

PLUMBING CONNECTION

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WHAT'S COLD IS HOT AGAIN

HEATED WASTEWATER CAN BE RECOVERED AND RE-USED TO PRE-HEAT THE INLET TO SHOWER HEADS, OFFERING CONSIDERABLE SAVINGS ON ENERGY CONSUMPTION. JUSTIN FELIX SPEAKS WITH THREE SHOWER HEAT RECOVERY DEVELOPERS TO DISCOVER HOW THEIR SYSTEMS CAN SAVE MONEY AND VALUABLE RESOURCES.

While the idea of drawing on recycled water to 'freshen up' may seem off-putting to some – it shouldn't in this case.

In today's economic landscape, people are looking at various ways to reduce their living costs, while not having to rely on baked beans and tuna to survive.

Energy costs are skyrocketing across Australia and while this isn't ground breaking news, there has never been a better time for homes and businesses to invest in energy recovery systems. If they inevitably help to ease the burden of energy bills, they can only be a good thing. Water is a precious resource, yet so much of it is wasted as it funnels into the abyss of bathroom drains around the country.

This is a worrying issue as energy needed to produce hot water is relatively high, be it gas or electricity, and while solar panels have assisted significantly, the market is in search of another alternative. There is a growing need to discover ways to draw-off the wasted heat that goes down the drainpipe in showers.

Of course, the challenge of achieving a payback in reasonable time remains.

Hot water that goes down the drain carries energy away with it. That's typically 80-90% of the energy used to heat water in a home or business. Shower heat recovery systems capture this energy from water that has essentially already been used, making 'old' water 'new' again.

Some clever inventors have been at work and *Plumbing Connection* caught up with three of them to see what makes their products tick.

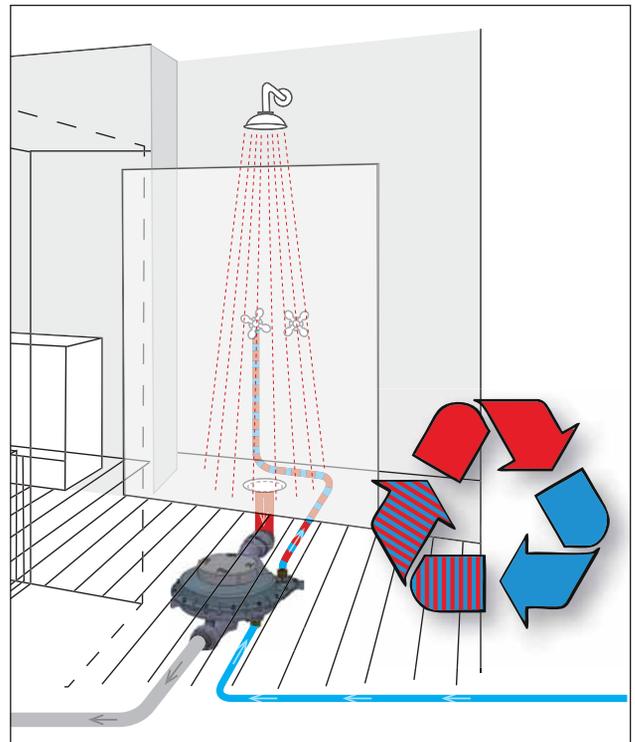
HEATBACK

HeatBack is the brainchild of Joseph van Liempt – a failed retiree from New Zealand who couldn't stand the thought of doing nothing.

"The idea developed from the wish to buy and operate a recovery system in several houses I lived in since the early-'80s," says Joseph.

"I was involved in engineering product development as a career and 30 years later I still hadn't found a recovery system that could be fitted to a drain system with limited line fall," Joseph says. "After reading forum discussions on the lack of waste heat recovery uptake on the World Plumbing Council website in 2007, I decided to take up the challenge myself."

HeatBack can instantly capture and re-use most of the



HeatBack's efficiency is achieved through patented technology that creates an effect they call 'gyro-cycling'.

energy from wastewater that would otherwise be wasted. The HeatBack claims to be capable of recovering 37-45% energy from 5 to 13L/min of warm wastewater. In a tandem HeatBack installation the rate of recovery can achieve more than 60%. Subsequent cycles will again increase those savings.

"The HeatBack's primary focus is to reduce harmful emissions from peak power generation that uses coal or gas. If collectively applied by households, the effort would pay for itself and potentially reduce output such as CO2 exponentially."

Joseph had previously experimented with industrial heat exchange methods so this wasn't a completely new piece of research and development.

"Waste water from residential areas collected at municipal treatment plants is often reported at temperatures above 30°C. Industrial recovery systems, ►

HEAT RECOVERY

applied for centuries, have optimised the process efficiently and as such the best performance options and functional requirements can be redefined to suit typical household use,” claims Joseph.

“Whereas industrial application processes are usually continuous, the key factor for intermittent use of hot water and recovery of the energy is response time. This will hasten pay-back for domestic users even at below peak efficiency levels. Compactness and flexibility of where to install the exchanger are also important, as is a low pressure drop.

“High efficiency ratings for energy recovery are fine, but if that is achieved using oodles of copper, the systems own heat sink will consume most of it alone.”

HeatBack is 252mm wide and 146mm high which makes it suitable for mounting under or near showers, baths and basins. The horizontal design makes the unit extremely versatile and perfect for new building or retrofit installations. The compact efficiency and horizontal action is achieved through patented technology that uses a combination of shape, gravity and momentum to create an effect the team calls ‘gyro-cycling’.

Gyro-cycling is the whirlpooling of warm wastewater inside the HeatBack’s chamber against a horizontally spiralled cold water pipe. The two water flows spin around each other to ensure the warm wastewater energy molecules have optimal contact with the cold water pipe for maximum heat transfer. Requiring only 110mm of fall, the resulting unit is about the size of a shoebox and fits within most concrete floor depths.

The biggest challenge for innovators like Joseph is testing and developing reasonable payback periods based on a number of factors.

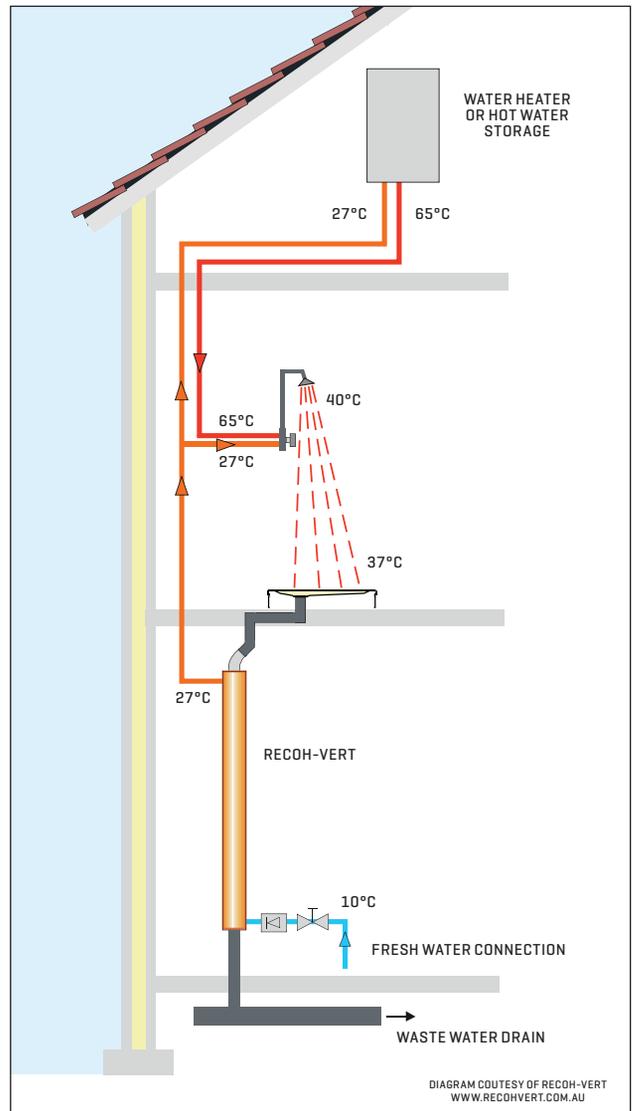
“Two years of test simulating household shower use, have shown that a gravity and centrifugally assisted planar approach is most effective on a variety of flow rates and can repeatedly achieve a competitive level of heat transfer producing instant [sub-second] returns,” says Joseph.

“Depending on energy costs at the time; three and four person households can typically expect to save around 4 to 6.3kWh per day with only the shower and basin connected. Your customers can expect to reach payback in 2.5 years. A household’s footprint would reduce by some 250-340kg CO₂ per year [calculated at NZ average output],” Joseph claims.

HeatBack’s first model to be launched later this year is primarily designed for new-build homes; however, a retrofit model is in the pipeline.

RECOH-VERT HEATEXCHANGER

Hei-tech has developed a heat exchanger which instantaneously pre-heats the cold water pipe to the shower and/or water heater. The Recoh-vert has been successfully applied in the Netherlands for a number of years, particularly in a large number of newly built homes.



The Recoh-vert’s design is simple and straightforward, making it suitable for residential and commercial installs.

“Waste water heat recovery systems have been used in industrial applications for a number of years where a constant supply of hot water is required,” explains Russell Nash, Business Development Manager of Evo Building Products.

“With increasing European incentives to reduce energy consumption, we feel this technology is also suitable for the Australian market which is experiencing increases in energy costs.”

Recoh-vert is a copper counter flow heat exchanger that works in a cycle. Hot waste water from the shower drains through the shower tray and into the waste pipe system.

The Recoh Heat Recovery System sends waste water from the shower or appliance – that needs a constant supply of hot water – through a heat exchanger on its way to the drain. The waste water never comes into contact with the fresh water as the only thing transferred is heat. This system’s versatility makes it suitable for residential and commercial applications where in Europe it’s proved to be particularly effective in gymnasiums, stadiums, restaurants and hotels.

The Recoh-vert is a tubular heat exchanger that can be delivered in three different lengths and consists of three

tubes. The inner pipe, with a diameter of 50mm, is the waste water drain pipe. The cold water mains that are to be pre-heated, flows upwards through the annular space between both pipes. The heat exchanger has a double wall separation between sewage and drinking water.

“As hot waste water passes through the inner bore [grey side] of the heat exchanger, cold mains water is delivered simultaneously through the gap between the inner and outer copper pipe.

“Heat exchange takes place and the cold mains water is pre-warmed to a temperature around 25°C before being delivered to the hot water heater and the shower mixer tap’s cold water feed. This means the water heater uses a lot less energy to heat the water to the required level,” says Russell.

“The Recoh-vert is designed to be installed in a two storey house as close to the shower unit as possible,” Russell explains. “This means it’s easier to be specified at the design phase rather than retrofitted. With this in mind, there is no real restriction to installing a Recoh-vert unless the whole ground floor is an open plan design. As long as there are dividing walls, a utility area or ground floor garage; there is ample room for the Recoh-vert to be installed. ➤



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“As with most energy saving systems – the payback period can change depending on many variables such as frequency of use, current power costs and installation variances. A standard Recoh-vert installed in a two storey house with four persons using the shower per-day, should have an average payback period of 1.4 years. Increased use reduces the payback period so shorter payback periods can be achieved in commercial applications.

“Plumbers should have no problem installing the Recoh-vert. Standard fixtures and fittings are used to connect the system to the fresh water supply and stack. After the first installation, the system should take no longer than 30 minutes to install,” says Russell.

Residential and commercial installations have been taking place in Europe for the last few years; however, Recoh-vert has only just received its WaterMark certification and was officially launched in July so the primary installations will take place shortly.

The heat exchanger is built on a simple, straightforward design which does not use pumps or controllers. Being made completely from copper also ensures a long working life.

The heat exchanger recently won the 2013 Selector DesignBuild Best New Product Award. Jurors were impressed that the product responds to thermal heat loss within the water delivery mechanism of the pipe itself. They said that it “jumped out immediately” as a simple, sustainable solution that is appropriate for both residential and commercial uses.

CINTEP WATER RECYCLING SHOWER

CINTEP’s Water Recycling Shower saves both energy and water which makes it more than a heat recovery system.

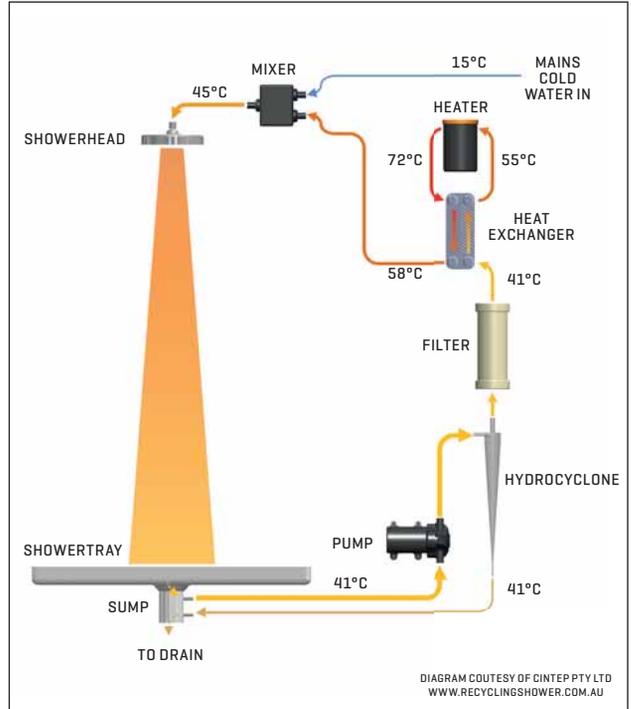
“The notion of recovering heat from showers isn’t new, in fact people have been thinking about it for 30 or 40 years, but three things have come into play that have helped to get the ball rolling,” says Nick Christy, Co-Founder and CEO of CINTEP.

“Technology is moving forward and it is digitalising the bathroom, which enables you to be smarter about the way in which you manage bathroom products. It makes more things possible.

“It hasn’t always been viable to recover heat from shower waste water though as it hasn’t been economical or easy to do.

“Because utility prices are increasing quite rapidly, and will continue to do so, the economics of recovering heat from shower water is now making it something that pays for itself. Politics and consumers are now moving towards the notion that water efficiency and energy efficiency are either sensible, necessary or in fact both,” Nick says.

“When you turn the shower on, it fills itself with three to four litres of potable water which it then heats and uses to start your shower. During operation, the shower recycles



The Water Recycling Shower can be installed as an invisible in-wall installation or more visibly as a modern tower.

your water from ‘right now’ and filters it three ways,” Nick states.

“Every time it goes through the cycle it throws 30% of the water out. The second filter splits the water into both a dirty and clean flow. The clever design throws the dirty flow out and replaces it with 30% fresh water. After you get out and turn the shower off, it completely drains out before the next user. Their shower consists of completely different water and as such, there is never any water shared between users.”

When users start the shower, water won’t come out of the shower head until it reaches the temperature that the user pre-selects. This means there is never cold water on start up.

Bent RotoDrill

The New Bent RotoDrill easily negotiates trap and bends
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HEAT RECOVERY

There is no need to connect the shower to the hot water system due to the inbuilt heating system.

This provides two main benefits states Nick. "You can downsize your current hot water system and if you're building a new house you can actually avoid putting a hot water system in the house all together. This is possible with forward planning and the installation of instant hot water taps in the kitchen and bathroom. Because the Water Recycling Shower generates its own hot water you have unlimited hot water - so there is no need to worry about how big your tank is."

The actual technology sits inside a relatively small black box. Installation is simple and there is no on-site assembly required by plumbers. They just need to hook the system up and they're good to go.

The Water Recycling Shower can be used in commercial and residential applications throughout new builds and renovations. The shower can be installed as an invisible 'in-wall' installation or more visibly as a modern tower.

“ RETROFITTING A CINTEP SHOWER IS NO MORE COMPLEX THAN RETROFITTING AN EXISTING SHOWER AND IN SOME CASES IT MAY BE EVEN EASIER. ”

While retrofitting is encouraged and easy enough to do, Nick doesn't advise it to those who are simply contemplating a change of shower head.

"We wouldn't expect people to buy the Water Recycling Shower unless they were building a new house or completely renovating an existing bathroom. Retrofitting a CINTeP shower is no more complex than retrofitting an existing shower and in some cases it may be even easier," says Nick.

"It's important to know that heat recovery is only one aspect of the CINTeP shower. It will consume 70% less energy thanks to the heat recovery from the system as well as 70% less water thanks to the recycling process", says Nick.

The Water Recycling Shower will be on sale in the first half of 2014.

Shower heat recovery systems will be a handy add-on for plumbers down the track as customers will continue to look at ways to save on water and energy bills. ■

HeatBack: heatback.co.nz

CINTEP: recyclingshower.com.au

Recoh-Vert: evobuild.com.au