

DOING THE MATH FOR A FANCY HOT WATER HEATER CALLED MIITO

<https://www.youtube.com/watch?v=2SYMgopseUk>

10.02.2015 01_looploop_mitowaterheatermath

This poster was made to explore the claim made in the video linked above. You should watch it first. In short it claimed that because many people heat more water than necessary, an equivalent amount of energy to all the street lighting in Britain was being wasted every day. The math involved is simple but the sources for data are rough and probably unreliable, so if you want, you can access the spreadsheet yourself to adjust for more accurate information. Goto looploop.me/archives/01

STREE LIGHTS in BRITAIN

hours per year	10,96	h	How much energy do the street lights in Britain use is counted here. The number of streetlights and their energy consumption is obviously just an approximation as I'm too lazy to get the right numbers. Most street lights are more powerful than 100W
number of street lights	7500000	units	
energy consumption	100	W	
average consumption per day	8219178082	Wh/day	

ENERGY in a CUP OF TEA

energy to heat a cup of tea	$Q (J) =$	$Cp \cdot m \cdot dt$	Here I count how much energy a cup of tea holds. 1 cup is counted as 2 dl or 0,2 kg. Using the basic formula $Cp \cdot m \cdot dt$ we get the total energy required to heat the water from 10°C to 100°C (so delta T=90). To keep things simple let the density of water be 1. Convert joules to kWh with the conversion factor because it's easier to count and understand.
heat capacity water (Cp)	4184	J/C	
increase in temp (dt)	90	degrees C	
mass (m)	0,2	kg	
1 Joule equivalent to	0,000000278	kWh	
Energy in one cup of tea	75312	joules	
Energy in one cup of tea	0,021	kWh	
Energy in one cup of tea	20,9	Wh	

Everyones CUP OF TEA

Population of Britain	64100000	million people	to start lets assume every man, woman and child consumes 1 cup and heats up no extra water at this point. How much energy would that take?
Energy in one cup of tea	20,9	Wh	
Energy from all Britain (1 cup/person)	1342044777,6	Wh	

CUP OF TEA RATIO

difference ratio	16,33	%
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So if everyone drank tea, **which they don't**, heated up just the right amount of water, and only **had one cup, which they probably don't either** (assuming they drink tea like Finns drink coffee) we'd have a 1-6 ration of tea to lighting energy consumption. So let's say people drink 2 cups a day and but heat up double the water.

Energy from all Britain (4 cup/person)	5368179110,40	Wh
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We'll, we are still a bit off by around 40%. So **how many cups are people heating per day?** (total street lighting energy/energy in a cup)

$B6/B16$	=	
392572084	392,57	million cups!
	6,13	cups per person per day

According to the video the woman said:

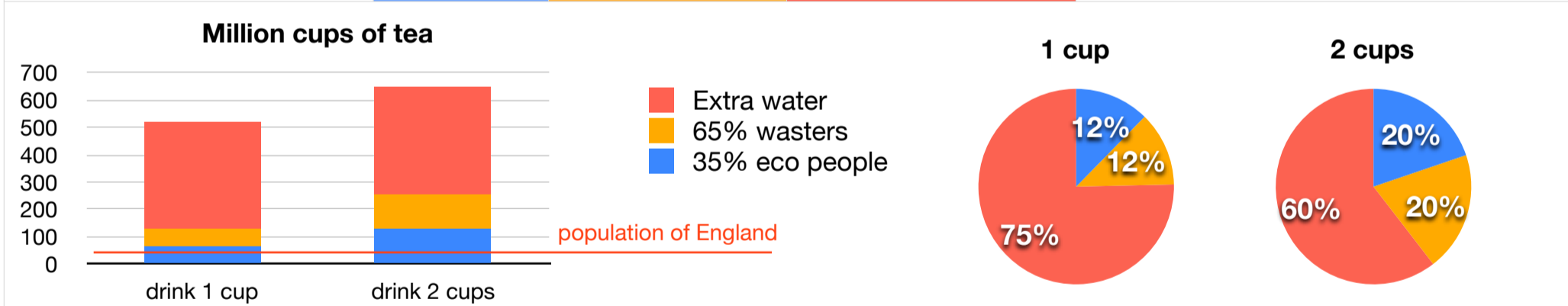
"65% OF BRITS ADMIT TO OVERFILLING THEIR KETTLE WHEN THEY ONLY NEED 1 CUP OF TEA, ALL OF THIS EXTRA WATER THAT'S BEING BOILED REQUIRES ENERGY AND IT'S BEEN CALCULATED THAT IN 1 DAY OF EXTRA ENERGY USE FROM BOILING KETTLES IS ENOUGH TO LIGHT ALL OF THE STREET LIGHTS IN ENGLAND FOR A NIGHT"

So according to the lady only the EXTRA energy is enough to heat up all the lights in England for the day. Which would mean that we're heating up more than 392 million cups...

so 65% of the population is heating an EXTRA 400 million cups per day

how many cups would we have all up considering they also make tea and drink is so it's not being wasted?

	35% (eco)	65% (wasters)	extra water	total (million cups)
drink 1 cup	64,1	64,1	392	520,2
drink 2 cups	128,2	128,2	392	648,4



FINDINGS BASED ON THE VIDEO + GUESSING

The people that heat up too much water put 4-5 times more water in their cup... maybe a bit less if they drink more than 2 a day

overall enough water for 10 cups per person per day are heated up, however, this is still considering that everyone in Britain drinks tea. In reality we'd probably about half the population drinking tea so some would have to heat up 8-10 more water then they have too.

MY SHITTY SOURCES

Google for population - duh	bbc.com/news/uk-11209143	britastro.org/dark-skies/environmental.html	citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.321.1973&rep=rep1&type=pdf
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My THOUGHTS

I think the product looks cool and if money wasn't an object I'd consider one after my current water kettle breaks.

The thing is that the way I heat up tea is by first filling up the cup that I want with water, then I pour it into the kettle, to save water, energy and time!

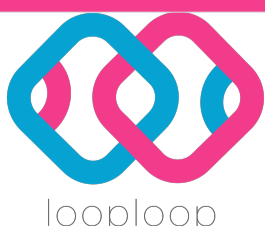
So it's just a solution for dumb people, and it won't stop them from heating up a whole kettle of water for their cup of tea

I sometimes forget my water in the kettle but it's got a lid and it kind of insulates itself so heat dissipation is slower

IT's just an idea at this point, they don't even have a prototype and are looking for an electrical engineer to make an alpha prototype

Which then makes me concerned that the heating element could damage your cups by overheating the contact surface

In the end I have a lot of love for people that are trying to change the world... but in the end I don't see it having an impact. The real solution is educating the public to stop wasting when it's soooooo simple.



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