



NORTHUMBRIAN  
WATER

# Sustainable 'building and burning' for the future

Thousands of tonnes of sludge remain every year after water has been treated to top quality to drink from the tap.

Successful innovative trials, offering sustainable solutions to re-use or recycle the sludge bi-product, have been tested in the North East of England.

More than two million bricks made from water treatment sludge have been used to build houses.

Also the sludge has been spread on land to successfully start the clean-up of toxic elements as lead, arsenic and cadmium.



In addition a high energy grass crop has been grown, harvested and compressed to form a biomass block for use in domestic and commercial heating and energy systems.

The collaborative research and testing work by the team from Northumbrian Water and Teesside University identified brick manufacture, and brownfield land soil remediation as viable alternatives to the existing sludge landfill which is costly in both financial and environmental terms.

With populations increasing and ever-tightening drinking water quality regulations, sludge volumes are growing annually.

There are currently 2.6 million customers in the North East and drinking water treatment results in some 16,500 dry tonnes of sludge a year. Nationally in the UK that figure is around 131,000 dry tonnes in a year.

Along with mineral solids, including clay, silt and sand, another component of the sludge is the hydroxide formed by the reaction between water treatment chemicals (typically iron and aluminium sulphate) and the untreated water.

These solid residues are particularly significant when reservoir and river raw water sources contain high levels of suspended materials, such as in upland peat catchments, which are common in the North East.

The trial with a local brickworks investigated the optimum volumes of sludge that could be added in brick manufacture before strength would deteriorate outside strict engineering standards. The sludge was particularly suitable for brick making because of its high clay content.

After laboratory testing found that 3% added sludge was best, the trial was scaled into full production and 90 tonnes of sludge was used to produce more than two million bricks which have been used in buildings around the UK.

In the soil remediation and energy trial the high hydroxide levels in the sludge provided a good surface for absorption and 'locking up' of traces of polluting metals and a contaminated three-acre site near Darlington in County Durham was spread with 250 tonnes of sludge per hectare.

To stabilise the soil and to create a useful energy crop for domestic and commercial heating and energy systems, Reed Canarygrass was planted on the remediated land. It gave a bumper harvest of 11 tonnes per hectare and metal pollution was reduced.



Summary of coagulation process:  $\text{Fe}_2(\text{SO}_4)_3 + 3 \text{Ca}(\text{HCO}_3)_2 \rightarrow 2 \text{Fe}(\text{OH})_3 + 3\text{CaSO}_4 + 6\text{CO}_2$