

WATER THE NEXT LIQUID GOLD - DAY ZERO IS COMING

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While the world grapples with the impending 'Climate Emergency' another lesser known crisis is emerging. The UK is running out of water.

In the United Kingdom, the widely held assumption is that fresh potable water is abundant, readily available and cheap. Since it is an island surrounded by water and known to have regular rainfall, this is an understandable mistake.

The truth is that the sustainability of the UK's water supply is affected by multiple factors. Regardless of rainfall volume, conditions in and on the earth determine how much of that water gets added to the usable water supply. Climate change, population growth and irresponsible water use are all contributing to a water shortage. Water supplies are being stretched, as this essential resource is being taken for granted.

Breaking the myth that water is abundant

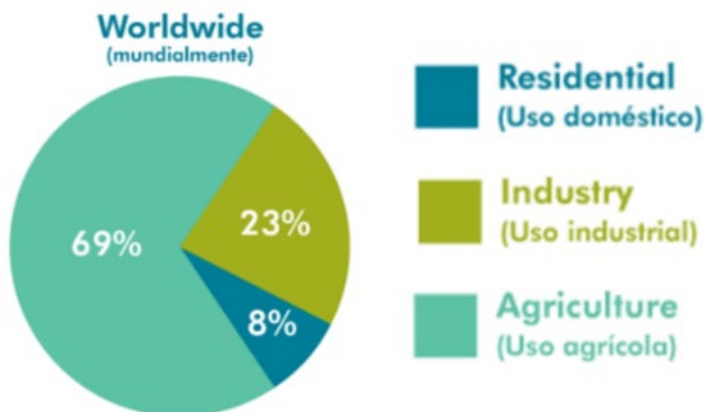
There is 326 Million Trillion Gallons of water in the world.

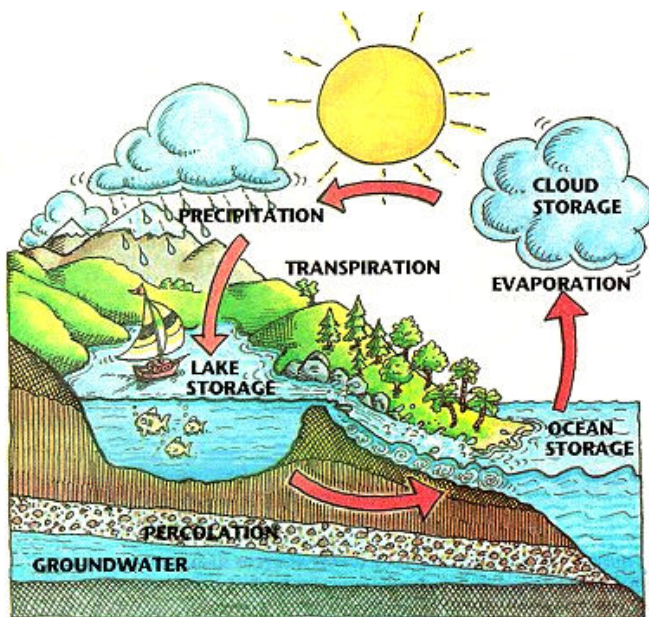
How much can we easily process to drink Worldwide?

The adjacent flowing pie chart shows only 2.5% can be classed as fresh water, 99% of which is held in the ground or ice caps. Out of the remaining 1% only approximately 50% can be easily obtained and treated to be suitable for consumption.

This equates to approximately 0.82 Million Trillion Gallons of water. The water usage is divided between agriculture, industry and domestic.

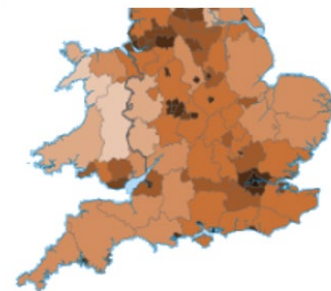
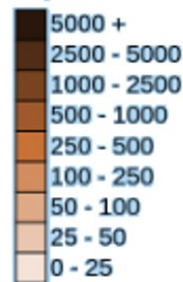
- 69% is used for Agriculture in 'Flood Irrigation'.
0.57 Million Trillion Gallons
- 23% is in Commercial and Industrial production etc.
0.19 Million Trillion Gallons
- With only a staggering 8% for domestic usage.
0.07 Million Trillion Gallons





So, easily obtained water, using natural filtration through the ground, where water treatment is minimal, is limited. Furthermore, as soon as water requires purification from salt or other contaminants this becomes costly and obtaining water from drilling deep wells requires significant capital.

Population density



Population Growth

With an average UK family having 2.4 children, population growth is inevitable, even without considering immigration. This means that water demand is increasing, and natural aquifers, such as dams are being drained faster than they can fill. This causes the land to dry out, hardening the earth, which becomes less porous.

This results in the water running off faster to the sea, bypassing the natural infiltration process and putting further stresses on the system.

What effect has Climate Change had on the UK's water supply?

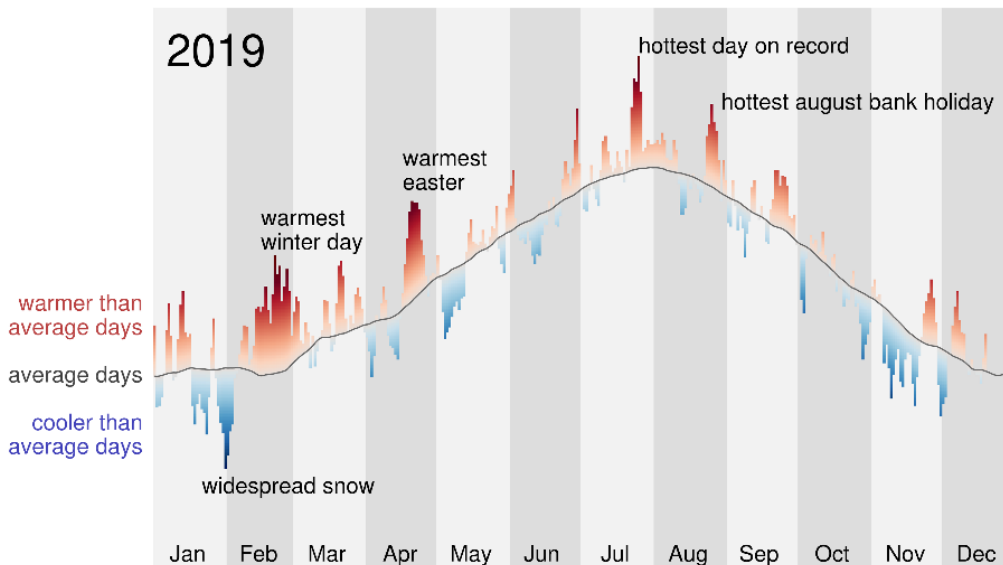
Due to 'Climate Change' our weather patterns are changing, resulting in longer dry spells and less heavy rainfalls.

In 2019, according to the MET Office (Met Office, 2019) we had a record-breaking year with the driest winter and heavy snows to the warmest February ever recorded.

<https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2019/weather-overview-2019>

There were also some heavy storms, however due to the dry winter the land became less porous over time resulting in flooding, run-off passing directly into the sea and less being captured for water supply.

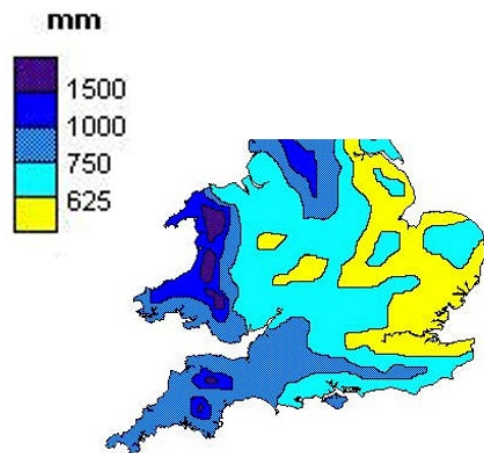
- Spring brought most of the warm weather and generally 25% less rainfall than previous years.
- Summer was similar for most of the UK, however selected regions, Cheshire, Lincolnshire, Lancashire, Staffordshire Derbyshire and Leicestershire received thunderstorms and intense rainfall. This created widespread flooding meaning that summer was both the hottest and 7th wettest recorded since 1910.
- Autumn again brought flooding in Yorkshire with record rainfalls, with Scotland at 70% and the south east recording the driest.
- Winter although, not commented within this MET Office document, again has been very changeable with warm weather and heavy rains in the center of Britain



Extract from MET Office (2019: A year in review Author: Press Office - 11:37 (UTC) on Mon 23 Dec 2019 - <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2019/weather-overview-2019>)

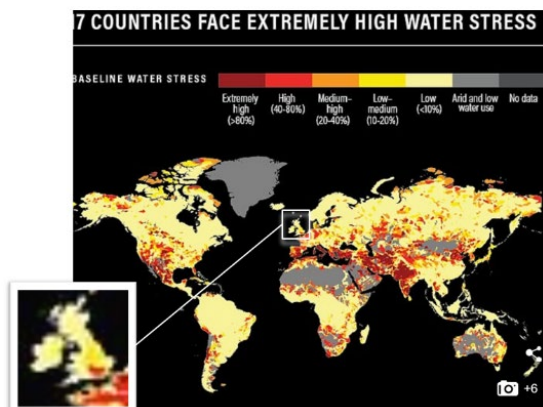
Natural aquifers, reservoirs and riverways, cannot cope with these heavy rainfalls and previously captured water is running off directly to the sea. What is captured in the areas of flooding is contaminated with effluent from local foul water sewers.

It should be noted that London is drier than both Sydney and Istanbul. Other factors, such as the increase in high densely populated areas putting a strain on a dated water utilities infrastructure, creates a system that cannot cope with the increasing demands. This combined with the country's lowest rainfall yields. Effects of which are seen in dried up river beds and overflow rivers.



Day Zero

The Global Sustainable crisis is directly impacting our precious resources and pulling us quicker to our 'Day Zero', we need to design and install smart now for our own sustainable future.



What is 'Day Zero'? 'Day zero is the day the water providers will be shut down, because the water has run out.' First measures would be the water prices increasing, then restricted and finally turned off.

London is listed as one of the top seventeen cities facing its own DAY ZERO!

Some businesses are investing heavily in both water companies, and land with high concentration of water for crop production. These early stages of creating a monopoly of this essential resource, are setting the stage for water to become the next 'Petroleum' or 'Liquid Gold'. This can give rise to human rights issues.

What can we do about it?

So, what can we in the industry do to promote water conservation and prolong this precious resource, so that infrastructure can be set in place, before the inevitable happens?

Many water Providers are running schemes to promote 'Water Smart Initiatives' promoting lowering our consumption rates and offering water saving devices (check with your local provider what they offer). However, this approach is not going to be enough. Widespread education is needed for the general population, and we as designers and installing engineers, need to take a more direct approach.

Many in the agriculture industry are considering alternative means of production and smart irrigation technologies, using less water direct to the routes or reclaiming water within the process. But this comes at a cost and is all dependant on the farm's financial capacity, and its global location.

The same can easily be said for Commercial and Industrial production where the usage may have alternative methods that use less water with a re-orientation on the larger sustainable issues.

Research and development requires investment, which in turn requires repayment. Are we generally able to bare this burden? Do we have any alternatives?!

The domestic use might only be 8% of available water but this is still a considerable portion of the global resource and critical to human/planetary survival.

Measures here in the UK are already partially in place; from schemes such as BREEAM, former Code of Sustainable Homes, Building Regulations, Water Regulations and Government action plans. These all cover in varying degrees, methods to be undertaken to reduce waste and misuse of water.

We widely use the WAT01 calculator, but we generally only aim for 25% reduction (105 litres) from the expressed water baselines of 140 litres. This can easily be lowered with modern fitting and appliances to a 50% reduction (4 to 5 credits) and with harvesting both grey^(a) and blue water^(b) systems, we can achieve 'Exemplary' attainment at 65% water reduction. We can lead by example and with intelligent planning, survive the coming water shortage.

a) Wastewater system such as showers and baths

b) Rainwater system from roofs and unpopulated terraces

The government is demanding that water companies act on reducing leakages according to the Consumer Council for Water (CCW), 'Water UK; England and Wales, Apr 2017 – Mar 2018' states that in England and Wales, we lost **3.1 billion litres** of treated potable water every day due to leakages. This equates to 20% of the national supply or 1273 Olympic swimming pools per day or 20 million people's water usage.

With a growing population using more water and climate change making it more difficult for us to maximise the benefits of rainfall, the pressures on our resources are growing stronger. To avoid 'Day Zero' we need to reduce both the usage and the waste of our water. The general population needs further education about the impending shortage and practical ways they can help. Furthermore, industry research and responsible implementation of existing sustainable systems will also help us reduce the likelihood of water restrictions, and avoid this crisis.



Top 11 check list for water conservation to consider

1. Report leaks to your water provider if you see one
2. Add a water meter to existing properties, so usage can be reviewed which highlights abnormal water use
3. Offer recorded usage to SoPHE for data logging so calculation documents may be reviewed
4. Turn off taps between uses or install a PIR system in both commercial and domestic installations
5. Install shower instead of a bath
6. Use water saving devices and if installed make these located in a location that is not easily removed at the incoming supply
7. Specify ECO-Water fittings
8. Use a full load in both washing machines and dishwashers (ensure these are water efficient fixtures)
9. Use a bowl in your kitchen sink
10. Harvest rainwater for irrigation and or flush water appliances
11. Stop installing dual flushing WC's.

What is next?

There are many organisations, companies and individuals working towards water neutrality and dual piped system.

When is the time to act? The best answer is NOW because tomorrow is going to be too late where we in the United Kingdom will run out of water.

It's no longer an option to VE harvesting and reclaiming water, and Urban design needs to consider greater durations of dry weather periods and offering ways in which to encourage water to be trapped so that it can pass into the land's natural aquifers.