The Water Footprint Calculator

A Conservation Tool

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CASCADIA CONSULTING GROUP

Resource Venture

Saving Water Partnership
Seattle and Participating Local Water Utilities

Assistance supports SPU's solid waste, and stormwater programs, and the Saving Water Partnership's water conservation programs.

Resource Venture

The Westin
Potential Recycling Cost Savings
May 8, 2010

Potential Savings (Annual Costs):

Current Costs:		$	93,000
Projected Costs:	–	$	80,600
Resulting Savings:	=	**$**	**12,400**

Projected increase in recycling rate: **175%**

Current Waste and Recycling Services:

Garbage	685 tons disposed per year							
1	25-yd compacting dumpster	for	waste	collected	2	days/week	Annual garbage costs	$ 93,000.00
Recycling	225 tons recycled year							
8	1.5-yd SeaDruNar carts	for	mixed recycling	collected	3	days/week	Annual recycling costs	$ -
							ANNUAL COSTS	$93,000.00

New Waste and Recycling Services: [1]

Garbage	290 tons disposed per year							
1	25-yd compacting dumpster	for	waste	collected	1	day/week	Annual garbage costs	$ 47,400.00
Recycling	60 glass tons recycled per year 365 (non-glass) tons[3] recycled per year							
1	2-yd dumpster	for	glass	collected	2	days/week		
10	1.5-yd SeaDruNar carts	for	mixed recycling	collected	4	days/week	Annual recycling costs	$ 19,000.00
Compost Recycling	195 tons composted per year							
2	2-yd dumpsters	for	compostables [2]	collected	5	days/week	Annual compost costs	$ 14,200.00
							ANNUAL COSTS	$ 80,600.00

Information presented is estimated and based on The Westin's waste bills, the City of Seattle's published waste costs, and data collected from Cascadia Consulting Group's studies of business waste.

1 Assumes a fully implemented program, capturing 70% of recyclable and compostable material.
2 Compost recycling includes food, soiled paper, flower and plant trimmings, wood scraps, and waxed cardboard.
3 Based on the Westin's current mixed recycling program by SeaDruNar and includes all recyclables except metal and glass.

The Westin Hotel, Seattle

$$ savings = approx. $10,000 annually

Diversion	Approx. volume/mo	Approx. weight/yr
Compost	85 cy	153 tons
Glass	17 cy	61 tons
Other Recycling	52 cy (add'l)	46 tons

HomeStreet Bank, Seattle

Reduce CO_2 output per employee by 15%

Activity	Overall goal	Mid-period achievement
Reduce servers	50%	35%
Reduce paper use	30%	15%

Carbon Footprint Calculator

Results

seattle climate partnership

INSTRUCTIONS

This worksheet summarizes results of the carbon footprint assessment. The results below are intended to help you assess what activities of your business contribute the largest relative shares of greenhouse gas emissions. All results are reported as metric tons (or million grams) of CO_2. These figures should be interpreted as CO_2 "equivalents", because although most of these emissions are actual CO_2, some of the emissions are from methane (from waste disposed in landfills).

For assistance assessing the relative costs and impacts of CO_2-reduction options, please see the *Actions* worksheet. For more information on case studies of Seattle-area business actions on climate change and a list of resources on employer services and climate incentives, visit the Seattle Climate Partnership website (particularly the Seattle Climate Partnership *Resource Guide*) at www.seattleclimatepartnership.org.

COMPANY FOOTPRINT: **1,195 metric tons of CO_2e** annually, or 3.5 metric tons of CO_2 per employee

FOOTPRINT DETAILS

Transportation

	Miles Traveled (Business Travel)	Miles Traveled (Commuting)	CO_2 (Metric Tons)
Car & Truck	392,000	941,361	526.8
Airplane	599,612	-	113.3
Train	-	107,423	18.5
Bus	-	1,546,319	385.4
Ferry	-	28,364	10.5
Subtotal	*991,612*	*2,623,466*	*1,054.4*

Energy Use

	Quantity	Units	CO_2 (Metric Tons)
Natural gas	109	therms	0.6
Electricity	1,920,959	kWh	49.9
Steam	-	thousand lbs	-
Other fuels	-	gallons	-
Subtotal			*50.5*

Materials and Services

	Quantity	Units	CO_2 (Metric Tons)
Paper	9,413,500	sheets	18.9
Other materials/services			-
Subtotal			*18.9*

Waste Generation

	Quantity	Units	CO_2 (Metric Tons)
Disposed	169	tons	70.8
Subtotal	*169*	*tons*	*70.8*

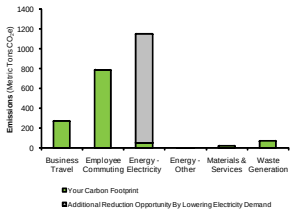
Company Footprint (Total of Above) **1,194.7**

EMISSIONS REDUCTION POTENTIAL*

Footprint and Reduction Potential

	Footprint (Metric Tons CO_2)	Reduction Potential* (Metric Tons CO_2)	Relative Reduction Potential (% of total)
Business Travel	268.1	268.1	12%
Employee Commuting	786.3	786.3	34%
Energy - Electricity	49.9	1152.6	50%
Energy - Other	0.6	0.6	0%
Materials & Services	18.9	18.9	1%
Waste Generation	70.8	70.8	3%
Total	1194.7	2297.3	100%

Relative Reduction Potential



***Emission reduction potential** is the amount of greenhouse gas emissions that can be reduced through actions taken by your organization. Note that the reduction potential for electricity, materials, and waste may be higher than your footprint in these categories. For example, the electricity emission factor (multiplier) for an organization's reduction potential is typically higher than the one for its footprint because the impact of load reduction is to reduce the operation of a fossil-fuel-generating plant in the region, not to reduce supply from non-emitting hydropower. This issue is described in more detail below.

Why calculators work…

- Expresses cost or carbon dioxide impacts of current activity levels
- Allows goal setting
- Drives action

Building the water footprint calculator

- Restrooms
- Office and commercial kitchens
- Cooling towers
- Laundry
- Cleaning
- Irrigation
- Other (e.g. hospital equipment)

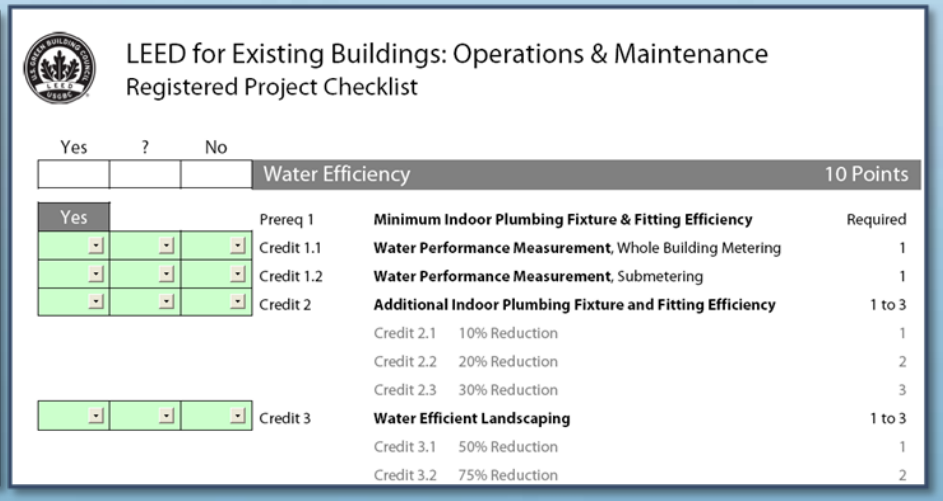
Our data sources and assumptions

From USGBC LEED:

Existing buildings: Operations and maintenance

Reference Guide, First Edition August 2008

Matthew McMullen, Area Manager, Puget Sound, Nalco



LEED for Existing Buildings: Operations & Maintenance
Registered Project Checklist

Yes	?	No		Water Efficiency	10 Points
Yes			Prereq 1	**Minimum Indoor Plumbing Fixture & Fitting Efficiency**	Required
			Credit 1.1	**Water Performance Measurement**, Whole Building Metering	1
			Credit 1.2	**Water Performance Measurement**, Submetering	1
			Credit 2	**Additional Indoor Plumbing Fixture and Fitting Efficiency**	1 to 3
				Credit 2.1 10% Reduction	1
				Credit 2.2 20% Reduction	2
				Credit 2.3 30% Reduction	3
			Credit 3	**Water Efficient Landscaping**	1 to 3
				Credit 3.1 50% Reduction	1
				Credit 3.2 75% Reduction	2

Water Footprint Calculator

Saving Water Partnership

Seattle and Participating Local Water Utilities

Office Kitchen Worksheet

Instructions

Please enter data below about the fixtures and appliances in your office kitchen(s) (if applicable).

Office Kitchen Water Use

Faucets

	Total # of faucets	Flow rate per unit (gallons per min)
Faucet type A	7	2.2
Faucet type B	26	2
Faucet type C		

Dishwashers

	Total # of dishwashers	Gallons per cycle	Cycles per day	Model type
Dishwasher type A	2	8.05	0.8	Miele G 681
Dishwasher type B	1	6	0.8	Whirlpool WJU 36001
Dishwasher type C	1	4.6	0.8	Asko D1776

Additional Information

Enter additional information about bathroom fixtures or practices here:

Also observed a Manitowoc QM45 ice maker, which uses 12 gallons/100 lbs of ice; Makes maximum 95 lbs of ice
Source:

Step 1: Getting the data

Water Footprint Calculator

Background Information Worksheet

Saving Water Partnership
Seattle and Participating Local Water Utilities

Please enter as much information as possible about your facility below. These data are essential for the other calculations to work correctly. Note that cells that are shaded in light grey are for user inputs. Cells that have dark grey backgrounds should populate automatically based on other user inputs. Light blue cells contain industry information and may be used to populate user-input cells if more accurate information is unavailable.

Footprint Year

	Month	Year
Start:	January	2009
End:	December	2009

Please enter the starting month and year of your footprint. The ending month and year will automatically populate assuming a one-year period.

Facility Information

Facility Name	
Physical Address	
Total building area (ft^2)	
Company area (ft^2)*	
Facility type	Select from list

**Only if a portion of the building's water use is being measured*

Occupant Information

	Total	Women***	Men***
Number of building occupants per day			
Estimated # of transient users** per day			
Occupancy rate (for hotels & hospitals)			

***Transient users are defined as individuals in the building only temporarily. E.g. retail customers, students, and visitors.*
****If exact numbers are not known, please estimate percentages of men and women.*

Water Meter & Sewer Information (from your City of Seattle water bill)

	Account/Meter Number	Meter Type	Annual CCF	Annual Cost
Water Meter 1		Select from list		
Water Meter 2		Select from list		
Water Meter 3		Select from list		
Water Meter 4		Select from list		
Water Meter 5		Select from list		
Water Meter 6		Select from list		
Water Meter 7		Select from list		

	Annual CCF to Sewer	Annual Sewer Cost
Sewer		

Getting Specific Use Data

Bathroom Fixtures

	Number of units	Flow rate (gallons per flush)
Toilet type A		
Toilet type B		
Toilet type C		
Urinal type B		
Urinal type A		
Urinal type C		

Toilet, urinal, and faucet types may be different throughout the facility resulting in different flow rates. For greater accuracy, please note all different types and counts of fixtures.

	Total #	Flow rate (gallons per minute)
Faucet type A		
Faucet type B		
Faucet type C		
Showerhead type A		
Showerhead type B		
Showerhead type C		

Once the faucet is turned on, how long does it take, on average, to get hot water? Select from list

Commercial Kitchens

	Features	Number	Flow rate (gallons/min)	Hours of use per day	Flow rate (gallons/min)	Hours of use per day
Pre-rise sprayheads					1.6	3
Faucets						
Food disposal/grinders					10	3
Steamers	Select type				0	3
Dipper wells					0.25	
Combination Ovens	Select type				0	
Steam Tables					60	
Steam Kettles						

	Features	Number	Gallons per cycle	fixture per day
Dishwashers				
Pasta Cookers	Select simmer mode			

	Ice Type	Number	Pounds of ice per unit per day	Water-cooled?
Ice machines	Select ice type			

	Type of appliance	Number	Gallons per day
Other*			

* In case other appliances not listed above are in use.

Step 2: Creating the water use map

Bathroom Water Use

Employees

	Male	Female
Gender split of FTEs	60%	40%

	Number of units	Flow rate per unit (gallons per flush)
Toilet type A	55	1.6
Toilet type B	10	1.6
Urinal type A	18	1
Urinal type B		

	Total #	Flow rate (gallons per minute)
Faucet type A	56	0.5
Faucet type B		
Faucet type C		
Showerhead type A	6	2.5
Showerhead type B		
Showerhead type C		

Visitors

	Male	Female
Number of visitors		

	Number of units	Flow rate per unit (gallons per flush)
Toilet type A		
Toilet type B	10	1.6
Urinal type A		
Urinal type B		

	Total #	Flow rate (gallons per minute)
Faucet type A		
Faucet type B		
Faucet type C		

Additional Information

Enter additional information about bathroom fixtures or practices here:

Step 2A: Identifying opportunities for conservation

Opportunities for Conservation

Lower flow fixtures

Toilets

	Number to replace	Flow rate of new toilet	Water savings (Annual CCF)	Cost savings on water and sewer costs	Available incentives*
Replace type A toilets	55	1.28	239	$ 3,164	$ -
Replace type B toilets	10	1.28	43	$ 575	$ -
Replace type A urinals	18	0.125	514	$ 6,816	$ -
Replace type B urinals			0	$ -	$ -

Step 3: Sharing the results

Water Footprint Calculator

Results

Saving Water Partnership

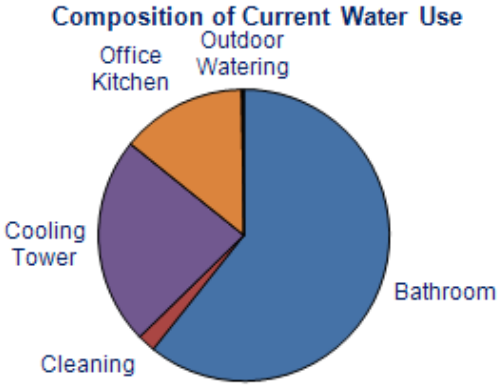
Seattle and Participating Local Water Utilities

Instructions

This worksheet summarizes the results of the water footprint assessment.

Water Footprint: **3,693 CCF annually** or **0.01 CCF/sq ft** or **2.5 CCF/occupant/year**

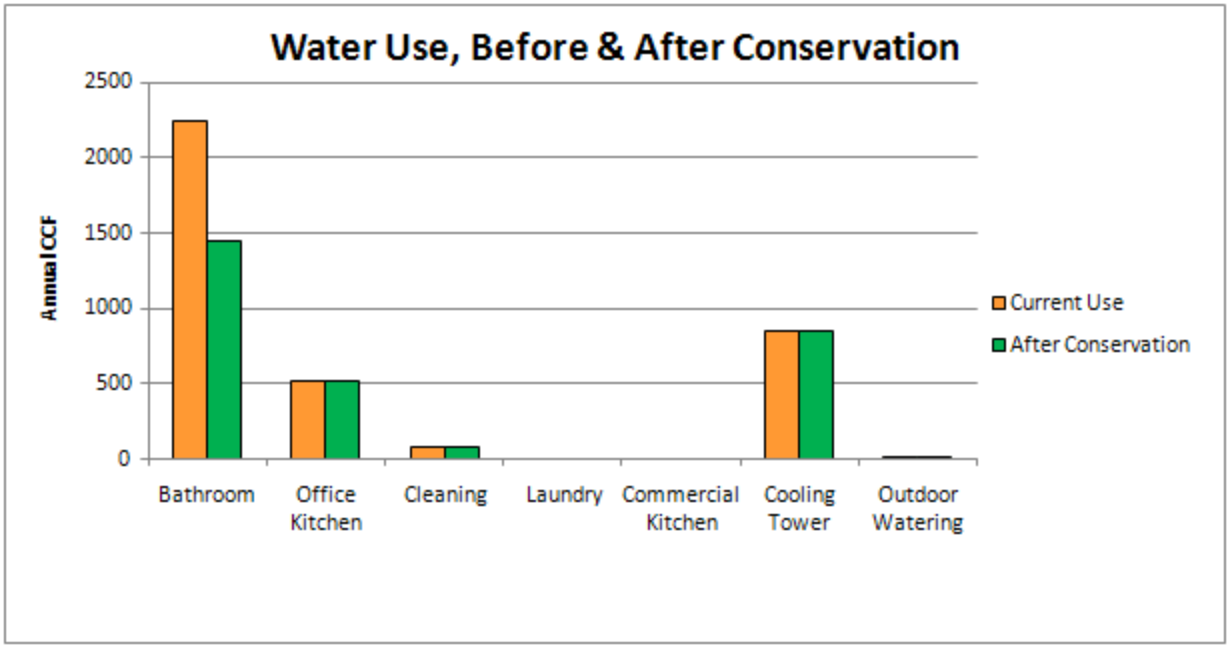
Water Use Area	Annual CCF	Annual Water Cost	Annual Sewer Cost
Bathroom	2,243	$ 7,902	$ 21,809
Cleaning	74	$ 260	$ 719
Commercial Kitchen	0	$ -	$ -
Cooling Tower	852	$ 3,001	$ 8,282
Laundry	0	$ -	$ -
Office Kitchen	516	$ 1,820	$ 5,022
Outdoor Watering	8	$ 30	$ 82
Total	**3,693**	**$ 13,013**	**$ 35,914**



Step 3A: Making recommendations for conservation

Opportunities for Conservation

Current Use is based on the above calculations."After Conservation" bars will appear if there are significant opportunities for water conservation.



Main Recommendations

1. Replace existing urinals with 1 pint per flush urinals
2. Replace existing toilets with 1.28 gallon per flush toilets
3. Only run kitchen dishwasher when full

Where do we go from here?

- Water footprint tool 1.0.
- 5 test sites; 20 planned for the year.
- Partnership with Lane Community College's Spring 2010 Water Conservation Technician course to test and refine.

From Version 1.0 to 2.0

Building in an ROI calculation.

Using good data: current data - LEED default values for fixture use.

E.g. shower use in hotels ~ 12 minutes rather than 5 minutes in LEED assumptions.

Building water footprinting: the next innovation?

A tool to:

- help businesses plan for conservation.
- help businesses prioritize their conservation dollars.
- engage businesses in water conservation.

Thank you!

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