Home Improvement Expert™ Factsheet

Adding Exterior Insulation when Re-Siding

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 the homeowner accepts 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

Re-siding your home provides an excellent opportunity to cost-effectively add exterior rigid insulation to the home's walls.

Older homes often lack effective wall insulation and air sealing, leading to excessive heat loss in winter and heat gain in summer. Wrapping the walls in a layer of rigid insulation is an effective way to improve the comfort and durability of your home while reducing heating and cooling bills. When the old siding is removed, your contractor can inspect the walls and windows, replace any damaged sheathing, air seal, and add house wrap, before installing the exterior rigid insulation, flashing, and new siding. There are several rigid insulation options to choose from, including expanded polystyrene (EPS), extruded polystyrene (XPS), polyisocyanurate, mineral wool boards, fiberglass, or cork, etc. If a foam plastic sheathing like XPS, coated EPS, or foil-faced polyiso is chosen, the contractor can seal the seams with a compatible tape so the rigid foam can serve as the weather-resistive barrier under the new siding. If a non-foam insulation board like mineral wool, wood fiber, or glass-fiber board is chosen, the contractor will first cover the sheathing with a paint-on sealant or house wrap that is taped or sealed at the seams then install the rigid insulation over this air and weather barrier. If the wall cavities lack insulation, consider adding cavity insulation too, either by removing the sheathing to install batt insulation or using the "drill and fill" method to install blown cellulose or fiberglass. Siding replacement is also an excellent time to consider window upgrades, ranging from adding interior or exterior storm windows, to replacing the window glazing unit, to full window and frame replacement. With the siding removed, the contractor can properly install window flashing to prevent drafts and water leaks for years to come.

RELATED HOME IMPROVEMENT CONSIDERATIONS

Air sealing and adding exterior insulation will reduce air leakage into and out of the home.

- Talk with your contractor or a qualified home energy assessor about the need for increased ventilation to bring in fresh air and remove stale air and moisture.
- If you have older gas appliances that draw their combustion air from inside the home, ask your contractor or energy assessor if a fresh air intake should be added to the home.

For more information, please see 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.
- Ask contractors to 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, Home Energy Score (HES) assessor, 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.

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For more resources, visit
basc.pnnl.gov/home-improvement-expert

PNNL-SA-185244 • May 2023

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Home Improvement Expert™ Checklist
Adding Exterior Insulation when Re-Siding

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 walls shall be inspected for any evidence of bulk water penetration, knob and tube wiring, or moisture or pest damage, and a list of any potential problems shall be provided to the homeowner before proceeding with the work so remediation can be fully addressed within the scope of the siding replacement.
☐	Inspect the walls and note architectural features, window and door trim projections, hose bibs, light fixtures, and other features that may be impacted by the addition or exterior insulation.

INSTALLATION: CONTINUOUS EXTERIOR INSULATION

☐	Existing wall cladding and trim shall be removed.
☐	The wall sheathing shall be free of any protruding nail heads, screws, or irregularities to ensure a smooth surface for installing the air/water control membrane.
☐	All exposed cracks and penetrations at sheathing, rim areas, and top and bottom plates shall be air sealed with sealant compatible with the surface.
☐	If foam plastic insulation sheathing (FPIS) like XPS or foil-faced polyiso is used for the exterior rigid insulation, tape the foam with a compatible tape to serve as the air and water control layers. If other exterior insulation products are used, install a liquid-applied weather-resistant barrier product or housewrap with all of the seams taped.
☐	Flashing for windows and doors shall be integrated with the WRB to protect the wall assembly from bulk moisture.
☐	If the existing windows and doors are replaced and frames are replaced as well, new head, jamb, and sill flashing shall also be installed and properly integrated with the insulation and weather-resistant barrier layers.
☐	Insulation shall be installed in accordance with the R-value specified for the wall assembly under the contract agreement for this work.
☐	Furring strips, draining house wrap, or other spacing material shall be installed to provide an air gap behind lap siding, or brick or stone veneer. Wall cladding and trim shall be attached to the furring strips or through the air gap material to the studs. Where vinyl siding is used, the furring strips are not required.
☐	Install new siding per manufacturers' instructions.

COMMISSIONING

☐	A combustion safety test in accordance with ANSI/ACCA 12 QH Appendix A or RESNET Chapter 8 shall be performed if any natural draft combustion appliances (e.g., water heater, furnace) exist in the home to help ensure there is no back-drafting or spillage of combustion emissions when the home is made more airtight. Recommendations for remediation shall be made to the homeowner where combustion safety issues are identified.

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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