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 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.

<table>
<thead>
<tr>
<th>Primary Space Heating Fuel</th>
<th>Cost limit per 100 CFM50 of reduction:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td>$25.00</td>
</tr>
<tr>
<td>All other</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Primary Space Heating Fuel</th>
<th>If existing insulation is R-19 or less, add to reach these levels:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>R-49</td>
</tr>
<tr>
<td>All other</td>
<td>R-38</td>
</tr>
</tbody>
</table>

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=tech aids_refrigerator](http://www.waptac.org/sp.asp?mc=tech aids_refrigerator).
   - Replacement refrigerators **may not** have through-the-door ice or water service.
   - Original units must be removed and decommissioned.

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

<table>
<thead>
<tr>
<th>Annual kWh/yr Existing Unit</th>
<th>400 kWh/yr</th>
<th>500 kWh/yr</th>
<th>600 kWh/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>$442</td>
<td>$353</td>
<td>$265</td>
</tr>
<tr>
<td>1,000</td>
<td>$530</td>
<td>$442</td>
<td>$353</td>
</tr>
<tr>
<td>1,100</td>
<td>$618</td>
<td>$530</td>
<td>$442</td>
</tr>
<tr>
<td>1,200</td>
<td>$707</td>
<td>$618</td>
<td>$530</td>
</tr>
<tr>
<td>1,300</td>
<td>$795</td>
<td>$707</td>
<td>$618</td>
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<tr>
<td>1,400</td>
<td>$795</td>
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<tr>
<td>1,600</td>
<td>$795</td>
<td>$795</td>
<td>$795</td>
</tr>
</tbody>
</table>
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.

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**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.

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Some examples include window or door repair