

An affordable heat store is possible because a simple tank can become a super efficient heat store.

We can store 50% more energy in half the volume of water when compared with energy storage in existing tanks.

We have a new tank which is the perfect partner for hybrid air source heat pumps.

We also have a tank which stores surplus renewable energy and helps us balance the power grid.

Hand in glove with energy saving there is additional water saving and energy saving.

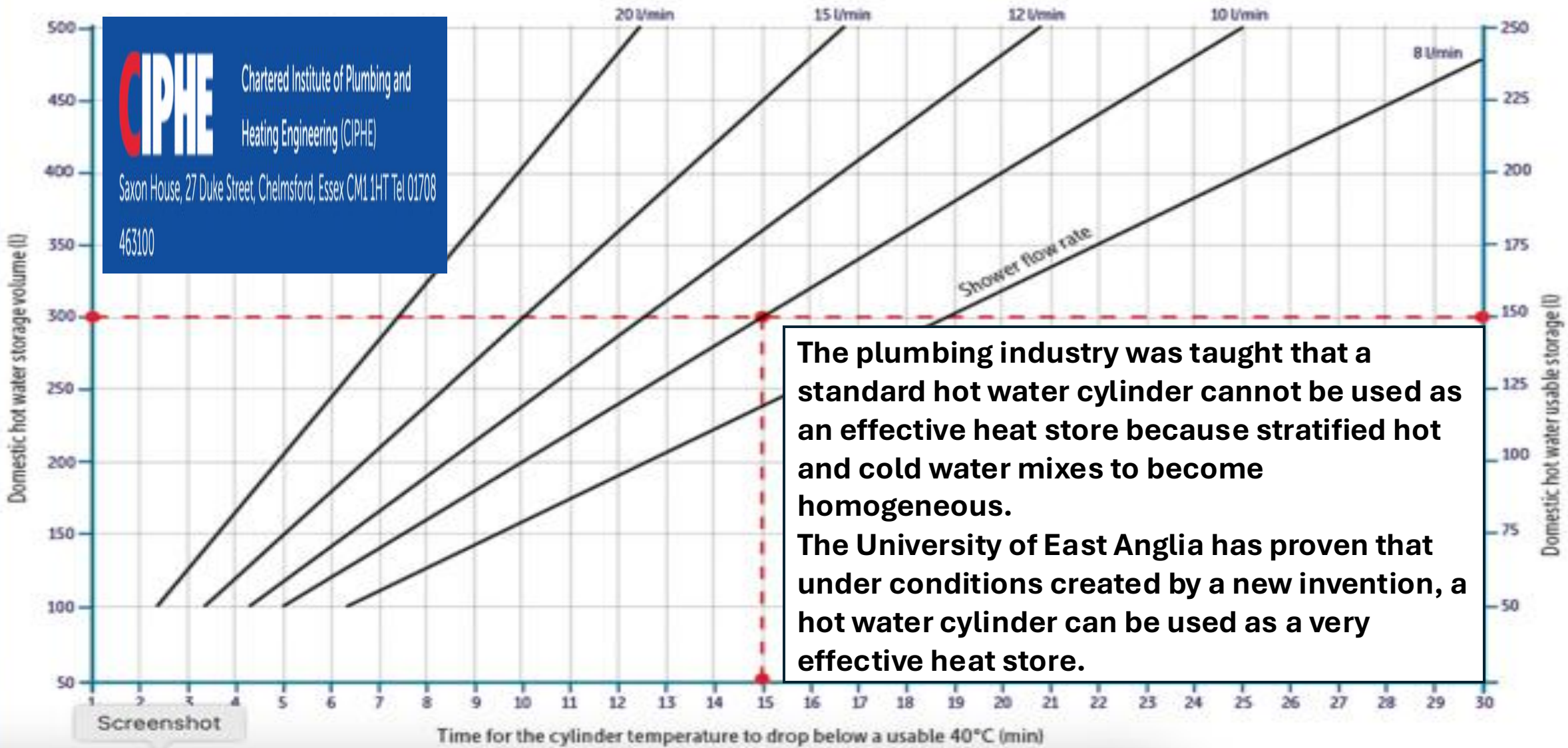
A simple hot water cylinder **CAN** be used as a heat store

FIGURE 1

CALCULATING USABLE DHW

Hot water storage volume, time of use, usable DHW volume at 40°C and outlet flow rates

PREVIOUS UNDERSTANDING OF SIMPLE HEAT STORES



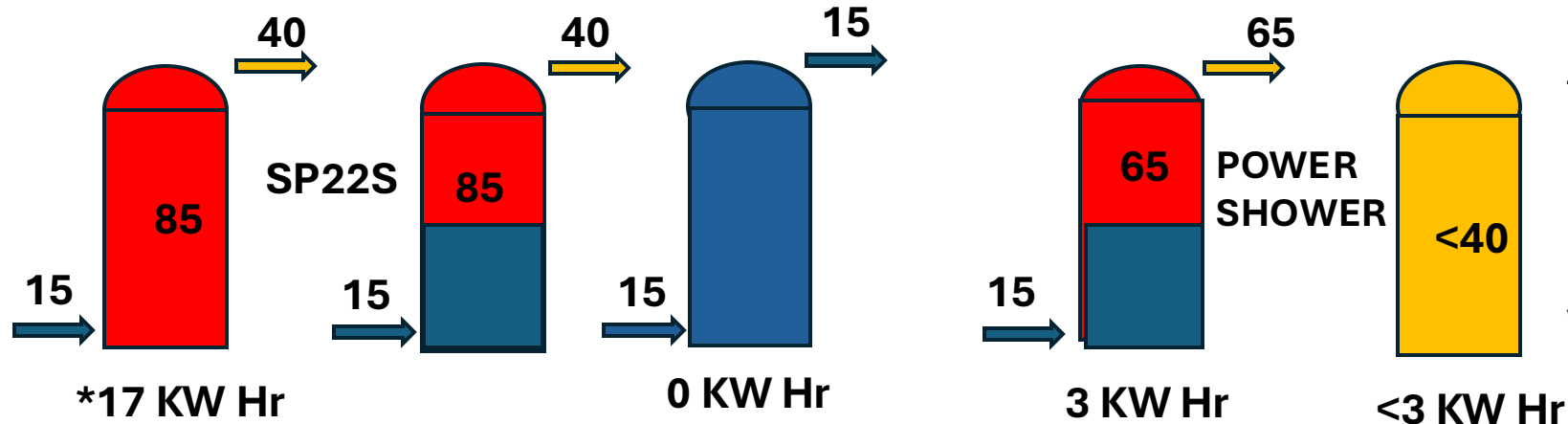
CIPHE Chartered Institute of Plumbing and Heating Engineering (CIPHE)
Saxon House, 27 Duke Street, Chelmsford, Essex CM1 1HT Tel 01708 463100

The plumbing industry was taught that a standard hot water cylinder cannot be used as an effective heat store because stratified hot and cold water mixes to become homogeneous. The University of East Anglia has proven that under conditions created by a new invention, a hot water cylinder can be used as a very effective heat store.

Screenshot

Energy Storage in a Simple Water Tank

Hot water is less dense than cold water. The perfect heat store is one that has hot water floating on the top of cold water with a narrow thermocline between the hot water and cold water. This allows you to draw most of the hot water off the top of the cylinder without disturbing the cold water below.

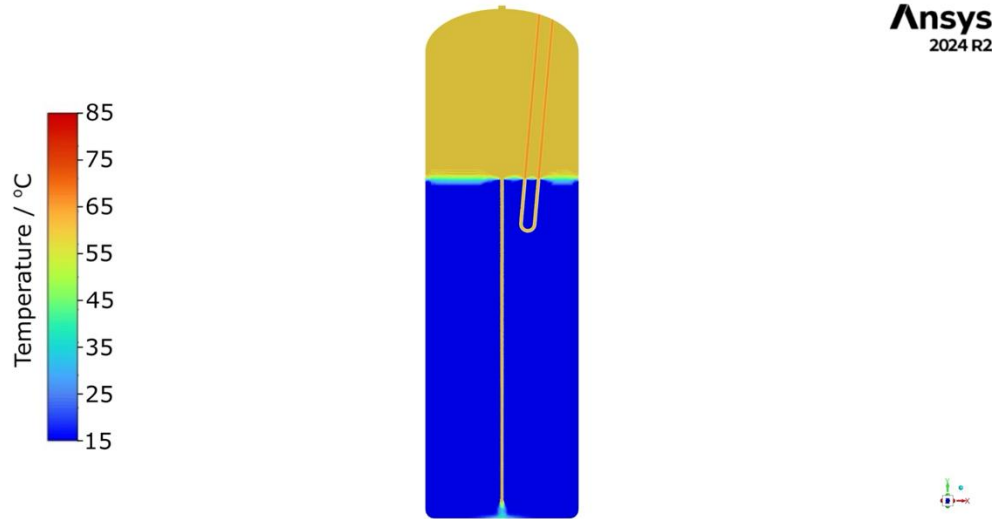


The Chartered Institute of Heating and Plumbing Engineers predicts that it takes under 10 minutes for a partly heated hot water tank to fully mix if you use a power shower.

The new patented heat store device can operate at 85 degrees centigrade. A blending valve regulates the temperature leaving the tank and it can operate at 85 degrees centigrade.

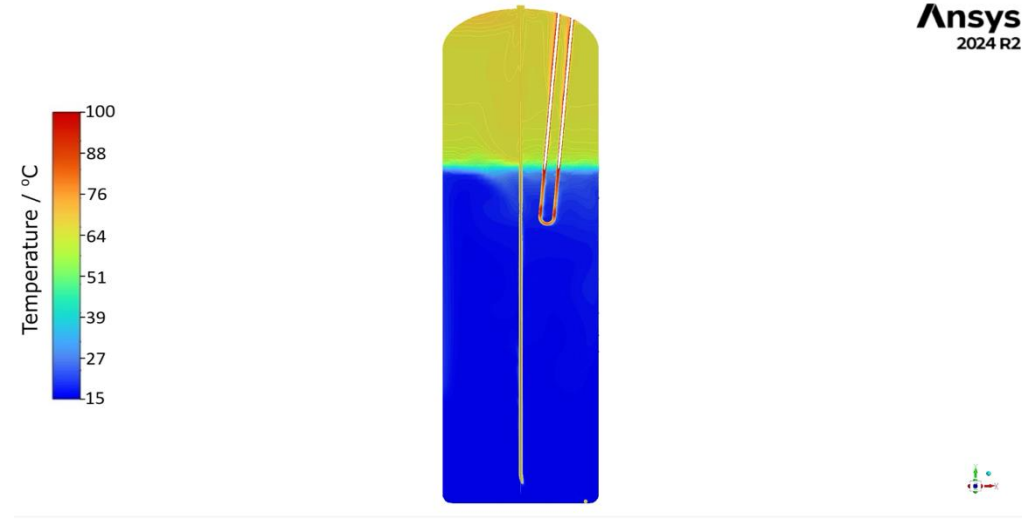
Traditional power showers operate at up to 65 degrees centigrade and cannot be integrated with a blending valve. The moment they switch on they start to mix the hot and cold water in a hot water cylinder. In under 10 minutes the hot and cold fully mixes.

The University of East Anglia computer model tells us why a simple standard hot water cylinder can store more usable energy than conventional wisdom predicted. A scientific 'sweet point' exists, where the flow rates during recharge, and discharge, are such that water wants to naturally maintain a thermocline.



POWER SHOWERS

Within seconds of discharge a power shower will completely mix the hot water and cold water.

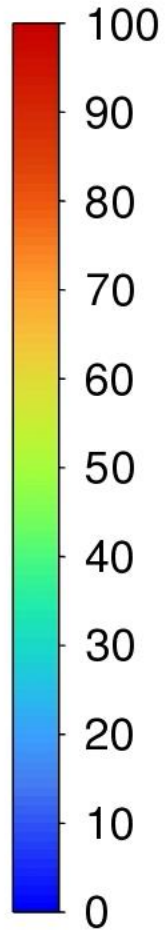


AFFORDABLE ENERGY STORE

Throughout recharge and discharge a perfect thermocline is created.

THE UEA HAS VALIDATED THAT A TRADITIONAL POWER SHOWER DESTROYS THE THERMOCLINE.

Static Temperature
[C]



THE UEA HAS VALIDATED THAT
AN ENERGY STORAGE DEVICE
CREATES A NEAR PERFECT
THERMOCLINE



WHAT IS AN AFFORDABLE HEAT STORE

A simple tank devoid of
complexity stores twice the
energy for half the cost
when compared with a
market leading heat pump
tank.

17 KWHr of
Energy stored
gives fourteen 30
litre perfect
showers



4.4
Excellent
★★★★★
137 reviews



Mixergy 210 Litre Indirect Unvented Smart Cylinder (MX-210-IND-582)
£1,910.65 incl. vat
+ £1,080.00 Annual servicing costs excluding parts over 9 years

Complex and Expensive vs Simple & Cheap

55 Deg C	Maximum Temperature	85 Deg C
40 Deg C	Minimum Usable Temperature	40 Deg C
9.8 KW Hr	Usable Energy Stored	17.1 KW Hr
£1,910	Purchase Price	£500*
	Installation Cost	£250

Maintenance £120 yr for 9yr. £0

+ Annual servicing to maintain warranty typically costs between £100 and £120 (See Below)

★★★★★

I bought one of these booster pumps...

I bought one of these booster pumps 9year ago a still working the same as the day I installed it. Easy to install. Great product!

Date of experience: 06 June 2025 £0

Current TrustScore ●

4.8 ★★★★★

Based on 1,908 reviews



Joule Stainless Steel Vented Cylinder – Direct – 1500×450
£365.53. Inc VAT

Current TrustScore ⓘ

4.8 ★★☆☆☆

Based on 1,908 reviews

ShowerPowerBooster customers often remove existing Power Showers to achieve perfect showers by replacing them with SP22S ShowerPowerBoosters

A SP22S creates the conditions for the heat store to work efficiently.



✓ Verified

May 12, 2025

The existing Grundfos booster pump...

The existing Grundfos booster pump flowswitch flap stopped seating and so was not switching off despite cleaning.

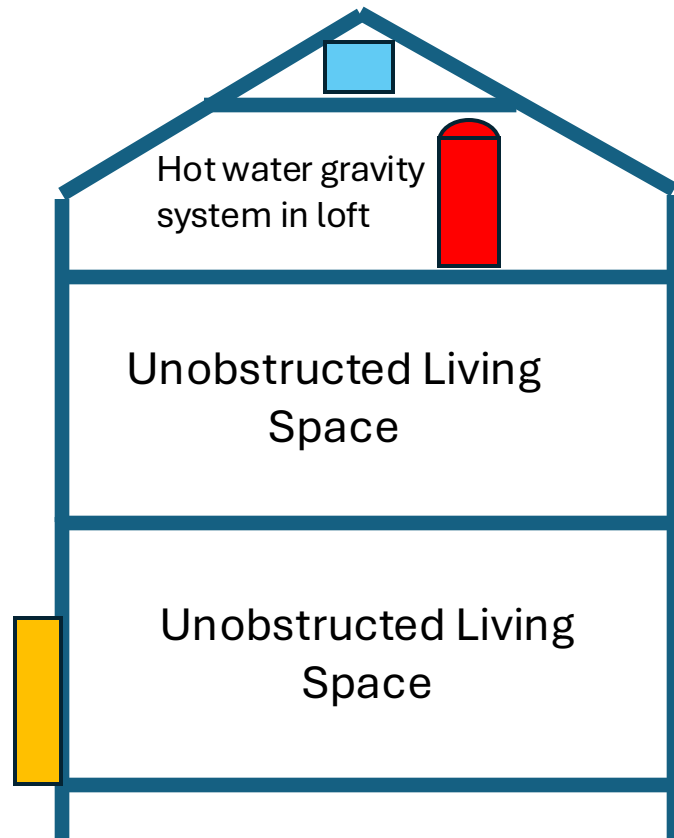
I changed it over to the Shower Power Booster pump and this worked as well and better than that huge heavy Grundfos.

This new pump is an engineering marvel with its hitech flow switch, low consumption, low cost and so easy to fit.

Date of experience: March 11, 2025



This presentation summarises a proposal for Water & Energy Storage in New Housing
It uses 100% Renewable Energy.



There are two 454 litre coffin cold water storage tanks (One for potable water, one for rain-water harvesting)
Each H 580 x L 1680 x W 695 mm



A 210 litre hot water cylinder/heat store
H 1500 x W 550 mm



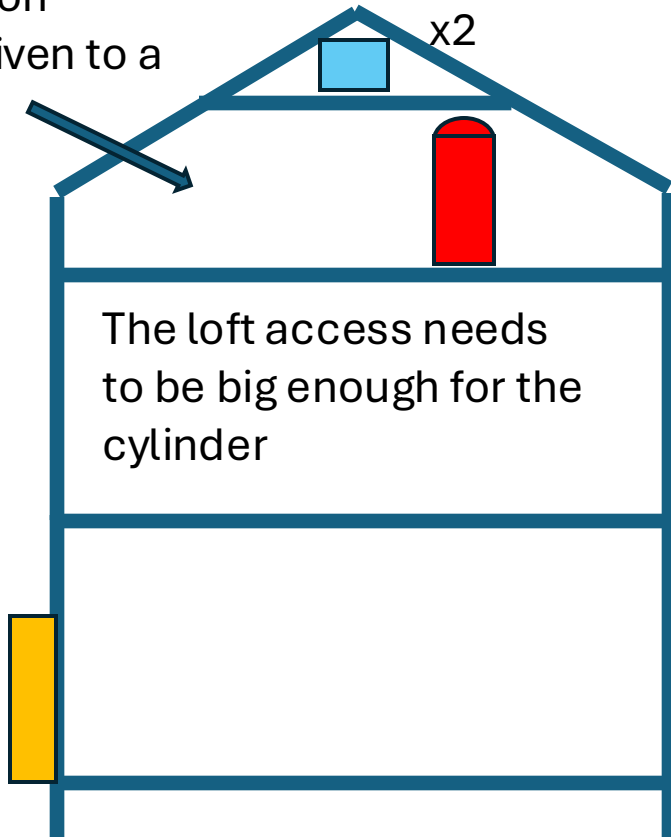
One SP22S provides high pressure showers and taps (except kitchen taps which must have a mains supply). A second SP22S runs the rainwater harvesting



A hybrid air source heat pump for central heating only

Practical Considerations

Consideration should be given to a 'warm roof'



Coffin tanks are designed to get through existing loft hatches and supported in the eaves they spread the load. One tank should be dedicated to supply toilets and the garden. The other for potable water.



The cylinder can sit near one end of the loft to minimize loading issues. This is not a problem and many SPB customers already have cylinders in their loft.



The addition of a micro pump allows 'instant hot water at taps

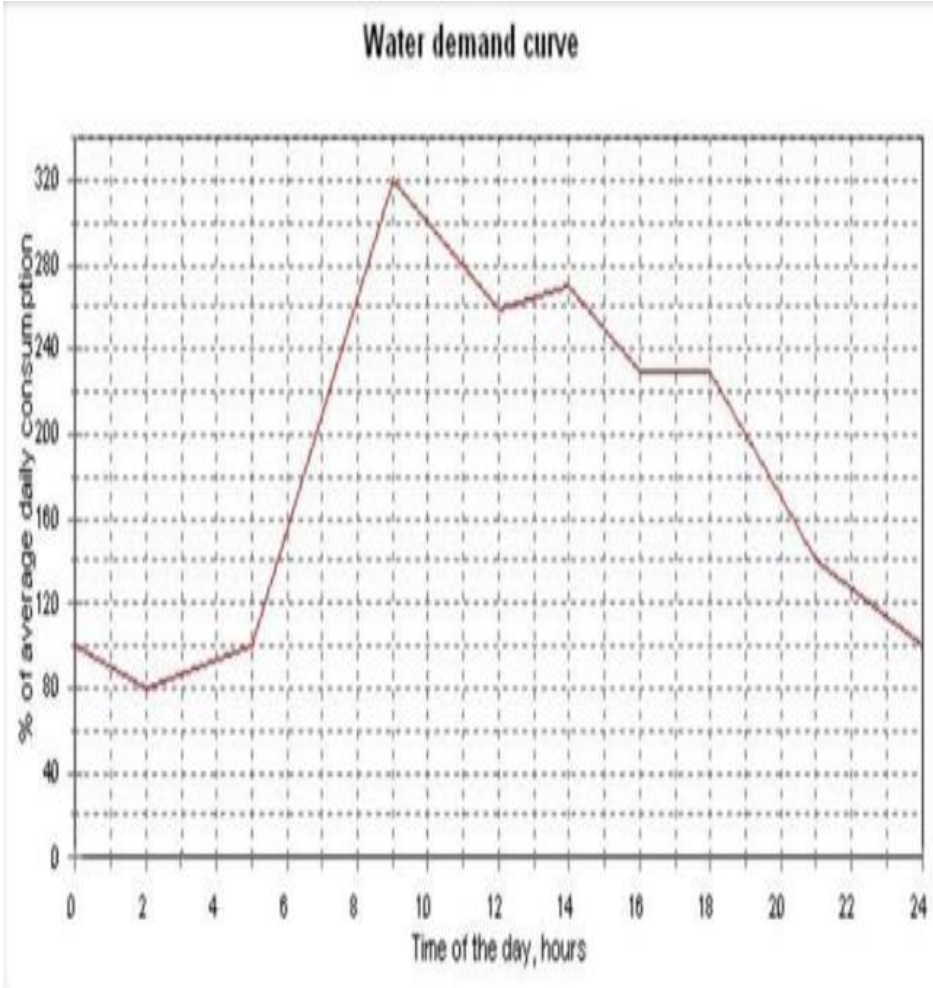
An additional SP22S and garden boosters can harvest rainwater at minimal cost



A hybrid air source heat pump for central heating only is not interfaced with the potable hot water system which provides hot water for 48 hours in the event of a power cut.

Water & Energy Storage in New Housing

Effect on Water Consumption



One coffin tank has the capacity to store more than one day's supply of potable water and it is supplied via an actuated valve. It fills at off-peak times
The second coffin holds rainwater. If it needs extra mains fed water it fills at off-peak times.



The hot water cylinder/heat store provides multiple showers using stored water with no further energy input



Two SP22S fully automatic ShowerPowerBoosters are responsive to demand from taps, showers, and toilets.



The hybrid air source heat pump can be turned off in the summer.

The effect on water supply and distribution

I worked for Anglian Water and other Water Companies for over 30 years. I was the most senior design engineer in Norfolk with specific responsibility for water network design and construction, so I know that once you add 48 hours of water storage in enough homes, the effect on the water network and water supply would be game-changing. The effects on regional water supply and distribution would be:

Reduced peak pressures in the networks which will result in a significant reduction in bursts and less leakage in general.

Bursts are affected by cyclic variations in pressure with the magnitude of the fluctuation being critical and with greater failures the higher the peak pressure.

Reduced energy would be needed to pump water around the grid (but at significant increased cost to Anglian Water because they are paid to use surplus electricity at night).

Reduction in the unit price of water, as supply sources can run at a more even output, (assuming that the daytime energy tariffs are relaxed).

An overall increase in water output from individual source works.

Many source works have a minimum contact time for treatments and the maximum output based on those minimums. Without storage capacity, water is left idle in a process tank during parts of the day.

The effect Heating Potable Water on the cost of heat pumps

Heating hot water for showers etc represents a small part of the total hot water and heating bill

Heat pumps are great at heating homes.

Heat pumps are inefficient at heating water for hot showers etc.

Air to Air Direct Heat Pumps

When the temperatures outside are around 5 degrees C, a direct air to air heat pump is super efficient. To achieve an air temperature of 20 degrees centigrade inside, **they only need to raise the temperature by 15 degrees centigrade .**

Air to Water Heat Pumps (CH Only)

To achieve an air temperature of 20 degrees centigrade they need to heat radiators to 40 degrees. **They need to raise the temperature by 35 degrees centigrade.**

Air to Water Heat Pumps (Central Heating and Hot Water)

To achieve hot water temperature at 60 degrees centigrade you need an indirect hot water cylinder, and the coil needs to be heated to 75 degrees centigrade. **They need to raise the temperature by *70 degrees centigrade or heat the water with an immersion heater and a complex tank.**

Running the heat pump to the higher temperatures results in much bigger air source heat pumps, noisy pumps, lower efficiency, and vastly more complicated systems, high maintenance costs, and higher servicing costs, and needing to run them though the summer. Smaller systems just running central heating could be 50% of the cost.

The effects on the cost of new housing

New homes would be cheaper to build because hybrid heat pumps are substantially cheaper, vented tanks are cheaper than unvented tanks, and on-site mains can be down-sized.

Additional new homes can be built in areas where demand for water and electricity is already close to maximum capacity.

Isolated new homes when built will not increase peak demand on the water supply and water networks.

Existing homes can be retrofitted and reduce peak demand, so perhaps every retrofit allows you to build one new home paid for by the developer.

Flats can use Air to Air Heat Pumps instead of Air to Water Heat Pumps with similar energy and water storage arrangements to those in new homes.

Destructive Technologies

Peak demand for water and electricity is coincident so in the morning an electric shower can take power at 13 KW and water 6 litres a minute. Combi Boilers take water at times of peak water demand.

Power Showers destroy the thermocline in hot water cylinders yet they are accepted by many plumbers as the only way to boost water. They use up to three times the water and energy compared with traditional showers. Customers prefer the showers SP22S create.

There are many more technologies such as multiple jet shower cubicles and the list is extensive.

It would be politically difficult to ban these and the vested interests within those industries are considerable. The facts above are understood by anyone who understands the science and the problems we face in mitigating climate change.

For the last 12 years, Norwich City Council and indeed all Councils across the country have set an example by insisting that all property upgrades install Combi Boilers and Electric Showers.

Norwich & Norfolk Pilot 2025

Phase One - Power Showers

Turning your gas boiler off in the summer and switching to an affordable heat store for hot water all year long, will cost you up to £1,500.

As well as perfect showers, and lots of them, you will be doing your bit for society to maximize the use of renewables and minimize the use of gas and oil.

As a consumer paying utility bills you will:

Save over £400 a year

Save 219 tonnes of water

Reduce your gas consumption by 18%

We expect to see the the installation of an affordable heat store as just a first step before fitting an air source heat pump. Avoiding a complex air source heat pump tank will save £3,000 and with the smaller, quieter, more efficient pump, you will save a further £4,000.

The current £7,500 grant for heat pumps could pay the entire cost of a new hybrid air source heat pump.

Norwich & Norfolk Pilot 2025

Opportunities & Issues

Enter the debate and battle between Octopus [Energy](#) and its founder, Greg Jackson, and Ed Miliband. We pay £millions for wind turbines to have them turn off when the wind blows hard. Instead of paying turbines compensation we could give the electricity away for nothing.

Enter the debate with Clive Lewis to promote the water enhancement aspects of this invention.

QUESTIONS AND ANSWERS

Why does Norwich City Council want to promote energy and water saving?
How can it help promote a pilot? Perhaps publicity – credibility – other.

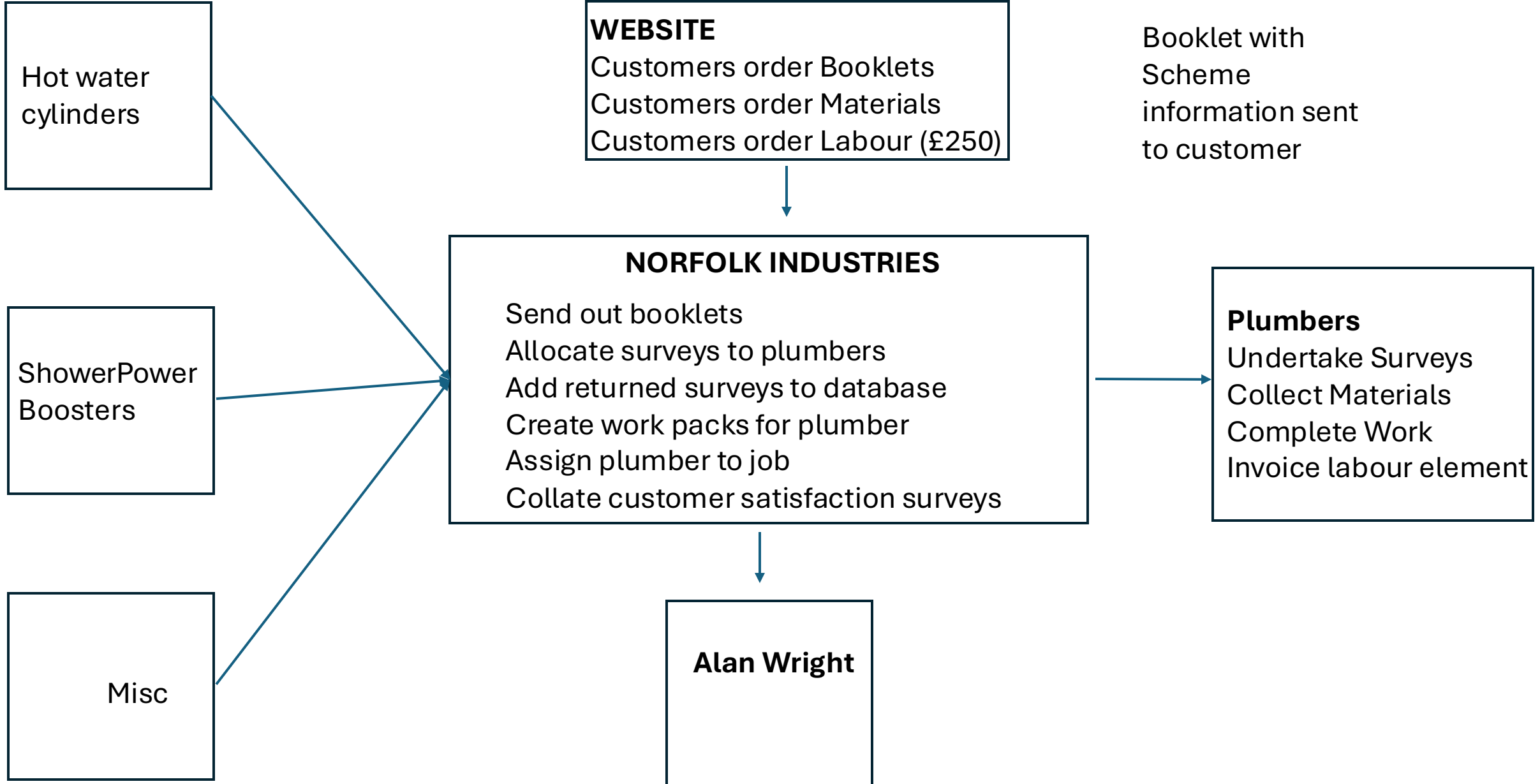
The technology is covered by a research agreement which could allow the University to develop this technology further. What is the potential for this?

Why does The UEA want to promote energy and water saving?
How can it help promote a pilot? Perhaps publicity – credibility – other.

UK Research and Innovation supports air source heat pumps which have a bad reputation, and industry lobbyists promote positive messages to sell poor solutions. How can we ensure this changes?

An outline summary of how the pilot will work is on your seat. Are there any further questions?

NORFOLK PILOT



Immediate Off Site Logistics

Meeting with Clive Lewis

Meeting between UEA, NCC, AW & Clive Lewis to discuss water saving issues

Meeting with Octopus Energy and its founder, Greg Jackson.

Meeting to discuss ‘*constraint payments’

Meeting with Hethel Engineering

Meeting to discuss development of new hybrid heat store and possible grants

UEA Business School

Meeting to discuss commercial topics.

Meeting with Tyndall Centre & Climate Commissioners.

Meeting between NCC, UEA, & AW to discuss energy and water issues in Norwich

Funding Issues – Robert Smith

Introduce a New Build Developer

The constraint payments are projected to increase from £1.5bn in 2024 – an estimate from FTI Consulting – to more than £1.8bn in 2025, based on data from the UK's nationalised energy system operator the National Energy System Operator (NESO). Ed Miliband has instructed that free energy should not be given to consumers because this would disadvantage London.

THE ULTIMATE GOALS OF EXTENDED PILOT

An affordable heat store is regarded as the first step towards a full Hybrid Air Source HP system.

A Hybrid Heat Pump that puts an end to gas in a home should receive a grant of £7.500

We can offer you a tariff which gets you free and discounted energy when available

Today, air source heat pumps recognize that they are not efficient when heating water to 65 degrees C, They can use an immersion heater to top up the water temperature. If they can get a £7,500 subsidy, then why can we not get the same grant?