

TRAINING OFF THE PAGE - JON PALFREY

THE FUTURE OF WATER HEATING: GAINING ENERGY FROM VARIOUS SOURCES

Jon Palfrey explores the latest technology in water heating and the benefits associated with using various energy yields as heating sources.

Water has traditionally been heated for domestic and commercial consumption via a gas burning system or an immersed electrical heating element located in a mild steel or stainless-steel pressurised vessel.

Clients, customers and end users in all forms are today looking for alternative methods to potentially gain energy and use it to provide the necessary input for domestic and commercial water heating temperatures and to reduce traditional energy consumption sources.

Energy yields for heating water can be provided and collected from various forms. Solar thermal, in recent years, is a method that has seen governments legislate to have domestic and commercial applications have preheated water sent typically into a gas instantaneous/continuous flow system for boosting temperature when required.

A recent technology that provides solar PV (photo voltaic) as the energy source has many and varied advantages over the traditional thermal solar

including direct energy provision via a power cable which eliminates traditional solar water heating issues including flow and return heat losses and pump performance panel damage due to extreme weather conditions etc.

Fields of PV panels (off grid) providing the energy input into a direct current voltage (DC) power supply can contribute significant energy gains. It can also provide a means to heat large volumes of water or assist in building ring main losses via the DC element connected to the Rotex tank, providing direct injection of energy with no need for solar pre-heat.

A recently completed commercial installation using this technology includes a 40-storey tower in Melbourne's CBD that has recently had a new commercial condensing gas system retrofitted including the ROSC20 heating system with DC power supplied via a field of solar PV panels.

The system has already provided an energy reduction of approximately 18% during winter months.

The ROSC20 combining Rotex and MYPV creates the perfect solution for

domestic and commercial applications looking for energy reduction (see consumption graph).

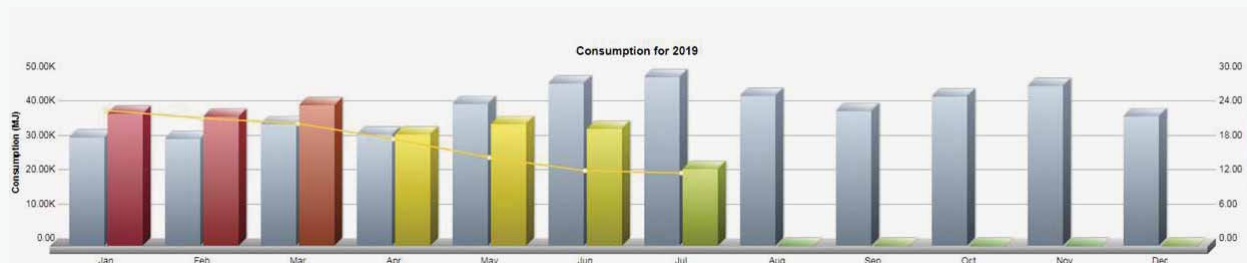
Another large medical facility is considering using a solar PV input via the AC.THOR 9s using a 3# 9kW photovoltaic power management system providing in excess of 106kw to supply the necessary thermal collection to deliver domestic water heating in a large-scale format (see design).

These thermal systems can be controlled via a device that has the philosophy of being able to direct the energy gain into a Rotex tank where staged elements are activated depending on the temperature increase required for the applications DHW demands.

The Rotex tank in this example provides the perfect energy yield storage system battery where water instantly changes temperature state via electric elements energised by solar PV collectors.

The energy system controller can also send energy gain back into the building's main power supply, providing electricity for other areas and to activate a direct

CONSUMPTION GRAPH PRE AND POST ROTEX AND MYPV INSTALLATION



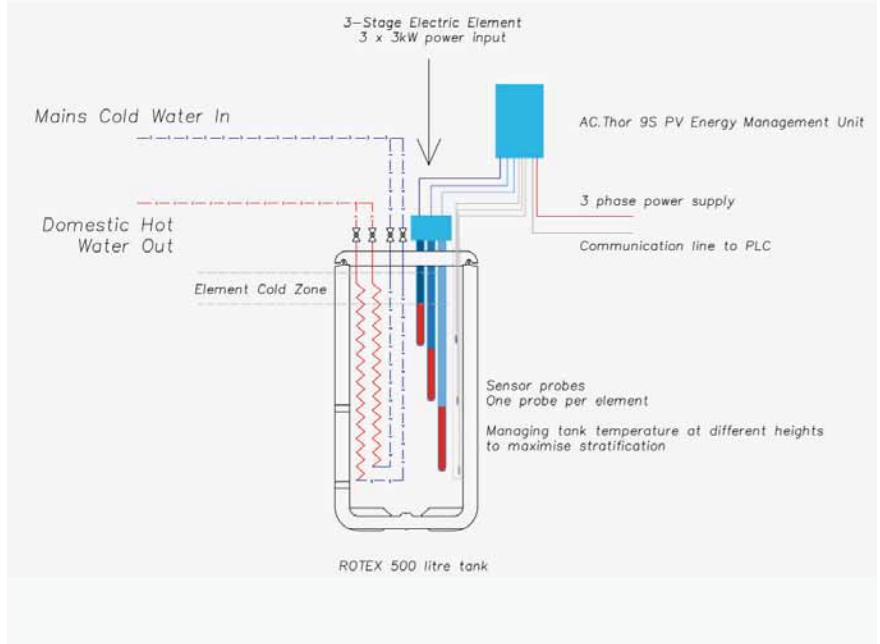
mains circuit for when solar yield conditions are unfavourable.

These system types are becoming more popular as industry groups gain a greater understanding and awareness of what's viable and how energy yields can be received, controlled and used.

Recent awareness has come to light that it is cheaper to store energy in the Rotex tank as a thermal battery [40kW per tank] as hot water storage rather than the expense of batteries which also have a limited lifespan. The Rotex tank also allows stored water at 85°C as it is an unpressurised vessel and has a heat transfer created by the 316 stainless steel closed loop circuit coils located within the tank.

In both residential and commercial applications the AC.THOR 9s energy distribution controller has the inbuilt technology which can activate electricity to lift temperature when high levels are required to control potential bacteria growth as in Legionella. ➤

AC.THOR 9S SOLAR PV HOT WATER SYSTEM ASSEMBLY



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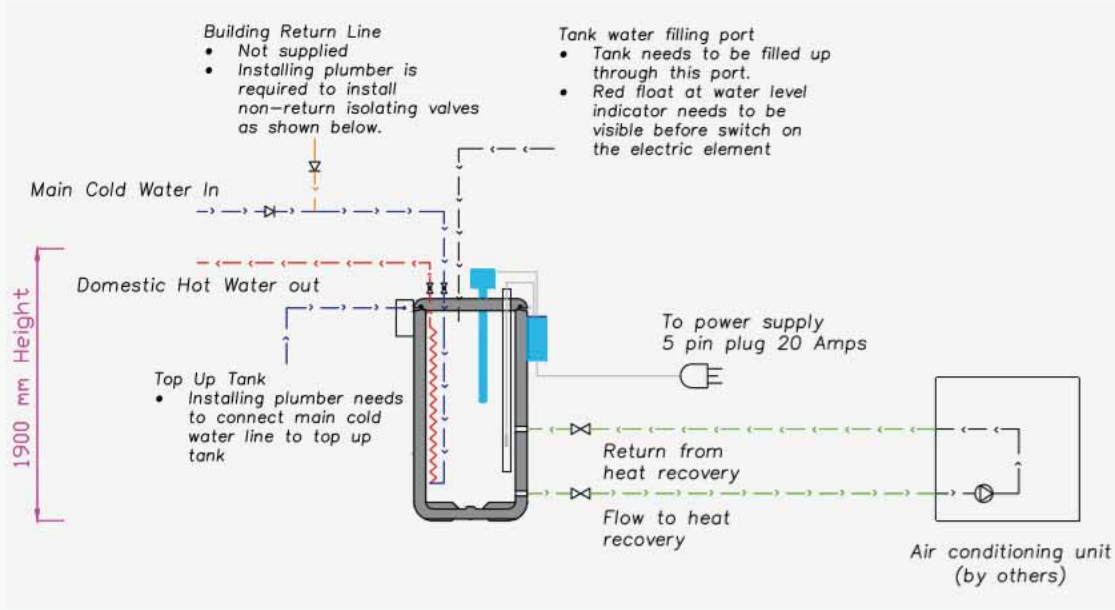


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USING AIR-CONDITIONING SYSTEMS TO HEAT WATER



The once mainstay energy sources are now becoming more expensive and with service charges making up a high percentage of a billing cost, 'off grid' energy yield is becoming a more sought-after project outcome.

In addition to solar PV which can essentially create hot water without an introduced power supply, commercial heat pump systems with the capacity to deliver up wards of 100-plus kilowatts of input per unit are also becoming a considered energy provision option to replace fossil fuel systems.

Waste heat recovery has been a method for mechanical heating for many years but recent large commercial restaurants are now using the facilities' air-conditioning system on site to provide an initial heat source from a heat exchanger where potable water is transferred via a small pump into a Rotex tank with stainless steel coils for heat distribution for the restaurants' commercial hot water needs [see diagrams/photos].

CONTROLLING ENERGY YIELDS

Traditional heat sources are now being significantly reduced in size and capacity as every energy contribution can be introduced from many

alternative sources to meet the needs and expectations of a client and the applications energy gain potential.

By the introduction of a DC power supply directly connected by cable into a vertical heating element or multiple elements that provide direct energy transfer heating is made available from a completely free supply cost source.

The multiple electrical heating elements in a Rotex tank provide controlled temperature zones and energise required water temperature increases via a controlling thermostat.

More than ever, potential heat transfer and energy yields are becoming a considered option for designers who are seeking methods not only to reduce energy consumption but plant cost as well.

An energy control logic system could also meet the needs and expectations of environmental engineers who have control over the selected type of DHW system and mechanical heating sources.

This outcome can be achieved using the AC.THOR 9s energy management system with the Rotex tank.

WHAT IS THE AC.THOR9S MANAGEMENT SYSTEM?

The AC.THOR 9s is a photovoltaic power manager for hot water and space

heating and can control linearly up to 9kW and up to three heat sources depending on available PV power and heat demand. It communicates via Ethernet with inverters, battery systems and smart residential and commercial DHW controllers to obtain the available information and data as to how much photovoltaic energy is available for use.

Therefore, less energy is required to be purchased from the public grid, generating savings to consumers/end users' running costs, meaning a conventional water or air heating system is no longer required or can be significantly reduced in size.

So a commercial water heating system that has the potential to be fed by a PV field without the need of pumps, flow and return piping and associated lagging, air eliminators and sensor cables can, via a direct electrical cable connection, meet energy reduction expectations and even replace conventional energy sources depending on available roof space for panel installation.

"Our systems allow for 100% self-consumption' of the energy gained from the photovoltaics, minimising what gets exported to the grid." says Rotex director Norm Anderson. ➤



A large commercial restaurant is using an air-conditioner as an initial heat source for commercial hot water needs.

THE FUTURE IS NOW WITH ENERGY REDUCTION OPTIONS

As markets and industries become more aware of energy reduction being a key fundamental of their businesses to maintain a competitive result, those prepared to invest can receive significant reduction to their operating costs and overheads often on a short return on investment (ROI) timeline.

Sustainability is now a critical asset to the plumbing industry and with Rotex systems being available to gain and use yields from many and varied sources, the industry can now, more than ever, move into a space of technology following demand and delivery performance with a future proofing and supportable cost outcome.

The plumbing industry has never experienced a more appropriate time to lead with innovation that has a direct and immediate impact on sustainability, the environment and energy reduction objectives.

ADVANTAGES OVER CONVENTIONAL HEAT SOURCES

For PV system outputs of 5-10kW, the AC.THOR 9s achieves seasonal-performance-factors [based on grid purchases] that are significantly above typical values. Thus, electric domestic and commercial water heating becomes

ecological and economical using cable instead of copper piping.

The AC.THOR 9s is the innovative advancement in photovoltaics and the new way for domestic heating systems. Cables instead of pipes, electricity instead of hydraulic systems, easy instead of complicated, self-generated energy instead of ever-increasing traditional fuel costs.

Energy yields are now available from many and various sources and can be controlled via a module that has the intrinsic function of being able manage electrical energy contributions and supply to either the Rotex storage tank or a buildings power supply requirements or to maintain tank temperature during periods of recovery performance modes.

If a space of more than a few square metres is available for solar PV to be positioned to provide a DC current directly connected to a vertical heating element, significant energy inputs are achievable reducing operating costs and providing sustainable energy use and management.

Sounds simple... and it is.

FUTURE PROOF YOUR DESIGN

The Rotex systems allow designers and installers to future proof any building through new installations

using a product with proven durability in Australia to provide a fit for purpose Commercial solution for any DHW or mechanical heating project.

The tank requires no sacrificial anode as it is constructed of plastic and has a removable lid enabling for maintenance or upgrading the system if ever the requirement for more hot water may eventuate.

Our electric elements systems controlled via photovoltaics can also be added as a retrofit solution at a later stage and one of the main benefits of the tank is that it can be carried through a standard door opening and be set up and operational in a short time allowing for retrofit and replacement with minimal DHW downtime to the building.

TRAINING

To experience this energy control system type operating, please contact us to arrange a site visit to our training facility in Dromana, Victoria.

Yours in hot water... ■

Jon Palfrey is the Thermal Energy Solutions/Rotex Commercial Manager & conducts training to industry groups relating to all things water heating.

