

Navajo Nation Priority List for Single-Family Housing

The *Navajo Nation Priority List for Single-Family Housing* lists the weatherization measures that shall be installed in Navajo single-family homes. The measures should be installed in order, as conditions dictate and funding allows. The most cost-effective measures are listed first. When no electric service is present, a more restrictive list of measures must be followed (see note on Electric Service below). Site-specific audits should be completed for unusual single-family homes or when measures not listed below appear suitable for a particular house.

An analysis of typical homes identified the following weatherization measures to be cost effective based on Navajo housing stock, energy costs, and climatic conditions.



Wood Stoves:

- For wood stoves, DOE analysis indicates that **\$2,300 of total replacement costs can be financed through program operations funds**. The remaining installed cost should be financed from alternate non-federal funding sources.
- If total installed cost (including chimney kit) is under \$2,300, charge to program operations
- If total installed cost is over \$2,300, the chimney kit can be charged as health and safety to bring down the total installed cost.
- All wood stoves not being replaced should be checked for draft and CO to ensure they are safe.

Health and Safety Measures:

- DOE Health & Safety Notices (Weatherization Program Notice [WPN] 11-6 and subsequent versions) contain the guidance on allowable costs.
 - Excludes items such as windows, doors, ramps, and handrails
 - Costs are reasonable as determined by DOE in accordance with the Navajo Nation's approved Annual Plan; **AND**
 - The actions must be taken to effectively perform weatherization work; **OR**
 - The actions are necessary as a result of weatherization work.

Electric Service: Homes with no electric service must not install electricity-based priority list measures, including:

- Duct Sealing
- Lighting Retrofits
- Refrigerator Replacement
- Heat Pump Installation

General Heat Waste Measures: (Items must only be performed on homes with hot water service)

- Set back water heater temperature to 120° F (with client approval)
- Install low-flow showerheads if existing showerhead has a flow rate greater than 2.5 gallons per minute. (with client approval)
- Install faucet aerators.
- Install insulating water heater tank blanket if none exists. Follow safety guidelines detailed in the *Energy OutWest Field Guide*.
- Install pipe insulation on the first six feet of hot water pipe exiting the water heater.
- Install new furnace filter or air conditioner filters.

1. Duct Sealing: (Skip measure if home is without electric service)

- Seal accessible ducts, connections, and boots with mastic.
- Insulate ducts located outside the conditioned space with R-4, foil-faced duct insulation.
- Pressure pan test all registers with blower door running to determine relative air leakage of tested sites. The goal is a reading of 1 Pascal or less.



2. Air Sealing:

- Use the blower door and digital manometer to guide air sealing.
- Determine the closure target.
- Seal plumbing, electrical, and HVAC penetrations through ceiling, flooring, and exterior walls. Use proper materials for high-temperature surfaces.



Primary Space Heating Fuel	Cost limit per 100 CFM50 of reduction:
Wood	\$25.00
All other	\$50.00

3. Attic Insulation: The amount of attic insulation that can be cost-effectively added depends on existing levels of insulation and HVAC type. If existing insulation is R-19 or less, add insulation until the R-value in **Table 1** is reached.

- Air seal the attic, including wire and plumbing penetrations, recessed light fixtures, and other bypasses, prior to insulating the attic.
- Check electrical circuits. Enclose exposed wires and connections in junction boxes.
- Check attic ventilation. There should be 1 square foot (ft²) of attic net free vent area for every 150 ft² of ceiling area if there is no vapor barrier¹. The ratio is 1:300 if a vapor barrier is present, or if 50% to 80% of the vents are placed at least 3 ft. above the lower vents. Generally, half of the vent area should be located low and half should be located high to induce good ventilation.



Table 1 – Post-Weatherization Attic Insulation R-Values

Primary Space Heating Fuel	If existing insulation is R-19 or less, add to reach these levels:
Propane	R-49
All other	R-38

¹ A sound, painted ceiling counts as a vapor barrier.

4. **Side Wall Insulation:** See the *Dense-Pack Sidewall Insulation* technical brief for installation procedures.

- Drill test holes to determine existing insulation.
- If there is no existing wall insulation, dense-pack all sidewall cavities with insulation at the recommended density.
- If all test holes indicate existing wall insulation, skip sidewall insulation measure.
- If some wall cavities have existing insulation and some do not, drill additional test holes to determine if sidewall dense-packing is warranted. If at least half of the wall cavities have no existing insulation, dense-pack all sidewalls with insulation.
- Wall insulation should only be installed in walls that can withstand the additional insulation.
- There is an additional allowance of up to \$2.00/sf to insulate a wall that needs to be substantially rebuilt before it can be insulated.



5. **Floor Insulation:**

- Before adding floor insulation, establish an effective air barrier at the floor.
- Add insulation to R-11 or maximum amount that joist dimensions will allow to all uninsulated floors.
- Install vapor barrier in crawl spaces.



6. **Lighting Retrofits: (Skip measure if home is without electric service)**

- Install compact fluorescent lamps (CFLs) in sockets used more than two hours per day.
- Tip: Use ENERGY STAR-qualified CFLs with a correlated color temperature between 2,700 – 3,000K (warm white).
- Educate client on proper disposal.

7. **Replace Refrigerator: (Skip measure if home is without electric service)**

- Determine annual energy consumption of existing unit by metering it for at least two hours. **Note: DOE requires grantees to meter at least 10% of units that are replaced.** Electricity usage of refrigerators can also be found in the database http://www.waptac.org/sp.asp?mc=techaids_refrigerator.

Table 2 – Refrigerator Replacement: Maximum Measure Cost for a Cost-Effective Refrigerator Replacement

Annual kWh/yr Existing Unit	Annual kWh/yr of New Refrigerator		
	400 kWh/yr	500 kWh/yr	600 kWh/yr
900	\$442	\$353	\$265
1,000	\$530	\$442	\$353
1,100	\$618	\$530	\$442
1,200	\$707	\$618	\$530
1,300	\$795	\$707	\$618
1,400	\$795	\$795	\$707
1,500	\$795	\$795	\$795
1,600	\$795	\$795	\$795

- Replacement refrigerators *may not* have through-the-door ice or water service.
- Original units must be removed and decommissioned.

8. **Heating and Cooling System: (Skip measure if home is without electric service)**

- Installing a **Heat Pump Replacement** can **only** occur in a home heated by a forced air electric furnace **and** a central air conditioner (existing equipment in place).
- Home must already have ducts.
- Manual J calculations must be completed to appropriately size the heat pump with higher order weatherization measures included.
- Maximum installed cost: **\$2,500**.
- Inoperable furnace replacements must use health and safety funds.
- A clean and tune not to exceed \$150 total cost is appropriate if the existing system does not need to be replaced. Install new furnace filter or air conditioning filter.
- If measured CO level of the heating system is 100ppm or greater the clean and tune is an allowable health and safety cost.
- Switching from furnaces to wood stoves is a fuel switch and must be approved on a case by case basis.

Incidental Repairs:

- Cost is limited to **\$400.00** in total
 - Incidental repairs should only be undertaken after other priority list measures have been performed
 - Incidental repairs must be energy related or installed to protect an energy related measure.
- | • Some examples include window or door repair