POWERPANEL™
HYBRID SOLAR THERMAL ENERGY & STORAGE

Everyone knows the sun can provide both electricity and heat. PowerPanel's patented PVT hybrid technology (photo-voltaic PLUS thermal) is the most efficient and effective way to capture all of it. And now our equally revolutionary Thermal Energy Storage System, augmented with proven Heat Pump technology, can put it to use when and where you need it most.

It's the most intelligent energy integration of the decade, proven by a 4X increase in energy output and made possible by new, patented technologies from PowerPanel—the company at the forefront of the next generation of hybrid energy systems.

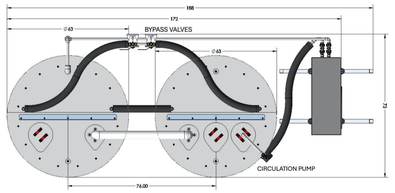
REVOLUTIONARY THERMAL ENERGY STORAGE SYSTEM

PV magazine, April 2024
"PowerPanel is taking a different approach: that of combining simple, safe, and easy to manage hot water with advanced thermoplastic technology and architecture—eliminating both the issues with old-fashioned steel tanks and the inherent risks of the newer exotic, inorganic thermal storage schemes… The adaptable materials that form the Tank cover the range of thermal applications, enabling either hot or cold storage from 200°F to as low as -25°F."

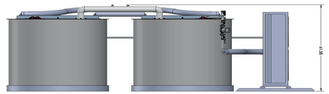
North American Clean Energy magazine, December 2024
"The PV generated enables the [PowerPanel] system to function as its own self-contained 'power plant' to run the water and heat pumps, heat exchangers, and other devices that comprise a hot water production and delivery system. Such a system can supply an entire commercial facility with enough 'net zero' hot water to meet its entire needs."

AltEnergy magazine, May 2024
"PowerPanel's Gen$_2$O Thermal Storage Tank scraps the concept of the traditional steel tank, replacing it with durable, safe, stable and recyclable thermoplastics. The result is a lightweight, secure, and rapidly-deployable thermal storage solution that can be set up in minutes and lasts for decades."

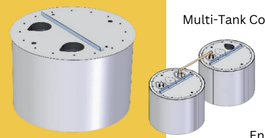
HVAC & Plumbing Product News, August 2024
"PowerPanel's new Gen$_2$O Thermal Tank is a departure from the steel types of tanks commonly used to store hot water… made from lightweight, modular 'building block' sections of expanded polypropylene foam. While much lighter in weight, it provides up to twice the insulation capability at a fraction of the energy storage costs of tanks made from conventional materials. A Gen$_2$O Thermal Tank will lose just a little over 3.6°F of heat over a 24-hour period."



THERMALTANK™
STORAGE TECHNOLOGY FROM POWERPANEL

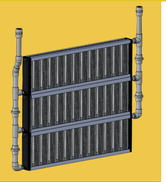


Thermal Storage Tank



Reference part number	PPTS0115.03
Multi-Tank Connection reference part number	PPTS0123.02
Storage volume	350 gallons (1,350 liters)
Diameter	60 inches (1.524 m)
Overall height	49.6 inches (1.259 m)
Weight (no fluid)	114 lbs (51.5 kgs)
Weight (filled with water)	3,089 lbs (1,402 kgs)
Floor Loading (filled with water)	157.4 lbs per sq ft (769 kgs per m2)
Energy storage per °C temperature	1.56 kWh (5,353 BTU)
Energy storage @ 35°C temperature delta	54.6 kWh (186,350 BTU)
Temperature loss- 24 hour (free convection)	2.1°C (3.58°F)
Shipping (volume purchase)	55 Units pr 40 foot ISO container, 7,000 lbs

Heat Exchanger



Heat Exchanger reference part number	PPPL0484.02
Type	Immersive, 8 bar
Body construction	Nylon plastic
Plumbing construction	1 inch SCHD 80 CPVC pipe & fittings
Heat Exchanger Connection (inlet and outlet)	1 inch female tapered pipe
Heat transfer rate (SI)	38 kW at 28 liter per minute flow
Heat transfer rate (Imperial)	130,000 BTU per hour at 7.4 GPM
Maximum flow rate	233 liters per minute (60 GPM)
Operating Pressure	5.5 Bar (80 psi)
Minimum operating temperature	-40°C (-40°F)
Maximum operating temperature	121°C (250°F)
Weight	9 kgs (20 lbs)

Balance of System

Heat Pump DHW (distributed hot water) Configuration*

Heat pump circulation	Grunfos Alpha 2 26-99FC
Motor	115 VAC 60 HZ; 1/6 HP
Pump head material	Cast iron
Performance (water)	33 GPM Max; with 3 speed settings
Insulated piping - Incotherm	1 inch SCHD 80 CPVC - PU with PVC outer jacket
Piping	1 inch schedule 80 CPVC
Hose - heat pump circulation	1 inch Parker 7092 GST braided, 200 psi
Hose - HX connections	1 inch Braided Food Grade PVC NSF 61-372
Service bypass valve assembly	Dual 1 inch brass 3-way ball valves

*Heat Pump systems can also be used to support cooling and space heating applications

Model:Arctic Air 050ZA (BE) used in Bolongo Bay installation. For other approved models contact PowerPanel	
Power Supply	220-240 single-phase 60 HZ; 40 amp breaker
Performance at -12°C ambient and 50°C outlet	Pwr in = 4.52 kW / Heat out = 10 kW COP 2.21
Performance at 7°C ambient and 50°C outlet	Pwr in = 4.89 kW / Heat out = 15 kW COP 3.07
Performance at 30°C ambient and 50° C outlet	Pwr in = 4.03 kW / Heat out = 21 kW COP 5.22
Dimensions in inches (width x depth x height)	16.5 w x 39.4 d x 54.3 h
Weight	260 lbs (118 kgs)

POWERPANEL™
HYBRID SOLAR THERMAL ENERGY & STORAGE

STOP THROWING AWAY ENERGY…

…instead, save it to use for later, with PowerPanel's breakthrough Thermal Energy Storage System

- More efficient— 3 to 4 times more so than conventional water heating systems, using proven Heat Pump technology to transfer heat exactly where it's needed
- More cost effective— especially when used with renewable and "green" sources such as PowerPanel's own hybrid solar/thermal panels, reducing or even eliminating the need for utility power. And, it qualifies for all Federal and local tax incentives since it's made in U.S.A.
- Easy to install—Thermal Storage Tank is made entirely of engineered advanced plastics. It's lightweight and ideal for rooftop installations
- Durable, built for the long term—unlike conventional steel tanks the Thermal Tank's EPP engineered plastic foam construction will never corrode

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MADE IN USA

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EFFICIENCY, COST AND ENVIRONMENTAL ADVANTAGES

When it comes to efficiency, water heating systems incorporating heat pumps—especially ones incorporating solar electric and solar thermal energy as heat sources— win over conventional water heating systems, averaging 3-4 times higher efficiency over gas and electric methods while reducing or even eliminating the need for fossil-fuel produced electricity.

Heat pumps work by transferring heat from one location to another where it's needed, using compression and a working fluid much the same way as an air conditioner does.

As a result, over the long term they "pencil out" to be more cost effective—dramatically so once the qualifying Federal and other incentives (including the 40% Federal Income Tax Credit) are factored into the investment. PowerPanel products and systems fully qualify because they are made in the U.S.A, making them ideal for "Green Infrastructure" projects.

SIMPLE ASSEMBLY - SETS UP IN 10 MINUTES

EPP foam pieces are inserted into a durable "hoop", made from lightweight, durable corrosion-resistant and recyclable plastic

The foam sectional pieces form an insulated tank inside the hoop, and are completed within a customizable liner for different fluids

The final tank with hardware and options installed. The entire process takes less than 15 minutes and can easily be handled by two people. The empty tank weighs just a little over 100 lbs for easy transport, handling and set-up

See the video on easy assembly and set-up

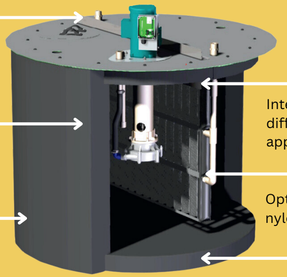
THERMAL STORAGE TANK

- **Tank capacities start at 350 gallons/1,350 liters**
- **Stores hot or cold fluids, from -25°F to +200°F**
- **Motorized pump module using durable Noryl plastic**
- **Tank designed to accommodate multiple options, including heat exchanger**

Multi-tank connection capability, for expanding storage capacity

Durable EPP foam material--insulation factor R18 with superior impact resistance

Outer "hoop" available in custom colors, for blending in with existing architecture



Interchangeable liners for safely storing different fluids, depending on the application

Optional heat exchanger with rugged nylon shell to resist corrosion

HEAT PUMP (OPTION)

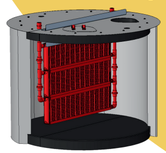
Heat pump with two interconnected tanks

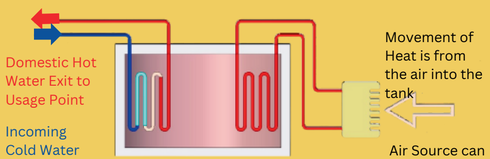
When augmented by Heat Pumps, a Thermal Generation and Storage system can easily maintain the desired water temperatures 24/7 by recovering heat from other sources (such as warm air or ground geothermal), when renewable energy sources may be reduced or unavailable (for example, solar thermal panels on a cloudy day and/or at nighttime). Heat Pump-equipped Thermal Storage systems are also ideal for use in space heating and cooling applications.

HOW IT WORKS

Heat pump hot water system using warm air

Thermal Tank (shown with Heat Exchange)





Success Story:
The Bolongo Bay Beach Resort

Because the US Virgin Islands struggle with some the highest electricity costs in the USA, the Bolongo Bay Beach Resort, a 45-room destination hotel, turned to PowerPanel for a solution using hybrid solar thermal-electric generation combined with heat pump technology. PowerPanel's Gen_2O Integrated System now provides enough hot water to meet the resort's daily needs, with a "net zero" effect in terms of emissions and costs- thanks to the ultra-efficient performance of the patented Thermal Tank technology.

The company's patented hybrid Photo- Voltaic/Thermal (PVT) array generates both solar electricity and thermal energy to heat water, with 4X the energy output of conventional solar PV alone. To produce enough thermal energy to "power" and supply the necessary 1400 gallons of water stored in PowerPanel's equally innovative Thermal Storage tanks, the Gen_2O heat pumps push additional heat into the system from the warm tropical air outside. The Thermal Tanks themselves also represent a breakthrough in design and materials—they are made from leading-edge, engineered thermoplastics and are safe, durable and recyclable, with none of the weight and corrosion issues associated with conventional steel types, making them practical for rooftop mounting. The resort uses 4 Tanks: 2 on the roof, and 2 at ground level for the heat pump system.

Because electricity costs are effectively reduced from 0.42 cents per kWh to 0.06 cents, the Made-in-USA system is expected to save the resort about $9,000 annually based on current electricity prices in St. Thomas with Federal and other incentive programs factored in, and achieve a return-on-investment in just over two years. According to the resort's managing director Richard Doumeng, "PowerPanel really did what they said they were going to do… their system now allows us to have all the hot water we need for our guests and use the sun's energy to do it, with no additional electricity needed."

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