
- 80 (31 points)
- 79 (29 points)
- 78 (27 points)
- 77 (25 points)
- 76 (23 points)

- 75 (21 points)
- 0-74 (0 points)

Assessment Guidance:
Express this number as a percentile (e.g. enter “75” if the building is 75% better than the benchmark baseline based on other similar building type(s). Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to other similar building types. Also provide what industry group data was used for the benchmarking.

There are many services in the building industry for tracking building water consumption, and subsequently benchmark for performance. EPA's ENERGY STAR® website includes links and additional information on building benchmarking services.

References:

- Green Button Alliance

4.1.1B.1 Criteria: Path B: EPA Water Score for Multifamily Housing
What is the EPA Water Score for your facility?

Answers:

- 97-100 (65 points)
- 96 (63 points)
- 95 (61 points)
- 94 (59 points)
- 93 (57 points)
- 92 (55 points)
- 91 (53 points)
- 90 (51 points)
- 89 (49 points)
- 88 (47 points)
- 87 (45 points)
- 86 (43 points)
- 85 (41 points)
- 84 (39 points)
- 83 (37 points)
- 82 (35 points)
- 81 (33 points)
- 80 (31 points)
- 79 (29 points)
- 78 (27 points)
- 77 (25 points)
- 76 (23 points)
- 75 (21 points)
- 0-74 (0 points)

Assessment Guidance:

The U.S. Environmental Protection Agency (EPA) Portfolio Manager provides a Water Score for Multifamily Housing (residential buildings that contain 20 or more residential living units). This water score provides an assessment of water use performance for multifamily housing relative to its peers.

To learn more, click to view the Portfolio Manager Technical Reference for EPA Water Score.

References:

- U.S. Environmental Protection Agency (EPA) Water Score (multifamily only)

4.1.1C.1 Criteria: Path C: Prescriptive Water Performance
What is the building's water reduction over 5-year benchmarking baseline?

(input whole numeral, between 0 - 100, for percentage reduction)

Answers:

- 50-100 (50 points)
- 49 (48 points)
- 48 (46 points)
- 47 (44 points)
- 46 (42 points)
- 45 (40 points)
- 44 (38 points)
- 43 (36 points)
- 42 (34 points)
- 41 (32 points)
- 40 (30 points)
- 39 (28 points)
- 38 (26 points)
- 37 (24 points)
- 36 (22 points)
- 35 (20 points)
- 34 (18 points)
- 33 (16 points)
- 32 (14 points)
- 31 (12 points)
- 30 (10 points)
- 29 (8 points)
- 28 (6 points)
- 27 (4 points)
- 26 (2 points)
- 0-25 (0 points)

Assessment Guidance:
Compare most recent 12 months of building data to previous years (within 5 years) to show water reduction. Baseline water use may be established from three contiguous years of data up to five

years prior to the current year. Provide documentation outlining the method used to establish a benchmark and the building's current standing as compared to previous years of energy consumption.

4.2 Prescriptive Water Measures (120 points)

4.2.1 Water Conserving Fixtures (40 points)

Green Globes provides eight paths for assessing indoor water-conserving fixtures:

- **Path A: WaterSense Labeling** - 40 points
- **Path B: Multifamily** - 36 points
- **Path C: Office** - 36 points
- **Path D: Healthcare** - 36 points or N/A
- **Path E: Hotel/Hospitality** - 36 points or N/A
- **Path F: Resort/Casino** - 36 points or N/A
- **Path G: Restaurant** - 36 points
- **Path H: Other Building Types** - 36 points or N/A

Please select a path.

4.2.1A.1 Criteria: Path A: WaterSense Labeling
Do all water fixtures meet the WaterSense label?

Answers:
- Yes (40 points)
- No (0 points)

Assessment Guidance:
WaterSense is an independent, third-party certification and meets EPA's specifications for water efficiency and performance. Using water fixtures that have the label are more water-efficient products as compared to others.

4.2.1B.1 Criteria: Path B: Multifamily
Are there the following water-conserving fixtures:

- **4.2.1B.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
  - **Answers:**
    - Yes (12 point)
    - No (0 points)
- **4.2.1B.1B:** WaterSense showerheads?
  - **Answers:**
    - Yes (12 point)
    - No (0 points)

- **4.2.1B.1C:** WaterSense water closets?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)

4.2.1C.1 Criteria: Path C: Office
Are there the following water-conserving fixtures:

- **4.2.1C.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)
- **4.2.1C.1B:** WaterSense urinals?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)
- **4.2.1C.1C:** WaterSense water closets?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)

4.2.1D.1 Criteria: Path D: Healthcare
Are there the following water-conserving fixtures:

Assessment Guidance:
The National Academy of Sciences issued a report stating, "Low-flow fixtures should not be allowed in hospitals and long-term care facilities, due to these buildings' high-risk occupant populations" (National Academies of Sciences, Engineering, and Medicine. 2020. Management of Legionella in Water Systems. Washington, DC: The National Academies Press).

Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

References:
- Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

- **4.2.1D.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)

        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1D.1B:** WaterSense showerheads?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1D.1C:** WaterSense water closets?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1D.1D:** WaterSense urinals?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1D.1E:** Low-flow pre-rinse and ENERGY STAR dishwashers?
    - **Answers:**

        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

4.2.1E.1 Criteria: Path E: Hotel/Hospitality
Are there the following water-conserving fixtures:

Assessment Guidance:
The National Academy of Sciences issued a report stating, "Low-flow fixtures should not be allowed in hospitals and long-term care facilities, due to these buildings' high-risk occupant populations" (National Academies of Sciences, Engineering, and Medicine. 2020. Management of Legionella in Water Systems. Washington, DC: The National Academies Press).

Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

References:
- Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

- **4.2.1E.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1E.1B:** WaterSense showerheads?
    - **Answers:**
        - Yes (12 point)
        - No (0 points)
        - N/A

- **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

- **4.2.1E.1C:** WaterSense water closets?
  - **Answers:**
    - Yes (12 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
- **4.2.1E.1D:** Low-flow pre-rinse and ENERGY STAR dishwashers?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

4.2.1F.1 Criteria: Path F: Resort/Casino
Are there the following water-conserving fixtures:

Assessment Guidance:
The National Academy of Sciences issued a report stating, "Low-flow fixtures should not be allowed in hospitals and long-term care facilities, due to these buildings' high-risk occupant populations" (National Academies of Sciences, Engineering, and Medicine. 2020. Management of Legionella in Water Systems. Washington, DC: The National Academies Press).

Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

References:
- Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

- **4.2.1F.1A:** WaterSense aerators on residential lavatory fixtures (not including main kitchen sink)?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.

- **References:**
  - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

- **4.2.1F.1B:** WaterSense aerators on non-residential lavatory fixtures (not including main kitchen sink)?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
  - **References:**
    - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1F.1C:** WaterSense showerheads?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
  - **References:**
    - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1F.1D:** WaterSense water closets?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
  - **References:**
    - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1F.1E:** WaterSense urinals?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)

        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine
- **4.2.1F.1F:** Low-flow pre-rinse and ENERGY STAR dishwashers?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Mark N/A where low-flow water fixtures would pose a possible health hazard due to the building type, user, and/or space use.
    - **References:**
        - Management of Legionella in Water Systems - National Academies of Sciences, Engineering, and Medicine

4.2.1G.1 Criteria: Path G: Restaurant
Are there the following water-conserving fixtures:

- **4.2.1G.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
- **4.2.1G.1B:** WaterSense water closets?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
- **4.2.1G.1C:** WaterSense urinals?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
- **4.2.1G.1D:** Low-flow pre-rinse?
    - **Answers:**
        - Yes (6 point)
        - No (0 points)
- **4.2.1G.1E:** ENERGY STAR dishwashers?

- **Answers:**
  - Yes (12 point)
  - No (0 points)

4.2.1H.1 Criteria: Path H: Other Building Types
Are there the following water-conserving fixtures:

Assessment Guidance:
Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).

- **4.2.1H.1A:** WaterSense aerators on lavatory fixtures (not including main kitchen sink)?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

    N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).
- **4.2.1H.1B:** WaterSense water closets?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

    N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).
- **4.2.1H.1C:** WaterSense urinals?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A

- **Assessment Guidance:** Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

  N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).

- **4.2.1H.1D:** Low-flow pre-rinse?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

    N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).
- **4.2.1H.1E:** ENERGY STAR dishwashers?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

    N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).
- **4.2.1H.1F:** Other water-saving features?
  - **Answers:**
    - Yes (6 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** If there are other water-saving features present that are not listed above, include a description in 4.2.1H.2.

    Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

N/A options have been provided for all fixtures, pending the building type and space use(s). Use 4.2.1H.2 to describe your building and space use(s).

4.2.1H.2 Criteria:

Describe building type and space use(s):

Assessment Guidance:

Path H is a customized approach for building types that do not fit into the other Pathway options for 4.2.1 Water Conserving Features, including building types that process water (e.g. manufacturing).

4.2.2 Outdoor Water Consumption (30 points)

Green Globes provides two paths for assessing outdoor water consumption:

- **Path A: No Irrigation** - 30 points
- **Path B: Outdoor Water Conserving Features** - up to 20 points

Please select a Path.

4.2.2A.1 Criteria: Path A: No Irrigation
Is no irrigation used for landscaping?

Answers:

- Yes (30 points)
- No (0 points)
- N/A

Assessment Guidance:
Xeriscape approaches, including urban sites with no need for irrigation. Irrigation may be used for plant establishment.

Not applicable for sites with no landscaping. Adding planters or other non-irrigated landscape would enable the points.

4.2.2B.1 Criteria: Path B: Outdoor Water Conserving Features
Are any of the following items incorporated into landscape irrigation?

- **4.2.2B.1.1:** Is rainwater used for irrigation?
    - **Answers:**
        - Yes (4 point)
        - No (0 points)

        - N/A
    - **Assessment Guidance:** Rainwater is a water collected specifically for irrigation in rain cisterns. If the building covers more than 80% of the site area, i.e. there is no land available for landscaping mark "not applicable".
- **4.2.2B.1.2:** Is Graywater or Municipal Reclaimed Water (purple pipe) used for irrigation?
    - **Answers:**
        - Yes (5 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Gray water is treated waste-water from sinks and showers (not toilets) that has had soils and undesirable bacteria removed. If the building covers more than 80% of the site area, i.e. there is no land available for landscaping mark N/A.
- **4.2.2B.1.3:** Does the landscaping minimize the need for using potable water for irrigation by planting specific species that require little watering?
    - **Answers:**
        - Yes (5 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Xeriscaping involves the use of plant species that require little watering and techniques that help reduce the amount of water needed for irrigation. If the building covers more than 80% of the site area, i.e. there is no land available for landscaping mark N/A. The ASHRAE 189.1 standard states potable water (and municipally reclaimed water, where used) intended to irrigate improved landscape shall be limited to 35% of the water demand for that landscape. The water demand shall be based upon ET for that climatic area and shall not exceed 70% of ETo for turf grass areas and 55% of ETo for all other plant material after adjustment for rainfall.
    - **References:**
        - ANSI/ASHRAE/IES Standard 90.1-2013, Section 6.5.1
- **4.2.2B.1.4:** Is hydro zoning used to water different plant materials such as turf grass vs. shrubs?
    - **Answers:**
        - Yes (3 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Hydro zoning is the practice of clustering together plants with similar water requirements in an effort to conserve water.
    - **References:**

- ANSI/ASHRAE/USGBC/IES Standard 189.1, Section 6.3.1.2

- **4.2.2B.1.5:** Is the irrigation system controlled by a qualifying smart controller that uses evapotranspiration and weather data to adjust irrigation schedules?
  - **Answers:**
    - Yes (3 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** For example, does the irrigation system have a rain shut off switch?
  - **References:**
    - ANSI/ASHRAE/USGBC/IES Standard 189.1, Section 6.3.1.3

4.2.3 Water Quality & Management (50 points)

4.2.3.1 Criteria:
Is there a written policy intended to minimize water use, and encourage water conservation?

Answers:
- Yes (10 points)
- No (0 points)

Assessment Guidance:
Water Conservation Policy should express the commitments to reduction of demand for water and for establishment of goals and strategies to reduce water consumption.

4.2.3.2 Criteria:
Is water use metered and monitored at the facility?

Answers:
- Indoor and outdoor water use are both separately metered (4 points)
- Indoor water use is metered, and there is no outdoor water use (4 points)
- Whole building water use is metered, including both indoor and outdoor uses (2 points)
- Only a portion of the water use is metered (1 points)
- No (0 points)

References:
- *Federal Energy Management Program (FEMP), U.S. Department of Energy - Metering in Federal Buildings*
- *U.S. General Services Administration (GSA), Sustainable Facilities Tool - Water Efficiency*

4.2.3.3 Criteria:
What percentage of annual water consumption (potable and non-potable) is submetered?

Answers:
- 75% or more (8 points)

- 50% - 74% (4 points)
- 25% - 49% (2 points)
- Less than 25% (0 points)

Assessment Guidance:
Submetering should include outdoor use if there is any (e.g. for irrigation and/or amenities). Monitoring should be reviewed quarterly or more frequently. This can be done by installing sub-meters with remote communication measurement to collect indoor and/or outdoor water consumption. Metering and checking bills help to verify consumption and to red flag occurrences of unusual and excessive consumption which should be investigated and corrected resulting in savings. Additionally, data should be reviewed against historic performance data and peer buildings by use of a program like ENERGY STAR Portfolio Manager (for MF) or other external benchmarks.

References:

- *Benchmarking starter kit for Portfolio Manager, ENERGY STAR, U.S. Department of Energy (DOE)*
- *U.S. Environmental Protection Agency (EPA) - Portfolio Manager*
- *U.S. General Services Administration (GSA), Sustainable Facilities Tool - Water Efficiency*
- *Federal Energy Management Program (FEMP), U.S. Department of Energy - Metering in Federal Buildings*

4.2.3.4 Criteria:
Has a water audit been done within the last three years?

Answers:

- Yes (10 points)
- No (0 points)

Assessment Guidance:
The water audit report must include: (I) water benchmarking analysis with benchmarking observations, (ii) a summary of major water-consuming systems in the buildings, (iii) and a list of potential water conservation opportunities based on walk-through audit of the facility. An audit should provide recommendations for maintenance procedures that may need to be revised and identify water-using equipment that should be upgraded.

4.2.3.5 Criteria:
Is there a water usage policy, including water-reduction targets, endorsed by senior management?

Answers:

- Yes (10 points)
- No (0 points)

Assessment Guidance:

Water targets should be established in gallons/ft2, or as a percentage reduction in gallons/person, or as reducing water use 20% below a FY 2007 baseline.

References:

- *U.S. Office of Federal Sustainability, Council on Environmental Quality (CEQ) - Updated Guiding Principles for Sustainable Federal Buildings and Associated Instructions (December 2020)*

4.2.3.6 Criteria:
Do building water systems conform with ASHRAE 188-2018, Legionellosis: Risk Management for Building Water Systems, per the following:

References:

- *Fitwel Section 9: Water Quality (9.3)*
- *Risk Management for Legionellosis (ASHRAE Journal, October 2015) (PDF)*
- *ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems*

- **4.2.3.6.1:** There is a program team tasked with managing Legionella in the building, and the team has described and diagrammed building water systems.
    - **Answers:**
        - Yes (1 points)
        - No (0 points)
    - **Assessment Guidance:** The program team is responsible for the development and implementation of a legionellosis management program for the building's water systems.
    - **References:**
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.3 Process Flow Diagrams*
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.2 Describe the Building Water Systems*
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.1 Program Team*
- **4.2.3.6.2:** Building water systems are analyzed for hazardous conditions, and consider the vulnerability of building occupants.
    - **Answers:**
        - Yes (1 points)
        - No (0 points)
    - **Assessment Guidance:** Analysis of building water systems for hazardous conditions, and should consider the vulnerability of building occupants.
    - **References:**
        - *Fitwel Section 9: Water Quality (9.3)*
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.4 Analysis of Building Water Systems*
- **4.2.3.6.3:** Control measures are being implemented and monitored for corrective action.
    - **Answers:**
        - Yes (4 points)

        - No (0 points)
    - **Assessment Guidance:** The program team is responsible for identifying and determining locations for control measures and limits to the control measures. This identification and determination should be based on the analysis of water systems for hazardous conditions and the description of building water systems (including process flow diagrams).

      Monitoring must be in place to identify when control measures are outside of the control limits established by the program team. Procedures should identify what corrective actions are to be taken in response to control measures beyond established control limits.
    - **References:**
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.7 Corrective Actions*
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.6 Monitoring*
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.5 Control Measures*
- **4.2.3.6.4:** The program team verify and validate the legionellosis management program on an ongoing basis.
    - **Answers:**
        - Yes (1 points)
        - No (0 points)
    - **Assessment Guidance:** Verification is the process of confirming that the legionellosis management program is being implemented on an ongoing basis as designed. Validation is the process of confirming that implementation of the legionellosis management program is successful in controlling hazardous conditions throughout the building's water systems. The program team is responsible for determining testing procedures, including testing approach, sampling frequency, locations for testing, sampling methods, test methods, and documentation.
    - **References:**
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.8 Program Confirmation*
- **4.2.3.6.5:** The legionellosis management program is documented, and activities are communicated by the program team.
    - **Answers:**
        - Yes (1 points)
        - No (0 points)
    - **Assessment Guidance:** The program team is responsible for all aspects of the legionellosis management program, including documentation of all procedures and activities, and communication with all those responsible for different portions of the building water system and equipment.
    - **References:**
        - *ANSI/ASHRAE Standard 188-2018, Section 6.2.9 Documentation and Communication*

5.0 Materials (Total Points: 100/1000)

5.1 Renovations & Procurement (45 points)

5.1.1 Cycle Renovations (27 points)

5.1.1.1 Criteria:

Green Globes provides two paths for assessing cycle renovations:

- **Path A: All building types, except healthcare settings** - 5 points
- **Path B: Healthcare settings** - 5 points

Please select a path.

5.1.1.1A.1 Criteria: Path A: All building types, except healthcare settings

Are there procedures and assessment processes that are followed for completing cycle renovations?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:

Regularly scheduled cycle renovations and facility maintenance reduces need for full replacement of FF&E, regular maintenance reduces energy use, water use, and supports indoor environmental quality. Strategically planning cycle renovations provides opportunities to develop buying agreements with manufacturers for reduction of product costs. Setting up a cycle renovation program allows re-evaluation of products that have performed well, and those that have not been sustainable over time meeting the durability and building service life goals.

Provide policies and procedures that include schedule and frequency of cycle renovation evaluations, walkthroughs, and resulting work plan for cycle renovations. As part of the policy, include the consideration of building repair construction waste diversion based upon size of project, recycling resources available in geographic area, and opportunities for re-use.

5.1.1.1B.1 Criteria: Path B: Healthcare settings

Are there procedures and assessment processes that are followed for completing cycle renovations that include designing for flexibility?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:

Regularly scheduled cycle renovations and facility maintenance reduces need for full replacement of FF&E, regular maintenance reduces energy use, water use, and supports indoor environmental quality. Strategically planning cycle renovations provides opportunities to develop buying

agreements with manufacturers for reduction of product costs. Setting up a cycle renovation program allows re-evaluation of products that have performed well, and those that have not been sustainable over time meeting the durability and building service life goals.

Provide policies and procedures that include schedule and frequency of cycle renovation evaluations, walkthroughs, and resulting work plan for cycle renovations. As part of the policy, include the consideration of building repair construction waste diversion based upon size of project, recycling resources available in geographic area, and opportunities for re-use.

Because healthcare settings are often reconfigured and are complex spaces, the goal is to conserve resources associated with construction and renovation that supports the opportunities for future adaptation for the building service life.

5.1.1.2 Criteria:
Have product standards for cycle renovations been developed that require the following:

(Points can be combined between answers but maximum points awarded will not exceed 5 points total for 5.1.1.2.)

Assessment Guidance:
Standards that are reviewed on a regular basis provides a road map to better understand product performance for specific applications. Evaluation of new products can be tested as standards are developed to verify products are meeting durability and building service life goals.

Provide examples and documentation of implementation of product standards on cycle renovations and/or regular maintenance. This can include policies, contracts, drawings, specifications, bills of sale, etc.

Points can be combined between answers but maximum points awarded will not exceed 5 points total for 5.1.1.2.

- **5.1.1.2.1:** Products that include:
    1. Third party verified multiple attribute standard certifications?
    2. Environmental Product Declarations?
    3. Being listed on NIST's (National Institute of Standards and Technology) BEES (Building for Environmental and Economic Sustainability) database?
    - **Answers:**
        - Yes (5 points)
        - No (0 points)
    - **Assessment Guidance:** The review of product transparency and understanding environmental impacts provides guidance on selecting products that reduce environmental impact; while meeting performance and building service life goals required for a specific application. This is a transparency and certification credit, only.

Multiple attribute standard certifications are developed with a consensus process and providing a certification level that allows similar product types to be compared based upon their attributes and certification levels.

Environmental Product Declarations (EPDs) are based upon life cycle assessment with a minimum of cradle to gate product live cycle. Points provided for both Product Specific Type III EPDs and Industry Wide Type III EPDs. Manufacturers using an initial EPD as a baseline, provides an opportunity to compare and benchmark when the LCA and related EPD is updated (sometimes referred to as an enhanced EPD) for the same product that includes the same Product Category Rules (PCRs) and LCA framework.

Using the BEES Online 2.0 ©2019 Beta database of Individual Building Products that include sustainability performance for individual building product for generic/industry average and manufacturer product line specific products. Evaluates product life cycle costs (LCC) using ASTM Economics Standards) and Cradle-to-Grave LCIA using ISO LCA Standards. Impact categories can be used to compare products.

Multi-attribute Standards (MAS): products compared use the same MAS. Examples include, but are not limited to, the following:

- NSF/ANSI 140-2015 Sustainability Assessment for Carpet
- NSF/ANSI 332-2015 Sustainability Assessment for Resilient Flooring
- NSF/ANSI 336-2011 Sustainability Assessment for Commercial Furnishings Fabric
- NSF/ANSI 342-2014 Sustainability Assessment for Wallcovering Products
- NSF/ANSI 347-2012 Sustainability Assessment for Single Ply Roof Membranes
- ANSI/NSC 373-2014 Sustainability Assessment for Natural Dimension Stone
- ANSI/BIFMA e3-2014: Business and Institutional Furniture Sustainability Standard (BIFMA e3) and Level® Sustainability Certification Program for Furniture
- Tile Council of North America's Green Squared Certification (ANSI A138.1-2011)
- UL 100: Sustainability of Gypsum Boards and Panels (2012)
- UL 102: Sustainability of Swinging Door Leafs (2009)

  - **References:**
    - *Global Green Tag*
    - *Green Circle Certified*
    - *Sustainable Minds (SM) Transparency Report Program*
    - *UL SPOT database*
    - *The International EPD® System*
    - *NIST BEES on-line software*

- **5.1.1.2.2:** Product selections that include sustainable comparison utilizing:
  1. Higher level of certification based upon third party verified multiple attribute standard certifications for the same product type?

2. Products that include a baseline Environmental Product Declaration (EPD), and over time produces an updated EPD that demonstrates continual improvement from the baseline of a specific product?
3. Comparison of similar building products utilizing NIST's BEES database, online analysis tool, and same impact indicators?

- **Answers:**
  - Yes (5 points)
  - No (0 points)
- **Assessment Guidance:** Multiple attribute standard certifications are developed with a consensus process and providing a certification level that allows similar product types to be compared based upon their attributes and level of certification.

  Environmental Product Declarations (EPDs) are based upon life cycle assessment and using an initial EPD as a baseline, provides an opportunity to compare and benchmark when an EPD is updated (sometimes referred to as an enhanced EPD) by a manufacturer for the same product that includes the same Product Category Rules (PCRs) and LCA framework. This type of comparison will provide an opportunity to compare a product for evaluation of reduction of Global Warming Potential (GWP) / Embodied Carbon.

  Multi-attribute Standards (MAS): products compared use the same MAS. Examples include, but are not limited to, the following:
  - NSF/ANSI 140-2015 Sustainability Assessment for Carpet
  - NSF/ANSI 332-2015 Sustainability Assessment for Resilient Flooring
  - NSF/ANSI 336-2011 Sustainability Assessment for Commercial Furnishings Fabric
  - NSF/ANSI 342-2014 Sustainability Assessment for Wallcovering Products
  - NSF/ANSI 347-2012 Sustainability Assessment for Single Ply Roof Membranes
  - ANSI/NSC 373-2014 Sustainability Assessment for Natural Dimension Stone
  - ANSI/BIFMA e3-2014: Business and Institutional Furniture Sustainability Standard (BIFMA e3) and Level® Sustainability Certification Program for Furniture
  - Tile Council of North America's Green Squared Certification (ANSI A138.1-2011)
  - UL 100: Sustainability of Gypsum Boards and Panels (2012)
  - UL 102: Sustainability of Swinging Door Leafs (2009)
- **References:**
  - *Global Green Tag*
  - *Green Circle Certified*
  - *Sustainable Minds (SM) Transparency Report Program*
  - *UL SPOT database*
  - *The International EPD® System*
  - *NIST BEES on-line software*

- **5.1.1.2.3:** Products that include:
  1. Third party sustainable forestry certification?

- **Answers:**
  - Yes (1 points)
  - No (0 points)
- **Assessment Guidance:** Products that contain certified wood includes the evaluation of the chain of custody for products and supports the sustainable growth and harvesting of forests. See Informational References for list of certifications.
- **References:**
  - *PEFC: Canadian Sustainable Forest Management: CAN/CSA-Z809-16 Sustainable Forest Management Standard*
  - *Sustainable Forestry Initiative® Standard (SFIS) - 2015 - 2019*
  - *Forest Stewardship Council (FSC) Standard FSC-STD-01-001 (V5-2): FSC Principles and Criteria for Forest Stewardship*
  - *American Tree Farm System® (ATFS): 2010-2015 Standards of Sustainability*

- **5.1.1.2.4:** Products that include:
  1. Pre-consumer and Post-consumer Recycled content?
  2. Biobased content (other than sustainable wood)?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** Products that contain pre-consumer and post-consumer recycled content and/or biobased content potentially reduce the environmental footprint of the products specified and used for cycle renovations. However, all products should be evaluated for performance and building service life requirements as a priority.
  - **References:**
    - *U.S. Office of Federal Sustainability, Council on Environmental Quality (CEQ) - Updated Guiding Principles for Sustainable Federal Buildings and Associated Instructions (December 2020)*
    - *ASTM D6866-16 Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis*
- **5.1.1.2.5:** Products that include:
  1. Reused, refurbished and/or salvaged materials from off-site in place of new materials? (including furnishings)?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** The utilization of reused, refurbished and/or salvaged materials provides an opportunity to reduce the overall environmental footprint by using materials that avoid landfill and become a resource in lieu of waste.

5.1.1.3 Criteria:
Does the building meet one or more of the following Levels?

Assessment Guidance:

Product manufacturers would provide Safety Data Sheet(s), Health Product Declaration, or equivalent transparency documentation on products being specified for cycle renovations in an existing building.

Points are earned where products include an SDS, HPD, or equivalent labeling/certification that includes transparency and ingredient listing as part of the cycle renovation criteria included in policies and procedures.

- **5.1.1.3.1: [Level 1]** Is a safety data sheet (or Health Product Declaration (HPD)) available for specified products?
    - **Answers:**
        - There is a requirement of 10 or more products (2 points)
        - There is a requirement of a minimum 5 products (1 points)
        - No (0 points)
    - **Assessment Guidance:** Product manufacturers to provide Safety Data Sheet(s), Health Product Declaration, Declare label, or equivalent transparency documentation on products being specified for cycle renovations in an existing building.

      Points are earned where products include an SDS, HPD, or equivalent labeling/certification that includes transparency and ingredient listing as part of the cycle renovation criteria included in policies and procedures.
    - **References:**
        - *Global Green Tag*
        - *Green Circle Certified*
        - *Sustainable Minds (SM) Transparency Report Program*
        - *UL SPOT database*
- **5.1.1.3.2: [Level 2]** Does the safety data sheet (SDS) or other certification documentation indicate the presence of chemicals that are considered carcinogenic, mutagenic, or reprotoxic (CMR) to reproduction or human development?
    - **Answers:**
        - There is a requirement of 10 or more products (2 points)
        - There is a requirement of a minimum 5 products (1 points)
        - No (0 points)
    - **Assessment Guidance:** Product manufacturers to provide documentation of chemicals that are considered carcinogenic, mutagenic, or reprotoxic in the SDS(s), HPDs, or equivalent documentation listing the CMR chemicals or ascertaining that there are no CMR chemicals.

      Points are earned if any CMR chemicals are identified within the SDS, HPD, or equivalent labeling/certification as part of the cycle renovation criteria included in policies and procedures.
    - **References:**
        - *Global Green Tag*
        - *Green Circle Certified*

        - *Sustainable Minds (SM) Transparency Report Program*
        - *UL SPOT database*
- **5.1.1.3.3: [Level 3]** Is a safety data sheet (or Health Product Declaration (HPD)) available for specified products?
    - **Answers:**
        - There is a requirement of 10 or more products (2 points)
        - There is a requirement of a minimum 5 products (1 points)
        - No (0 points)
    - **Assessment Guidance:** If there is a CMR chemical present, product manufacturer to provide documentation based upon evaluation of potential exposure during the installed use phase of the product. In addition to transparency, the goal of this credit is to identify if any of the CMRs identified are an exposure concern for the users of a space or building during the use phase of the product.

      Points are earned by having documentation of exposure data in the use phase of the product as part of the cycle renovation criteria included in policies and procedures.
    - **References:**
        - *Global Green Tag*
        - *Green Circle Certified*
        - *Sustainable Minds (SM) Transparency Report Program*
        - *UL SPOT database*

5.1.1.4 Criteria:
Has an annual assessment and inventory of available existing furniture (including systems furniture) for re-use or refurbishment been completed as part of the cycle renovation process?

Answers:
- Yes (4 points)
- No (0 points)

Assessment Guidance:
Completion of an inventory on an annual basis provides facilities management and design team to be aware of opportunities to re-use, re-upholster or refurbish existing furniture for regular cycle renovation of spaces.

5.1.1.5 Criteria:
Is there a construction, renovation and demolition waste management policy, procedure, and plan for cycle renovation(s)?

Answers:
- Yes (5 points)
- No (0 points)

Impact Statement:

The U.S. Environmental Protection Agency (EPA)'s Advancing Sustainable Materials Management: 2014 Fact Sheet full report shows: 534 million tons of Construction and Demolition (C&D) debris were generated in the United States in 2014 - more than twice the amount of generated municipal solid waste. Demolition represents more that 90% of total C&D debris generation, while construction represents less than 10%.

Assessment Guidance:
Reduction of Construction and Demolition waste can be reduced by implementing recycling and reuse programs on site. The construction and demolition waste program should meet the requirements of the jurisdiction.

Prior to completing cycle renovations, a waste management plan is created prior to any demolition, construction, or replacement of finishes. The construction waste management plan describes the strategy for reducing any construction waste and diverting materials from landfill. The plan should include:

- The intended strategies for construction waste reduction, salvaging, recycling, returning to supplier/manufacturer, or other methods for diverting waste from landfill;
- The construction and demolition waste materials expected to be diverted;
- The facility, hauler, or service provider that will handle each material being diverted;
- Whether construction and demolition materials will be separated onsite or commingled for removal.

At the conclusion of the cycle renovations, a final waste management summary report is completed documenting the results of the implementation of the preconstruction waste management plan.

The following shall be included in the summary report:

- The various recycling streams included in the overall project; including but not limited to corrugated cardboard, metals, concrete blocks, clean dimensional wood, building plastic, glass, gypsum board, carpet, and other finish products;
- The overall reuse/recycling diversion rate for the project;
- The weight or volume of the total quantity of construction and demolition waste;
- Copies of receipts and invoices used to track the waste management effort.

References:

- *Estimating 2003: Building-Related Construction and Demolition Materials Amounts [PDF]*
- *EPA's Best Practices for Reducing, Reusing, and Recycling Construction and Demolition Materials*
- *EPA's Sustainable Management of Construction and Demolition Materials*
- *EPA's waste characterization report, Advancing Sustainable Materials Management: Facts and Figures Report*

5.1.2 Environmental Purchasing (18 points)

5.1.2.1 Criteria:

Does building management have a written environmental purchasing policy?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
The environmental purchasing policy should assign responsibilities; ensure that those who do purchasing have adequate training; refer to products used by in-house staff; stipulate requirements for cleaning contractors; and provide education to tenants.

References:

- *Fitwel Section 6: Green Purchasing Policy (6.6)*

5.1.2.2 Criteria:
Is there a list of environmentally preferred products used in housekeeping and building maintenance based upon the building type application?

Answers:

- Yes (5 points)
- No (0 points)

Assessment Guidance:
Staff need a list of feasible environmentally friendly substitutes and their suppliers. Because products are frequently discontinued and new products introduced to the market, the list should be regularly reviewed and updated.

Cleaning and disinfection chemicals have to meet the performance criteria dictated by the building type and application. Specified materials and surfaces should be evaluated and tested based upon the cleaning and disinfection requirements and chemical compatibility. An interdisciplinary approach to evaluating cleaning and/or disinfection chemicals, their use and application, and storage requirements should be part of the evaluation of housekeeping and building maintenance performance needs as part of a regularly conducted risk assessment.

Several resources exist for identifying and purchasing environmentally preferred products, including but not limited to the following:

- EPA's Comprehensive Procurement Guideline (CPG) Program
- EPA's Safer Choice Label
- Ecologo Certified
- Global Ecolabelling Network (GEN)

References:

- *Fitwel Section 6: Green Purchasing Policy (6.6)*
- *Global Ecolabelling Network (GEN)*

- *ECOLOGO Certification Program - UL Environment*
- *Safer Choice - U.S. Environmental Protection Agency (EPA)*
- *Comprehensive Procurement Guideline (CPG) Program - U.S. Environmental Protection Agency (EPA)*

5.1.2.3 Criteria:
Does the purchasing policy include the requirement for purchasing energy saving equipment?

Answers:
- Yes (5 points)
- No (0 points)

Assessment Guidance:
The policy should include the requirement that any purchases of appliances and HVAC equipment should be ENERGY STAR® certified.

References:
- *Fitwel Section 6: Green Purchasing Policy (6.6)*
- *ENERGY STAR Qualified Product Lists*

5.1.2.4 Criteria:
Are Safety Data Sheets (SDSs) reviewed by staff who purchase hazardous products?

Answers:
- Yes (3 points)
- No (0 points)

Assessment Guidance:
Those responsible for purchasing should ensure that up-to-date Safety Data Sheets (SDS) for controlled products are reviewed and are available to employees. They should not be dated more than 3 years previous to the receiving date.

5.2 Recycling & Waste (55 points)

5.2.1 Facilities for Storage & Handling of Recyclable Materials (32 points)

5.2.1.1 Criteria:
Are there storage/handling facilities for collection and pickup of:

Assessment Guidance:
A separate designated area for storage and handling of recyclable items will help avoid recycled waste being inadvertently hauled away with other refuse or to the landfill.

References:
- *U.S. Office of Federal Sustainability, Council on Environmental Quality (CEQ) - Updated Guiding Principles for Sustainable Federal Buildings and Associated Instructions (December 2020)*
- *ANSI/ASHRAE/USGBC/IES Standard 189.1-2017, 9.3.4.1 Recyclables*

- **5.2.1.1.1:** Paper products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no paper products, mark N/A.
- **5.2.1.1.2:** Cardboard products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** This includes prioritizing reuse of cardboard products in certain scenarios, such as shipping box storage in rental apartment and office settings when boxes are needed during moving. If there are no cardboard products mark N/A.
- **5.2.1.1.3:** Glass products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no glass products, mark N/A.
- **5.2.1.1.4:** Metal products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no metal products, mark N/A.
- **5.2.1.1.5:** Plastic products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no plastic products, mark N/A.
- **5.2.1.1.6:** Composting?
    - **Answers:**
        - Yes (2 points)

        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there is no compost, mark N/A.

5.2.1.2 Criteria:
Are there point of service collection points throughout the building or campus near the areas where waste is generated for:

Assessment Guidance:
Unless there are collection points near the areas where waste is generated, it is unlikely that occupants will recycle.

- **5.2.1.2.1:** Paper and cardboard products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no paper or cardboard products, mark N/A.
- **5.2.1.2.2:** Glass products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no glass products, mark N/A.
- **5.2.1.2.3:** Metal products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no metal products, mark N/A.
- **5.2.1.2.4:** Plastic products?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If there are no plastic products, mark N/A.
- **5.2.1.2.5:** Composting?
    - **Answers:**
        - Yes (2 points)

- No (0 points)
- N/A

- **Assessment Guidance:** If there is no compost (including food waste), mark N/A.

5.2.1.3 Criteria:
For fluorescent and high-intensity discharge lamps and ballasts is there:

Assessment Guidance:
Mercury can be harmful and is commonly used in fluorescent and high-intensity discharge (HID) lamps. The appropriate storage, recycling, and disposal of these products is necessary to avoid release of mercury into the environment.

- **5.2.1.3.1:** A designated, secured storage area for replacement lamps and ballasts?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
- **5.2.1.3.2:** A designated, secured recycling/disposal area?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)

5.2.1.4 Criteria:
For electronics and batteries is there:

Assessment Guidance:
The appropriate storage, recycling, and disposal of electronics and batteries is necessary to avoid the leaching of chemicals into the environment.

Electronics include a wide range of equipment including computers, accessories, monitors, TVs, scanners, fax machines, postage machines, CD/DVD players, audio/visual equipment, paper shredders, small appliances, and other related items. Batteries include alkaline batteries, rechargeable lithium batteries, vehicle/ work equipment batteries, and any other type of single use or rechargeable battery.

Answers:
- **5.2.1.4.1:** A designated storage area for back-up and replacement electronic equipment and batteries?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
- **5.2.1.4.2:** A completed inventory of electronic equipment and batteries stored onsite and in-use?

- **Answers:**
  - Yes (1 point)
  - No (0 points)

- **5.2.1.4.3:** A designated recycling/disposal area for pick-up/removal by recycling vendor?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
- **5.2.1.4.4:** A designated charging area for equipment batteries
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** If there are no applicable equipment batteries, mark N/A.

5.2.1.5 Criteria:
Is there a designated storage area for reusable goods?

Answers:
- Yes (2 points)
- No (0 points)

5.2.2 Consumables/Disposables: Waste Reduction & Recycling (23 points)

5.2.2.1 Criteria:
Has a waste audit and vendor review been completed within the last one to three years?

Answers:
- Yes (5 points)
- No (0 points)

Assessment Guidance:
A waste audit can be conducted in-house or using a waste-management firm. It should identify the types and quantities of waste generated in the building and assess which waste materials are produced in sufficient quantities to warrant recycling. Identification of vendors and contracted third parties should be part of the waste audit including reports used to verify recycling compliance goals.

References:
- *WasteCap TRACE*
- *Benchmarking starter kit for Portfolio Manager, ENERGY STAR, U.S. Department of Energy (DOE)*
- *U.S. Environmental Protection Agency (EPA) - What is a "Waste Management Method?"*

5.2.2.2 Criteria:
Is waste regularly monitored?

Answers:

- Yes (4 points)
- No (0 points)

Assessment Guidance:
This is done by recording the weight or volume of trash and recycling that is removed from the building. Documentation from vendor or contractor used for verification.

5.2.2.3 Criteria:
Does the building have a policy for diverting consumables/disposables that includes waste reduction targets?
Answers:

- Yes (6 points)
- No (0 points)

Assessment Guidance:
Policy to include types of consumables/disposables waste being diverted from landfill, contractor requirements, and waste reduction targets. Waste measurements should be expressed both in absolute terms (e.g. the total amounts of trash and recycling) and percentage rate reduction over a specific timeframe.

5.2.2.4 Criteria:
What is the current diversion rate of consumables/ disposables?

Answers:

- 85% - 100% (5 points)
- 75% - 84% (4 points)
- 50% - 74% (3 points)
- 25% - 49% (2 points)
- Less than 25% or unknown (0 points)

Assessment Guidance:
Diversion rate is used by commercial contractors to report the rate at which non-hazardous solid waste is diverted from entering a disposal facility (as landfill avoidance).

For Federal buildings, divert at least 50% of non-hazardous, non-construction related materials from landfills (where markets exist).

References:

- *WasteCap TRACE*
- *Benchmarking starter kit for Portfolio Manager, ENERGY STAR, U.S. Department of Energy (DOE)*

- *U.S. Environmental Protection Agency (EPA) - What is a "Waste Management Method?"*

5.2.2.5 Criteria:
What is the current diversion rate of compostables?

Answers:
- 75% - 100% (3 points)
- 50% - 74% (2 points)
- 25% - 49% (1 points)
- Less than 25% or unknown (0 points)

References:
- *U.S. Environmental Protection Agency (EPA) - Managing and Transforming Waste Streams - A Tool for Communities*

6.0 Indoor Environmental Quality (Total Points: 205/1000)

6.1 IEQ Systems & Measures (67 points)

6.1.1 Ventilation System (16 points)

6.1.1.1 Criteria:

Are outdoor air intakes checked regularly to ensure that the openings are protected and free from obstruction?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:

Check that the grilles on the fresh-air supply inlets are free from obstruction by leaves, snow, insects, and pigeon bird droppings.

6.1.1.2 Criteria:

Are condensate drip trays drained and/or inspected to ensure there is no free-standing water that cannot drain away?

Answers:

- Yes (3 points)
- No (0 points)
- N/A

Assessment Guidance:

Verify that there is no free-standing water in the air-conditioning ductwork, particularly in the condensate drip trays of cooling coils, downstream from humidifiers, which can result in contamination of ducts by bacteria and fungi. If there is no air-conditioning system mark N/A.

6.1.1.3 Criteria:

Are air-handling units (AHUs) free of any signs of corrosion, loose material (such as damaged filters), or sound attenuation material?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:

Inspect the air-handling units (air-mixing chambers, coils, and fan blades) and duct interiors including any crawlspaces, tunnels, plenums, or other areas that are used as ducts or which may be in contact with the ventilation air stream. Investigate whether commissioning took place. If there are no air-handling units mark N/A.

6.1.1.4 Criteria:
Is there a steady-state CO2 concentration no greater than 700ppm above outdoor levels?

Answers:

- Yes (5 points)
- Ventilation is modulated based on ASHRAE 62.1 (4 points)
- No (0 points)

Assessment Guidance:
Reports including measurements of CO2 concentration using a CO2 monitor or sensor(s) to be provided to assessor for review. Readings to establish a representative profile for a wide range of spaces in the building. See listing of apps in Green Globes for Existing Buildings Technical Manual for consideration for using meters / apps / devices to verify CO2 levels by assessors or reports provided by owner.

Typical outdoor air is in range from 300 to 500 ppm.

The Building Automation System (BAS) may already have sensors tied to CO2 concentration measurements that can be used for reporting.

Examples of apps to use for measuring CO2 Levels include, but are not limited to:

1. BLE CO2 meter ($.99) iPhone: CO2 Meter (Bighead chen)
2. Indoor Air Quality Sensor (idevices that tie sensors to App - air quality, CO2, temperature, etc.)
3. Air Mentor PRO (Device that ties to app: CO, CO2, VOCs, small and large particle matter, relative humidity levels, temperature)
4. Awair Smart Air (Device that ties to app: dust particles, VOCs, levels of CO2, temperature and humidity.)
5. Air Mentor (Device that ties to app: particulate matter, CO2, TVOCs, Temperature, humidity.)

6.1.1.5 Criteria:
In densely occupied rooms (25 or more people per 1,000 ft2 (92.9 m2)) with variable occupancy (e.g. meeting rooms, assembly areas) are there CO2 sensing and ventilation control equipment?

Answers:

- Yes (3 points)
- No (0 points)
- N/A

Assessment Guidance:
Monitoring should be located in areas with high occupant densities. CO2 monitoring can be installed as an independent system or be a function of the building automation system that includes feedback on space ventilation performance and operation of the air intake vents.

Not applicable where there are no densely occupied spaces with variable occupancy.

References:

- *ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.1.4*
- *ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 8.3.3*

6.1.1.6 Criteria:
Do the occupants have personal control over the ventilation rates in the area in which they work, either through hybrid system (operable windows) or personalized HVAC controls?
Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Personal controls refer to 4-6 workstations or less. For unoccupied buildings and buildings with no regular working occupants, mark N/A.

6.1.2 Filtration System (20 points)

6.1.2.1 Criteria:
Green Globes provides three paths for assessing filtration systems:

- **Path A: Offices, Higher Education, General Commercial Facilities** - up to 10 points
- **Path B: Multifamily** - up to 10 points
- **Path C: Healthcare** - up to 10 points

Please select a path.

Assessment Guidance:
If there are only single space recirculating systems, such as packaged terminal air conditioning (PTAC), select "No."

6.1.2.1A.1 Criteria: Path A: Offices, Higher Education, General Commercial Facilities
What type of filtration is in place at the facility?

Answers:

- MERV 13 on make-up air (MUA) and distributed outdoor air system (DOAS) units and MERV 8 for zone units (10 points)
- MERV 13 in central air handling units (AHUs) (10 points)
- MERV 8 on MUA, DOAS, and zone units (5 points)
- None of the above (0 points)

6.1.2.1B.1 Criteria: Path B: Multifamily
What type of filtration is in place at the facility?
Answers:

- MERV 13 on make-up air (MUA), distributed outdoor air system (DOAS), and zone units (10 points)
- MERV 8 on MUA, DOAS, and zone units (5 points)
- None of the above (0 points)

6.1.2.1C.1 Criteria: Path C: Healthcare
What type of filtration is in place at the facility?

Answers:
- Filtration meets FGI Guidelines (10 points)
- Does not meet FGI Guidelines (0 points)

Assessment Guidance:
Reference 2018 FGI Guidelines for filtration requirements.

References:
- 2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)

6.1.3 Control of Pollutants at Source (31 points)

6.1.3.1 Criteria:
Are enclosed parking areas mechanically ventilated?

Answers:
- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Closed garages are generally underground and require mechanical ventilation to avoid carbon monoxide, oil, and gas fumes becoming concentrated in the garage and entering the building. Open and partially open garages which are typically above-grade, may not need mechanical ventilation. If there are no enclosed parking areas mark N/A.

6.1.3.2 Criteria:
Are there measures to prevent intake of exhaust fumes from the loading dock and parking areas?

Answers:
- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Measures include posting notices to turn off vehicles; having well-sealed doors between the parking and occupied areas; ensuring that occupied spaces near parking garages and loading

docks are under positive pressure; and increasing exhaust ventilation in the garage and loading docks. If there is no loading dock or parking areas mark N/A.

6.1.3.3 Criteria:
Is there carbon monoxide monitoring in the following:

- **6.1.3.3.1:** Garages?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Carbon monoxide monitoring should occur in the parking garage. If there are no enclosed parking areas mark N/A.
- **6.1.3.3.2:** Boilers?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Carbon monoxide monitoring should occur near boilers or other sources of combustion. If there are no enclosed boilers mark N/A.

6.1.3.4 Criteria:
Are the following addressed and/or resolved, including observations or complaints, so that the facility is free of the following symptoms of mold or excess moisture?

Assessment Guidance:
Check for visual or odor clues in the following areas: crawl spaces, sub-floor cavities and service tunnels, cold surfaces such as under windows and in corners formed by exterior walls, uninsulated cold water piping, bathrooms, indoor areas in the vicinity of known roof or wall leaks, floors and ceilings under plumbing, duct interiors near humidifiers, cooling coils, outdoor air-intakes and under carpets.

References:
- *ASHRAE 160-2016 Criteria for Moisture-Control Design Analysis in Buildings*
- *2015 ASHRAE Handbook - HVAC Applications: Chapter 62 Moisture Management in Buildings*

- **6.1.3.4.1:** Damp or musty carpets?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
- **6.1.3.4.2:** Musty odors?

- **Answers:**
  - Yes (1 point)
  - No (0 points)

6.1.3.5 Criteria:
Is there separate ventilation that provides effective local exhaust for the following spaces:

Assessment Guidance:
Some special-use areas may require additional local exhaust to prevent air pollutants from accumulating in or spreading beyond a local area. Fans should operate continuously when the source is present, not only when the room is occupied. Test the exhaust pressure effectiveness with light tissue paper.

References:
- *ASHRAE 62.2-2016: Ventilation and Acceptable Indoor Air Quality in Residential Buildings*
- *ASHRAE 62.1-2016 Ventilation for Acceptable Indoor Air Quality*
- *2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)*
- *ANSI/ASHRAE/ASHE 170-2017 Ventilation of Health Care Facilities*

- **6.1.3.5.1:** Dining venues?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Examples include cafes, cafeterias, dining rooms, eateries within grocery stores, restaurants, seating areas open to adjacent kitchen, etc.
- **6.1.3.5.2:** Kitchens?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Examples include commercial kitchens and those kitchens used for congregate living and activities.
- **6.1.3.5.3:** Chemical storage areas?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Includes decentralized and centralized chemical storage.
  - **References:**
    - *Fitwel Section 6: Indoor Air Quality Testing Results (6.5)*
- **6.1.3.5.4:** Areas that use or process chemicals?

- **Answers:**
  - Yes (1 point)
  - No (0 points)
  - N/A
- **Assessment Guidance:** Examples include an environmental services closet, housekeeping closets, barber shop, hair salon, print shop, auto repair shop, paint shop, etc.
- **References:**
  - *Fitwel Section 6: Indoor Air Quality Testing Results (6.5)*

- **6.1.3.5.5:** Bathrooms?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **Assessment Guidance:** Includes public restrooms, staff dedicated restrooms, and personal bathrooms within any type of living and/or care setting.
- **6.1.3.5.6:** Printer or copier rooms?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Includes larger, centralized copier or printer centers.

6.1.3.6 Criteria:
Are there documented measures to control pollutants in the following areas:

Assessment Guidance:
Measures to reduce at source should be documented and maintenance records kept, otherwise they may become a risk to building occupants.

References:
- *2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)*
- *ANSI/ASHRAE/ASHE 170-2017 Ventilation of Health Care Facilities*

- **6.1.3.6.1:** Environmental Services Rooms?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **Assessment Guidance:** Includes housekeeping closets.
- **6.1.3.6.2:** Kitchens?
  - **Answers:**
    - Yes (1 point)

        - No (0 points)
        - N/A
    - **Assessment Guidance:** Includes management of cooking activities.
- **6.1.3.6.3:** Chemical storage areas?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Includes decentralized and centralized chemical storage.
    - **References:**
        - *Fitwel Section 6: Indoor Air Quality Testing Results (6.5)*
- **6.1.3.6.4:** General storage areas?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** Includes vented gas appliances.
    - **References:**
        - *Fitwel Section 6: Indoor Air Quality Testing Results (6.5)*
- **6.1.3.6.5:** Printer areas or rooms?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Includes fume hoods should be installed over printing areas.

6.1.3.7 Criteria:
Does the building comply with the following:

Assessment Guidance:
Banning smoking is the most effective way to avoid environmental tobacco smoke - a source of irritation and a known carcinogen. No smoking includes vaping and electronic cigarettes.

References:
- *Fitwel Section 4: Tobacco- and Smoke-Free Signage (4.1)*
- *Fitwel Section 3: Tobacco- and Smoke-Free Outdoor Spaces (3.8)*
- *Fitwel Section 6: Tobacco- and Smoke-Free Environment (6.1)*

- **6.1.3.7.1:** Is smoking prohibited in any form within the building and within 25 feet of all building entrances, operable windows, and building ventilation intake?
    - **Answers:**

        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** The goal is to minimize / eliminate exposure to environmental tobacco smoke for all building endusers and to avoid smoke to impact ventilation returns to mechanical systems.
    - **References:**
        - *Fitwel Section 6: Tobacco- and Smoke-Free Environment (6.1)*
- **6.1.3.7.2:** Is there a building policy stating the building is smoke free?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** The goal is to minimize / eliminate exposure to environmental tobacco smoke for all building endusers and to avoid smoke to impact ventilation returns to mechanical systems.
    - **References:**
        - *Fitwel Section 6: Tobacco- and Smoke-Free Environment (6.1)*
- **6.1.3.7.3:** Are there permanent signs stating that the building is smoke-free at each entrance?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
    - **Assessment Guidance:** Posting signage at building entries support the policy for a smoke-free building. Where applicable, signage should be posted near operable windows and building ventilation intakes.
    - **References:**
        - *Fitwel Section 4: Tobacco- and Smoke-Free Signage (4.1)*
- **6.1.3.7.4:** Is there a smoke-free policy for outdoor spaces part of the building site?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
    - **Assessment Guidance:** Providing a policy banning smoking on the grounds of a building is and additional effective way to avoid environmental tobacco smoke.
    - **References:**
        - *Fitwel Section 3: Tobacco- and Smoke-Free Outdoor Spaces (3.8)*

6.1.3.8 Criteria:
Is there an entry mat system used to reduce particulate and dirt from entering the building?

Answers:

- Yes (2 points)

- No (0 points)

Assessment Guidance:
Providing an entry mat system at the main entries used by building occupants will reduce the amount of particulate in the air, contributing to improvement in indoor air quality.

References:

- *Fitwel Section 4: Entryway Systems (4.8)*

6.1.3.9 Criteria:
Is a clean steam humidification system used within the building?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Because of the risk of microbial contamination associated with spray humidification, a preferred method is humidification by steam. Clean steam humidification should be provided from an independent source, as there are some concerns with steam generated as a by-product, because of potential air contamination from boiler additives used to control scale and corrosion. If no steam humidification is used mark N/A.

6.1.3.10 Criteria:
Are floor drains protected in areas where chemicals are stored?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
At a minimum, there should be contaminate of chemicals used in building operations, such as oils, solvents, rust inhibitors, biocides pesticides, and cleaning chemicals. This can consist of plastic trays to store the materials, an enclosed system that provides portion control, or similar type of drain protection.

References:

- *ANSI/ASHRAE/ASHE Standard 189.3-2017: Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities*

6.2 IEQ Management (34 points)

6.2.1 IAQ Management (22 points)

6.2.1.1 Criteria:

Does building management have in place a documented means for addressing building occupant concerns and complaints regarding indoor air quality (such as a complaint form and incident log)?

Answers:

- Yes (4 points)
- No (0 points)

Assessment Guidance:
Building management to have in place a documented means for addressing building occupant concerns regarding indoor air quality (including odor and other contaminants). One such method is airborne contaminant tracing using chemical or biological tracing methods (e.g. tracer gas, veriDARTTM, etc.).

If inlets are on the roof, check for stagnant pools of water, insects and bird droppings as well as proximity and wind direction with regard to the spray from cooling towers. If near the ground level, check for sources of vehicle emissions (parking, drop-off/pick-up locations, and idling), industrial or commercial pollution sources, and occupant behaviors, such as smoking areas.

References:

- *Fitwel Section 6: Indoor Air Quality Testing Results (6.5)*

6.2.1.2 Criteria:
Has the building had an IAQ audit in the past year?

Answers:

- Yes (4 points)
- No (0 points)

Assessment Guidance:
The audit should have been detailed enough for management to gain a comprehensive understanding of the current IAQ situation in the building, including all of the factors that could influence the buildings IAQ, including VOCs, particulate matter, emissions, and mold/mildew. Airborne contaminant tracing using chemical or biological tracing methods (e.g. tracer gas, veriDARTTM, etc.) can be used as part of the IAQ audit.

References:

- *Fitwel Section 6: Indoor Air Quality Testing (6.4)*
- *ASTM D5197-16 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)*
- *U.S. EPA Compendium of Methods for the Determination of Toxic Organic Pollutants in Ambient Air (PDF)*

6.2.1.3 Criteria:
Are there procedures and policies for maintaining good IAQ that include:

Assessment Guidance:

Building management must have heating, ventilation, and air conditioning (HVAC) procedures and a preventive maintenance program in place.

References:

- *Fitwel Section 6: Indoor Air Quality (IAQ) Policy (6.3)*

- **6.2.1.3.1:** HVAC operations?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** There should be daily, weekly and monthly schedules.
- **6.2.1.3.2:** Housekeeping procedures?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** These should identify all areas that should be cleaned, specify the products that are to be used and their appropriate application, and provide a cleaning schedule.
- **6.2.1.3.3:** Preventive maintenance?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** This should include a scheduled program for monitoring, cleaning, and replacing HVAC components such as outside air intakes, outside air dampers, air filters, drain pans, heating and cooling coils, the interior of air handling units, fan motors and belts, air humidification, controls and cooling towers.
- **6.2.1.3.4:** Procedures for unscheduled maintenance?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)
  - **Assessment Guidance:** Procedures for unscheduled maintenance should be documented in the event of equipment failures which may require the prolonged deactivation or modification of the buildings HVAC equipment.
- **6.2.1.3.5:** Utilizing low-emitting products and materials that have conforming VOC content limits and low VOC emissions?
  - **Answers:**
    - Yes (2 points)
    - No (0 points)

- **Assessment Guidance:** The VOC content to conform to the VOC limits in the South Coast Air Quality Management District (SCAQMD) Rule 1168 (January 7, 2005). VOC limits are expressed as grams of VOC per liter of adhesive or sealant less water and less exempt compounds, with no exception for chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene according to SCAQMD Rule 1168. For low-solid adhesives or sealants the VOC limit is expressed in grams per liter of material. SCAQMD Rule 1168.

  VOC emissions results are determined by either the California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010; or UL 2821 GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings, 2013.
- **References:**
  - *South Coast Air Quality Management District (SCAQMD)- Rule 1168*

6.2.1.4 Criteria:
Is there a policy and checklist of items connected to IAQ that require discussion with architects, engineers, contractors, and other professionals prior to cycle renovations and repairs?

Answers:
- Yes (4 points)
- No (0 points)

Assessment Guidance:
Discussion is essential to avoid design features that could interfere with ventilation or thermal comfort, or which could cause condensation, or result in the selection of inappropriate materials or systems. Renovation procedures should also be discussed to avoid the release of dust and hazardous materials.

6.2.2 Integrated Pest Management (IPM) (6 points)

6.2.2.1 Criteria:
Are there suitable measures to ensure that food or food waste is well contained and that there are no unprotected openings, to minimize access by rodents?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
One way to minimize pesticides usage indoors is through the planned elimination of sources of food and pest habitats.

References:
- *Fitwel Section 6: Integrated Pest Management (6.8)*

6.2.2.2 Criteria:
Does the landscaping or building exterior grounds policy include an integrated pest management plan?

Answers:
- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Pesticide refers to insecticides, herbicides, fungicides, rodenticides, disinfectants, anti-foulants and plant growth regulators. Use of local resistant plants in landscaping may lead to a minimal need for pesticides. If there is no landscaping and no exterior grounds, mark N/A.

References:
- *Fitwel Section 6: Integrated Pest Management (6.8)*

6.2.2.3 Criteria:
Is there an integrated pest management plan for the interior of the building?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
The inclusion of an integrated pest management plan minimized the amount of chemical usage.

References:
- *Fitwel Section 6: Integrated Pest Management (6.8)*

6.2.2.4 Criteria:
Does the pest control policy and/or contract require licensed staff and utilization of an integrated pest management plan for the building?

Answers:
- Yes (1 point)
- No (0 points)
- N/A

Assessment Guidance:
The contract should require that records be kept on the type and frequency of applications of pesticides, alternative pest management approaches, compliance with legislation, and communication to tenants to notify them of pesticide applications in locations that they use. If there is no landscaping mark as N/A.

6.2.3 Cleaning & Disinfection (6 points)

6.2.3.1 Criteria:
Does the contract with the cleaning contractors specifically state that they are to use environmentally preferable cleaning materials?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Preferable cleaning materials include but are not limited to those that are defined by the Centers for Disease Control or Green Seal.

6.2.3.2 Criteria:
Is there a protocol or plan in place for flushing building air to rapidly and regularly improve air quality?

Answers:
- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Protocols/plans should include all events that may cause quickly decrease air quality, such as infectious airborne disease and volcano/fire ash.

6.2.3.3 Criteria:
If a poor air quality event has occurred in the building or in the community, can the following techniques to rapidly improve air quality take place pending longer term and/or permanent resolution of the problem:

- **6.2.3.3.1:** Increasing air changes (where feasible)?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
- **6.2.3.3.2:** After hour air flushes?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A

6.3 Hazard Prevention (30 points)

6.3.1 Asbestos (4 points)

6.3.1.1 Criteria:

If there is asbestos has the building been certified that all asbestos has been remediated or encapsulated?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:

The presence of asbestos-containing materials does not, in itself, constitute a health hazard, provided the asbestos is in tact. Friable asbestos can crumble. Encapsulating it avoids the health hazards, which can occur when asbestos fibers become airborne. If the building was complete before 1981, the building would require an assessment and certified that asbestos had been remediated or encapsulated. This is N/A if there is no asbestos in the building.

References:

- *Fitwel Section 6: Asbestos-Safe Property (6.2)*

6.3.1.2 Criteria:

Is there a documented asbestos management plan that includes precautions to be taken during repairs and cycle renovations?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:

If the building was complete after 1981 mark N/A.

References:

- *Fitwel Section 6: Asbestos-Safe Property (6.2)*

6.3.2 Radon (6 points)

6.3.2.1 Criteria:

Is the building located outside a high risk area or has a radon survey been completed which indicates levels below 4 pCi/L?

Answers:

- Building is located outside a high risk area (6 points)
- Site specific radon assessment shows site is free of radon (6 points)

- No (0 points)

Assessment Guidance:
Radon is a colorless, odorless, naturally occurring, radioactive gas produced by radium decay that is believed to cause lung cancer. The most common source of indoor radon is the uranium in the soil or rock upon which facilities are built.

Visit EPA's Map of Radon Zones to identify potential risk for your location.

References:

- *U.S. EPA document Radon Prevention in the Design and Construction of Schools and Other Large Buildings (EPA 625-R-92-016, June 1994).*
- *U. S. Environmental Protection Agency (EPA) - Map of Radon Zones*

6.3.3 Lead (6 points)

6.3.3.1 Criteria:
Is there no lead within the building?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
Lead has been found to be a hazardous material, particularly to children.

6.3.3.2 Criteria:
If there is lead in the building, has the building been certified that all lead has been encapsulated?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Lead can be encapsulated when it is in paint or other architectural coatings. If there is no lead in the building, mark N/A.

6.3.3.3 Criteria:
Is there a documented lead management plan that includes precautions to be taken during repairs and cycle renovations?

Answers:

- Yes (1 points)
- No (0 points)
- N/A

Assessment Guidance:
During renovation of any type that includes lead, verification and either encapsulation or proper licensed removal to be executed based upon an environmental assessment. If there is no lead in the building, mark N/A.

6.3.3.4 Criteria:
Has the lead levels in the potable water been tested and certified safe?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Provide water testing data from local authority or jurisdication proving potable water to the building occupants.

References:
- *Fitwel Section 9: Water Quality (9.3)*

6.3.4 Health, Safety, and Management of Chemicals & Hazardous Materials (14 points)

6.3.4.1 Criteria:
Green Globes provides two paths for assessing hazardous chemicals and chemical management.

- **Path A: Buildings other than Healthcare, Education, Laboratories, and Hospitality Facilities** - up to 14 pts
- **Path B: Healthcare, Education, Laboratories, and Hospitality Facilities** - up to 14 pts

Please select a path.

Assessment Guidance:
Assessor to help identify the appropriate path.

6.3.4A.1 Criteria: Path A: Buildings other than Healthcare, Education, Laboratories, and Hospitality Facilities
Are cleaning chemicals safely stored and secured?

Answers:
- Yes (5 points)
- No (0 points)

Assessment Guidance:
Cleaning chemicals used in buildings include various types of chemicals including bleach, ammonia base products, quaternary ammonia, hydrogen peroxide, various types of cleaning and disinfection wipes, alcohol rubs, and vinegar. It is important for environmental services staff

and/or contractor secure chemicals and verify that no OSHA violations are present within housekeeping closets and/or on housekeeping carts.

References:

- 2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)

6.3.4A.2 Criteria:
Is there a policy and procedure for disposal of cleaning chemicals?

Answers:

- Yes (3 points)
- No (0 points)

6.3.4A.3 Criteria:
Is there a Health and Wellness committee that periodically reviews the purchasing policy in relationship to chemicals being purchased, what is used within the building, and exposure risks to building occupants?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

6.3.4A.4 Criteria:
Are Hazard Communication Standard (HCS) labels present on regulated products?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
Implementing the Hazard Communication Standard (HCS) and the Workplace Hazardous Materials Information System (WHMIS) is a US-wide legal requirement designed to ensure that chemicals are handled safely and that information about them including the relevant protective measures is disseminated to workers and employers.

6.3.4A.5 Criteria:
Are current digital or hard copy Safety Data Sheets (SDSs) accessibly located near or in environmental services closets?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:

Safety Data Sheets (SDS) contain information about the properties and safe handing of each cleaning chemical.

6.3.4B.1 Criteria: Path B: Healthcare, Education, Laboratories, and Hospitality Facilities
Are cleaning chemicals and hazardous materials safely stored, secured, and HCS labeled?

Answers:

- Yes (4 points)
- No (0 points)

Assessment Guidance:
Cleaning and disinfection chemicals used in buildings include various types of chemicals including bleach, ammonia base products, quaternary ammonia, hydrogen peroxide, various types of cleaning and disinfection wipes, alcohol rubs, and vinegar. It is important for environmental services staff and/or contractor secure chemicals and verify that no OSHA violations are present within housekeeping closets and/or on housekeeping carts.

Chemicals used in buildings that are classified as hazardous include oils, biocides, solvents, insecticides, pesticides and herbicides. They should be stored in rooms with proper ventilation, controlled temperatures, drain protection and adequate shelf space. Containers should be capped to avoid possible spills and fumes, properly labeled and kept in securely locked areas.

Implementing the Hazard Communication Standard (HCS) and the Workplace Hazardous Materials Information System (WHMIS) is a US-wide legal requirement designed to ensure that chemicals and other hazardous substances are handled safely and that information about them including the relevant protective measures is disseminated to workers and employers.

References:

- ANSI/ASHRAE/ASHE Standard 189.3-2017: Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities

6.3.4B.2 Criteria:
Is there a designated person responsible for the management of hazardous materials?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
The designated person should be responsible for

1. Advising workers of potential and actual hazards,
2. Ensuring that workers use prescribed protective equipment devices, and
3. Taking every reasonable precaution for the protection of workers.

6.3.4B.3 Criteria:
Are there inventory and records of the hazardous materials/waste, including their removal and disposal?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
The inventory must identify the hazardous waste streams, the operations in the building that product them, how and where the hazardous waste is handled and stored, and who is responsible for the process. The records should show that the organization tracks the hazardous waste from the facility through a municipality licensed or certified carrier to a waste disposal facility that is also licensed or certified to accept hazardous waste.

6.3.4B.4 Criteria:
Is there a Health and Safety Committee that meets regularly and carries out regular inspections of the property?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Inspections should cover ventilation, spill containment and clean-up provisions as well as compatibility of the hazardous materials that are being stored together, and security of access. The committee should include representatives from the tenants, if applicable, as well as the management and should meet on a regular basis to deal with health and safety issues.

6.3.4B.5 Criteria:
Are current digital or hard copy SDSs, slip clean-up kits, and safety equipment such as eye-wash stations accessibly located near chemical storage areas?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Safety Data Sheets (SDS) contain information about the properties and safe handing of each hazardous product.

References:
- ANSI/ASHRAE/ASHE Standard 189.3-2017: Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities

6.3.4B.6 Criteria:
Is there a plan in place for reduction of mercury-containing products and devices and procedure for recycling, substitution, and/or disposal?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
The goal is to minimize / eliminate mercury from devices and equipment used within healthcare settings.

References:

- ANSI/ASHRAE/ASHE Standard 189.3-2017: Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities
- 2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)

6.4 Lighting (36 points)

6.4.1 Daylighting & Electrical Lighting Features (26 points)

6.4.1.1 Criteria:
Have all magnetic ballasts been replaced by electronic ballasts or with new light fixtures that include electronic ballasts or solid state technology?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
Electronic ballasts help prevent eyestrain and headaches which are often associated with the flicker produced by standard magnetic ballasts. In addition, they can result in 10% to 15% energy reduction compared to magnetic or hybrid ballasts.

6.4.1.2 Criteria:
Are there daylight controls for internal or external shading systems that reduce glare at work areas and Visual Display Terminals (VDT)?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:

Controls for shading systems limit the glare resulting from daylight and building orientation. Sensors and controls allow occupants to adjust the amount of direct light entering a space. The cut-off angle of downward light should reduce glare on VDT screens.

References:

- *Fitwel Section 7: Operable Shading (7.3)*

6.4.1.3 Criteria:
Are indirect or combination indirect/direct artificial lighting solutions provided to reduce glare?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
The provision of indirect lighting solutions for general ambient lighting reduce glare on electronic device screens and work surfaces. Combining indirect lighting with direct lighting provides ambient lighting as well as task lighting.

References:

- *IESNA Lighting Handbook, 10th Edition, 2011*
- *DG-18-08 Light + Design: A Guide to Designing Quality Lighting for People and Buildings*
- *IES/DG-25-17 Design Guide for Hospitality Lighting*
- *ANSI/IES RP-30-17 Recommended Practice for Museum Lighting*
- *ANSI/IES RP-7-17 Recommended Practice for Lighting Industrial Facilities*
- *ANSI/IES RP-4-13 Recommended Practice for Library Lighting*
- *ANSI/IES/ALA RP-11-17 Lighting for Interior and Exterior Residential Environments*
- *ANSI/IES RP-2-17 Recommended Practice for Retail Lighting*
- *ANSI/IES RP-3-13 American National Standard Practice on Lighting for Educational Facilities*
- *ANSI/IES RP-29-16 Lighting for Hospital and Healthcare Facilities*
- *ANSI/IES RP-28-16 Lighting and the Visual Environment for Seniors and the Low Vision Population (including Errata 1_020118)*
- *ANSI/IES RP-1-12 American National Practice for Office Lighting including Table B1a*

6.4.1.4 Criteria:
Do lighting levels meet the following IES requirements based upon the building type?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
To measure lighting levels, use an illuminance light meter or downloaded app, and provide documented lighting levels to third-party assessor.

- **Offices and related work spaces:** ANSI/IES RP-1-12, Table B1a: Office and Common Application Illuminance Values for additional information. An example from the table includes: for Horizonal Targets working with VDT Screen and Keyboard (average height at 30" AFF) and CSA/ISO Types I and II (Negative polarity) the following applies: <25 years old: 75 (7.5) Lux (fc), 25-65 years old: 150 (15) Lux (fc), and >65 years old: 300 (30) Lux (fc).
- **Senior living settings:** ANSI/IES RP-28-16 Lighting and the Visual Environment for Seniors and the Low Vision Population including Errata 1 020118
- **Hospital and healthcare facilities:** ANSI/IES RP-29-16 Lighting for Hospital and Healthcare Facilities
- **Educational facilities:** ANSI/IES RP-3-13 American National Standard Practice on Lighting for Educational Facilities
- **Retail establishments:** ANSI/IES RP-2-17 Recommended Practice for Retail Lighting
- Multifamily housing: ANSI/IES/ALA RP-11-17 Lighting for Interior and Exterior Residential Environments
- **Library buildings:** ANSI/IES RP-4-13 Recommended Practice for Library Lighting
- **Warehouses and industrial facilities:** ANSI/IES RP-7-17 Recommended Practice for Lighting Industrial Facilities
- **Museums and art galleries:** ANSI/IES RP-30-17 Recommended Practice for Museum Lighting
- Hotels and hospitality settings: IES/DG-25-17 Design Guide for Hospitality Lighting
-

See GBI/ANSI Standard 01-2019: 11.3.2 Lighting Design Quantity: 11.3.2.1 Regularly occupied spaces meet the Recommended Illuminance for the Locations/Tasks in Table 11.3.2.1-A and Table 11.3.2.1-B. See description and Tables in Technical Reference Manual.

References:

- *TM-18-18 Light and Human Health: An Overview of the Impact of Optical Radiation on Visual, Circadian, Neuroendocrine, and Neurobehavioral Responses*
- *DG-18-08 Light + Design: A Guide to Designing Quality Lighting for People and Buildings*
- *ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.3.2*
- *IES/DG-25-17 Design Guide for Hospitality Lighting*
- *ANSI/IES RP-30-17 Recommended Practice for Museum Lighting*
- *ANSI/IES RP-7-17 Recommended Practice for Lighting Industrial Facilities*
- *ANSI/IES RP-4-13 Recommended Practice for Library Lighting*
- *ANSI/IES/ALA RP-11-17 Lighting for Interior and Exterior Residential Environments*
- *ANSI/IES RP-2-17 Recommended Practice for Retail Lighting*
- *ANSI/IES RP-3-13 American National Standard Practice on Lighting for Educational Facilities*
- *ANSI/IES RP-29-16 Lighting for Hospital and Healthcare Facilities*
- *ANSI/IES RP-28-16 Lighting and the Visual Environment for Seniors and the Low Vision Population (including Errata 1_020118)*
- *ANSI/IES RP-1-12 American National Practice for Office Lighting including Table B1a*

6.4.1.5 Criteria:

Is individual control of task lighting provided for at least 90% of occupants?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
This is lighting for which shines directly from the luminaire to the task. It includes desk and table lights.

"Control" may either be dimming from 100% to at least 10% or stepped dimming with at least three (3) steps: 100%, 50% and 0%.

References:

- *ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.3.2*

6.4.1.6 Criteria:
Does the floor plan of the building achieve a minimum daylight factor (DF) of at least 2 (excluding all direct sunlight penetration)?

Answers:

- Yes (3 points)
- No (0 points)

Impact Statement:
Provision of daylight into workspaces are attributed to positive outcomes for building occupants. Research on circadian rhythm is available demonstrating the positive aspects of access to daylight on the wellbeing of building occupants.

Assessment Guidance:
Estimate the DF for a daylit space that has vertical windows using the following formula:

DF = 0.1 x PG, where:

DF = daylight factor

PG = percentage of glass to floor area (area of the windows/floor area)

References:

- *Fitwel Section 7: Natural Daylight (7.1)*
- *New Building Institute –Advanced Buildings® Daylighting pattern guide*
- *U.S Department of Energy (DOE) - Daylighting*
- *Architectural Lighting Magazine –Benefits of Natural Light*
- *ASHRAE Advanced Energy Design Guides*

- *Whole Building Design Guide (WBDG): Daylighting*
- *RADIANCE software (for evaluation) Validated Lighting Simulation Tool*
- *International Commission on Illumination*

6.4.1.7 Criteria:
Do 60% of regularly occupied areas have clear views to the exterior or atria within 25 ft. (7.6 m) from a window?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Provision of access to views into workspaces are attributed to positive outcomes for building occupants.

References:
- *Fitwel Section 7: Views of Nature (7.2)*

6.4.1.8 Criteria:
Do windows oriented to the south, east, and west include passive shading devices (e.g. manual window shades or permanent projections such as overhangs)?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Provision of shading systems provides personal control of daylighting that reduces glare and provides individual choice in relationship to the task at hand and the relevant impact of access to daylighting and views.

References:
- *Fitwel Section 7: Operable Shading (7.3)*

6.4.1.9 Criteria:
Do windows oriented to the south, east, and west include active automated shading system (e.g. automated windows shades or electrochromic glazing) that automatically adjust based upon sky conditions and daylighting levels?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:

Provision of automatic shading systems with the use of sensors provides reduction of glare, energy savings, and balance between the utilization of daylighting and artificial light usage for the task at hand.

References:

- *Fitwel Section 7: Operable Shading (7.3)*

6.4.1.10 Criteria:
Are photo-sensors used to maintain consistent lighting levels throughout the day using both daylighting and artificial lighting?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
Provision of automatic shading systems with the use of sensors provides reduction of glare, energy savings, and balance between the utilization of daylighting and artificial light usage for the task at hand.

6.4.1.11 Criteria:
Are exterior pathways and parking areas lit to provide safe access from parking areas to building entries?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
Provision of areas that require employees to walk from parking areas promotes safety and physical exercise. The lighting of exterior pathways that are used for physical exercise enhances use by building occupants.

References:

- *Fitwel Section 7: Pathway and Parking Area Lighting (3.7)*

6.4.1.12 Criteria:
Are all building entrances regularly used by building occupants lit to provide safe access to the building?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:

Well-lit building entrances provides a safety measure for building occupants entering and exiting a building.

References:

- *Fitwel Section 7: Safe Entry and Exit Lighting (4.4)*

6.4.2 Lighting Quality & Management (10 points)

6.4.2.1 Criteria:
In regularly occupied spaces does replacement or existing lamping include a minimum Color Rendering Index (CRI) of 80?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
The CRI value, on a scale of 0 to 100, can be used to compare one lamp to another. Color Rendition is the effect of the lamp's light spectrum on the color appearance of objects. A higher CRI value will show more saturated colors than a lower value.

6.4.2.2 Criteria:
In regularly occupied spaces does replacement or existing lamping include a Correlated Color Temperature (CCT) between 2700°K and 4500°K and is one CCT used consistently throughout occupied spaces?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
Correlated Color Temperature (CCT) measures light color. "Cool" colors have higher Kelvin temperatures (3600 - 5500°K) and "warm" colors have lower color temperatures (2700-3500°K).

Providing consistent lamping temperatures throughout occupied spaces as a standard provides consistent lighting for building occupants.

6.4.2.3 Criteria:
Is the lighting layered within workspaces within the building?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Impact Statement:

Circadian rhythms are biological processes that are generated and regulated by a biological clock located in the brain. These biological processes include body temperature, digestion, release of certain hormones, and a person's wake/sleep cycle. If a person does not receive enough light, their circadian rhythms become desynchronized with the local day-night cycle.

Assessment Guidance:
The benefits of circadian-effective daylight can be supplemented through artificial lighting under certain conditions to provide access to occupants to positively impact the re-setting of natural circadian rhythms.

Daylighting uses natural daylight as a substitute for electrical lighting. While it will likely be counterproductive to eliminate artificial lighting completely, the best proven strategy is to employ layers of light - using daylight for basic ambient light levels while providing occupants with additional lighting options to meet their needs.

An effective daylighting strategy appropriately illuminates the building space without subjecting occupants to glare or major variations in light levels, which can impact comfort and productivity.

References:

- *U.S. General Services Administration (GSA), Sustainable Facilities Tool - Circadian Light*

6.4.2.4 Criteria:
Is the artificial lighting system capable of adjusting the color rendering index (CRI) to reflect the time of day to align with circadian entrainment?

Answers:

- Yes (2 points)
- No (0 points)

6.4.2.5 Criteria:
Are there occupancy sensors and/or timeclocks for turning off indoor lighting for spaces not in use?

Answers:

- Yes (1 point)
- No (0 points)

6.4.2.6 Criteria:
Are there timeclocks and/or photosensors for exterior lighting?

Answers:

- Yes (1 point)
- No (0 points)

6.5 Comfort, Health, & Wellness (38 points)

6.5.1 Thermal Comfort (6 points)

6.5.1.1 Criteria:

Green Globes provides two paths for assessing thermal comfort:

- **Path A: ASHRAE 55 Assessment** - 3 points
- **Path B: ISO Standards Based Assessment** - 3 points

Please select a path.

Assessment Guidance:
Use Section 7 Comfort Criteria of ASHRAE 55-2017 for the ASHRAE 55 assessment path.

6.5.1A.1 Criteria: Path A: ASHRAE 55 Assessment

Have comfort levels been evaluated using Section 7 Evaluation of Comfort in Existing Buildings?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
Use ASHRAE 55-2017 Section 7 Evaluation of Comfort in Existing Buildings for the ASHRAE 55 assessment path. Methods include occupant survey and measurements using portable devices or building automation systems.

References:

- ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy

6.5.1B.1 Criteria: Path B: ISO Standards Based Assessment

Have HVAC systems and the building envelope been designed to meet ISO 7730: 2005 and ISO 17772-2017?

Answers:

- Yes (3 points)
- No (0 points)

Assessment Guidance:
Use ISO 7730: 2005 (confirmed in 2015: 2005 Version remains current), Ergonomics of the Thermal Environment -- Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local1: thermal comfort criteria and use ISO 17772-1:2017, Energy performance of buildings - Indoor environmental quality -- Part 1: Indoor environmental input parameters for the design and assessment of energy performance of

Buildings: 6.2 Thermal environment and 7.2 Thermal environment and Annex H Default criteria for the thermal environment, Table A.2 Recommended design values of the indoor operative temperature in winter and summer for buildings with mechanical cooling systems, Table A.3 Local thermal discomfort design criteria.

Provide letter from a design engineer documenting HVAC systems and building envelope have been designed to meet ISO 7730: 2005 and ISO 17772-2017 (or more recent).

References:

- ISO 17772-1:2017 Energy Performance Of Buildings - Indoor Environmental Quality - Part 1
- ISO 7730:2005 Ergonomics Of The Thermal Environment

6.5.1.2 Criteria:
Are the following being monitored continuously:

References:

- *ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy*

- **6.5.1.2.1:** Temperature?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** The building should comply with ASHRAE 55.2017 for Temperature.
    - **References:**
        - *ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy*
- **6.5.1.2.2:** Humidity?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** The building should comply with ASHRAE 55.2017 for Humidity.
    - **References:**
        - *ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy*

6.5.1.3 Criteria:
Do occupants have access to thermal control devices?

Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
Thermal control devices must be free to use for all regular building occupants, be available on every floor, and allow for individual or group control of temperature in their space.

References:
- *Fitwel Section 7: Thermal Control (7.5)*

6.5.2 Acoustical Privacy & Comfort (5 points)

6.5.2.1 Criteria:
Have noise limits been evaluated?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Evaluation should include verification of building-related systems', services', and utilities' noise levels.

6.5.2.2 Criteria:
Has an acoustical plan been developed to address acoustical privacy and comfort?

Answers:
- Yes (1 point)
- No (0 points)

Assessment Guidance:
Must be a documented acoustical plan that includes acoustic objectives (e.g. maintain specific STC rating, speech intelligibility, acoustical privacy, freedom from distraction, etc.) for all functional spaces, and includes any associated specifications and/or calculations.

Typical strategies for increasing acoustical comfort include acoustically separating areas producing atypical levels of noise (such a dance studios, music rooms, cafeterias, indoor swimming pools, mechanical rooms, toilets, gymnasia, etc.) by relocating the space in the building or enhancing insulating and isolating properties of such spaces.

6.5.2.3 Criteria:
If there is a sound masking system, has it been measured in accordance with ASTM E1573-18?

Answers:
- Yes (1 point)
- No (0 points)

- N/A

Assessment Guidance:
ASTM E1573-18 Standard Test Method for Measurement and Reporting of Masking Sound Levels Using A-Weighted and One-Third-Octave-Band Sound Pressure Levels must be used to determine compliance with specified performance requirements, as follows:

- The measured overall level is within +/-0.5dBA of that specified.
- The measured spectrum conforms to the National Research Council's SPMSoftOptimum Masking frequency range and 1/3 octave band levels, or the project acoustician's specified 1/3 octave band levels, within +/-2.0dB.

If there is no need for a sound masking system, and there is no sound masking system, mark N/A.

6.5.2.4 Criteria:
Are there spaces available to engage in a private conversation, make telephone calls, or complete focused work without noise distraction?

Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
To measure sound levels, use an integrated sound-level meter with 'A' weighting or a similar type of meter application available on-line. This reading should be no more than 45dBA (NC: 40) as maximum design criteria for noise caused by building systems in interior office spaces and 40dBA in conference rooms. Project team to provide documentation outlining dBA levels for each space. The goal is to reduce acoustic disruptions and increase speech privacy by creating spaces that minimize noise in interior spaces caused by building systems.

Reference ANSI/ASA S12.2 Standard "Criteria for Evaluating Room Noise". Airborne sound power levels from HVAC unit do not exceed the Room Criteria detailed in 2015 ASHRAE HVAC Application Handbook, Chapter 8, Table 1 for listed spaces when HVAC unit are in operation; and Chapter 48:

1) Table 1: Achieve maximum background noise levels from heating, ventilating, and air conditioning (HVAC) systems.
2) Table 6: Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed.

Reference AHRI Standard 885-2008,5/10/2019: Table 15.

For healthcare spaces, minimum requirements provided by the Facility Guidelines Institute guidelines to be used. The following references the minimum requirements for Maximum Design Criteria for Noise in Interior Spaces Caused by Building Systems:

- Guidelines for Design and Construction of Hospitals: Table 1.2-5: Maximum Design Criteria for Noise in Interior Spaces Caused By Building Systems

- Guidelines for Design and Construction of Outpatient Facilities: Table 1.2-5: Maximum Design Criteria for Noise in Interior Spaces Caused By Building Systems
- Guidelines for Design and Construction of Residential Health, Care, and Support Facilities: Table 2.5-2: Maximum Design Criteria for Noise in Interior Spaces Caused By Building Systems

References:

- *2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)*
- *Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities*
- *U.S. General Services Administration (GSA), Sustainable Facilities Tool - System Impacts*
- *GSA, Sound Matters, 2012*
- *"Workspace satisfaction: The privacy-communication trade-off in open-plan offices."*

6.5.2.5 Criteria:
Are there a variety of work spaces available that meet the acoustical needs of the building occupants?
Answers:

- Yes (1 point)
- No (0 points)

Assessment Guidance:
In open offices, speech should be heard but not generally understood in adjacent work stations. Providing a variety of types of flexible work space allows the level of acoustic privacy to be adjusted based upon space being used by building occupant.

For healthcare spaces, minimum requirements provided by the Facility Guidelines Institute guidelines to be used. The following references the minimum requirements for Sound Isolation and Speech Privacy:

- Guidelines for Design and Construction of Hospitals: Table 1.2-6 Design Minimum Sound Isolation Performance Between Enclosed Rooms and 1.207 Design Criteria for Speech Privacy for Enclosed Rooms and Open-Plan Spaces
- Guidelines for Design and Construction of Outpatient Facilities: Table 1.2-6 Design Minimum Sound Isolation Performance Between Enclosed Rooms and 1.207 Design Criteria for Speech Privacy for Enclosed Rooms and Open-Plan Spaces
- Guidelines for Design and Construction of Residential Health, Care, and Support Facilities: Table 2.5-4 Minimum Design Room - Average Sound Absorption Coefficients

References:

- *2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)*
- *Sound & Vibration: Design Guidelines for Health Care Facilities: The Acoustics Research Council, 2010 (Requires free registration)*
- *U.S. General Services Administration (GSA), Sustainable Facilities Tool - System Impacts*
- *U.S. General Services Administration (GSA), Sound Matters: How to achieve acoustic comfort in the contemporary office (PDF)*
- *"Workspace satisfaction: The privacy-communication trade-off in open-plan offices."*

6.5.3 Access to Potable Water (8 points)

6.5.3.1 Criteria:
Is there convenient access to potable drinking water?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Providing potable water supplies through a building contributes to health and wellness by providing access to hydration opportunities by the building occupants. "Convenient access" means availability for all regular building users.

References:
- *Fitwel Section 9: Universally Accessible Water Supply (9.1)*

6.5.3.2 Criteria:
Are there water bottle refilling stations available throughout the building?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Providing bottle re-filling stations contributes to building occupant hydration.

References:
- *Fitwel Section 9: Water Bottle Refilling Station (9.2)*

6.5.3.3 Criteria:
Is a water quality report available for the primary drinking water source?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
This test could have included any of the following: turbidity, total coliforms, lead, arsenic, antimony, mercury, nickel, copper, organic pollutants, agricultural contaminants, or others.

References:
- *Fitwel Section 9: Water Quality (9.3)*

6.5.3.4 Criteria:
If the water quality report indicates need for improvement is there a remediation policy?

Answers:

- Yes (2 points)
- No (0 points)

Assessment Guidance:
If the water quality report was favorable, mark N/A.

References:

- *Fitwel Section 9: Water Quality (9.3)*

6.5.4 Health & Wellness (19 points)

6.5.4.1 Criteria:
Do the work place areas within the building include active workstations?

Answers:

- Yes (2 points)
- No (0 points)
- N/A

Assessment Guidance:
Active workstations include treadmill desks, adjustable height desks, and other workstation accessories and configuration that support exercise and movement within workplaces.

References:

- *Fitwel Section 7: Active Workstations (7.4)*

6.5.4.2 Criteria:
Are there the following in place for stairwells?

Assessment Guidance:
Utilizing stairs instead of elevators and escalators supports building occupant activity and exercise that is beneficial for building occupants. Encouraging the use of stairs contributes building occupant choices - with the goal of selecting the vertical circulation option that supports health and wellness.

References:

- *Fitwel Section 5: Stair Safety (5.6)*
- *Fitwel Section 5: Stair Visibility (5.5)*
- *Fitwel Section 5: Stair Signage (5.4)*
- *Fitwel Section 5: Stair Design (5.3)*
- *Fitwel Section 5: Stair Location (5.2)*
- *Fitwel Section 5: Stair Access (5.1)*

- **6.5.4.2.1**: If the building is multi-story, does the building include a minimum of one centrally located, highly visible stairwell that is fully accessible by all building occupants from each floor?
    - **Answers:**
        - Yes (2 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If this is a one story building, mark N/A.
    - **References:**
        - *Fitwel Section 5: Stair Visibility (5.5)*
        - *Fitwel Section 5: Stair Location (5.2)*
        - *Fitwel Section 5: Stair Access (5.1)*
- **6.5.4.2.2:** If the building is multi-story, are there cues, signage, or other design features that encourage use of stairs over elevator or escalator?
    - **Answers:**
        - Yes (1 points)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** If this is a one story building, mark N/A.
    - **References:**
        - *Fitwel Section 5: Stair Signage (5.4)*
        - *Fitwel Section 5: Stair Design (5.3)*
- **6.5.4.2.3:** Are best practices for stair safety observed by including a minimum of two of the following:
    - Handrails
    - Materials
    - Lighting
    - Visual cues
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
        - N/A
    - **Assessment Guidance:** Handrails must be located on two sides. "Materials" include using high contrast tread edges, matte finishes that minimize glare, and patterned carpet. Stair safe lighting includes using lighting to emphasize steps and other impediments, illuminating dark corners, and lighting to locate entrances and exits. Visual cues include using paint, lighting, and/or tape to highlight stair edges, entrances and exits, and impediments.
    - **References:**
        - *Fitwel Section 5: Stair Safety (5.6)*

6.5.4.3 Criteria:
If a building includes Food and/or Vending Services, is the following included:

- **6.5.4.3.1:** Healthy food and beverage standards?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Based upon Human Health and Sustainability Guidelines for Federal Concessions and Vending Operations developed by Human Health Services and General Services Administration Guidelines for healthy food and beverages guidance.:
  - **References:**
    - *Fitwel Section 11: Healthy Vending Machines and Snack Bars (11.1)*
    - *Fitwel Section 10: Healthy Food and Beverage Policy (10.1)*
    - *Health and Sustainability Guidelines for Federal Concessions and Vending Operations (GSA, HHS, CDC)*
- **6.5.4.3.2:** Nutritional labeling and portion control via size and shape of food and beverage containers, prominent display of healthy food and beverage options, and/or packaging design that supports health food and beverage labeling?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Impact Statement:** Provision of cues for healthy eating and drinking assists in:
    1) Reducing morbidity and absenteeism
    2) Instills feelings of well-being
    3) Provides healthy food options
  - **References:**
    - *Fitwel Section 11: Vending Machine and Snack Bar Choice Architecture (11.2)*
    - *Fitwel Section 10: Choice Architecture (10.2)*
- **6.5.4.3.3:** Provide discounts or rebates for healthy food options?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Supporting access to reasonably priced healthy food options encourage building occupants to make healthier decisions about food and beverages. Examples include pricing incentives for healthy food and beverage

options (including in vending machines or snack bars) and crop share drop off or other fresh food delivery.

- **References:**
  - *Fitwel Section 8: Crop Share Drop-off (8.10)*
  - *Fitwel Section 11: Vending Machine and Snack Bar Pricing Incentives (11.3)*
  - *Fitwel Section 10: Pricing Incentives (10.3)*

- **6.5.4.3.4:** Provide access to free sources of drinking water?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
    - N/A
  - **Assessment Guidance:** Supporting access for hydration supports building occupant health and wellness.
  - **References:**
    - *Fitwel Section 11: Water Access (11.4)*
    - *Fitwel Section 10: Water Access (10.4)*

6.5.4.4 Criteria:
Does the building include an exercise room and/or fitness center or is access to an off-site fitness facility available for use by building occupants?

Answers:
- Yes (2 points)
- No (0 points)

Assessment Guidance:
Providing access to exercise facilities supports building occupant health and wellness.

References:
- *Fitwel Section 8: Fitness Facility (8.9)*
- *Fitwel Section 8: Exercise Room (8.8)*

6.5.4.5 Criteria:
Does the building include the following staff spaces that promote health and wellness:

References:
- *Fitwel Section 8: Multi-purpose Room (8.7)*
- *Fitwel Section 8: Lactation Rooms and Stations (8.6)*
- *Fitwel Section 8: Quiet Room (8.5)*
- *Fitwel Section 8: Break Areas Cleaning Protocol (8.4)*
- *Fitwel Section 8: Common Break Areas (8.3)*

- **6.5.4.5.1**: Break areas that accommodate space for eating meals?

- **Answers:**
  - Yes (1 point)
  - No (0 points)
- **References:**
  - *Fitwel Section 8: Common Break Areas (8.3)*

- **6.5.4.5.2**: Policy for regularly cleaning appliances within staff break room?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **References:**
    - *Fitwel Section 8: Break Areas Cleaning Protocol (8.4)*
- **6.5.4.5.3**: A quiet room that provides individual privacy?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **References:**
    - *Fitwel Section 8: Quiet Room (8.5)*
- **6.5.4.5.4**: A lactation room that includes a lactation station, refrigerator, and sink?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **References:**
    - *Fitwel Section 8: Lactation Rooms and Stations (8.6)*
- **6.5.4.5.5**: A multi-purpose room that includes the scheduling of exercise classes, nutritional educational classes, and other similar scheduled events that focus on health and wellness?
  - **Answers:**
    - Yes (1 point)
    - No (0 points)
  - **References:**
    - *Fitwel Section 8: Health Programming (8.11)*
    - *Fitwel Section 8: Multi-purpose Room (8.7)*

6.5.4.6 Criteria:
On the main entry floor:

References:
- *Fitwel Section 4: Activate Pedestrian Areas (4.6)*
- *Fitwel Section 4: Publicly Accessible Use (4.5)*

- **6.5.4.6.1**: Is there a public amenity; such as a café, library, etc. available for public access?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** Providing a public amenity generates and promotes pedestrian traffic and movement of building occupants and those in the surrounding community at-large to encourage physical activity and socialization, both positive attributes for health and wellness of building occupants.
    - **References:**
        - *Fitwel Section 4: Main Entrance Amenities (4.3)*
        - *Fitwel Section 4: Activate Pedestrian Areas (4.6)*
        - *Fitwel Section 4: Publicly Accessible Use (4.5)*
- **6.5.4.6.2:** Is there dedicated signage near a building entry for the public amenity being provided?
    - **Answers:**
        - Yes (1 point)
        - No (0 points)
    - **Assessment Guidance:** Encouraging use of the amenity increases pedestrian traffic and movement of building occupants and those using the amenity in the surrounding community at-large.
    - **References:**
        - *Fitwel Section 4: Activate Pedestrian Areas (4.6)*

Appendix A: REFERENCES AND GUIDELINES

The following is an alphabetical list of References recommended within this Technical Reference Manual. Click on the criteria number to link back to the corresponding subsection heading within the manual (references with website links listed at end of Appendix A).

- 2015 ASHRAE Handbook - HVAC Applications: Chapter 62 Moisture Management in Buildings
  - 6.1.3.4
- 2018 Guidelines for Design and Construction - Facility Guidelines Institute (FGI)
  - 6.1.2.1C.1
  - 6.1.3.5
  - 6.1.3.6
  - 6.3.4A.1
  - 6.3.4B.6
  - 6.5.2.4
  - 6.5.2.5
- AARP Livability Index
  - 2.2.2.7C.1
- ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems
  - 1.1.1.7
  - 4.2.3.6
- ANSI/ASHRAE Standard 188-2018, Section 6.2.1 Program Team
  - 4.2.3.6.1
- ANSI/ASHRAE Standard 188-2018, Section 6.2.2 Describe the Building Water Systems
  - 4.2.3.6.1
- ANSI/ASHRAE Standard 188-2018, Section 6.2.3 Process Flow Diagrams
  - 4.2.3.6.1
- ANSI/ASHRAE Standard 188-2018, Section 6.2.4 Analysis of Building Water Systems
  - 4.2.3.6.2
- ANSI/ASHRAE Standard 188-2018, Section 6.2.5 Control Measures
  - 4.2.3.6.3
- ANSI/ASHRAE Standard 188-2018, Section 6.2.6 Monitoring
  - 4.2.3.6.3
- ANSI/ASHRAE Standard 188-2018, Section 6.2.7 Corrective Actions
  - 4.2.3.6.3
- ANSI/ASHRAE Standard 188-2018, Section 6.2.8 Program Confirmation

- 4.2.3.6.4
- ANSI/ASHRAE Standard 188-2018, Section 6.2.9 Documentation and Communication
  - 4.2.3.6.5
- ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy
  - 6.5.1A.1
  - 6.5.1.2
  - 6.5.1.2.1
  - 6.5.1.2.2
- ANSI/ASHRAE/ASHE 170-2017 Ventilation of Health Care Facilities
  - 6.1.3.5
  - 6.1.3.6
- ANSI/ASHRAE/ASHE Standard 189.3-2017: Design, Construction, and Operation of Sustainable High-Performance Health Care Facilities
  - 6.1.3.10
  - 6.3.4B.1
  - 6.3.4B.5
  - 6.3.4B.6
- ANSI/ASHRAE/IES Standard 90.1-2010
  - 3.2.1.1
  - 3.2.4.1
- ANSI/ASHRAE/IES Standard 90.1-2013, Section 6.5.1
  - 4.2.2B.1.3
- ANSI/ASHRAE/USGBC/IES Standard 189.1, Section 6.3.1.2
  - 4.2.2B.1.4
- ANSI/ASHRAE/USGBC/IES Standard 189.1, Section 6.3.1.3
  - 4.2.2B.1.5
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2017, 9.3.4.1 Recyclables
  - 5.2.1.1
- ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.1.4
  - 6.1.1.5
- ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.3.2
  - 6.4.1.4
- ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 11.3.3
  - 6.4.1.5

- ANSI/GBI 01-2019 Green Globes Assessment Protocol for Commercial Buildings, Section 8.3.3
  - 6.1.1.5
- ANSI/IES RP-1-12 American National Practice for Office Lighting including Table B1a
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-2-17 Recommended Practice for Retail Lighting
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-28-16 Lighting and the Visual Environment for Seniors and the Low Vision Population (including Errata 1_020118)
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-29-16 Lighting for Hospital and Healthcare Facilities
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-3-13 American National Standard Practice on Lighting for Educational Facilities
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-30-17 Recommended Practice for Museum Lighting
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-4-13 Recommended Practice for Library Lighting
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES RP-7-17 Recommended Practice for Lighting Industrial Facilities
  - 6.4.1.3
  - 6.4.1.4
- ANSI/IES/ALA RP-11-17 Lighting for Interior and Exterior Residential Environments
  - 6.4.1.3
  - 6.4.1.4
- ASHRAE 160-2016 Criteria for Moisture-Control Design Analysis in Buildings
  - 6.1.3.4
- ASHRAE 62.1-2016 Ventilation for Acceptable Indoor Air Quality
  - 6.1.3.5
- ASHRAE 62.2-2016: Ventilation and Acceptable Indoor Air Quality in Residential Buildings

- 6.1.3.5
- ASHRAE Advanced Energy Design Guides
  - 6.4.1.6
- ASHRAE Guideline 12-2000: Minimizing the Risk of Legionellosis Associated with Building Water Systems
  - 1.1.1.7
- ASHRAE Position Document on Energy Efficiency in Buildings (PDF)
  - 3.3.2.1
- ASHRAE Standard 211-2018
  - 3.3.2.1
  - 3.3.2.1.1
  - 3.3.2.1.2
  - 3.3.2.1.3
- ASHRAE Weather Data Center
  - 3.2.1.2
- ASTM D5197-16 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)
  - 6.2.1.2
- ASTM D6866-16 Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis
  - 5.1.1.2.4
- American Bird Conservancy - Glass Collisions Downloadable Resources
  - 2.2.2.10
- American Tree Farm System® (ATFS): 2010-2015 Standards of Sustainability
  - 5.1.1.2.3
- Architectural Lighting Magazine –Benefits of Natural Light
  - 6.4.1.6
- Benchmarking starter kit for Portfolio Manager, ENERGY STAR, U.S. Department of Energy (DOE)
  - 3.1.1B.1
  - 4.2.3.3
  - 5.2.2.1
  - 5.2.2.4
- Buildings and Health, Sustainable Facilities Tool, U.S. General Services Administration (GSA)
  - 2.2.1.3
- CEMs and CEAs Qualified under ASHRAE Standard 211
  - 3.3.2.1

    - 3.3.2.1.1
    - 3.3.2.1.2
- Chicago Bird Collision Monitors (CBCM) - Products
    - 2.2.2.10
- DG-18-08 Light + Design: A Guide to Designing Quality Lighting for People and Buildings
    - 6.4.1.3
    - 6.4.1.4
- Disaster Resilience Scorecard for Industrial and Commercial Buildings (UN ARISE), UN Office for Disaster Risk Reduction (UNDRR)
    - 1.2.1.1
    - 1.2.1.1.1
    - 1.2.1.1.2
- Doing the Right Thing: Measuring Well Being for Public Policy. International Journal of Wellbeing Vol.1, No. 1. (2011), Seligman, Martin E.P
    - 2.2.1.3
- ENERGY STAR Qualified Product Lists
    - 5.1.2.3
- EPA Facilities Manual - Building Commissioning Guidelines
    - 3.3.3.1
    - 3.3.3.2
- EPA Report on the Environment: Contaminated Land
    - 2.1.1.2
- EPA's Best Practices for Reducing, Reusing, and Recycling Construction and Demolition Materials
    - 5.1.1.5
- EPA's Sustainable Management of Construction and Demolition Materials
    - 5.1.1.5
- EPA's waste characterization report, Advancing Sustainable Materials Management: Facts and Figures Report
    - 5.1.1.5
- Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations (PDF, U.S. Environmental Protection Agency)
    - 1.1.1.2
- Estimating 2003: Building-Related Construction and Demolition Materials Amounts [PDF]
    - 5.1.1.5
- Federal Energy Management Program (FEMP) - Technical Resilience Navigator
    - 1.2.1.1

- Federal Energy Management Program (FEMP), U.S. Department of Energy - Metering in Federal Buildings
    - 4.2.3.2
    - 4.2.3.3
- Fitwel Section 10: Cafeterias and Prepared Food Retail (10.1)
    - 6.5.4.3.1
- Fitwel Section 10: Cafeterias and Prepared Food Retail (10.2)
    - 6.5.4.3.2
- Fitwel Section 10: Cafeterias and Prepared Food Retail (10.3)
    - 6.5.4.3.3
- Fitwel Section 10: Cafeterias and Prepared Food Retail (10.4)
    - 6.5.4.3.4
- Fitwel Section 11: Vending Machines and Snack Bars (11.1)
    - 6.5.4.3.1
- Fitwel Section 11: Vending Machines and Snack Bars (11.2)
    - 6.5.4.3.2
- Fitwel Section 11: Vending Machines and Snack Bars (11.3)
    - 6.5.4.3.3
- Fitwel Section 11: Vending Machines and Snack Bars (11.4)
    - 6.5.4.3.4
- Fitwel Section 12: Emergency Procedures (12.1)
    - 1.2.2.3
- Fitwel Section 12: Emergency Procedures (12.2)
    - 1.2.2.6
- Fitwel Section 12: Emergency Procedures (12.3)
    - 1.2.2.1.4
- Fitwel Section 12: Emergency Procedures (12.4)
    - 1.2.2.1.3
- Fitwel Section 1: Location (1.1, 1.2, 1.3)
    - 2.2.2.7A.1
- Fitwel Section 1: Location (1.4)
    - 2.2.2.2
- Fitwel Section 2: Building Access (2.1)
    - 2.2.2.3
- Fitwel Section 2: Building Access (2.2)
    - 2.2.2.1
- Fitwel Section 2: Building Access (2.3)
    - 2.2.2.5

- Fitwel Section 2: Building Access (2.4)
  - 2.2.2.5
- Fitwel Section 2: Building Access (2.5)
  - 2.2.2.6
- Fitwel Section 2: Building Access (2.6)
  - 2.2.2.6
- Fitwel Section 3: Outdoor Spaces (3.1)
  - 2.2.1.3
- Fitwel Section 3: Outdoor Spaces (3.2)
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- Fitwel Section 3: Outdoor Spaces (3.3)
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- Fitwel Section 3: Outdoor Spaces (3.4)
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- Fitwel Section 3: Outdoor Spaces (3.5)
  - 2.2.1.3
- Fitwel Section 3: Outdoor Spaces (3.6)
  - 2.2.1.3
- Fitwel Section 3: Outdoor Spaces (3.7)
  - 6.2.2.2
  - 6.2.2.3
- Fitwel Section 3: Outdoor Spaces (3.8)
  - 6.4.1.11
- Fitwel Section 3: Outdoor Spaces (3.9)
  - 6.1.3.7.4
- Fitwel Section 4: Entrances and Ground Floor (4.1)
  - 6.1.3.7.3
- Fitwel Section 4: Entrances and Ground Floor (4.2)
  - 2.2.2.3
- Fitwel Section 4: Entrances and Ground Floor (4.3)
  - 2.2.2.3
- Fitwel Section 4: Entrances and Ground Floor (4.4)
  - 6.4.1.12
- Fitwel Section 4: Entrances and Ground Floor (4.5)
  - 6.5.4.6
  - 6.5.4.6.1
- Fitwel Section 4: Entrances and Ground Floor (4.6)
  - 6.5.4.6

    - 6.5.4.6.2
- Fitwel Section 4: Entrances and Ground Floor (4.7)
    - 6.1.3.8
- Fitwel Section 5: Stairwells (5.1)
    - 6.5.4.2
    - 6.5.4.2.1
- Fitwel Section 5: Stairwells (5.2)
    - 6.5.4.2
    - 6.5.4.2.1
- Fitwel Section 5: Stairwells (5.3)
    - 6.5.4.2
    - 6.5.4.2.2
- Fitwel Section 5: Stairwells (5.4)
    - 6.5.4.2
    - 6.5.4.2.2
- Fitwel Section 5: Stairwells (5.5)
    - 6.5.4.2
    - 6.5.4.2.1
- Fitwel Section 5: Stairwells (5.6)
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    - 6.5.4.2.3
- Fitwel Section 6: Indoor Environment (6.1)
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    - 6.1.3.7.1
- Fitwel Section 6: Indoor Environment (6.2)
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- Fitwel Section 6: Indoor Environment (6.3)
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- Fitwel Section 6: Indoor Environment (6.5)
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    - 6.1.3.6.3
    - 6.1.3.6.4
- Fitwel Section 7: Workspaces (7.1)
    - 6.4.1.6
- Fitwel Section 7: Workspaces (7.2)
    - 6.4.1.7
- Fitwel Section 7: Workspaces (7.3)

    - 6.4.1.8
    - 6.4.1.9
- Fitwel Section 7: Workspaces (7.4)
    - 6.5.4.1
- Fitwel Section 7: Workspaces (7.5)
    - 6.5.1.3
- Fitwel Section 8: Shared Spaces (8.1)
    - 1.1.1.10.1
- Fitwel Section 8: Shared Spaces (8.2)
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  - 5.1.1.2.2
  - 5.1.1.3.1
  - 5.1.1.3.2
  - 5.1.1.3.3
- Green Button Alliance
  - 4.1.1A.1
- Green Circle Certified
  - 5.1.1.2.1
  - 5.1.1.2.2
  - 5.1.1.3.1
  - 5.1.1.3.2
  - 5.1.1.3.3
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  - 1.1.1.2
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  - 4.2.1F.1f
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  - 1.2.1.1
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  - 5.1.1.2.1
  - 5.1.1.2.2
- NIST Community Resilience Planning Guide for Buildings and Infrastructure Systems (Guide and companion Playbook)
  - 1.2.1.1
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  - 6.4.1.6
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  - 5.1.1.2.3
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  - 6.4.1.6
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  - 4.2.3.6
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  - 2.2.2.10
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  - 6.5.2.4
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  - 6.2.1.3.5
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  - 5.1.1.2.3
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  - 5.1.1.2.2
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  - 5.1.1.3.3
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  - 3.4.1.1
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  - 3.4.1.1
- U.S. Environmental Protection Agency (EPA) - Managing and Transforming Waste Streams - A Tool for Communities
  - 5.2.2.5
- U.S. Environmental Protection Agency (EPA) - Portfolio Manager
  - 3.1.1B.1
  - 3.3.4.1
  - 4.2.3.3
- U.S. Environmental Protection Agency (EPA) - Renewable Energy Certificates (RECs)
  - 3.4.1.1
- U.S. Environmental Protection Agency (EPA) - What is a "Waste Management Method?"
  - 5.2.2.1
  - 5.2.2.4
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  - 4.1.1.B.1
- U.S. General Services Administration (GSA), Commissioning Guide
  - 3.3.3.1

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  - 6.5.2.5
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  - 6.4.2.3
- U.S. General Services Administration (GSA), Sustainable Facilities Tool - System Impacts
  - 6.5.2.4
  - 6.5.2.5
- U.S. General Services Administration (GSA), Sustainable Facilities Tool - Water Efficiency
  - 4.2.3.2
  - 4.2.3.3
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  - 4.2.3.5
  - 5.1.1.2.4
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- United Nations Sustainable Development Goals
  - 1.2.1.1
- WasteCap TRACE
  - 5.2.2.1
  - 5.2.2.4
- Whole Building Design Guide (WBDG) : Daylighting
  - 6.4.1.6
- Whole Building Design Guide (WBDG): Building Commissioning
  - 3.3.3.1
- “Workspace satisfaction: The privacy-communication trade-off in open-plan offices.”
  - 6.5.2.4
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Appendix B: DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

Definitions

Terms not defined in this Appendix or in referenced standards contained in Green Globes shall have their ordinarily accepted meanings within the context in which they are used. Ordinarily accepted meanings are based upon American Standard English language usage as documented in a comprehensive dictionary. Where definitions in this Appendix differ from those in a reference standard or any other source, definitions found in this Appendix shall be used.

acoustic: used when the term being qualified designates something that has the properties, dimensions, or physical characteristics associated with sound. (Citation: The Journal of the Acoustical Society of America 27, 975 (1955); doi: 10.1121/1.1908102)

acoustical: used when the term being qualified does not designate explicitly something which has properties, dimensions or physical characteristics (e.g. the subjective quality of sound). (Citation: The Journal of the Acoustical Society of America 27, 975 (1955); doi: 10.1121/1.1908102)

acoustically separated area: an enclosed space that, to function properly, requires separation from other adjacent spaces by wall, floor, and ceiling assemblies that have an STC rating adequate to allow clear, intelligible communication between sender and receiver within the space (e.g. meeting rooms, auditoria, theaters, concert venues, cinemas, lecture halls, libraries, classrooms, conference rooms, counseling offices, private offices, private rooms in health care facilities, sleeping rooms, etc.).

article: a manufactured item which:

1. is formed to a specific shape or design during manufacture;
2. has end use function(s) dependent in whole or in part upon its shape or design during end use; and
3. has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the article, and that result from a chemical reaction that occurs upon end use of other chemical substances, mixtures, or articles; except that fluids and particles are not considered articles regardless of shape of design.

assemblies: building systems categorized as exterior walls, internal partitions, windows, interim floors, roofs, beams, and columns.

alternate water source(s): non-potable water resources or water supplies not developed for potable use.

autoclaves: (see steam sterilizers).

baseline equivalent emission rate (BER): the baseline building emission rate (BER) represents the mass carbon dioxide equivalent (CO_2e) emitted for the average U.S. commercial building in the proposed building's location when using data from the U.S. Department of Energy's Energy Information Administration's (EIA) "Commercial Building Energy Consumption Survey (CBECS)." The BER is expressed as the mass of CO_2e emitted per year per unit area of the total useful floor area of a building – lb./ft²/yr. (kg/m²/yr.).

biobased content: that portion of a material or product derived from plants and other renewable agricultural, marine, and/or forestry resources. Biobased content does not include animal feed, food, or biofuels.

boilerless/connectionless food steamers: an appliance designed to cook food within an enclosure via steam-laden air that does not have a dedicated connection to a water supply.

brownfield: real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant (Some legal exclusions and additions may apply).

building commissioning: a process for enhancing the delivery of a project. The process assesses and documents that the facility, systems, and/or assemblies are planned, designed, installed, tested, and can be operated and maintained to meet the Owner's Project Requirements.

building envelope: the element of a building that separates the conditioned interior space from the exterior, such as walls, roofs, floors, slabs, foundations, doors, and fenestration.

building product: building elements and assemblies.

building resilience: the ability of a building and project site to withstand and recover rapidly from adverse events and to adapt to changing environmental conditions.

C-factor (thermal conductance): the amount, in British Thermal Units (Btu), that flows each hour through 1 ft² of the surface area of material when there is a 1° temperature difference between the inside and outside air Btu/hr-ft²-F.

carbon dioxide equivalent (CO_2e): a measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). CO_2e approximates the time-integrated warming effect of a unit of a given greenhouse gas, relative to that of carbon dioxide (CO_2). GWP is an index for estimating the relative global warming contribution of atmospheric emissions of a unit mass of a particular greenhouse gas compared to the emission of a unit mass of CO_2.

carbon offset: a certificate representing the reduction of one metric ton (2,205 lbs.) of carbon dioxide equivalent emissions.

cartridge filtration: a removable type of filtration unit containing media. Cartridge filters are removed and cleaned or replaced as a unit in entirety.

CAS number: assignment by the Chemical Abstracts Service (CAS), a division of the American Chemical Society, which assigns numbers to chemicals to allow for database searches. Most molecule databases allow searching by CAS number.

charrette: a collaborative session in which a project team creates a solution to a design or project problem. The structure may vary, depending on the complexity of the problem or desired outcome and the individuals working in the group. Charrette's can take place over multiple sessions in which the group divides into sub-groups. Each sub-group then presents its work to the full group as material for future dialogue. Charrette's can serve as a way of quickly generating solutions while integrating the aptitudes and interests of a diverse group of people.

clear views: direct, unobstructed visual sightlines from a seated or standing position inside the building to a point at least 20 ft. (6.1 m) outside the building allowing occupants exposure to sunlight and a visual connection to nature and the outdoors. Adjustable shading devices for glare control shall not be considered an obstruction.

climate zone: see Normative Appendix B of ANSI/ASHRAE/IESNA Standard 90.1-2013, or Section 301 of the 2015 International Energy Conservation Code (IECC).

clothes washer:

- commercial clothes washer: a front-loading or top-loading clothes washer designed for use in applications in which the occupants of more than one household will be using the clothes washer, such as multi-family housing common areas or laundromats.
- multi-load clothes washer: a clothes washer with a bulk capacity generally equal to or greater than 25 lbs. (11.33 kg) of laundry; used in commercial laundromat operations and multi-family common areas for tenant use and are coin- or card-operated.

- single-load clothes washer: a clothes washer with a bulk capacity less than 25 lbs. (11.33 kg); typically termed "family-sized" and found in dwelling units, commercial laundromats, and multi-family common areas for tenant use. Except for those located within dwelling units, SLWs are typically coin-or card-operated.
- tunnel washer: an industrial laundry machine design specifically to accommodate heavy wash loads; also called a continuous batch washer. In operation, laundry progresses through the washer in one direction, while water and washing chemicals move through in the opposite direction on a continuous basis.

combination oven: an appliance designed to cook food within an enclosure via hot air convection and steam-laden air.

conceptual design phase: a document that records the concepts, calculations, decisions, and product selections used to meet the owner's project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

construction documents: all of the written and graphic documents (including BIM, CAD, and other electronic files) prepared or assembled by the architect/engineer for communicating the design and administering the project. The term "Construction documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications, as well as documentation of all modifications made after the construction agreements are signed.

construction documents phase: the last stage of the design process. The design and delivery team is focused on finalizing the drawings and specifications for all components and systems of the building producing the Contract Documents. A complete set of Contract Documents provides a comprehensive, fully coordinated set of construction documents and specifications that the contractor uses to obtain necessary permits and construct the project.

conventional filtration: sorptive media filtration (e.g., with perlite or diatomaceous earth) in which regular backflushing is done with each filter cleaning and the media is replaced after each flush. In conventional filtration, the media is mixed in a slurry process inside the filter and deposited on fabric coated tubes in the pressure vessel.

counterflow systems: an evaporative cooling system in which the flow of air is upward across the wetted cooling media.

cradle-to-gate product life cycle: a partial product life cycle from resource extraction (cradle) to the factory gate before the product is transported to the consumer. This includes the product stages or raw material supply, transport, and manufacturing. The construction process, use, and end-of-life stages of the product are omitted in this case.

cradle-to-grave product life cycle: the full product life cycle from resource extraction (cradle) through the disposal stage (grave). This includes the product, construction process, use, and end-of-life stages.

crossflow system: an evaporative cooling system in which the flow of air is horizontal across the wetted cooling media.

daylighting: the integration of natural light for an enhanced connection to nature and to minimize the need for artificial lighting during the day using strategies such as effective orientation and placement of windows, use of light wells, light shafts or tubes, skylights, clerestory windows, light shelves, reflective surfaces, and shading, and the use of interior glazing to allow light into adjacent spaces.

deconstruction: the systematic dismantling and removal of a structure or its parts to salvage and harvest the components, for the purpose of reusing and recycling the reclaimed materials for their maximum value; the disassembly of a building with the explicit intent of recovering building materials for safe and economical reuse.

design development phase: refines the scope of work previously approved in the schematic design phase. In this phase, the project is developed to a level of detail necessary to work out a clear, coordinated description of all aspects of the project. Major elements including equipment, fire protection, mechanical, electrical, structural, telecommunications and plumbing systems are designed and coordinated through enlarged scale drawings, detailed elevations, and plans, and design mockups as required.

direct lighting: lighting provided from a source without reflection from other surfaces, which allows light to travel on a straight path from the light source to the point of interest, such as ceiling-mounted or suspended luminaires with mostly downward light distribution characteristics.

drift eliminator: structure to control water lost from cooling towers as liquid droplets are entrained in the exhaust air. A drift eliminator does not prevent water lost by evaporation.

drip irrigation: any non-spray, low volume irrigation system using emission devices with a flow rate measured in gallons per hour (gal/hr.) or liters per hour (L/hr.). Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

drought tolerant plant: a plant that can withstand long periods with little or no water and/or that have relatively low water requirements.

dry vacuum system: a system that does not use water to form a seal for a vacuum pump or use flowing water to create a vacuum.

existing building: a building or portion thereof that was previously occupied or approved for occupancy by the authority having jurisdiction.

exterior vegetated space: outside the building footprint and paved areas. Applies only to sites where the site is vegetated with plants that are native, adapted to the ecosystem and/or non-invasive.

fenestration: all areas (including frames) in the building envelope that transmit light including windows, translucent panels, clerestory windows, skylights, and glass block walls. For doors where the glazed vision area is less than 50% of the door area, the fenestration area is the glazed vision area. For all other doors, the fenestration area is the door area (including frames).

fenestration area: total area of the fenestration measured using the rough opening and including glass, sash, and frame.

F-factor: the perimeter heat loss factor for slab-on-grade floor, expressed in Btu/hr-ft-oF (W/m-K).

food waste disposer: a device used to shred food and other kitchen wastes prior to disposal.

formulated product: any combination or blend of two or more constituent chemicals if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction.

furnishings, finishes, and fit-outs: products and materials permanently installed on the interior of a building. This definition includes casework, shelving, and cabinets as well as finish materials used on floors, walls and ceilings. This definition does not include moveable furniture such as desks, tables, and chairs.

global warming potential (GWP): an index, describing the radiative characteristics of well-mixed greenhouse gases, that represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of carbon dioxide. (See carbon dioxide equivalent).

graywater: Untreated waste water that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. Graywater includes waste water from bathtubs, showers, and bathroom wash basins, clothes washers and laundry tubs.

greenfield: undeveloped lands such as fields, forests, farmland or rangeland.

grid displaced electricity: all electricity generated in or on the building site by, for example, PV panels, wind-power, combined heat and power systems (CHP), or similar systems.

impervious hardscape area: a hard surface area (e.g., parking lot) that prevents or retards the entry of water into the soil, thus causing water to run off the surface in greater quantities and at an increased rate of flow.

indoor environmental quality (IEQ): refers to the quality of the air and environment inside buildings, based on pollutant concentrations and conditions that can affect the health, comfort, and performance of occupants-including temperature, relative humidity, light, sound and other factors.

integrated design process (IDP): a holistic approach to project design and planning where project team members from multiple disciplines work together throughout the project design and delivery process; this emphasizes goal setting, clear and ongoing communication, attention to detail, and active collaboration among team members with the objective of achieving holistic solutions.

integrated pest management: the use of different techniques to control pests, used singly or in combination, such as selection of pest-resistant plant varieties, regular monitoring for pests, use of pest-resistant materials or use of natural predators of the pest, to control pests, with an emphasis on methods that are least injurious to the environment and most specific to the particular pest.

landscape irrigation sprinkler(s): hydraulically operated mechanical device that discharges pressurized water into the air through a nozzle(s) as a spray or stream of water.

lavatory: a washbowl or basin plumbing fixture supplied with water from a lavatory faucet located within the confinements of a bathroom or toilet room and used for the sole purpose of personal hygiene.

lavatory faucet(s): a fitting that controls the flow of water into a lavatory.

light pollution: any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

luminaire: a complete lighting unit, consisting of an artificial light source(s) together with the components required to mount the unit and distribute the light, position the light source, and connect the light source to a power supply (often referred to as a "fixture").

major renovation: has occurred when 50% of the gross area (measured to the exterior footprint) of the building has been renovated.

makeup water: water added to a cooling tower for water replenishment or water quality maintenance in a cooling tower, evaporative cooler, humidifier, fountain, pool, or other items in which water is continually depleted or used during operation.

mature plant: a full-grown plant or the size of the plant after a specified period once the plant becomes established.

meter (or sub-meter): an instrument used to measure the volume and/or rate of flow of water in a conduit or channel.

modular construction: the remote assembly of major portions of a building constructed of multiple material types involving several trades working together to build a modular unit such as a bathroom pod, patient room pod, or a wall/floor/roof assembly including HVAC, electrical, and plumbing components.

mulch: a layer of permeable material applied to the surface of a landscape area to help conserve soil moisture, improve soil health, discourage weed growth and enhance visual appeal.

multi-load: (see clothes washer)

neighborhood asset(s): a single physical location where business transactions or services are available to the public. Neighborhood assets include, but are not limited to grocery stores, banks, retail outlets, and nonprofit and public services such as religious facilities, schools, parks, police and fire stations, and government offices.

non-potable water: water that is not potable water (see potable water).

non-structural element(s): elements attached to or housed in a building or building system, that are not part of the main load-resisting structural system of the building. These include:

- architectural elements such as a parapet wall, partition wall, non-load carrying windows, suspended ceilings, furnishings, cladding systems, and veneer;
- mechanical system components;
- electrical system elements; and
- miscellaneous components, such as sign boards and file cabinets.

off-site renewable energy: green power or Renewable Energy Certificates (RECs) purchased from a third-party source such as an electrical utility. There is no physical renewable energy system either on site or specifically connected to the building.

once-through water-cooled equipment: equipment that uses a heat exchange process for cooling only once before discharge of the water to a drainage system.

onsite renewable energy: energy derived from sun, wind, water, the Earth's core, and various forms of biomass from recovered waste sources that is captured, stored and used on the building site, using such technologies as wind turbines, photovoltaic solar panels, transpired solar collectors, solar thermal heaters, and small-scale hydroelectric power plants.

orientation: the relation of a building and its associated fenestration and interior surfaces to compass direction and, therefore, to the location of the sun, usually given in terms of angular degrees away from the south, (e.g., a wall facing due Southeast has an orientation of 45 degrees east of south).

overhang: a horizontal projection for a window or wall.

ozone depletion potential (ODP): a number that refers to the amount of ozone depletion caused by a substance.

> The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the ODP of CFC-11 is defined to be 1.0. Other CFCs and HCFCs have ODP's that range from 0.01 to 1.0. The halons have ODP's ranging up to 10. Carbon tetrachloride has an ODP of 1.2, and methyl chloroform's ODP is 0.11. HFCs have zero ODP because they do not contain chlorine. Manufacturers publish tables of all ozone depleting substances showing their ODP's, GWP's, and CAS numbers.

permeable pavement(s): infiltrate, treat, and/or store rainwater where it falls. They can be made of pervious concrete, porous asphalt, or permeable interlocking pavers.

pervious concrete: allows some or all water to penetrate the concrete assembly

porous asphalt pavement(s): allows some or all water to penetrate the asphalt assembly.

post-consumer recycled content: the portion of recycled material, in a product, generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. Post-consumer recycled content includes returns of materials from the distribution chain.

potable water: water that meets the requirement of the authority having jurisdiction and is satisfactory for drinking, culinary, and domestic purposes.

pre-consumer recycled content: the portion of recycled material in a product diverted from the waste stream during a manufacturing process. Materials that have been reused (i.e., reworked, reground, or scrap generated in a process and capable of being reclaimed within the same process that generated it) are excluded.

pre-design: the activities that happen during or prior to the conceptual/schematic design phase of the project.

prefabrication: off-site, custom fabrication of major building elements in specialized facilities, in which various materials are joined to form a component part of a final installation. Examples include trusses, joists, structural steel fabrications, architectural casework, curtain wall, and precast concrete. This does not include manufactured, multi-material components such as windows, doors, and gypsum sheathing unless they are incorporated into a prefabricated building element.

pre-rinse spray valve(s): a handheld device, used with commercial dishwashing and warewashing equipment and applications, that sprays water on dishes, flatware, and other food service items to remove food residue before cleaning and sanitizing the items.

pressure regulation: a device used to maintain a constant, desired down-stream water pressure in a pipeline or emission device.

previously developed site: land that is or was occupied by a permanent structure (excluding agricultural or forestry buildings), and associated fixed surface infrastructure.

primary [regularly] occupied space: a room or enclosed space designed for human occupancy in which individuals perform activities for which the space has been specifically designed.

product formulation: any combination or blend of two or more constituent chemicals, if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction.

proposed equivalent emission rate (PER): PER is expressed as the mass of CO_2e emitted per year per unit area of the total useful floor area of the proposed building – lb./ft²/yr. (kg/m²/yr.).

R-value: indicates the resistance to heat flow (thermal resistance) of a material. The R-value of thermal insulation depends on the type of material, its thickness, and its density. The higher the R-value, the greater the insulating effectiveness. In calculating the R-value of a multi-layered installation, the R-value's of the individual layers are added.

rain shutoff device: a device connected to an irrigation controller that overrides scheduled irrigation when significant precipitation is detected.

rainwater: untreated water from natural precipitation that has not been contaminated by use. Can be used through rainwater harvesting.

rainwater catchment: collection and conveyance of precipitation from a rooftop or other constructed, above ground collection surface.

rainwater harvesting: using rainwater for potable, non-potable, industrial or irrigation applications.

reclaimed [recycled] water: highly treated wastewater that can be used for irrigation or other non-potable uses to extend water supplies.

recovered [reclaimed] material: material that would have otherwise been disposed of as waste or used for energy recovery (e.g., incinerated for power generation), but has instead been collected and recovered as a material input, in lieu of virgin primary material, for recycling or a manufacturing process.

recycled content: proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer recycled materials are considered to be recycled content (see recycled material).

recycled material: materials that have been diverted from the waste stream and reprocessed and remanufactured to form part or all of a new product.

regenerative sorptive media: filtration media capable of filtering down to 5 microns, that is usually composed of diatomaceous earth or perlite but that is unique in that it is not back-washed and replace after each use, but rather agitated off of filter tubes and then recoated on the filter. In addition to only needing occasional replacement, filtration processes using this type of media are much more water efficient.

remediation: cleanup or other methods used to remove or contain a toxic spill, contamination or hazardous material.

renewable energy: energy that is continuously replenished on the Earth, such as wind, solar thermal, solar electric, geothermal, hydropower, and various forms of biomass from recovered waste sources.

Renewable Energy Certificates (RECs): renewable energy certificates (RECs) also known as renewable energy credits, green certificates, green tags, or tradable renewable certificates, represent the environmental attributes of the power produced from renewable energy projects and are sold separately from commodity electricity. Customers can buy green certificates whether or not they have access to green power through their local utility or a competitive electricity marketer and they can purchase RECs without having to switch electricity suppliers.

renovation: changing in-kind, strengthening, refinishing, or replacing of structural elements or upgrading of existing materials, equipment and/or fixtures.

reuse: to use an object, material or resource again, either for its original purpose or a similar purpose, without significantly altering the physical form of the object or material.

risk: the probability that a product formulation, article or constituent chemical will cause an unacceptable hazardous or toxic human health or safety, or ecological effect under the intended exposure and use conditions.

risk assessment, product: a scientific product composition screening-level analysis that determines if a product formulation, article, or constituent chemical will produce a risk, based upon constituent hazards, dose and exposure assessments, and risk characterization.

risk characterization ratio (RCR): the quantitative probability estimate for adverse effects (i.e., toxicity) to occur under defined exposure conditions – calculated as RCR = exposure dosage/no adverse effects dosage, with RCR values \< 1.0 indicating the risk is adequately controlled.

salvaged material: discarded or unused construction materials or products removed from a structure or a site that have value and can be directly substituted for new materials or products with minimal reprocessing.

sand-based filtration: filtration that does not use sorptive media (such as diatomaceous earth or perlite) and does not filter down to 5 microns.

service life: the expected lifetime of a product.

shared use [multi-user] path: a form of infrastructure that supports multiple non-motorized transportation opportunities, such as walking, bicycling and inline skating. A multi-use path is physically separated from motor vehicular traffic with an open space or barrier.

sidelit daylighted area: the perpendicular area from the glazing into the space that is determined by either:

1. a distance of 15 ft. (4.6 m) or
2. the perpendicular distance from the glazing to the nearest partition that is 5 ft.(1.5 m) or higher

multiplied by the smaller of either;

a. the width of the window plus 2 ft. (0.6 m) on both sides,

b. the width of the window plus the distance to a permanent partition, or

c. the width of the window plus one-half the distance to the closest skylight or vertical glazing.

single load: (see clothes washer)

Smart Water Application Technology (SWAT): a national initiative of water providers and irrigation industry representatives to promote landscape water-use efficiency through the application of state-of-the-art irrigation technologies.

soil moisture sensor: a device to measure the moisture level in the soil and which is, in some instances, connected to an irrigation system to signal the bypass of the scheduled irrigation cycle if the soil moisture is above a specified level.

specialized activities: activities that generate pollutants, that may include but are not limited to, printing rooms, and areas that contain industrial and quasi-industrial equipment.

splash out trough: the channel located around the edge of a pool that is designed to catch water that otherwise would spill or be tracked out of the pool onto the decking. The splash out trough drains back to the pool system.

steam sterilizer [autoclave]: a device that uses moist heat in the form of saturated steam under pressure for a predetermined period of time to sterilize materials.

stormwater: natural precipitation that has contacted a surface at, below (channels storm drain pipes), or above (elevated roadways) grade.

structural system: the load-resisting system of a structure that transfers loads to the soil or supporting structure through interconnected structural components or members.

sub-meter: a subdivision of the utility metering of a building that records the proportionate energy use of specific building systems and appliances.

substantial completion: the stage in the progress of a construction project when the project or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or use the project for its intended use.

Superfund site: a site that is on the U.S. Environmental Protection Agency's (EPA) National Priority List (NPL) based on a scoring process that rates its current or potential health impact.

task lighting: light that is directed to a specific surface or area to provide illumination for visual tasks.

toplit daylighted area: the actual perimeter of the rough glazing unit or skylight opening to a point expanding outward from each side to a distance of 70% of the ceiling height. Areas of overlap with toplit daylighted area or sidelit daylighted area can only be applied to one area. Light obstructed by a permanent partition that is 5 ft. (1.5 m) high or taller is not considered as part of the toplit daylighted area.

Total Material Value: the invoiced cost of materials and products as received by the contractor, permanently installed in the building project, not including the contractor's profit, overhead, or labor. Alternatively, 45% of the total construction cost may be used to establish the Total Material Value.

Tree Protection Zone (TPZ): an area established to minimize damage to trees and their root systems. The TPZ is determined by measuring the diameter of the trunk at a standard height of 4.5 ft. (1.37 m) above the ground line and a radius from the tree trunk is extended 1.5 ft. (.46 m) for each inch (2.54 cm) of trunk diameter. For example, if the tree trunk is 10 in. (25.4 cm) at 4.5 ft. (1.37 m) above the ground line, then the TPZ radius would extend 15 ft. (4.57 m) from the tree trunk in all directions.

U-factor (thermal transmittance): the heat transmission in unit time through unit area for all the elements of construction and the boundary air films, induced by unit temperature difference between the environmental conditions on each side. Btu/hr-ft²-oF (W/m²-K).

variable air volume (VAV) system: an HVAC system that provides temperature control by varying the supply of conditioned air in different parts of the building according to heating and cooling needs. The air supply temperature may be constant or varied (also according to heating and cooling needs).

variable occupancy: a variance of 30% from design occupancy for a minimum of 30% of normally occupied hours.

vegetated roof: a roof system that may include a water proofing and root repellent system, a drainage system, filter cloth, a lightweight growing medium, and plants. Vegetated roof systems can be modular, with drainage layers, filter cloth, growing media and plants already prepared in movable, interlocking grids or each component can be installed separately.

waste heat: waste heat from industrial processes and power stations rated at more than 10MWe and with a power efficiency of greater than 35%.

water factor (WF): the quotient of the total weighted per-cycle water consumption for cold wash divided by the cubic foot (or liter) capacity of the clothes washer.

water features: a designated, often artificial, area in which visible water is moving or open for some purpose. While often this is for aesthetic purposes, these areas may have multiple uses. Generally, the term applies to places not used exclusively for irrigation.

water tempering device: a device that cools a discharge of hot water or steam to the sanitary sewer by dilution (mixing) with cooler water.

wetland: natural or constructed areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Wetlands generally include swamps, marshes, bogs and similar areas.

Abbreviations and Acronyms

APBP: Association of Pedestrian and Bicycle Professionals

ASA: Acoustical Society of America

ASABE: American Society of Agricultural and Biological Engineers ASCE:

American Society of Civil Engineers

ASTM: ASTM International

ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers ATFS:

American Tree Farm System

BUG: Backlight, Uplight and Glare Ratings

CABI: Center for Agriculture and Bioscience International CAS:

Chemical Abstracts Service

CBECS: Commercial Building Energy Consumption Survey. Developed by the U.S. Department of Energy's Energy Information Administration (EIA)

CDP: Carbon Disclosure Project

CDPH: California Department of Public Health CHPS:

Collaborative for High Performance Schools CO_2e: Carbon

Dioxide Equivalent Emissions Rate CRI: Carpet and Rug

Institute, Inc .

DJSI: (Dow Jones Sustainability Indices) EMS:

Environmental Management System EPA:

Environmental Protection Agency

FEMA: Federal Emergency Management Agency FEMP:

Federal Energy Management Program FGI: Facility

Guidelines Institute

GRESB: Global Real Estate Sustainability Benchmark

GRI: Global Reporting Institute

HVAC&R: heating, ventilating, air-conditioning, and refrigerating IAPMO: International Association of Plumbing and Mechanical Officials ICC: International Code Council®

IDP: Integrated Design Process

IECC: International Energy Conservation Code

IES: Illuminating Engineering Society of North America INCE: Institute of Noise Control Engineering

ISO: International Organization for Standardization LCA: life cycle assessment

LWA: Landscape water allowance

MERV: Minimum Efficiency Reporting Value MURB: Multi-Unit Residential Building

NAVFAC: Naval Facilities Engineering Systems Command NBI: New Buildings Institute

NCAC: National Council of Acoustical Consultants NFPA: National Fire Protection Association

NISIC: National Invasive Species Information Center NIST: National Institute of Standards and Technology NREL: National Renewable Energy Laboratory

PEFC: Programme for Endorsement of Forest Certification RCR: Risk

Characterization Ratio

RELs: Reference Exposure Levels

RFCI: Resilient Floor Covering Institute

SASB: Sustainable Accounting Standards Board SCAQMD:

South Coast Air Quality Management District

SMACNA: Sheet Metal and Air Conditioning Contractors' National Association TCNA:

Tile Council of North America

UN ARISE: UN Private Sector Alliance for Disaster Resilience Societies UNDRR: UN

Office of Disaster Risk Reduction

UNPRI: UN Principles of Responsible Investing USDA:

United States Department of Agriculture VOC: Volatile

Organic Compounds

WBDG: Whole Building Design Guide WF:

Water Factor

WISP: Whole Systems Integration Process ZWIA: Zero

Waste International Alliance

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