

# Aquafacts No. 23

**It's official - the water softener, 'the best energy saving device you can buy'.**

**A recent Water Quality Association (WQA) Benefits Study, in America, provides amazing energy and detergent savings data when using domestic water softeners.**

## Introduction and comment

We have a tendency to dismiss information that originates in the States as it is often not considered to be undertaken to the high standards set by British organisations. We are pleased to say that this is not the case with the findings outlined here. Hard water is exactly the same in the USA as in the UK. The WQA is a world renowned authority in water conditioning matters and our trade association, the UKWTA, works closely with their highly professional team. The results of the study were closely monitored and independently verified. We believe the facts are hugely important highlighting that the way hard water influences our day to day lives needs to be taken more seriously. Water softening can clearly save a lot of money.

## Energy Savings Study

The Research Foundation of the Water Quality Association of America has undertaken, through the Battelle Memorial Institute, an independent testing organisation, a study into the effects of hard and softened water in the home. This has involved the testing of many products and appliances. The study was funded by the WQA at a cost of over \$700,000.

As a consequence of this study, undertaken during 2009, the WQA is now promoting water softeners as:

### **"The best energy saving device you can buy"**

The efficiency benefit focuses on 10% over 2 years but the actual saving may be higher or lower depending on water hardness, type of water heater and water usage.

1. The testing involved 10 gas storage heaters, 10 gas instantaneous water heaters and 10 electric storage heaters (N.B. for hot water only – **not central heating**), 5 of each on 400 mg/l of carbonate hardness in the water and 5 on softened water.
2. 10 low flow shower heads, 10 taps (faucets), 6 dishwashers and 6 washing machines were also tested on hard and softened water.
3. The trial was designed to simulate up to 15 years of household operation using recognised acceleration techniques.

4. All of the water heaters on softened water maintained their original efficiency throughout the testing and all the showerheads, taps, dishwashers and washing machines remained clean on softened water.

5. On hard water:

A) The gas instantaneous water heaters dropped in thermal efficiency by 8 % over a simulated 1.6 years – but fouled to the point where flow could not be maintained. They were therefore descaled regularly throughout the testing. However the original efficiency was not restored after descaling. Water softener payback time due to energy and descaling costs was forecast to be 1 year.

B) The gas storage heaters dropped in efficiency by 3% over 2 years equivalent service with a predicted drop of 14% (70% down to 56%) over 10 years.

C) The electric storage heaters maintained their efficiency throughout the test because the elements were totally submerged and most of the scale fell to the bottom of the tank. However, due to the high operating temperature of the scaled elements, the total amount of scale formed was nearly double that of the gas storage heater and the elements were predicted to fail prematurely.

D) The shower heads blocked up almost completely in the equivalent of 16 months.

E) The taps (faucets) blocked after 19 days of testing.

F) The dishwashers and washing machines were all heavily fouled.

G) All appliances were visually heavily fouled reducing life expectancy and impacting on cleaning cost effectiveness.

The WQA is now pursuing 'Energy Star' rating for water softeners in the US.

Some water heater manufacturers in America (Norit and Renae) now void their product warranty if there is scale evident in a failed heater or if the water hardness is above a specified level.

## Detergent Savings Study

During 2009/10 a series of experiments were carried out to

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compare the effects of detergent dosage, water hardness and wash temperature on the stain removal capabilities of household laundry products. The testing was commissioned by the WQA and undertaken by the independent laboratory, Scientific Services Labs, NY.

**Washing machines** This study used six liquid and three powder detergents. The stains studied included blood, coffee, grass, red wine, chocolate pudding and ice cream, BBQ sauce, skin sebum and ground in clay. The temperatures used were cold, 15°C and 37°C.

What was most significant was that softened water was 100 times more effective at stain removal than increasing temperature or detergent dose. It was found that when 50% of a detergent was used at 15°C instead of 37°C the washing yielded improved results over hard water. Even cold water achieved the desired soil removal using half the detergent needed in hard water. The results were the same for all the detergents used.

**Dishwashers** In this study four liquid and two tablet non-phosphate dishwasher detergents were used on a variety of stained plates and glassware. The hard to remove soiling included dried milk, egg, spinach, fish, grease, oatmeal, bread crumbs and olive oil.

At hardness levels of 350mg/l (similar to that found in the Thames Valley) savings of around 60%, of the recommended dose of detergent, was observed when using softened water as well as being 6 times more effective in removing spotting. It was also noted that air drying was quicker and could be a way of saving electrical consumption. One detergent was run for an additional three cycles to show that the hardness and dose performance relationship would persist.

The full WQA Benefits Study can be viewed on our web site: [www.aqua-nouveau.co.uk](http://www.aqua-nouveau.co.uk)

(Note: the hardness of water in The Thames Valley and North Hampshire averages between 300 and 350 mg/l of carbonate hardness).