RV Electric/Propane Tankless Water Heater

The following is an excerpt from **Our "Los Gatos Casita" RV** modification write-up:

If and when our Casita trailer OEM Electric/Propane 6 gallon tank water heater fails, we hope to take advantage of our added 50A (12,000 Watts) 120/240VAC True Split-Phase AC Distribution Panel and replace our obsolete tank water heater with a dedicated and optimized RV Electric/Propane tankless water heater to provide endless hot water capability when using propane or when connected to 50A 120/240VAC Shore Power when we also have a readily-available supply of potable water and a convenient means to easily empty the gray water tank…which is always the case when we "glamp" with hookups and is now also always the case when we "glamp" without hookups too as previously described.

While RV Propane tankless water heaters are currently available, they are overly expensive, not well designed and perform very poorly. RV Electric/Propane tankless water heaters are NOT currently available. ***We do not want to be forced to use our propane to heat our water when we are paying for a 50A electric, water and sewer hookup and we want to take long hot showers!***

Well-designed, modern tankless water heaters with recirculation capability don't have any significant delay and don't waste any water at all to deliver hot water where needed. Despite the BS and ignorance based opinions you will often encounter on social media, tankless water heaters are ALWAYS more energy efficient than tank water heaters because they only heat water to the temperature you select and only for the short amount of time that you actually use this hot water as opposed to heating a tank of water to some high temperature and then having to keep heating it because of the continuous heat loss of the tank into the surroundings. ***This means that tankless water heaters ALWAYS use significantly less propane when camping without hookups than tank water heaters.*** Tankless water heaters require less space and weigh less than tank water heaters. Tankless water heaters don't need or use anodes that have to be frequently replaced and they don't have tanks that will collect grime, create Legionaries disease, corrode and eventually fail. Tankless water heaters do require periodic descaling using bypass valves in the system to allow pumping a descaling solution through just the tankless water heater. And while tankless water heaters are ALWAYS more energy efficient overall and thereby use less overall energy then tank water heaters, tankless water heaters do need and do use a lot of energy during the actual short duration of time that they are actually heating the water.

How much electric and propane energy a tankless water heater requires is solely a function proportional to the hot water flow rate and the water temperature rise that is required (i.e., required energy in BTU/H equals flow rate in GPM times delta temperature rise in degrees F times a proportionality constant of 500). The consensus opinion is that the ideal shower temperature is 105 degrees F. A 0.8 GPM shower head is fairly common for camping without hookups when water isn't as readily available. If you set the tankless water heater to produce a maximum of 105 degrees F at the shower head, you don't need to also mix in and waste cold water to reduce the temperature to 105 degrees F. The objective here being to only create the minimum flow rate of hot water needed at only the highest water temperature needed to reduce the tankless water heater flow rate and water temperature rise requirements and hence also reduce the associated electric and propane energy requirements. ***The end result being a more energy efficient, far longer life, lighter weight, reduced maintenance RV tankless water heater optimized for RV flow rates when camping without hookups using propane or when in campgrounds having a 50A hookup without using any propane at all.***

A 240VAC circuit using a double-pole 30A circuit breaker (and actually only using a maximum of 27A) will generate 6,500 Watts (i.e., 240VAC times 27A) or 22,000 BTU/H (i.e., 6,500 Watts times 3.41 BTU/H per Watt) which at a flow rate of 0.8 GPM could raise the input water temperature 55 degrees F (i.e., 22,000 BTU/H divided by 0.8 GPM divided by 500) which could then handle an input water temperature as cold as 50 degrees F (i.e., 105 degrees F minus 55 degrees F) and achieve our 105 degrees F ideal shower temperature.

When using only propane at 44,000 BTU/H, it could heat this 50 degrees F water to 105 degrees F at a 1.6 GPM flow rate (i.e., 44,000 BTU/H divided by 55 degrees F divided by 500). Or at a 0.8 GPM flow rate, it could raise the input water temperature 110 degrees F (i.e., 44,000 BTU/H divided by 0.8 GPM divided by 500) which would then allow handling even freezing 32 degrees F water and provide 142 degrees F water (i.e., 32 degrees F plus 110 degrees F).

When using electric (22,000 BTU/H) and propane (44,000 BTU/H) at the same, it could heat this 50 degrees F water to 105 degrees F at a 2.4 GPM flow rate (i.e., 66,000 BTU/H divided by 55 degrees F divided by 500). Or at a 1.6

GPM flow rate, it could raise the input water temperature 83 degrees F (i.e., 66,000 BTU/H divided by 1.6 GPM divided by 500) which would then allow handling even freezing 32 degrees F water and provide 115 degrees F water (i.e., 32 degrees F plus 83 degrees F). And when the input water temperature is warmer, which would nearly always be the case if you don't camp in cold weather (and why would any intelligent, well-off person CHOOSE to camp in cold weather...), it could provide even higher flow rates and/or provide even higher water temperatures.

For freeze protection of the RV potable water system and overall propane and water conservation, this RV tankless water heater should have recirculation capability such that the system water temperature is ALWAYS and ONLY kept above some low minimum temperature (e.g., 40 degree F) and is ONLY quickly heated to the desired set point temperature (e.g. 105 degrees F) for the specific faucet plumbing WHEN it calls for hot water and ONLY RELEASED from it AFTER this temperature is reached. Recirculation Solenoid Valve Modules should be made optionally available to easily enable extending this recirculation capability throughout the entire RV plumbing to all desired faucets. The existing temperature sensors in the Recirculation Solenoid Valve Modules plus an additional temperature sensor and an additional recirculation line in the potable water tank could be used to accomplish this freeze protection functionality.

To conserve electrical power, the Recirculation Solenoid Valve Modules **should normally remain unpowered** while connecting the cold/hot water lines and only get powered when disconnecting these lines and actually releasing the hot water at the faucet. To provide the lower flow rate performance levels needed for camping without hookups and recirculation capability without short cycling and shortening the unit life this RV tankless water heater ***should use two or three stages of modulation for both electric and propane heating.*** This RV tankless water heater should place the required electric and propane connections in similar locations that RV tank water heaters currently use so as to make installation and replacement very easy. Please see the European **NextGen Boiler** which we initially helped develop/market in the USA, often recommended in our many **Hydronic Radiant Floor Heating Designs** and is now available at **HomeDepot**.

So we are patiently waiting for some smart and innovative company to create an energy efficient, light-weight, Electric (240VAC 30A circuit) and Propane (44,000 BTU/H) tankless water heater to enable easy replacement of the obsolete Electric/Propane 6 gallon tank water heaters that we are currently forced to use in our RVs given the increasing number of RVs that now have a 50A (12,000 Watts) 120/240VAC True Split-Phase AC Distribution Panel. ***A dedicated and optimized RV Electric/Propane tankless water heater having the aforementioned capabilities is much needed and would certainly become a very popular RV product.***

Updated March 2024: We are now actively working with a well-established German tankless water heater company to design, test and bring this RV optimized Electric/Propane tankless water heater to the USA marketplace. Goodbye obsolete RV tank water heaters!

Updated September 2024: Several prototypes are now undergoing real life RV testing in Europe and by us in USA and are performing exactly as we designed.

Updated February 2025: The Recirculation Solenoid Modules have been developed and are now undergoing real life RV testing in Europe and by us in USA and are performing exactly as we designed.

Updated June 2025: General availability in USA is on hold due to our current USA federal administration Authoritarianism, Fascism, Nationalism, Protectionism, Religious Extremism, Wealthy Pedophiles First and White Supremacy policies causing alienation and trade issues with our previous allies and trading partners. Germany had similar failed policies in the 1930/40s that got them into WW2 that then resulted in the destruction of their country. As such they are now much smarter and they don't tolerate this degeneracy and lunacy at all and nor do we. It has also been alleged that some USA RV water heater manufacturers lobbied (AKA bribed) their puppet politicians to block import of this German product. Photos of our installation may eventually be provided when the patent process is completed and if this RV Electric/Propane tankless water heater can ever be imported into the USA. We absolutely love our new Electric/Propane tankless water heater. The recirculation freeze protection capability enables us to deal with extreme cold temperatures when traveling without any frozen and damaged plumbing risk, without any weight penalty of using more RV insulation and without using any electrical power to accomplish this. However, we are very sorry that other USA RVers can't yet share our joy.