



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: basc.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)
- Schedule an expert assessment through **Home Performance with ENERGY STAR®** (www.energystar.gov/homeperformance).



BENEFITS

Installed correctly, heat pump water heaters can cut utility expenses by up to 60% while providing additional cooling and dehumidification during hot weather.

Water heating is the second largest energy expense in a home – typically 18% of the total utility bill. High-efficiency heat pump water heaters reduce heat loss with well-insulated tanks and produce heat much more efficiently using the refrigerant cycle rather than electric resistance. This process also provides additional cooling and dehumidification to the space, which can be useful during hot weather and a penalty during cold weather.

RELATED HOME IMPROVEMENT CONSIDERATIONS

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

- inspection of plumbing fixtures 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 fixtures 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, basc.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 with 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

Comprehensive Attic Upgrade

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 new replacement water heater shall be sized based on the first-hour rating.

INSTALLATION

- The new water heater shall be ENERGY STAR certified and shall be installed in compliance with manufacturer's specifications and relevant industry standards.
- The new heat pump water heater shall be installed in a space with adequate clearance to ensure efficient operation, maintenance, and flow. The minimum space shall be 750 ft³ or as specified by the manufacturer. If the space where the water heater is located is smaller than specified, manufacturer requirements shall be followed (e.g., connecting the space to a larger space via a louvered grille in a wall or door or to the outdoors via ducting provided by the manufacturer).
- 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 ¾-inch drain line or larger running to a drain or pumping to daylight.
- The water heater shall be installed on blocks within the drain pan when a drain pan is included.
- The temperature shall be set and the pressure relief valve shall be installed according to the manufacturer's specifications; the discharge tube shall be terminated within 6 inches of the floor or as prescribed by local code.
- 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).
- The hot water line exiting the water heater shall be installed with a heat trap configuration or nipple to prevent thermosiphon losses.
- Where required by local codes, or if desired, a mixing valve shall be installed to reduce water temperature at the tap to prevent scalding.
- All accessible hot water pipes connected to the water heater shall be insulated with a minimum of R-3 pipe insulation.
- A condensate drain shall be installed in accordance with the local code.

COMMISSIONING

- The water heater shall be commissioned in compliance with the manufacturer's specifications and relevant industry standards.
- Maintenance procedures shall be reviewed with the homeowner (e.g., filter, condensate, check for leaks, draining and flushing).
- Once the system has been filled and purged, safety and operational controls shall be verified and the system inspected for water leaks.

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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