

## WHY HOME IMPROVEMENT EXPERT?

### An easy way to get a quality job.

Research findings reveal significantly reduced energy savings and potential performance risks where home improvements are not properly installed. To help homeowners address this challenge, the U.S. Department of Energy has compiled world-class expert guidance from industry leaders and national laboratories in factsheets and checklists under the name *Home Improvement Expert*. Homeowners can leverage these expert recommendations to help ensure quality installation by attaching Home Improvement Expert checklists to vendor contracts and ensuring the vendor completes and signs the checklist before accepting the work.

## READY TO DO MORE?

This factsheet and accompanying checklist cover one of more than 20 home improvements covered by the U.S. Department of Energy Home Improvement Expert. Use them to help optimize energy savings and improve performance related to comfort, health, safety, and durability.

To download other checklists: [bascc.pnnl.gov/home-improvement-expert](http://bascc.pnnl.gov/home-improvement-expert)

For more customized home improvement recommendations:

- Get your *Home Energy Score* from a qualified assessor ([www.home-energy-score.gov](http://www.home-energy-score.gov))
- Schedule an expert assessment through *Home Performance with ENERGY STAR®* ([www.energystar.gov/homeperformance](http://www.energystar.gov/homeperformance)).



## BENEFITS

Done correctly, gas tankless water heater upgrades can save significant utility expenses while providing unlimited hot water, longer life, and added safety by eliminating the potential for back-drafting of combustion gases.

Water heating is the second largest energy expense in a home – typically 18% of the total utility bill. High-efficiency gas tankless water heaters eliminate heat loss from stored hot water in tank systems and use more efficient burners for significant energy savings. The combustion process is decoupled from the indoors with ducting for outside combustion air and exhaust air. This mitigates potential back-drafting of combustion gases that can occur with less efficient atmospherically vented gas tank water heaters. These systems also provide added durability compared to tank systems, which are prone to leaks.

## RELATED HOME IMPROVEMENT CONSIDERATIONS

Before purchasing a gas tankless water heater, consider working with a qualified home energy assessor to evaluate other related home performance needs and opportunities. This includes:

- inspection of all plumbing fixtures and toilets to identify opportunities for switching to water-conserving options with the EPA WaterSense label; and
- testing how long it takes for hot water to reach the most remote plumbing fixture(s) to determine if it would make sense to install a demand-activated recirculation pump, which would eliminate thousands of gallons of water down the drain wasted waiting for hot water.

For more information on water heaters, please search the Building America Solution Center, [bascc.pnnl.gov](http://bascc.pnnl.gov).

## TIPS FOR HIRING A CONTRACTOR

- Look for licensed, insured, and certified contractors.
- Check references and reviews on home improvement web sites.
- Get multiple bids in writing.
- Check your utility and state, local, and federal weatherization programs for rebates and incentives.
- Include the Home Improvement Expert™ checklist in bids and contracts to ensure quality installation.
- Consider using a Residential Energy Services Network (RESNET) certified Home Energy Rating System (HERS) rater, Building Performance Institute (BPI) certified Building Analyst, or other qualified professional (e.g., licensed engineer or architect) to inspect the work.

**ENCLOSURE UPGRADES**

Attic Air Sealing and Insulation

Basement Wall Insulation

Framed Wall Insulation

Masonry Wall Insulation

Home Air Sealing

Vented to Unvented Attic

Vented to Unvented Crawl Space

Window Replacement

**HEATING & COOLING**

Air Conditioner Replacement

Gas Furnace Replacement

Heat Pump Replacement

Duct Sealing and Insulation

Oil or Gas Boiler Replacement

**HOT WATER HEATING**

Gas Tank Water Heater

Gas Tankless Water Heater

Heat Pump Water Heater

**FRESH AIR SYSTEM**

Bathroom Exhaust Fan

Kitchen Exhaust Fan

Balanced HRV/ERV

Balanced Supply plus Exhaust

Supply Integrated with HVAC

**PROPER SEQUENCING OF HOME IMPROVEMENTS**

Through the U.S. Department of Energy's Building America research program, expert guidance has been developed for optimizing whole-house energy-efficiency upgrades. This includes a recommended sequence for home improvements (shown below) to help ensure homeowners get the most out of their upgrade investments while minimizing potential harm from safety, indoor air quality, and moisture issues.

**STEP 1: ENSURE SAFE AND DURABLE**

Have experts assess opportunities to improve energy efficiency and identify comfort, moisture management, health, and safety issues.

**STEP 2: ENSURE FRESH AIR**

Ensure effective ventilation before increasing air tightness.

**STEP 3: ENSURE MOISTURE CONTROL**

Ensure adequate water protection before reducing the ability of walls to dry by adding air sealing and insulation.

**STEP 4: ENSURE DRAFT-FREE**

Capture air sealing opportunities not accessible after insulation is installed.

**STEP 5: ENSURE THERMAL COMFORT**

Insulate at least to the latest national code recommendations for your location after addressing related safety, indoor air quality, and moisture management issues.

**ANYTIME: EQUIPMENT UPGRADES**

Replace heating and cooling equipment, water heaters, windows, appliances, lighting, fans, and electronics when they fail or become out of date with ENERGY STAR® qualified products or better, and improve systems to operate more efficiently.



This U.S. Department of Energy checklist includes important specifications that can contribute to a complete and quality installation. All work shall comply with these specifications, all relevant codes and standards, and all manufacturer installation instructions. The contractor shall check each box on the checklist below and sign and date at the bottom to certify the work is completed.

### PREPARATION

- The existing hot and cold water pipes around the water heater shall be inspected for water leaks before installation, and any leaks found shall be reported to the homeowner for repairs before continuing the work.
- The existing gas service line shall be inspected to determine if the size is adequate for the tankless gas water heater. If not, the gas line shall be replaced with one of adequate size.
- The contractor shall determine whether the water heater model to be installed requires an outlet or a hard-wired power supply, confirm the availability of an electrical outlet or supply near the location for the water heater, and install an outlet if necessary.
- The water hardness shall be tested and recommendations shall be made to the homeowner about installation of a water softener if the tested level exceeds manufacturer-specified limits.
- The water heater shall be sized based on the maximum demand anticipated and the temperature rise needed (which depends on climate).

### INSTALLATION

- The water heater installed shall be ENERGY STAR certified.
- Collection and disposal of combustion condensate shall be provided if necessary. For a closed water supply system (i.e., with a back-flow preventer in the cold water supply), provisions shall be made to control thermal expansion (i.e., install an expansion tank if needed).
- Where required by local codes, a mixing valve shall be installed to reduce the point-of-use temperature of the hot water to prevent scalding.
- Where water leakage from the water heater could cause damage to the home, a building code-compliant emergency drain pan shall be installed with a 3/4-inch drain line or larger running to a drain or pumping to daylight.
- All accessible pipes connected to the water heater shall be insulated with a minimum of R-3 pipe insulation.
- The water heater shall be installed in compliance with the manufacturer's specifications and relevant industry standards.
- If installation of a new sealed-combustion, direct-vented water heater results in a vacated entry point in the chimney, the hole in the chimney wall shall be sealed.

### COMMISSIONING

- The water heater shall be commissioned in compliance with the manufacturer's specifications and relevant industry standards.
- All operation and maintenance procedures shall be reviewed with the homeowner.
- The gas line shall be tested for leaks after installation is complete.

I hereby certify that, to the best of my knowledge and ability, all checked items on the above checklist have been accomplished as part of completion of this home upgrade.

Contractor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Contracting Organization: \_\_\_\_\_

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