Water Awareness Work with Schools

A report for Thames Water as part of Thames Water's Water Makeover • August 2009

Ali from Queensbridge School measuring flow rates as part of the School Water Audit.

Headline figures

Under the Thames Water Schools Water Makeover ech$_2$o:

- **delivered 33 "Be Water Aware" assemblies to 7,446 pupils and 264 teachers across 32 schools in London,**
- **carried out 21 School Water Audits with 557 pupils,**
- **ran various water awareness workshops and demonstrated how to fit a save-a-flush bag to 2539 pupils in 31 schools.**

Potential yearly savings from behaviour change at home from 7710 pupils and teachers in 32 schools are:

- **54,024m^3 of water**
- **35.1 tonnes of CO_2 if savings are all cold water**
- **562.9 tonnes of CO_2 if savings are all hot water**

In a survey of 236 pupils, average use of the toilet or urinals at school was 0.8 times a day.

In a survey of 437 (pupils and family members) the average shower time was 13.8 minutes.

Acknowledgments
With thanks to Farah Sharif, Jon Ferrie and Trevon Jervis of ech$_2$o for their work with the schools and for Trevon Jervis for his help in producing this report

With special thanks to all the schools, pupils and teachers who have been a part of this project.

ech$_2$o's Water Awareness Work with Schools – Thames Water's Water Makeover

- ech$_2$o water specialists designed and delivered a series of assemblies and workshops that informed pupils and teachers about the Water Makeover and helped them to understand why, from an environmental aspect, it is important to save water and how they can do this most effectively, both at school and at home.
- A series of different workshops were offered to the school combined with a "Be Water Aware" assembly.
- ech$_2$o worked with pupils from reception class to the sixth form. Whilst the message remained the same the content and delivery style changed to reflect the age difference.
- Pupils' abilities varied widely within age groups. ech$_2$o are conscious of the importance of engaging with all pupils during the learning process. We would like to acknowledge the support we were given by both teachers and teaching assistants in many schools who gave one-to-one support with the more challenging pupils, thus enabling them to participate in our workshops.
- The UK is a multi-cultural society and the schools in this project reflected that fact. ech$_2$o design and deliver workshops that engage with pupils across all cultures.

Outcomes

By the end of July 2009 ech$_2$o had:

- visited 22 primary schools and 10 secondary schools across three London boroughs,
- delivered 33 "Be Water Aware" assemblies to 7,446 pupils and 264 teachers,
- revisited 2 schools to run an assembly on the savings made to 577 pupils and 16 teachers
- carried out 21 School Water Audits with 557 pupils,
- ran "How do we use water at home?", (the Home Water Audit) with 469 pupils from 12 schools,
- enabled 1580 pupils (and 94 teachers or teaching assistants) from 23 schools to gain a clear understanding of where precisely they use the most water with the "How much does it cost to flush your toilet?" workshop,
- demonstrated how to fit a save-a-flush bag to 2539 pupils in 31 schools. Of the first 1460 pupils, 1168 took at least one save-a-flush bag home to install.[1] For the final 1079 pupils, Thames Water were unable to provide the schools with the bags and so we directed pupils to the Thames Water website, but are unable to calculate how many pupils subsequently visited the website to request a bag.
- Appendix 1 details the workshops and assemblies held in each school.

Engagement by schools

- Most schools fully participated in the project and welcomed the fact that education was a core feature of the project.
- Some schools proved hard to access. At these schools the fact that the efficiency improvements would not happen without the educational work proved a helpful lever in the schools eventually agreeing to engage with the educational activities.
- We were unable to deliver either a workshop or an assembly to just two schools. One, Benthal Primary School (Hackney) said they did not wish to be part of the project, but due to some confusion had the water efficiency upgrades fitted.
- Orleans Infant School (Richmond) pulled out of the water awareness day at the last minute due to internal problems, and the school was unable to make any alternative dates during the school year.

[1] On average 20% of pupils had a toilet fitted after 2001, a figure that was higher than we expected.

- Apart from Whitton School (Richmond) which only wanted an assembly, all other schools participated fully in the project.

Water Benchmarking

- Water consumption is measured in m^3 per pupil per year. This allows comparisons to be made between schools of differing pupil numbers.

Water Benchmarks DCSF				
Water consumption (m^3/pupil/annum)	Primary school (with pool)	Primary school (no pool)	Secondary school (with pool)	Secondary school (no pool)
Good practice	3.1	2.7	3.6	2.7
Typical practice	4.3	3.8	5.1	3.9
Poor practice	6.1	5.6	7.5	5.8

Table 1

- From research in 2005, the DCSF[2] considered that on average primary schools use $7m^3$ of water per pupil per year and secondary schools use $11m^3$ of water per pupil per year. They stated that usage could be reduced to $4m^3$ per pupil per year with good practice.
- Currently the DCSF uses the information in Table 1 to rate all schools against a series of benchmark figures.

The "Be Water Aware" Assembly

- The "Be Water Aware" assembly lasted from 10 - 25 minutes depending on the usual length of the school assembly.
- A PowerPoint presentation was produced to show how each school was using water. (See Appendix 2)
- Most of the information was presented visually using graphs.
- The graphs were provided by Aqualogic from data collected from automatic meter reading. One graph showed school use per day over a 2-4 week period. The second graph showed 24 hours use of water in 15 minute downloads.
- The school's use of water over a three year period from historical bill data, and from the logged data, was presented against DCFS benchmarks.
- The improvements that the school could potentially make were presented as average savings per pupil (WC displacement device or conversion to dual flush, tap upgrade) or per appliance (urinal).
- The final message delivered was that a short shower (with emphasis on the short) is the way to save water with examples given of how a 20 minute shower will use more water than an average bath.

- ech$_2$o delivered assemblies to pupils ranging in age from 4 years old (reception) to 18 years old (sixth form)

[2] Department for Children, Schools and Families

The School Water Audit

- Pupils carried out a water audit of their school. (See Appendix 3.)
- They collected data about the number of appliances, flushing volumes of WCs, whether urinals were controlled and flow rates from taps.
- They identified where the school was performing well with regards to water efficiency, and where improvements could be made.
- They also decided how best to promote the message of water efficiency.

- ech$_2$o carried out the School Water Audit with pupils ranging in age from 5 (Year 1) to 14 (Year 9). The Audit was carried either by a whole class (up to 30 pupils) or, in five schools, by the Eco Team or School Council. The pupils worked in small teams and covered most of the toilets in the school as well as various other areas, e.g. taps in the school kitchen, classroom taps, outside taps.

~ Pupil engagement with the School Water Audit

- All pupils enjoyed the team work of the audit.
- The school water audit is a very hands-on activity, especially measuring flow rates from taps and verifying how long push taps are on for. This was especially appreciated by pupils at primary school level.
- Many schools widened the number of pupils directly involved by running a competition to deign a poster to save water.
- In at least five of the schools, the class or eco team carrying out the audit presented their findings to the rest of the school at a future assembly.
- Where possible, ech$_2$o water specialists demonstrated what happens inside a WC cistern when the toilet is flushed. The younger pupils especially were fascinated by this.

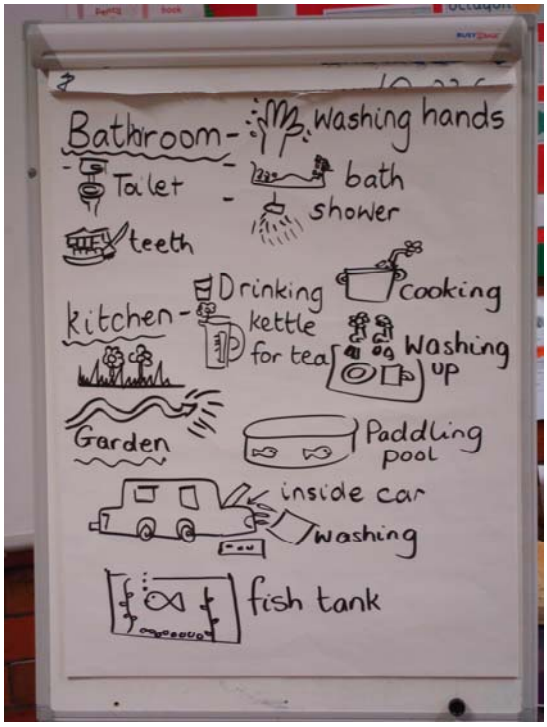

Some of the eco team at Gainsborough School carrying out the school water audit.

- Pupils at secondary school level were far less motivated even among eco team members.[3] The main reason (especially amongst the girls) was that they did not want to be in the toilets which they perceived as an unhygienic environment.

[3] A notable exception was the Eco team at Gunnersbury Secondary school who really engaged with the audit.

How do we use water at home? The Home Water Audit

- This audit is about use of water by pupils and their families, and enables pupils to understand how behaviour is the major factor in determining whether an individual uses above or below the UK average of 150 litres per day (160 litres per day in the Thames Water area).
- Pupils filled out the audit form with themselves as the first respondent, to appreciate the importance of methodical data input and to understand the data the question was asking for. (See Appendix 4 for form)
- Pupils completed the forms by inputting their family's data as homework. The sheets were collected by the school and returned to ech$_2$o for analysis. The school was sent an overview report and a PowerPoint presentation of the analysis, which they can use with the pupils in a future lesson.



Year 2 pupils at Springfield School identify where they use water at home

Jon Ferrie of ech$_2$o demonstrates how a save-a flush bag works

- Data is anonymous. Pupils put their first name onto the forms but no names are allocated to data on the report.[4] This ensures that replies are truthful, rather than what the pupils or their parents feel is the right thing to say.
- Discussion was encouraged amongst pupils about their use of water at home when filling out the audit.
- Filling out the audit in class resulted in data that the ech$_2$o water specialists could discuss with the pupils to analyse their own water use against national averages.

[4] We asked for first names so that we could acknowledge pupils by name thanking them for their input.

- ech$_2$o carried out the School Water Audit with pupils ranging in age from 7 (Year 3) to 15 (Year 10).

~ Pupil engagement with the Home Water Audit

- Primary School pupils felt excited by the importance attached to collecting data that is currently not readily available in the UK.
- All pupils engaged with interest as to how much they personally used compared to the national average.
- Only 7 out of 10 schools who set the Home Water Audit as homework returned the collected sheets. It is hard to know whether this was the teachers failing to return the forms to us or the pupils failing to hand in their homework.

~ Analysis of the Home Water Audit

- 82 pupils carried out the full audit with their respective households. In total 437 adults and children were surveyed about their use of water.
- Pupils were encouraged to collect accurate and unbiased data rather than trying to impress about how little water they used.
- The audit concentrated on behaviour and did not ask about the types of fixtures and fittings installed, or about flow rates.

There is an in depth report in Appendix 5. The main findings are:

- **On average the pupils in the survey used the toilet or urinal less than once a day. This finding has significance for anticipated water savings from water efficiency measures fitted to toilets in schools. Most calculations currently use an average of three times.**
- **The average shower time in our survey was 13.8 minutes, which is almost three times the quoted UK average.** [5]

How much does it cost to flush your toilet?

- The question is answered in a variety of ways.
- Pupils learn about the monetary cost of a m^3 of water and the environmental cost of supplying mains water to our buildings and cleaning the corresponding foul water.
- They calculate how much water they use per day whilst learning how much water the toilets they have at home and at school use per flush; the advantages of using a urinal instead of a WC; how many litres of water they use to bathe ranging from a bucket bath to a deep bath; the effect that different flow rates have on the amount of water they use to shower, and whether they really are saving more water with a shower instead of a bath.
- Finally they can rate their use of water against the national average and see if they are above or below.
- The workshop is fun as well as informative with an emphasis on pupils discussing their own water use with each other and sharing the result with the rest of the class.
- The workshop is completely focused on each pupil as an individual; how much water do they use and where. The premise is that it is only once an individual understands how much water they use for any particular activity, that they can then make an informed decision about reducing that use where appropriate.

[5] Both of these findings are in line with previous behavioural surveys that we have done.

- ech$_2$o ran "How much does it cost to flush your toilet?" with pupils ranging in age from 6 (Year 2) to 15 (Year 10). For younger pupils there is a simple version of this workshop that calculates the amount of water they use for bathing, showering and brushing teeth. (See Appendix 6 for both versions of the workshop.)

~ Pupil engagement with the "How much does it cost to flush your toilet?" workshop

- In terms of pupil engagement this was the most popular workshop.
- Pupils vote on 1p, 10p or £1 to flush the toilet. This immediately involves everyone's attention with bragging rights for the winners (though in most classes no-one voted for 1p!).
- The emphasis on each pupil as an individual means that secondary school pupils are drawn into the workshop just as much as primary school pupils.
- The workshop created a lot of interaction between the teacher and the pupils as usage of water is revealed.
- The awarding of badges at the end of the workshops focuses pupil's attention on the importance of saving water.

Customised workshops

- ech$_2$o delivered customised workshops for four secondary schools.
- ech$_2$o water specialists acted as technical consultants on water use for two schools, one whose pupils were making a film on Sustainable Water and another who were planning a Water Day.
- We ran a design and technology workshop on "The save-a-flush bag v the hippo" and ran a very technical "How much does it cost to flush your toilet?" workshop concentrating on technological solutions as opposed to behaviour change.
- We delivered a lecture on water linked into the chemistry curriculum for Year 10 physics pupils covering in detail water treatment (both supply and sewage) and highlighting the effect of hard water and soft water on pipes and fittings.

Supporting resources

- A series of supporting resources was provided for each school involved in the Water Makeover.

~ Save-a-flush bags

- In all workshops ech$_2$o demonstrated to pupils how a save-a-flush bag worked and identified pupils in the class who had a WC that was installed pre 2001 and so was suitable for the device.

~ PowerPoint presentations

- The school was given the "Be Water Aware" and "How much does it cost to flush you toilet?" PowerPoint presentations if they wanted them.

~ Assorted handouts

- Schools were given various supporting handouts for pupils, including PDFs of the PowerPoint presentations, and worksheets that enabled the pupils to calculate the water, CO_2 emissions and money saved by fitting a save-a-flush bag and the water, CO_2 emissions and money saved by reducing the time they spend in the shower. (See Appendix 7.)

~ Shower timers

- Each school received 30 shower timers. If we worked with a single class in any particular school, we handed out the shower timers at the end of the session. They were always very enthusiastically received. If we worked with more than 1 class we left the shower timers with our lead contact in the school. Levels of enthusiasm were very high with most schools deciding to use them as prizes, often with a water theme.

~ Drip gauges

- Each school received 30 drip gauges. We explained how they worked with the teachers and suggested that pupils could use them at school or at home to identify water wastage from any dripping taps. Most teachers said they could envisage areas where they could incorporate them into the teaching process.

~ Measuring beakers and measuring bags

- 60 shower and tap measuring bags were provided to each of the first 20 schools in the project.
- 60 ½ litre plastic measuring beakers were provided to each of the remaining 13 schools in the project.
- We did not find them a useful tool for the school water audit as there was too much maths involved to work out the actual flow rate and too much error in the timing as virtually no pupils had watches.
- Some of the schools said they might be able to find a use for them in future lessons.[6]

~ Tea towels and watering cans

- Some of the earlier schools involved in the Water Makeover were given ten tea towels with animated pictures on them about saving water. The tea towels are amusing and were very well received.
- Some of the earlier schools involved in the Water Makeover were given five indoor watering cans. They were very well received.

~Flow measurers

- ech$_2$o provided five flow measurers per school for the duration of the school water audit.
- Flow measurers are expensive to buy but are a very useful tool to enable fast and accurate monitoring of flow rates from taps.
- A lot of the schools said they would like to have had a flow measurer left with the school.

~ Badges

- The slogans for the badges were designed by ech$_2$o. Thames Water's design department ensured that the final badges matched the companies branding guidelines with regards to colour and style.

[6] In one school the measuring beakers were being used in the school canteen as the school was short of drinking glasses.

- Badges were not available for the first 13 schools involved in the project. We recommend that these schools are sent some badges retrospectively.
- We consider that the badges were the most successful supporting resource.
- All pupils who attended an assembly were given an "I'm water aware" badge.
- The "I love shorter shower" badges were given as prizes in the workshop classes. Pupils who had a 5 minute shower, a bucket bath or shallow bath were automatically awarded a badge and praised for their water awareness.
- Pupils who did not automatically receive a badge were given the opportunity to identify a behaviour change they would make to save water. As they were "awarded" their badge they were encouraged to ensure they carried out the change.
- Teachers and teaching assistants were also awarded, or had to earn, a badge.

Changing behaviour

- As well as informing pupils about the project and the environmental need to save water in the south east, the TWWM also had a core deliverable to encourage pupils in the partner schools to use water wisely.

~ Saving water at school by behavioural change

- There is not a lot of chance to influence behaviour change in schools. Indeed with the younger pupils we were at pains to point out that it's really important to flush the toilet and wash your hands after using the toilet. We emphasised that being water aware is about not wasting water.
- We encouraged the pupils to identify where the school wasted water and solutions to that wastage. We always highlighted the potential to save water by turning off any taps the pupils find running, and reporting faulty push taps to the caretaker.
- Most schools had no signs to save water. Pupils were encouraged to identify this as an area where they could influence behaviour change at school. Many schools initiated a poster competition to save water after our visit.

~ Saving water at home by behavioural change

- There is a far higher potential to instill good habits into pupils to get them to save water at home.
- These savings cannot be easily calculated as there are so many variables between pupils and their home environment and also because in line with the rest of the UK 70% of the pupils do not live in homes with a water meter.
- However we are confident that as a result of the importance and resources that Thames Water attached to the educational part of this project, considerable savings will be made by pupils and their families as they changes the way they use water.

Savings from Reducing Personal Water Use

~ Water usage

- Average water use in the UK is 150 litres of water per person per day. (160 litres per day in the Thames water area)
- We did not systematically record all water usage. However from the records we kept, the lowest daily usage was 64 litres and the highest was over 400.

Some of the pupils in year 5 at Gainsborough School. In a class of 16 just 4 used less than the UK average of 150 litres per day. Most of the pupils who used more than 200 litres had a bath or shower twice a day. The class used 3,729 litres per day and the average daily consumption per pupil was 241 litres.

Projected water savings from behaviour change at home

- If every pupil and staff member that ech$_2$o talked to at assembly reduces their water use at home by just 5 litres per day a total of 14,604m^3 of water will be saved every year as a result of this project.
- If every pupil and teacher we worked with in a workshop reduces their water use by another 10 litres per day a further 9,855m^3 of water will be saved every year as a result of this project.
- If every pupil and teacher we worked with in a workshop were able to persuade three family members to reduce their water use by 10 litres per day a further 29,565m^{3}of water will be saved every year.

- **Potential total savings from behaviour change under this project are 54,024m^3 of water.**

Projected CO_2 savings from behaviour change at home

- There is a carbon load to using water.
- Thames Water has calculated that the energy required to provide 1m^3 of unheated water generates 0.3kgCO_2 and to remove and treat the resultant waste water generates 0.35kgCO_2.
- The carbon load for hot water is far higher. To provide 1m^3 of hot water at 35 degrees C from a gas boiler working at 75% efficiency has been calculated as producing 9.77kgCO_2.[7]

~ Projected CO_2 savings from cold water

- **If the savings are from cold water 35.1 tonnes of CO_2 will be saved every year as a result of this project.**

[7] 46.5 kWh of gas (@ 0.21kgCO_2/kWh) to deliver 1m^3 of hot water

~ Projected CO_2 savings from hot water

- **If the savings are from hot water 562.9 tonnes of CO_2[8] will be saved every year as a result of this project.**

Household savings

- If, as a result of one of the be water aware workshops, a pupil or teacher reduces their hot water use by 10 litres per day and persuades three other family members to also reduce their hot water use by 10 litres per day, each four person household would save 14.6m^3 of water and 152kg of CO_2 every year.
- Yearly savings per household from heating the hot water with a 75% efficient gas boiler would be £16.97. [9]
- If the household was one of the 30% of households that pay for water by volume used, savings from using less water would be £24.97 and total yearly savings would be £41.94.

- **A four person household could save 14.6m^3 of water, 152kg of CO_2 and £41.94.**

[8] All CO_2 figures assume a hot water is heated by a gas boiler working at 75% efficiency.
[9] Most pupils we worked with used gas to heat their water. If using electricity CO_2 savings would be approximately twice as high and monetary savings would be three times as high.

Appendices

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Overview for Thames Water on schools visited as part of the Water Makeover project. **APPENDIX 1**

Richmond Primary Schools

School	Be Water Aware assembly	No. of pupils at assembly	Workshop	Year Group	No. of pupils worked with
Barnes Primary School	Infants + reception	180	School Water Audit	5	30
	Juniors	240	Home Water Audit	5	30
			How much does it cost to flush your toilet?	2	60
Buckingham Primary School	Whole school	350	School Water Audit		
			Home Water Audit	6	42
Chase Bridge Primary School	Juniors	240	School Water Audit	5	30
			Home Water Audit	5	30
Collis Primary School	Juniors	360	School Water Audit	Green Team	18
			How much does it cost to flush your toilet?	5	90
East Sheen Primary School	Juniors	210	School Water Audit	School council	8
			How much does it cost to flush your toilet?	5	60
Hampton Junior School	whole school	340	School Water Audit	4	30
			Home Water Audit	4	60
Heathfield Junior School	Whole school	280	School Water Audit	6	30
			Home Water Audit	3	30
Holy Trinity Cof E Primary School	Infants + reception	120	School Water Audit		
	Juniors	90	How much does it cost to flush your toilet?		
			Home Water Audit	3 and 4	25
Nelson Primary School	Juniors	240	How much does it cost to flush your toilet?	4 and 5	120
Queen's C of E Primary School	Juniors	240	How much does it cost to flush your toilet?	5 and 3	120
St John the Baptist Junior School	Juniors	210	School Water Audit	5	30
			Home Water Audit	5	30
St Osmunds Primary School	Whole school	193	How much does it cost to flush your toilet?	5 and 2	60
			School Water Audit	Water team	8
Total		3293			941

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Overview for Thames Water on schools visited as part of the Water Makeover project.

Richmond Secondary Schools

School	Be Water Aware assembly	No. of pupils at assembly	Workshop	Year Group	No. of pupils worked with
Christ Secondary School	Year 7 and 8	240	School Water Audit	School council	25
			How much does it cost to flush your toilet?	7	90
Grey Court Secondary School	Year 8	170	Home Water Audit		
			How much does it cost to flush your toilet? (emphasising design and technology issues)	8	30
Hampton Community College	No assembly	0	School Water Audit	10	25
			Home Water Audit	9	15
Orleans Park Secondary School	Year 7	210	How much does it cost to flush your toilet?	9	150
	Year 8	210	How much does it cost to flush your toilet?	8	25
Waldegrave Girls Secondary School	Year 8	240	School Water Audit	2 Year 10 (eco team) + 8	32
			Home Water Audit	8	30
			How much does it cost to flush your toilet?	8	30
Whitton Secondary School	Year 10	240	none	none	0
Total		1070			452

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Overview for Thames Water on schools visited as part of the Water Makeover project.

Hackney

School	Be Water Aware assembly	No. of pupils at assembly	Workshop	Year Group	No. of pupils worked with
Brook Community Primary School	Infants	215			
	Juniors	240	School Water Audit	Student Council	22
Gainsborough Primary School	none		School Water Audit	Eco team	28
			How much does it cost to flush your toilet?	4	30
Grasmere Primary School	Whole school	180	How much does it cost to flush your toilet?	4,5 and 6	90
Holmleigh Primary School	Whole school	240	School Water Audit	6	30
			How much does it cost to flush your toilet?	5	30
Parkwood Primary School	Whole school	217	Home Water Audit	6	27
			School Water Audit	5	22
			How much does it cost to flush your toilet?	5	22
Queensbridge Primary School	Whole school	210	School Water Audit	3	30
			How much does it cost to flush your toilet?	4	30
Springfield Community Primary School	Whole school	187	School Water Audit	2 and 5	50
St John the Baptist School	Whole school	316	School Water Audit	6	30
			How much does it cost to flush your toilet?	6	30
Tyssen Primary School	Whole school	418	How much does it cost to flush your toilet?	3,4,5 and 6	240
Lubavitch Primary School	Whole school	120	How much does it cost to flush your toilet?	6	25
Lubavitch Secondary School	none	0	How much does it cost to flush your toilet?	7,8 and 10	50
Total		2343			786

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Overview for Thames Water on schools visited as part of the Water Makeover project.

Hounslow

School	Be Water Aware assembly	No. of pupils at assembly	Workshop	Year Group	No. of pupils worked with
Gunnersbury School	Year 7 - 10	380	School Water Audit	Eco team	12
	6th form	120	How much does it cost to flush your toilet?	7 and 9	60
Heston Community School	0	1	Home Water Audit	7	120
			Technical support for Sustainable Water day	11	15
			How much does it cost to flush your toilet?	7	120
Lampton School	Year 8	240	How much does it cost to flush your toilet?		
			Design and Technology: the Save-a-flush v the Hippo	10	18
			Technical support for film on sustainable water	10	15
Total		740			360

Appendix 2

Be Water Aware!

Thames Water's Water Makeover for Schools 2008 and 2009

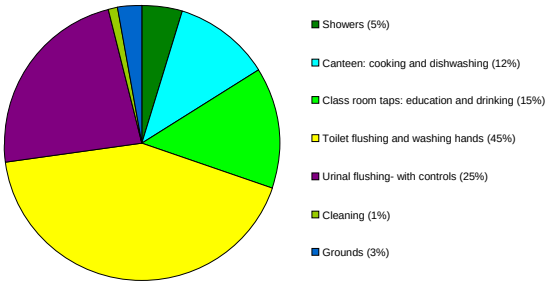
Cath Hassell of ech$_2$o

We need to reduce our demand for potable water by installing water efficient appliances and changing our behaviour.

The carbon load of water

- Thames Water has calculated that the energy required to provide 1m3 of unheated water generates 0.3kgCO2 and to remove and treat the resultant waste water generates 0.35kgCO2.
- Using less hot water reduces your carbon footprint more than using less cold water. 5% of the UK's CO_2 emissions are from heating water at home
- Solar thermal can supply 50-70% of hot water use in a school producing virtually no CO_2 emissions

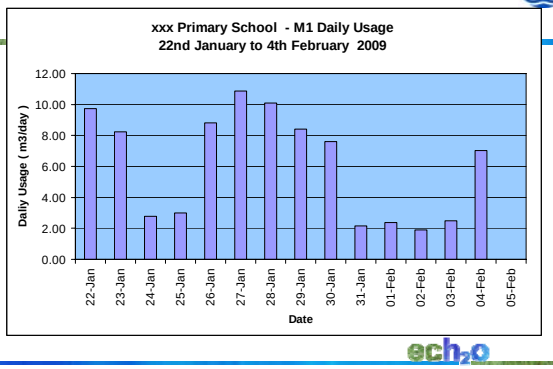
Typical water use in schools



How much water does xxx Primary School use?

- Water use is measured in m^3/pupil/year
- On average primary schools use 7m^3/pupil/year. The DCSF suggests this could be reduced to 4m^3/pupil/year (school without a pool)
- From analysis of three years of water bills your school uses 6.8m^3/pupil/year, which is 34 litres per pupil per school day
- Extrapolating data from the loggers, your school uses 4.5m^3/pupil/year, which is 23 litres per pupil per day

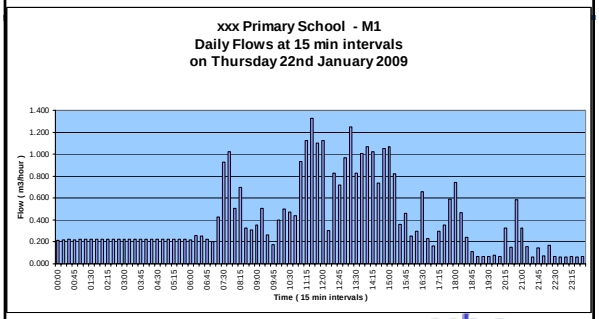
Logged data of your school – m^3/day



During the assmebly slides 1,2,6 and 7 were shown to the pupils. Information from all slides was covered.

Appendix 2

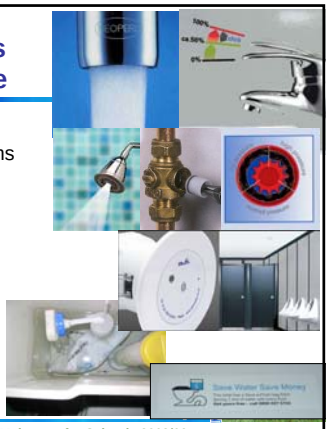
Logged data of your school - water use over 24 hours in m^3



Be Water Aware! Thames Water's Water Makeover for Schools 2008/09

Technical solutions to reduce water use

- Install dual flush WCs or retrofit dual-flush mechanisms in existing WCs
- Install save a flush bags
- Retrofit urinal controls or install waterless urinals
- Control flow rate from taps and showers, with flow regulators, brake taps or percussion taps



Be Water Aware! Thames Water's Water Makeover for Schools 2008/09

Potential water savings in a school

- Installing urinal controls in a school can reduce the water required to 10,500 litres per urinal space per year saving up to 55,200 litres of water.
- Installing dual flush WCs or retrofit dual-flush mechanisms in existing WCs can save up to 2700 litres per pupil per year
- Controlling flow rates from taps can save up to 900 litres per pupil per year
- Installing save a flush bags can save up to 600 litres per pupil per year

Be Water Aware! Thames Water's Water Makeover for Schools 2008/09

Change your behaviour at school + at home!

- Make sure taps are OFF when you have finished using them
- If you see a tap running turn it OFF. If a percussion tap is stuck in the on position pull the cap up. If you cannot stop it running tell the caretaker.
- If the school toilets have a dual flush function use the half flush after a wee. SAVE up to 4.5 litres per use
- Drink more water but not bottled water
- Don't leave the tap running while you brush your teeth. SAVE 10 litres of water each time
- Have a short shower instead of a bath. SAVE 50 litres of water.. (But……..have a long shower instead of a bath WASTE 100 litres of water or more……)

Be Water Aware! Thames Water's Water Makeover for Schools 2008/09

Source of pictures

ech2o would like to thank the following companies and organisations for allowing us to reproduce their photos:

- Construction Resources
- Crawley Borough Council
- DVS Ltd
- ech$_2$o
- Environment Agency
- Green Building Store
- Neoperl

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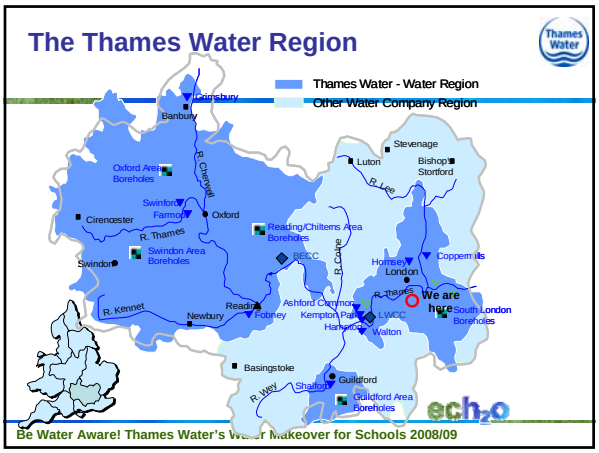
ech$_2$o consultants ltd work with local authorities, developers, housing associations, water companies, community groups, architects and engineers, at both a strategic and individual site level, to successfully incorporate sustainable water and low carbon solutions into the built environment. www.ech2o.co.uk

Be Water Aware! Thames Water's Water Makeover for Schools 2008/09

During the assmebly slides 1,2,6 and 7 were shown to the pupils. Information from all slides was covered.

Appendix 2



During the assmebly slides 1,2,6 and 7 were shown to the pupils. Information from all slides was covered.

Saving Water in Schools Appendix 3a

Site Sheet Toilets

audit carried out at: | date:

carried out by: | sheet number of

Location in school or toilet block name	Are the toilets girl's, boy's, staff or disabled? Enter g, b, s, or d.	Enter number of toilets	Is the flushing mechanism dual or single flush? Enter df, or sf.	If dual flush, does it work properly? Enter y, n, or u.	What is the flushing capacity of the cistern in litres? Enter 9, 7.5, 6, 6/4, u, or other.	Is the cistern close coupled, concealed, high or low level. Enter cc, c, h or l	Is a save-a-flush already fitted? Enter y, n, or u.	Are there signs to save water? Enter y, or n.

Notes

Saving Water in Schools Appendix 3b
Site Sheet Urinals

audit carried out at:	date:
carried out by:	sheet number of

Every 700mm of a trough or slab urinal counts as 1 place

Location	Is the urinal a bowl, trough, slab or stall design? Enter b, t, sl or st.	Enter number of places	Enter number of flushing cisterns (if known).	Are controls fitted? Enter y, n, or u.	Type and model of contorls	Do controls work? Enter y, n, or u.	What is the flush interval in minutes?	Are there signs to save water? Enter y, n, or u.

Notes

Saving Water in Schools Appendix 3c
Site Sheet Taps

ech2o

audit carried out at:						date:		
carried out by:						sheet number of		
Location: girls wc, boy's wc, staff wc, kitchen, classroom, other. enter gwc, bwc, swc, k, cl, or o and where in school	**No of taps (total)**	**Appliance type: basin / sink / other. enter whb, s or o**	**Tap operation: push/twist/lever. Enter p, tw, l**	**Flow rates litres / min**	**Push tap on for (seconds)**	**Are taps dripping or running? Enter d or r and rate in litres/day**	**Enter number of taps left on by users**	**Are there signs to save water? Enter y or n**
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
				h c	**h c**	**h c**		
Notes								

Saving Water in the Home Appendix 4
Site Sheet Behaviour

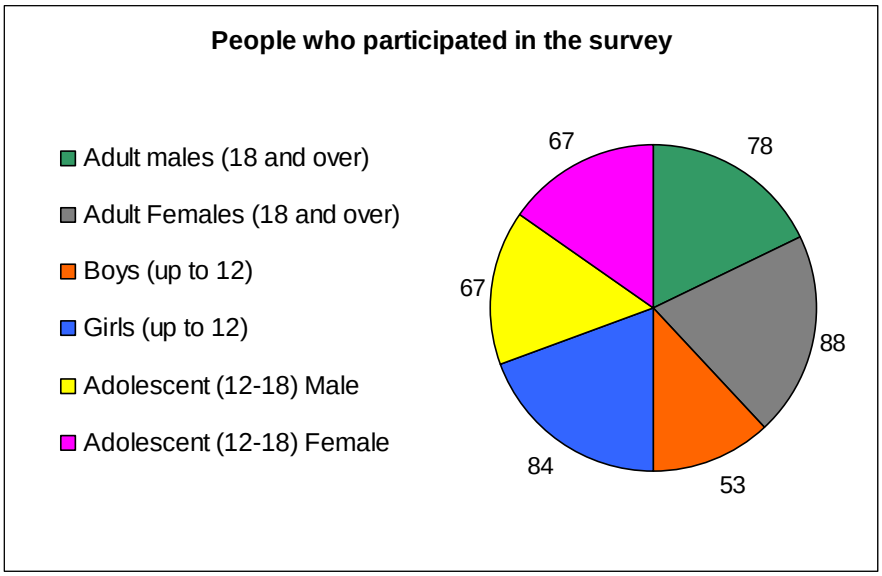
audit carried out at:						date:				
carried out by:										
	Are you an adult, adolescent (12-18), child? enter a, ado, ch	**Are you male or female? Enter m or f**	**How many times do you bath or shower a week?**	**Do you have a bucket, shallow, medium or deep bath?. Enter b, sh, m, or d.**	**How long is your average shower time in minutes?**	**Do you wash up in a bowl, with a soapy sponge, in a dishwasher or under running water? Enter b, ss, dw or rw.**	**Do you turn off the tap when brushing your teeth? Enter y or n**	**How often do you use the toilet on average a day? (Includes home and school/office)**	**Has your toilet at home got a save-a-flush bag fitted?**	**If you attend school, how often do you use the toilet on average at school per day?**
resident 0001			b s							
resident 0002			b s							
resident 0003			b s							
resident 0004			b s							
resident 0005			b s							
resident 0006			b s							
resident 0007			b s							
resident 0008			b s							
Notes										

Appendix 5 - Analysis of the Home Water Audit

- Pupils were asked to survey their family's use of water.
- Information was collected by pupils at the following schools:
  ~ Year 8 pupils at Grey Court Secondary School
  ~ Year 3 pupils at Heathfield Junior School
  ~ Year 3 and 4 pupils at Holy Trinity C of E Primary School
  ~ Year 6 pupils at Parkwood Primary School
  ~ Year 3 pupils at St John the Baptist Junior School
  ~ Years 8 pupils at Waldegrave Girls Secondary School
- ech$_2$o analysed the data for each school. The analysis was returned to the school in a word document and as a PowerPoint presentation, for use by the relevant form teacher in a subsequent lesson.
- In addition 67 pupils answered some of the questions. They were from the following schools:
  ~ Year 7 pupils at Heston Secondary School
  ~ Year 10 pupils at Lampton Secondary School
- Families and pupils were from different cultural and class backgrounds, although this information was not collected during the audit. We asked respondents to identify gender and age.
- Pupils were encouraged to understand that they had an important role in collecting accurate and unbiased data about individual's use of water in the UK. All data collected was anonymous with audit sheets only identified by pupil's first names, and by school.
- The audit concentrated on behaviour and did not ask about the types of fixtures and fittings installed, or about flow rates from appliances.

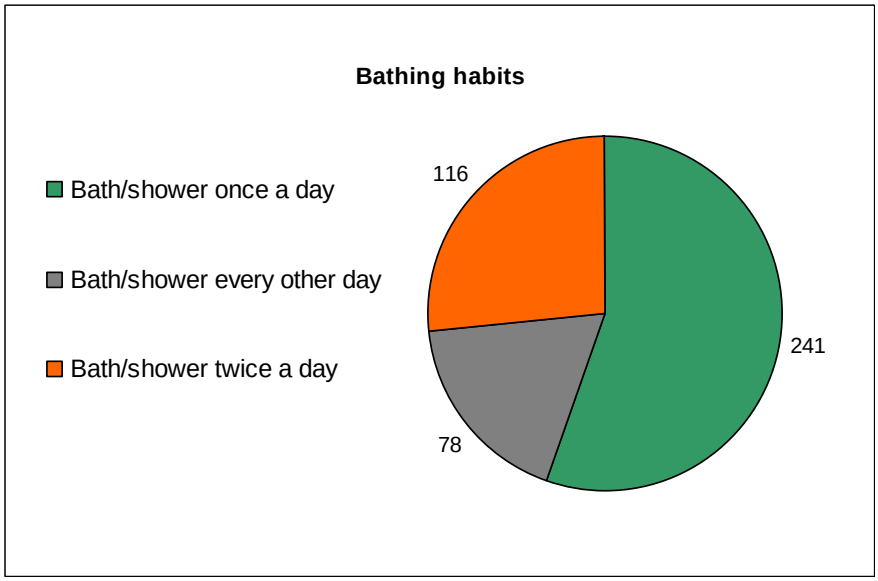
- The following charts show the findings from all the participating pupils and families.

- ech$_2$o would like to thank everyone who answered the water audit questionnaire.



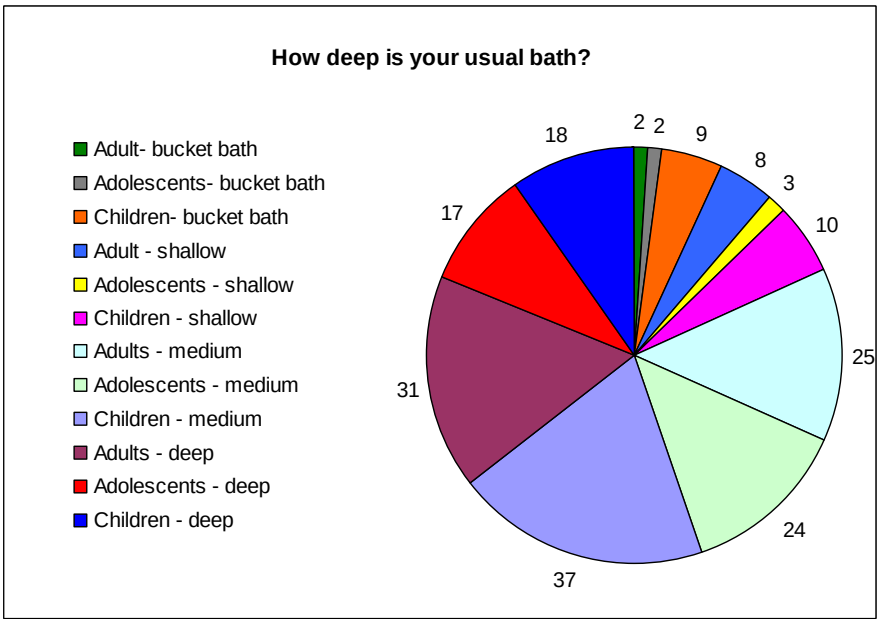
437 people took part in this survey. Full data was collected from 370 people across 82 households. Household sizes ranged from 2 -9. Partial data was collected from 67 people. 198 males and 239 females answered the survey. Of these 166 were adults, 137 were children up to age 12 and 134 were adolescents aged 12-18.

BATHS



55% of respondents bathed or showered once a day, 27% did so twice a day, and 18% bathed or showered every other day.[1] Over 95% who bath or shower every other day are children.

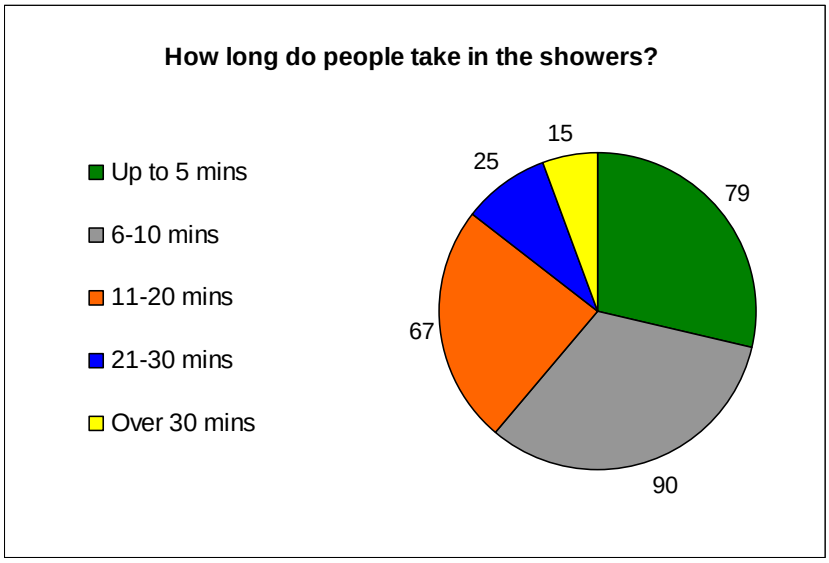
Most people either always bath or always shower. However, 30 people had either a bath or a shower on a regular weekly basis and so replied about both.



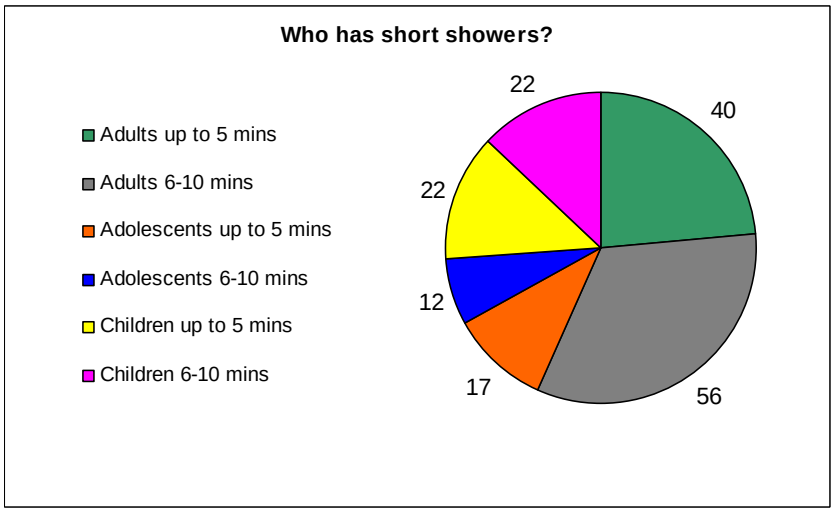
In this survey 189 people always or regularly had a bath.[2]
18% had a bucket bath or a shallow bath, 46% had a medium bath and 36% had a deep bath. Out of 74 children who regularly have a bath, 24% have a deep bath.

[1] 2 people did not respond to this question.
[2] Three people indicated they had a bath but not how deep the bath was.

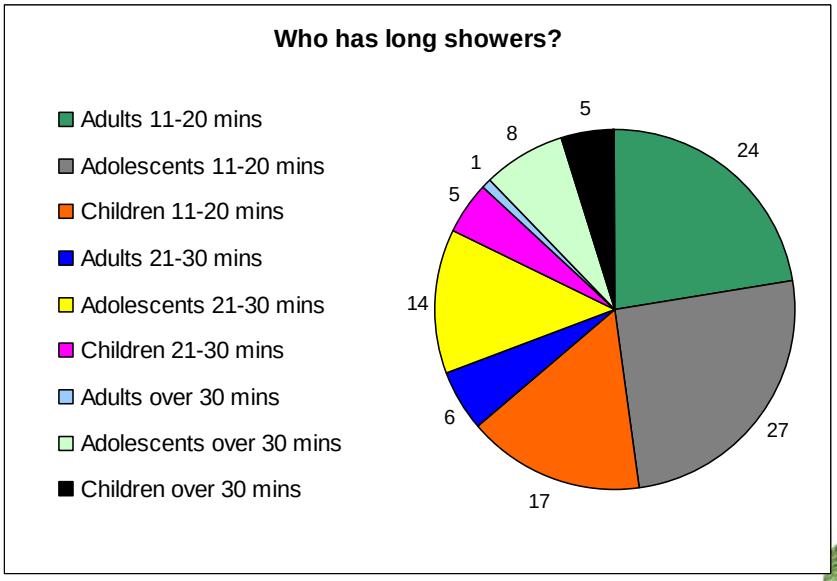
SHOWERS



Of the 276 people who always or regularly took a shower, 29% take 5 minutes (most of them) or less in the shower. 15 respondents have a shower that is over 30 minutes long, 8 of whom spend 60 minutes or more in the shower.



169 adults spend less than 10 minutes in the showers, and 40 spend 5 minutes or less. This compares to 109 adults who spend more than 10 minutes in the shower. 29 adolescents have a shower of less than 10 minutes, compared to 41 who spend over 10 minutes in the shower. 44 children have a shower of less than 10 minutes duration, compared to 27 who have one longer than 10 minutes.

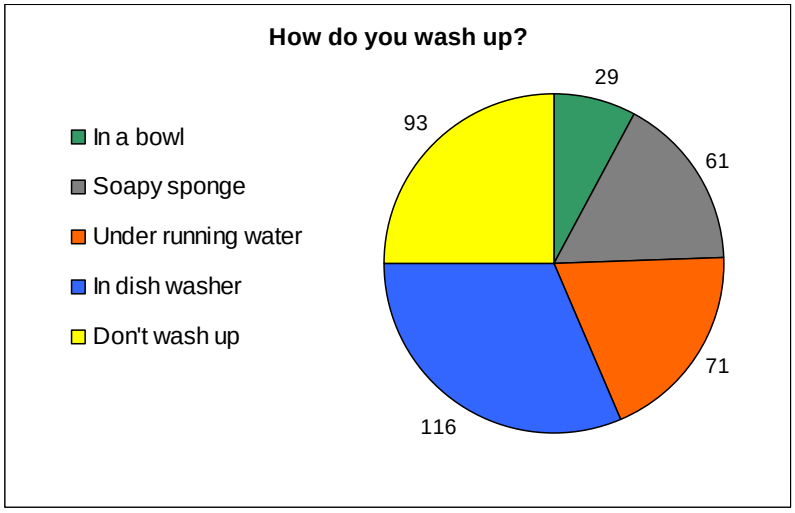


n this survey, adolescents are more likely to have long showers of greater than 20 minute duration than either adults or children.

How long is your average shower time in minutes?	
In Minutes	**No. of People**
2	6
3	6
4	9
5	58
6	3
7	9
8	7
9	4
10	67
11	4
12	2
13	1
15	33
20	27
25	10
30	15
35	5
40	2
60	7
[3]120	1
Total no. of minutes	**3690**
Total no. of people answered	**276**
Average shower time in minutes	**13.8**

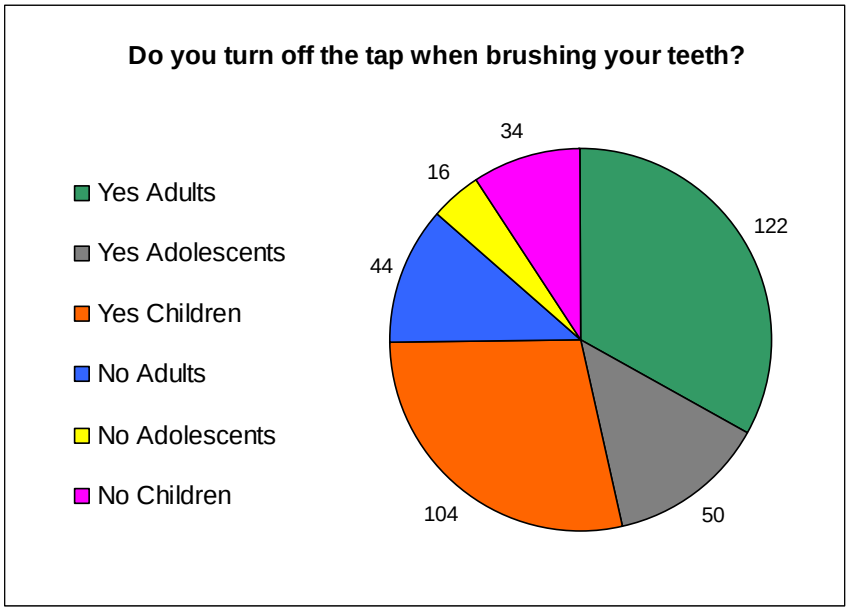
The average shower time in the UK is estimated at 5 minutes; on average the people in this survey spent nearly 14 minutes in the shower.

TAP USAGE



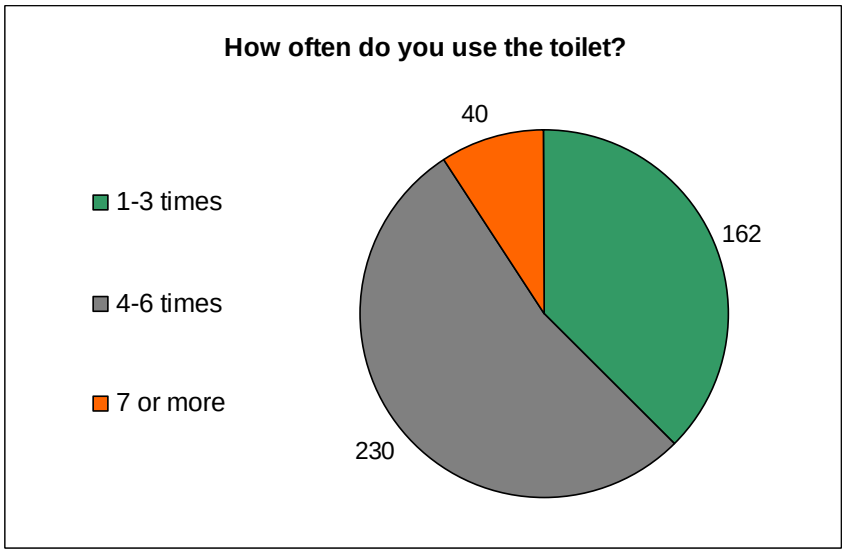
25% of respondents do not wash up. Some were children. Some were adult males.
In this survey we found that most people wash up using a dishwasher. Of the 277 people who do wash up, 22% wash up under running water.

[3] We did not use this figure when calculating the average shower time for respondents in this survey.



25% of respondents do not turn off the tap when brushing their teeth. Adults, adolescents and children were all similar in this respect.

WC USAGE



Average WC use in the UK is considered to be five times a day.

We received 432 responses to this question.
53% of respondents use the toilet at, or close to, the average. 37.5% use the toilet less than the UK average.

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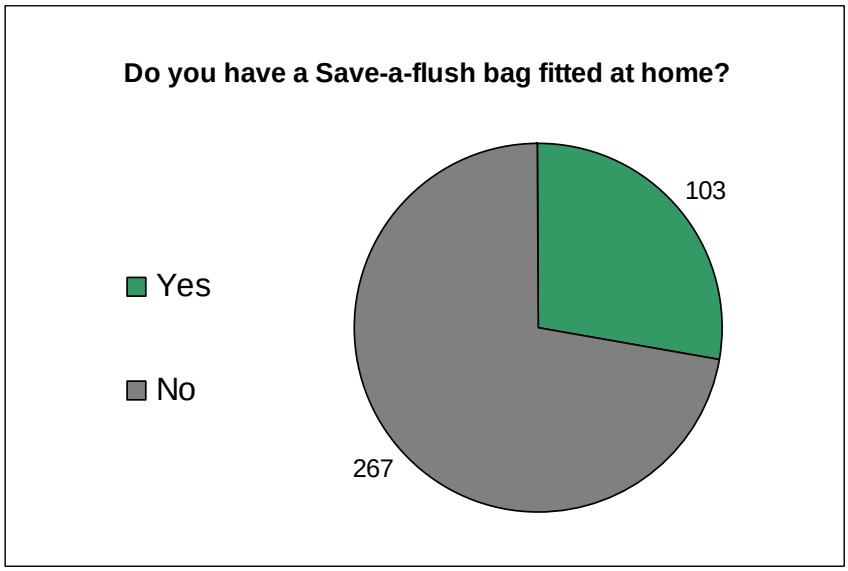
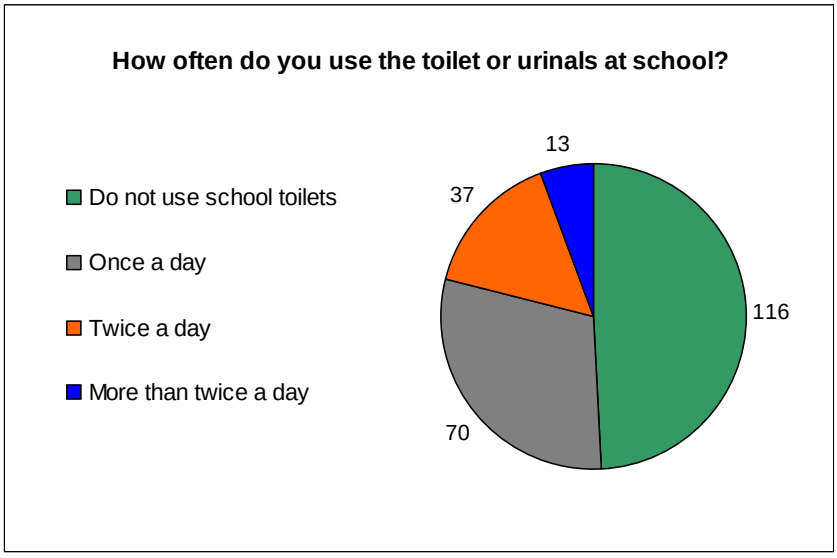


Some household had a WC that did not require a save-a-flush bag to be fitted.

Out of 82 households 22 have WCs that are 6/4 litre dual flush or 6 litre single flush and so do not require a save-a-flush bag.



In a survey of 236 pupils, average use of the toilets and urinals at school is 0.8 times a day.

We did not ask about adult use in offices.

Appendix 6a - What does it cost to flush your toilet??

Name: …… Year……

School ……..

How much water do you use a day??

	Amount of water per use or per minute litres	Time minutes	Use per day	Total litres litres
Washing dishes, preparing food	-	-	-	18
Washing clothes	-	-	-	15
Brushing teeth		-		
WC or urinal use at school		-		
WC use at home		-		
Washing hands		-		
Bath		-		
Shower				
Total litres used per day				

Average UK water use is 150 litres per day. Are you above or below average??

Above ☹	**Below ☺**

Reduce your water use

First reduce your water use by changing your behaviour and becoming more water aware. At school always make sure taps are switched OFF when you have finished using them and report any malfunctioning taps. If the toilet has a dual flush function use the half flush option when you have had a wee. At home have a shorter shower or shallower bath, turn the tap OFF while brushing your teeth, install a save-a-flush bag in the WC cistern and collect rainwater for use in the garden. **Note:** Remember, only install a save a flush bag in a toilet that flushes with 7.5 or 9 litres of water. Get one at www.thameswater.co.uk

Appendix 6b - How much does it cost to flush your toilet??

Name: …… Year……

School ……

How much water do you use when you …	Amount of water per use or per minute	Time minutes	Use per day	You use per day	Are you water aware?
brush your teeth	litres per use 0.5 10.5	-	1 2 3	litres	☺ ☹
have a bath Bucket bath (per bucket) Shallow Medium Deep	litres per use 10 70 110 160	-	0.5 1 2	litres	☺ ☹
have a shower Connected to bath taps Electric Power Thermostatic mixer	litres per minute 7 5 20 10	5 10 15 20 25 More than 25	0.5 1 2	litres	☺ ☹

Be water aware!!! **Know how much water you use and reduce where possible.**

- Using less water in a bath or shower saves CO_2 emissions as well as water.
- If your toilet was installed before 2000 it will use 7.5 or 9 litres of water to flush. Fit a save-a-flush bag and save 1 litre of water per flush. Available for free at **www.thameswater.co.uk**

Appendix 7a - Water saved by retrofitting a save-a-flush bag to an existing WC

Name: …… Year……..

School ……..

Water Supplier	**Thames Water**	
Cost of water per m^3	**£1.71**	
Current flushing volume of WC		**litres**
Flushing volume of WC after save- a-flush bag fitted		**litres**
No. of people in dwelling		
WC uses per person per day		
Savings	Savings	
1 litre x no. of people in dwelling x WC uses per day = water saved per day (litres)		**litres**
water saved per day x 7 = water saved per week (litres)		**litres**
water saved per day x 365 = water saved per year (litres)		**litres**
water saved per year (litres)/1000 = water saved per year (m^3)		**m^3**
water saved per year (m^3) x cost of water per m^3 = £ saved per year		**£**
water saved per year (m^3) x 0.65 = CO_2 emissions saved per year ($kgCO_2$)		**$kgCO^2$**

- Current flushing volume is 95% likely to be one of the following: 9 litres, 7.5 litres, 6 litres, or 6/4 litres dual flush. If your toilet is not dual flush and was fitted before 2001 it will be flushing with 7.5 or 9 litres of water and you can fit a save-a-flush bag.
- Average use of the WC a day in the UK in the home is 5 times per person
- 1 litre of water is saved per flush once you have fitted a save-a-flush bag
- Thames Water prices up to April 2010 are £1.71 per m^3
- There are 1000 litres in a m^3
- In the Thames Water area there are 0.3 kg of CO_2 emissions produced to supply a m^3 of cold water to a dwelling and 0.35 kg of CO_2 emissions produced to treat a m^3 of waste water.
- Save-a-flush available from www.thameswater.co.uk

Appendix 7b - Water saved by reducing duration of shower

Name: …… Year……

School ……..

Water Supplier	Thames Water	
Cost of water per m^3	£1.71	
Flow rate of shower		litres/minute
Current time in shower		minutes
Current water used per shower = flow rate of shower x time in shower		litres
Proposed time in shower		minutes
Proposed water used per shower = flow rate of shower x time in shower		litres
Potential Savings	Savings	
Current water used per shower - proposed water used per shower x number of showers per day = water saved per day (litres)		litres
water saved per day x 7 = water saved per week (litres)		litres
water saved per day x 365 = water saved per year (litres)		litres
water saved per year (litres)/1000 = water saved per year (m^3)		m^3
water saved per year (m^3) x cost of water per m^3 = £ saved per year		£
water saved per year (m^3) x 0.65 = CO_2 emissions saved per year ($kgCO_2$) from cold water		$kgCO_2$
water saved per year (m^3) x 7.15 = CO_2 emissions saved per year ($kgCO_2$) from hot water		$kgCO_2$

- The average UK shower time is considered to be 5 minutes.
- A 5 minute shower will save water compared to a medium or deep bath.
- However, many people spend far longer than 5 minutes in the shower. The result is that many people use more water for their shower than if they had a bath!
- Thames Water prices up to April 2010 are £1.71 per m^3
- There are 1000 litres in a m^3
- In the Thames Water area, there are 0.3 kg of CO_2 emissions produced to supply a m^3 of cold water to a dwelling and 0.35 kg of CO_2 emissions produced to treat a m^3 of waste water.
- It is estimated that using gas to heat water for a shower produces 11 times as much CO_2 as in supplying the cold water to a building.

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