# Your Hot Water Heater

- Have you ever had to wait for hot water in your kitchen or shower?
- Have you thought about how much water this wastes in a year?
- Do you want to decrease your carbon footprint?
- Do you want to save on utility bills?

## "TANKLESS" WATER HEATERS

A continuous flow water heater (a so-called "tankless" unit") may be the answer for HM downsized residents who could save on water and especially energy costs. There are five (5) major types of tankless units:

1. **Heat Pump Electric "Hybrid"**: A good choice for residents using electric to heat their water. Hybrids do have a tank.
2. **Electric**- 67% of HM residences are "all-electric". Not cost-effective. Most residents will have to bump up power at high cost.
3. **Gas**: 16% of residents have gas service. However, they heat water with electricity. Tankless is not a practical choice.
4. **Geothermal**: 15% have geothermal. Some homes already partially heat their water.
5. **Propane**: Probably not practical in HM. Need larger tanks. Many Villages prohibit.

Note: For this report the term tankless means both true Tankless and Heat Pump Hybrids.

**Standard Water Heaters**:
Traditional water heaters are fickle friends. During heavy use, the standard 80-gallon reservoir can be emptied faster than it refills and heats. Heating and maintaining that much hot water at once isn't very energy efficient, and if the heater suffers a catastrophic failure … that's a lot of water pouring into your basement or unit below you.

Several years ago the government set efficiency standards for water heaters. At first the manufacturers could only meet these standards by reducing the size of the tank and adding more insulation. Heavy duty models are available with lifetime warranties.

**Author's Note:** Many suppliers asked why I was interested in 80-gallon capacity. In their experience townhomes do not need such capacity. The answer is our hot tubs.

**Tankless Water Heaters**:
One major marketing point of tankless heaters is greater efficiency which translates into lower operating costs especially if your need for hot water is intermittent with long periods of time between use.

Tankless" does not mean "instant hot water." A tankless water heater does not necessarily deliver hot water to your tap any faster than a conventional water heater. In fact, a tankless unit *may be slower.* It takes time for the tankless unit's heating element to first heat water before delivering it to the tap.

Tankless water heaters cost more than a conventional unit, usually have longer warranties, last longer (20 years compared to 10-15 years for tank water heaters) and allow the homeowner to save money on energy. According to energy.gov, "For homes that use 41 gallons or less of hot water daily, continuous demand water heaters can be 24% to 34% more energy efficient than conventional storage tank water heaters." Energy savings vary depending on the efficiency rating of the unit and the cost of energy in the area.

**How does a tankless system work?**

When a hot water faucet is turned on, cold water is carried through pipes and circulated through a series of coils. Water is directly heated by an electric element or a gas burner that heats the water only if there is demand. They do not include a storage tank, which uses energy continuously to heat the water even when it's not being used. That means you're not wasting energy heating water when you don't need it. A water heater is the second most energy-sapping appliance in the house. Tankless units typically provide hot water indefinitely at a rate of two to five gallons per minute, depending on the model and the temperature of the groundwater.

A "Hybrid" water heater (really a heat pump) uses heat in the air pulled from different sources to condition and to heat water in the tank instead of creating heat by burning natural gas or using electricity.

If saving water heating cost or return on investment is the principal reason you are considering converting from a conventional hot water tank to a tankless on-demand heater, you should perform total cost analysis that reflects an accurate and unbiased comparison between the total costs of replacing (or installing new) a tank type water heater and a tankless.

When considering replacing a water heater the homeowner needs to consider the size of the heater that will be required, installation costs, the type of fuel (gas, electric or propane) and the actual size and bulkiness of the heater itself. The other issues are the flow rate of the unit and the noise level it might make.

**Heat Pump Electric Hybrids**:

Hybrid Water Heaters provide a solution to both high energy bills and running out of hot water. A Hybrid includes a heat pump that uses heat in the air pulled from different sources to condition and to heat water in the tank instead of using electricity. These hybrids are energy efficient both to the homeowner's wallet and to the environment; have different operating modes, and they are the safest types on the market. Most families will reclaim the incremental cost within four years.

Never running out of hot water again is the number #1 reason for buying a hybrid. Many hybrid water heaters can produce 2-3x the hot water flow of traditional models and the operating modes ensure that cold showers will never occur again. This also means no one will lose hot water if two large water draws (like dishwater, washing machine, or hot shower) are running at the same time.

**Greener World:** Most homeowners don't realize their water heater accounts for almost 19-30% of their home's energy usage. Hybrids lower costs, saving the homeowner money and lessening their reliance on fossil fuels. Also, by using a hybrid water heater, a resident is cutting their carbon footprint by 2 metric tons annually. This is around 10% of a typical household's footprint in the United States.

Different hybrid water heaters have different operating modes, but they all have one. Some homeowners will have to vent the hybrid to allow for good air circulation at an additional expense. HM residents with an unfinished basement can avoid this expenditure. Wherever they are located the area will be completely dehumidified.

Hybrids need an open area of at least 10' x 10' to circulate air properly. If one cannot provide such an area, it precludes using.

You should get extra five years life for hybrids.

**Electric Tankless Heaters**:

Replacing a standard heater with an electric is about 50% more than standard equivalent tank, because tankless units require a greater energy supply and usually require very expensive additional service (larger multiple electric lines & circuit breakers). However, there does not seem to be a market for these devices as **replacement** heaters. No supplier offered pricing.

**Gas Tankless Heaters**:

No one in HM uses their gas service to heat water. It is not an easy replacement. To install new gas lines and required venting through the wall may be price prohibitive.

**Power Vent Heaters:**

Power Vent Heaters are a good choice for those HM residents that have gas service. They have a tank and are very efficient; but still costly and require venting and new gas lines.

Both kinds of water heaters need regular flushing / maintenance, although the tankless type require a more involved procedure and are less forgiving of neglect.

| | **STORAGE TANK 50 GAL.HEATER** | **HYBRID** |
|---|---|---|
| **Description** | **Heater holds 50 gal., heats up the entire tank and keeps it warm until it needed for use and must regularly be re-heated.** | Hybrid electric heat pump heaters use heat from the surrounding air to heat your water. |
| **Size** | It will occupy a large space inside your home. | It will occupy a large space inside your home. |
| **Warranty** | 5-10 years. | 6-10. |
| **Life Span** | 8-12 years. | 15-20 years. |
| **Star Rating** | 4 or 5 Star | 6 Star |
| **PRO** | - Relatively low upfront cost.<br>-Reserve of hot water in case of a fault**.** | -Unlimited hot water.<br>-Provides a solution to both high energy bills and running out of hot water. |

| | | |
|---|---|---|
| | -Relatively simple to diagnose and fix problems.<br>- Easy installation.<br>- One gets enough flow for multiple uses like shower, dishwashing, cloth washing. | -Combines electric, air, and water technologies.<br>- Easy to install.<br>-Connections/installation similar to traditional so costs are lower.<br>-Will dehumidify home.<br>-Wi-fi & custom settings.<br>-Energy Star rebates.<br>- Works in a board range of ambient temperatures.<br>- Saves money through energy efficiency.<br>- Smart Home Integration with LCD screen, Wi-Fi and alarm.<br>- Custom settings.<br>- Environmently friendly.<br>-No wasteful pilot light.<br>- Reduces CO2 emissions. |
| **CON** | -Generally, less efficient, so more expensive to operate.<br>-Takes up a lot of space.<br>-Limited capacity of hot water. (50 gal.)<br>- Wastage of power/water due to keeping the water warm in the storage tank.<br>-Recovery time is substantially longer. - ---Likely to fail…potentially catastrophic flooding in your home. | -Some Up-front installation costs.<br>-Venting up front costs.<br>-Needs routine maintenance. |
| **Cost** | **$2,076.00 average** | **$3,007.00 average** |

## Summary and Savings Comparison

Research and analysis have determined that replacement true tankless units for HM are not price competitive because of the expensive conversion costs. Therefore, two good solutions are to be compared: 50-gallon standard electric vs. 50-gallon electric hybrids.

**WATER SAVINGS**:

The layout of the pipes and distance from the source in your home dictates how much water is wasted while waiting for hot water. Replacing with any tankless unit will not affect this. In addition, HM residents cannot save on water because their typical individual water bill has a fixed rate per month e.g., $18.00 / first 2,000 gallons.

The most important thing to understand about efficient water heating and efficiency is that the design of the system is much more important than the heater. The most super efficient heater will not make a poorly designed system efficient, and a well-designed system can be quite efficient with a standard water heater. For us in HM, the design is a given.

**Power Savings: (Traditional heater vs. Hybrid heater)**

According to PECO, the average consumption of electricity for HM residents is 20,000 KwH/year (rounded).

According to the U.S. Department of Energy, heating water accounts for about 19-30 percent of a family's energy bills.

**Calculation**:
Using the low end of 20% of 20,000 KwH=4,000 KwH x PECO generation cost of electricity of $.065950 plus .04828 for distribution for a total of $.11423 equals a annual savings of $457.00.

Using a price of $ **2,076.00** for a standard heater and **$ 3,077** for a hybrid, the additional cost of a hybrid has paid for itself within 2.2 years. In addition, you should get extra five years life for hybrids. With tax credits in place, hybrids will be paid back faster than ever.

**A Cautionary Tale**:

Switching to tankless won't necessarily save you operating costs. The units *are* more efficient, but that efficiency is often offset by lifestyle creep: when you know your hot water supply is limited you tend to be conscious of your use to ensure you don't run out, but if you have unlimited hot water the tendency is to take longer showers and be less frugal, offsetting the reduction in costs gained by greater operating efficiency.

## NEXT STEPS

- You should contact your plumber or one of the suppliers who advertise and support the HM Digest and the HM Directory.
- Research Rebates
- Take a look at the Comparison Table and decide what are your requirements/issues; then…

If saving water heating cost or return on investment is the principal reason you are considering converting from a conventional hot water tank to a tankless, you should perform total cost analysis that reflects an accurate and unbiased comparison between the total costs of replacing (or installing new) a tank type water heater and a tankless or demand water heater. Timeline of the analysis should be how long the residents intends to stay in HM or the predicted life of the product desired whichever is least.

Be sure to include these cost factors in your analysis after you understand pro and cons in above table.:

- Resident's s annual or daily hot water usage volume.
- Home's maximum hot water flow or demand rate.
- Comparative fuel or energy costs for the water heater of each type.
- Installation costs for the conversion from storage tank type to hybrid heater.
- Maintenance & repair cost comparisons for the two approaches to heating water.
- Cost of extras that may be needed for a successful on-demand type water heater installation such as

- multiple point of use water heaters or a higher capacity single tankless water heater to handle maximum hot water flow demand.
- requirement to install a water softener or water conditioner to protect the tankless heater from scale formation & clogging.
- the extra cost to purchase a on-demand heater that resists scale formation/damage.
- requirement to install one or more electrical circuits, such as 240V circuits to individual point of use locations for tankless water heater.

When considering purchasing a water heater the homeowner needs to consider the size of the heater that will be required, installation costs, the type of fuel (gas, electric or propane) and the actual size and bulkiness of the heater itself. The other issues are the flow rate of the unit and the noise level it might make. Proper installation and maintenance of your demand water heater can optimize its energy efficiency and significantly extend your water heater's life.

Therefore, it's best to have a qualified plumbing and heating contractor install your demand water heater. Do the following when selecting a contractor:

- Request cost estimates in writing
- Ask for references
- Check the company with your local Better Business Bureau
- See if the company will obtain a local permit if necessary and understands local building codes.

Periodic water heater maintenance can significantly extend your water heater's life and minimize loss of efficiency. Read your owner's manual for specific maintenance recommendations.

## CONCLUSIONS

- 50-gallon replacement conventional heaters are a viable choice for most HM residents especially those who will not be staying in their home long term. Consider larger capacity if you use your hot tub frequently.

- Gas tankless units are NOT a good option for HM residents.
- Electric Tankless units are NOT a good choice for HM residents.
- Heat pump hybrid electric units are a very good choice for those residents who will be staying in their home for 5 years. However, if one cannot provide a 10' x 10' open space, then it precludes using hybrids. Even moving existing location to another location if possible is cost effective.
- Power vent gas heaters are a good choice for residents with gas service. The cost of new gas lines and venting is much less expensive than gas tankless heaters.

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The following companies were utilized in the preparation of this Report:

Oliver Heating.

Horizon Services.

Horn Plumbing and Heating.

Websites of energy.gov and major manufacturers, Rheem, OC Tanner, AO Smith and Bradford White.