

THE WATER COSTS OF ENERGY (WCE): U.S. units

How many gallons of water are consumed^a to produce a kilowatt-hour of electricity?

Renewable sources in italics

How many gallons of water are consumed^a to produce electricity for one household for one month?

Average household kWh use:^{1,2} AZ = 1095, U.S. = 920, world = 240

How many gallons of water are consumed^a to produce electricity for 100,000 households for one month?

Ranges of averages are shown: high (darker) & low (lighter). Overall averages are not necessarily the medians of the extremes.

Source	gal/kWh
<i>Hydroelectric</i> ^{3, 4}	56.000 4.500
<i>Geothermal</i> ^{3, 4, 5}	1.400 0.005
<i>Solar Thermal/CSP</i> ^{b, 3, 4}	0.900 0.026
<i>Nuclear</i> ^{3, 4}	0.785 0.560
<i>Coal</i> ^{3, 4}	0.510 0.390
<i>Natural Gas (SC)</i> ^{c, 3, 5}	0.415 0.000
<i>Natural Gas (CC)</i> ^{c, 3, 4}	0.195 0.180
<i>Biofuel</i> ^{3, 4}	0.390 0.350
<i>Landfill Gas</i> ^{d, 3}	0.350
<i>Solar PV</i> ^{3, 4, 6}	0.001 0.000
<i>Wind</i> ^{e, 4, 6}	0.000
<i>Micro Hydroelectric</i> ^f	0.000
United States Average ^{4, 7}	0.640 0.500

Source	AZ	U.S.	world
<i>Hydroelectric</i>	61,320 4,928	51,520 4,140	13,440 1,080
<i>Geothermal</i>	1,533 5	1,288 5	336 1
<i>Solar Thermal/CSP</i>	986 28	828 24	216 6
<i>Nuclear</i>	860 613	722 515	188 134
<i>Coal</i>	558 427	469 359	122 94
<i>Natural Gas (SC)</i>	454 0	382 0	100 0
<i>Natural Gas (CC)</i>	214 197	179 166	47 43
<i>Biofuel</i>	427 383	359 322	94 84
<i>Landfill Gas</i>	383	322	84
<i>Solar PV</i>	1 0	1 0	0 0
<i>Wind</i>	0	0	0
<i>Micro Hydroelectric</i>	0	0	0
United States Average	701 548	589 460	154 120

Source	U.S.	world
<i>Hydroelectric</i>	5,152,000,000 414,000,000	1,344,000,000 108,000,000
<i>Geothermal</i>	128,800,000 460,000	33,600,000 120,000
<i>Solar Thermal/CSP</i>	82,800,000 2,392,000	21,600,000 624,000
<i>Nuclear</i>	72,220,000 51,520,000	18,840,000 13,440,000
<i>Coal</i>	46,920,000 35,880,000	12,240,000 9,360,000
<i>Natural Gas (SC)</i>	38,180,000 0	9,960,000 0
<i>Natural Gas (CC)</i>	17,940,000 16,560,000	4,680,000 4,320,000
<i>Biofuel</i>	35,880,000 32,200,000	9,360,000 8,400,000
<i>Landfill Gas</i>	32,200,000	8,400,000
<i>Solar PV</i>	92,000 0	24,000 0
<i>Wind</i>	0	0
<i>Micro Hydroelectric</i>	0	0
United States Average	58,880,000 46,000,000	15,360,000 12,000,000

Available at HarvestingRainwater.com/water-energy-carbon-nexus

About 7% of the electricity generated in the U.S. is lost during transmission & distribution. Greater transmission distances show greater loss.⁸
 The country whose **per-capita monthly kWh usage** is lowest: **Haïti**, 2 kWh. Highest: **Iceland**, 4,172 kWh. **France, Germany, & Japan**: ~625 kWh, **Jordan**: 174 kWh, **China**: 205 kWh, **Australia**: 935 kWh.² + Of **total U.S. kWh usage**, 37% is **residential**, 36% is **commercial**, & 27% is **industrial**.¹

NOTES

Data do not include water used in association with extraction or production of raw energy sources or with lifecycle of power-generating infrastructure (construction of facilities, manufacture & transport of equipment, etc).

- a. All emissions rates are calculated based on U.S. and Arizona emissions data. In actuality, average emissions will vary based on each region's power-generation specifics.
- b. CSP = concentrated solar power, a form of solar-thermal energy that uses solar-tracking mirrors or lenses to focus a large area of sunlight onto a small area. The light energy is converted to heat to produce steam to turn turbines, and thus generate electricity via conventional thermoelectric methods.⁹
- c. SC = single cycle (a.k.a., combustion turbine), CC = combined cycle. In CC, one heat engine's exhaust is used as heat source for another. The more-efficient use of heat increases system's overall efficiency.¹⁰
- d. Although labeled simply Landfill in the original source, the data provided is for the burning of landfill gas.¹¹
- e. Unlike hydroelectric power, micro-hydroelectric does not require large dams which create reservoirs from which large amounts of water can be lost to evaporation.

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