LEED V4 TRAINING PROGRAM

WATER EFFICIENCY

ECOBUILD®

1

WATER EFFICIENCY

TITLE			D/C	SCORE
WE	PREREQUISITE	1 REDUCTION OF OUTDOOR WATER USE	D	PREREQUISITE
WE	PREREQUISITE	2 REDUCTION OF INDOOR WATER USE	D	PREREQUISITE
WE	PREREQUISITE	3 COOLING TOWERS WATER USE	D	PREREQUISITE
WE	CREDIT	1 REDUCTION OF OUTDOOR WATER USE	D	1
WE	CREDIT	2 REDUCTION OF INDOOR WATER USE	D	7
WE	CREDIT	3 COOLING TOWERS WATER USE	D	2
WE	CREDIT	4 WATER CONSUMPTION MEASUREMENT	D	1

ECOBUILD®

2

WATER DEFINITIONS IN BUILDING

1	DRINKING WATER	Potable Water	Municipal supply of tap water
2	GREY WATER	Grey Water	WC Toilet Sink, Washing Machine, Showers
3	BLACK WATER	Black Water	Dishwasher, Toilets, Kitchen Sink, Cooling Tower Water
4	COOLING TOWER WATER	Cooling Tower Water	Water used for heat dissipation in the cooling tower
5	RAINWATER	Rainwater	Water collected from rain
6	IRRIGATION WATER	Irrigation Water	Water used for watering landscape plants
7	RECLAIMED WATER	Reclaimed Water	Water provided by municipalities or supplied by recycling systems that is not potable
8	PROCESS WATER	Process Water	Water used in production or appliances

ECOBUILD

3

WE PREREQUISITE 1: REDUCTION OF OUTDOOR WATER USE

PURPOSE

Water is one of the most important natural resources. The aim is to reduce the amount of water used outside the building.

In landscape irrigation, the use of potable water, natural resources, and surface flow water must be limited through one of the following methods, or its use must be eliminated.

Unvegetated areas, such as permeable or impermeable coverings, should be excluded from landscape area calculations.

Athletic fields, children's play areas (if they have been landscaped), and agricultural product gardens may be included in calculations at the initiative of the project team.

ECOBUILD

4

WE PREREQUISITE 1: REDUCTION OF OUTDOOR WATER USE

REQUIREMENTS

Option 1: Not irrigating.

Demonstrating that the landscape requires no water at all and not performing continuous irrigation in landscape irrigation, only allowing a maximum of 2 years of irrigation.

Or

Option 2: Reducing Irrigation

Reducing the water consumption of the landscape irrigation water needs of the project by at least 30% based on the calculated baseline water consumption values (should be based on the month with the highest water demand).

This goal can be achieved through selected plant species and efficient irrigation systems.

In both options, alternative water sources are not considered.

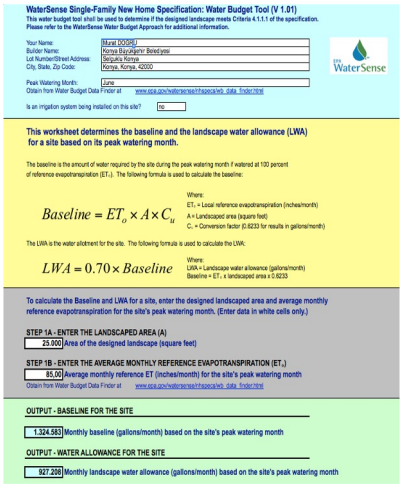
Calculations are made according to the EPA-Water Sense Budget Tool.

ECOBUILD

5

WE PREREQUISITE 1: REDUCTION OF OUTDOOR WATER USE

EPA WATER SENSE BUDGET TOOL



WaterSense Single-Family New Home Specification: Water Budget Tool (V 1.01)

This water budget tool shall be used to determine if the designed landscape meets Criteria 4.1.1.1 of the specification. Please refer to the WaterSense Water Budget Approach for additional information.

Your Name: Murat DOSRU
Builder Name: Konya Büyükşehir Belediyesi
Lot Number/Street Address: Selçuklu Konya
City, State, Zip Code: Konya, Konya, 42000

Peak Watering Month: June
Obtain from Water Budget Data Finder at www.epa.gov/watersense/nhspecs/wb_data_finder.html

Is an irrigation system being installed on this site? no

This worksheet determines the baseline and the landscape water allowance (LWA) for a site based on its peak watering month.

The baseline is the amount of water required by the site during the peak watering month if watered at 100 percent of reference evapotranspiration (ET_o). The following formula is used to calculate the baseline:

$$Baseline = ET_o \times A \times C_u$$

Where:
ET_o = Local reference evapotranspiration (inches/month)
A = Landscaped area (square feet)
C_u = Conversion factor (0.6233 for results in gallons/month)

The LWA is the water allotment for the site. The following formula is used to calculate the LWA:

$$LWA = 0.70 \times Baseline$$

Where:
LWA = Landscape water allowance (gallons/month)
Baseline = ET_o x landscaped area x 0.6233

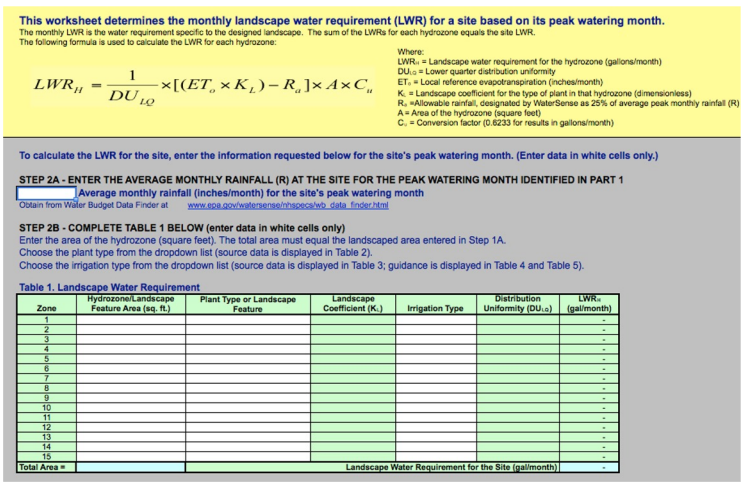
To calculate the Baseline and LWA for a site, enter the designed landscaped area and average monthly reference evapotranspiration for the site's peak watering month. (Enter data in white cells only.)

STEP 1A - ENTER THE LANDSCAPED AREA (A)
25.000 Area of the designed landscape (square feet)

STEP 1B - ENTER THE AVERAGE MONTHLY REFERENCE EVAPOTRANSPIRATION (ET_o)
85,00 Average monthly reference ET (inches/month) for the site's peak watering month
Obtain from Water Budget Data Finder at www.epa.gov/watersense/nhspecs/wb_data_finder.html

OUTPUT - BASELINE FOR THE SITE
1.324,583 Monthly baseline (gallons/month) based on the site's peak watering month

OUTPUT - WATER ALLOWANCE FOR THE SITE
927,208 Monthly landscape water allowance (gallons/month) based on the site's peak watering month



This worksheet determines the monthly landscape water requirement (LWR) for a site based on its peak watering month.

The monthly LWR is the water requirement specific to the designed landscape. The sum of the LWRs for each hydrozone equals the site LWR.
The following formula is used to calculate the LWR for each hydrozone:

$$LWR_H = \frac{1}{DU_{LQ}} \times [(ET_o \times K_L) - R_a] \times A \times C_u$$

Where:
LWR_H = Landscape water requirement for the hydrozone (gallons/month)
DU_{LQ} = Lower quarter distribution uniformity
ET_o = Local reference evapotranspiration (inches/month)
K_L = Landscape coefficient for the type of plant in that hydrozone (dimensionless)
R_a =Allowable rainfall, designated by WaterSense as 25% of average peak monthly rainfall (R)
A = Area of the hydrozone (square feet)
C_u = Conversion factor (0.6233 for results in gallons/month)

To calculate the LWR for the site, enter the information requested below for the site's peak watering month. (Enter data in white cells only.)

STEP 2A - ENTER THE AVERAGE MONTHLY RAINFALL (R) AT THE SITE FOR THE PEAK WATERING MONTH IDENTIFIED IN PART 1
Average monthly rainfall (inches/month) for the site's peak watering month
Obtain from Water Budget Data Finder at www.epa.gov/watersense/nhspecs/wb_data_finder.html

STEP 2B - COMPLETE TABLE 1 BELOW (enter data in white cells only)
Enter the area of the hydrozone (square feet). The total area must equal the landscaped area entered in Step 1A.
Choose the plant type from the dropdown list (source data is displayed in Table 2).
Choose the irrigation type from the dropdown list (source data is displayed in Table 3; guidance is displayed in Table 4 and Table 5).

Table 1. Landscape Water Requirement

Zone	Hydrozone/Landscape Feature Area (sq. ft.)	Plant Type or Landscape Feature	Landscape Coefficient (K_L)	Irrigation Type	Distribution Uniformity (DU_{LQ})	LWR_H (gal/month)
1						-
2						-
3						-
4						-
5						-
6						-
7						-
8						-
9						-
10						-
11						-
12						-
13						-
14						-
15						-
Total Area =		Landscape Water Requirement for the Site (gal/month)				-

ECOBUILD

6

WE PREREQUISITE 1: REDUCTION OF OUTDOOR WATER USE

STRATEGIES AND APPLICATIONS

- Preparation of soil analysis
- Selection of suitable plant species
- Effective and efficient irrigation systems (such as drip irrigation)
- Using plants that require little or no water can be expressed as some strategies.
- Using dry grass and bark for trees, shrubs, and flower beds (mulching)
- Rainwater harvesting (in reservoirs, underground tanks, or open pools)
- Treatment and use of wastewater
- Micro irrigation systems, use of moisture sensors
- Implementation of systems to stop irrigation during rain
- Air-based evaporation controls and
- The use of drip irrigation systems are some of the strategies.


MULCHING APPLICATION


SMART IRRIGATION SYSTEMS

ECOBUILD

7

WE PREREQUISITE 1: REDUCTION OF OUTDOOR WATER USE

NECESSARY DOCUMENTS

Documents	Option 1	Option 2
Site plan showing planted areas	✓	
Summary report showing plant species and irrigation needs	✓	
"Site Plan" showing the locations and sizes of landscaping areas		✓
Water Budget Tool Report		✓

ECOBUILD

8

WE PREREQUISITE 1: REDUCTION OF EXTERIOR WATER USE

REFERENCE STANDARDS

- EPA Water Sense Budget Tool
- LEED V4 Guide

DIFFERENCES FROM LEED v3 2009

- This topic was previously a credit title, but in V4 it has become a prerequisite.
- The 'Water-Sensitive Water Calculation Method' belonging to the EPA has been adopted as the new reference calculation method for the LEED prerequisite Water Sense Budget Tool.

ECOBUILD

9

WE PREREQUISITE 2: REDUCTION OF INDOOR WATER USE

OBJECTIVE

- Water is one of the most important natural resources. The primary goal is to reduce water usage within buildings and increase water efficiency to reduce the load on the city water supply network and wastewater system.
- In the next screen, for the sinks and fixtures (faucets) listed in the Table, it should be ensured that the total water consumption is reduced by 20% compared to the baseline consumption values, to the extent that it can be adapted to the project's scope and content.
- The baseline calculations on which the consumption values are based are summarized in Table 1 below.
- The 20% savings threshold should be achieved without using alternative water sources.

ECOBUILD

10

WE PREREQUISITE 2: REDUCTION OF INDOOR WATER USE

REQUIREMENTS

All new toilets, urinals, lavatory faucets, and showerheads in the building must be products that are adjustment-compatible and must have the WATERSENSE label.

The mentioned products must comply with a local equivalent standard for projects outside the United States.

Table 1: Basic Water Consumption Values for Sinks and Fixtures

Commercial Lavatories, Faucets, and Accessories	Existing Baseline Consumption Values (IP Units)	Existing Baseline Consumption Values (SI units)
Water Closets (toilets)*	1.6 gallons (6 lt) per flush (gpf)	6 liters per flush (lpf)
Urinals*	1.0 (4 lt) (gpf)	3.8 lpf
Commercial Lavatories (toilet) Faucets	0.5 gpm at 60 psi** excluding specialized applications in all other sinks	1.9 lpm at 415 kPa, excluding specialized applications in all other sinks
Special Lavatory Faucets*	2.2 gpm (8.3 lt) at 60 psi	8.3 lpm at 415 kPa
Kitchen Sinks (filling purpose sinks will not be included)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerheads*	2.5 gpm at 80 psi per each shower activation	9.5 lpm at 550 kPa per each shower activation
* WaterSense label is available for these product types gpf = gallons per flush gpm = gallons per minute	psi = pounds per square inch lpf = liters per flush lpm = liters per minute kPa = kilopascals	

ECOBUILD

11

WE PREREQUISITE 2: REDUCTION OF INDOOR WATER USE

REQUIREMENTS

Use of Accessories and Process Water:

All accessories and equipment necessary within the project must comply with the standards listed in the table.

In addition to energy efficiency, ENERGY STAR also evaluates water efficiency.

Table 2: Standards for Accessories

Accessory	Standard
Residential Washing Machines	ENERGY STAR or performance equivalent
Commercial Washing Machines	CEE Tier 3A
Residential Dishwashers (standard and compact)	ENERGY STAR or performance equivalent
Pre-wash spray type faucet heads	≤ 1.3 gpm (4.9 lpm)
Ice Machines	ENERGY STAR or performance equivalent and use of air-cooled or closed-loop cooling system (e.g. freezer or condensing systems)

ECOBUILD

12

WE PREREQUISITE 2: REDUCTION OF INDOOR WATER USAGE

REQUIREMENTS

Standards for Process Water Usage:
All process waters included in the project must comply with the standards listed in the table.

Table 3: Standards for Process Waters

Process	Standard
Cooling	All equipment and accessories rejecting heat should not use drinking water for cooling.
Cooling Towers and Steam Condensers	The following Equipment Must Be Included in the Project
	Makeup water meters
	Conductivity controllers and overflow alarms
	Efficient drift eliminators are used to reduce the circulating water volume for counterflow towers to a maximum of 0.002% and the circulating water flow for crossflow towers to a maximum of 0.005%.

ECOBUILD

13

WE PREREQUISITE 2: REDUCTION OF WATER USAGE IN THE BUILDING

REQUIREMENTS

For Hospital, School, Retail and Hotel Projects;
In addition to the above, devices, equipment, and processes that consume water in the building shall meet the requirements listed in Tables 4 and 5.

Table 4: Water Consumption of Devices Used in the Building

Kitchen Equipment		Requirement (IP units)	Requirement (SI units)
Dishwashers	Under-counter	≤ 1.6 gal/shelf	≤ 6.0 liters/shelf
	Single tank, door	≤ 1.4 gal/shelf	≤ 5.3 liters/shelf
	Single tank, conveyor	≤ 1.0 gal/shelf	≤ 3.8 liters/shelf
	Multiple tank, conveyor	≤ 0.9 gal/shelf	≤ 3.4 liters/shelf
	Automatic washing machine (flight machine)	≤ 180 gal/hour	≤ 680 liters/hour
Steam Cookers	Single piece (non-drain connection)	≤ 6 gal/hour/pan	≤ 23 liters/hour/pan
	Cook-to-order (a la carte - drain connected)	≤ 10 gal/hour/pan	≤ 38 liters/hour/pan
Combination Ovens	Under-counter or standalone	≤ 3.5 gal/hour/pan	≤ 13 liters/hour/pan
	Standalone large oven	≤ 3.5 gal/hour/pan	≤ 13 liters/hour/pan

ECOBUILD

14

WE PREREQUISITE 2: REDUCTION OF WATER USE INSIDE THE BUILDING

REQUIREMENTS

- Device Water Use Standards:
- In addition to the above, devices, equipment, and processes consuming water in the building must meet the requirements listed in Tables 4 and 5.
- It is recommended that all projects implement the following strategies:
- Flow stabilizers
- Flow sensors
- Automatic faucet sensors and timed products
- Low water consumption products and tanks
- Efficient toilet systems
- Products that do not use water

Table 5: Standards and Procedures

Procedure	Requirement
Discharge water temperature adjustment	Where local requirements limit the drainage temperature of liquids to the drainage system, use a temperature control device that operates only when the device discharges hot water. Or, Use a heat exchange device that cools the drained water below the maximum discharge temperature set by regulations while simultaneously preheating the incoming feed water. Or, If the fluid is condensate, return it to the boiler.
Venturi type flow vacuum generators or aspirators	Do not use any device that discharges water through the device and thereby creates a vacuum.

ECOBUILD

15

WE PREREQUISITE 2: REDUCTION OF IN-BUILDING WATER USE

REQUIRED DOCUMENTS

Documents	All Projects		Projects Using Accessories or Process Water	Only Core Shell Projects
	Traditional	Usage-Based Calculation		
Product Catalogs and Manufacturer Information	✓	✓	✓	
In-Building Water Consumption Calculator		✓		
Tenant Lease Agreement				✓
Tenant Job Description Summary				✓

ECOBUILD

16

WE PREREQUISITE 2: REDUCTION OF WATER USE IN BUILDINGS

REFERENCE STANDARDS

- The Energy Policy ACT (EPAct) of 1992
- The Energy Policy ACT (EPAct) of 2005
- International Association of Plumbing and Mechanical Officials Publication IAPMO
- American National Standards Institute UPC 1-2006
- ANSI UPC 1-2006 Uniform Plumbing Code 2006 Section 402.0 Water Conserving Fixtures and Fittings
- International Code Council, International Plumbing Code 2006, Section 604, Design of Water Distribution Systems
- ENERGY STAR
- Consortium for Energy Efficiency
- IgCC/ASHRAE 189.1

ECOBUILD

17

WE PREREQUISITE 2: REDUCTION OF INDOOR WATER USE

DIFFERENCES FROM LEED v3 2009

- In addition to cooling towers and steam condensers, it also includes the requirements for water-using accessories and processes.
- WaterSense label requirements were recommended in LEED v3. These requirements have now become mandatory for projects in the U.S. and abroad with equivalent regulations.
- Automatic sensor fixtures have been removed from the base fixture list. Studies related to this topic have shown that automatic control fixtures do not actually save water due to reasons such as continuing to operate after the hand is withdrawn or not activating immediately when the hand is first extended.
- The use of alternative water sources instead of potable water is not allowed to fulfill prerequisite requirements. However, the use of alternative water sources in related credit categories may earn points.

The images feature packaged greywater treatment systems.

ECOBUILD

18

WE PREREQUISITE 2: REDUCTION OF WATER USE INSIDE BUILDINGS

v4.1 CHANGES

- Where standard pressure values differ from the LEED baseline pressure values, the flow rates of fixtures are calculated based on standard pressure values. The pressure values used for comparison of flow rates should be the same in both the baseline building and the actual project.
- Existing appliances that are reused in the project are exempt from the requirements listed in Table 2.
- In projects located in Europe, the EU A+++ label is accepted instead of the Energy Star label for washing and dishwashing machines.

ECOBUILD

19

WE PREREQUISITE 3: WATER MEASUREMENT AT THE BUILDING LEVEL

PURPOSE

The aim is to reduce water consumption by supporting water management and identifying opportunities for additional water savings.

Permanent Water Meters should be installed to measure the total amount of drinking water consumed by the building and all adjacent gardens.

The collected meter values should be tabulated in monthly and annual summary tables, and the meters should be read manually or automatically.

ECOBUILD

20

WE PREREQUISITE 3: WATER MEASUREMENT AT BUILDING LEVEL

REQUIREMENTS

Permanent water meters must be installed to measure the total amount of drinking water consumed in the building and in the open areas of the garden.

Meters should be read manually or automatically, and the meter values must be archived in monthly and yearly summary tables.

It is also pledged that all water consumption values and invoices will be submitted to USGBC for a period of 5 years after the building obtains the LEED Certification or after residents move into the building (whichever comes first).

This commitment must continue for 5 years or until the building changes hands or is rented to another person.

ECOBUILD

21

WE PREREQUISITE 3: WATER MEASUREMENT AT THE BUILDING LEVEL

STEPS

- Step 1: Define the final uses of all drinkable water.
- Step 2: If applicable, determine the scope of general water supply measurement.
- Step 3: Identify the number, location, and type of all meters.
- Step 4: Monitor water consumption.
- Step 5: Share water consumption data with USGBC.

ECOBUILD

22

WE PREREQUISITE 3: BUILDING-LEVEL WATER METERING

REQUIRED DOCUMENTS

Documents	All Projects
Meter Measurements and Notifications	✓
Commitment to Sharing	✓

DIFFERENCES FROM LEED v3 2009

This is a new prerequisite.

All ongoing and reported contents were required under the Minimum Program Requirements 6 was requested for all projects in LEED V3 2009.

Building-Level Water Metering Template:

https://www.usgbc.org/resources/building-level-water-metering-template

ECOBUILD

23

WE CREDIT 1: REDUCING EXTERIOR WATER USE

OBJECTIVE

The aim is to reduce the amount of water used outside the building.

The use of potable water, natural resources, and surface runoff water in landscape irrigation should be limited or eliminated using one of the following methods.

Unplanted areas, for example, permeable or impermeable coverings should be excluded from landscape area calculations.

Athletic fields, children's play areas (if they are greened), and agricultural product gardens may be included in the calculations at the initiative of the project team.

ECOBUILD

24

WE CREDIT 1: REDUCTION OF OUTDOOR WATER USE

REQUIREMENTS

Option 1: Not using drinking water or not irrigating.
2 points for all projects, 1 point for hospitals.
Demonstrating that the landscape does not need water at all and not having continuous watering in landscape irrigation, with watering done only for a maximum of 2 years.






ECOBUILD

25

WE CREDIT 1: REDUCTION OF EXTERNAL WATER USE

REQUIREMENTS

- Option 2: Reduction of Irrigation: For off-site projects 1-2 points, for Hospitals 1 point.
- The project's landscape irrigation water requirement must be reduced by at least 50% from the calculated baseline water consumption values (should be based on the month with the highest water demand).
- This goal can be achieved through selected plant species and efficient irrigation systems.
- Calculations are made according to the EPA - Water Sense Budget Tool.
- Savings figures above 30% can be achieved by using one or more of the methods of efficiency, alternative water sources, and smart irrigation technologies.



ECOBUILD

26

WE CREDIT 1: REDUCTION OF OUTDOOR WATER USE

STRATEGIES

- Using dry grass and bark for trees, shrubs, and flower beds
- Collecting rainwater (in reservoirs, underground storage, open pools...)
- Wastewater treatment
- Micro irrigation systems, moisture sensors,
- Rain shut-off systems for irrigation,
- Air-based evaporation controls,
- Implementing drip irrigation

ECOBUILD

27

WE CREDIT 1: REDUCTION OF EXTERIOR WATER USAGE

SCORES

Reduction in Base Usage Values %	Points (Outside Hospital)	Points (Hospital)
50%	1	1
100%	2	—

APPLICATION DOCUMENTS

Documents	Option 1	Option 2
Site plan showing vegetated areas	✓	
Summary report showing plant species and irrigation needs	✓	
Site Plan showing landscape areas and their sizes		✓
Water Budget Tool Report		✓
Alternative Water Sources and Control Accounts		✓

ECOBUILD

28

WE CREDIT 1: REDUCTION OF EXTERNAL WATER USAGE

V4.1 CHANGES

- The maximum score that can be obtained in Core & Shell buildings has been increased from 2 to 3. A 75% water savings threshold has been added.
- The scoring table for Core & Shell Buildings is as follows:

Decrease from Base Usage Values %	Scores (Core & Shell)
50%	1
75%	2
100%	3

ECOBUILD

29

WE CREDIT 2: REDUCTION OF WATER USE WITHIN BUILDINGS

PURPOSE

Water is one of the most important natural resources. The main goal is to increase water efficiency to reduce water consumption within buildings and the load on the city's water network and wastewater system.

For the sinks and fixtures (taps) listed in Table 1, the total water consumption should be reduced by at least 25% compared to baseline consumption values, to the extent that it can be adapted to the scope and content of the project. The baseline calculations are summarized in the table below based on which consumption values they have been made.

ECOBUILD

30

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

OBJECTIVE

The main objective is to increase water efficiency to reduce water consumption inside the building and alleviate the burden on the city's water supply network and wastewater system.

It is necessary to raise the baseline water consumption values stated in the WE (Water Efficiency) Precondition by selecting water-saving fixtures and accessories to even higher thresholds/values.

Additional/extra drinking water savings beyond the savings values specified in the precondition can be achieved through the use of alternative water sources.

ECOBUILD®

31

WE CREDIT 2: REDUCTION OF WATER USAGE WITHIN BUILDINGS

REQUIREMENTS

All newly built toilets, urinals, special sink faucets, and showerheads must necessarily be from brands with the WATERSENSE label that are adjustable.

The mentioned products must comply with a local equivalent standard for projects outside the USA.

Table 1: Basic Water Consumption Values for Sinks and Fixtures

Commercial Sinks, Faucets, and Accessories	Current Base Consumption Values (IP Units)	Current Base Consumption Values (SI units)
Water Closets (toilets)*	1.6 gallons (6 lt) per flush (gpf)	6 liters per flush (lpf)
Urinals*	1.0 (4 lt) (gpf)	3.8 lpf
Faucets for Commercial Sinks (toilets)	0.5 gpm at 60 psi** except for special applications in all other sinks	1.9 lpm at 415 kPa, except for special applications in all other sinks
Faucets for Special Sinks*	2.2 gpm (8.3 lt) at 60 psi	8.3 lpm at 415 kPa
Kitchen Sinks (filling purposes sinks will not be included)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerheads*	2.5 gpm at 80 psi for each shower activation	9.5 lpm at 550 kPa for each shower activation
* WaterSense label is available for these product types gpf = gallons per flush gpm = gallons per minute	psi = pounds per square inch lpf = liters per flush lpm = liters per minute kPa = kilopascals	

ECOBUILD®

32

WE CREDIT 2: REDUCTION OF WATER USAGE INSIDE BUILDINGS

REQUIREMENTS

For schools, retail, hotels, and health facilities:

If all requirements of one of Table 2, 3, 4, or 5 are met, 1 point is awarded (for buildings other than hotels), and if all requirements of two of them are met, 2 points can be obtained.

Table 2: Requirements for Washing Machines

Washing Machine	Requirement
Must operate within the building, with a minimum capacity of 1,088 kg (2,400 lbs) per 8-hour shift	Maximum water consumption of 7 liters (1.8 gal/lbs) per 0.45 kg
Commercial Washing Machines	CEE Tier 3A

Note: To use Table 2, projects must have an annual laundry washing capacity of 57,606 kg (120,000 lb).

ECOBUILD

33

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

REQUIREMENTS

Standards for Commercial Kitchen Equipment

All commercial kitchen equipment necessary within the project content must comply with the standards listed in the table.

Projects must have a capacity of serving 100 meals daily to utilize Table 3.

Table 3: Requirements for Commercial Kitchen Equipment

Kitchen Equipment		Requirement (IP units)	Requirement (SI units)
Dishwashers	Under-counter	ENERGY STAR	ENERGY STAR or equivalent
	Single tank, door	ENERGY STAR	ENERGY STAR or equivalent
	Single tank, conveyor	ENERGY STAR	ENERGY STAR or equivalent
	Multiple tank, conveyor	ENERGY STAR	ENERGY STAR or equivalent
	Automatic washer (flight machine)	ENERGY STAR	ENERGY STAR or equivalent
Steam Cookers	Single piece (without drainage connection)	≤ 2 gal/hour/pan (including condensate water)	≤ 7.5 liters/hour/pan (including condensate water)
	Cook-to-order (a la carte) (with drainage connection)	≤ 5 gal/hour/pan (including condensate water)	≤ 19 liters/hour/pan (including condensate water)
Combination Oven	Under-counter or stand-alone	≤ 1.5 gal/hour/pan (including condensate water)	≤ 5.7 liters/hour/pan (including condensate water)
	Stand-alone large oven	≤ 1.5 gal/hour/pan (including condensate water)	≤ 5.7 liters/hour/pan (including condensate water)
Waste Grinder	Grinder	3-8 gpm, at full load, 10 minutes automatic shut off; or 1 gpm, no load	11-30 lt/min, at full load, 10 minutes automatic shut off; or 43.8 lt/min, no load
	Waste Collector	Maximum 2 gpm feed water	Maximum 7.6 lt/min feed water
	Pulp Producer	Maximum 2 gpm feed water	Maximum 7.6 lt/min feed water
	Strainer basket	No extra water use	No extra water use

34

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

REQUIREMENTS

Standards for Water Use of Laboratory and Medical Devices:
Only medical facilities and laboratories are subject to the requirements of Table 4.

Table 4: Water Consumptions of Laboratory and Medical Devices

Device	Requirement (IP units)	Requirement (SI units)
Reverse Osmosis Water Purifier	%75 recovery	%75 recovery
Steam Sterilizer	≤ 6.3 gal/U.S. rack (60-inch sterilizer) ≤ 7.5 gal/U.S. rack (48-inch sterilizer)	≤ 28.5 lt/DIN rack (1520-mm sterilizer) ≤ 28.35 lt/DIN rack (1220-mm sterilizer)
Sterile Process Washer	≤ 0.35 gal/U.S. rack	≤ 1.5 liter/DIN rack
X-ray machine; 150 mm or larger	Film Processor Water Recovery Unit	
Digital Imager; all sizes	No water use	

ECOBUILD

35

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

REQUIREMENTS

Municipal Steam Systems Condensate Water Standards:
Projects connected to the municipal or central steam system but without steam return are subject to the requirements of Table 5.

Table 5: Municipal Steam Systems

Steam System	Requirement
Disposal of steam condensate	Steam condensate provided by the municipality must be cooled to the temperature of the drainage system with a heat recovery system or recovered water
or	
Recovery and reuse of steam condensate	100% recovery and reuse

ECOBUILD

36

WE CREDIT 2: REDUCING INDOOR WATER USE

REQUIRED DOCUMENTS

Documents	Faucets	Accessories	Process Water
		Commercial, Hospital, Hotel, and School Projects	
Alternative Water Source Calculations (If Applicable)	✓		
Plumbing System Design Drawings (If Applicable)	✓		
Alternative Water Summary Reports	✓		
Product Catalogs and Manufacturer Information Forms	✓	✓	✓
Indoor Water Use Calculator	✓		

ECOBUILD

37

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

SCORES

Water Savings Percentage	Points				
	BD+C	Schools, Commerce, Hotels, Hospitals	ID&C	CI-Commercial Indoor Volumes	CI-Hotels
%25	1	1	2	2	2
%30	2	2	4	4	4
%35	3	3	6	6	6
%40	4	4	8	8	8
%45	5	5	10	10	10
%50	6	--	12	--	11

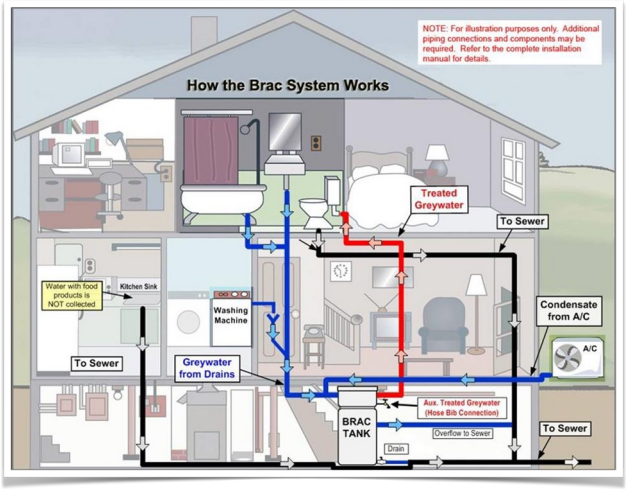
ECOBUILD

38

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

REFERENCE STANDARDS

- The Energy Policy ACT (EPAct) of 1992
- The Energy Policy ACT (EPAct) of 2005
- International Association of Plumbing and Mechanical Officials Publication IAPMO
- American National Standards Institute UPC 1-2006
- ANSI UP C1-2006 Uniform Plumbing Code 2006 Section 402.0 Water Conserving Fixtures and Fittings
- International Code Council, International Plumbing Code 2006, Section 604, Design of Water Distribution Systems
- ENERGY STAR
- Consortium for Energy Efficiency
- IgCC/ASHRAE 189.1



ECOBUILD

39

WE CREDIT 2: REDUCTION OF INDOOR WATER USE

DIFFERENCES FROM LEED v3 2009

- Savings in accessories and processing waters can earn additional points in the Retail, Hospital, Hotel, and School Certification systems.
- WaterSense requirements are recommended for LEED 2009. These requirements have now become mandatory in the US and abroad with equivalent regulations.
- Automatic sensor fixtures have been removed from the base fixture list. Studies on the subject have revealed that autocontrol fixtures do not actually save water due to reasons such as continuing to operate after the hand is withdrawn or not activating immediately when the hand is extended.
- To earn points, project teams must use fixtures that meet the desires and needs of building users. If there is no water-related activity within the project boundaries, the nearest restrooms to the project boundary must be included in the project and their calculations should be made. These public restrooms can be kept outside of calculations to meet the prerequisite requirements.

ECOBUILD

40

WE CREDIT 2: REDUCING WATER CONSUMPTION INSIDE BUILDINGS

V4.1 CHANGES

- The maximum score that can be obtained in Core & Shell buildings has been reduced from 6 to 4. The 45% and 50% water savings thresholds have been removed.
- The scoring table for Core & Shell Buildings is as follows:

Reduction in Base Usage Values %	Scores (Core & Shell)
25%	1
30%	2
35%	3
40%	4

ECOBUILD

41

WE CREDIT 3: COOLING TOWER WATER USE

PURPOSE

Cooling towers are supplied with process water,
The control of microbes,
The prevention of corrosion and the formation of residues within the device,
The aim is to use water efficiently.

The credit title addresses water efficiency in cooling towers and similar systems located in the building from a multidimensional perspective.

ECOBUILD

42

WE CREDIT 3: COOLING TOWERS WATER USAGE

STEPS

- Step 1: Conduct water analysis.
- Step 2: Calculate the concentration values of the determined parameters.
- Step 3: Determine the number of cooling water cycles.
- Step 4: Define the limiting cycle number.
- Step 5: Enhance system performance.
- Evaluate all processes together with the HVAC design firm.

ECOBUILD

43

WE CREDIT 3: COOLING TOWER WATER USAGE

REQUIREMENTS

In cooling towers and evaporative condensers, a one-time analysis of the drinking water should be conducted to optimize the cycles in the cooling tower.

At least 5 of the parameters listed in the table next to this should be measured for control purposes.

To calculate the cycles of the cooling towers, the permitted maximum concentration level of each parameter must be divided by the measured amount of each parameter in the feed water. The cooling tower cycles are restricted to prevent any of these parameters from exceeding the required levels.

Table 1. Maximum Densities of Parameters Found in Condenser Water

Parameters	Maximum Level
Ca (as CaCO3)	1000 ppm
Total alkalinity	1000 ppm
SiO2	100 ppm
Cl-	250 ppm
Conductivity	2000 µS/cm

ppm = parts per million
µS/cm = microsiemens per centimeter

ECOBUILD

44

WE CREDIT 3: COOLING TOWER WATER USE

SCORES

Cooling Tower Cycles	Points
Maximum Cycle Numbers are achieved without exceeding any filtration level or affecting the operation of the condenser water system. (up to a maximum of 10 cycles)	1
By improving the condenser or make-up water, a minimum of 10 cycles is reached or the required number of cycles for 1 point is achieved and a minimum of 20% non-recycled potable water is used.	2

REQUIRED DOCUMENTS

Documents	1 Point	2 Points
Drinking Water Analysis Results	✓	✓
Drinking Water Analysis Summary Reports	✓	✓
Concentration Calculation Cycles	✓	✓
Gray Water Calculations		✓
Water Treatment Calculations		✓
Gray Water Analyses (If 100% gray water will be used)		✓

ECOBUILD®

45

WE CREDIT 3: COOLING TOWERS WATER USAGE

REFERENCES STANDARDS

- The Energy Policy ACT (EPAct) of 1992
- The Energy Policy ACT (EPAct) of 2005
- International Association of Plumbing and Mechanical Officials Publication IAPMO
- American National Standards Institute UPC 1-2006
- ANSI UP C1-2006 Uniform Plumbing Code 2006 Section 402.0 Water Conserving Fixtures and Fittings
- International Code Council, International Plumbing Code 2006, Section 604, Design of Water Distribution Systems
- ENERGY STAR
- Consortium for Energy Efficiency
- IgCC/ASHRAE 189.1

ECOBUILD®

46

WE CREDIT 3: COOLING TOWER WATER USE

V4.1 CHANGES

The name of the credit has been changed to Cooling Tower and Process Water Use.

In addition to cooling towers, water savings used in mechanical processes have also been included in the scope of the credit.

The credit has been made available in 3 options. The scoring table and scope of Option 1 have been modified. Options 2 and 3 have been newly added.

Option 1: Cooling Tower Water Use

Cooling Tower Cycles	Points (Excluding C&S)	Points (Including C&S)
Maximum Cycle Numbers are achieved without exceeding any filtration level or affecting the operation of the water system condenser.	1	1
The maximum cycle number required for 1 point is reached, and the cycle count is increased by a minimum of 25% through improvements/maintenance in the condenser or operating water levels or systems. or The maximum cycle number required for 1 point is reached, and water that is not at least 20% recycled drinking water is used.	2	2
The maximum cycle number required for 1 point is reached, and the cycle count is increased by a minimum of 30% through improvements/maintenance in the condenser or operating water levels or systems. or The maximum cycle number required for 1 point is reached, and water that is not at least 30% recycled drinking water is used.	-	3

47

WE CREDITS 3: COOLING TOWER WATER USAGE

V4.1 CHANGES

- Projects connected to the central cooling system can earn points if the cooling towers of the central system meet the requirements.
- Option 2: Not Using Cooling Towers
- If the baseline building defined in ASHRAE 90.1-2016 Appendix G Table G-3-1-1 is one of the systems with a cooling tower (system 7 or 8), and the project does not use a cooling tower, is not connected to a central cooling system, and does not use the latent heat generated from evaporative cooling in its mechanical system, then 2 points can be earned from this option.
- Option 3: Process Water Usage
- If at least 20% recycled water is used to meet the process water needs, 1 point can be earned, and if at least 30% recycled water is used, 2 points can be earned. The quality of the reclaimed water must be suitable for the intended use. In Core & Shell buildings, an additional 3 points can be earned if 40% recycled water is used.
- For Option 3, suitable process water usages should relate to items that account for at least 10% of the building's total water consumption. E.g.: Boilers, humidifiers, etc.

ECOBUILD

48

WE CREDIT 4: WATER CONSUMPTION MEASUREMENT

OBJECTIVE

The main goal is to support water management by measuring water and to identify additional water conservation opportunities to reduce water consumption.

Water measurement significantly helps in detecting leaks in the building.

Additionally, the water consumption figures over the lifetime of the building can adhere to the consumption figures from the first year during the design phase. This ensures continuity in projects.

ECOBUILD

49

WE CREDIT 4: WATER CONSUMPTION MEASUREMENT

REQUIREMENTS

It is necessary to implement Permanent Water Measurement Devices (Water Meters) in two or more of the underwater systems listed below, to the extent permitted by the project:

Irrigation: It is required to measure the water consumption of 80% of the irrigated landscape area.

The percentage of irrigated landscape area = Total measured irrigated landscape area / total irrigated landscape area, calculated using the formula.

Drought-resistant landscape areas that do not require regular irrigation or areas with local plants can be kept outside of the calculation.

Indoor Plumbing Fixtures and Equipment: At least 80% of the water consumption of the Indoor Plumbing Fixtures and equipment defined in the WE Prerequisite should be measured. This measurement can be determined directly or can be found by subtracting the water consumption figures measured for all other water uses in the building and its garden.

ECOBUILD

50

WE CREDIT 4: WATER CONSUMPTION MEASUREMENT

REQUIREMENTS

Domestic Hot Water: At least 80% of the installed domestic hot water capacity must be measured for water consumption. Water tanks/reservoirs and demand-based heaters/thermosiphons are included in the measurement requirement.

Boilers: Boilers with an annual estimated water consumption of 378,500 liters (100,000 gallons) or more, or boilers with a capacity of more than 500,000 BtuH (150kW). A single meter can record the flow rates of multiple boilers.

Reclaimed Water: All recycled and reused water must be measured regardless of the quantity. To accurately measure the amount of recycled water, it is also mandatory to measure the reclaimed water that has a supplemental water connection.

Other Process Water: At least 80% of the estimated daily process water consumption must be measured. Examples of consumption include condensation/evaporation systems, dishwashers, washing machines, pools, and other subsystems using process water.

ECOBUILD

51

WE CREDIT 4: WATER CONSUMPTION MEASUREMENT

REQUIREMENTS

- Health projects must perform water measurement in addition to those specified in credit requirements at five additional tiers.
- Meters must be installed to monitor at least 5 of the following water usages from those available in the project:
- Purified water system (reverse osmosis and/or deionized waters)
- Backwash water for filters
- Water usage in the diet department
- Laundry water usage
- Laboratory water usage
- Water usage in the central sterilization and processing department
- Water usage in physio- and hydrotherapy treatment areas
- Water usage in operating rooms
- Feed water for closed-loop hydraulic systems (water heating/cooling systems)
- Cold feed water for domestic hot water systems

ECOBUILD

52

WE CREDIT 4: WATER CONSUMPTION MEASUREMENT

REQUIRED DOCUMENTS

Documents	All Projects
Water Measurement Strategies Report	✓
Plans showing the locations of meters	✓
Brochures of the meters	✓

ECOBUILD®

53

HOW TO CALCULATE FTE ACCORDING TO APPENDIX 1?

TABLE 1. Default Occupancy Numbers

	Gross square feet per occupant		Gross square meters per occupant	
	Employees	**Transients**	**Employees**	**Transients**
General office	250	0	23	0
Retail, general	550	130	51	12
Retail or service (e.g., financial, auto)	600	130	56	12
Restaurant	435	95	40	9
Grocery store	550	115	51	11
Medical office	225	330	21	31
R&D or laboratory	400	0	37	0
Warehouse, distribution	2,500	0	232	0
Warehouse, storage	20,000	0	1860	0
Hotel	1,500	700	139	65
Educational, daycare	630	105	59	10
Educational, K-12	1,300	140	121	13
Educational, postsecondary	2,100	150	195	14

Table 2. Sample Calculations for Area per Occupancy Type

Occupancy Type	Area (sf)		
	Total	Per FTE	Per Transient Occupant
Commercial office	550,000	250	0
Retail space	50,000	550	130
Restaurant	20,000	225	95
Total Building			620,000

STEP 2
Calculate the FTE occupancy and transient occupancy for each occupancy type.

FTE Occupants

Commercial: $\frac{550{,}000}{250} = 2{,}200$

Retail space: $\frac{50{,}000}{550} = 90.9$, or 91

Restaurant: $\frac{20{,}000}{225} = 88.8$, or 89

Transient Occupants

Retail space: $\frac{50{,}000}{130} = 384.6$, or 385

Restaurant: $\frac{20{,}000}{95} = 211$

STEP 3
Add the FTE and transient occupants for each space to determine whole building occupancy.

Commercial:	2,200	+	0	
Retail space:	91	+	385	
Restaurant:	89	+	211	
Total	2,380	+	596	= 2976

54

FTE Full-time Equivalent CALCULATION EXAMPLE

Office Building Example

In an office building of 2,800 m^2, there are 31 full-time employees and 18 part-time employees working 20 hours a week.

How many people are there in total in this office building as FTE, i.e., full-time equivalent personnel?

1 FTE = A person working 8 hours a day. 

31 employees working 8 hours a day 31 people x (8/8) = 31 FTE 

18 employees working 20 hours a week / 4 hours a day 18 x (4/8)= 9 FTE 

Total FTE = 31 (full-time) + 9 (from part-time) = 40 FTE 

ECOBUILD

55

LEED V4 TRAINING PROGRAM

WATER EFFICIENCY

ECOBUILD

56