

# Green Existing Schools Implementation Workbook



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**green school** /grEn skül / n. a school building or facility that creates a healthy environment that is conducive to learning while saving energy, resources and money

Green schools create healthy environments conducive to learning while saving energy, resources, and money. The U.S. Green Building Council (USGBC) developed the Green Existing Schools Implementation Workbook to help schools and school districts green their existing facilities and achieve LEED® (Leadership in Energy and Environmental Design) certification.

The Implementation Workbook focuses on the O&M best practices and sustainable policies addressed by the LEED for Existing Buildings: Operations & Maintenance rating system. It is designed to be used in concert with additional resources contained in the Green Existing Schools Toolkit ([www.usgbc.org/k12toolkit](http://www.usgbc.org/k12toolkit)), including:

- **Green Existing Schools Project Management Guide for Schools** - Project teams should refer to the Project Management Guide for general guidance on navigating the LEED EB: O&M certification process, including how to conduct personnel and organizational assessments, educate and train staff, initiate the certification process, and manage a campus- or district-wide sustainability program.
- **LEED 2009 for Existing Buildings: Operations & Maintenance Project Checklist** - Project teams can use the LEED Project Checklist as a scorecard to track the credits they are pursuing toward certification.
- **LEED 2009 for Existing Buildings: Operations & Maintenance Rating System** - The Rating System summarizes the intent, requirements, and technologies/strategies for each credit
- **LEED 2009 Green Building Operations & Maintenance Reference Guide** - The Reference Guide contains detailed information on the implementation of prerequisites and credit requirements.

## Utilizing the Green Existing Schools Implementation Workbook

The Green Existing Schools Implementation Workbook is designed to assist with the evaluation and improvement of current O&M practices and policies. The workbook is organized by LEED for Existing Buildings: O&M prerequisites and credits, though not all prerequisites and credits in the rating system are addressed by the workbook. The guidance and tools contained in the workbook correspond to prerequisites and credits that lend themselves to a campus- or district-wide application. Although LEED certification is awarded to individual facilities, many of the prerequisites and credits related to O&M best practices and sustainable policies can be adopted at the district or campus level, helping to accelerate green initiatives and streamline the LEED process.

Several factors will dictate the extent to which current practices and policies need to be changed and if new ones need to be adopted. The condition and age of the building(s), the size of the district or campus, budgets and financing options, the expertise of in-house staff, and the level of certification sought will influence which practices and policies the project team will address in order to meet the LEED requirements. For example, smaller independent or charter schools where maintenance and procurement efforts are often the responsibility of one staff person may choose to focus on different O&M practices and policies than a large school district where these responsibilities are clearly delineated and assigned to district-wide departments. The LEED for Existing Buildings: O&M rating system allows for this type of flexibility and the templates and tools in the workbook can be modified accordingly.

The contents of the workbook include:

- Sample policies, programs, and plans
- Data collection forms, worksheets, and tables
- Sample surveys

## Sample Policies, Program, and Plans

The templates provided in the workbook are samples and are presented as suggestions. In many cases, schools and school districts will not have to create new policies, programs, and plans; they can simply modify existing ones by referencing the samples in the workbook.

## Data Collection Forms, Worksheets, and Tables

Data collection tools are provided for gathering the data needed to meet various prerequisite and credit requirements. Tools that are Excel-based are hyperlinked within the document; to download these spreadsheets project teams will need an internet connection.

## Sample Surveys

Customizable surveys for collecting information and feedback from teachers and school staff are provided.

## LEED Online

LEED Online is the primary resource for managing the LEED documentation process. Through LEED Online, project teams can manage project details, complete documentation requirements for LEED credits and prerequisites, upload supporting files, submit applications for review, receive reviewer feedback, and ultimately earn LEED certification.

LEED Online provides a common space where members of a project team can work together to document compliance with the LEED rating system. Project teams gain access to LEED Online once they have completed the registration process. All projects must be certified using LEED Online. The sample documents and tools provided in the *Implementation Workbook* can be customized, completed, and uploaded to LEED Online to demonstrate prerequisite and credit compliance.

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# List of Policies, Programs, and Plans

## LEED for Existing Buildings: O&M 2009

Policies, programs, and plans are referenced throughout the LEED-EB: O&M Rating System. The list below includes all the credits where such documents are referenced. Some of the documents are required uploads to LEED Online. Of those required for upload, some also require a model format specified by USGBC. They are either (1) the Policy Model, which is described in the Rating System Guide and the Reference Guide, or (2) the Program/Plan Model, which is described in a document found on the USGBC Web site under Registered Project Tools. Complete guidance for policies, programs, and plans is quoted in its entirety from the USGBC Web site at the end of this workbook.

| Document                                                                                                 | Required Upload                                                            | Policy Plan/Program Model Format |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------|
| <b>Sustainable Sites</b>                                                                                 |                                                                            |                                  |
| SSc2 – Building Exterior and Hardscape Management Plan                                                   | Building Exterior and Hardscape Management Plan                            | Yes                              |
| SSc3 – Integrated Pest Management, Erosion Control, and Landscape Management Plan                        | Integrated Pest Management, Erosion Control, and Landscape Management Plan | Yes                              |
| SSc6 – Stormwater Management Plan                                                                        | None                                                                       | N/A                              |
| <b>Water Efficiency</b>                                                                                  |                                                                            |                                  |
| WEp1 – Minimum Indoor Plumbing Fixture and Fitting Efficiency                                            | Economic Assessment of Plumbing Fixtures Policy                            | No                               |
| WEc4 – Cooling Tower Water Management                                                                    | Water Management Plan: Cooling Towers                                      | No                               |
| <b>Energy &amp; Atmosphere</b>                                                                           |                                                                            |                                  |
| EAp1 – Energy Efficiency Best Management Practices — Planning, Documentation, and Opportunity Assessment | Building Operating Plan                                                    | No                               |
| EAp3 – Fundamental Refrigerant Management                                                                | CFC Phase Out Plan                                                         | No                               |
| EAc2.1 – Existing Building Commissioning — Investigation and Analysis                                    | Commissioning Plan                                                         | No                               |
| EAc2.2 – Existing Building Commissioning — Implementation                                                | Capital Improvement Plan                                                   | No                               |
| EAc2.3 – Ongoing Commissioning Plan                                                                      | Yes                                                                        | No                               |
| EAc2.3 – Existing Building Commissioning — Ongoing Commissioning                                         | Ongoing Commissioning Program                                              | No                               |
| EAc3.1 – Performance Measurement --Building Automation System                                            | BAS Preventive Maintenance Program                                         | No                               |

| Materials and Resources                                                                                                       |                                              |     |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----|
| MRp1 – Sustainable Purchasing Policy                                                                                          | Sustainable Purchasing Policy                | Yes |
| MRp2 – Solid Waste Management Policy                                                                                          | Solid Waste Management Policy                | Yes |
| MRc1 – Sustainable Purchasing Program - (Ongoing Consumables)                                                                 | None                                         | N/A |
| MRc2 – Sustainable Purchasing Program - (Durable Goods)                                                                       | None                                         | N/A |
| MRc3 – Sustainable Purchasing Program - (Facility Alterations)                                                                | None                                         | N/A |
| MRc4 – Sustainable Purchasing --Reduced Mercury in Lamps                                                                      | None                                         | N/A |
| MRc7 – Solid Waste Management --Ongoing Consumables                                                                           | None                                         | N/A |
| MRc8 – Solid Waste Management --Durable Goods                                                                                 | None                                         | N/A |
| Indoor Environmental Quality                                                                                                  |                                              |     |
| IEQp2 – Environmental Tobacco Smoke (ETS) Control                                                                             | None                                         | N/A |
| IEQp3 – Green Cleaning Policy                                                                                                 | Green Cleaning Policy                        | Yes |
| IEQc1.1 – Indoor Air Quality Best Management Practices — Indoor Air Quality Management Program                                | None                                         | N/A |
| IEQc1.5 – Indoor Air Quality Best Management Practices — Indoor Air Quality Management for Facility Alterations and Additions | IAQ Management Plan for Facility Alterations | No  |
| IEQc3.1 – Green Cleaning — High Performance Cleaning Program                                                                  | High Performance Cleaning Program            | Yes |
| IEQc3.4 – Green Cleaning — Sustainable Cleaning Equipment                                                                     | None                                         | N/A |
| IEQc3.6 – Green Cleaning — Indoor Integrated Pest Management                                                                  | Indoor Integrated Pest Management Plan       | No  |

# SUSTAINABLE SITES



# BUILDING EXTERIOR AND HARDSCAPE MANAGEMENT PLAN (SSc2)

The Building Exterior and Hardscape Management Plan is a required upload to LEED Online and must include all elements of the USGBC model format for programs and plans. The plan helps to reduce exposure of people and animals to toxic chemicals while maintaining a clean and presentable building exterior and site hardscape.

The plan provided lends itself to a campus-wide approach and is adaptable to a district-wide application. Many of the elements of the plan can be generic to all schools in a district. However, there may need to be an attachment for schools with special stormwater management facilities. If a district-wide plan is used for meeting the requirements of this credit, the project team should review the document to make sure it covers any special circumstances for the specific school site being certified.

1. **Sample Building Exterior and Hardscape Management Plan** – The plan provided is an example that can be modified and used to establish a new, more customized document about building exterior and site hardscape.

# Sample Building Exterior and Hardscape Management Plan

## Goals and Scope

The Building Exterior and Hardscape Management Plan is intended to encourage environmentally sensitive building exterior and hardscape management practices to provide a clean, well-maintained, and safe building exterior while supporting high-performance building operations.

By adhering to the plan, [School/School District Name] will strive to employ best management practices that significantly reduce the use of harmful chemicals, energy waste, water waste, air pollution, solid waste, and chemical runoff from the building exterior and hardscape.

The annual goal of the plan is to achieve at least a 20% use of sustainable and low-impact practices or chemical use in overall building exterior and hardscape maintenance.

## Responsible Party

Exterior Maintenance Leader - Overall responsibility for the Building Exterior and Hardscape Management Plan will rest with the [Grounds Maintenance Supervisor, Facilities Manager, Maintenance Manager, etc. (select appropriate position)], who will ensure the plan's provisions are implemented, monitored, and updated, as needed.

Designated Person for Tracking Cleaning and Chemical Purchases – The exterior maintenance leader will designate an individual to track cleaning purchases to ensure they meet the sustainability criteria outlined in the plan. Manufacturer's or supplier's specification sheets will be maintained on file for all products purchased. Products that meet sustainability criteria will be noted.

## Guidance for Resources and Implementation

The following resources provide guidance for implementing the provisions of the Building Exterior and Hardscape Management Plan. [Below is a sample list of documents that apply.]

- Standard Operating Procedure (SOP) [designate SOP as applicable] for Disposing of Hazardous Cleaning Materials
- Material Safety Data Sheets (MSDS) for All Chemicals Used for Cleaning
- U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) of Cleaning Materials ([www.epa.gov/epp/pubs/products/cleaning.htm](http://www.epa.gov/epp/pubs/products/cleaning.htm)).
- School District Plan for Erosion Control, Integrated Pest Management, and Landscape Management

## Performance Measurement

Each component of the Building Exterior and Hardscape Management Plan has its own metric and will be monitored to ensure the plan's objectives are met.

## Training

All staff assigned to [The Grounds Maintenance Department, or other department name] will receive, upon hiring, orientation training on the chemical hazards they may encounter on the job. Thereafter, all staff will be required to attend the annual training workshop to include updates on HAZMAT procedures; procedures for maintaining, disposing, and recycling of cleaning and service chemicals; the Building Exterior and Hardscape Management Plan; and

the Erosion Control, Integrated Pest Management, and Landscape Management Plan. All assigned staff will be obligated to attend the annual training workshop or a makeup session.

## **Maintenance Equipment**

Maintenance equipment used in building exterior and hardscape management is to be purchased and operated in order to reduce the consumption of fossil fuels, generation of emissions, and noise. The following equipment will be used and operated as specified below:

- Lawn mowing equipment will consist primarily of mulching mowers to the extent feasible to reduce landscape waste.
- Pressure washers will be operated to reduce the amount of chemicals in the spray that can accumulate on the site, causing an adverse impact on the local ecology.
- Blowers will be purchased specifying low-decibel ratings and operated by trained employees with appropriate protection from noise and eye hazards.
- Ice removal equipment will be used only where it is not practical to use manual snow removal methods.

An equipment log will be maintained to include a list of all equipment used on the school site(s), date placed in service, maintenance schedule, and a record of servicing. The log will be inspected quarterly by the responsible party to ensure the equipment is being properly specified, operated, serviced, and maintained.

## **Snow and Ice Removal**

A low-impact ice prevention program will be implemented to use less environmentally disruptive de-icing chemicals. The objective is to reduce hazards for staff operating and maintaining the equipment and to lessen the impact on the local ecology. The following practices will be implemented as specified below:

- Ice melters will be used to break the bond between ice and the road surface so that ice and snow can be removed by shoveling or plowing. An application of a liquid anti-icing agent will be considered where it is especially important to prevent ice from forming or where the use of an ice melting chemical is not possible.
- Where occupant and visitor movement and building materials permit, redundant stairways, sidewalks, and roads will be closed during the winter to reduce the area that must be cleared of snow and ice.
- Manual shoveling or sweeping for light snow to minimize chemical usage will be used as a first step for snow removal.
- When mechanical equipment is utilized, equipment will be well maintained to minimize environmental impacts, such as leaking gas, oil, or lubricant.
- Magnesium chloride, potassium acetate, and potassium chloride products will be used on site in lieu of calcium chloride and sodium chloride as much as practical. These products are less damaging to plants, concrete, carpeting, and hard surface flooring.
- Chemical de-icing compounds will be applied with a spreader (sprayer for liquids), to minimize the amount of product used and to ensure a uniform application.
- When manual shoveling is performed, staff will be adequately protected from the cold. In addition, appropriate support equipment will be used to protect workers' backs and prevent other potential injuries.
- Staff operating mechanical equipment will have access to safety goggles and ear protection.

## Use of Chemical Concentrates and Dilution Systems

To the extent that reasonable economy can be maintained, the use of concentrates will be minimized. Where concentrates must be used, the following measures will be taken:

- Training will be documented indicating that the staffs handling concentrates are familiar with dilution procedures.
- Material Safety Data Sheets (MSDS) for the chemical being handled will be present in the room where chemical is being diluted.
- Manufacturer's instructions for dilution of cleaning chemical will be present in the room where chemical is being diluted.
- A log will be maintained on the school site(s) showing all exterior maintenance chemicals used or stored on site and the storage location.
- Portion controlled dilution devices or premeasured pouches will be used wherever possible.

## Sustainable Building Exterior, Sidewalks, Pavement Cleaning

Cleaning products are necessary for maintaining attractive and healthy schools. In addition to a tidy appearance, other benefits include the reduction of chemicals that can be tracked into the school and become air-borne or flow as run-off into the sewer system. Cleaning materials will be selected for use based on the following sustainability criteria:

- Biodegradable and low-impact cleaning products
- Minimizes exposure to concentrates
- No ozone depleting substances
- Recyclable packaging
- Recycled content in packaging
- Reduced bioconcentration factor
- Reduced flammability
- Reduced or no added dyes, except when added for safety purposes
- Reduced or no skin irritants
- Reduced or no Volatile Organic Compounds (VOCs)
- Reduced packaging

All cleaning chemicals, materials, paper, and plastic products will be tracked by the designated staff for recording cleaning purchases. Staff will maintain a spreadsheet that lists purchases and a file for product manufacturer's or supplier's product data. The files will be maintained for five years.

A cleaning schedule for exterior building components will be maintained and reviewed annually to ensure the optimum frequency of cleaning to maintain site appearance and occupant health, while minimizing use of water and cleaning chemicals. Each scheduled maintenance or cleaning will be evaluated for low-impact practices and be designated a low-impact process whenever practical.

## Paints and Sealants Used on the Building Exterior

To reduce harmful VOC emissions and protect the health of staff or workers, paints and sealants used on site will meet the sustainability requirements of South Coast Air Quality Management District (SCAQMD) Rule 1168 (based on VOC

limits effective July 1, 2005, and the rule amendment date of January 2, 2005). Green Seal Standard GS-11 will be used to meet the requirement.

## **Cleaning of Sidewalks, Pavement, and other Hardscape**

The school/school district exterior maintenance leader will coordinate with the school/school district interior cleaning leader to ensure an integrated approach to reducing outside dust, soil, and chemical residue from being tracked into the school(s).

## **Quality Assurance/Quality Control Processes**

Each component of the Building Exterior and Hardscape Management Plan will be assessed annually based on the metric for each component. The following assessment schedule is established to ensure all components are consistently evaluated on their effectiveness.

- An annual inspection of the exterior maintenance schedule(s) and log(s) will be made by the school/school district exterior maintenance leader to assess compliance of maintenance operations with the plan.
- A quarterly inspection of purchasing records and manufacturer's or supplier's data sheets will be conducted to ensure records are kept up to date.
- Review of training attendance logs will be conducted to ensure relevant staffs have been trained, which will be a ratable item for grounds maintenance supervisors' performance evaluations.
- An annual review will be conducted by the school/school district exterior maintenance leader and all grounds maintenance supervisors to assess the effectiveness of the Building Exterior and Hardscape Management Plan, highlighting challenges and opportunities for improvement.

# INTEGRATED PEST MANAGEMENT, EROSION CONTROL, AND LANDSCAPE MANAGEMENT PLAN (SSc3)

The Integrated Pest Management, Erosion Control, and Landscape Management Plan comprises three best practices. In some cases these may be three separate and distinct plans which can be uploaded to LEED Online as such. The plan (or plans) is a required upload and must include all elements of the USGBC model format for programs and plans.

The Integrated Pest Management (IPM) Plan (or section of the overall plan) helps to reduce exposure of people and animals to toxic chemicals while maintaining a pest-free environment. The Erosion Control Plan (or section of the overall plan) outlines best practices relating to stormwater management for the school site(s). The Landscape Management Plan (or section of the overall plan) compliments the stormwater management strategies for reducing erosion caused by stormwater runoff. It also reduces potable water use by including drought tolerant and native plant species that require little or no irrigation.

The plan lends itself to a campus-wide approach and is adaptable to a district-wide application. Many of the elements of the plan can be generic to all schools in a district. However, there may need to be an attachment for schools with special stormwater management facilities. If a district-wide plan is used for meeting the requirements of this credit, the project team should review the document to make sure it covers any special circumstances for the specific school site being certified.

1. **Sample Integrated Pest Management, Erosion Control, and Landscape Managements Plan and Attachment** - The plan provided is an example that can be modified and used to establish a new, more customized document.

# Sample Integrated Pest Management, Erosion Control, and Landscape Management Plan

## Goals and Scope

The Integrated Pest Management, Erosion Control, and Landscape Management Plan is intended to protect students, teachers, maintenance technicians, and other staff by reducing harmful chemical use, energy and water waste, air pollution, solid waste, and chemical runoff, such as gasoline, oil, antifreeze, and salt at the school site(s).

## Responsible Parties

Exterior Maintenance Leader - Overall responsibility for the Integrated Pest Management, Erosion Control, and Landscape Management Plan will rest with the school/school district [Grounds Maintenance Supervisor, Facilities Manager, Maintenance Manager, etc. (select appropriate position)], who will ensure the plan's provisions are implemented, monitored, and updated as needed.

Designated Person for Tracking Landscaping and Pest Management Chemical Purchases – The school/school district exterior maintenance leader will designate an individual to track purchases of chemicals to ensure they meet the sustainability criteria outlined in the program. Manufacturer's or supplier's specification sheets will be maintained on file for all products purchased. Products that meet sustainability criteria will be noted in the sustainable purchases tracking system.

Entomology Services Leader – The school/school district entomology services leader will be responsible for the Integrated Pest Management Program, including selecting strategies and ordering sustainable products and materials. He or she will maintain records on applications and treatments in all buildings on campus/within the school district.

## Guidance for Resources and Implementation

The following resources provide guidance for implementing the provisions of the Integrated Pest Management, Erosion Control, and Landscape Management Plan. [Below is a sample list of resources that could apply.]

- Standard Operating Procedure (SOP) [designate SOP as applicable] for Disposing of Hazardous Cleaning Materials
- Material Safety Data Sheets (MSDS) for all chemicals used for cleaning
- EPA's Environmentally Preferable Purchasing (EPP) of Cleaning Materials ([www.epa.gov/epp/pubs/products/cleaning.htm](http://www.epa.gov/epp/pubs/products/cleaning.htm))
- EPA Web site for Pesticides ([www.epa.gov/pesticides](http://www.epa.gov/pesticides)).
- School District Plan for Building Exterior and Hardscape Management Plan

## Performance Measurement

Each component of the Integrated Pest Management, Erosion Control, and Landscape Management Plan has its own metric and will be monitored to ensure the plan's objectives are met.

## Training

All staff assigned to [The Grounds Maintenance Department, or other department name] will receive, upon hiring, orientation training on the chemical hazards they may encounter on the job. Thereafter, all staff will be required

to attend the annual training workshop to include updates on HAZMAT procedures; procedures for maintaining, disposing, and recycling of cleaning and service chemicals; the Building Exterior and Hardscape Management Plan; and the Erosion Control, Integrated Pest Management and Landscape Management Plan. All assigned staff will be obligated to attend the annual training workshop or a makeup session.

## **Chemical Treatment Purchasing and Application**

Chemical treatment products, such as pesticides and fertilizers, are sometimes necessary for maintaining attractive, pest-free, healthy schools. The benefits of an environmentally sensitive management plan include the reduction of chemicals that can be tracked into the school(s) and become air-borne or flow as run-off into the sewer system or local water shed. Treatment chemicals will be selected for use based on the following sustainability criteria:

- Pesticides – Tier III products will be the standard purchase for pesticides and require no technical approval. Tier I and II pesticides will be purchased only by approval of the entomology services leader (see attachment).
- Fertilizers – If synthetic fertilizers are needed, the slow-release formulations will be purchased. “Weed and feed” products are not approved for purchase.

All treatment chemicals (fertilizer and pesticides, except Tier III) will be tracked by the staff designated to record chemical purchases. The designated staff will maintain a spreadsheet that lists purchases and a file for product manufacturer’s or supplier’s product data. The files will be maintained a minimum of five years.

For all facilities, a chemical application log will be maintained and reviewed annually to ensure the optimum frequency of treatment to maintain site appearance and occupant health, while minimizing use of chemicals. Each treatment will be evaluated for low-impact practices and be considered for a low-impact process whenever practical. Tier I and II pesticides will be used only by approval of the entomology services leader and only after careful evaluation of the specific circumstances

## **Integrated Pest Management (IPM)**

To promote the safe application of pest control treatments for outdoor spaces (i.e. the control of fungi, unwanted plants, insects, and animals), the following strategies will be used:

- Outdoor IPM strategies will be integrated with indoor IPM strategies to ensure consistency. Both indoor and outdoor services will be managed by the entomology services leader.
- Advance notice will be provided to all building occupants before a pesticide is applied. (Notice is not required for the use of least-toxic pesticides.) At least 72 hours notice is required under normal circumstances. The notice time may be shortened to 24 hours in an emergency situation. Notice will be communicated to building occupants by [describe communication system].
- Material Safety Data Sheets (MSDS) for each pesticide will be cataloged and maintained in a central location on the site.
- Food service areas and break rooms will be kept clean and free of food waste to eliminate food, water, and shelter for insect and animal pests. Any standing water or leaks will be reported as soon as discovered to the service order and repair desk.
- Structural repairs will be employed where appropriate to deter pests from entering the building through cracks.
- Mechanical and living biological controls will be considered and employed before pesticide use.
- When it is determined by the entomology services leader that a chemical pesticide is the only practical solution for a specific issue, then the least-toxic pesticide will be used. It will be used only in the particular location for the targeted species. To the extent practical, Tier III pesticides will be used (see attachment).

## **Erosion and Sediment Control**

Existing erosion and sedimentation problems, as well as future construction, will require assessment, plan development, and the implementation of measures to mitigate adverse impacts to the school site(s) and adjacent areas.

The exterior maintenance leader will ensure the school site(s) is inspected periodically [quarterly, annually, or select other frequency]. Areas of soil erosion will be assessed for causes and repaired as soon as practical.

During construction on the school site, the following strategies will be used to mitigate possible erosion and sedimentation issues:

- Structural – diversion dikes, silt fences, sedimentation basins/traps, inlet protection
- Stabilization – temporary seeding, permanent seeding, watering down dust-prone areas

## **Stormwater Management Plan**

The Stormwater Management Plan for the school site(s) should be reviewed annually to ensure integration with erosion and sedimentation control and landscaping maintenance. Stormwater management facilities on the school site(s) will be inspected annually. Any required repairs should be scheduled for completion before the critical-use season.

## **Landscape Management**

At least 5% of the total school site area [for every school in the district (if adopted as a district-wide plan)], including the building footprint, will be maintained with native or adaptive vegetation. The exterior maintenance leader will work with the entomology services leader to ensure the proper plant species and locations are selected to facilitate the Integrated Pest Management Plan. Plant selection will also be made based on the Stormwater Management Plan and erosion and sedimentation control requirements.

To reduce waste, chemical use, and water use required for landscape management, the following techniques will be used:

- Native or adapted species to reduce fertilizer and irrigation needs
- Large variety of plants
- Fertilizer only on an as-needed basis
- Composting waste onsite
- Municipal composting, if available
- Mulching
- Invasive species removal
- Maintain protected natural areas, which may be easier to maintain
- Mulching mower
- Shredding device for wood and leaves

## **Composting**

The exterior maintenance leader will have overall responsibility for maintaining the composting operation at the school site(s). He or she will coordinate with [Grounds Maintenance, Food Services/Kitchen Operations, Custodial Services, site manager or other applicable department] to determine the inflow materials contributing to the compost. Inflow materials may include:

- Shredded paper waste
- Landscape maintenance waste
- Food waste, as approved by the exterior maintenance leader, entomology services leader, and safety and health advisor
- Compost additives (Note: vermiculture or organic fertilizer may be used to enhance the composting process.)

The entomology services leader will also review and approve the location and materials of the composting operation to ensure compatibility and compliance with the Integrated Pest Management Plan.

## **Quality Assurance/Quality Control Processes**

Each component of the Integrated Pest Management, Erosion Control, and Landscape Management Plan will be assessed annually based on the metric for each component. The following assessment schedule is established to ensure all components are consistently evaluated for effectiveness:

- An annual inspection of the chemical treatment log(s) will be made by the school/school district exterior maintenance leader to assess compliance of maintenance operations with the plan.
- A quarterly inspection of purchasing records and manufacturer's or supplier's data sheets will be conducted to ensure records are kept up to date.
- Review of training accomplishments at least annually to ensure each employee has been trained, which will be a ratable item for all maintenance supervisors' performance evaluations that have staff working on tasks in compliance with the plan.
- An annual review will be conducted by the school/school district exterior maintenance leader and all applicable maintenance supervisors to assess the effectiveness of the Integrated Pest Management, Erosion Control, and Landscape Management Plan, highlighting challenges and opportunities for improvement.

## Sample Attachment – Tier III Lowest Concern Pesticide Products

The following pesticide products are approved for use in all schools without prior approval from the entomology services leader. [Each school district should update the list to comply with local requirements. Product names are not shown below, but should be included in the attachment for the school/school district.

| Product Name | Active Ingredient(s)           | Signal           | Notes                                                        |
|--------------|--------------------------------|------------------|--------------------------------------------------------------|
| [Product A]  | Bacillus thuringiensis (B.t.)  | Caution          |                                                              |
| [Product B]  | Potassium salts of fatty acids | Caution          |                                                              |
| [Product C]  | B.t.kurstaki (k).              | Caution          |                                                              |
| [Product D]  | S-kinoprene                    | Warn             |                                                              |
| [Product E]  | B.t.k.                         | Caution          | Indoor use only                                              |
| [Product F]  | B.t.israelensis (i).           | Caution          |                                                              |
| [Product G]  | Potassium salts of fatty acids | Warn             |                                                              |
| [Product H]  | B.t.k                          | Caution          | Sub-registration of Thuricide                                |
| [Product I]  | Potassium salts of fatty acids | Warn             |                                                              |
| [Product J]  | B.t.k.                         | Caution          |                                                              |
| [Product K]  | B.t.i.                         | Caution          |                                                              |
| [Product L]  | Mint oil                       | None<br>Required | Considered minimum risk by EPA;<br>registration not required |

# ALTERNATIVE COMMUTING TRANSPORTATION (SSc4)

Reducing the use of conventionally powered automobiles can significantly decrease air pollution and CO<sub>2</sub> emissions. Alternative commuting strategies may encourage or incentivize carpooling, use of public transportation, walking, bicycling, telecommuting, operating fuel-efficient vehicles, or implementing compressed work week schedules.

The requirements for the credit focus on staff and faculty only. However, project teams may want to consider the Innovation in Operations credit (IOc1) by expanding alternative commuting programs to include student drivers and school bus transportation.

1. **Sample Commute Survey for Staff and Faculty** – This survey can be tailored according to the school or school district’s needs. Further details on the survey process can be found in the *LEED 2009 Reference Guide for Operations & Maintenance*.
2. **Commuting Summary Table** – This [spreadsheet-based tool](#) helps organize survey data. Data from each survey form is entered into the spreadsheet tool, which automatically totals and analyzes all entered data to show whether the credit requirement has been met.

## Sample Commute Survey for Staff and Faculty

### Survey Week

|                               |  |
|-------------------------------|--|
| (Mo/Day/Yr through Mo/Day/Yr) |  |
|-------------------------------|--|

### Employee Information

|                                                      |                                              |                                              |
|------------------------------------------------------|----------------------------------------------|----------------------------------------------|
| Name:                                                |                                              |                                              |
| Make, model, and year of vehicle used for commuting: |                                              |                                              |
| Length of commute (in miles, one way):               |                                              |                                              |
| Typical arrival time:                                | <input type="checkbox"/> 6:00 AM to 10:00 AM | <input type="checkbox"/> 10:00 AM to 6:00 PM |
| Phone:                                               |                                              |                                              |
| Date:                                                |                                              |                                              |
| Signature:                                           |                                              |                                              |

### Survey Week Commuting

Place an "X" under the day of the week for the mode of transportation that was used for commuting. If you did not commute to work on one or more days, indicate the reason in the next table (e.g. vacation, day off, jury duty, etc.).

| Mode                                                 | Mon | Tue | Wed | Thu | Fri | Total |
|------------------------------------------------------|-----|-----|-----|-----|-----|-------|
| Drive Alone (conventional commute)                   |     |     |     |     |     |       |
| Drive Alone in Qualified Fuel Efficient Vehicle *    |     |     |     |     |     |       |
| 2 Persons in Vehicle [circle "X" if fuel efficient*] |     |     |     |     |     |       |
| 3 Persons in Vehicle [circle "X" if fuel efficient*] |     |     |     |     |     |       |
| 4 Persons in Vehicle [circle "X" if fuel efficient*] |     |     |     |     |     |       |
| 5 Persons in Vehicle [circle "X" if fuel efficient*] |     |     |     |     |     |       |
| 6 Persons in Vehicle [circle "X" if fuel efficient*] |     |     |     |     |     |       |
| Motorcycle                                           |     |     |     |     |     |       |
| Bus                                                  |     |     |     |     |     |       |
| Rail/Light Rail                                      |     |     |     |     |     |       |
| Walk                                                 |     |     |     |     |     |       |
| Bicycle                                              |     |     |     |     |     |       |
| Zero Emission Vehicle (Not Hybrid)                   |     |     |     |     |     |       |
| Telecommute (reduction of more than 50% of trip)     |     |     |     |     |     |       |
| Compressed Work Week Day Off                         |     |     |     |     |     |       |
| Non-commuting (and note in table below)              |     |     |     |     |     |       |

\*See instructions below on how to determine if your vehicle qualifies.

## Reasons for Non-commuting

|                                                                             |  |  |  |  |  |
|-----------------------------------------------------------------------------|--|--|--|--|--|
| Other Day(s) Off                                                            |  |  |  |  |  |
| Vacation                                                                    |  |  |  |  |  |
| Sick Leave                                                                  |  |  |  |  |  |
| Regular Day Off, Jury Duty, Leave of Absence (LOA), Off-site Training, etc. |  |  |  |  |  |

## Qualified Fuel Efficient Vehicles

To determine whether your vehicle qualifies as a fuel efficient vehicle:

1. Go online to [www.greenercars.org](http://www.greenercars.org) to search the database (2000-2008) and see if your car is listed.
2. Click on “[LEED Certified Vehicles](#).”
3. Click on “[LEED MY 2000-2009 Low Emission Vehicles](#).”
4. Scroll down the spreadsheet to find your vehicle.
5. If you find your vehicle listed, then check the box “Yes” below. If you drive your car in a carpool, be sure to check the box in the table above (e.g. “2 Persons in vehicle...”)

### American Council for an Energy-Efficient Economy (ACEEE) Vehicle Rating – LEED qualified:

☐ Yes ☐ No

## For Administrative Use

### Calculation Factors

- One conventional commute counts as one vehicle trip.
- One conventional commute with other riders counts as one vehicle trip divided by the number of total riders (e.g. three riders would be counted as 0.33 trip).
- All alternative commutes count as zero vehicle trips.
- Total number of alternative commutes (counted as zero vehicle trips):
- Driving alone in qualified fuel efficient vehicles counts as a zero vehicle trip.
- Motorcycle, bus, rail, walk, bicycle, and **zero-emissions vehicle (ZEV)** trips all count as zero vehicle trips.
- Telecommuting counts as a zero vehicle trip.
- Days off from a compressed workweek count as a zero vehicle trip.
- Absences from work, such as vacation, sick leave, etc. neither count as a conventional commute nor a zero vehicle trip. They simply are not added to the calculations.

# STORMWATER QUANTITY CONTROL (SSc6)

Improving stormwater management strategies can decrease stormwater runoff and reduce the pollution of local water bodies and the demand on municipal treatment facilities.

This credit requires the implementation of a stormwater management plan. However, the quantitative results of this plan (volume of stormwater runoff mitigated) are the focus of the submittal template. The stormwater management plan is not a required upload to LEED Online. The credit addresses the engineering aspects of stormwater management. SSc3 addresses the operational aspects of stormwater management in the erosion control component of the plan.

The annual inspection program required for this credit can be included in the erosion control plan component addressed in SSc3 and uploaded to LEED Online. The submittal for this credit requires a description of the inspection program, a copy of the most recent stormwater inspection, and a log showing that any needed maintenance or repairs were performed within 60 days of the inspection.

Required data inputs are indicated in the worksheet. The submittal form will automatically calculate the other fields and will indicate whether the credit was earned.

1. **Stormwater Quantity Control Data Collection Worksheet** - this worksheet can be used to gather data for stormwater management quantity control calculations required for the submittal form in LEED Online. Required data inputs are indicated in the worksheet. The submittal form will automatically calculate the other fields and will indicate whether the credit was earned.

## Stormwater Quantity Control – Data Collection Worksheet

| Surface Type* | Area (SF) |
|---------------|-----------|
|               |           |
|               |           |
|               |           |
|               |           |
|               |           |
|               |           |
|               |           |
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|               |           |
|               |           |

### Rainfall Intensity and Capture

For data on the 2-year, 24-hour Design Storm Rainfall Intensity: NOAA's National Weather Service Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS) (<http://hdsc.nws.noaa.gov>)

2-year, 24-hour design storm rainfall intensity:

Volume captured via collection/detention facilities:

### \* Surface Types (listed in the drop-down menus on the submittal form)

|                                                           |                                                                                                                                      |                                                                                                        |                                                                                                              |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>Pavement</b><br>Asphalt<br>Concrete<br>Brick<br>Gravel | <b>Roof</b><br>Conventional<br>Garden roof (<4 in.)<br>Garden roof (4 – 8 in.)<br>Garden roof (9 – 20 in.)<br>Garden roof (> 20 in.) | <b>Turf</b><br>Flat (0-1% slope)<br>Average (1-3% slope)<br>Hilly (3-10% slope)<br>Steep (> 10% slope) | <b>Vegetation</b><br>Flat (0-1% slope)<br>Average (1-3% slope)<br>Hilly (3-10% slope)<br>Steep (> 10% slope) |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|



# WATER EFFICIENCY



# MINIMUM INDOOR PLUMBING FIXTURE AND FITTING EFFICIENCY (WEp1)

The Economic Assessment of Plumbing Fixture Policy requires district facilities staff to consider upgrading plumbing fixtures to more efficient types at the same time that any other large renovation project is being considered. This helps keep the water savings option visible to facility planners when a large facility improvement is being contemplated. The policy is a required upload to LEED Online, however project teams are not required to follow the USGBC model format for policies.

This plan lends itself to a campus-wide approach and easily adaptable to a district-wide application. However, campus- or district-wide adoption of the policy is not a requirement of the rating system. Only future renovations of the facility being certified must be addressed by the policy. The school/school district may want to consider making this a campus or district-wide policy for all facilities.

1. **Sample Economic Assessment of Plumbing Fixtures Policy** - The policy sample shown below is an example that can be modified and used to establish a new, more customized document.
2. **Water Use Performance Calculations - Data Collection Worksheet** - The worksheet contains data fields needed for the submittal form.

# Sample Economic Assessment of Plumbing Fixtures Policy

## Purpose

The purpose of the policy is to ensure that for any retrofit/renovation that includes indoor plumbing renovation or replacement, the facility planners consider converting plumbing fixtures to high-performance models. The policy will assist decision makers in understanding the costs and benefits of converting to high-performance plumbing fixtures.

## Scope

In the event that a project includes indoor plumbing renovation or replacement, the conversion of all current plumbing fixtures and fittings to high-performance fixtures and fittings will be considered. Fixtures and fittings include, at a minimum, water closets, urinals, showerheads, and faucets. The assessment will account for water supply and disposal and maintenance cost savings for all fixtures and fittings under consideration.

[School/School District] will assess the cost savings of installing or replacing current flush fixtures with the following high-performance flush fixture models:

| Flush Fixture                                      | Flow rate [GPF] |
|----------------------------------------------------|-----------------|
| Conventional water closet                          | 1.6             |
| High-efficiency toilet (HET), single-flush gravity | 1.28            |
| HET, single-flush pressure assist                  | 1.0             |
| HET, dual flush (full-flush)                       | 1.6             |
| HET, dual flush (low-flush)                        | 1.1             |
| HET, foam flush                                    | .05             |
| Nonwater toilet                                    | 0.0             |
| Conventional urinal                                | 1.0             |
| High-efficiency urinal (HEU)                       | .5              |
| Nonwater urinal                                    | 0.0             |

[School/School District] will assess the cost savings of installing or replacing current flow fixtures with the following high-performance flow fixture models:

| Flow Fixture                  | Flow rate                  |
|-------------------------------|----------------------------|
| Conventional private lavatory | 2.2 gpm                    |
| Conventional public lavatory  | 0.5 gpm or $\leq 0.25$ gpc |
| Conventional kitchen sink     | 2.2 gpm                    |
| Low-flow kitchen sink         | 1.8 gpm                    |
| Conventional shower           | 2.5 gpm                    |
| Low-flow shower               | 1.8 gpm                    |

[School/School District] will assess the costs savings of installing the following alternative high-efficiency plumbing fixtures and strategies:

- Flow reduction aerators in faucets
- Automatic controls on lavatory faucets
- Graywater volumes captured from showers, sinks, and lavatories for use in water closets
- Composting toilets
- Waterless urinals

## Procedures and Strategies

[Responsible Party (Title)] will accomplish the following tasks:

- Perform (or include in facility planners scope of work) an economic analysis for potential future indoor plumbing renovations.
- Use the economic analysis to identify which high-efficiency fixtures and fittings will work in the building(s) with a payback of less than [10] years. (Note: Each school district should determine its own threshold for what it considers to be economical.)
- Present the results of the analysis to [head of facilities or other applicable administrator]; obtain decision on how to proceed with plumbing fixture upgrades.

## Water-Use Performance Calculations – Data Collection Worksheet

Projects with fixtures installed before 1993 will need to have the water-use performance calculated to determine compliance with the prerequisite. The submittal form contains embedded tables for the data needed to calculate performance. The worksheet below, when completed, will provide all the data needed for the submittal form. Other fields in the embedded tables that will automatically be populated and/or calculated by the submittal form are not shown in this worksheet.

|                   |              |
|-------------------|--------------|
| Project Building: | Square Foot: |
|-------------------|--------------|

### 1. Fixture Group Definitions

The inventory of fixtures should be grouped in order to differentiate between pre and post 1993 fixtures and by occupant or user groups. In some cases, calculations will vary based on user groups. Different baselines will be used depending on the year of fixture installation.

|            |                                                                       |                                                                            |                          | Occupants (users) in Group |                   |       |
|------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------|----------------------------|-------------------|-------|
| Group Name | # of Fixtures Installed or Completely Replaced Before January 1, 1993 | # of Fixtures Installed or Completely Replaced on or After January 1, 1993 | Annual Days of Operation | Full-Time Employees        | Students/Visitors | Other |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |
|            |                                                                       |                                                                            |                          |                            |                   |       |

## 2. Flush Fixture Data

| Fixture Group | Fixture ID (optional) | Fixture Family (1) | Fixture Type (2) |
|---------------|-----------------------|--------------------|------------------|
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
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|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |

|                                                                        |                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>(1) Fixture Family (choose one):</p> <p>Water Closet<br/>Urinal</p> | <p>(2) Fixture Type:</p> <p>Water Closet:<br/>IPC/UPC Equivalent Water Closet<br/>Low-Flow Water Closet<br/>Ultra Low-Flow Water Closet<br/>Composting Toilet<br/>Other</p> <p>Urinal:<br/>IPC/UPC Equivalent Urinal<br/>Non-Water Urinal<br/>Other</p> |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Notes:

### 3. Flow Fixture Data

| Fixture Group | Fixture ID (Optional) | Fixture Family (1) | Fixture Type (2) |
|---------------|-----------------------|--------------------|------------------|
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |
|               |                       |                    |                  |

|                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>(1) Fixture Family (choose one):</p> <p>Private Lavatory Faucet<br/>Public Lavatory Faucet<br/>Kitchen Sink<br/>Shower</p> | <p>(2) Fixture Type:</p> <p>Private Lavatory Faucet:<br/>IPC/UPC Equivalent Lavatory<br/>Low-Flow Lavatory<br/>Ultra Low-Flow Lavatory<br/>Other</p> <p>Public Lavatory Faucet:<br/>IPC/UPC Equivalent Lavatory<br/>Low-Flow Lavatory<br/>Ultra Low-Flow Lavatory<br/>Other</p> <p>Public Lavatory Faucet:<br/>IPC/UPC Equivalent Kitchen Sink<br/>Low-Flow Kitchen Sink<br/>Other</p> <p>Shower:<br/>IPC/UPC Equivalent Shower<br/>Low-Flow Shower<br/>Other</p> |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Notes:

# COOLING TOWER WATER MANAGEMENT (WEc4)

Proper cooling tower maintenance can conserve significant amounts of water and lower operating costs. The purpose of the Cooling Tower Water Management Plan is to reduce the amount of potable water needed for cooling tower operations. The plan is a required upload but does not have to follow the USGBC model format for programs and plans.

The sample plan provided can be used for a single facility or campus and is adaptable for a district-wide application. In this case, specific equipment (cooling towers) for each facility in the district can be included in an appendix to make sure it covers the specifics of the school site(s) being certified. This credit does not require a campus- or district-wide implementation of the water management plan for cooling towers, however an existing campus- or district-wide plan can be used to meet the requirements of this credit, provided it addresses the specifics of the facility being certified.

1. **Sample Cooling Tower Water Management Plan** - The plan provided is an example that can be modified and used to establish a new, more customized document.

# Sample Cooling Tower Water Management Plan

## Goals and Scope

The plan is intended to reduce potable water consumption for cooling tower equipment through effective water management. The plan is applicable to all cooling towers located at [School/School District].

Water chemistry will be maintained at maximum ionic content while preventing calcium buildup in the system. Efforts to reduce heating and cooling demands in buildings with cooling towers will reduce the demand for cooling and reduce water consumption. The facilities manager will investigate opportunities to use alternative cooling technologies when replacing major HVAC systems.

Every opportunity will be sought to implement best management practices related to cooling tower control. The goal of [School/School District] is to operate cooling towers at [insert #] cycles of concentration or better. Historically, cooling towers were operated at between [insert #s] cycles of concentration.

The goal is to reduce cooling tower makeup water demand by [insert #] percent. [School/school districts should enter the values that relate to the specific cooling towers covered by this policy.]

[School/School District] operates [insert #] cooling towers, listed in Table 1, with a total cooling capacity of \_\_\_\_ tons.

Note: School/school districts should insert a narrative reflecting how cooling towers are maintained at the school, Ex: *A cooling tower maintenance contractor performs a monthly quality, performance, and water chemistry review of cooling tower operation. Chemical treatment is provided to control scale and corrosion; treatment chemical addition rates are controlled to be proportional to the quantity of water blowdown. Conductivity meters set between 850 and 900 uS/cm are used to control blowdown.*

| Table 1. Cooling Tower Locations | Rating (tons) | Makeup Water Meter                                       |
|----------------------------------|---------------|----------------------------------------------------------|
| Building # _____                 |               | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Building # _____                 |               | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Building # _____                 |               | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Building # _____                 |               | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Building # _____                 |               | <input type="checkbox"/> Yes <input type="checkbox"/> No |

As a check on system performance, meter readings will be recorded on a monthly basis and water-use trends evaluated by the operations and maintenance contractor and facilities manager. Unexpected trends in cooling tower water use will be investigated and resolved.

## Strategies for Improving Concentration Ratios

Target Concentration Ratios: [The school/school district should indicate their goal.]

[Note: Chemical treatment is a required element to be included in the plan and can be addressed as follows:]

- Treatment will be provided for scaling and corrosion.
- Workers handling acidic chemicals must exercise caution to prevent contact with eyes or skin. No worker will handle treatment chemicals without properly certified training, including response protocols for accidents and chemical spills.
- [Servicing contractor] will provide information on all chemicals used for treatment.

[Note: Bleed-off and blow down are required elements to be included in the plan and can be addressed as follows:]

- Bleed-off is defined as the circulating water in the tower that is discharged as waste to help keep the dissolved solids concentration of the water below a maximum allowable limit. As a result of evaporation, the dissolved solids concentration will progressively increase unless reduced by bleed-off. Conductivity meters will be used to control cooling tower bleed-off. [The maintenance contractor will provide regular servicing and maintenance on all conductivity meters and related system components.] The blow down controller will be set to achieve [insert #] cycles of concentration within the cooling tower.

All makeup water will be metered. Water-use data will be collected weekly and analyzed for trends and overall efficiency based on expected seasonal usage. Whenever possible, non-potable water sources will be used. A list of alternatives is outlined below:

- Harvested rainwater/stormwater
- Air conditioner condensate
- Swimming pool filter backwash water
- Cooling tower blowdown
- Pass-through (once through) cooling water
- Recycled, treated wastewater for toilets/urinals
- Foundation drain water
- Municipally reclaimed water
- Any other acceptable onsite source not from a well, river, or lake

[Note: Biological control is a required element to be addressed in the plan and can be addressed as follows:]

With increased cycles of concentration comes an increased potential for greater microbial growth in cooling towers. Biocides, such as chlorine, ozone, chlorine dioxide, dithiocarbamate, and others are typically used in cooling towers to control microbial growth. However, they pose a health and safety hazard to users as well as an environmental concern due to their toxicity.

- Whenever possible, least toxic treatments, such as bromine-based options, will be considered for use in cooling towers.
- Workers handling chemicals will wear protective clothing at all times when handling these materials.

[Note: Staff training is a required element to be included in the plan and can be addressed as follows:]

- Trainings will be provided [monthly/quarterly/annual/other] for appropriate staff including [list applicable staff titles]. The topics covered will include [cooling tower operation and maintenance, testing for common biological contaminants, chemical treatment, and best management practices for bleed-off].

## Responsible Parties

Teams and individuals involved in activities pertaining to the policy include:

[Facility Manager] \_\_\_\_\_

[Building Engineer] \_\_\_\_\_

[Other] \_\_\_\_\_

## Guidance for Resources and Implementation

School/school district administrators should review the list below and consider the items to be included in the plan. The actual system and chemicals being used at the sites(s) will dictate which items to address.

- [Responsible party (title)] will work with a water treatment specialist to develop a water management strategy.
- [Responsible party (title)] will identify non-potable water sources that may be available for makeup water.
- Water purity requirements based on the manufacturer's guidelines will be followed: [Describe].
- Meter cooling tower make-up water and trends will be tracked weekly. Unusual consumption trends will be investigated and resolved.
- [Responsible party (title)] will conduct a cooling tower system quality and performance review twice per month using a cooling tower maintenance contractor. A conductivity meter to automatically control cooling tower blow down will be used. The meter will be regularly maintained by the cooling tower maintenance contractor.
- [Responsible party (title)] will perform monthly quality, performance, and water chemistry review of cooling tower operations.
- Adjustments of the set points for number of cycles to reduce cooling tower makeup water demand will be evaluated and adjusted as necessary.



# ENERGY & ATMOSPHERE



# ENERGY EFFICIENCY BEST MANAGEMENT PRACTICES – PLANNING, DOCUMENTATION AND OPPORTUNITY ASSESSMENT (EAp1)

Energy efficiency is a key component of green operations and maintenance. Energy efficiency practices lower utility costs and support a healthy, safe, secure, and comfortable indoor environment.

1. **Sample Building Operating Plan** – This plan provides the framework for how the building will be operated and includes such items as occupancy schedules, run-time schedules, and set points. The plan is updated whenever changes are made to optimize performance. The sample format can be used to establish a new, more customized document. Information for the document may be found in as-built drawings, original project files, or from visual inspection of existing equipment operation and control systems.
2. **Components of Annual Energy Use (Example)** – An example is provided showing an output based on an ASHRAE Level I energy audit .
3. **Energy Efficiency Improvements and Annual Savings (Example)** – An example of energy efficiency improvements made as the result of an ASHRAE Level I energy audit is provided.

## Sample Building Operating Plan

### General Requirements for All Spaces

| Description of Requirement                                         | Classrooms | Offices | Media Center | Kitchen |
|--------------------------------------------------------------------|------------|---------|--------------|---------|
| 1. Cooling Season Temperature<br>(range in °F)                     |            |         |              |         |
| 2. Heating Season Temperature<br>(range in °F)                     |            |         |              |         |
| 3. Humidity Levels<br>(range in %RH)                               |            |         |              |         |
| 4. Air Pressure Relationships<br>(inches water gauge differential) |            |         |              |         |
| 5. Air Filters<br>(description)                                    |            |         |              |         |
| 6. Outside Air Ventilation<br>(% outside air)                      |            |         |              |         |
| 7. Air Changes<br>(ASHRAE 62.1)                                    |            |         |              |         |
| 8. Interior Lighting Levels<br>(range in foot-candles)             |            |         |              |         |

| Description of Requirement                                         | Gymnasium | Auditorium | Cafetorium | Other |
|--------------------------------------------------------------------|-----------|------------|------------|-------|
| 1. Cooling Season Temperature<br>(range in °F)                     |           |            |            |       |
| 2. Heating Season Temperature<br>(range in °F)                     |           |            |            |       |
| 3. Humidity Levels<br>(range in %RH)                               |           |            |            |       |
| 4. Air Pressure Relationships<br>(inches water gauge differential) |           |            |            |       |
| 5. Air Filters<br>(description)                                    |           |            |            |       |
| 6. Outside Air Ventilation<br>(% outside air)                      |           |            |            |       |
| 7. Air Changes<br>(ASHRAE 62.1)                                    |           |            |            |       |
| 8. Interior Lighting Levels<br>(range in foot-candles)             |           |            |            |       |

## Equipment Inventory and Run Time Schedules

|                                       |  |
|---------------------------------------|--|
| <b>Facility:</b>                      |  |
| <b>Responsible Facility Operator:</b> |  |
| <b>Last Update:</b>                   |  |

| Equipment                              | Occupied Hours<br>(Weekdays)                 | After Hours<br>(Weekdays) | Weekends and<br>Holidays | Vacation Periods |
|----------------------------------------|----------------------------------------------|---------------------------|--------------------------|------------------|
|                                        | (hours of operation, ex: 6:00 am to 4:00 pm) |                           |                          |                  |
| [Examples]                             |                                              |                           |                          |                  |
| PU-1 (Room 101)                        |                                              |                           |                          |                  |
| RTU-1 (Rooms 102, 103, 104, 105)       |                                              |                           |                          |                  |
| AHU-01 (Building 06)                   |                                              |                           |                          |                  |
| AHU-02 (Wing A, 2 <sup>nd</sup> floor) |                                              |                           |                          |                  |
| DX-1                                   |                                              |                           |                          |                  |
| Chiller (250 t)                        |                                              |                           |                          |                  |
| Cooling Tower                          |                                              |                           |                          |                  |
| Boiler #1 (Natural gas)                |                                              |                           |                          |                  |
| Parking Lot Lights                     |                                              |                           |                          |                  |
| Overhead Walkway Lights                |                                              |                           |                          |                  |
| Tennis Court Lights                    |                                              |                           |                          |                  |
| Field Lights                           |                                              |                           |                          |                  |

[Depending on the area served by the above equipment examples there will be different hours of operation. In the example above, the package unit (PU-1) for Room 101 – may be an administration office that needs to run longer hours than other spaces and needs to run during vacation periods. Or, the parking lot lights may run from dusk to 11:00 pm and from 6:00 am to dawn on weekdays but not outside these times. Some equipment may run after hours on weekdays, but not on weekends or holidays.]

## Design Set Points

|                                       |  |
|---------------------------------------|--|
| <b>Facility:</b>                      |  |
| <b>Responsible Facility Operator:</b> |  |
| <b>Last Update:</b>                   |  |

| Item Description                       | Supply Air Temperature | Supply Water Temperature | Static Pressure |
|----------------------------------------|------------------------|--------------------------|-----------------|
| [Examples]                             |                        |                          |                 |
| PU-1 (Room 101)                        |                        |                          |                 |
| RTU-1 (Rooms 102, 103, 104, 105)       |                        |                          |                 |
| RTU's (All RTU's serving classrooms)   |                        |                          |                 |
| AHU-01 (Building 06)                   |                        |                          |                 |
| AHU-02 (Wing A, 2 <sup>nd</sup> floor) |                        |                          |                 |
| Chiller (250 t)                        |                        |                          |                 |
| Cooling Tower                          |                        |                          |                 |
| Boiler #1 (natural gas)                |                        |                          |                 |

## Components of Annual Energy Use (Example)

[Example from ASHRAE Level I Audit for EAp1]

The example below is typical of a 54,000-square-foot elementary school in a hot and humid climate. Data for the table can be found in energy utility bills by analyzing monthly usage over a one-year period and estimating the buildings base load and weather (outside temperature) related energy loads. A lighting survey and plug load inventory can be done to estimate the lighting and plug loads, which can be subtracted from the base load to get the fan (ventilation) load.

| List of Major End-Use Systems                               | kBtu      | 2008 Annual Cost | %   |
|-------------------------------------------------------------|-----------|------------------|-----|
| Space Cooling                                               | 583,500   | \$17,500         | 25% |
| Space Heating                                               | 536,820   | \$16,100         | 23% |
| Fans                                                        | 163,380   | \$4,900          | 7%  |
| Lighting                                                    | 770,200   | \$23,100         | 33% |
| Other (Plug loads, water heating, kitchen appliances, etc.) | 280,000   | \$8,400          | 12% |
| Total                                                       | 2,333,900 | \$70,000         |     |

## Energy Efficiency Improvements and Annual Savings (Example)

[Example from ASHRAE Level I Audit for EAp1]

The types of energy saving measures that might be implemented as a result of an ASHRAE Level I Audit walk-through are outlined below. All are operational changes that can be implemented with little or no cost. The prerequisite requires that the total energy and maintenance cost savings be reported. Energy cost savings must include annual demand and annual consumption cost savings. The example addresses all the data elements required by EAp1.

| List of Low/No Cost Changes        | Annual Energy Demand Cost Savings | Annual Energy Consumption Cost Savings | Annual Total Energy Cost Savings | Annual Maintenance Cost Savings |
|------------------------------------|-----------------------------------|----------------------------------------|----------------------------------|---------------------------------|
| Change Settings On DDC/BAS         | \$0                               | \$650                                  | \$650                            | \$0                             |
| Replace Time Clock                 | \$0                               | \$900                                  | \$900                            | \$320                           |
| Install Idle Time Cut-off Switches | \$0                               | \$1,200                                | \$1,200                          | \$0                             |
| Repair Damper Actuators            | \$50                              | \$450                                  | \$500                            | \$600                           |
| New Custodial Procedures           | \$0                               | \$2,500                                | \$2,500                          | -\$350                          |
| <b>Total:</b>                      | <b>\$50</b>                       | <b>\$5,700</b>                         | <b>\$5,750</b>                   | <b>\$570</b>                    |

# FUNDAMENTAL REFRIGERANT MANAGEMENT (EAp3)

Refrigerant management helps prevent loss of refrigerants to the atmosphere. This is particularly significant when chlorofluorocarbon (CFC) based refrigerants are used, which have a greater ozone depletion and global warming potential than leakage from hydrofluorocarbon (HFC) based refrigerants. Many CFC-based refrigerants can be eliminated through refrigerant conversion processes. In some cases, system replacement will be necessary.

1. **Sample Refrigerants Inventory Form** – The form can be used to gather data for the Registrants Table in the LEED Online submittal form for the prerequisite.
2. **Refrigerant Phase-out Plan (Example)** – The plan can be tailored according to the school or school district's needs. This plan has been filled in with data from a sample project in order to show how the form can be used. The plan is a required upload to LEED Online for project's with CFC-based refrigerants.
3. **Sample Economic Analysis** – A sample format is provided for conducting an economic analysis, which can be used to assist in understanding calculations to be performed by a third-party to assess HVAC system replacement or refrigerant conversion.

## Sample Refrigerants Inventory Form

This form is for use in gathering information for the Refrigerants Table in the LEED Online submittal form.

[illegible]

See below for selection options for designated columns. (These options appear in the drop-down menus of the LEED Online submittal form.)

|                                                                                                                                                                                                                                                                      |                                                                            |                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 . HVAC&amp;R Equipment Type:</p> <p>Window AC or Heat Pump<br/> Split AC or Heat Pump<br/> Packaged AC or Heat Pump<br/> Reciprocating Compressor<br/> Reciprocating Chiller<br/> Centrifugal Chiller<br/> Screw Chiller<br/> Absorption Chiller<br/> Other</p> | <p>2 . Equipment Location:</p> <p>LEED Project only<br/> Central Plant</p> | <p>3 . Refrigerant Used:</p> <p>CFC-11, CFC-12, CFC-114, CFC-500,<br/> CFC-502, HCFC-22, HCFC-123, HFC-23,<br/> HFC-134a, HFC-245fa, HFC-404A, HFC-407C, HFC-410A, HFC-507A, Carbon Dioxide, Ammonia (NH3), Propane, Other, None</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Refrigerant Phase-out Plan (Example)

|                                                       |                   |
|-------------------------------------------------------|-------------------|
| <b>Responsible Department:</b>                        | HVAC Shop         |
| <b>Responsible Person for Refrigerant Management:</b> | Brian Phillips    |
| <b>School Site:</b>                                   | Bright Elementary |
| <b>Date of Last Update:</b>                           | July 13, 2009     |

| System                                   | 5-Ton Packaged Units | 5-Ton Heat Pump Units | 100-Ton Chiller      | 3-Ton Split System  |
|------------------------------------------|----------------------|-----------------------|----------------------|---------------------|
| Number of Units                          | 12                   | 10                    | 1                    | 15                  |
| Expected Life (years)                    | 15                   | 15                    | 23                   | 15                  |
| Age (years)                              | 5                    | 20                    | 19                   | 20                  |
| Planned Replacement Date                 | 2019                 | 2010                  | Aug 2010             | 2013                |
| Refrigerant                              | R410A                | R22                   | R11                  | R11                 |
| Refrigerant Charge (lbs/unit)            | 9 lbs                | 15 lbs                | 200 lbs              | 10 lbs              |
| Current Annual Leakage Rate <sup>1</sup> | N/A                  | 6%                    | 11%                  | 8%                  |
| Conversion Feasible (Yes/No)             | N/A                  | N/A                   | No                   | Yes (R123)          |
| Planned Conversion or Replacement Date   | N/A                  | Replacement Aug 2010  | Replacement Aug 2014 | Conversion Aug 2010 |
| Completed Date                           | July 2004            |                       |                      |                     |

## Sample Economic Analysis

The Fundamental Refrigerant Management prerequisite requires system replacement or refrigerant conversion if CFC-based refrigerants are used in base building systems. An exception is granted for replacements or conversions where the economic feasibility does not meet at least a 10-year simple payback. In order to document this exception the project team needs to obtain an economic analysis performed by a third party showing that replacement is not economically feasible. This example shows a format that could be requested from the third-party performing the analysis.

### 1.0 System Description

[Enter details about refrigerant systems]

| System | Refrigerant Type | Year Installed | Capacity (Tons) |
|--------|------------------|----------------|-----------------|
|        |                  |                |                 |
|        |                  |                |                 |

(Add rows as needed.)

### 2.0 Economic Analysis – Equipment Replacement

[Describe what type of data was used to quantify analysis. Complete calculations to prove analysis.]

| [Equipment Name] Audit Calculations             |     |     |     |     |
|-------------------------------------------------|-----|-----|-----|-----|
| Unit designation                                | U-1 | U-2 | U-3 | U-4 |
| Capacity (Tons)                                 |     |     |     |     |
| Annual Ton-hours                                |     |     |     |     |
| Measured Efficiency (Peak)*                     |     |     |     |     |
| New Efficiency (Peak)**                         |     |     |     |     |
| Delta E                                         |     |     |     |     |
| Delta kWh                                       |     |     |     |     |
| Delta \$, kWh                                   |     |     |     |     |
| Delta \$, kW                                    |     |     |     |     |
| Annual Maintenance Cost Savings for Replacement |     |     |     |     |
| Total Annual Savings                            |     |     |     |     |
| Replacement Chiller Cost (Per ton)              |     |     |     |     |
| Simple Payback                                  |     |     |     |     |

\*Measured Efficiency – Determined from direct measurement, includes equipment power only

\*\*New Efficiency – Based on efficiency of new equipment at design conditions of existing physical plant

### 3.0 Economic Analysis – Refrigerant Conversion

[Describe conversion of existing machine to a different refrigerant. Include costs of new refrigerant, leakage rate of existing refrigerant, and operating costs.]

# OPTIMIZE ENERGY EFFICIENCY PERFORMANCE (EAc1)

Energy performance refers to how much energy the facility actually uses and how it is measured. The LEED for Existing Buildings:: O&M rating system uses the U.S. Environmental Protection Agency's (EPA) Portfolio Manager as the benchmarking platform for validating a building's energy performance. Portfolio Manager is a free, interactive online tool that assesses energy and water consumption, performance, and cost information for individual buildings and building portfolios. Portfolio Manager rates the current level of building energy efficiency, based on 12 months of utility data entered into the online tool. The building then receives an energy performance rating on a scale of 1 to 100, known as the ENERGY STAR rating. For LEED certification, a building must have a score of 69 or higher.

- 1. Portfolio Manager Space Types** – Project teams should follow this guidance for selecting the appropriate Portfolio Manager space type for the project pursuing certification.
- 2. Instructions for Establishing a Portfolio Manager Account** – All projects pursuing the LEED for Existing Buildings certification, regardless of whether they are eligible for an ENERGY STAR rating or not, will have to have a Portfolio Manager account for the project. Instructions are provided for creating this account.
- 3. Information Worksheet for the K-12 Space Type** – This worksheet can be used to collect the information needed for entering data into the Portfolio Manager account. Definitions of the space attributes addressed in this worksheet are provided as they appear in Portfolio Manager.
- 4. Explanation of EAc1 Case 2 Calculator** – Project buildings that do not fit the Portfolio Manager definition of a K-12 (e.g. a typical public school) space type or an Office (e.g. administration building) space type will need to use the USGBC Case 2 Calculator in conjunction with the project's Portfolio Manager account to determine the energy efficiency performance.

## Portfolio Manager Space Types

The school site configuration is an important consideration which will determine how the project team satisfies the requirements for Minimum Energy Efficiency Performance prerequisite (EAp2).

Most school facilities will be eligible for an ENERGY STAR rating as a “K-12 School” space type. The Portfolio Manager K-12 School space type applies to facility space used as a school building for Kindergarten through 12th grade students. This does not include college or university classroom facilities and laboratories, or vocational, technical, or trade schools. The total gross floor area should include all supporting functions such as administrative space, conference rooms, kitchens used by staff, lobbies, cafeterias, gymnasiums, auditoria, laboratory classrooms, portable classrooms, greenhouses, stairways, atria, elevator shafts, small landscaping sheds, storage areas, etc.

Portfolio Manager allows K-12 facilities that are housed in one or more buildings to be rated as a single space. For the purpose of obtaining an ENERGY STAR rating for a K-12 school, a school site with several buildings housing the typical activities noted above is considered to be a single facility and a single space, not a campus. Schools that fall into this category will satisfy the requirements of the prerequisite using “Case 1. Projects Eligible for Energy Star Rating.” Some schools, like vocational-technical schools and special education facilities, are not eligible for an ENERGY STAR rating and will satisfy the requirements of EAp2 using “Case 2. Projects Not Eligible for ENERGY STAR Rating.” More information on EAp2 requirements, including details on Case 1 and Case 2 compliance paths, can be found in the LEED 2009 for Existing Buildings: Operations & Maintenance Rating System.

The term “campus” has a special meaning in Portfolio Manager and is typically applied to college and university campuses or other government campus complexes. Campuses may be comprised of several buildings with various space types. Some are ratable space types, such as dormitories, office buildings, retail stores, hospitals, and medical offices. Others are non-ratable space types such as classroom buildings, laboratories, athletic complexes, libraries, and performing arts centers.

- 1. Public School Districts** - School districts are typically comprised of multiple schools. Most of the schools will be ratable as a K-12 space type - elementary schools, middle schools, junior high schools, and high schools. However, some schools in the district may not fit the definition of the K-12 space type, such as vocational-technical schools, adult education centers, and special education facilities. These schools are not eligible for an ENERGY STAR rating and will satisfy the requirements of the prerequisite using “Case 2. Projects Not Eligible for ENERGY STAR Rating.”
- 2. Independent Schools** - Independent schools can range from a small campus meeting the definition of the ENERGY STAR K-12 space type to a large campus that resembles a college campus in size and complexity. Independent schools with dormitories is a good example of the latter. Assessing an independent school will include a determination as to whether the campus meets the Portfolio Manager definition of a K-12 space type or whether it falls under the Portfolio Manager definition of a campus. The results of this assessment will determine how the requirements for the prerequisite will be satisfied and the number of buildings that will be included in the certification project.
- 3. Charter Schools** - Charter schools tend to be located on a single site. In many cases, charter school facilities will fall under the category of a K-12 school space type. However, depending on the type of buildings comprising the school site, there may be instances in which a charter school facility would not be considered a ratable space type.

## Instructions for Establishing a Portfolio Manager Account

### Part A – Required Registration Information

The following guidelines provide instructions for creating a Portfolio Manager account.

- Go to the Portfolio Manager website.
- In the web browser, type in: [www.energystar.gov](http://www.energystar.gov).
- Click on “Buildings and Plants.”
- On the right of the Buildings and Plants page, under the heading “Quick Finder,” click on “Portfolio Manager Login.”
- When at the login page, look to the top right of the page and click on “New User? Register.”
- For questions 3-7, 12, 16 provide information for staff member who will use account most frequently.

1. Username: \_\_\_\_\_

Choose a username for the account (organization, municipality, school, or school district). The username cannot have spaces, dashes, or other special characters.

2. Password: \_\_\_\_\_

Choose a password with 8 to 32 characters (letters and numbers only, no spaces).

3. First Name: \_\_\_\_\_

4. Last Name: \_\_\_\_\_

5. E-mail: \_\_\_\_\_

6. Title: (your job title) \_\_\_\_\_

7. Organization: (School/school District name) \_\_\_\_\_

8. Address: \_\_\_\_\_

9. City: \_\_\_\_\_

10. State: \_\_\_\_\_

11. Zip Code: \_\_\_\_\_

12. Phone: \_\_\_\_\_

13. Select a Verification Question: \_\_\_\_\_

(This is for obtaining your password, if you lose it.)

14. Enter Answer: \_\_\_\_\_

15. What is the primary business or service of your organization? \_\_\_\_\_

16. Which best describes your job title?

Choose from the following:

- ☐ Construction/Project Manager

- ☐ Energy Manager\*
- ☐ Energy/Environmental Manager
- ☐ Facility Owner/Developer
- ☐ Facility/Building/Property Manager\*
- ☐ Leasing Manager/Broker/Agent
- ☐ Physical Plant Manager
- ☐ Staff Architect/Space Planner/Designer
- ☐ Staff Engineer
- ☐ VP/Dir. Of Construction/Design/Engineer
- ☐ VP/Director of Facilities/Agent
- ☐ Other: \_\_\_\_\_ (please specify)

\*most common selections

#### 17. Indicate your organization's annual activity for each category:

You will need to know the total square footage of all facilities within your campus/jurisdiction.

Manage/Upgrade: \_\_\_\_\_ (for school districts, total district sq ft)

Own: \_\_\_\_\_ (same as above)

Develop/Build: \_\_\_\_\_ (unless you know the total square footage of the capital improvement plan, just use your best guess/estimate of the square footage of new facilities in design or under construction)

#### 18. You will not have to address the optional "Master Account Feature."

### Part B – Required Information for Each Facility

- "Add a Property" Set Up.
- Click on "Add a Property" – Enter information for school.
- "Add Space" Set Up.

Select a space type for the building. Most school systems will choose the K-12 school space type. However, if the school site does not fit the definition of the K-12 space type, then another space type or "Other" should be selected. Each space type has its own unique set of space attributes that must be entered. The following instructions concern the K-12 school space type only.

### K-12 School

The total gross floor area should include all supporting functions such as administrative space, conference rooms, kitchens used by staff, lobbies, cafeterias, gymnasiums, auditoria, laboratory classrooms, greenhouses, stairways, atria, elevator shafts, small landscaping sheds, storage areas, etc.

The following information is required for a K-12 school space:

- Zip code
- Gross floor area

- Is the school regularly open on weekends?
- Number of personal computers
- Number of walk-in refrigerators or freezers
- On-site cooking facilities?
- Percent of the gross floor area of this space that is air-conditioned
- Percent of the gross floor area of this space that is heated
- Is the school a high school?

## Computer Data Center

The computer data center category applies to spaces specifically designed and equipped to meet the needs of high-density computing equipment, such as server racks used for data storage and processing. Typically these are raised floor spaces that maintain controlled temperatures and/or humidity. The air conditioning system for this type of space is usually separate from that used to control the space environment in other parts of the building and is usually separated by walls and doors.

The following information is required for Computer Data Center spaces:

- Gross floor area
- Weekly operating hours

## Parking

The parking category refers to any area connected to the building that is used for parking vehicles. This includes parking lots, fully enclosed parking structures, and unenclosed parking structures that are open on all sides and may or may not include roof parking. All parking areas should be combined into one parking space. The purpose of combining all of these areas into one space is to avoid double counting and to simplify the process. By apportioning the square footage of the parking area into these three categories, Portfolio Manager can properly assign lighting and ventilation allowances.

The following information is required for parking spaces:

- Parking sf that is enclosed
- Parking sf that is unenclosed (with a roof)
- Parking sf that is open (no roof)
- Weekly hours of access

## Swimming Pool

The swimming pool category applies to heated swimming pools that operate on the premises and on the same energy use meter as the primary facility. This category applies to any heated swimming pools located inside or outside of the facility. Swimming pools are categorized by size, application, and usage.

The following information is required for swimming pools:

- Months in use
- Size of swimming pool
- Gross floor area

## Information Worksheet for the K-12 Space Type

The information below is required for the Portfolio Manager account.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| School District:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |
| Contact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |
| School Name & Address:<br>(including zip code)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |
| Year Built:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |
| Space Type:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | K-12 Schools |
| Gross Floor Area:<br>Total floor area, expressed in square feet or square meters, for a given space within a facility. The total of all K-12 school spaces must include the floor area for all supporting functions, such as lobbies, stairways, rest rooms, storage areas, elevator shafts, etc., in the facility.                                                                                                                                                                                                                                                        |              |
| Open on Weekends:<br>Is this building typically open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances, or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the user should select "yes" for open weekends. The "yes" response should apply whether the building is open for one or both of the weekend days. |              |
| Number of PCs:<br>The total number of personal computers used at the K-12 school. The number should include computers used in classrooms and/or student computer labs. It should also include computers used in managerial offices and break rooms.                                                                                                                                                                                                                                                                                                                        |              |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><b>Number of Walk-in Refrigeration/Freezer Units:</b><br/>         Indicate the total number of large walk-in refrigeration or freezer units in use within the K-12 school. This typically includes large refrigeration units located in the back of a cafeteria used to store refrigerated goods.</p>                                                                                                                                                                                            |  |
| <p><b>Presence of Cooking Facilities:</b><br/>         Does the K-12 school have commercial or institutional cooking on-site? This typically includes cooking facilities associated with lunch counters or cafeterias located onsite. This does not include employee lounges or galleys with food preparation equipment and/or vending machines.</p>                                                                                                                                                 |  |
| <p><b>Percent of Space Air-conditioned:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| <p><b>Percent of Space Heated:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <p><b>High School:</b><br/>         Is the building a high school, teaching grades 10, 11, and/or 12? If the building teaches to high school students at all, the user should check "yes" to "high school." For example, if the school teaches grades K through 12 (elementary/middle and high school), the user should check "yes" to "high school."</p>                                                                                                                                            |  |
| <p><b>Provide at least 12 months of energy data for all fuel types:</b><br/>         The data should contain the start and end dates of each billing period and the number of units of energy (kWh, gallons, therms, ton-hours, etc.) consumed for that period. The total billing cost is desirable, but not required for a rating. It is not necessary to send copies of the bills unless it is easier to do so. A simple spreadsheet with this information can be sent as an email attachment.</p> |  |

## Explanation of EAc1 Case 2 Calculator

Project buildings that do not fit the definition of a K-12 (e.g. a typical public school) space type or an Office (e.g. administration building) space type will need to use the USGBC Case 2 Calculator in conjunction with the project's Portfolio Manager account to determine the energy performance. Details on this process are included in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*.

### Case 2 Option 1 – Adjusted Benchmark Score

School facilities that are not eligible for an ENERGY STAR rating will likely pursue Case 2 Option 1.. Ratable and non-ratable space types that could apply to a school system project are shown below in alphabetical order. Some school sites that house more than the traditional K-12 school space activities may also contain some of the spaces listed below.

- Computer Data Center
- Education K-12 School (ratable)
- Education General
- Entertainment/Culture
- Food Service - General
- Healthcare Clinic
- Laboratory
- Library
- Lodging – Residence Hall/Dormitory (ratable)
- Office (ratable)
- Public Assembly – Other
- Recreation
- Religious Worship
- Social/Meeting
- Storage - General
- Warehouse – Self-storage

The following examples may be helpful to project teams in deciding how to proceed with the – Optimize Energy Performance credit (EAc1).

#### 1. Charter School Example

Scenario: A charter school established to help serve students who have dropped out, are at risk of dropping out, or are performing poorly in traditional public schools (grades 10 through 12) is being considered for a LEED for Existing Buildings: O&M certification. The school facility includes four separate buildings – a building with two classroom wings; a building for the gymnasium; a building that houses the main office, guidance counseling section, media center, and the cafeteria; and a building for vocational and technical education. There are two electric meters and two natural gas meters.

Approach: The project team can use Case 1 – Projects Eligible for ENERGY STAR Rating. All the activities housed by the four buildings described in this example would be typical of a high school. Therefore, the project team can enter the space attributes and energy consumption data into the Portfolio Manager account and receive a rating for the school.

## 2. Independent School Example

Scenario: A large independent school established to prepare students for college and provide religious education (grades 9 through 12) is being considered for a LEED for Existing Buildings: O&M certification. The campus includes the typical buildings associated with a high school (classrooms, media center, gym, music and band, cafeteria, etc.) plus a chapel, a separate administration building, and two dormitory buildings. The campus has a central heating and chiller plant that serves all buildings. There is one main electric meter for the campus, four natural gas meters, and one fuel oil tank.

Approach: This campus as a whole will not fit the definition of a K-12 school space. Therefore, the project team will have to consider several issues to determine whether to satisfy the requirements of the prerequisite using Case 1 (Projects Eligible for ENERGY STAR Rating) or Case 2. (Projects Not Eligible for ENERGY STAR Rating):

- Since the entire campus cannot be certified as a single project, the project team must install additional electric meters to obtain the energy performance of the specific building or buildings that are registered as the LEED project.
- The project team may consider multiple certifications for the various buildings on campus. Each building will have to have its own energy meters (or submeters). Each building may represent a different ratable space type (office, dormitory, etc.) or non-ratable space type (library, performing arts center, athletic center, classroom building, etc.).
- The project team may select one building for certification. If that building fits the definition of one of the ratable spaces (see list above), then the project team can use Case 1. If the building selected for certification contains more than one space type, the project team will have to use Case 2 and the Case 2 Calculator in the LEED Online submittal form.
- The energy use for the project building that is associated with the central plant will be accounted for in Portfolio Manager as a separate energy fuel type. However, there must be a way to meter chilled water or hot water (or steam) being used by the project building.

## 3. Public School District Example

Scenario: A school district has recently undergone a large modernization and upgrade project for an adult education center and is considering it for a LEED for Existing Buildings: O&M certification. The center conducts day and night classes and consists primarily of classrooms, an office area, and a snack bar. The center is housed in a single building with one electric meter and one natural gas meter.

Approach: Although this is a single building, it does not fit the definition of a K-12 school space or any other ratable space type. This is essentially a classroom building. The project team will need to use Case 2 and the Case 2 Calculator in the LEED Online submittal form. to determine the energy performance for this building. Having one electric meter and one natural gas meter should make the process fairly simple.

# EXISTING BUILDING COMMISSIONING - INVESTIGATION AND ANALYSIS (EAc2.1)

The investigation and analysis phase of existing building commissioning provides further insight into opportunities for improving building performance. Building systems that do not operate properly waste energy and can cause occupant discomfort and health issues. Commissioning existing building systems helps reveal deficiencies and identify potential for increases in energy efficiency and decreases in operating costs. This credit allows for two compliance paths: an existing building commissioning process and an energy audit process. In either case, a list of capital improvement measures must be uploaded to LEED Online. However, the energy audit path calls for a more detailed summary, based on the requirement for an ASHRAE Level II Audit.

1. **Capital Improvement Measures (Example)** – One of the credit requirements is to develop a list of capital improvement measures. The example provided illustrates a list of four improvement measures being considered for a future project. Three are deemed practical and one is not. The example shows the level of detail expected for the ASHRAE Level II Audit.

## Capital Improvement Measures (Example)

[Example from ASHRAE Level II Audit for EAc2.1]

| List of Major Capital Projects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Cost to Implement | Expected Cost Savings | Simple Payback <sup>1</sup> | Return on Investment <sup>1</sup> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|-----------------------------|-----------------------------------|
| Lighting Retrofit (Replace T-12s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | \$27,000          | \$6,000               | 4.5 years                   | 22% (P)                           |
| <ul style="list-style-type: none"> <li>The cause of excess energy use is due to the inefficiency of outdated technology (T-12 and magnetic ballasts).</li> <li>A simple bulb and ballast replacement, using T-8 bulbs and electronic ballasts, will increase illumination levels and reduce energy costs.</li> <li>The project can be carried out after occupant work hours over five evenings. Wiring in three rooms of the old wing will have to be replaced before the retrofit can be applied to that area. The rest of the building does not require any additional repairs.</li> <li>Lamp maintenance procedures will remain the same, except that it is anticipated that there will be a much reduced work-load for the next two years.</li> <li>Extended warranties will be obtained for all installed materials for up to 10 years.</li> </ul> |                   |                       |                             |                                   |
| Replace roofing with cool roof and added insulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | \$35,000          | \$2,300               | 15.2 years                  | 6.6% (I)                          |
| <ul style="list-style-type: none"> <li>The cause of excess energy use is due to the lack of insulation and dark color of roofing materials.</li> <li>Installation of added roof insulation and a single ply cool roof membrane would reduce annual energy costs by 6.6%.</li> <li>There would be a minimal impact on maintenance procedures, merely a shift in repair processes.</li> <li>However, there is 10% cost premium for the system being considered and the existing roof still has several years left in its useful life. No substantial leaking or excessive maintenance is being experienced for the existing system. Therefore, it is not deemed practical at this time to replace the existing roof.</li> </ul>                                                                                                                           |                   |                       |                             |                                   |
| Replace unit A/Cs with high efficiency units (Classroom Building A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | \$89,000          | \$7,200               | 12.4 years                  | 8% (P)                            |
| <ul style="list-style-type: none"> <li>The cause of excess energy use is due to aging mechanical components, particularly the compressors. The current systems are several years past their expected life of 15 years.</li> <li>Individual units can be replaced during the summer vacation period with newer systems that have a higher energy efficiency ratio (EER) and will require less maintenance than existing systems.</li> <li>The new systems will also have better ventilation control and are quieter than the existing systems.</li> <li>System replacements are well within the capability of existing maintenance technicians.</li> <li>The expected life of the new units is 15 years.</li> </ul>                                                                                                                                      |                   |                       |                             |                                   |
| Replace boiler with high efficiency boiler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$16,000          | \$2,100               | 7.6 years                   | 13.1% (P)                         |
| <ul style="list-style-type: none"> <li>The cause of excess energy use is due to the inefficiency of outdated technology.</li> <li>A new natural gas high efficiency boiler would replace an existing electric boiler.</li> <li>There is an added operational procedure for power outages that requires manual reset of natural gas valves.</li> <li>The existing boiler is still serviceable, but a replacement now has an attractive payback.</li> <li>Replacement can be accomplished during the summer vacation, if funding is available.</li> </ul>                                                                                                                                                                                                                                                                                                 |                   |                       |                             |                                   |

(P) Practical at this time to include in capital improvement plan

(I) Impractical at this time

<sup>1</sup> Simple Payback is determined by dividing the total cost of the project by the amount of annual savings that the project produces. The result of this calculation will yield the number of years it will take for the savings to equal the total project cost. Return on Investment (ROI) is the mathematical inverse of simple payback.

# EXISTING BUILDING COMMISSIONING - IMPLEMENTATION (EAc2.2)

Low and no-cost energy improvement measures are identified during the investigation and analysis phase of existing building commissioning or through the ASHRAE Level II energy audit. Commissioning and energy auditing are the two compliance paths available for this credit as well as the Existing Building Commissioning - Investigation and Analysis credit (EAc2.1). The implementation phase involves putting these improvements into place. Improvements can be made through the existing building commissioning effort or as a separate project resulting from the energy audit. These improvements can, in turn, help to improve the overall energy efficiency of the building, decreasing utility costs and increasing the number of points that can be achieved under the Optimize Energy Performance credit (EAc1).

The investigation and analysis phase may also uncover large capital projects that are needed to make further energy performance improvements. An excerpt of the Capital Improvement Plan is therefore required for this credit to show the level of commitment the organization is making toward improving energy efficiency.

1. **Low/No-cost Energy Efficiency Improvements (Example)** – This list is similar to the list required by EAp1 but contains more detail. The example provided shows the increased level of detail required by this credit. The list of improvements was first compiled in the ASHRAE Level I Energy Audit (EAp1) and is further developed by the ASHRAE Level II Audit, one of the compliance paths for this credit.
2. **Capital Improvement Plan Excerpt (Example)** – A sample excerpt for a Capital Improvement Plan is provided.

## Low/No-cost Energy Efficiency Improvements (Example)

[Example from ASHRAE Level II Audit for EAc2.2]

Observed or Expected Financial Attractiveness – Annual Costs

| List of Low/No Cost Changes                                                                                                                                                                                           | Cost to Implement | Expected Cost Savings | Simple Payback | Return on Investment |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|----------------|----------------------|
| <b>Change settings on Building Automation System</b><br>Adjusting equipment run times to better match occupancy periods will reduce energy waste. Cost is for a service order to the energy management system vendor. | \$900             | \$650                 | 1.4 years      | 72%                  |
| <b>Replace time clock</b><br>Existing time clock is no longer functioning, causing lighting systems to be on when not needed. The new time clock has expanded programming features that require less maintenance.     | \$400             | \$900                 | 4 months       | 225%                 |
| <b>Install idle time cut-off switches</b><br>These systems will allow efficient shutdown of vending machines that would otherwise require manual shutdown, which is too labor intensive.                              | \$3,200           | \$1,200               | 2.7 years      | 38%                  |
| <b>Repair damper actuators</b><br>Existing failed actuator has allowed outside air into HVAC system, resulting in unnecessary conditioning during unoccupied periods.                                                 | \$2,200           | \$450                 | 4.9 years      | 20%                  |
| <b>Add procedure for custodians</b><br>A weekly task added for the night custodian involves switching designated breakers in the panel off Friday on nights and back on Monday mornings.                              | \$350             | \$2,500               | 2 months       | 700%                 |

## Capital Improvement Plan Excerpt (Example)

[Example from ASHRAE Level II Audit for EAc2.2]

This example builds on the list of capital improvement measures developed in EAc2.1 and shows that three of the four capital projects (deemed practical for accomplishment at this time) are planned for completion in the organization's Capital Improvement Plan.

| Project                                                              | 2009 | 2010     | 2011 | 2012 | 2013     |
|----------------------------------------------------------------------|------|----------|------|------|----------|
| Lighting Retrofit (Replace T-12s)                                    |      | \$27,000 |      |      |          |
| Replace roofing with cool roof and added insulation                  |      |          |      |      |          |
| Replace unit A/Cs with high efficiency units (Class-room Building A) |      | \$89,000 |      |      |          |
| Replace boiler with high efficiency boiler                           |      |          |      |      | \$16,000 |



# MATERIALS & RESOURCES



# SUSTAINABLE PURCHASING POLICY (MRp1)

Sustainable purchasing can have a positive impact on a wide variety of environmental issues, including slowing the depletion of natural non-renewable resources and promoting the use of safer products. Materials purchased regionally help the local economy as well as reduce the energy required for delivery logistics, which has a wider impact on reducing energy use in both manufacturing and transportation and on reducing the associated greenhouse gas emissions. The immediate benefits to schools may include the use of safer products and supplies, which improves the health and well-being of students, teachers, and staff.

**Guidance for Environmentally Preferable Purchasing Policy (EPP)** – A sample outline for the Environmentally Preferable Purchasing Policy that is required for this prerequisite can be found in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*. The LEED 2009 for Existing Buildings: Operations & Maintenance Rating System also provides information on what must be included in the policy.

# SUSTAINABLE PURCHASING (MRc1, MRc2, MRc3, MRc4 & MRc5)

Sustainable purchasing programs include a process to track all purchases and identify which of those purchases meet the sustainability criteria of the above referenced credits. Schools/school districts will find it beneficial to assign the responsibility of tracking purchases to an individual employee who can keep the records up to date. A spreadsheet-based tracking tool has been developed for use by the person responsible for tracking sustainable purchases.

1. **Sustainable Purchasing Tracking Spreadsheet** – This spreadsheet can be used to track various categories of sustainable purchases, including ongoing consumables and durable goods, materials for facility alterations and additions, lamps containing mercury, and food purchases. The spreadsheets are aligned to the tables found in the LEED Online submittal forms for Sustainable Purchasing credits (MRc1 through MRc5).

## Tracking Tool:

[Sustainable Purchase Tracker\\_MR.xls](#)

Guidance for Sustainable Purchasing Programs (MRc1, MRc2, and MRc3)

The LEED for Existing Buildings: O&M rating system requires that a sustainable purchasing “program” be maintained covering the following categories of materials.

- Ongoing Consumables (MRc1) – These are materials with a low cost per unit that are regularly used and replaced through the course of business.
- Durable Goods (MRc2) – These are items available at a higher cost per unit and durable goods that are replaced infrequently and/or may require capital program outlays to purchase. The options for this credit include electric-powered equipment and furniture.
- Facility Alterations and Additions (MRc3) – These are materials for renovations, demolitions, retrofits, and new construction additions. Mechanical, electrical, and plumbing components and specialty items such as elevators are also excluded from this credit.

A program generally consists of written guidance from school administrators, delegation of authority and responsibility for accomplishing specified tasks, and some means of tracking and verifying that the tasks or levels of performance have been achieved. The sustainable purchasing credits do not require the upload of program guidance documents, although the school/school district will likely want to create them nonetheless. Each school/school district is free to devise and document a sustainable purchasing program of their choosing. However, there is no special formatting or requirement to upload the program document to LEED Online.

Credits MRc1, MRc2, MRc3 (as well as the Sustainable Purchasing - Food credit, MRc5) only require that the project team demonstrate the level of performance specified by the credit. This is accomplished by completing the embedded tables found in the submittal forms for these credits.

# SUSTAINABLE PURCHASING – REDUCED MERCURY IN LAMPS (MRc4)

Mercury causes serious ecological and human health problems when released to the environment through human activities. Once these projects leave buildings, they often become part of the waste stream and contribute to air, land, and water contamination. To satisfy the requirements of this credit, project teams must develop a lighting purchasing plan that specifies maximum levels of mercury permitted in mercury-containing lamps (for both indoor and outdoor fixtures).

**Guidance for Lighting Purchasing Plan** – A plan is typically a written document that describes tasks, time frames, performance measures, and responsibilities for completion of those tasks. *The LEED 2009 Green Building Operations & Maintenance Reference Guide* provides an example of a Lamp Purchasing Plan that meets the requirements of this credit. However, the plan itself is not a required upload to LEED Online. Instead the project team is required to acknowledge in the submittal form that the plan includes the elements listed below:

- A target of 90 picograms per lumen-hour or less for the overall average of mercury content
- Indoor and outdoor fixtures, hard-wired and portable fixtures
- A requirement that 90% of all lamps comply with the average mercury content
- Evidence of compliance with to industry standard criteria (list of specifications provided in the submittal form)
- Instructions to use highest value if manufacturer's data specifies a range
- Screw-based, integral compact fluorescent lamps included in calculations for compliance

A Lamp Purchasing Plan Table and a Performance Period Lamp Purchasing Table are embedded in the submittal form that must be completed.

The Sustainable Purchases Tracking Spreadsheet contains a version of the above tables.

# SOLID WASTE MANAGEMENT POLICY (MRp2)

Solid waste management that includes recycling can have the immediate benefit of reduced costs to the school/school district. Some waste management companies or utilities charge less for recycling dumpsters than for ordinary trash dumpsters. Recycling (reducing and reusing) also has the benefit of diverting waste from landfills. Recycling of existing materials reduces the need for new raw materials, thereby reducing the energy required for extraction and the resulting greenhouse gases.

**Guidance for Solid Waste Management Policy** – A sample outline for the Solid Waste Management Policy that is required for this prerequisite can be found in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*. The LEED 2009 for Existing Buildings: Operations & Maintenance Rating System also provides information on what must be included in the policy.

# SOLID WASTE MANAGEMENT (MRc7, MRc8, MRc9)

Waste reduction and recycling programs include a process to track waste and identify what is being recycled. Schools/school districts will find it beneficial to assign the responsibility of tracking waste to an individual employee who can keep the records up to date. A spreadsheet-based tracking tool has been developed for use by the person responsible for tracking waste.

1. **Solid Waste Management Tracking Spreadsheet** – This spreadsheet can be used by staff to maintain the consistency of record keeping. The spreadsheet can track ongoing consumables (MRc7), durable goods (MRc8), and waste from facility alterations and additions (MRc9).

## Tracking Tool:

[WM\\_Tracker\\_MR.xls](#)

2. **Guidance for Ongoing Consumables and Durable Goods Programs** - The LEED for Existing Buildings: O&M rating system requires that a waste reduction, reuse, and recycling program be maintained to address the following categories of materials:
  - **Ongoing Consumables (MRc7)** – These are materials with a low cost per unit that are regularly used and replaced through the course of business.
  - **Durable Goods (MRc8)** – These materials include at minimum office equipment, appliances, external power adapters, televisions, and other audiovisual equipment.

A program generally consists of written guidance from school administrators, delegation of authority and responsibility for accomplishing specified tasks, and some means of tracking and verifying that the tasks or levels of performance have been achieved. The waste management credits do not require the upload of program guidance documents, although the school/school district will likely want to create them nonetheless. Each school/school district is free to devise and document a solid waste management program of their choosing. However, there is no special formatting or requirement to upload the program document to LEED Online.

Credits MRc7 and MRc8 only require that the school demonstrate the level of performance specified by the credit. This is accomplished by completing the embedded table found in the submittal form for these credits. The spreadsheet-based version of this table can be found in the Solid Waste Management Tracking Spreadsheet.

# INDOOR ENVIRONMENTAL QUALITY



# ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL (IEQp2)

Elimination of Environmental Tobacco Smoke from school sites is already a widely accepted practice. However, there may be some school sites that allow smoking for teachers, staff, or visitors. These exceptions should be evaluated to ensure that occupants are not inadvertently exposed to ETS. To comply with this prerequisite, the school/school district must prohibit smoking in the building by instituting an ETS policy.

**Guidance for ETS Policy** – Although implementation of ETS control is addressed as a policy in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*, there is no requirement to upload that policy to LEED Online. Therefore, there is no required format for this policy. Some states have laws governing ETS which makes it unnecessary for school officials to create a policy. This prerequisite focuses on the performance aspect of ETS control. The owner must acknowledge in the submittal form that smoking is prohibited and to what extent. If smoking is allowed anywhere on site, the owner must explain how the ETS policy is communicated to building occupants and visitors.

# GREEN CLEANING POLICY (IEQp3)

Custodial services involve the use of many chemicals, some of which are toxic to humans and school site ecology. A green cleaning policy protects custodial staff, students, teachers, and the natural environment. The LEED for Existing Buildings: O&M rating system requires that a policy on green cleaning be established for the facility being certified. Although campus- or district-wide adoption of the policy is not a requirement of the rating system, the school/school district may want to consider making this a campus- or district-wide policy.

**Guidance for Green Cleaning Policy** – A sample outline for the Green Cleaning Policy that is required for this prerequisite can be found in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*. The LEED 2009 Existing Buildings: Operations & Maintenance Rating System also provides information on what must be included in the policy.

# INDOOR AIR QUALITY (IAQ) BEST MANAGEMENT PRACTICES - IAQ MANAGEMENT PROGRAM (IEQc1.1)

Indoor air quality is a top priority for schools and school districts. Improving indoor air quality can enhance the well being of staff, teachers, and students and increase attendance rates, performance, and productivity. This credit requires the development and implementation of an ongoing IAQ management program based on the EPA's Building Education and Assessment Model (I-BEAM).

**Guidance for IAQ Management Program** – A program generally consists of written guidance from school administrators, delegation of authority and responsibility for accomplishing specified tasks, and some means of tracking and verifying that the tasks or levels of performance have been achieved. The LEED Online submittal form for this credit does not require the program document to be uploaded. The submittals for this credit focus on the results of an IAQ audit and the upload of at least two of the four protocols listed in the submittal form for managing significant pollution sources. Examples of two of these protocols are provided in this workbook – a Remodeling and Renovation Protocol (see Indoor Air Quality Management Plan for Facility Alterations) and a Pest Control Protocol (see Indoor Integrated Pest Management).

# **IAQ BEST MANAGEMENT PRACTICES - IAQ MANAGEMENT FOR FACILITY ALTERATIONS AND ADDITIONS (IEQc1.5)**

Indoor air quality (IAQ) can be significantly affected by facility alterations and additions. An effective plan for reducing or eliminating exposure to toxic and hazardous chemicals will help to keep building occupants safe. Selecting materials with the least potential for harmful off-gassing, installing effective air filtration media, and implementing flush-out procedures when appropriate will help promote the health and well being of students, teachers, and staff.

Although campus- or district-wide adoption of the plan is not a requirement of the rating system, the school/school district may want to consider having this plan apply to the entire campus or district..

1. **Sample Indoor Air Quality Management Plan for Facility Alterations and Attachment** - The sample IAQ Management Plan for Facility Alterations shown below can be modified and used to establish a new, more customized document.

# Sample Indoor Air Quality Management Plan for Facility Alterations and Attachment

## Goals and Scope

The Indoor Air Quality Management Plan for Facility Alterations is intended to maintain healthy indoor air quality in the occupied areas of facilities undergoing alterations.

By adhering to the plan, [School/School District Name] will strive to employ best management practices that significantly reduce major sources of pollution in the school.

## Responsible Party

**Facilities Management Leader** – Overall responsibility for the IAQ Management Plan for Facility Alterations will rest with the [Facilities Manager, Maintenance Manager, etc. (select appropriate position)], who will ensure the plan's provisions are implemented, monitored, and updated, as needed.

**IAQ Manager** – The IAQ Manager will be designated by the facilities management leader and will be responsible for establishing, coordinating, and publishing effective IAQ protocols for facilities alterations. The IAQ manager will be responsible for the following tasks:

- Ensure plan elements are included in construction documents (for contracted effort) or disseminated to the appropriate shop foreman (for in-house effort).
- Coordinate with quality assurance (QA) inspectors for projects that must comply with the plan to ensure that they are familiar with the plan's provisions.
- Ensure completion of the Project Flush-Out Completion Report at the project's conclusion (see attachment).

**Shop Foremen** – The responsibility for implementing the plan at all worksites will rest with the shop foreman responsible for the trade involved in the work. All foremen will consider impacts of their work on IAQ in the project planning phase and identify measures to implement during the project to protect occupants and workers from contaminants and pollution sources.

## Implementation Resources

The following information resources provide guidance on implementing the provisions of the IAQ Management Plan for Facility Alterations.

- Sheet Metal and Air Conditioning National Contractors Association (SMACNA) "IAQ Guidelines for Occupied Buildings under Construction" 1995, Chapter 3.
- ASHRAE52.2-1999: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI Approved).
- EPA's IAQ Tools for Schools, Section 6, "What is an IAQ Management Plan?"
- EPA's Indoor Air Quality Building Education and Assessment Model (I-BEAM)
- EPA's Healthy School Environments Assessment Tool (HealthySEAT)

## Performance Measurement

To prevent indoor air quality problems resulting from facility alterations and to help sustain the comfort and well-being

of workers and building occupants, the following IAQ protocols are established.

## **Plan Dissemination**

The facilities management leader will be responsible for ensuring the plan's provisions are communicated to all parties involved in the facility alteration project. Means of dissemination may include:

- Referencing the plan in the project's bid specifications.
- Ensuring the plan is an agenda item at the preconstruction conference.

## **IAQ Control Measures for HVAC Equipment Protection**

The following protocol will be used to control sources of pollution affecting HVAC equipment:

- Whenever possible, HVAC systems will be shut down during alteration activities.
- Mechanical rooms will not be used to store construction or waste materials.
- HVAC ductwork ends and outlets will be protected from construction dust and debris.
- If air handling units servicing work zones must be run during the course of the project, the units will be protected from dust with the use of filtration media. Filtration media must have a Minimum Efficiency Reporting Value (MERV) of 8 or higher and be placed at each return air grille.

## **Building Materials**

Building materials with desired emission profiles will be considered and, where practical, selected for inclusion in the project. Absorptive materials will be protected from moisture damage until project completion. The following measures will be observed:

- Selection of building materials (adhesives and sealants, paints and coatings, flooring systems, composite wood and agrifiber products, furniture and furnishings, and ceiling and wall systems) for installation in schools will be guided by the testing and product requirements of the California Department of Health Services' Standard Practice for The Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- Construction site storage of building materials will include measures for protecting against rain and humidity.
- Materials will be kept in factory sealed containers until installation or application.
- Installed materials will be protected from moisture damage throughout the project.

## **Protection of Occupied Areas**

Air movement from work zones into occupied or clean areas will be prevented using pressurization or plastic sheeting barriers. Filtration media used in work zones will be replaced immediately prior to reoccupation.

## **Construction Work Site**

The entire construction site will be maintained as a clean and safe working environment throughout the project. The following measures will be observed:

- Each work zone will be cleaned at the end of the work shift by the trade(s) responsible for the work.
- Trash and product containers will be covered and sealed when not in use.

- Spills will be cleaned up immediately.
- Portable ventilation systems used at the work zone will use 100% outside air and not recycle any air within the building.
- Pollutants will be directly exhausted to the outdoors where possible using portable air filtration devices.
- Vehicle idling will be minimized. Electric-powered equipment will be used where feasible.
- Facility alterations projects will be scheduled during periods of low occupancy or school closures whenever possible.

## Painting

The following protocol will be followed for both in-house and contracted efforts:

- Low Volatile Organic Compound (VOC), fast drying paints will be used where feasible (see section on “Building Materials” above).
- Painting will occur during unoccupied hours.
- Lids will be kept on paint containers when not in use.
- Buildings will be ventilated with significant quantities of outside air during and after painting. A complete building out will be conducted prior to occupancy.
- Outside air ventilation will be increased for a 30-day period after occupancy.
- Spraying will be avoided when possible.

## Building Flush-out

After alterations activities end and all interior finishes have been applied, a flush-out of the construction area will be performed and new filtration media will be installed. The IAQ manager will evaluate the project and determine which of the two flush-out procedures below will be used.

1. **Non-occupied Flush-Out** – Upon completion of alteration activities and prior to occupancy, conduct a minimum two-week building flush-out at 100% outside air, or maximum outdoor air, while achieving a relative humidity not greater than 60%, for 24 hours a day.
2. **Occupied Flush-Out – Phase 1:** Upon completion of construction and prior to occupancy, conduct a minimum three-day building flush-out at 100% outside air, or maximum outdoor air, while maintaining a relative humidity not greater than 60%, for 24 hours a day. **Phase 2:** Replace the filtration media and continue maximum outdoor air for an additional period of no less than 30 days using 100% outdoor air, or maximum percent of outdoor air consistent with thermal comfort and humidity control. Occupancy is allowed during the second phase.

## Project Completion

All HVAC and lighting systems will be returned to the designed or modified sequence of operation at the completion of alteration activities.

## Quality Assurance/Quality Control Processes

During any alteration project, the following measures will be observed to ensure the implementation of the plan:

- A log will be kept for each location of installed filtration that includes the following information: filtration

manufacturer, filter identification, MERV rating, location, and status of replacement immediately prior to occupancy.

- Photographs documenting IAQ control measures implemented at periods during the project (e.g. beginning, middle, and end) will be taken. Photos will be labeled to highlight the approach taken.
- A report will be prepared documenting the flush-out procedure that was used, including airflow and duration.
- Quality Assurance inspectors will have access to this plan and make periodic inspections of the job site and relevant documentation to assess compliance.
- Issues identified throughout the course of the project will be discussed in detail during project team meetings between the Facilities Management Leader and the contracted or in-house shop foreman.

## Attachment – Project Flush-out Completion Report

|                 |  |
|-----------------|--|
| Project Title:  |  |
| Date Completed: |  |
| IAQ Manager:    |  |
| Contractor:     |  |
| Shop Foreman:   |  |

|                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Yes <input type="checkbox"/> No | The project building's air handling units were operated during construction alterations activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | A copy of the flush-out procedures was provided to (select all that apply):<br><input type="checkbox"/> Contractor<br><input type="checkbox"/> Shop Foreman                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | All spaces that underwent alterations were flushed out prior to occupancy. The following flush-out procedure was used in this project:<br><input type="checkbox"/> Non-occupied Flush-out<br>1. Prior to occupancy, a building flush-out was performed by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and relative humidity no higher than 60%.<br>Or,<br>2. <input type="checkbox"/> Occupied Flush-out<br>a. A building flush-out was conducted to supply a minimum of 3,500 ft <sup>3</sup> of outdoor air per square foot of floor area (at a minimum rate of 0.30 cfm/ft <sup>2</sup> of outside air or at the design minimum outside air rate, whichever is greater) a minimum of three-hours prior to occupancy and during occupancy, until a total of 14,000 ft <sup>3</sup> /ft <sup>2</sup> of outside air had been delivered to the space.<br>b. On each day of occupancy, a minimum ventilation rate for the affected space was begun at least 3 hours prior to occupancy and continued while the space was occupied.<br>c. Comfort levels of temperature and humidity were maintained during occupied periods. |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | A detailed narrative describing the project's pre-occupancy and post-occupancy flush-out process is attached to this report (including data regarding airflow and duration of flush-out).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | Information regarding any special circumstances is attached to this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | Photos highlighting the IAQ Management Plan practices are enclosed with this report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

IAQ Manager: \_\_\_\_\_ (Name)

IAQ Manager: \_\_\_\_\_ (Signature)

Date: \_\_\_\_\_

# OCCUPANT COMFORT - OCCUPANT SURVEY (IEQc2.1)

Comfortable, healthy school environments can increase staff, teacher, and student productivity and reduce absenteeism. An occupant's perspective can help identify issues affecting employee health and productivity, indoor air quality, and energy use.

1. **Sample Occupant Comfort Survey** – The form provided can be used to gather survey data on occupant comfort.

## Sample Occupant Comfort Survey

|              |  |
|--------------|--|
| Survey Date: |  |
|--------------|--|

Please forward completed survey form to: \_\_\_\_\_

### Anonymity of Respondent Information

The intent of the survey is to solicit anonymous responses on occupant comfort; please do not record your name or leave any markings on the form that could identify you as the respondent.

### Survey Topics and Assessment

Place an "X" under the level of rating that best reflects your assessment. Negative numbers indicate levels of dissatisfaction. Zero (0) is a neutral position. Positive numbers indicate levels of satisfaction. N/A indicates the topic does not apply to you.

|                            |  |    |    |  |   |   |  |     |
|----------------------------|-----------------------------------------------------------------------------------|----|----|-------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------|-----|
| Comfort Category           | -3                                                                                | -2 | -1 | 0                                                                                   | 1 | 2 | 3                                                                                   | N/A |
| A. Thermal Comfort         |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |
| B. Acoustics               |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |
| C. Indoor Air Quality      |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |
| D. Lighting Levels         |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |
| E. Cleanliness             |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |
| F. Other (please specify): |                                                                                   |    |    |                                                                                     |   |   |                                                                                     |     |

Follow-up Questions: (Please comment on anything that receives a -1 rating or below.)

1. Can you describe the problem?

2. Have you or someone else requested that corrective action be taken?

3. Has corrective action been attempted? (Yes, No) Comment:

4. Has there been any response to the request for corrective action? (Yes, No, N/A) Comment:

5. To the extent that anonymity is not compromised, please indicate the general location, if appropriate, for any problems noted.

(Please use the back of this form to continue your comments if needed.)

# CONTROLLABILITY OF SYSTEMS - LIGHTING (IEQc2.2)

Proper lighting helps to optimize conditions for learning and working. Increasing the level of controllability of lighting systems can increase teacher and staff satisfaction and decrease utility costs.

1. **Lighting Controls in Individual Workstations Form** - The form provided can be used to gather data for the LEED Online submittal form.
2. **Lighting Controls in Classrooms and Other Multi-occupant Spaces Form** - The form provided can be used to gather data for the LEED Online submittal form.

## Lighting Controls in Individual Workstations Form

| Room Number                                                                                                          | Number of workstations | Number of workstations with individual lighting controls* |
|----------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------|
|                                                                                                                      |                        |                                                           |
|                                                                                                                      |                        |                                                           |
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|                                                                                                                      |                        |                                                           |
|                                                                                                                      |                        |                                                           |
|                                                                                                                      | # of workstations:     | # w/ controls:                                            |
| Totals:                                                                                                              |                        |                                                           |
| Percent of Workstations with Individual Lighting Controls:                                                           |                        | %                                                         |
| <p>*Individual controls can include task lighting, as well as overhead lighting in private spaces.</p> <p>NOTES:</p> |                        |                                                           |

## Lighting Controls in Classrooms and Other Multi-occupant Spaces Form

| Room Number or Space Identification                                                                                  | Area of Space (sf) | Area with Lighting Controls Provided* | Brief Descriptions of Installed Lighting Controls |
|----------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------|---------------------------------------------------|
|                                                                                                                      |                    |                                       |                                                   |
|                                                                                                                      |                    |                                       |                                                   |
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|                                                                                                                      |                    |                                       |                                                   |
|                                                                                                                      | Area of Space:     | Area with Controls:                   |                                                   |
| Totals:                                                                                                              |                    |                                       |                                                   |
| Percent of Areas with Lighting Controls:                                                                             |                    |                                       | %                                                 |
| <p>*Individual controls can include task lighting, as well as overhead lighting in private spaces.</p> <p>NOTES:</p> |                    |                                       |                                                   |

# DAYLIGHT AND VIEWS

## (IEQc2.4)

Daylighting and views improve the indoor quality of a school facility by allowing students, teachers, and staff exposure to natural light and a visual connection to the surrounding outdoor environment. Studies have shown that access to daylight and views can increase occupant productivity and performance. In addition, daylighting can decrease energy costs and reduce space-cooling loads.

1. **Views Compliance Form** - the form provided can be used to gather data on views to the outside in classrooms and other areas, as required by the LEED Online submittal form.

## Views Compliance Form

The form is for use in gathering information for determining view compliance.

| Room Number<br>or Space<br>Identification                                                                                                                                                                                                                                         | Regularly<br>Occupied Floor<br>Area (sf) | Plan Area of<br>Direct Line<br>of Sight to<br>Perimeter Vision<br>Glazing (sf) | Calculated<br>Area of Direct<br>Line of Sight to<br>Perimeter Vision<br>Glazing (sf)* | Horizontal View<br>at 42 Inches<br>(Yes/No) | Compliant Area<br>(sf) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------|------------------------|
|                                                                                                                                                                                                                                                                                   |                                          |                                                                                |                                                                                       |                                             |                        |
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|                                                                                                                                                                                                                                                                                   |                                          |                                                                                |                                                                                       |                                             |                        |
| <b>Totals:</b>                                                                                                                                                                                                                                                                    |                                          |                                                                                |                                                                                       |                                             |                        |
| <b>Percent Regularly Occupied Floor Area Compliant:</b>                                                                                                                                                                                                                           |                                          |                                                                                |                                                                                       |                                             | %                      |
| <p>*For classrooms, estimate the actual square footage with direct line of sight to perimeter vision glazing. For private offices, if the percentage of floor area with direct line of sight is 75% or more, then enter the entire square footage of that room.</p> <p>NOTES:</p> |                                          |                                                                                |                                                                                       |                                             |                        |

# GREEN CLEANING - HIGH PERFORMANCE CLEANING PROGRAM (IEQc3.1)

Green cleaning involves the purchase and use of sustainable cleaning chemicals, best practices for mixing concentrates, the purchase and use of janitorial equipment, and assessment of cleaning performance. The impact of best practices for custodial and janitorial services includes safe operations for custodial staff, a safe and healthy indoor environment for building occupants, and environmentally responsible purchasing and disposal of cleaning products and materials.

Although campus- or district-wide adoption of the program is not a requirement of the rating system, the school/school district may want to consider implementing this program across a campus or district.

1. **Sample High-Performance Cleaning Program and Attachment** – The sample program and attachment provided can be modified to create a new, more customized document. The example is formatted in accordance with the USGBC Program/Plan model.

# Sample High-Performance Cleaning Program and Attachment

## Goals and Scope

The High Performance Cleaning Program for [School/School District] is designed to reduce exposure of occupants and maintenance staff to potentially hazardous chemical, biological, and particulate contaminants, which can also adversely affect air quality, building finishes, building systems, and the environment.

The program implements the [School/School District's] Green Cleaning Policy. The scope of the program includes the following components:

- Appropriate staffing plans.
- Training of maintenance staff in the hazards, use, maintenance, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Use of chemical concentrates with dilution systems that reduce chemical concentrations wherever possible.
- Use of sustainable cleaning materials, products, equipment, janitorial paper products, and trash bags, including microfiber tools and wipes.
- Use of sustainable hard floor and carpet care products meeting sustainability criteria (outlined below).
- Use of cleaning equipment meeting the sustainability criteria (outlined below).

## Responsible Parties

**Interior Cleaning Leader** – Overall responsibility for the High-Performance Cleaning Program will rest with the [Custodial Services Manager, Facilities Manager, Maintenance Manager, etc. (select appropriate position)], who will ensure the program's provisions are implemented, monitored, and updated as needed.

**Designated Person for Tracking Cleaning Purchases** – The interior cleaning leader will designate an individual to track all cleaning purchases to ensure they meet the sustainability criteria outlined in the program. Manufacturer's or supplier's specification sheets will be maintained on file for all products purchased. Products that meet sustainability criteria will be noted.

## Guidance for Resources and Implementation

The following resources provide guidance for implementing the provisions of the High-Performance Cleaning Program. [Below is a sample list of resources that could be cited.]

- Standard Operating Procedure (SOP) [designate SOP as applicable] for Disposing of Hazardous Cleaning Materials
- Material Safety Data Sheets (MSDS) for all chemicals used for cleaning
- EPA's Environmentally Preferable Purchasing (EPP) of Cleaning Materials ([www.epa.gov/epp/pubs/products/cleaning.htm](http://www.epa.gov/epp/pubs/products/cleaning.htm))
- Custodial Services Handbook

## Performance Measurement

Each component of the High-Performance Cleaning Program has its own metric and will be monitored to ensure that the program's objectives are met.

## Staffing Plan

A staffing plan for custodial services will be prepared annually in conjunction with the annual budget process.

The performance metric for the component involves auditing cleaning procedures and processes using the APPA: Leadership in Educational Facilities' "Custodial Staffing Guidelines." The objective is to achieve a minimum score of three on the APPA audit while maintaining the most efficient level of staffing possible.

## Training

All staff assigned to [Custodial Services, or other department name] will, upon hiring, receive orientation training on the chemical hazards they may encounter on the job. Thereafter, all staff will be required to attend the annual training workshop that includes a HAZMAT update; procedures for maintaining, disposing, and recycling of cleaning and service chemicals; an overview of the High-Performance Cleaning Program; and an overview of the Green Cleaning Policy. All assigned staff will be obligated to attend the annual training workshop or a makeup session.

## Use of Chemical Concentrates and Dilution Systems

To the extent that reasonable economy can be maintained, the use of concentrates will be minimized. Where concentrates must be used, the following metric will apply:

- Training will be documented indicating that the staffs handling concentrates are familiar with the dilution procedures.
- Material Safety Data Sheets (MSDS) for all chemicals being handled will be present in room where chemical is being diluted.
- Manufacturer's instructions for dilution of cleaning chemical will be present in the room where chemical is being diluted.
- A log will be maintained on the school site(s) showing all housekeeping chemicals used or stored on site and their storage location.
- Portion controlled dilution devices or pre-measured pouches will be used wherever possible.

## Sustainable Cleaning Materials

Cleaning products are necessary for maintaining clean, healthy schools. In addition to the appearance of a tidy school, other benefits include the removal of dust, allergens, and infectious agents. Cleaning materials will be selected for use based on the following sustainability criteria:

- Minimizes exposure to concentrates
- No ozone depleting substances
- Recyclable packaging
- Recycled content in packaging
- Reduced bioconcentration factor
- Reduced flammability

- Reduced or no added dyes, except when added for safety purposes
- Reduced or no added fragrances
- Reduced or no skin irritants
- Reduced or no Volatile Organic Compounds (VOCs)
- Reduced packaging

All cleaning chemicals, materials, paper, and plastic products will be tracked by the designated person for tracking cleaning purchases. The designated person will maintain a spreadsheet that lists purchases and a file for product manufacturer's or supplier's product data. The files will be maintained for five years.

## Hard Floor and Carpet Care Products

A floor maintenance plan will be developed (for each facility) addressing the following:

- A log for tracking the number of coats of floor finish applied as base and top coats.
- Relevant maintenance and restoration practices and dates for both hard floors and carpets.
- The recommended interval between stripping and recoat cycles and the actual occurrences.
- Use of entryway matting to minimize cycles of floor stripping and recoating.

## Cleaning Equipment

To the extent that reasonable economy can be maintained, the following criteria will be used for the purchasing of cleaning equipment.

- Vacuum cleaners that are certified by the Carpet and Rug Institute "Green Label" Testing Program for vacuum cleaners.
- Carpet extraction equipment used for restorative deep cleaning that is certified by the Carpet and Rug Institute's "Seal of Approval" Testing Program for deep-cleaning extractors.
- Powered floor maintenance equipment, including electric and battery-powered floor buffers and burnishers, are to be equipped with vacuums, guards, and/or other devices for capturing fine particulates and that operate with a sound level of less than 70 dBA.
- Propane-powered floor equipment that has high-efficiency, low-emissions engines with catalytic converters and mufflers that meets the California Air Resources Board (CARB) or EPA standards for the specific engine size and that operate with a sound level of less than 90 dBA.
- Automated scrubbing machines that use only tap water with no added cleaning products or scrubbing machines equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids.
- Battery-powered equipment with environmentally preferable gel batteries.
- Powered equipment that is ergonomically designed to minimize vibration, noise, and user fatigue.
- Equipment designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

The designated person for tracking sustainable purchases will record purchases of cleaning equipment as well as the manufacturer's or supplier's equipment specification sheets.

An equipment log will be maintained that includes a list of all equipment used on the school site, date placed in service,

maintenance schedule, and a record of servicing.

### **Quality Assurance/Quality Control Processes**

Each component of the High-Performance Cleaning Program will be assessed annually based on the metric for that component. The following assessment schedule is established to ensure all components are consistently evaluated on their effectiveness.

- An annual evaluation will consist of the APPA Custodial Staffing Guidelines Audit, which will be conducted prior to the cutoff date for budget input for the upcoming year.
- A quarterly inspection of purchasing records and manufacturer's or supplier's data sheets will be conducted to ensure records are kept up to date.
- Review of training attendance logs will be conducted to ensure relevant staffs have been trained, which will be a ratable item for custodial supervisors' performance evaluations.
- An annual in-progress review working session will be conducted by the Interior Cleaning Leader and all custodial supervisors to assess the effectiveness of the High-Performance Cleaning Program, noting challenges and opportunities for improvement.

## **Attachment – Sustainable Cleaning Products and Materials**

The following guidelines are provided for purchases of cleaning materials and products, disposable janitorial paper products, and trash bags. To the extent that is economically feasible, the following standards will be used for purchasing cleaning materials and products.

### **Cleaning Products**

- Green Seal GS-37, for general-purpose, bathroom, glass, and carpet cleaners
- Environmental Choice CCD-110, for cleaning and degreasing compounds
- Environmental Choice CCD-146, for hard surface cleaners
- Environmental Choice CCD-148, for carpet and upholstery care

### **Disinfectants, Metal Polish, Floor Finishes, Strippers or Other Products Not Addressed Above**

- Green Seal GS-40, for floor care products
- Environmental Choice CCD-112, for digestion additives for cleaning and odor control
- Environmental Choice CCD-113, for drain or grease traps additives
- Environmental Choice CCD-115, for odor control additives
- Environmental Choice CCD-147, for hard floor care
- California Code of Regulations maximum allowable VOC levels for the specific product

### **Disposable Paper Products and Trash Bags**

- EPA Comprehensive Procurement Guidelines for Janitorial Paper and Plastic Trash Can Liners
- Green Seal GS-09, for paper towels and napkins
- Green Seal GS-01, for tissue paper
- Environmental Choice CCD-082, for toilet tissue
- Environmental Choice CCD-086, for hand towels
- Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers

### **Hand Soaps**

- No antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (e.g., food service and health care requirements)
- Green Seal GS-41, for hand cleaners
- Environmental Choice CCD-104, for hand cleaners and hand soaps

# GREEN CLEANING - PURCHASE OF SUSTAINABLE CLEANING PRODUCTS AND MATERIALS (IEQc3.3)

Sustainable purchasing programs include a process to track all purchases and identify which of those purchases meet the sustainability criteria of the above referenced credit. Schools/school districts will find it beneficial to assign the responsibility of tracking purchases to an individual employee who can keep the records up to date. A spreadsheet-based tracking tool has been developed for use by the person responsible for tracking sustainable purchases.

1. Sustainable Purchasing Tracking Spreadsheet – This spreadsheet can be used to track sustainable purchases of cleaning products. The spreadsheets are aligned to the tables found in the LEED Online submittal forms for Sustainable Purchasing credits (IEQc3.3).

## **Tracking Tool:**

[Sustainable Purchase Tracker\\_IEQ.xls](#)

# GREEN CLEANING – SUSTAINABLE CLEANING EQUIPMENT (IEQc3.4)

Managing the selection and use of janitorial cleaning equipment allows schools and school districts to reduce the exposure of staff and building occupants to potentially hazardous chemicals, air quality problems, and noise. This credit requires the implementation of a janitorial equipment program that reduces building contaminants and minimizes environmental impact.

Although campus- or district-wide adoption of the program is not a requirement of the rating system, the school/school district may want to consider implementing this program throughout the campus or district.

**Guidance for Janitorial Cleaning Equipment Program** – A program generally consists of written guidance from school administrators, delegation of authority and responsibility for accomplishing specified tasks, and some means of tracking and verifying that the tasks or levels of performance have been achieved. The sustainable cleaning equipment credit does not require the upload of a written program document. However, the facility manager must acknowledge in the submittal template that a program is in place that reduces building contaminants, minimizes environmental impact, and requires that all newly purchased janitorial equipment meet the credit requirements. The elements that should be included in the program are outlined in the *LEED 2009 Green Building Operations & Maintenance Reference Guide*.

The facility manager must also acknowledge the provisions noted below. These provisions may be a part of a written program established by school administrators or other combination of existing guidance documents.

- All powered cleaning equipment in use within the project building and associated grounds is routinely maintained to optimize performance.
- The sustainable cleaning equipment program has been implemented such that at the close of the performance period at least 20% of janitorial equipment (as measured by either the number of equipment items or purchase price) in use within the project building and associated grounds meets one of the required sustainability criteria other than the equipment safeguard requirement (i.e., rollers or bumpers). The compliant equipment may have been purchased either during or before the performance period.
- All janitorial cleaning equipment purchased for the project building and associated grounds during the performance period complies with the required sustainability criteria.

Other items that are required by this credit and could be included in a program document include an equipment inventory and an equipment inspection program.

# GREEN CLEANING - INDOOR INTEGRATED PEST MANAGEMENT (IEQc3.6)

Indoor Integrated Pest Management Plan (IPM) is used to reduce the level of exposure that occupants have to toxic chemicals used to treat pests. The sample provided shows the level of detail and range of topics to be included in the plan adopted by the school/school district.

Although campus- or district-wide adoption of the program is not a requirement of the rating system, the school/school district may want to consider implementing this program across the campus or district.

1. **Sample Indoor Integrated Pest Management Plan and Attachment** – The sample plan and attachment shown below is an example that can be used to establish a new, more customized document.

# Sample Indoor Integrated Pest Management Plan and Attachment

## Goals and Scope

The Indoor Integrated Pest Management Plan is intended to protect building occupants, maintenance technicians, and other school/school district staff by reducing harmful chemical use and improving indoor air quality in the school/school district.

## Responsible Parties

**Entomology Services Leader** – Overall responsibility for the Indoor Integrated Pest Management Plan will rest with the [Facilities Manager, Maintenance Manager, Safety and Health, or Entomology Department Supervisor, etc. (select appropriate position)], who will ensure that the plan's provisions are implemented, monitored, and updated as needed. The entomology services leader will be responsible for the Indoor Integrated Pest Management Plan, including implementing strategies and ordering sustainable products and materials. He or she will maintain records on applications and treatments in all schools and offices within the school/school district.

**Designated Person for Tracking Pest Management Chemical Purchases** – The entomology services leader will designate an individual to track all purchases of chemicals to ensure they meet the sustainability criteria outlined in this program. Manufacturer's or supplier's specification sheets will be maintained on file for all products purchased for at least five years. The products that meet sustainability criteria will be noted.

## Guidance for Resources and Implementation

The following resources provide guidance for implementing the provisions of the Indoor Integrated Pest Management Plan. [Below is a sample list of resources that could be cited.]

- Standard Operating Procedure (SOP) [designate SOP as applicable] for Disposing of Hazardous Materials
- Material Safety Data Sheets (MSDS) for all chemicals
- EPA's Web site for pesticides ([www.epa.gov/pesticides](http://www.epa.gov/pesticides))
- The school/school district Integrated Pest Management, Erosion Control, and Landscape Management Plan

## Performance Measurement

Each component of the Indoor Integrated Pest Management Plan has its own metric and will be monitored to ensure the plan's objectives are met.

## Training

All staff assigned to [Safety and Environment Department, or other department name] will receive, upon hiring, orientation training on the chemical hazards they may encounter on the job. Thereafter, all staff will be required to attend the annual training workshop that includes a HAZMAT update and review of the Indoor Integrated Pest Management Plan. All assigned staff will be obligated to attend the annual training workshop or a makeup session.

## Chemical Treatment Purchasing and Application

Pesticide treatment products are sometimes necessary for maintaining attractive and healthy schools. Use of least toxic pesticides can help to maintain the look of a tidy school and have other benefits that include the reduction of chemicals

that can come into contact with occupants or become airborne and affect the school's indoor air quality. Pesticides will be selected for use based on the following sustainability criteria:

- Tier III Pesticides will be the standard purchase for pesticides and require no technical approval (see attachment).
- Tier I and II pesticides will be purchased only by approval of the entomology services leader.

All pesticides (except Tier III) will be tracked by the staff designated to record pesticide purchases. The designated staff will maintain a spreadsheet that lists purchases and a file for product manufacturer's or supplier's product data. The files will be maintained a minimum of five years.

A pesticide application log will be maintained and reviewed annually [or more frequently if required by other regulations] to ensure the optimum frequency of treatment to maintain building appearance, control pest populations and promote staff and occupant safety, while minimizing use of pesticides. Each treatment will be evaluated for low-impact practices and be considered for a low-impact process whenever practical. Tier I and II pesticides will be used only by approval of the entomology services leader and only after careful evaluation of the specific circumstances.

## Integrated Methods and Strategies

To promote the safe application of pest control treatments (control of fungi, unwanted plants, insects, and animals), the following strategies will be used:

- The indoor IPM strategies will be integrated with outdoor IPM to ensure consistency. Both indoor and outdoor services will be managed by the entomology services leader.
- Advance notice will be provided to all building occupants before a pesticide, other than a least-toxic pesticide, is applied. At least [72] hours notice is required under normal circumstances. This may be shortened to [24] hours notice in an emergency situation. Notice will be communicated to building occupants by [describe communication system].
- Material Safety Data Sheets (MSDS) for each pesticide will be cataloged and maintained in a central location on the site.
- Food service areas and break rooms will be kept clean and free of food waste to eliminate food, water, and shelter for insect and animal pests. Any standing water or leaks will be reported as soon as discovered to the service order and repair desk.
- Structural repairs will be employed where appropriate to deter pests from entering the building through cracks.
- Mechanical and living biological controls will be considered and employed before pesticide use.
- When it is determined by the entomology services leader that a chemical pesticide is the only practical solution for a specific issue, then the least toxic pesticide will be used. It will be used only in the particular location for the targeted species. To the extent practical, Tier III pesticides will be used (see attachment).
- If an emergency pest control application is needed to mitigate or eliminate a pest which threatens the health or safety of students, teachers, or staff, notification will not be required in advance. However, notification must be made within 24 hours of the emergency application to parents and school staff.

## IPM Protocols

The following protocols will be observed to reduce or eliminate contaminant sources [school/school districts should select the protocols that are practical for their situation]:

- Minimize the use of pesticides to manage pests by controlling dirt, moisture, clutter, foodstuff, harborage, and building penetrations. Use baits and traps rather than pesticide sprays where possible. Avoid periodic pesticide

application for “prevention” of pests. Use pesticides only where pests are located. Use pesticide specifically formulated for the targeted pest.

- Apply pesticides only during unoccupied hours.
- Ventilate the building with significant quantities of outside air during and after applications.
- Ensure a complete building flush-out prior to occupancy.
- Notify occupants prior to occupation.
- Keep outside applications away from building air intakes.

## **Quality Assurance/Quality Control Processes**

Each component of the Indoor Integrated Pest Management Plan will be assessed annually based on the metric for each component. The following assessment schedule is established to ensure all components are consistently evaluated for effectiveness.

- An annual inspection of the school site and pesticide treatment log(s) will be made by the school/school district entomology services leader to assess compliance of maintenance operations with the plan. Maintenance deficiencies will be called in as a service order for correction. A review of the log and history of treatments will also serve to guide pest population monitoring.
- A quarterly inspection of purchasing records and manufacturer’s or supplier’s data sheets will be conducted to ensure records are kept up to date.
- Review of training attendance logs will be conducted to ensure relevant staffs have been trained, which will be a ratable item for all maintenance supervisors’ performance evaluations that have staff working on tasks in compliance with the plan.
- An annual review will be conducted by the school/school district entomology services leader and all applicable maintenance supervisors to assess the effectiveness of the Indoor Integrated Pest Management Plan, highlighting challenges and opportunities for improvement.

## Attachment – Tier III Lowest Concern Pesticide Products

The following pesticide products are approved for use in all facilities without prior approval from the entomology services leader. [This is an example of the kinds of pesticides that could be specified. Each school/school district should determine which chemicals are acceptable for their situation. Consultation with the safety and environment leader or staff entomologist is advised prior to developing such a list.]

| Product Name | Active Ingredient(s)           | Signal           | Notes                                                        |
|--------------|--------------------------------|------------------|--------------------------------------------------------------|
| [Product A]  | Bacillus thuringiensis (B.t.)  | Caution          |                                                              |
| [Product B]  | Potassium salts of fatty acids | Caution          |                                                              |
| [Product C]  | B.t.kurstaki (k).              | Caution          |                                                              |
| [Product D]  | S-kinoprene                    | Warn             |                                                              |
| [Product E]  | B.t.k.                         | Caution          | Indoor use only                                              |
| [Product F]  | B.t.israelensis (i).           | Caution          |                                                              |
| [Product G]  | Potassium salts of fatty acids | Warn             |                                                              |
| [Product H]  | B.t.k                          | Caution          | Sub-registration of Thuricide                                |
| [Product I]  | Potassium salts of fatty acids | Warn             |                                                              |
| [Product J]  | B.t.k.                         | Caution          |                                                              |
| [Product K]  | B.t.i.                         | Caution          |                                                              |
| [Product L]  | Mint oil                       | None<br>Required | Considered minimum risk by EPA;<br>registration not required |

# APPENDIX A

The following USGBC Guidance is quoted in its entirety from the USGBC Web site

## Policy, Program, and Plan Models for LEED for Existing Buildings: Operations & Maintenance

In organizational or facility management there are high-level statements called “policies” that ultimately set the stage for lower-level statements called “programs and/or plans” targeted at implementing those policies. In LEED for Existing Buildings: O&M, a policy commits the organization to an overarching course of action which empowers staff working at the operational level. A policy is a strategic view of a given sustainability goal that sets behavioral boundaries and may encompass a large number of buildings, or an entire organization, in a general way. The program/plan is the field level, operational working document that lays out the series of steps required to meet the sustainability goal in a given building or group of buildings.

### POLICIES

In LEED for Existing Buildings: O&M certain policies are required as prerequisites (e.g. WE prerequisite 1, MR prerequisites 1 and 2, and IEQ prerequisite 3). In those cases, USGBC provides the following policy model to help the project team ensure that all relevant and necessary aspects of the policy are addressed. (Note: this policy model appears in the LEED for Existing Buildings: O&M rating system as well; for reference it is repeated here without change.)

**Scope** – Describe the facility management and operations processes to which the policy applies. Describe the building components, systems, and materials to which the policy applies.

**Performance Metric** – Describe how performance will be measured and/or evaluated.

**Goals** – Identify the sustainability goals for the building.

**Note:** although applicants are required to set goals, documentation of actual achievement is not required to demonstrate compliant policies; stating the goal is enough. Applicants are encouraged to set high goals and work toward their achievement.

**Procedures and Strategies** – Outline the procedures and strategies in place to meet the goals and intent of the policy.

**Responsible Party** – Identify the teams and individuals involved in activities pertaining to the policy. Identify and outline key tasks for the above teams and individuals.

**Time Period** – Identify the time period over which the policy is applicable.

Applicants are not required to develop separate policies for the purposes of achieving LEED for Existing Buildings: O&M prerequisites and credits as long as they can highlight these components in their existing policies.

## PROGRAMS & PLANS

Certain optional credits in LEED for Existing Buildings: O&M reward the project for having a program or plan to operate the building or grounds in a sustainable way. In LEED for Existing Buildings: O&M the terms ‘program’ and ‘plan’ are used synonymously to reference the facility’s operational system in place to implement sustainability goals for certain portions of the building or grounds. A program/plan for a given sustainability goal may or may not have an associated policy.

The LEED Submittal Templates for several LEED for Existing Buildings: O&M credits specify that the project team must provide a compliant written program/plan as part of the certification process (e.g. SS credits 2 and 3, IEQ credit 3.1). For those credits the program/plan must meet certain minimum requirements, as defined by the key elements listed below:

**Goals and Scope** – the intent of the program/plan, the physical or programmatic boundaries of the program/plan.

**Responsible Party(ies)** – the party responsible for program/plan development and oversight of implementation. If the key responsible party is a contractor or consultant to the owner or property manager, list the contractor or consultant’s title as well as the title of the in-house person to whom that person reports.

**Guidance for Resources and Implementation** – the guidance documents or information used to instruct staff on the required sustainability practices and actually implement them in the field. These may include standard operating procedures, process outlines, educational/communications materials, recommended/required product lists and sources, excerpts from contract language, or similar materials that enable the successful ongoing implementation of the program/plan.

**Performance Measurement** – how actual outcomes and sustainability performance for each element of the program/plan will be measured and tracked over time.

**Quality Assurance/Quality Control Processes** – a description of how the responsible party verifies that the program/plan is being successfully implemented, the performance measurement methods truly reflect the actual outcomes, and that sustainable performance persists over time.

Applicants are not required to develop separate programs/plans for the purposes of achieving LEED for Existing Buildings: O&M credits as long as they can highlight these components in their existing operations documents or contracts. Also, where elements of the program/plan repeat elements of an associated LEED for Existing Buildings: O&M policy, it is not necessary to replicate that information in the program/plan.

A company-wide program/plan is acceptable for LEED for Existing Buildings: O&M; it is not necessary to have a completely unique document dedicated to each project building. However, all project building-specific requirements, special circumstances, or exceptions must be identified and listed in an addendum or supplement to the company-wide program/plan.

**Note:** LEED for Existing Buildings: O&M also uses the word “plan” in some credits to reference a technical document produced by an industry specialist, i.e., “stormwater management plan,” “building operating plan,” or “commissioning plan.” In these cases this use of “plan” is intended to capture a term of art in the industry, and such technical plans do not need to comply with this program/plan model.

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