

Longer-term disaster relief provides for basic human needs using renewable energy

## Dual-Energy Renewable Technology with Morningstar On-Board Helps Stricken Communities Recover and Thrive

Gen2<sub>0</sub><sup>™</sup>  
PORTABLE

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**Garth Schultz**  
President  
PowerPanels

## Summary

PowerPanel's innovative Gen<sub>2</sub>0 systems are changing the way disaster teams respond to crises, enabling populations at risk to access clean and hot water along with electricity even under the harshest, most challenging conditions.

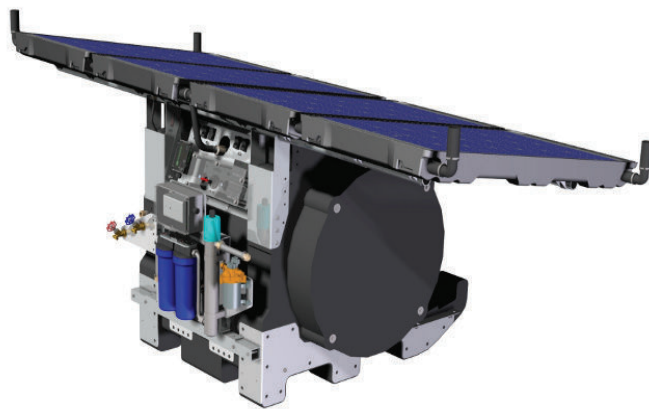
### Systems:

Portable and integrated PowerPanel systems, featuring combined PV and solar thermal panels, energy and hot water storage, and optional water filtration, incorporating Morningstar SunSaver<sup>™</sup> 20 (SS-20L-12V) and TriStar<sup>™</sup> 60 (TS-60 or TS-60M) solar charge controllers.

## In the case of a crisis

In a situation of extreme distress, while the average person can survive without food for weeks, the amount of time they can get by without water is measured by just days. Equally important is the ability to communicate with the outside world—because without that, the chances of improving or ending that distressful, emergency situation remain very low.

It was a "convergence of consideration" for these essential human needs that was the inspiration for the convergence of technologies behind PowerPanel. Founded by its president Garth Schultz in 2007, the mission is simple: "do good work out in the NGO world." That's a reference to Non-Governmental Organizations, the type that do the "heavy lifting" during emergency situations around the globe. However, achieving something that could meet the basic needs of potable drinking water, hot water for cooking and washing, and electricity—was a complex engineering challenge. Solving it required a uniquely integrated design approach, as well as new patented photo-voltaic/thermal hybrid technology—an all-in-one, easily and quickly deployable unit that could run nearly indefinitely in a remote location.



PowerPanel Gen<sub>2</sub>0 Portable, showing the storage tank, dual-energy PV/thermal array, electronics and batteries, and integrated shipping/mounting skid for rapid deployment

# Solution

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Schultz's background and experience proved up to the task. A veteran of vehicle development on projects involving GM, Chrysler and Ford, as well as clean agriculture initiatives, he started PowerPanel as a concept that, in the company's own words, would be "curious, creative and not conformist." The key was in integrating both photo-voltaic energy generation and thermal solar technology, the type used for solar hot water heating into a single panel, for maximum efficiency in harnessing the sun's output. A photovoltaic system uses sunlight to create electricity and a solar thermal system uses sunlight to generate heat. While PV electricity from solar modules is typically just above 20% efficient, if combined with thermal solar, that efficiency can jump up to an over 80% energy harvest.

The PowerPanel dual-energy module was developed as a result of their research and is capable of outputs exceeding the best single energy source PV or solar thermal conventional types individually. The four panels used in PowerPanel's innovative Gen<sub>2</sub>O Portable unit can produce 2.5kW of thermal energy for water heating, along with 540W of electrical energy for powering communications and/or to power the pumps and filtering equipment to supply 200 gallons of purified water per hour simultaneously—enough "solar powered electricity, hot water, potable water in one device" as stated in the spec sheet to meet the needs of a settlement or even an entire community during an emergency.

The next step was ensuring that the output of both PV solar generated electricity and solar heated water being generated by the same integrated panel could be effectively stored for on-demand use. To achieve that, PowerPanel's Gen<sub>2</sub>O Portable unit combines a proprietary molded polyethylene 52 gallon/200 liter thermal storage tank with a pair of matched AGM batteries with 2.4Wh electricity storage. The electrical system can also power an optional water filtration unit as well. Two Morningstar SunSaver 20 PWM charge controllers are on-board to manage and optimize solar battery charging and ensure long-term operation.

"We originally tried another brand of charge controller. After a month of use in our application, the case actually changed color and they quit working," says Garth Schultz. "So we switched to the Morningstar SunSaver after seeing that it was rated for oil & gas use, and figured it had to be good. It was, and we've never had a charge controller failure since. I even have one powering my own chicken coop at home!"

PowerPanel's Gen<sub>2</sub>O Portable can be easily transported on a pick-up truck. A team of several people can carry a Gen<sub>2</sub>O to a site and set it up quickly, with all the necessary materials built-into the unique foam pallet/base itself. **It takes less than 2 hours to go from unboxing to being fully operational.** That became a real advantage at PowerPanel's "trial by fire" in two challenging humanitarian crises, in Puerto Rico following Hurricane Maria in 2017 and most recently in the Ukraine in 2022.

The Gen<sub>2</sub>O Portable unit deployed in Dos Bocas P.R. provided a dependable, long-term source of clean water to the small community it served. In that emergency situation, PowerPanel teamed up with Good 360, Crisis Response International and RG Resource Technologies to successfully deploy the unit. Around the world in the Ukraine, a Gen<sub>2</sub>O Portable is providing hot water and enough electricity to serve an entire small community and keep them connected to the internet for vital communications, under extraordinary wartime conditions.

**With an optional Gen<sub>2</sub>O storage tank added , a single Gen<sub>2</sub>O Portable can potentially supply clean water for the daily drinking needs of a village of over 100 people indefinitely.** PowerPanel also produces a larger version called the Gen<sub>2</sub>O Integrated, which consists of 20 dual-energy PV/thermal modules and over 2kW of electricity as well as up to 700 gallons of hot water storage. Using Morningstar's TriStar 60 controllers for the larger PV array, these rooftop-mounted units are successfully serving hotels and apartment buildings. One Caribbean hotel using the unit is realizing energy savings of \$6,000 annually.

Garth Schultz says the best endorsement of his company's technology may be the simple and grateful one from one of the people benefiting from it in the Ukraine, as translated into English: "Despite all the outside challenges, this machine has made it so we can live less stressful lives... an enormous 'thank you' for this wonderful equipment!"