WATER EFFICIENCY PREREQUISITE

Indoor Water Use Reduction

This prerequisite applies to:

New Construction
Core and Shell
Schools
Retail
Data Centers
Warehouses and Distribution Centers
Hospitality
Healthcare

INTENT

To reduce indoor water consumption.

REQUIREMENTS

Building Water Use

For the fixtures and fittings listed in Table 1, as applicable to the project scope, reduce aggregate water consumption by 20% from the baseline. Base calculations on the volumes and flow rates shown in Table 1.

All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled (or a local equivalent for projects outside the U.S.).

TABLE 1. Baseline water consumption of fixtures and fittings

Fixture or fitting	Baseline (IP units)	Baseline (SI units)
Toilet (water closet)*	1.6 gpf	6 lpf
Urinal*	1.0 gpf	3.8 lpf
Public lavatory (restroom) faucet	0.5 gpm at 60 psi all others except private applications	1.9 lpm at 415 kPa, all others except private applications
Private lavatory faucets	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Kitchen faucet (excluding faucets used exclusively for filling operations)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerhead*	2.5 gpm at 80 psi per shower stall	9.5 lpm at 550 kPa per shower stall

*WaterSense label available for this product type
gpf = gallons per flush gpm = gallons per minute psi = pounds per square inch
lpf = liters per flush lpm = liters per minute kPa = kilopascals

Appliance and Process Water Use

Install appliances, equipment, and processes within the project scope that meet the requirements listed in the tables below.

TABLE 2. Standards for appliances

Appliance	Requirement
Residential clothes washers	ENERGY STAR or performance equivalent
Commercial clothes washers	CEE Tier 3A
Residential dishwashers (standard and compact)	ENERGY STAR or performance equivalent
Prerinse spray valves	≤ 1.3 gpm (4.9 lpm)
Ice machine	ENERGY STAR or performance equivalent and use either air-cooled or closed-loop cooling, such as chilled or condenser water system

gpm = gallons per minute lpm = liters per minute

TABLE 3. Standards for processes

Process	Requirement
Heat rejection and cooling	No once-through cooling with potable water for any equipment or appliances that reject heat
Cooling towers and evaporative condensers	Equip with • makeup water meters • conductivity controllers and overflow alarms • efficient drift eliminators that reduce drift to maximum of 0.002% of recirculated water volume for counterflow towers and 0.005% of recirculated water flow for cross-flow towers

gpm = gallons per minute lpm = liters per minute

HEALTHCARE, RETAIL, SCHOOLS, AND HOSPITALITY ONLY

In addition, water-consuming appliances, equipment, and processes must meet the requirements listed in Tables 4 and 5.

TABLE 4. Standards for appliances

Kitchen equipment		Requirement (IP units)	Requirement (SI units)
Dishwasher	Undercounter	≤ 1.6 gal/rack	≤ 6.0 liters/rack
	Stationary, single tank, door	≤ 1.4 gal/rack	≤ 5.3 liters/rack
	Single tank, conveyor	≤ 1.0 gal/rack	≤ 3.8 liters/rack
	Multiple tank, conveyor	≤ 0.9 gal/rack	≤ 3.4 liters/rack
	Flight machine	≤ 180 gal/hour	≤ 680 liters/hour
Food steamer	Batch	≤ 6 gal/hour/pan	≤ 23 liters/hour/pan
	Cook-to-order	≤ 10 gal/hour/pan	≤ 38 liters/hour/pan
Combination oven	Countertop or stand	≤ 3.5 gal/hour/pan	≤ 13 liters/hour/pan
	Roll-in	≤ 3.5 gal/hour/pan	≤ 13 liters/hour/pan

TABLE 5. Process requirements

Process	Requirement
Discharge water temperature tempering	Where local requirements limit discharge temperature of fluids into drainage system, use tempering device that runs water only when equipment discharges hot water OR Provide thermal recovery heat exchanger that cools drained discharge water below code-required maximum discharge temperatures while simultaneously preheating inlet makeup water OR If fluid is steam condensate, return it to boiler
Venturi-type flow-through vacuum generators or aspirators	Use no device that generates vacuum by means of water flow through device into drain

BEHIND THE INTENT

Potable water usage in buildings constitutes a large portion of freshwater consumption. Strategies to reduce potable water use in buildings entail the selection of efficient plumbing fittings, fixtures, and equipment. Fixtures that use 20% to 50% less water than code-required levels are now widely available. The WaterSense label was developed by the U.S. Environmental Protection Agency to identify these efficient fixtures and ensure that higher efficiency does not come at the cost of performance. The WaterSense label has been incorporated as a requirement for this credit to ensure that fixtures in a LEED building are both water efficient and high performing.

In some buildings, intensive appliance and process water use can exceed water use from fixtures and landscape combined. This is especially true for buildings with cooling towers or evaporative condensers. Appliance and process water use is therefore addressed specifically with a separate set of requirements.

Because the WE section is designed around an "efficiency first" model, the prerequisite deals only with the efficiency of fixtures and fittings; alternative or nonpotable water sources that offset potable water demand are also addressed in the corresponding credit.

STEP-BY-STEP GUIDANCE

STEP 1. SELECT COMPLIANCE PATH

Determine the appropriate compliance path(s) for the project.

- Compliance Path 1 Prescriptive Achievement is for projects whose installed fixtures do not exceed WaterSense maximum levels. Compliance is documented through product cutsheets or fixture schedules.
- Compliance Path 2 Usage-Based Calculation is for projects that cannot demonstrate the 20% reduction for each fixture, based on manufacturers' documentation. Using the indoor water use calculator provided by USGBC, the project team must perform calculations to show that, in aggregate, the fixtures comply with prerequisite requirements. Projects pursuing points under WE Credit Indoor Water Use Reduction must use this compliance path.

STEP 2. SELECT WATERSENSE-LABELED PRODUCTS

Select WaterSense-labeled products for all newly installed fixtures that are eligible for labeling by verifying that the manufacturer and model are listed on the WaterSense website. The WaterSense label can be found for fixtures in the following product categories:

- Tank-type toilet (water closet)
- Water-using urinals
- Private lavatory faucets
- Showerheads

The following fixture types are not labeled by WaterSense and must comply with the percentage reduction criteria:

- Tankless toilets
- Composting toilets and waterless toilets
- Waterless urinals
- Public lavatory faucets

Using aerators is an acceptable water savings strategy.

- Newly installed aerators or flow restrictors added to private lavatories or showers must be WaterSense labeled.
- For private lavatories, WaterSense requires a maximum flow rate of 1.5 gallons per minute at 60 pounds per square inch and a minimum flow rate of 0.8 gallons per minute at 20 pounds per square inch. The installed fixtures in the design case must use the rated flow rate from the manufacturer, and the underlying assumptions must remain consistent between the baseline and design cases.

For projects in countries where WaterSense-labeled products are not readily available, see *Further Explanation, International Tips*.

STEP 3. SELECT HIGH-EFFICIENCY FIXTURES

For all product categories, including those covered by WaterSense, specify low-flow fixtures. Where possible, select fixtures that meet or exceed the 20% reduction indicated in the prerequisite requirements.

- Some equipment does not need to meet the 20% reduction threshold (see *Further Explanation, Excluded Water-Using Equipment*).
- The distinctions between public and private determine which thresholds each fixture and fitting must meet (see *Further Explanation, Public versus Private Lavatories*).
- For guidance on unusual fixtures, see *Further Explanation, Unique or Nonstandard Water Closets*.
- Sinks can be defined as public, private, kitchen, or process, depending on use and location. Kitchen sinks include all sinks in public or private buildings that are used with patterns and purposes similar to residential kitchen sinks. Hotel or motel kitchenette sinks, office kitchenette sinks, staff lounge sinks, pantry or nutrition station sinks, school classroom sinks (if used similarly to residential kitchen sinks), and commercial (food service) kitchen hand sinks that do not pass through a grease interceptor are considered kitchen sinks.

STEP 4. SELECT HIGH-EFFICIENCY APPLIANCES

Select appliances that meet the labeling or performance requirements outlined in the prerequisite requirements.

- ENERGY STAR may not be readily available in all areas (see *Further Explanation, International Tips*).
- Commercial projects with noncommercial, standard-sized dishwashers must comply with the residential dishwasher requirements.
- Residential criteria include all noncommercial-grade clothes washers in office spaces, daycare centers, and so on.
- Ice machines that are ineligible for the ENERGY STAR label—for example, ice machines within refrigerators—do not need to comply with the prerequisite requirement.

STEP 5. DESIGN PROCESS WATER SYSTEMS

Where applicable, select and design appliances and equipment that meet the standards for process water in the prerequisite requirements.

- For heat rejection, the requirements apply to systems such as sterilizers, autoclaves, ice machines, x-ray machines, MRI machines, CT scanners, and other medical equipment the cooling for which involves large amounts of water and energy.
- Design equipment-cooling systems to limit or eliminate potable water use and to capture and reuse excess generated heat. Install air-cooled or closed-loop cooling instead of open-loop (i.e., once-through) systems for medical equipment. Redundancy for cooling in critical applications may be required; as emergency backups, consider recirculating systems, draining technology, and holding tanks, as well as nonpotable water sources for air-cooled vacuum pumps and once-through cooling systems.
- For medical equipment, consider designing and installing a dedicated nonpotable water loop to serve multiple pieces.
- If discharge waste temperature is regulated, consider recovering and reusing the system's waste heat for low-temperature heating (e.g., domestic water preheating).

STEP 6. DEVELOP COOLING TOWER NARRATIVE, IF APPLICABLE

Describe the cooling tower or evaporative condenser system, and address the meters, controllers, alarms, and features indicated in the credit requirements.

COMPLIANCE PATH 1. PRESCRIPTIVE ACHIEVEMENT (PREREQUISITE ONLY)

STEP 1. CONFIRM PRESCRIPTIVE COMPLIANCE

Ensure that all selected fixtures meet the following prescriptive flush or flow rate thresholds.

TABLE 6. Maximum installed flush or flow rates for prescriptive path

Fixture or fitting	Maximum installed flush or flow rate (IP)	Maximum installed flush or flow rate (SI)	Threshold below code baseline
Toilet (water closet)*	1.28 gpf**	4.8 lpf**	20%
Urinal*	0.50 gpf	1.9 lpf	50%
Public lavatory (restroom) faucet	0.40 gpm	1.5 lpm	20%
Private lavatory faucets*	1.50 gpm	5.7 lpm	32%
Kitchen faucet	1.75 gpm	6.7 lpm	20%
Showerhead*	2.00 gpm	7.6 lpm	20%

* The WaterSense label is available for this fixture type.
**The average flush rate for dual-flush toilets must be calculated as the average flush volume of one full flush and two reduced flushes, using a 1:2 (high flush:low flush) ratio.
gpf = gallons per flush gpm = gallons per minute lpf = liters per flush lpm = liters per minute

STEP 2. COLLECT MANUFACTURERS' INFORMATION

Compile fixture cutsheets or manufacturers' information for all fixtures and appliances. The fixture data must highlight the flush or flow rates. A plumbing fixture schedule is acceptable, provided it contains the fixture manufacturer, model, flush or flow rate information, and the WaterSense designation where applicable.

COMPLIANCE PATH 2. USAGE-BASED CALCULATION

STEP 1. COMPILE CUTSHEETS OR PREPARE PLUMBING FIXTURE SCHEDULE

For each fixture, compile manufacturer's data that indicate its flush or flow rate.

- To simplify the collection of calculation data, consider creating a table or plumbing fixture schedule that indicates the flush or flow rate information for each fixture.
- For ease of documentation, collect fixture model, flush or flow rate, percentage of occupants with access to the fixture, and so on.

STEP 2. GATHER INFORMATION FOR CALCULATOR

The indoor water use calculator requires the following information:

- **Project occupancy.** Count occupants consistently across all LEED credits (see *Further Explanation, Occupant Types*).
  - If the project has different sets of fixtures for different parts of the building, create a separate table for each subset. If fixtures are uniform across the project and restroom access is unrestricted, multiple calculations are not necessary; one calculation can cover all building fixtures and occupants.
  - A separate calculation to accommodate visitors is not necessary because the calculator automatically assigns them a lower daily usage rate. For example, it assumes that visitors do not use kitchen faucets.
- **Gender ratio.** The default gender mix is half male and half female. Assumptions that differ from the default must be supported by a narrative and supporting data (see *Further Explanation, Gender Ratio*).
- **Days of operation.** The default number of days of operation per year is 365.
  - If the project is in use for only a portion of the year or closes on specific days, the days of operation can be reduced.
  - The same number of days of operation must be applied to both the baseline and the design cases.
  - Ensure that the number of days of use is consistent with the building's operating schedule and prepare supporting documentation.
- **Fixture types used in the project.**

STEP 3. COMPLETE CALCULATIONS

Complete the calculations for the design case (installed) flush and flow fixtures. The following information is required:

- Fixture type
- Flush or flow rate
- Fixture manufacturer and model (which should match cutsheets)
- Percentage of occupants using each fixture model. The total for all fixtures of each type must total 100% of occupants for standard fixture types.

The calculator determines usage based on Equation 1 (see *Further Explanation, Calculations* and *Default Durations and Uses*).

EQUATION 1. Basic indoor water use reduction calculation

$$\text{Daily water use for each fixture type} = \text{Fixture flush or flow rate} \times \text{Duration of use} \times \text{Users} \times \text{Uses per person per day}$$

- The duration of use, number of users, and uses per person per day must be the same in both the baseline and the design cases.
- Dual-flush toilet flush rates must be calculated as the average using a 1:2 (high flush:low flush) ratio.
- Metering faucets measured in gallons (liters) per cycle (gpc, lpc) and cycle duration in manufacturer's documentation must be converted to a flow rate in gallons (liters) per minute (gpm, lpm). Use Equation 2 to perform the conversion.

EQUATION 2. Faucet flow rate conversion

$$\text{Flow rate (gpm)} = \left\{ \frac{\text{Gallons per cycle (gpc)} \times 60 \text{ sec}}{\text{Cycle duration (seconds)}} \right\}$$

$$\text{Flow rate (lpm)} = \left\{ \frac{\text{Liters per cycle (lpc)} \times 60 \text{ sec}}{\text{Cycle duration (seconds)}} \right\}$$

For example, convert a 0.2 gpc metering faucet with a 12-second cycle duration as follows:

$$\left\{ \frac{0.2 \text{ gpc} \times 60 \text{ sec}}{12 \text{ sec}} \right\} = 1 \text{ gpm}$$

Likewise, convert a 0.76 lpc metering faucet with a 12-second cycle duration as follows:

$$\left\{ \frac{0.76 \text{ lpc} \times 60 \text{ sec}}{12 \text{ sec}} \right\} = 3.8 \text{ lpm}$$

Provide manufacturer's documentation to confirm the flow rate conversion.

FURTHER EXPLANATION

CALCULATIONS

See equations in *Step-by-Step Guidance*. Calculations are built into the indoor water use calculator; the following is provided for reference.

The usage-based calculation for the project is the difference between the calculated design case and a baseline case. The percentage is determined by dividing the design case reduction by the baseline reduction. In traditional plumbing design, calculations are based on fixture counts; the methodology under this prerequisite calculates water use according to fixture consumption rates and estimated use. Occupants' estimated use is determined by counting full-time-equivalent and transient occupants and applying appropriate fixture use rates to each. The calculator estimates the percentage reduction of potable water use, compared with the baseline, using the following equation (see *Further Explanation, Default Durations and Uses* for more about this equation's variables).

EQUATION 1. Basic indoor water use reduction calculation

$$\text{Daily water use for each fixture type} = \text{Fixture flush or flow rate} \times \text{Duration of use} \times \text{Users} \times \text{Uses per person per day}$$

The calculator produces the following:

- Annual baseline water consumption (gallons or liters per year)
- Annual design case water consumption (gallons or liters per year)
- Percentage savings between baseline and design cases

EQUATION 3. Indoor water-use reduction

$$\text{\% improvement from baseline} = \left\{ \frac{\text{Baseline volume} - \text{Performance volume}}{\text{Baseline Volume}} \right\} \times 100$$

This prerequisite deals only with the water efficiency of fittings and fixtures, appliances, and processes that use potable water. Water derived from alternative sources, such as captured rainwater, is not considered under this prerequisite but can be used to document additional savings in WE Credit Indoor Water Use Reduction.

EXCLUDED WATER-USING EQUIPMENT

Appliances and equipment that use water on materials intended for human consumption may be excluded. For example, bread and produce misters, soda machines, coffee-making machines, and fixtures used to fill sinks for washing produce are excluded.

Fixtures whose flow rates are regulated by health codes may be excluded from the calculation. For example, regulated medical equipment is considered a process water user and is excluded from fixture calculations. Process water sinks are excluded from the fixture water-use reduction calculations.

The following list provides examples of process water sink fixtures that are excluded.

Specialized

- Janitor sinks
- Laboratory sinks regulated for medical or industrial purposes

Commercial kitchens (food service)

- Commercial kitchen (food service) sinks and prep sinks, including pot filling sinks, wash-down, and cleaning sinks

Health care

- Surgical scrub sinks
- Exam or procedure room sinks for clinical use
- Medication room sinks

General

- Janitor closet sinks
- Soiled utility room flushing rim sinks
- Soiled utility room hand-washing sinks
- Clean utility room hand-washing sinks

PUBLIC VERSUS PRIVATE LAVATORIES

Lavatory faucets must be classified as public or private. The Uniform Plumbing Code, International Plumbing Code, and the National Standard Plumbing Code each define private as those fixtures in residences, hotel or motel guest rooms, and private rooms in hospitals. All other applications are deemed to be public.

Fixtures used by residential occupants and fixtures used by residential-type occupants who use the building for sleeping accommodations fall into the private classification. Resident bathrooms in dormitories, patient bathrooms in hospital and nursing homes, and prisoner bathrooms are considered private use.

If it is unclear whether the classification should be public or private, default to public use flow rates in performing the calculations.

Lavatory faucets are intended for hand washing (Table 7). Private lavatory faucets are subject to the federal standard of 2.2 gallons per minute at 60 pounds per square inch (8.3 liters per minute at 415 kilopascals). Public lavatory faucets are subject to the federal standard of 0.5 gallons per minute at 60 pounds per square inch (1.9 liters per minute at 415 kilopascals).

TABLE 7. Typical public and private lavatory faucet applications

Lavatory faucet	Classification
Restroom sink School classroom sinks (if used primarily for hand washing)	Public (baseline: 0.5 gpm, 1.9 lpm)
Residential bathroom sink Hotel or motel bathroom sink Dormitory bathroom sink Patient room sink Patient bathroom sink in hospital or nursing home	Private (baseline: 2.2 gpm, 8.3 lpm)

gpm = gallons per minute lpm = liters per minute

Unique or Nonstandard Water Closets

For unique or nonstandard toilets and fixtures, the following may apply:

- **Toilets with flush valve control and separate bowls.** The flush rates should be based on installed flush valve. Confirm that bowl and flush valve rates are compatible to ensure performance.
- **Prison fixtures.** Flow rates and flushing mechanisms must conform to the same design standards as commercial toilets.

- **Children's toilets.** Flow rates and flushing mechanisms must conform to the same design standards as commercial toilets. Confirm that the flush rates of the flush valves are compatible with the bowl sizes to ensure performance.
- **Squat (floor-mounted) toilets.** Flow rates and flushing mechanisms must conform to the same design standards as commercial toilets.

OCCUPANT TYPES

Identify the daily average number of building users by type (see *Getting Started, Occupancy*). The indoor water use calculator requires total occupant counts in the following categories:

- Employees and staff, expressed as full-time-equivalent (FTE) employees
- Residents

  Determine the number of residents—residential occupants in dormitories, hospital in-patients, prisoners, hotel guests, and any other people who use the building for sleeping accommodations. For apartments or multifamily residences where resident occupancy is unknown, estimate the default resident number as the total number of bedrooms + 1 for each residential unit. For example, assume two residents per one-bedroom unit, three residents per two-bedroom unit, and so forth, unless a different assumption is warranted.
  - Include inpatients at health care facilities with residents.
  - Include hotel guests with residents. Calculate the number of overnight hotel guests based on the number and size of units in the project. Assume 1.5 occupants per guest room and multiply the resulting total by 60% (average hotel occupancy, per American Hotel and Lodging Association).
- K–12 students. See *Further Explanation*, *Rating System Variations*.
- Retail customers
- Visitors (excluding retail customers)
  - Include outpatients and higher education students.
  - Report visitors as a daily average total.

If occupancy is known, use the actual occupant counts for calculating occupancy. Use occupancy numbers that are a representative daily average over the course of the year. If the occupancy is not known, see *Getting Started, Occupancy*).

Tables 8 and 9 (see *Further Explanation, Default Duration and Uses*) provide default fixture use values for different occupancy types. These values should be used in the calculations unless special circumstances warrant modifications (see *Further Explanation, Rating System Variations*).

GENDER RATIO

The default gender ratio for full-time-equivalent occupants is 50:50. In special circumstances, where an alternative ratio may be justified, provide a narrative and supporting documentation. Modifications to the 50:50 ratio must be shown to apply for the life of the building.

Acceptable special circumstances include projects specifically designed for an alternative gender ratio—for example, a single-gender educational facility. Such projects must show that flush and flow fixtures have been distributed to account for the modified ratio. Project teams must provide documentation of the code-required plumbing fixture counts per gender so that the review team can verify that the flush-fixture ratio installed in the project supports the alternative gender ratio.

Gender ratio affects water usage only when urinals are installed. If the project does not include urinals, a 50:50 or 0:100 male:female ratio should yield the same usage results.

DEFAULT DURATIONS AND USES

Duration of use and uses per day are calculated using defaults (Tables 8 and 9).

TABLE 8. Nonresidential default fixture uses

Fixture type	Duration (sec)	Uses per day			
		Employees (FTE)	Visitors	Retail customers	Students
Water closet (female)	n/a	3	0.5	0.2	3
Water closet (male)	n/a	1	0.1	0.1	1
Urinal (female)	n/a	0	0	0	0
Urinal (male)	n/a	2	0.4	0.1	2
Public lavatory faucet	30	3	0.5	0.2	3
Shower	300	0.1	0	0	0
Kitchen sink	15	1	0	0	0

TABLE 9. Residential default fixture uses

Equipment	Duration (sec)	Uses per day
Water closet (female)	n/a	5
Water closet (male)	n/a	5
Private lavatory Faucet	60	5
Shower	480	1
Kitchen sink	60	4

For residents, hospital inpatients, hotel guests, prisoners, or any other residential occupants who use the building for sleeping accommodations, use the default residential fixture usage assumptions.

RATING SYSTEM VARIATIONS

Core and Shell

Include in the prerequisite documentation only plumbing fixtures, appliances, and process water installed as a part of the Core and Shell project's scope of work (i.e., what the developer is installing in the project). Do not include as-yet-uninstalled (future) plumbing fixtures, appliances, and process water. If no eligible plumbing fixtures, appliances, and process water are installed as part of the Core and Shell project scope of work, the project automatically achieves this prerequisite.

If plumbing fixtures are installed by the developer in otherwise-incomplete tenant spaces, include those plumbing fixtures installed as part of the Core and Shell project scope and use the default occupancy counts to account for their usage in the calculations if pursing Compliance Path 2. If the occupancy is not known, see *Getting Started, Occupancy*. Use code occupancy to determine the project occupancy.

Schools

Appliance and process water-use equipment installed in the project must meet the requirements of Tables 4 and 5 of the prerequisite.

For K–12 schools that close on weekends, holidays, and for eight weeks of school vacation, assume 195 days of operation.

For occupancy calculations (Table 10), in deciding whether to count individuals as employees, students, or visitors, consider their fixture-use patterns. For example, a volunteer who serves four hours each day in an elementary school will likely have the same plumbing usage patterns as full-time staff. Such a volunteer could therefore be considered to have an FTE value of 0.5. On the other hand, an individual who attends a high school basketball game may be expected to use the water closets and lavatory faucets in the school building infrequently and therefore should be counted as a visitor. Report visitors as average daily totals.

TABLE 10. Default fixture uses in schools, by occupancy type

Fixture Type	FTE	Student	Visitors
Water Closet			
Female	3	3	0.5
Male	1	1	0.1
Urinal			
Female	0	0	0
Male	2	2	0.4
Lavatory faucet	3	3	0.5
Shower	0.1	0	0
Kitchen Sink	1	0	0

When calculating annual occupancy for schools with multiple sessions, consider a session a discrete period of school building operation. A session can be defined by a season or by other variations in building occupancy and usage, such as weekend programming by a community organization. If the school building is used for more than one session annually, calculate the percentage for each session, based on the number of days in the session divided by the total number of days during which the school building operates annually, using Equation 4.

EQUATION 4. School session as percentage of annual operation

$$\text{Session \%} = \text{Days in session} \;/\; \text{Annual days of operation}$$

Then calculate the annual occupants of each gender by multiplying the number of occupants in each session by the session percentage (from Equation 1) and adding the results of all sessions together, using Equation 5:

EQUATION 5. Annual occupancy for Schools projects

$$\text{Annual occupants, by gender} = \left\{\text{Session A FTEs, by gender} \times \text{Session \%}\right\} + \left\{\text{Session B FTEs, by gender} \times \text{Session \%}\right\}$$

FTE = full-time equivalent

PROJECT TYPE VARIATIONS

Mixed-Use Projects

If a mixed-use project uses the same fixtures throughout the building, complete one calculation for building water use. If the spaces use different fixtures or have dramatically different patterns of occupancy or varying annual days of operation, complete the indoor water use calculator with a separate fixture group for each space type.

Additions

All fixtures within the project boundary must be included in the prerequisite calculations. If the project boundary includes only the addition, the fixtures or fittings outside the addition do not need to be included in the calculations for prerequisite compliance, even if used by project occupants.

INTERNATIONAL TIPS

For fixtures that require the WaterSense label in countries where the label is unavailable, look up acceptable WaterSense substitutes at usgbc.org. Project outside the U.S. must meet WaterSense flush and flow rates.

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

For appliances that require the Consortium for Energy Efficiency (CEE) label, a project outside the U.S. may purchase products that have not been qualified or labeled by CEE if they meet the CEE product criteria for efficiency.

CAMPUS

Group Approach

Submit separate documentation for each building.

Campus Approach

Ineligible. Each LEED project may pursue the credit individually.

REQUIRED DOCUMENTATION

Documentation	All projects		Projects with appliance or process water
	Prescriptive	Usage-based calculation	
Product cutsheets, manufacturers' information	X	X	X
Indoor water use calculator		X	

RELATED CREDIT TIPS

WE Prerequisite Building-Level Water Metering. Metering of potable water usage will allow facilities management staff to monitor changes in water usage as efficiency measures are implemented.

WE Credit Water Metering. Additional submetering of water-using systems will give facilities management staff actual performance data on specific water efficiency measures so that they can make adjustments to reduce water consumption. The credit builds on the prerequisite by requiring a higher level of water efficiency. In this prerequisite, projects may demonstrate compliance through product cutsheets showing that all fixtures meet or exceed the minimum reduction threshold; in the credit, a usage-based calculation is mandatory.

CHANGES FROM LEED 2009

- This prerequisite now includes requirements for water-using appliances and processes, as well as cooling towers and evaporative condensers.
- The WaterSense label requirements were recommended in LEED 2009. They are now mandatory in the U.S., with local equivalents allowed outside the U.S.
- The prescriptive compliance path, based on demonstrating that all fixtures are 20% below baseline, is new.
- Duration-based savings from autocontrol faucets with automatic fixture sensors or metering controls are no longer allowed in the design case. Studies have shown that autocontrol faucets do not save water because users frequently reactivate the faucet after initial use or stop washing before the cycle ends.
- Applying nonpotable water is no longer allowed as an alternative compliance path in the prerequisite. Alternative water sources can, however, earn points in the corresponding credit.

REFERENCED STANDARDS

Energy Policy Act (EPAct) of 1992 and as amended: eere.energy.gov/femp/regulations/epact1992.html

EPAct 2005: eere.energy.gov/femp/regulations/epact2005.html

International Association of Plumbing and Mechanical Officials Publication IAPMO/ANSI UPC 1-2006, Uniform Plumbing Code 2006, Section 402.0, Water-Conserving Fixtures and Fittings: iapmo.org

International Code Council, International Plumbing Code 2006, Section 604, Design of Building Water Distribution System: iccsafe.org

ENERGY STAR: energystar.gov

Consortium for Energy Efficiency: cee1.org

WaterSense: epa.gov/watersense

IgCC/ASHRAE 189.1 cooling tower and evaporative condenser requirements: ashrae.org/resources--publications/bookstore/standard-189-1

EXEMPLARY PERFORMANCE

Not available.

DEFINITIONS

closed-loop cooling a system that acts as a heat sink for heat-rejecting building and medical equipment by recirculating water. Because the water is sealed within the system, some closed-loop cooling systems use nonpotable water (such as recycled process water harvested from an air handler's cooling coil condensate).

conductivity the measurement of the level of dissolved solids in water, using the ability of an electric current to pass through water. Because it is affected by temperature, conductivity is measured at 25°C for standardization.

drift water droplets carried from a cooling tower or evaporative condenser by a stream of air passing through the system. Drift eliminators capture these droplets and return them to the reservoir at the bottom of the cooling tower or evaporative condenser for recirculation.

makeup water water that is fed into a cooling tower system or evaporative condenser to replace water lost through evaporation, drift, bleed-off, or other causes

metering control a regulator that limits the flow time of water, generally a manual-on and automatic-off device, most commonly installed on lavatory faucets and showers

nonpotable water water that does not meet drinking water standards

potable water water that meets or exceeds U.S. Environmental Protection Agency drinking water quality standards (or a local equivalent outside the U.S.) and is approved for human consumption by the state or local authorities having jurisdiction; it may be supplied from wells or municipal water systems

process water water that is used for industrial processes and building systems, such as cooling towers, boilers, and chillers. It can also refer to water used in operational processes, such as dishwashing, clothes washing, and ice making.