



# METHODOLOGY

FOR GRACE'S WATER FOOTPRINT CALCULATOR

UPDATED APRIL 2020

# WATER FOOTPRINT CALCULATOR

GRACE's Water Footprint Calculator (WFC) provides a snapshot of how your daily activities and routines impact your water use. The result, reported as your water footprint, is meant to be an estimate that can help you better understand your habits and behaviors and how they contribute to your overall water footprint. The value of the WFC lies in its ability to help people understand how they use water and how they can use less, not to give a precise accounting of water use such as you might obtain from a water audit. The calculations used in the WFC are estimates.

The data is the latest and best available at the time of this update to the calculator. In some cases, we have used data from studies that looked at personal water use based on individual behaviors. In other cases, we took national and international data and created statistical averages and values to calculate individual water use. This effort points out that there is a lack of consistent, high quality water-use data collected in the United States (and globally), so please view your results with this in mind.

Some of these questions do not technically fall within the guidelines for conducting a proper Water Footprint Assessment as formally developed by the Water Footprint Network. Although we try to focus the questions on water consumption, the line between withdrawal and consumption is not always clear for direct use. Also, the pet food question is based solely on withdrawals because no consumption data is available at this time. We've prepared a post that describes the differences between withdrawals and consumption.

## **The Difference Between Water Conservation and Efficiency**

[watercalculator.org/footprint/water-conservation-efficiency/](http://watercalculator.org/footprint/water-conservation-efficiency/)

Results and average values shown in the results spreadsheet are subject to rounding.

**NOTE:** Although the WFC focus area is the United States, it uses international and United States data. All data has been converted to US-standard units (i.e. gallons, pounds and feet). If you're from outside of the United States, we've prepared a guide to help you adapt and use the WFC.

## **Using the Calculator When You're Outside the US**

[watercalculator.org/resource/outside-the-us/](http://watercalculator.org/resource/outside-the-us/)

Alternately, you can use the Water Footprint Network's calculator which is presented in multiple languages with metric units and uses international data.

## **Water Footprint Network: Personal calculator - extended**

[waterfootprint.org/en/water-footprint/personal-water-footprint/](http://waterfootprint.org/en/water-footprint/personal-water-footprint/)

*For questions regarding these methods, please email [info@watercalculator.org](mailto:info@watercalculator.org).*

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# Household Size

**QUESTION:** HOW MANY PEOPLE ARE IN YOUR HOUSEHOLD?

**DISCUSSION:** Calculations for some of the questions involve all the people in your household. If you live alone or choose to take the calculator as an individual, then you're a household of 1. If you're a household of two or more, your water footprint is an average (i.e., a statistical mean) of water use among all household members. This is because some resources like dishwashers, pools and lawn water are shared among family members so you answer those questions as an average for your household. Other questions ask you to figure out collectively how long or how often members of your household do something. In that case, think about the behavior of each household member. (If someone in your household uses more water than others they might be increasing your water footprint results. This would be a good opportunity to get them to conserve water.)

## Direct Water Use Questions

The first set of questions is about direct water use - the water you use when you turn on a tap. It includes water used indoors, in the bathroom, kitchen and laundry. It also includes greywater reuse as an offset to your direct water use. Outdoor water use includes the water you use on your lawn and garden and in your pool and includes xeriscaping and rain barrels as offsets. It also includes car washing.

### Indoor Direct Use

#### Bathroom

##### Showers

**QUESTION:** HOW LONG IS THE AVERAGE SHOWER IN YOUR HOUSEHOLD?



**DISCUSSION:** Think about how people in your household shower and determine an average shower length. Then choose the interval that best reflects how your household uses the shower.

Time Interval	Value Used
Under 5 minutes	4 minutes
5-10 minutes	8 minutes
11-15 minutes	13 minutes
Over 15 minutes	15 minutes

**QUESTION:** DO YOU HAVE LOW-FLOW SHOWERHEADS?

**DISCUSSION/SOURCE:** Low-flow showerheads flow at 2.5 gallons per minute (gpm) (some go as low as 1.5 gpm). Older, less-efficient showerheads use as much as 5.0 gpm.

Choose your showerhead type. For mixed-flow households, we used the average of 2.5 and 5.0 gpm for a flow rate of 3.8 gpm.

Low-Flow Showerhead?	Flow Rate
Yes	2.5 gpm
Some	3.8 gpm
No	5.0 gpm

**CALCULATION:** \_\_\_ minutes associated with chosen time interval x \_\_\_ flow rate (based on showerhead type) = \_\_\_ gallons of water per person per day

**AVERAGE:** 11 gallons per person per day

**SOURCE:** Residential End Uses of Water Study, Version 2  
[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

### Bathub

**QUESTION:** DO YOU TAKE BATHS? IF SO, HOW OFTEN?

If you or someone in your household takes baths, then you answered “yes.”

**DISCUSSION/SOURCE:** The average bath uses about 35 gallons of water.



Residential Water Use  
[allianceforwaterefficiency.org/resources/topic/residential-bath-use](http://allianceforwaterefficiency.org/resources/topic/residential-bath-use)

Think about how often people in your household take baths (monthly? weekly? daily?). Select a number and time period in order to complete your answer.

Time Period	Multiplier
per day	1/1 = 1.0
per week	1/7 = 0.14
per month	1/30 = 0.033
per year	1/365 = 0.003

**NOTE:** Taking a bath once in a while does not affect your results significantly, but a daily bath could add a lot to your direct water use.

**CALCULATION:** 35 gallons x \_\_\_ number of baths x \_\_\_ time period multiplier/number of people in the household = \_\_\_ gallons of water per person per day

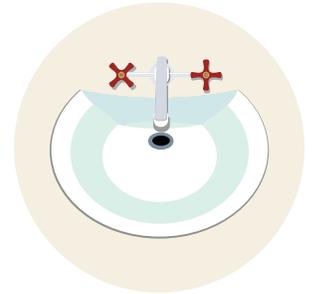
**AVERAGE:** 2 gallons per person per day

**DISCUSSION/SOURCE:** Residential End Uses of Water Study, Version 2  
[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

### Bathroom Sinks

**QUESTION:** HOW LONG DO YOU LEAVE YOUR BATHROOM FAUCETS RUNNING EACH DAY?  
(Include brushing your teeth and shaving.)

**DISCUSSION:** Think about how people in your household use the bathroom sink and determine an average use time. Then choose the time interval that best reflects how your household uses the bathroom sink.



Time Interval	Value Used
Under 4 minutes	4 minutes
4-10 minutes	8 minutes
11-30 minutes	20 minutes
Over 30 minutes	30 minutes

**QUESTION:** DO YOUR BATHROOM SINKS HAVE LOW-FLOW FAUCETS?

**DISCUSSION/SOURCE:** Low-flow faucets flow at 1.5 gpm (some go lower). Older, less-efficient faucets can flow as much as 5 gpm.

Water-Efficient Plumbing Fixtures

[ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx](http://ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx)

EPA WaterSense: Bathroom Faucets

[epa.gov/watersense/bathroom-faucets](http://epa.gov/watersense/bathroom-faucets)

For mixed flow households, we used the average of 1.5 and 5.0 gpm for a flowrate of 3.3 gpm.

Low-Flow Faucets?	Flow Rate
Yes	1.5 gpm
Some	3.3 gpm
No	5.0 gpm

**CALCULATION:** \_\_\_ minutes associated with chosen time interval x \_\_\_ flow rate  
(based on faucet type(s)) = \_\_\_ gallons of water per person per day

**AVERAGE:** 3 gallons per person per day

**DISCUSSION/SOURCE:** The Residential Water Use study found an average of 10.1 gallons per person per day for all faucets. We apportioned that between bathroom and kitchen faucets for 3 and 7 gallons per person per day, respectively, figuring that most households will use more water in the kitchen than in the bathroom.

Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

## Toilets

**QUESTION:** DO YOU “LET IT MELLOW”?

**DISCUSSION/SOURCE:** People can have bowel movements from 3 times per day to 3 times per week, for an average of 1.7 bowel movements per day.



Assessment of Normal Bowel Habits in the General Adult Population: the Popcol Study  
[ncbi.nlm.nih.gov/pubmed/20205503](http://ncbi.nlm.nih.gov/pubmed/20205503)

The average person flushes 5 times per day.

Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

It might be awkward but think about how people in your home flush the toilet. Do they “let it mellow” and only flush for bowel movements? If they don’t, they should consider it because “letting it mellow” could save 1.5 gallons (or more) per flush. For those that do, we took the average of 1.7 flushes per day.

For those who select “sometimes”, we used the average of 1.7 and 5, or 3.4 flushes per day.

**NOTE:** The “yes” and “no” values are reversed in Spanish because there is no similar concept of “letting it mellow,” so we asked the question in reverse.

Let It Mellow?	Flushes Per Day
Always	1.7 flushes
Sometimes	3.4 flushes
Never	5.0 flushes

**QUESTION:** DO YOU HAVE LOW-FLOW TOILETS?

**DISCUSSION/SOURCE:** Older, less-efficient toilets use 5 gallons or more per flush. Low-flow toilets use 1.6 gallons (or less) per flush and are now required in new construction and remodels.

WaterSense Labeled Toilets

[epa.gov/watersense/residential-toilets](http://epa.gov/watersense/residential-toilets)

For mixed toilet type households, we used the average of 1.6 and 5, or 3.3 gallons per flush.

Low-Flow Toilets?	Flushes Per Day
Yes	1.6 gpm
Some/ Not All	3.3 gpm
No	5.0 gpm

**CALCULATION:** \_\_\_ number of flushes (on average, for the household) x \_\_\_ flow rate (based on toilet type) = \_\_\_ gallons of water per person per day

**AVERAGE:** 14 gallons per person per day

**DISCUSSION/SOURCE:**

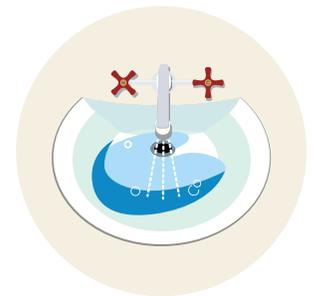
Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

## Kitchen

### Kitchen Sink

**QUESTION:** HOW LONG DO YOU LEAVE THE KITCHEN FAUCET RUNNING EACH DAY?  
(Include rinsing food and cleaning, don't include washing dishes)



**DISCUSSION/SOURCE:** Think about how people in your household use the kitchen sink - like when they wash their hands or rinse produce but not when they wash dishes - and determine an average use time. Then choose the time interval that best reflects how your household uses the kitchen sink.

Time Interval	Value Used
Under 5 minutes	4 minutes
5-20 minutes	13 minutes
21-45 minutes	33 minutes
Over 45 minutes	45 minutes

**QUESTION:** DOES YOUR KITCHEN SINK HAVE A LOW-FLOW FAUCET?

**DISCUSSION/SOURCE:** Water-saving faucets flow at 1.5 gpm (some even lower). Older, less-efficient faucets flow up to 5 gpm.

Department of Energy: Best Management Practice #7: Faucets and Showerheads  
[energy.gov/eere/femp/best-management-practice-7-faucets-and-showerheads](http://energy.gov/eere/femp/best-management-practice-7-faucets-and-showerheads)

Water-Efficient Plumbing Fixtures

[ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx](http://ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx)

We assume you only have one kitchen faucet.

Low-Flow Faucet?	Flow Rate
Yes	1.5 gpm
No	5.0 gpm

**CALCULATION:** \_\_\_ minutes associated with chosen time interval x \_\_\_ flow rate (based on faucet type) = \_\_\_ gallons of water per person per day

**AVERAGE:** 7 gallons per person per day

**DISCUSSION/SOURCE:** The Residential Water Use study found an average of 10.1 gallons per person per day for all faucets. We apportioned that between bathroom and kitchen faucets for 3 and 7 gallons per person per day, respectively, figuring that most households will use more water in the kitchen than in the bathroom.

Residential End Uses of Water Study, Version 2  
[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

### Washing Dishes

**QUESTION:** HOW DO YOU WASH YOUR DISHES?

**DISCUSSION/SOURCE:** Some people might not wash their dishes every day, so we've given you multiple time options.



Time Period	Multiplier
per day	1/1 = 1.0
per week	1/7 = 0.14
per month	1/30 = 0.033
per year	1/365 = 0.003

Most people wash their dishes in a variety of ways, so we've given you multiple options that you can add together.

**Residential Dishwashers:** Older, less-efficient dishwashers use 15 gallons or more. Energy/water-efficient dishwashers use just over 4 gallons to wash dishes.

ENERGY STAR: Dishwashers Key Product Criteria  
[energystar.gov/products/appliances/dishwashers/key\\_product\\_criteria](http://energystar.gov/products/appliances/dishwashers/key_product_criteria)

**Plasticware:** For those who only use plasticware from delivery or eat most of their meals out, we used an average value. If you have most of your food delivered, there is water involved in making the plastic utensils.

It takes 28 gallons of water to produce a pound of plastic.

Corporate Water Footprint Accounting and Impact Assessment: The Case of the Water Footprint of a Sugar-Containing Carbonated Beverage

[waterfootprint.org/media/downloads/Ercin-et-al-2011-CorporateWaterFootprint-Softdrink.pdf](http://waterfootprint.org/media/downloads/Ercin-et-al-2011-CorporateWaterFootprint-Softdrink.pdf)

Using a kitchen scale, we determined that a place setting of plasticware weighs about 1 ounce. To find out how much 1 ounce takes, we used this calculation: 28 gallons/pound plastic x 1 pound/16 ounces = 1.8 gallons of water.

If you use plastic at each meal, on average you'd use three place settings per day, for  $3 \times 1.8 = 5.3$  gallons per person per day.

**Hand Washing:** According to a European study of dishwashing by hand, it takes about 27 gallons of water to clean 12 place settings of dishes.

A European Comparison of Cleaning Dishes by Hand

[landtechnik.uni-bonn.de/forschung/haushaltstechnik/publikationen/eedal-manualdishwashing-ht1](http://landtechnik.uni-bonn.de/forschung/haushaltstechnik/publikationen/eedal-manualdishwashing-ht1)

**Commercial Dishwashers:** Restaurants typically wash dishes in commercial dishwashers and sinks. According to ENERGY STAR, it takes 600 to 1000 gallons of water for 300 to 600 meals prepared in a day at a restaurant. Using the midpoints of 800 gallons and 450 meals, this equates to 800 gallons per meal/450 meals per day = 1.8 gallons per meal. If you eat three meals per day, 3 meals x 1.8 gallons per meal = 5.4 gallons of water per person per day.

Best Practices – How to Achieve the Most Efficient Use of Water in Commercial Food Service Facilities  
Best Management Practices for Commercial and Institutional Facilities

[epa.gov/sites/production/files/2017-02/documents/watersense-at-work\\_final\\_508c3.pdf](http://epa.gov/sites/production/files/2017-02/documents/watersense-at-work_final_508c3.pdf)

To determine a value for the option of using plasticware or eating out, we took the average of both with the following calculation:  $(5.3 \text{ gallons} + 5.4 \text{ gallons}) / 2 = 5.4$ , which we rounded to 5 gallons per person per day.

Dishwashing Method	Gallons Per Load
Less-efficient dishwasher	15
Energy/ Water-efficient dishwasher	4.3
Hand wash	27
Disposable dishes or eat out	5.4 times the number of household members

Choose any method that your household uses to do the dishes. Figure out how many loads you wash using each method over a given time period.

**CALCULATION:** Multiply the gallons for each method by the number of loads then multiply that by the time multiplier. If you choose the “disposable dishes or eat out” option, multiply that number by the number of people in your household (remember, dishwashers are shared resources, but disposable plasticware is not). Add all the methods together and divide that by the number of people in your household to get the gallons of water per person per day.

**AVERAGE:** 1 gallon per person per day

**DISCUSSION/SOURCE:**

Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

## Laundry

**QUESTION:** HOW DO YOU DO LAUNDRY?

**DISCUSSION/SOURCE:** Some people do laundry every day and some don't, so we've given you multiple time options.



Time Period	Multiplier
per day	1/1 = 1.0
per week	1/7 = 0.14
per month	1/30 = 0.033
per year	1/365 = 0.003

People use different methods to wash their clothes, so we've given you multiple options that you add together.

**Residential Washing Machines:** Older, less-efficient machines can use 41 gallons or more. Energy/water-efficient machines use just 20 gallons or less to wash one load of clothes.

WaterSense: Water Efficiency Management Guide Residential Kitchen and Laundry

[epa.gov/sites/production/files/2017-10/documents/ws-commercialbuildings-waterscore-residential-kitchen-laundry-guide.pdf](http://epa.gov/sites/production/files/2017-10/documents/ws-commercialbuildings-waterscore-residential-kitchen-laundry-guide.pdf)

**Cleaners/Laundromat:** The average water use for a load at the cleaners is 32 to 38 gallons per load. We took the midpoint to get 35 gallons per load. The average water use for a load in a shared laundry room is 35 to 45 gallons per load. We took the midpoint to get 40 gallons per load. Then we averaged those numbers together to get  $(35 + 40)/2 = 37.5$ , which we rounded to 38 gallons per load.

WaterSense: Water Efficiency Management Guide Residential Kitchen and Laundry

[epa.gov/sites/production/files/2017-10/documents/ws-commercialbuildings-waterscore-residential-kitchen-laundry-guide.pdf](http://epa.gov/sites/production/files/2017-10/documents/ws-commercialbuildings-waterscore-residential-kitchen-laundry-guide.pdf)

Clothes Washing Method	Gallons Per Load
Less-efficient washing machine	41
Energy/Water-efficient washing machine	20
Laundromat, wash and fold or shared laundry rooms	17

Choose any method that your household uses to do the laundry. Figure out how many loads you wash using each method over a given time period.

**CALCULATION:** Multiply the gallons used for each method you selected by the number of loads, then multiply that by the time multiplier. Add the methods together and divide by the number of people in your household to get the gallons of water per person per day.

**AVERAGE:** 10 gallons per person per day

**DISCUSSION/SOURCE:**

Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](http://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf) (See Figure 5)

## Greywater System

**QUESTION:** DO YOU HAVE A GREYWATER SYSTEM INSTALLED IN YOUR HOME?

If you have a greywater system in your household, then you answered “yes.”



**DISCUSSION/SOURCE:** A greywater system lets you collect and reuse safe, relatively clean water from your laundry, shower and bath to water your lawn and garden. There is no average system capacity but research has shown that the average household has the potential to generate about 23,000 gallons of usable greywater per year.

Using Graywater and Stormwater to Enhance Local Water Supplies: An Assessment of Risks, Costs, and Benefits; Chapter 3: Quantities Available for Beneficial Use and Potential Impacts on Water  
[nap.edu/read/21866/chapter/5](http://nap.edu/read/21866/chapter/5)

**CALCULATION:** 23,000 gallons per household per year/365 days per year = 63 gallons per household per day. Divide this by the number of people in your household to get the gallons per person per day. Subtract this from your total water footprint so far.

**AVERAGE:** 25 gallons per person per day

**DISCUSSION/SOURCE:**

Using Graywater and Stormwater to Enhance Local Water Supplies: An Assessment of Risks, Costs, and Benefits; Chapter 3: Quantities Available for Beneficial Use and Potential Impacts on Water  
[nap.edu/read/21866/chapter/5](http://nap.edu/read/21866/chapter/5)

There were 2.53 people per household in 2016.

United States Census: Historical Households Tables for 2016

[census.gov/data/tables/time-series/demo/families/households.html](http://census.gov/data/tables/time-series/demo/families/households.html)

**CALCULATION:** 63 gallons per household/2.53 people per household = 25 gallons per person per day

# Outdoor Direct Use

## Lawn & Garden

### Watering

**QUESTION:** DO YOU WATER A LAWN OR GARDEN?

If you have a lawn, then you answered “yes.”

**QUESTION:** HOW MUCH DO YOU WATER?

**DISCUSSION/SOURCE:** Most people don’t water their lawn every day or even every week, so we’ve given you multiple time options.



Time Period	Multiplier
per day	$1/1 = 1.0$
per week	$1/7 = 0.14$
per month	$1/30 = 0.033$
per year	$1/365 = 0.003$

It takes 330 gallons to water a 1000 square foot lawn to a depth of ½ inch.

Watering Tips for Your Lawn and Garden  
[lowes.com/n/how-to/watering-tips](https://lowes.com/n/how-to/watering-tips)

We created area intervals and took the midpoint of each interval to figure out how many gallons it would take to water that area to a depth of 1/2 inch. We multiplied the midpoint by the ratio of 333 gallons/1000 square feet to get the gallons associated with the midpoint. If you water 40,000 square feet or more, we rounded up to an acre.

Time Period	Multiplier
1-99 square feet	17 gallons
100-500 square feet	99 gallons
500-1,000 square feet	248 gallons
1,000-5,000 square feet	990 gallons
5,000-10,000 square feet	2,470 gallons
10,000-40,000 square feet	8,250 gallons
> 40,000 square feet	14,375 gallons

Think about how many square feet you actually water and choose the area interval from the table.

**CALCULATION:** Multiply the gallons for that interval by the number of times you water in a given time period and multiply that by the time multiplier, then divide that by the number of people in your household to get the gallons of water per person per day.

**AVERAGE:** 72 gallons per person per day

**DISCUSSION/SOURCE:** Average outdoor water use is 88,000 gallons per household per year from irrigation and pools.

Residential End Uses of Water Study, Version 2

[circleofblue.org/wp-content/uploads/2016/04/WRF\\_REU2016.pdf](https://circleofblue.org/wp-content/uploads/2016/04/WRF_REU2016.pdf)

The average water use for pools (calculated below) is 23 gallons per person per day. We subtracted pool water use from the total to get irrigation water use.

There were 2.53 people per household in 2016.

United States Census: Historical Households Tables for 2016

[census.gov/data/tables/time-series/demo/families/households.html](https://census.gov/data/tables/time-series/demo/families/households.html)

**CALCULATION:** 88,000 gallons per household per year/365 days per year/2.53 people per household = 95 gallons per person per day

Subtract pools to get irrigation: 95 gallons per person per day – 23 gallons per person per day = 72 gallons per person per day

## [Xeriscaping](#)

**QUESTION:** DO YOU LANDSCAPE WITH PLANTS THAT REQUIRE LITTLE TO NO WATER?

If you xeriscape, then you answered “yes.”

**DISCUSSION/SOURCE:** Planting low-water use or native flowers and grasses, known as xeriscaping, can reduce how much you have to water your landscape by about 25 percent.

An in-depth investigation of Xeriscape as a water conservation measure

[awwa.onlinelibrary.wiley.com/doi/pdf/10.1002/j.1551-8833.2006.tb07590.x](https://awwa.onlinelibrary.wiley.com/doi/pdf/10.1002/j.1551-8833.2006.tb07590.x)

**CALCULATION:** Take the result you got from the previous question about watering your lawn and garden and multiply it by 0.25 (25 percent). Then subtract this from your lawn and garden value. This is how much water you could save by xeriscaping your lawn.

**AVERAGE:** 18 gallons per person per day

**DISCUSSION/SOURCE:** Based on the calculations from the lawn and garden section, the average water use for lawn and garden watering is 72 gallons per person per day.



**CALCULATION:** 72 gallons per person per day x 0.25 = 18 gallons per person per day  
This value is subtracted from the lawn and garden average.

## Rain Barrel

**QUESTION:** DO YOU HAVE A RAIN BARREL?

If you have a rain barrel, then you answered “yes.”

**DISCUSSION/SOURCE:** Rain barrels vary in size, but on average can collect about 1,300 gallons in a year that you could use on your lawn and garden. That works out to a savings of about 4 gallons per day for a household.

EPA: Control Your Stormwater and Save Money, Use a Rain Barrel

[blog.epa.gov/2010/06/24/control-your-stormwater-and-save-money-use-a-rain-barrel/](http://blog.epa.gov/2010/06/24/control-your-stormwater-and-save-money-use-a-rain-barrel/)

**CALCULATION:** Divide 4 gallons by the number of people in your household to get the number of gallons per person per day. Subtract this from your total water footprint.

**AVERAGE:** 2 gallons per person per day

**DISCUSSION/SOURCE:** There were 2.53 people per household in 2016.

United States Census: Historical Households Tables for 2016

[census.gov/data/tables/time-series/demo/families/households.html](http://census.gov/data/tables/time-series/demo/families/households.html)

**CALCULATION:** 4 gallons per household per day/2.53 people per household = 2 gallons per person per day



## Swimming Pool

**QUESTION:** DO YOU HAVE A SWIMMING POOL?

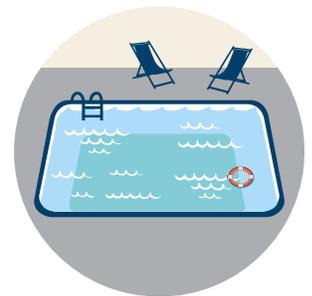
If you have a swimming pool, then you answered “yes.”

**QUESTION:** HOW MANY MONTHS OUT OF THE YEAR DO YOU KEEP IT COVERED?

**DISCUSSION/SOURCE:** The average pool requires an initial volume of 18,000 gallons of water to fill.

Water Policy: What about All Those Swimming Pools in Los Angeles?

[pacinst.org/water-policy-what-about-all-those-swimming-pools-in-los-angeles/](http://pacinst.org/water-policy-what-about-all-those-swimming-pools-in-los-angeles/)



Uncovered pools lose 1,000 gallons per month or more from evaporation. The amount depends on where you live and the humidity or dryness of your climate. We accounted for the water lost when you leave your pool uncovered.

Swimming Pool Cover Rebate Program Follow Up Customer Survey  
[map-testing.com/assets/reports/Pool\\_Covers\\_Consumer%20survey%202004.pdf](http://map-testing.com/assets/reports/Pool_Covers_Consumer%20survey%202004.pdf)

Months Uncovered	Value Used
1	1,000 gallons
2	2,000 gallons
3	3,000 gallons
4	4,000 gallons
5	5,000 gallons
6	6,000 gallons
7	7,000 gallons
8	8,000 gallons
9	9,000 gallons
10	10,000 gallons
11	11,000 gallons
12	12,000 gallons

Think about how many months per year you leave your pool uncovered.

**CALCULATION:**  $[(18,000 \text{ gallons of initial pool water} + (1,000 \text{ gallons per month} \times \text{__ months left uncovered})] / 365 \text{ days per year} / \text{__ people in the household} = \text{__ gallons of water per person per day}$

**AVERAGE:** 23 gallons per person per day

**DISCUSSION/SOURCE:** We assumed that the average pool owner covers their pool nine months out of the year.

Water Policy: What about All Those Swimming Pools in Los Angeles?  
[pacinst.org/water-policy-what-about-all-those-swimming-pools-in-los-angeles/](http://pacinst.org/water-policy-what-about-all-those-swimming-pools-in-los-angeles/)

There were 2.53 people per household in 2016.

United States Census: Historical Households Tables for 2016  
[census.gov/data/tables/time-series/demo/families/households.html](http://census.gov/data/tables/time-series/demo/families/households.html)

**CALCULATION:**  $[(18,000 \text{ gallons} + (12 - 9 \text{ months}) \times 1000 \text{ gallons per month})] / 365 \text{ days per year} / 2.53 \text{ people per household} = 23 \text{ gallons per person per day}$

## Car Washing

### QUESTION: DO YOU HAVE A CAR?

If you have a car, then you answered “yes.”

**DISCUSSION:** Cars have both a direct and virtual water use component. The question in this section asks about the direct use component – car washing – first. The virtual water use component – gasoline – is addressed in the virtual water section, below.



### QUESTION: HOW DO YOU WASH YOUR CAR?

**DISCUSSION/SOURCE:** Not everyone washes their car on a regular basis, so we provided multiple time options.

Time Period	Multiplier
per day	$1/1 = 1.0$
per week	$1/7 = 0.14$
per month	$1/30 = 0.033$
per year	$1/365 = 0.003$

People use different methods to wash their car, so we provided options.

**Wash at Home:** A hose at home without a spray nozzle could use as much as 100 gallons per wash. You can reduce this if you use a spray nozzle that lets you turn the spray on and off.

**Full-service Car Wash:** An automatic or full-service car wash (where a machine sprays water over your car) varies from 30 gallons to 100 gallons per wash (numerous studies presented in the link below list various volumes) and uses an average of 58 gallons per wash (we averaged the numbers to get our value).

**Self-service Car Wash:** A self-service car wash (where you use a high-pressure hose with a “trigger” spray nozzle) uses the least amount of water at 15 gallons per wash. These usually work on timers, which encourage conservation.

Water Conservation and Washing Vehicles

[mde.maryland.gov/programs/Water/waterconservation/Pages/carwashing.aspx](http://mde.maryland.gov/programs/Water/waterconservation/Pages/carwashing.aspx)

Think about which method you use to wash your car and how frequently you wash it.

Car Washing Methods	Gallons Per Wash
Garden Hose	100
Full-service Car Wash	58
Self-service Car Wash	15

**CALCULATION:** Multiply the gallons associated with each method you chose by the number of times you wash your car and then by the time multiplier. Add all the methods together and divide that by the number of people in your household to get the gallons of water per person per day.

**AVERAGE:** 1 gallon per person per day

**DISCUSSION/SOURCE:** An estimated 8 million vehicles a day are cleaned at car washes. An estimated 38 gallons of water is used for each car wash.

21 Car Wash Industry Statistics and Trends  
[brandongaille.com/19-car-wash-industry-statistics-and-trends/](http://brandongaille.com/19-car-wash-industry-statistics-and-trends/)

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](https://www.census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

**CALCULATION:** 8 million vehicles per day x 38 gallons per vehicle/323,127,513 people = 1 gallon per person per day

## Indirect Water Use Questions

The rest of the questions are about your indirect water use. It takes water to make the energy you use, the products you buy and the food you eat - this indirect water use is called virtual water. The remaining questions help you understand just how much virtual water you use.

### Energy

#### Gasoline

This is the virtual water component of the car question.

**QUESTION:** HOW MANY MILES DO YOU DRIVE PER WEEK?

**DISCUSSION/SOURCE:** For each mile you drive it takes 0.17 gallons of water to process and refine the gasoline.

Water Intensity of Transportation  
[pubs.acs.org/doi/full/10.1021/es800367m](https://pubs.acs.org/doi/full/10.1021/es800367m)

Figure out how many miles all the people in your household collectively drive in one week.

**CALCULATION:** \_\_\_ miles driven per week (by the household) x 0.17 gallons per mile/7 days per week/  
\_\_\_ people in the household = \_\_\_ gallons of water per person per day

**AVERAGE:** 5 gallons per person per day



**DISCUSSION/SOURCE:** In 2016, people in the United States drove 3,174,418,000,000 miles (that’s more than 3 trillion miles driven in one year).

Office of Highway Policy Information: Average Annual Miles per Driver by Age Group  
[fhwa.dot.gov/policyinformation/statistics/2016/vmt421c.cfm](http://fhwa.dot.gov/policyinformation/statistics/2016/vmt421c.cfm)

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](http://census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

This averages out to 27 miles per day driven in the United States in 2016.

**CALCULATION:**  $3,174,418,000,000 \text{ miles/year} / 365 \text{ days per year} / 323,127,513 \text{ people} = 27 \text{ miles per person per day}$

$27 \text{ miles per person per day} \times 0.17 \text{ gallons per mile} = 5 \text{ gallons of water per person per day}$

## Electricity

**QUESTION:** *WHERE DO YOU LIVE?* (Choose your state)

**DISCUSSION/SOURCE:** Each state in the United States has a different mix of fuel sources, but most states predominantly use thermoelectric and hydroelectric power, which can have very big water footprints due to high water consumption rates.



Where does your household’s electricity come from? If you get your electricity from a standard utility, it likely uses a mix of fuel sources (such as hydroelectric, coal-fired or natural gas-fired thermoelectric and/or wind power) to generate the electricity delivered to you.

**State Water Footprints:** We used data for 2016 from two national databases to figure out your state’s water footprint (presented in the table below). Find your state to get the state value.

We got state data for 2016 from the United States Energy Information Agency (EIA). We used the number of residential customers and the residential sales in megawatt hours (MWh) to calculate daily kilowatt hours (kWh) per customer for each state. Note that a “customer” could represent more than one person and often represents multi-person households. This likely overestimates a person’s water footprint value based on state electrical profiles.

We noted what percentage of electricity comes from hydroelectric power versus thermoelectric power using EIA data for power generation type in each state.

Number of Retail Customers and Sales by State by Sector (for the year 2016)  
[eia.gov/electricity/data/state/](http://eia.gov/electricity/data/state/)

We used net generation data to calculate the percentage of each state’s electricity generation from thermoelectric sources that include: coal; oil (e.g., diesel); gas natural gas; nuclear; and other fuels (look for “Total Electric Power Industry” values).

Net Generation by Type of Producer by Energy Source (for the year 2016)

[eia.gov/electricity/data/state/annual\\_generation\\_state.xls](http://eia.gov/electricity/data/state/annual_generation_state.xls)

Next we used values from the United States National Renewable Energy Labs (NREL) for water use by thermoelectric and hydroelectric power plants.

We calculated water consumption by hydroelectric power in each state by multiplying the percentage of electricity generated from hydropower by the NREL value and by the kWh per customer per day. We calculated water consumption from thermoelectric power generation by multiplying the percentage of thermoelectric power generated by the NREL value by the kWh per customer per day.

Then we added the thermoelectric value to the hydroelectric value to find the total daily consumption of water use for each state for each customer.

Since there is little to no water required for the operation of distributed photovoltaic (PV) solar or wind power, we assumed a value of 0 gallons for the renewable energy system option.

Consumptive Water Use for US Power Production

[nrel.gov/docs/fy04osti/33905.pdf](http://nrel.gov/docs/fy04osti/33905.pdf)

Choose your state from the table of state water footprint values to get the portion of your water footprint from power production.

State	Gallons Per Person Per Day	State	Gallons Per Person Per Day
AK	122.6	NC	34.0
AL	93.2	ND	147.1
AR	72.0	NE	41.8
AZ	70.2	NH	61.4
CA	49.7	NJ	12.9
CO	28.2	NM	22.3
CT	22.1	NV	47.4
DE	11.4	NY	99.6
FL	13.6	OH	25.5
GA	31.1	OK	51.2
HI	15.8	OR	402.2
IA	33.2	PA	43.1
ID	251.2	RI	8.6
IL	30.6	SC	41.5
IN	21.2	SD	247.6
KS	19.8	TN	60.1
KY	54.6	TX	24.4
LA	36.7	UT	32.5
MA	16.2	VA	22.3
MD	24.6	VT	68.6
ME	107.2	WA	517.6
MI	20.1	WI	32.4
MN	22.4	WV	81.1
MO	23.3	WY	156.6
MS	25.0	WDC	0.2
MT	413.4		

**NOTE:** If you're from outside of the United States, we've prepared a guide to help you adapt and use the WFC.

Using the Calculator When You're Outside the US  
[watercalculator.org/resource/outside-the-us/](http://watercalculator.org/resource/outside-the-us/)

## QUESTION: WHERE DOES YOUR ELECTRICITY COME FROM?

**DISCUSSION/SOURCE:** You use the slider that goes from 0 to 100 percent, depending on which direction you're sliding to choose a percentage. At the left end is renewables at home (photovoltaic solar and wind), which goes from 0 to 100 percent. On the right end is the utility, which goes from 100 to 0 percent. The default setting is 100 percent utility because that's where most people get their electricity.

**CALCULATION:** Multiply your state value by the utility percent you selected with the slider (note that the contribution from the renewable percentage will always equal 0 gallons) to get the gallons of water per person per day.

**EXAMPLES:** If a user in Alaska selects 100 percent utility and 0 percent renewable, the calculation will look like this:  $(122.6 \times 100\%) + (0.0 \times 0\%) = 122.6$  gallons per person per day.

If a user in Hawaii selects 50 percent utility and 50 percent renewable, the calculation will look like this:  $(15.8 \times 50\%) + (0 \times 50\%) = 7.9$  gallons per person per day.

**AVERAGE:** 30 gallons per person per day

**DISCUSSION/SOURCE:** There were 2.53 people per household in 2016.

United States Census: Historical Households Tables for 2016  
[census.gov/data/tables/time-series/demo/families/households.html](https://www.census.gov/data/tables/time-series/demo/families/households.html)

We determined the average household value for each state by adding the state values together (which equaled 3,911 gallons per household per day) then divided that number by 51 (50 states plus Washington, DC).

**CALCULATION:**  $3,911 \text{ gallons per household per day} / 51 \text{ states} / 2.53 \text{ people per household} = 30 \text{ gallons per person per day}$

## Consumption (Shopping, Recycling, Reusing)

### Shopping

**QUESTION:** HOW MUCH DO YOU SHOP?

**DISCUSSION/SOURCE:** This question covers shopping for everything but food (that's handled in the diet question).

The Water Footprint Network determined that the industrial water footprint of the United States is 583 gallons per person per day. This is the total amount of freshwater used to produce the goods and services consumed by those of us who live in the United States. Many of our goods were produced in other countries, and the industrial water footprint covers water used inside and outside of the country to produce those goods.

The Water Footprints of Nations, Value of Water Research Report Series No.16, p. 55  
[waterfootprint.org/Reports/Report16Vol1.pdf](https://www.waterfootprint.org/Reports/Report16Vol1.pdf)



You may not see or feel this virtual water, but it was required to make all the “stuff” you buy and use in your life, including cars, plastics (like for toys and food packaging), electronics, household goods (like furniture and textiles), clothing, etc., along with the packaging and shipping for all of those items. You can offset this amount by reducing your consumption, reusing and re-purposing the items you already have, and by recycling or donating (where appropriate) the items you might otherwise put in the trash. Around the world, the United States has the highest industrial water footprint.

We recognize that some people shop more or less than others, so there are three choices.

If your shopping habits are typical of someone living in the United States, then you have an industrial water footprint of 583 gallons per day, based on the Water Footprint Network research. We know that some people shop more or less than the average, and each type of shopping behavior has a water footprint, so we made some assumptions. If you fall in the low category, you still have to buy essentials so we assumed your use would equate to half of the average value, or 291 gallons per person per day. For those of you in the high category who love to shop, we assumed that your use is double the average, or 1,166 gallons per person per day.

Choose the category that best describes your household.

Shopping Frequency	Gallons Per Person Per Day
Shop for basics	291
Like to shop	583
Shop ‘til you drop	1,166

**CALCULATION:** Choose the appropriate category to get the gallons of water per person per day.

**AVERAGE:** 583 gallons of water per person per day

**DISCUSSION/SOURCE:**

Water Footprint of Nations; Vol. 2  
[waterfootprint.org/Reports/Report16Vol2.pdf](http://waterfootprint.org/Reports/Report16Vol2.pdf)

## Recycling Paper, Plastic, Bottles & Cans

Recycling paper, plastic, bottles and cans could help reduce your indirect water use because recycled materials typically require less water and energy (and the water needed for energy) to process than does producing raw materials.

We used federal municipal waste and recycling data from 2016.

### Recycle Paper

**QUESTION:** DO YOU RECYCLE PAPER?

**DISCUSSION/SOURCE:** In 2016, 67.48 million tons (134,960,000,000 pounds) of paper waste was generated in the United States. 67.5 percent of that was recovered through recycling.



Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/pepsect/2010s-national-total.html#par\\_textimage\\_2011805803](http://census.gov/data/tables/time-series/demo/pepsect/2010s-national-total.html#par_textimage_2011805803)

Recycling 1 ton of paper saves 7,000 gallons water.

Wastes - Resource Conservation - Common Wastes & Materials - Paper Recycling  
[archive.epa.gov/wastes/conserve/materials/paper/web/html/index-2.html#benefits](http://archive.epa.gov/wastes/conserve/materials/paper/web/html/index-2.html#benefits)

If you say that you recycled some paper we assumed you recycle half of the paper products you use.

Recycle Paper?	Gallons Saved
None	0
Some	2
All	4

Choose the answer that applies to your household to get the gallons per person per day. This number is subtracted from your total water footprint.

**CALCULATIONS:** 134,960,000,000 pounds of paper per year/323,127,513 people/365 days per year = 1.14 pounds per person per day

7,000 gallons water/2000 pounds recycled paper x 1.14 pounds per person per day = 4 gallons per person per day

**AVERAGE:** 3 gallons per person per day

**DISCUSSION/SOURCE:** In the United States, we recycled 67.5 percent of our paper waste in 2016.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

**CALCULATION:** 4 gallons x 0.675 = 3 gallons per person per day

## Recycle Plastic

**QUESTION:** DO YOU RECYCLE PLASTIC?

**DISCUSSION/SOURCE:** In 2016, 34.87 million tons (69,740,000,000 pounds) of plastic waste was generated in the United States. 9.3 percent of that was recovered through recycling.



There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](http://census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

Recycle Plastic?	Gallons Saved
None	0
Some	8.3
All	16.5

It takes 28 gallons of water to produce a pound of plastic.

Corporate Water Footprint Accounting and Impact Assessment: The Case of the Water Footprint of a Sugar-Containing Carbonated Beverage  
[waterfootprint.org/media/downloads/Ercin-et-al-2011-CorporateWaterFootprint-Softdrink.pdf](http://waterfootprint.org/media/downloads/Ercin-et-al-2011-CorporateWaterFootprint-Softdrink.pdf)

If you say that you recycle some plastics we assumed you recycle half of the plastic products you use.

Choose the answer that applies to your household to get the gallons per person per day. This number is subtracted from your total water footprint.

**CALCULATION:** 69,740,000,000 pounds of plastic per year/323,127,513 people/365 days per year = 0.59 pounds per person per day

0.59 pounds per person per day x 28 gallons water per pound = 16.5 gallons water per person per day

**AVERAGE:** 1 gallon per person per day

**DISCUSSION/SOURCE:** In the United States, we recycled 9.3 percent of our plastic waste in 2016.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

**CALCULATION:** 16.5 gallons x 0.093 = 1.53 gallons per person per day

### [Recycle Bottles & Cans](#)

**QUESTION:** DO YOU RECYCLE BOTTLES AND CANS?

**DISCUSSION/SOURCE:** Although we ask about bottles and cans, the calculations cover recycling of glass and aluminum, which is more encompassing than just bottles and cans.



In 2016, 11.48 million tons (22,560,000,000 pounds) of glass waste were generated in the United States. 27.5 percent of glass was recovered through recycling.

In 2016, 3.77 million tons (7,540,000,000 pounds) of aluminum waste were generated in the United States. 16.4 percent of aluminum was recovered through recycling.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](http://census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

It takes 156.8 gallons of water to produce a pound of glass.

The Blue and Grey Water Footprint of Construction Materials: Steel, Cement and Glass  
[sciencedirect.com/science/article/pii/S2212371717300458](http://sciencedirect.com/science/article/pii/S2212371717300458)

It takes 2.2 gallons of water to produce a pound of aluminum.

Water scarcity footprint of primary aluminium  
[link.springer.com/article/10.1007/s11367-015-0997-1](http://link.springer.com/article/10.1007/s11367-015-0997-1)

It takes a lot less water to produce a pound of aluminum than it does to produce a pound of glass but it's still important to recycle. This is because in addition to how much water it takes, it also takes a lot of energy. And, as you found out from the energy question, when you save energy you save water. So when you recycle you're saving more water than you think.

If you say that you recycle some bottles and cans we assumed you recycle half of the bottles and cans you use.

Recycle Bottles & Cans?	Gallons Saved
None	0
Some	15
All	30.1

Choose the answer that applies to your household to get the gallons per person per day. This number is subtracted from your total water footprint.

**CALCULATION:**

*Bottles:*  $22,560,000,000 \text{ pounds} / 323,127,513 \text{ people} / 365 \text{ days per year} = 0.19 \text{ pounds per person per day}$   
 $0.19 \text{ pounds per person per day} \times 156.8 \text{ gallons water per pound of glass} = 30 \text{ gallons per person per day}$

*Cans:*  $7,540,000,000 \text{ pounds} / 323,127,513 \text{ people} / 365 \text{ days per year} = 0.06 \text{ pounds per person per day}$   
 $0.06 \text{ pounds per person per day} \times 2.2 \text{ gallons water per pound of glass} = 0.13 \text{ gallons per person per day}$

*Bottles and Cans Combined:*  $30 + 0.13 = 30.13$  gallons per person per day

**AVERAGE:** 8.3 gallons per person per day (for bottles and cans combined)

**DISCUSSION/SOURCE:** In the United States, we recycled 27.5 percent of our glass in 2016.

In the United States, we recycled 16.4 percent of our aluminum in 2016.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures

[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](https://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

**CALCULATION:**

*Glass:*  $30 \times 0.275 = 8.25$  gallons per person per day

*Aluminum:*  $0.13 \times 0.164 = 0.02$  gallons per person per day

*Total:*  $8.25 + 0.02 = 8$  gallons per person per day

[Recycle Fabrics](#)

**QUESTION:** DO YOU DONATE OR RE-USE OLD CLOTHING, SHEETS, BLANKETS AND TOWELS?

**DISCUSSION/SOURCE:** Plant based textiles are produced from crops that require water. For example, cotton requires a lot of irrigation water and is often grown in arid locations that get little precipitation.



Textile manufacturing is one of the largest industrial users of process water in the United States. Water is used extensively throughout textile-processing operations, and consumption varies widely among the unit processes.

The water footprint of all fabrics is at least 20 gallons of water per 1 pound of textile product.

Clean Technologies in US Industries: Focus on Textiles

[p2infohouse.org/ref/06/05656.htm](https://p2infohouse.org/ref/06/05656.htm)

The Green, Blue and Grey Water Footprint of Crops and Derived Crop Products

[waterfootprint.org/media/downloads/Mekonnen-Hoekstra-2011-WaterFootprintCrops.pdf](https://waterfootprint.org/media/downloads/Mekonnen-Hoekstra-2011-WaterFootprintCrops.pdf)

It is important to note that synthetic fabrics have a significant water footprint as well because they are often made from oil and gas products that involve extracting and refining. In addition, they create a lot of wastewater, which has a large impact on water footprint values.

The Water Footprint Assessment of Polyester and Viscose and Comparison to Cotton

[waterfootprint.org/media/downloads/WFA\\_Polyester\\_and\\_Viscose\\_2017.pdf](https://waterfootprint.org/media/downloads/WFA_Polyester_and_Viscose_2017.pdf)

This is especially significant because fabric production is trending towards synthetic, and as a result, all-cotton fabrics are becoming harder to find.

If your clothes aren't already made out of plastic, they will be  
[qz.com/414223/if-your-clothes-arent-already-made-out-of-plastic-they-will-be/](http://qz.com/414223/if-your-clothes-arent-already-made-out-of-plastic-they-will-be/)

In 2016, 16.88 tons (33,760,000,000 pounds) of textile waste was generated in the United States. 14.9 percent of textiles were recovered through recycling.

Note that the reference covers "textiles" which includes fabric for clothing, linens, etc. and includes carpet, upholstery, etc. The amount of fabric waste is likely overcounted so the offset to a water footprint is likely overestimated.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

**NOTE:** Reusing what you already have and buying fewer new items is a great way to lower your water footprint. If you find you're ready to part with what you have, consider donating and recycling your clothing, sheets, towels, etc. When you keep fabrics and other materials out of the waste stream you help reduce your water footprint.

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](http://census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

If you say that you recycle some fabrics we assumed you recycle half of the fabrics you use.

Recycle Fabrics?	Gallons Saved
No	0
Sometimes	2.9
Always	5.7

Choose the answer that applies to your household to get the gallons per person per day. This number is subtracted from your total water footprint.

**CALCULATION:** 33,760,000,000 pounds of textiles/323,127,513 people/365 days per year = 0.29 pounds per person per day

0.29 pounds per person per day x 20 gallons water per pound of textiles = 5.7 gallons per person per day

**AVERAGE:** 1 gallon per person per day

**DISCUSSION/SOURCE:** In the United States, we recycled 14.9 percent of our textiles in 2016.

Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures  
[epa.gov/sites/production/files/2019-11/documents/2016\\_and\\_2017\\_facts\\_and\\_figures\\_data\\_tables\\_0.pdf](http://epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf)

**CALCULATION:** 5.7 gallons x 0.149 = 1 gallon

# Food (Human & Pet)

## Diet

### QUESTION: WHAT'S YOUR DIET?

**DISCUSSION/SOURCE:** In this question we ask you to account for all vegans, vegetarians and meat eaters in your household. Meat eaters have higher water footprints than vegans or vegetarians because, ounce for ounce, it takes more water and resources to produce animal products than it does to produce fruits and vegetables (this gives dairy products a higher water footprint as well).



In the United States, livestock and poultry are typically grain-fed (raised in an industrial system) but can instead be grass-fed and/or pasture-raised. This represents a small percentage of livestock and poultry production in the United States.

The Water Footprint of Beef: Industrial vs. Pasture-Raised  
[watercalculator.org/footprint/water-footprint-beef-industrial-pasture/](http://watercalculator.org/footprint/water-footprint-beef-industrial-pasture/)

Meat from grass-fed and pasture-raised animals still has a large total water footprint because it takes water from rain and soil moisture to grow the grass and other vegetation the animals eat. Because of this and because the Water Footprint Network uses an average total water footprint for all production systems (grass-fed, industrial and mixed) in their estimate of the water footprint of meat and dairy, we didn't differentiate between grass-fed and grain-fed meat.

### QUESTION: HOW OFTEN DO YOU EAT MEAT?

**DISCUSSION/SOURCE:** Using data from the Water Footprint Network and United States Department of Agriculture, we built a profile of a diet typical for someone living in the United States (someone who eats meat, dairy, fruits and vegetables). Using this profile as a baseline, we derived all the other dietary profiles.

We recognize that many people don't eat meat with every meal, every day, so we provided choices of different meat consumption patterns: not every day, once a day, twice a day and every meal.

**Food Supply Statistics:** First, we assembled a "basket" of common food items in six categories based on Food Availability statistics from the United States Department of Agriculture's Economic Research Service. We used these products as a proxy for daily per person consumption (ounce/capita/day) for all foods.

The basket included: cereal grains (wheat, corn/maize, rice, barley, oats); vegetables (tomato, broccoli, cucumber, lettuce, cabbage, carrots); fruits (apple, citrus, banana, strawberries, mango, grapes); beans (dry beans); dairy (milk, cheese, butter); meat (poultry, pork and beef); and other (eggs, sugar, potatoes). The three primary meats eaten in the United States are poultry, pork and beef. The basket included 3 to 5 servings of meat per day.

Food Availability (Per Capita) Data System  
[ers.usda.gov/data-products/food-availability-per-capita-data-system/](http://ers.usda.gov/data-products/food-availability-per-capita-data-system/)

**Serving Sizes:** One serving of meat is estimated to be 3 ounces of lean meat, per the United States Department Agriculture. Because the United States Department Agriculture has shied away from specific dietary recommendations – including meat servings – since moving to the “Choose MyPlate” program in 2010, we rely on previous dietary guidelines that defined what a serving is.

Dietary Guidelines for Americans 2015-2020, Eighth Edition  
[health.gov/sites/default/files/2019-09/2015-2020\\_Dietary\\_Guidelines.pdf](https://health.gov/sites/default/files/2019-09/2015-2020_Dietary_Guidelines.pdf)

**Water Footprint Data:** Next, using the Water Footprint Network’s data, we took each food item’s water footprint value and divided it by per person consumption. A fraction of the food item’s water footprint was determined and tabulated with all the other items to get the total water footprint for the typical diet (i.e., gallons of water per day). Note that water footprint values of all the food items are global averages from Water Footprint Network statistical analyses. This “typical American diet” yielded a daily water footprint of 1,112 gallons per person per day.

Variations in water footprints based on a person’s diet depends on what that person eats. Those who eat more meat and dairy will have a larger overall water footprint.

Meat and dairy products tend to have larger water footprints compared to most grains, vegetables, fruits and some beans. This is due to the water-intensive inputs that go into animal food production, like feed type and the often-large amounts of water needed to grow that feed, in addition to water needed for animal hydration and cleaning, to process animals, to transport meat products, etc. Other factors that contribute to large animal product water footprints are the size and lifespan of animals, the feed conversion efficiency, etc.

Water Footprint Product Gallery  
[waterfootprint.org/?page=files/productgallery](https://waterfootprint.org/?page=files/productgallery)

The Green, Blue and Grey Water Footprint of Farm Animals and Animal Products: Volume 1  
[waterfootprint.org/media/downloads/Report-48-WaterFootprint-AnimalProducts-Vol1.pdf](https://waterfootprint.org/media/downloads/Report-48-WaterFootprint-AnimalProducts-Vol1.pdf)

The Green, Blue and Grey Water Footprint of Farm Animals and Animal Products: Volume 2, Appendices  
[waterfootprint.org/media/downloads/Report-48-WaterFootprint-AnimalProducts-Vol2.pdf](https://waterfootprint.org/media/downloads/Report-48-WaterFootprint-AnimalProducts-Vol2.pdf)

A Global Assessment of the Water Footprint of Farm Animal Products  
[link.springer.com/article/10.1007/s10021-011-9517-8](https://link.springer.com/article/10.1007/s10021-011-9517-8)

**Vegan and Vegetarian Dietary Patterns:** For the dietary consumption patterns of vegans and vegetarians, we followed the Haddad and Tanzman study that reported survey findings from the two dietary groups. We assumed that vegans eat no meat or dairy while vegetarians eat dairy but no meat. In all dietary profiles except vegans, egg consumption holds constant.

What do vegetarians in the United States eat?  
[ncbi.nlm.nih.gov/pubmed/12936957](https://ncbi.nlm.nih.gov/pubmed/12936957)

Snapshot: Few Americans Vegetarian or Vegan  
[news.gallup.com/poll/238328/snapshot-few-americans-vegetarian-vegan.aspx](https://news.gallup.com/poll/238328/snapshot-few-americans-vegetarian-vegan.aspx)

On a daily basis, some people eat more meat than others, so we created four categories for eating a little, eating an average amount or eating a lot of meat.

Diet of Household Members	Gallons Per Day
Vegan	406
Vegetarian	563
Meat Not Every Day	596
Meat Once a Day	768
Meat Twice a Day	939
Meat Every Meal	1,283

Choose a diet for each of your household members.

**CALCULATION:** Multiply the value associated with the dietary categories that apply to you and your household members by how many members are in that category, add those results together, then divide by the number of people in the household to get the gallons of water per person per day.

**AVERAGE:** 1,063 gallons per person per day

**DISCUSSION/SOURCE:** To determine the average, we used data from a Gallup poll about the type of diet Americans say they follow:

- 3 percent of the United States population is vegan;
- 5 percent of the United States population is vegetarian; and
- 92 percent of the United States population is omnivorous (i.e., eats plants, meats and other animal products).

Snapshot: Few Americans Vegetarian or Vegan

[news.gallup.com/poll/238328/snapshot-few-americans-vegetarian-vegan.aspx](https://news.gallup.com/poll/238328/snapshot-few-americans-vegetarian-vegan.aspx)

We multiplied the percentages for dietary types by the water use associated with that type of diet, then added those together. In a group of 100 people, there would be 3 vegans, 5 vegetarians and 92 meat eaters.

**CALCULATION:**

$3 \times 406 = 1,218$  gallons (for 3 vegans)

$5 \times 563 = 2,815$  gallons (for 5 vegetarians)

$92 \times 1,112 = 102,304$  gallons (for 92 omnivores)

Total = 106,337 total gallons (for 100 people total)

Divided by 100 = 1,063 gallons per person per day

## Dog or Cat Food

**QUESTION:** HOW MUCH MONEY DO YOU SPEND ON DOG AND CAT FOOD EACH MONTH?

**DISCUSSION/SOURCE:** All food has a water footprint, even dog and cat food (which is usually meat-based and can have a large water footprint). While you may have other animals, the water footprint calculator only accounts for cats and dogs.



Our calculation comes from a study which showed that for every \$1 you spend on dog and cat food, 200 gallons of water were required to produce it. Note that the study looked at withdrawals for pet food, which tends to have a larger water volume as compared to water consumed. At this time there is no consumption data available for pet food.

Direct and Indirect Water Withdrawals for US Industrial Sectors  
[pubs.acs.org/doi/10.1021/es903147k](https://pubs.acs.org/doi/10.1021/es903147k)

Pet Food Sucking Up US Water  
[news.nationalgeographic.com/news/2010/04/100423-pet-food-water-footprint/](https://news.nationalgeographic.com/news/2010/04/100423-pet-food-water-footprint/)

**NOTE:** The point of including this question is not to discourage people from owning cats and dogs, but rather to encourage people to be aware and waste as little pet food as possible.

**CALCULATION:** 200 gallons of water X \$\_\_ spent by household on pet food per month x 12 months per year x 1 year per 365 days / \_\_ people in the household = \_\_ gallons of water per person per day

**AVERAGE:** 48 gallons per person per day

**DISCUSSION/SOURCE:** In the United States we spent \$28.23 billion on pet food in 2016.

Pet Industry Market Size & Ownership Statistics for 2016  
[americanpetproducts.org/Uploads/MarketResearchandData/PetIndustryMarketSize2019.pdf](https://americanpetproducts.org/Uploads/MarketResearchandData/PetIndustryMarketSize2019.pdf)

For every \$1 you spend on dog and cat food, 200 gallons of water were required to produce it.

Pet Food Sucking Up US Water  
[news.nationalgeographic.com/news/2010/04/100423-pet-food-water-footprint/](https://news.nationalgeographic.com/news/2010/04/100423-pet-food-water-footprint/)

There were 323,127,513 people in the United States in 2016.

United States Census: National Population Totals and Components of Change: 2010-2019  
[census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par\\_textimage\\_2011805803](https://census.gov/data/tables/time-series/demo/popest/2010s-national-total.html#par_textimage_2011805803)

**CALCULATION:** 200 gallons water per \$1 spent x \$28.23 billion spent / 323,071,342 people / 365 days per year = 48 gallons per person per day

# United States Average

**DISCUSSION:** We added the average values for a typical profile of someone in the United States and got a value of 1,802 gallons per person per day. We excluded greywater, rain barrels, pools, pets and all recycling, because most people in the United States don't have or do those things on a regular basis.

*For questions regarding these methods, please email [info@watercalculator.org](mailto:info@watercalculator.org)*

[watercalculator.org](http://watercalculator.org)

## ABOUT US

The Water Footprint Calculator (WFC) seeks to raise awareness about how people in the United States use water throughout their day. The free tool illustrates how everyday actions – from washing dishes to watering the lawn to buying groceries – impact water use. The WFC also provides water-saving tips, lesson plans and other content to promote sustainable water use.

The WFC was created by the nonprofit GRACE Communications Foundation (GRACE), which develops innovative strategies to increase public awareness of the critical environmental and public health issues created by our current industrial food system, and to advocate for more sustainable alternatives.



[watercalculator.org](http://watercalculator.org)



[gracecommunicationsfoundation.org](http://gracecommunicationsfoundation.org)

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