

ORIGINAL NEW APPLICATION



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2005 JUN -6 P 4: 36

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Arizona Corporation Commission
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IN THE MATTER OF THE APPLICATION OF
ARIZONA PUBLIC SERVICE COMPANY FOR
APPROVAL OF APS ENERGY WISE LOW
INCOME WEATHERIZATION PROGRAM, (A
DEMAND SIDE MANAGEMENT PROGRAM)

Docket No. E-01345A-05-____
APPLICATION
E-01345A-05-0414

Arizona Public Service Company ("APS" or "Company") hereby submits this Application for Approval of its Energy Wise Low Income Weatherization Program ("Energy Wise Program")¹. The Energy Wise Program is first of a series of Demand Side Management ("DSM") programs that APS will be proposing in the upcoming months to fulfill its DSM obligations pursuant to the Arizona Corporation Commission ("Commission") Decision No. 67744.²

Program Description

The Energy Wise Program is an expansion and modification of the current program which has been in place since 1996. This program is available to all income-qualified³ residential customers in the APS service territory, including those on tribal lands. Estimates based on census data indicates that there are between 135,000 and 180,000 customers in the target market. The objective of the Energy Wise Program is to help low income customers, who may spend a high

¹ The proposed Energy Wise Program is attached as Exhibit A.

² In Decision No. 67744, the Commission adopted a settlement agreement that obligates APS to spend a total of at least \$48 million on approved eligible DSM-related items during the calendar years 2005 – 2007.

³ To be income-qualified, the APS residential customer must have a household income of less than or equal to 150% of the federal poverty guidelines.

1 proportion of their total income for energy to reduce that cost, thereby making funds available for
2 other necessities.

3 The Energy Wise Program consists of four components: 1) Weatherization; 2) Health and
4 Safety; 3) Repair and Replacement; and 4) Bill Assistance.

5 The Weatherization component of the Program provides low income residential customers
6 with an assessment of the feasibility of improving the energy efficiency of their homes, and to
7 install energy effective measures. An assessment of the dwelling's structure and appliances are
8 required to determine which cost effective measures are necessary. General repairs may also be
9 done, such as repairs to stop roof leaks, repairs or replacement of non-repairable exterior doors,
10 and the restoration or replacement of ceiling areas that cannot support ceiling insulation.

11 The Health and Safety provisions provide financial assistance for installation of window
12 unit air conditioners and heat pumps that are prescribed by a medical doctor.

13 The Repair and Replacement component allows for the repair or replacement of non-
14 functioning appliances and is limited to air conditioners, heat pumps, evaporative coolers,
15 refrigerators, and water heaters that impact energy use.

16 Bill Assistance will be used to pay electric bills for customers in crisis situations. These
17 situations include those who are at risk of endangering their health by not utilizing necessary
18 appliances, such as air conditioners, hot water heaters, or ovens; a sudden loss of income; or an
19 unexpected expense that resulted in the inability to pay, such as a medical expense. The
20 maximum funding per household is \$400 per year.

21 APS will provide overall program management for the Energy Wise Program. For the
22 non-tribal participants, the program will be administered through a third party independent
23 administrator who will coordinate with community action agencies. For the Native American
24 participants, APS will coordinate with the agencies authorized by tribal governments to serve low
25 income households in the APS service territory. Key partnering relationships may include
26

1 agencies such as the Inter-Tribal Council of Arizona, Navajo Nation Weatherization services and
2 the Arizona Energy Office.

3 **Estimated Energy Savings & Benefits of Program**

4 The maximum total combined program expenditure per home in a 12 month period for
5 Weatherization, Repair/Replacement, and Health and Safety is \$6,000. It is estimated that the
6 Energy Wise Program will result in 14,447 lifetime megawatt hours reduction in energy per year,
7 and a 145 kW demand reduction per year. The average cost savings to each equivalent customer
8 served under this Program is estimated to be \$180 per year. Lifetime savings are estimated to be
9 approximately \$2,700, based on \$1,255 expenditure per equivalent home.

10 The DSM collaborative working group⁴ has participated in the development of the
11 proposed Energy Wise Program. Prompt Commission approval of the Energy Wise Low Income
12 Weatherization Program will help ensure that the valuable benefits to low income customers in
13 the APS service territory will be available during the high temperature season and that APS can
14 comply with the 2005 DSM spending requirements ordered in Decision No. 67744.

15 For the reasons stated above, APS requests that the Commission expeditiously approve the
16 proposed Energy Wise Low Income Weatherization Program.

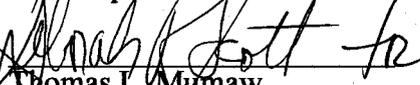
17 Respectfully submitted this 6th day of June, 2005.

18 SNELL & WILMER L.L.P.

19 

20 Deborah R. Scott
Kimberly A. Grouse

21 PINNACLE WEST CAPITAL CORP.
22 Law Department

23 

24 Thomas L. Mumaw
Karilee S. Ramaley

25 Attorneys for Arizona Public Service Company

26 ⁴ This collaborative group was formed as a result of Decision No. 67744.

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ORIGINAL and 13 copies of the foregoing
filed this 6th day of June 2005, with:

Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

A COPY of the foregoing was hand-delivered
this 6th day of June, 2005, to:

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Participants in ACC DSM Workshops

Vicente D'Cola

EXHIBIT 1

Arizona Department of Commerce Energy Office

Weatherization Assistance Program Rules

**JULY 1, 2005
EDITION**

WEATHERIZATION ASSISTANCE PROGRAM APPENDIX

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ENERGY AUDIT PROCEDURE

The Weatherization Assistance Program (WAP) Energy Audit Procedure is to be used by all sub-grantees to gather, record and analyze data on structures. This data is to be used to deliver weatherization materials/measures in a fashion that protects the health and safety of the client, increase the durability of the structure, increases the comfort of the client and reduces the energy cost to the client in a cost effective manner.

The following audit activities must be completed on all homes utilizing WAP funds.

- A site audit is to be completed that records all of the relevant data on the structure that is needed to perform a cost effectiveness test.
- The Cost Effectiveness Procedure must be followed to determine cost effectiveness of potential weatherization materials/measures.
- The Pressure Diagnostic Procedure must be completed and the findings documented following the Reporting Procedures.
- A health and safety audit of the structures must be completed and the findings documented following the Reporting Procedures.

COST EFFECTIVENESS PROCEDURE

WAP has incorporated a performance based energy audit procedure that focuses on optimizing investment in energy efficiency through a systems approach. To enable the WAP program to optimize the investment in energy efficiency, the following requirements have been established for the audit procedure:

- The energy audit procedure must determine that each weatherization material/measure is cost effective by ensuring the discounted savings-to-investment ratio (SIR) is greater or equal to one.
- The energy audit procedure must assign priorities among weatherization materials/measures in descending order of SIR and must account for interactions between architectural and mechanical measures.
- The energy audit procedure must ensure that the overall SIR for the entire package of materials/measures, including the cost of incidental repairs, is greater or equal to one. Incidental repairs are only allowed if they are necessary to make the installation of weatherization materials effective.
- Funds spent to abate energy related health and safety hazards do not need to be included in the preceding requirements. Funds can be spent to eliminate health and safety hazards when the elimination of the hazard is necessary before or because of the installation of weatherization materials.

- A waiver must be received from the Energy Office before the installation measures/materials that do not meet the Cost Effectiveness or Health and Safety Requirements established by the WAP program.

To determine the cost effectiveness of weatherization materials/measures, the contractor must use a computer audit approved by the Energy Office or an appropriate priority list for homes that meet the criteria contained in the list.

FUEL SWITCHING

The Weatherization Assistance Program does not permit the general practice of fuel switching when replacing heating, cooling or water heating equipment. The changing or converting equipment using one fuel source to another will be considered on a limited case-by-case basis only.

A waiver must be received from the Energy Office prior to changing or converting equipment using one fuel source or another.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 1 – Flagstaff, Showlow

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 1 (see Climate Zone map). The priority list is comprised of two housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Gas Heating

- Existing ceiling insulation of R-19 or less upgraded to R-38.
- Uninsulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

Housing Type Two: Homes with Electric Resistance Heating

- Existing ceiling insulation of R-19 or less upgraded to R-38.
- Uninsulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 2 – Phoenix, Casa Grande

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 2 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Refrigeration Cooling (AC or Heat Pump)

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Homes with Evaporative Cooling Only and Electric Resistance Heating

- Existing ceiling insulation of R-11 or less upgraded to R-30.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

Housing Type Three: Homes with Evaporative Cooling Only and Gas Heating

- Existing ceiling insulation of R-11 or less upgraded to R-19.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100 or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 3 – Prescott, Payson, Globe, Douglas

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 3 (see Climate Zone map). The priority list is comprised of four housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Refrigeration Cooling and Electric Heating (Heat Pump or Electric Resistance)

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Shade screens on all sun struck South, East and West windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Home with Refrigeration Cooling and Gas Heating

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Three: Homes with Evaporative Cooling Only and Electric Resistance Heating

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

Housing Type Four: Homes with Evaporative Cooling Only and Gas Heating

- Existing ceiling insulation of R-11 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy

upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 4 – Tucson, Carefree, Wickenburg, Kingman

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 4 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Refrigeration Cooling (AC or Heat Pump)

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Homes with Evaporative Cooling Only and Electric Resistance Heating

- Existing ceiling insulation of R-11 or less upgraded to R-30.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

Housing Type Three: Homes with Evaporative Cooling Only and Gas Heating

- Existing ceiling insulation of R-11 or less upgraded to R-30.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 5 – Winslow, Tuba City

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 5 (see Climate Zone map). The priority list is comprised of four housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Refrigeration Cooling and Electric Heating (Heat Pump or Electric Resistance)

- Existing ceiling insulation of R-19 or less upgraded to R-38.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Shade screens on all sun struck east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Homes with Refrigeration Cooling and Gas Heating

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Shade screens on all sun struck east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Three: Homes with Evaporative cooling only and Electric Resistance Heating

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

Housing Type Four: Homes with Evaporative Cooling Only and Gas Heating

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy

upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR DETACHED HOUSING

CLIMATE ZONE 6 – Yuma, Parker, Bull Head City

The priority list can be used to determine cost effective weatherization materials/measures for homes located in Climate Zone 6 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Homes with Refrigeration Cooling (AC or Heat Pump)

- Existing ceiling insulation of R-19 or less upgraded to R-30.
- Un-insulated frame walls upgraded with blown insulation.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Homes with Evaporative Cooling Only and Electric Resistance Heating

- Existing ceiling insulation of R-11 or less upgraded to R-30.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

Housing Type Three: Homes with Evaporative Cooling Only and Gas Heating

- Existing ceiling insulation of R-11 or less upgraded to R-19.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 1 – Flagstaff, Showlow

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 1 (see Climate Zone map). The priority list is comprised of one housing type with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Priority list for Mobile Homes

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$18 per square foot).
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 2 – Phoenix, Casa Grande

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 2 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Mobile Homes with Refrigeration Cooling (AC or Heat Pump)

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$8 per square foot).
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Mobile Homes with Evaporative Cooling Only and Electric Resistance Heating

- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$4 per square foot).
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

Housing Type Three: Mobile Homes with Evaporative Cooling Only

- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Replacement of jalousie windows with dual pane windows (installed cost of under \$4 per square foot).
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If

sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 3 – Prescott, Payson, Globe, Douglas

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 3 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Mobile Homes with Refrigeration Cooling

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$10 per square foot).
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Mobile Homes with Evaporative Cooling Only and Electric Resistance Heating

- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$10 per square foot).
- Water heater wrap (where allowed).

Housing Type Three: Mobile Homes with Evaporative Cooling Only and Fossil Fuel Heating

- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Replacement of jalousie windows with dual pane windows (installed cost of under \$9 per square foot).
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 4 – Tucson, Carefree, Wickenburg, Kingman

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 4 (see Climate Zone map). The priority list is comprised of three housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures, including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Mobile Homes with Refrigeration Cooling (AC or Heat Pump)

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$7 per square foot).
- Shade screens on all sun struck south, east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Mobile Homes with Evaporative Cooling Only and Electric Resistance Heating

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$4 per square foot).
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

Housing Type Three: Mobile Homes with Evaporative cooling only and Fossil Fuel Heating

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Replacement of jalousie windows with dual pane windows (installed cost of under \$4 per square foot).
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete **all** (energy, health and safety and energy related

repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 5 – Winslow, Tuba City

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 5 (see Climate Zone map). The priority list is comprised of two housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Mobile Homes with Refrigeration Cooling

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$11 per square foot).
- Shade screens on all sun struck east and west windows and glass doors.
- Water heater wrap (where allowed).

Housing Type Two: Mobile Homes with Evaporative Cooling Only

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane windows (installed cost of under \$10 per square foot).
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete **all** (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

COST EFFECTIVENESS PRIORITY LIST FOR MOBILE HOMES

CLIMATE ZONE 6 – Yuma, Parker, Bull Head City

The priority list can be used to determine cost effective weatherization materials/measures for mobile homes located in Climate Zone 6 (see Climate Zone map). The priority list is comprised of two housing types with a listing of cost effective upgrades.

A computer audit is required if:

- There are potential cost-effective energy upgrades to the house that are not listed on the priority list or the General Waste Heat Items list.
- There are not sufficient funds to complete all the measures; including energy related health and safety measures and other energy related repairs.
- Energy related incidental repairs of more than \$100 are included with the energy upgrades.

Housing Type One: Mobile Homes with Refrigeration Cooling (AC or Heat Pump)

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Air Conditioners twenty years old or older upgraded with a minimum 12 SEER unit.
- Shade screens on all sun struck south, east and west windows and glass doors.
- Storm windows on single pane windows (installed cost of under \$3 per square foot).
- Replacement of jalousie windows with dual pane, windows (installed cost of under \$8 per square foot).
- Water heater wrap (where allowed).

Housing Type Two: Mobile Homes with Evaporative Cooling Only

- Reflective roof coating.
- Pressure diagnostics and repair following the pressure diagnostic procedure established by the WAP program.
- Replacement of jalousie windows with dual pane windows (installed cost of under \$3 per square foot).
- Upgrade of evaporative cooler motor with higher efficiency two-speed motor.
- Water heater wrap (where allowed).

In cases where there are potential cost effective energy upgrades not listed, incidental repairs of more than \$100, or sufficient funds are not available to complete all (energy, health and safety and energy related repairs) possible upgrades, a computerized audit must be completed to develop a ranking of the energy upgrades, based on their SIR. Only those measures with a SIR of one or greater can be completed. If sufficient funds are not available to complete all possible upgrades, those upgrades with the highest SIR must be completed first.

GENERAL WASTE HEAT ITEMS

ALLOWABLE MEASURES WHICH DO NOT REQUIRE A COST EFFECTIVENESS TEST

Domestic Hot Water

- Adjustment of the hot water temperature to 120 degrees if approved by the client.
- Replacement of existing showerhead, which exceeds a flow rate of 2.5 GPM, with a low-flow replacement showerhead if approved by the client.
- Faucet aerators

Space Heating and Cooling Systems

- Equipment maintenance and tune-up.
- Heating or Cooling System setback thermostat(s) for people with mobility problems or other extenuating circumstances, which make it difficult for them to manually adjust thermostat set points.

Existing Evaporative Coolers

- General evaporative cooler tune-ups.
- Replacement of a single speed evaporative cooler motor with a listed two-speed motor.

MEASURES THAT CAN BE FUNDED WITH LIHEAP WAP

- Replacement Hot Water Tanks: Gas fired tanks shall have R-8.3 minimal sidewall insulation. Electric tanks shall have R-11 minimal sidewall insulation.
- Exterior doors.
- Attic ventilation.
- Replacement of wall, ceiling, and floor forced air supply registers when existing condition limits functioning of control louvers.

BASE LOAD ITEMS

ALLOWABLE MEASURES WHICH DO NOT REQUIRE A COST EFFECTIVENESS TEST

- Replacement of incandescent light bulbs, which are on for at least one hour per day, with a compact fluorescent bulbs that emits the same amount of light.
- Refrigerators replacement. All replacements must follow the Refrigerator Replacement Policy.

PRESSURE DIAGNOSTIC PROCEDURE

The pressure diagnostic procedures are to be followed when performing air leakage diagnostics and repair. These procedures provide crews with immediate feedback on the effectiveness of air sealing work, insure that repairs will provide long-term energy benefit in a safe manner, and provide essential management information needed to monitor the cost effectiveness of the air sealing programs.

Pressure Diagnostic Decision Tree

The pressure diagnostic decision tree provides assistance to agency personnel in identifying the minimum level of pressure testing that needs to be performed to meet the Weatherization Program requirements. The decision tree is comprised of two levels of housing characteristics and corresponding test requirements. In all cases, air sealing can only be performed in conjunction with pressure diagnostics.

Level One: Homes with Central Forced Air Heating or Cooling.

- The **complete** pressure diagnostic process must be followed in all cases on homes with a central forced air heating or cooling system. (Evaporative cooling is not considered a forced air system in this case.)

Level Two: Homes with No Central Forced Air Heating or Cooling

- The use of pressure diagnostic process is **optional** in homes that do not have a central forced air heating or cooling system and that do not contain the characteristics listed below.
 - **Possible cost effective envelope sealing:** Pressure diagnostics must be completed on homes where the cost of space heating and/or cooling provides possible cost effective envelope sealing opportunities.
 - **Combustion appliance zone testing:** The Worst Case Pressure Test must be performed in all zones that contain a combustion appliance.

Testing Procedure

When performing pressure diagnostic, crews are required to use the following procedures **IN SEQUENCE**. If a test is not performed, document must be provided in all cases stating the rational for not following the testing procedure.

1. Initial air leakage and room pressure tests
2. Duct repair
3. Envelope air sealing
4. Room pressure balancing

1. Initial Air Leakage and Room Pressure Tests:

These initial tests will provide reference information on the existing condition of the home. This information will be used to determine what retrofit measures are to be completed and their effectiveness.

- A. Perform a complete energy audit and combustion safety test of the house. **No pressure testing or air sealing can be done until the required combustion safety procedure is completed.**
- B. Perform Room Pressure Tests (dominant duct leakage test, room pressure test, and combustion appliance zone [CAZ] test) and record pressures. List combustion appliances located in rooms tested. **If a pressure of -3 Pascals (Pa) or more exists in a CAZ, or the possibility exists that repair work will create a pressure of -3 Pa or more in a CAZ, corrective action must be completed before or in conjunction with air sealing or duct repair.** Discuss possible corrective action with the client. **If client refuses to allow corrective action to be completed, no air sealing or duct repair can be completed.**
- C. Perform zonal pressures and record the results.
- D. Perform initial Whole House CFM50 Test and record the results.
- E. Perform Pressure Pan Test and record initial pressure difference.
- F. Based on the results of the energy audit, combustion safety tests, and pressure tests, determine the extent of work to be completed.

2. Duct Repair Procedure:

- A. Duct repair can only be performed under the supervision of a trained technician.
- B. The Health and Safety Policy must be followed at all times.
- C. Perform duct repair using approved products (see Product Guidelines) and repair techniques (see Duct Repair Techniques).
- D. After initial duct repair is performed, evaluate if additional duct repair is possible.
- E. Once all attainable duct leakage is repaired, perform post duct repair Whole House CFM50 Test and pressure pan readings. The difference between the initial Whole House CFM50 Test and the post duct repair Whole House CFM50 Test will provide the CFM reduction in duct leakage.

3. Envelope Air Sealing Procedure:

- A. All duct repairs must be completed before envelope air sealing.
- B. Envelope air sealing can only be performed under the supervision of a trained technician.
- C. The Health and Safety Policy must be followed at all times.
- D. Perform air sealing with high-quality products. Weatherization products must be permanent and guaranteed for at least 15 years.
- E. Repeat Whole House CFM50 Test after air sealing work is performed and evaluate if additional air sealing is possible (see Health and Safety Policy for CFM ventilation requirements).
- F. Once air sealing is completed, perform final Whole House CFM50 Test and record results.

4. Room Pressure Balancing:

- A. All duct repair and air sealing must be completed before room pressure balancing.
- B. Room pressure balancing can only be performed under the supervision of a trained technician.
- C. The Health and Safety Policy must be followed at all times.
- D. Perform post air sealing room pressure tests (dominant duct leakage test, room pressure test, and worst case test) and record room pressures.
- E. Review options to remedy pressure imbalances with the client. If pressure balancing is not performed, record reasons in the work summary.

- F. Repeat room pressure tests after initial pressure balancing measures are installed and evaluate if addition pressure balancing is needed.
- G. Once pressure balancing is completed, repeat room pressure tests and record results.

Economics

The cost effectiveness of pressure diagnostic and repair is to be based on a comparison of the present value of the reduced air leakage and the cost (labor and materials) to achieve the reduction. The values in the following tables are designed to provide general guidance on the present value of air leakage control.

Infiltration

The following table gives the present value of reducing the infiltration rate by 100 CFM50 for a typical weatherized home.

Present value of 100 CFM50 reduction	Climate Zone 1	Climate Zone 2	Climate Zone 3	Climate Zone 4	Climate Zone 5	Climate Zone 6
	\$160	\$40	\$90	\$40	\$90	\$40

Duct Leakage

The following table gives the present value of reducing duct leakage by 100 CFM50 for a typical weatherized home.

Present Value of 100 CFM reduction	Climate Zone 1	Climate Zone 2	Climate Zone 3	Climate Zone 4	Climate Zone 5	Climate Zone 6
Heating	\$800	\$90	\$345	\$95	\$385	\$50
Cooling*	\$10	\$450	\$80	\$300	\$100	\$870

*If a home has only evaporative cooling, only the heating values will be realized in duct repair.

HVAC EQUIPMENT AND DISTRIBUTION INSTALLATION/REPAIR POLICY

The following policy must be strictly adhered to when installing or repairing HVAC equipment and distribution systems.

Sizing & Installing HVAC Equipment

- Minimum HVAC efficiencies:
 - AC: 12 SEER
 - Heat Pump: 12 SEER and 7 HSPF
 - Combustion furnace: 80% AFUE.
- New mechanical systems shall be sized according to the ACCA Manual J. Room-by-room load calculations using the ACCA Manual J shall be submitted for each plan to verify sizing.
- Airflow across the indoor coil and/or heat exchanger shall conform to the manufacturer's specifications.
- Refrigerant charge shall be installed per the manufacturer's specifications.
- Indoor and outdoor units shall be "matched" according to the ARI Directory.

Installation of Forced Air Distribution Systems

- All new ductwork must be installed according to the Duct Installation/Repair Techniques and Product Guidelines.
- All duct systems must be pressure tested and the CFM leakage rate cannot exceed 3% of the systems air handler capacity.
- Airflow to each room shall match designed airflow calculations from the ACCA Manual J to within +/- 10%.

Repair of Existing Systems

All ductwork must be repaired according to the Duct Installation/Repair Techniques and Product Guidelines.

Evaporative Cooler Installation

It is strictly prohibited to install a new evaporative cooler on the ductwork of a forced air heating or cooling system.

All existing evaporative coolers must be equipped with a damper system that allows the cooler to be isolated from forced air ductwork or the conditioned space.

Duct Installation/Repair Techniques

- A. Flex ducts
 - Seal the start collar to the plenum using mastic reinforced with mesh around the entire circumference.
 - At all connections (triangles, junction boxes, etc.), fasten the inner liner to the start collar using a mechanically tightened draw band for mechanical strength.
 - Seal the inner liner using approved mastic reinforced with fiberglass mesh and overlaid with another layer of mastic sufficient to cover the entire pattern in the mesh.
 - Fasten the outer liner well over the start collar using a mechanically tightened draw band.

- Seal all boots to the Sheetrock using mastic or silicone caulk applied at the point where the air barrier (metal or exterior foil backing) meets the Sheetrock.

B. Duct board

- Staple all duct board joints with appropriate staples every two inches.
- Apply a layer of mastic; embed reinforcing mesh and overcoat with another layer of mastic sufficiently thick to hide the pattern in the tape.
- Allow for proper curing (manufacturer's specifications) before starting the system. This is critical.
- Seal all boots to the Sheetrock at the point where the foil backing meets the Sheetrock.

C. Metal

- Seal all points where components join together using mastic. Special attention must be given to any area where tabs provide the method of securing the joint.
- Seal all boots to the Sheetrock at the point where the metal meets the Sheetrock.
- Join all components with screws or other mechanical fastening devices as required in listings or code.

D. Building Cavities Used as Returns

- If the cavity is lined with Sheetrock, seal all joints with mastic. All gaps over 1/4 inch must be reinforced with embedded mesh tape.
- If the cavity is lined with duct board with the fiberglass side facing inside, you must create a positive air barrier in the plenum by covering the fiberglass with a material such as Sheetrock, duct board with the foil facing inside, or coat the fiberglass with mastic, etc., and seal all remaining joints in the plenum.
- If the cavity is unlined (exposed studs) and it is impossible to line the plenum, seal all joints, holes and penetrations using mastic applied with a brush attached to a handle or other extension. It may be easier and more effective to simply create a ducted plenum or chase and avoid the problems associated with using a building cavity to convey conditioned air.
- It may be necessary to cut a hole in the plenum in order to gain access and seal the interior adequately.

E. Air Handler

- Seal all penetrations and gaps between materials using mastic or silicone. If the gap is over 1/4 inch, reinforce with fiberglass mesh.
- Seal the areas where the air handler meets the supply/return plenums using mastic reinforced with fiberglass mesh or other approved methods.
- Seal any panels that will require frequent access by the client (such as the filter area), using a quality temporary tape (duct tape).
- The air handler must not have any noticeable leaks.

F. Wall Penetrations

(The most common wall penetration problem is where the opening for the return grille is cut through the wall. In such an installation, even in a lined plenum, the wall cavity is open into the plenum.)

- Where an un-ducted section of the air distribution system penetrates a wall cavity, the wall cavity must be sealed.
- The cavity will first be blocked using a rigid air barrier such as Sheetrock or duct board with the foil facing the airflow.
- All seams, cracks, crevices, and openings will then be sealed airtight using approved mastic.

PRODUCT GUIDELINES

- All new ductwork will be a minimum of R-6.
- Duct sealing materials shall have both excellent cohesive and adhesive qualities.
- Water-based Latex mastic with at least 50 percent solids reinforced with fiberglass mesh at all duct connections, joints and seams shall be used. "Hardcast" type mastic with reinforcing mesh is also acceptable.
- The ducts shall be further attached as per manufacturer's specification, using a draw tie, plumbing strap or screws, as appropriate for a strong mechanical connection. The mechanical connection **does not** replace air sealing.
- Foil tapes, including UL 181 AP-type tapes, when used alone will not be accepted. If tape is used to temporarily hold a seam, it must be overlaid with a coating of mastic that extends at least one inch (1") past the tape on all sides, and is thick enough to hide the tape completely.
- Do not use materials that are potentially damaging or have harmful effects, such as toxic vapors or carcinogenic substances that may be harmful to the clients or the installer. Agencies are required to obtain and maintain the Material Safety Data Sheets (MSDS) for all materials used on the job. Federal law requires this procedure; further information is available locally from the vendor.
- Materials must meet all current codes and manufacturer's specifications.

HEALTH AND SAFETY PLAN

PURPOSE

To establish the policies and procedures under which health and safety concerns are addressed in the Weatherization Assistance Program (WAP).

GOAL

To ensure energy savings are the result of Weatherization Assistance Program actions while promoting a healthy and safe environment for clients and WAP workers and contractors.

SCOPE

Energy-related health and safety concerns need to be remedied before, or because of, the installation of weatherization materials. Therefore, energy-related health and safety hazards associated with weatherization activities may be remedied or prevented with DOE funds. Measures and their costs must be reasonable and must not seriously impair the primary energy conservation purpose of the program.

The Health and Safety Procedures are applicable to all activities under the WAP.

A. Grantee Health & Safety

The Arizona Energy Office – WAP field monitors will follow all applicable health and safety rules with respect to the conduct of their on-site job visits including the use of face masks, hard hats, appropriate footwear, and such other applicable attire and equipment so as to minimize personal risks.

B. Crew and/or Contractor Health & Safety

Arizona Subgrantees and their contractors will comply with Occupational Safety and Health Administration (OSHA) requirements in all weatherization activities.

The costs for Subgrantees to comply with OSHA requirements (action items & measures that DOE funds and receives credit for) may be charged under health and safety, tools and equipment, incidental repairs, etc. The cost category selected will be charged consistently throughout the state (from agency to agency) for the same activity.

Because of the wide range of activities involved in weatherizing a house, ensuring crew health and safety requires a broad knowledge of the appropriate OSHA requirements. Some of these requirements include, but are not limited to: respirator protection, techniques for safely lifting heavy objects, electrical equipment safety, ladder safety, and general worker protection. OSHA standards should be consulted for further details.

Other useful information includes Material Safety Data Sheets (MSDS) that identify potential health risks and describe the proper use, handling, and storage of a wide variety of materials, including some common weatherization materials. MSDS also recommend personal protective equipment and address first aid measures.

C. Client Health and Safety

Weatherization services can be provided in a manner that minimizes risk to workers and clients. Although the Weatherization Assistance Program does not provide all the solutions, awareness of potential hazards is essential to providing quality services. A list of the more common hazards and DOE's preferred approach to them are discussed in Section D. Other energy-related hazards should be considered on a case-by-case basis

Grantees and subgrantees are required to take all reasonable precautions against performing work on homes that will subject workers or clients to health and safety risks. If there is any doubt that weatherization work can be conducted in a manner that is safe for all parties concerned, the Subgrantee must not proceed further.

Before beginning work on the residence, Subgrantees will take into consideration the health concerns of each occupant, the condition of the dwelling, and the possible effect of work to be performed on any particular health or medical condition of the occupants. When a person's health is fragile and/or the work activities would constitute a health or safety hazard, the occupants at risk will be required to leave the home during these work activities or the work will be suspended until such a time as it can be performed appropriately.

D. Potential Hazard Considerations

1. Biologicals

Removal of mold, odors, viruses, bacteria, unsanitary (including raw sewage) conditions, and rotting wood is not a Weatherization responsibility; however, Subgrantees frequently encounter these conditions. DOE funds may be used if these conditions must be remedied to allow effective weatherization work and/or to assure the immediate or future health of workers and clients. The Arizona Energy Office – WAP requires that its Subgrantees seek prior approval to proceed before attempting to weatherize such dwellings with *Biological* problems.

Arizona Subgrantees will exercise caution when selecting air tightness limits for dwellings with these problems. Since these conditions are often related to moisture, Arizona subgrantees may use DOE health & safety funding to acquire moisture detection instruments. Subgrantees should incorporate moisture detection into their initial energy audits. If necessary, weatherization services may need to be delayed until moisture problems can be corrected by other funding sources.

2. Combustion Appliances and Combustion Gases

The following policy must be strictly adhered to when completing Weatherization work. If any house fails these program safety standards and the problem cannot be remedied, the homeowner must be notified in writing and a copy placed in the client's file.

- Perform air sealing and duct repair **only** in conjunction with pressure diagnostics to ensure that sufficient ventilation and draft rates are maintained in the home.
- A UL listed carbon monoxide detector (Underwriters Laboratories 2034-98) shall be installed in all structures with an attached garage or a combustion appliance located in the conditioned space.
- Research and follow the local health and safety codes and standards dealing with residential ventilation requirements for occupants and combustion equipment.
- No air sealing (including duct repair) should be done if there is a high pollution source, such as a non-vent combustion heater, that can't be removed.
- No air sealing (including duct repair) should be done if there are existing health and safety problems in the home.
- No air sealing (including duct repair) should be done if there is Carbon Monoxide (CO) present in the flue gases higher than 100 PPM.
- No air sealing (including duct repair) should be done if there is a possible gas leak.
- No air sealing (including duct repair) should be done if CO is greater than 9 PPM in the living space.
- If CFM50 is less than 1500 CFM for the home or 300 CFM per person (whichever is greater), the homeowner must be advised of the tightness of the home. Any further air sealing (including duct repair) may require that an active ventilation strategy be employed.

- Under normal operating conditions, an air handler cannot create room pressures with a magnitude greater than - 3.0 Pascals, with reference to outside, anywhere in a combustion appliance zone.
- Corrective action must be completed before or in conjunction with air sealing (including duct repair) if a negative pressure of greater than 3 pascals exists or is produced by repair work in a combustion appliance zone.
- Flame change is an indication of a cracked heat exchanger - no air sealing (including duct repair) should be done until the problem is fixed.
- If spillage of flue gases occurs for more than one minute - no air sealing (including duct repair) should be done until the problem is fixed.
- If draft is low, it must be fixed before air sealing (including duct repair) is completed.

Minimum draft pressures required as follows:

- Outside temperature below 20° F, -5.0 pascals draft
- Outside temperature 20° to 40° F, -4.0 pascals draft
- Outside temperature 40° F to 60° F, -3.0 pascals draft
- Outside temperature 60° F to 80° F, -2.0 pascals draft
- Outside temperature above 80° F, -1.0 pascals draft

IF THE CONDITIONS DESCRIBED BELOW CONCERNING COMBUSTION AIR ARE NOT MET, NO AIR SEALING (INCLUDING DUCT REPAIR) SHOULD BE DONE:

- In homes of ordinary tightness insofar as infiltration is concerned, all or a portion of the air for fuel-burning appliances may be obtained from infiltration when the requirements for 50 cubic feet per 1000 Btu/hr input is met. Two openings are required and one shall be within 12 inches of the bottom of the space containing the combustion equipment. Openings shall allow space to communicate with the rest of the house. A minimum free area of one square inch per 1000 Btu per hour (or 100 square inches, which ever is greater) of the total input rating of all gas utilization equipment in the space, shall be provided.
- In all cases where combustion air is from inside the home, the homeowner must be made aware of this and sign the Health and Safety Waiver before any airtighting or duct repair is completed. (Note: If this method is used, special attention must be given to zonal and draft pressures. In buildings of unusually tight construction, combustion air shall be obtained from outside.)
- In homes that receive combustion air from outside the conditioned space, two openings are required. One shall be within 12 inches of the top and one within 12 inches of the bottom of the space containing the combustion equipment. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that communicate with the outdoors.
- The following guidelines must be met when determining the minimum free area for combustion air openings:

- Openings directly communicating with the outdoors shall provide one square inch per 4000 Btu per hour of the total input of all gas utilization equipment in the space.
- Openings communicating to outdoors with vertical ducts shall provide one square inch per 4000 Btu per hour of the total input of all gas utilization equipment in the space.
- Opening communicating to outdoors with horizontal ducts shall provide one square inch per 2000 Btu per hour of the total input of all gas utilization equipment in the space.

(NOTE: If the free area is not known because of louvers or screens, double the required opening size. **IF THESE NFPA 54 NATIONAL FUEL GAS CODE REQUIREMENTS ON COMBUSTION AIR ARE NOT MET, THEN NO AIR SEALING (INCLUDING DUCT REPAIR) SHOULD BE DONE UNTIL THESE CONDITIONS ARE MET.**)

3. Fire Hazards

Combustion appliances and their associated venting systems can also present potential fire hazards. Subgrantees that accept clients with wood stoves and fireplaces will have procedures to identify potentially dangerous creosote build-up in chimneys and wood stove flues.

It is the Subgrantee's responsibility to ensure that any work on wood stoves and fireplaces conforms with applicable codes in jurisdictions where the work is being performed.

4. Existing Occupant Health Problems

Subgrantees will be sensitive to client health problems that might be exacerbated by weatherization activities.

Subgrantees will establish procedures to identify pre-existing client conditions (e.g., allergies) and address such problems when they are found. Those procedures should address the manner in which such problems will be identified and the steps to be taken to ensure that weatherization work will not worsen these problems.

5. Indoor Air Quality (IAQ)

a. Asbestos

General asbestos removal is not approved as a DOE WAP health and safety weatherization cost.

Major asbestos problems should be referred to the Arizona Department of Environmental Quality or to the Environmental Protection Agency (EPA).

Where local agencies work on large heating and distribution systems, including related piping, asbestos removal may be necessary. Removal is allowed to the extent that energy savings resulting from the measure will provide a cost-effective savings-to-investment ratio. This would normally be true with work done on large, multifamily heating systems. Where permitted by code or EPA regulations, less costly measures that fall short of asbestos removal, such as encapsulation, may be used. Removal and replacement of asbestos siding for purposes of wall cavity insulation is permissible if allowed by state and local codes.

b. Radon

Where there is a previously identified radon problem, work that would exacerbate this problem should be limited. Radon abatement is not an allowable activity under the Weatherization program. However, those costs associated

with taking precautions in a dwelling known to have radon problems are allowable weatherization expenditures. These costs are allowable if an energy audit indicates that weatherization techniques would help in radon remediation. While Subgrantees should establish sound radon-related strategies, major radon problems should be referred to the appropriate local environmental organization or agency for mitigation or abatement.

c. Formaldehyde and Volatile Organic Compounds (VOCs)

Formaldehyde vapors may be slowly released by some new carpets, wafer-board, plywood, etc. Some household cleaning agents also emits VOCs. Caution should be taken when selecting air tightness limits in dwellings with VOC problems.

6. Lead Paint

In May 2001, the Weatherization Assistance Program (WAP) issued Program Notice 01-10, Weatherization Activities and Federal Lead-Based Paint Regulations. This document and its attachments lay out the requirements for Arizona's sub-grantees and their contractors to follow when working in homes with lead-based paint.

Lead-based paint dust and other residues are hazards that Weatherization workers are likely to encounter in older homes. HUD estimates that four million homes have significant lead-based paint hazards. Furthermore, some Weatherization work (working with older wood sash windows) may directly disturb lead-based paint, possibly creating hazardous conditions. Arizona's WAP policy is that Weatherization workers must be aware of the hazard and conduct Weatherization activities in a safe work manner to avoid contaminating homes with lead-based paint dust and debris, and to avoid exposing the occupants, themselves and their families to this hazard. The protocols used to safe guard people from lead-based paint hazards are called Lead Safe Weatherization (LSW).

Arizona's Lead Safe Weatherization Protocols

LSW is a set of protocols to be used when disturbing surfaces that may have lead-based paint, that will reduce and control the amount of lead dust and paint chips that are generated. Arizona has adopted the protocols developed by the Montana State University. These protocols are attached or the curriculum is available for review on the WAPTAC website www.waptac.org.

When is LSW necessary.

Local sub-grantees will use the following set of criteria for determining when LSW would be performed:

- The dwelling was constructed pre-1978, and
- The dwelling has not been determined to be lead-based paint free, and
- Either, the amount of disturbed lead-based painted surface exceeds two square feet per room of interior surface, twenty square feet of exterior surface, or 10 percent of a small component type, e.g., window; or the amount of lead-based paint dust that will be generated by the Weatherization work exceeds the OSHA-defined airborne levels for lead.

Testing for lead-based paint and lead-based paint residues.

Testing for lead-based paint is not an allowable weatherization expense except, when it is related to the installation of energy efficiency measures. These expenditures must be within the limits set by the state in its Weatherization health and safety plan.

In pre-1978 houses where the presence or absence of lead-based paint has not been determined, testing for lead-based paint could be worthwhile as an economy step. If the anticipated weatherization/energy efficiency work involves disturbing more than a small amount of painted surfaces, then ruling out the presence of lead in the paint would save extra time and costs associated with doing LSW practices. Testing in a home for lead in a painted surface, when it is done, is limited to only those surfaces that will be disturbed.

The following considerations are offered as a guide to determining whether testing is worth the time and money on a case-by-case basis:

- Houses (including mobile homes, and apartments) built from 1978 on may be assumed to be free of lead-based paint, without testing.
- In houses (including mobile homes, and apartments) built prior to 1930, it is logical to simply assume the presence of lead-based paint and save the cost of testing.
- In homes built between 1930 and 1978, testing may not be warranted if the amount of paint to be disturbed is small, since it may be cheaper to perform LSW for a small area than to incur the expense of testing. However, where the amount of paint to be disturbed is relatively large, it may be worth the cost of testing, since a negative result would mean that the crews could dispense with having to perform the LSW protocols.

Routine testing of every house for lead paint levels before the start of work (testing of painted surfaces to be disturbed and/or risk assessment) and at the end (clearance testing) is a standard practice associated with lead paint hazard control or abatement work and is not an allowable use of DOE Weatherization funds, except as required when weatherization work is being done on HUD homes or with HUD funds. If a sub-grantee establishes a regimen of routine risk assessment and clearance testing for all cases where the presence of lead paint is a possibility, the sub-grantee must use other sources of funding to implement such a policy.

NOTE: HUD's guidance to its properties has been to test all properties for the presence of lead-based paint; so, the HUD program housing in your area may already have been tested for lead-based paint.

About Clearance Testing - Clearance testing (as required by the HUD Rule) is not a requirement for Weatherization work per se. **As such, clearance testing is not an allowable expenditure of DOE funds.**

However, under some circumstances, clearance testing may be required if you are doing Weatherization work in HUD program housing or you are using HUD funds. In these instances, your first course of action should be to ask the HUD program to fund the additional cost for LSW and clearance testing. If no HUD funds are available, DOE funds may be used for clearance testing since it is a requirement in this instance.

Arizona subgrantees must seek prior approval in every instance before DOE WAP funds will be approved for clearance testing in allowable *special situations* involving HUD housing.

Deferrals

Arizona's WAP sub-grantees will follow the lead-based paint "deferral policy" to determine when it is prudent to defer certain Weatherization work in homes that have either tested positive or are assumed to have lead-based painted surfaces.

- First, the subgrantee should assess the following factors:
 - 1) Is the subgrantee prepared to work with lead-based paint? (i.e., have workers received training in LSW work practices - is the necessary equipment, such as HEPA vacuum cleaners, available; and does the agency's liability insurance cover work with lead-based paint);
 - 2) What is the condition of the painted surfaces in the house that might be specifically disturbed in the course of an allowable weatherization measure? (i.e., are they *seriously* deteriorated);
 - 3) What is the extent to which the specific energy efficiency measures determined by the audit will disturb painted surfaces? (i.e., will the disturbance likely generate dust in excess of OSHA minimums); and,
 - 4) Will the cost of doing LSW work represent a large portion of the total cost, such as to exceed the amount allowed by the state's health and safety plan (which could be the case if large amounts of lead-based paint surfaces will be disturbed)?
- Second, the grantee should determine, based on consideration of the above factors, whether to:
 - 1) proceed with all the weatherization work, following LSW work practices; or
 - 2) Do some of the weatherization tasks, defer others; or
 - 3) Defer all the weatherization work

Deferral would mean postponing the work either until the Weatherization agency is prepared to work with lead-based paint, or until another funding source has been identified that can finance corrections to the problem LPB area that weatherization can be safely performed.

In cases where extensive LSW would be necessary, agencies are encouraged to arrange with other organizations, which are funded to do lead-based paint hazard control, to perform some of the more costly activities, such as risk assessment or clearance testing.

In areas where there are no organizations performing such work, Weatherization agencies may choose to develop their capabilities (purchase of equipment and advanced training for subgrantee crews) for lead-based paint hazard control work, but they may not use DOE Weatherization funds for this purpose. In such a home, regular Weatherization work that does not disturb painted surfaces can be done.

Funding of lead safe weatherization

Whereas DOE funds may be used to pay for Weatherization activities that disturb lead-based painted surfaces while installing energy efficiency measures or for case-by-case testing, the funds may not otherwise be used for abatement, stabilization or control of lead-based paint hazards, or routine entrance and clearance testing.

However, U. S. Department of Housing and Urban Development (HUD) funds such as Community Development Block Grant (CDBG), lead hazard control programs and HOME Repair and Rehabilitation Program funds may be used to do this work. Also, U. S. Department of Health and Human Services' (HHS) Low-Income Home Energy Assistance Program (LIHEAP), may be used for certain expenses related to Lead Safe Weatherization.

Specifically, for DOE funding, agencies should budget LSW costs under health and safety as a separate cost category, excluded from the calculation of average cost per home. Lead Safe Weatherization costs include labor, material, insurance, training, and equipment.

Liability issues

Unless an agency has specifically purchased additional insurance to cover pollution occurrences, they probably do not have sufficient insurance for their work as required by the WAP's Program Year 2002 Annual Guidance, Weatherization Program Notice 02-1. It is likely that their general liability insurance has a pollution occurrence exclusion.

All Arizona Sub-grantees must have liability insurance that covers work in a home with lead-based paint before any LSW work is implemented. **This liability insurance does not and should not cover lead abatement projects.**

Abatement projects are extensive projects designed to permanently eliminate the lead-based paint hazard. Only work that HUD refers to as "interim controls" must be covered. It is important to use this policy to demonstrate to the insurer the limited nature of the paint disturbance and the precautions being taken to avoid liability. The cost of such insurance is an allowable DOE expense, and we urge agencies to seek ways to obtain the coverage at reasonable rates.

For insurance shopping purposes, there are features about Weatherization work that local agencies should use in making the case for the lower risk associated with the nature of Weatherization work, especially when compared to lead-based paint abatement and lead hazard control work:

- Weatherization is different from lead hazard control work and involves lesser levels of work associated with painted surfaces. In fact, the disturbance of painted surfaces, by comparison, is minimal and when it happens, is incidental to the purpose of the work - the installation of energy conserving measures.
- In addition, not all weatherization work involves disturbing painted surfaces and some homes are lead free, and so the *risk basis* for insurance rates - unlike insurance for lead hazard control work - should not be based on one hundred percent operations in a lead paint environment for every home weatherized.

DOE is involved with EPA and HUD in continuing discussions with the insurance industry about ways to qualify Weatherization agencies for more favorable rates. We also welcome suggestions from state and local agencies with experience in obtaining reasonable rates for this kind of work, which we will share with the Arizona subgrantees.

Training

Arizona's WAP requires that *when disturbance of painted surfaces is significant*, Weatherization workers will use LSW practices.

Arizona's WAP will provide or recognize prior participation in the following training opportunities to sub-grantee as required, taking into consideration each subgrantees mix of action items and allowable measures:

- LSW workshops provided by trainers who are certified in The HUD Lead Safe Work Practices.
- Peer-to-Peer training.
- Individual agency training on an as needed basis.

All training will utilize the Lead Safe Weatherization curriculum developed by Montana State University.

7. Building Structure

Building rehabilitation is beyond the scope of the Weatherization Assistance Program; however, Arizona Subgrantees frequently encounter homes in poor structural condition. Dwellings whose structural integrity is in question should be referred to the Arizona Department of Housing.

Weatherization services may need to be delayed until the dwelling can be made safe for crews and occupants (see Deferral Standards).

Incidental repairs necessary for the effective performance or preservation of weatherization materials are allowed if the cost of the weatherization material and incidental repair are cost justified by the audit. Examples of these limited repairs include sealing minor roof leaks to preserve new attic insulation and repairing water-damaged flooring as part of replacing a water heater.

8. Electrical Issues

The two primary energy-related health and safety electrical concerns are 1) insulating homes that contain knob-and-tube wiring and 2) identifying overloaded electrical circuits.

Older electric wiring, primarily knob-and-tube wiring, located in a wall cavity or exposed on an attic floor was originally intended by code to have *free air movement* for that would cool the wire when carrying an electric current. Laboratory tests have shown that retrofitting thermal insulation around electric wiring can cause it to overheat, resulting in a fire hazard.

Arizona program policy requires that Subgrantees ensure that insulation around knob-and-tube wiring conforms with applicable codes in jurisdictions where the work is being performed.

Serious electrical hazards exist when gross overloads are present. Should auditors and crews find such existing problems, they must notify the owner verbally and in writing by the Subgrantee WAP program manager.

Weatherization measures that involve the installation of new equipment such as air conditioners, heat pumps, or electric water heaters can exacerbate previously marginal overload problems to hazardous levels. The problem must also be noted in the client file. To the extent that these problems prevent adequate weatherization, the agency should consider repairing them on a case-by-case basis.

9. Refrigerant Issues

The replacement of air conditioners requires Subgrantees to ensure that the requirements of the Clean Air Act 1990, section 608, as amended by 40 CFR 82, 5/14/93, be enforced. The appliance vendor, de-manufacturing center, or other entity recovering the refrigerant must possess EPA-approved section 608 type I or universal

certification. Subgrantees must ensure they have appropriate protocols in place that comply with all standards relating to the disposal of the existing appliances.

10. Other Code Compliance Issues

It is the Subgrantee's responsibility to ensure that weatherization-related work conforms with applicable codes in jurisdictions where the work is being performed.

E. Deferral Standards

The decision to defer work in a dwelling is difficult, but necessary, in some cases. This does not mean that assistance will never be available, but that work must be postponed until the problems can be resolved and/or alternative sources of help are found. Note that subgrantees, including crews and contractors, are expected to pursue reasonable options on behalf of the client, including referrals, and to use good judgment in dealing with difficult situations.

Subgrantees will develop guidelines and a standardized form for such situations. The form will include the client's name and address, dates of the audit/assessment and when the client was informed, a clear description of the problem, conditions under which weatherization could continue, the responsibility of all parties involved, and the client(s) signature(s) indicating that they understand and have been informed of their rights and options.

Deferral conditions may include:

- The client has known health conditions that prohibit the installation of insulation and other weatherization materials.
- The building structure or its mechanical systems, including electrical and plumbing, are in such a state of disrepair that failure is imminent and the conditions cannot be resolved cost-effectively.
- The house has sewage or other sanitary problems that would further endanger the client and weatherization installers if weatherization work were performed.
- The house has been condemned or electrical, heating, plumbing, or other equipment has been "red tagged" by local or state building officials or utilities.
- Moisture problems are so severe they cannot be resolved under existing health and safety measures and with minor repairs.
- Dangerous conditions exist due to high carbon monoxide levels in combustion appliances, and cannot be resolved under existing health and safety measures.
- The client is uncooperative, abusive, or threatening to the crew, subcontractors, auditors, inspectors, or others who must work on or visit the house.
- The extent and condition of lead-based paint in the house would potentially create further health and safety hazards.
- In the judgment of the energy auditor, any condition exists which may endanger the health and/or safety of the work crew or subcontractor, the work should not proceed until the condition is corrected.

REFRIGERATOR REPLACEMENT POLICY

The following criterion apply to replacement refrigerators:

ELIGIBILITY FOR REPLACEMENT

Weatherization Program Notice 00-5 lists the types of refrigerators that may be installed with U.S. Department of Energy (DOE) funds. Refrigerators and refrigerator-freezers with manual, automatic, or partial automatic defrost are eligible. Units must comply with UL-250 and with energy efficiency standards established in the National Appliance Energy Conservation Act of 1987 that are periodically updated. New replacement units may not have through-the-door ice or water service since this feature increases energy use.

To qualify for replacement, the refrigerator replacement unit must result in a savings-to-investment ratio (SIR) of 1.0 or greater.

To determine the SIR, one of the following methods must be used to determine the energy use of the existing unit:

Refrigerator replacement analysis tools that utilize the Association of Home Appliance Manufacturers or other approved refrigerator databases.

Meter electric usage of the existing unit utilizing an approved meter. A list of approved meters is available from the Arizona Energy Office.

METERING REQUIREMENTS

Meter at least 10% of units replaced — It is not required to meter every existing refrigerator that is replaced. Initially, as the program gains experience, DOE will require metering on at least 10% of the units replaced. Units that cannot be located in the Association of Home Appliance Manufacturers, or other refrigerator databases, may make up all or most of the 10% requirement.

Meter at least 2 hours — The minimum metering duration required to obtain results accurate enough to make a reliable replacement decision has been debated for several years. DOE believes a two-hour minimum metering duration is an appropriate compromise.

MATERIALS

New refrigerators shall:

Not exceed the size as the replaced unit.

Not exceed 18 cubic feet in size.

Have a minimum 1-year warranty.

INSTALLATION

The electrical outlet shall:

Provide the voltage specified on the ID plate of the new refrigerator.

Be properly grounded and/or protected with a properly functioning GFCI device.

Be located within reach of the refrigerator without the use of an extension cord.

Be in good condition with nothing visibly wrong (e.g., not cracked or broken, and no spark, smoke, or burn marks, etc.).

Meet refrigerator manufacturer's specifications for space and clearances.

The contractor shall:

- Deliver and install the new refrigerator.
- Level the unit to ensure proper operation.
- Ensure that door hinges are on the appropriate side.
- Instruct the customer on refrigerator operation.
- Deliver warranties and operating manuals to the customer.
- Set temperature controls appropriately.

DISPOSAL

The contractor shall:

- Take unit out of service. Make sure the existing refrigerator, removed from the house, does not find its way back onto the electric grid.
- Dispose of unit in an environmentally responsible manner. All refrigerators replaced must be properly disposed of according to the environmental standards in the Clean Air Act of 1990, section 608, as amended by Final Rule 40 CFR 82, May 14, 1993.
- Take unit to a de-manufacturing facility or incorporate disposal requirements in vendor contract.
- Remove all packing materials from the customer's premises.

REPORTING

The sub-grantee shall record the following information for both the existing and replacement refrigerators on the Household Reporting Form:

- Manufacturer (for years available).
- Brand.
- Year of manufacture.
- Model number.
- Type (e.g., side-by-side, top freezer).
- Database estimated kWh/yr.

On metered units, the sub-grantee shall provide an estimated annual kWh usage and the duration of metered data.

Provide saving to Investment Ratio for the replacement refrigerator.

WAIVERS

There may be cases where it is the best interest of the client that a refrigerator be installed that does not meet the requirements of the Weatherization Assistance Program Refrigerator Replacement Policy. In these cases, the Weatherization Assistance Program Waiver Process must be followed.

ARIZONA WEATHERIZATION ASSISTANCE REFRIGERATOR REPLACEMENT POLICY

The following criterion apply to replacement refrigerators:

ELIGIBILITY FOR REPLACEMENT

Weatherization Program Notice 00-5 lists the types of refrigerators that may be installed with U.S. Department of Energy (DOE) funds. Refrigerators and refrigerator-freezers with manual, automatic, or partial automatic defrost are eligible. Units must comply with UL-250 and with energy efficiency standards established in the National Appliance Energy Conservation Act of 1987 that are periodically updated. New replacement units may **not** have through-the-door ice or water service since this feature increases energy use.

To qualify for replacement, the refrigerator replacement unit must result in a savings-to-investment ratio (SIR) of 1.0 or greater.

To determine the SIR, one of the following methods must be used to determine the energy use of the existing unit:

Refrigerator replacement analysis tools that utilize the Association of Home Appliance Manufacturers or other approved refrigerator databases.

Meter electric usage of the existing unit utilizing an approved meter. A list of approved meters is available from the Arizona Energy Office.

METERING REQUIREMENTS

Meter at least 10% of units replaced — It is not required to meter every existing refrigerator that is replaced. Initially, as the program gains experience, DOE will require metering on at least 10% of the units replaced. Units that cannot be located in the Association of Home Appliance Manufacturers, or other refrigerator databases, may make up all or most of the 10% requirement.

Meter at least 2 hours — The minimum metering duration required to obtain results accurate enough to make a reliable replacement decision has been debated for several years. DOE believes a two-hour minimum metering duration is an appropriate compromise.

MATERIALS

- New refrigerators shall:
- Not exceed the size as the replaced unit.
- Not exceed 18 cubic feet in size.
- Have a minimum 1-year warranty.

INSTALLATION

- The electrical outlet shall:
- Provide the voltage specified on the ID plate of the new refrigerator.
- Be properly grounded and/or protected with a properly functioning GFIC device.
- Be located within reach of the refrigerator without the use of an extension cord.
- Be in good condition with nothing visibly wrong (e.g., not cracked or broken, and no spark, smoke, or burn marks, etc.).

Meet refrigerator manufacturer's specifications for space and clearances.

The contractor shall:
Deliver and install the new refrigerator.
Level the unit to ensure proper operation.
Ensure that door hinges are on the appropriate side.
Instruct the customer on refrigerator operation.
Deliver warranties and operating manuals to the customer.
Set temperature controls appropriately.

DISPOSAL

The contractor shall:
Take unit out of service. Make sure the existing refrigerator, removed from the house, does not find its way back onto the electric grid.
Dispose of unit in an environmentally responsible manner. All refrigerators replaced must be properly disposed of according to the environmental standards in the Clean Air Act of 1990, section 608, as amended by Final Rule 40 CFR 82, May 14, 1993.
Take unit to a de-manufacturing facility or incorporate disposal requirements in vendor contract.
Remove all packing materials from the customer's premises.

REPORTING

The sub-grantee shall record the following information for both the existing and replacement refrigerators on the Household Reporting Form:
Manufacturer (for years available).
Brand.
Year of manufacture.
Model number.
Type (e.g., side-by-side, top freezer).
Database estimated kWh/yr.

On metered units, the sub-grantee shall provide an estimated annual kWh usage and the duration of metered data.
Provide saving to Investment Ratio for the replacement refrigerator.

WAIVERS

There may be cases where it is the best interest of the client that a refrigerator be installed that does not meet the requirements of the Weatherization Assistance Program Refrigerator Replacement Policy. In these cases, the Weatherization Assistance Program Waiver Process must be followed.

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

Program Concept and Description

- This program is an expansion and modification of the current program which has been in place since 1996. It is composed of four parts.
 1. Weatherization: Provides low income residential customers with both an assessment of the feasibility of improving the energy efficiency of their homes and the installation of energy efficiency measures. Weatherization requires an assessment of the structure and appliances as appropriate to determine what cost effective measures are needed.

The weatherization portion of the program will be conducted in accordance with the rules of the Weatherization Assistance Program (WAP) as interpreted by the Arizona Department of Commerce Energy Office (Energy Office) with the exceptions noted below. The WAP is funded by the U.S. Department of Energy (DOE) and administered by the Arizona Department of Commerce Energy Office (Energy Office). It enables low-income families to permanently reduce their energy bills by making their homes more energy efficient. It is this country's longest running, and perhaps most successful energy efficiency program. During the last 27 years, the program has provided weatherization services to more than 5.3 million low-income families. By reducing the energy bills of low-income families, weatherization liberates these funds for spending on pressing family needs such as medical prescriptions. A copy of the Energy Office WAP is attached as Exhibit 1.

The APS program is independent of WAP, however, APS funds are often leveraged with other fund sources by the Community Action Agencies (CAA;s).

See Exhibit 1 for details of the WAP program.

Exceptions to WAP rules:

- Weatherization measures will be limited to those that conserve primarily electric energy.
 - Waivers for exceptions in special cases will be subject to approval by APS.
 - General repairs may also be done, providing that the entire project is cost effective.
 - This category may include: repairs to membranes to stop roof leaks, repairs to or replacement of non-repairable window units; repairs to or replacement of non-repairable exterior doors; restoration/replacement of ceiling areas which cannot support ceiling insulation; and restoration/replacement of floor areas over "crawl spaces" which are not structurally strong enough to remain part of the building "envelope".
 - The maximum expenditure per home in a 12 month period for Weatherization, Repair/Replacement, Health and Safety combined is \$6,000.
2. Health and Safety: Pays for energy efficient window unit air conditioners and heat pumps that are prescribed by a Medical Doctor.

3. Repair and replacement:

This service is crisis related. The service provides for repair or replacement of an existing utility related appliance/system. Appliances are replaced only when repair costs would exceed replacement costs or when an appliance would be inoperable or unsafe even with repairs.

The work performed and any appliances/systems are guaranteed.
The program does not provide for maintenance of these appliances/systems.

If a renter, structurally attached appliances or systems (i.e. evaporative cooler, water lines, etc.) are not eligible for this service. These are the financial responsibility of the property owner.

List of Acceptable verifications of ownership of appliance and/or system:

Homeowner: Deed, Title, Property Tax Statement

APS Energy Wise Low Income Weatherization Program

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Renter: Receipt of purchase of the specific appliance; or notarized affidavit signed by landlord confirming that client is owner of the specific appliance (with serial number noted) **AND** proof that the landlord is the owner of the rental property (deed, title, property tax statement)

4. **Bill assistance:** Bill assistance can be used to pay electric bills for customers in crisis situations. A household may receive assistance once in a 12 month period for a maximum of \$400. Three categories of Crisis as defined by Arizona Department of Economic Security/Community Services Division are: 1) loss or reduction of income, 2) unexpected or unplanned expenses that caused lack of resources, 3) a condition that endangers the health or safety of the household.

Target Market and Current Baseline Conditions

- The program is available to all income qualified APS residential electric customers who are responsible for paying the electric bill.
- Estimates based on census data indicate that there are between 135,000 and 180,000 customers in the target market.

Program Eligibility

- Be an APS residential customer with a household income less than or equal to 150% of the federal poverty guidelines and be responsible for paying the electric bill.
- Customers living in rented homes are eligible for weatherization services only with the owner's written approval. Owners must agree to not increase the rent for 12 months.
- Special weatherization projects for master metered and/or multifamily housing will be considered by APS on a case by case basis.

Program Rationale

- Low income households spend a high proportion of their total income for energy. This program will help to reduce energy costs, making funds available for other necessities.

Program Objectives

- The long term goal is to help low income customers become self sufficient by assisting them in reducing their energy bills.
- To substantially increase the number of homes served and approximately double the amount of electricity saved. APS has historically provided weatherization services to an average of 514 customers a year.
- To provide bill assistance to at least 625 customers per year.

Products and Services Provided

- The program provides an on-site audit for customers accepted for consideration for weatherization services. It may provide installation of a variety of energy efficiency measures identified by WAP as interpreted by the Energy Office. In general, these may include energy efficient measures to the structure or appliances that will save electricity in an economical manner.
- Other forms of assistance may include:
 - Energy education of occupants
 - Remediation of certain health and safety issues when prescribed by a medical doctor.
 - Remediation of defects necessary to allow the implementation of energy efficiency measures.
 - Repair and replacement of certain electric appliances.
 - Bill assistance up to a maximum of \$400 per household in a 12 month period.
 - Training support for field personnel on energy efficiency assessment and implementation techniques will also be supported by the program.

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

Delivery Strategy and Administration

- APS will provide overall program management for the Energy Wise Program.
- The implementation of the non-tribal portion program will be coordinated through an independent administrator who will oversee the individual CAA's. CAA's were formed by the federal government in 1964 by the Economic Opportunity Act. They provide a variety of social services. Eight CAAs serve APS service areas and are assigned geographic areas. Together they serve all of the APS service areas, with the exception of Tribal lands which by mutual agreement are served by Tribal Governments. CAAs and Tribal Governments may receive funds from multiple sources including the federally funded Low Income Housing Energy Assistance Program (LIHEAP), Department of Energy (DOE), various utility companies, and other sources.
- APS will coordinate directly with the agencies or entities authorized by Tribal Governments to serve low income tribal households throughout the APS service areas.
- To maximize the benefits of the program overall, other funding sources and services will be leveraged, as appropriate. For example, APS weatherization program services will be delivered in conjunction with existing activities such as Weatherization Assistance Program (WAP), the Low Income Home Energy Assistance Program (LIHEAP), and other programs as appropriate.
- Key partnering relationships may include agencies such as the Arizona Community Action Association (ACAA), the various CAAs, the Inter Tribal Council of Arizona, Navajo Nation Weatherization services, other social service agencies and the Arizona Energy Office.

Marketing and Communications

- Marketing for this program will be conducted primarily through the CAAs and Tribal Governments. Their offices serve a large number of customers with a variety of social services including weatherization and bill assistance.
- APS will provide informational brochures suitable for the CAAs and Tribal Governments to hand out in their offices and to leave in homes.
- APS Customer Care Associates will be trained to inform payment challenged customers of the program and direct them to the appropriate agency.
- APS will promote the program via the electric bill to targeted areas as needed.
- Signs will be provided to the CAAs and Tribal Governments. They will be suitable for placing near homes that are receiving weatherization services. They are intended to be in place during the weatherization process and removed when the work is completed.
- Window stickers will be provided. The intent is to have the weatherization provider, with the client's permission, place the sticker inside the front window when the work is complete. It will serve as a reminder that the home has been weatherized, and promote the program to the neighbors.

Program Implementation Schedule

Program Activity	Timeline												
	2005			2006			2007						
Continuation of existing program													
Modify CAA Agreements for revised program and implement Tribal Government Agreements as required													
Implementation of revised program													

Monitoring and Evaluation Plan

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

- The energy savings will be evaluated on the basis of a comparison of pre and post utility bills of weatherized homes which will be compiled and analyzed by the Arizona Department of Commerce Energy Office. This method provides actual measured savings on a high percentage of homes.

Program Budget

Budget Categories	Calendar Year			
	2005	2006	2007	3 year total
Implementation Costs				
Weatherization: Includes Weatherization, Health & Safety, Repair/Replace, Program Delivery	\$705,000	\$705,000	\$705,000	\$2,115,000
Bill Assistance	\$250,000	\$250,000	\$250,000	\$750,000
Program Support Costs				
Third party management	\$50,000	\$50,000	\$50,000	\$150,000
Training, technical support, monitoring and evaluation	\$10,000	\$10,000	\$10,000	\$30,000
Marketing and Promotion	\$10,000	\$10,000	\$10,000	\$30,000
APS Administration	\$75,000	\$75,000	\$75,000	\$225,000
Total costs	\$1,100,000	\$1,100,000	\$1,100,000	\$3,300,000*

*Total expenditures will be counted towards the \$48,000,000 DSM budget to which APS is committed in 2005-2007. Decision No. 67744 provided that a minimum of \$1 million would be expended.

Funds will be distributed to the CAA and Tribal Governments based largely on estimates of the number of APS low income customers in their service areas. Please see Exhibit 2. Future distributions will be reviewed and adjusted annually.

Weatherization expenditures are for direct costs of providing weatherization services. Examples include: assessment of the structure and appliances using current building science technologies such as blower doors, duct blasters, flow hoods, infrared heat sensors; analysis of appliances using amp meters and refrigerant pressure gages; visual inspection of the property; CAA and Tribal Agency labor; materials; contract labor.

Health and Safety funds pay for window unit air conditioners and heat pumps that are prescribed by a Medical Doctor's order.

Repair/Replace: This service is crisis related. The service provides for repair or replacement of an existing utility related appliance/system. Appliances are replaced only when repair costs would exceed replacement costs, when an appliance would be inoperable or unsafe even with repairs, or when an appliance is of such a vintage that it is economical to replace with an energy efficient model in accordance with guidelines established by the Energy Office. An assessment is not required for Repair/Replace. For example, a case worker may be visiting the home for an unrelated reason and notice that an appliance is not working. The case worker, using good judgment, can authorize a repair or replacement without doing a technical assessment of the property.

Program delivery is for expenses incurred by the CAAs and Tribal Governments that are necessary to deliver Weatherization, Health and Safety, Repair/Replace and Bill Assistance services to customers and which would not be incurred if those services were not provided. Examples include: vehicle mileage; tools; employee related expenses such as social security, Medicare, etc.; equipment rental; cost allocated shares of office and management expenses;

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

expenses for technical training of field technicians; etc. These are the types of costs that would be included in the price that any contractor would charge.

Bill assistance is used to pay electric bills for customers in crisis situations.

Third party management will coordinate the record keeping, invoicing and reporting through out the year. They review all invoices to assure compliance with program guidelines. They serve as a point of contact and a conduit for providing information to APS. They create and submit to APS the reports required by the ACC.

Training and technical support supplements the monitoring and evaluation conducted by the Energy Office.

Marketing and promotion is for brochures and signage for the CAAs and Tribal Governments.

APS administration is for the additional resources required to manage the expanded program and the additional constituencies. The weatherization and bill assistance program has been funded at \$500,000 since 1996. . The new program requires APS to spend a minimum of \$1,000,000 each year. The expanded program includes compact fluorescent lamps and refrigerators, renters (previously it was limited to owner occupied homes), the cap on expenditures per home has been raised from \$1,500 to \$6,000, tribal governments are new to the program, APS will need to work directly with the agencies and entities that the tribal governments authorize to administer the program. All of these changes will require more management by APS and will be nearly a full time job for an Account Executive for the first year, and a significant portion of that person's time for several years.

Estimated Energy Savings

The most thoroughly documented cost effectiveness study of Arizona homes is from the Energy Office report titled "Present Value Analysis SWG Low-Income Weatherization Program July 1, 1999 to June 31, 2000". The data in the following tables is extracted from that report. Refer to Appendix B for details of the Energy Office study. Refer to Appendix C for supporting documentation for the values in the savings and cost effectiveness tables below.

	Savings per Home		Equivalent Homes Served per Year ⁽¹⁾			Total Savings	
	Annual kWh	kW	2005	2006	2007	Lifetime mWh ⁽²⁾	kW ⁽³⁾
Weatherization	1,998	0.30	562	562	562	50,503	505

(1) An equivalent home is one that receives \$1,255 in APS weatherization funding. The \$1,255 is the average amount of weatherization dollars spend on the study homes. APS has historically funded only 47% of the weatherization cost for a typical home. At that rate, the number of homes weatherized using APS funds leveraged with other funds would be 1,025 in each of the 3 years. Since the cap per home is increased, APS will be contributing a larger share and the number of homes weatherized with APS funds will be between the 562 that could be served if APS funded 100%, and the 1,196 that could be served if APS funded 47%. An estimate of homes that will be weatherized with leveraged APS funds under the proposed program is the average of the two, or 879 per year.

(2) Lifetime mWh is the electric energy saved from all weatherization measures implemented in 2005-2007 over the 15 year life of the measures.

(3) kW savings is 0.30 kW/home x 562 per year x 3 years = the demand reduction from weatherizing 562 homes in each of the three years.

Weatherization Program Cost Effectiveness

BCR Activity	Societal Benefit/Cost ⁽¹⁾	Societal Net Benefit ⁽²⁾	Societal Benefits	Societal Costs	Program Administrator Costs
Weatherization	0.74	(\$624,312)	\$1,807,460	\$2,431,772	\$2,431,772

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

⁽¹⁾ While it is the goal that the Societal Benefit/Cost is greater or equal to one, the Commission Staff has recognized that this standard cost effectiveness analysis may not be appropriate for certain types of DSM, including low-income programs. See, Staff Report of Demand Side Management Policy, Docket No. E-00000A-02-0051, *et. al.*, issued February 7, 2005, at pp. 16-17.

⁽²⁾The Societal net benefit does not include the monetary value of the environmental externalities that are saved. The externalities are shown in the table below, along with the physical quantities of the emissions emitted and resources consumed. These have a monetary value that is not quantified.

Externalities – emissions reductions based on 50,503 mWh saved
SOx – 217 pounds
NOx - 8,687 pounds
CO2 – 46,311,516 pounds
PM10 – 1,197 pounds
Water – 11,767,266 gallons

BCR = Benefit Cost Ratio

Societal = Total Resource Cost + Externalities. Externalities are stated in physical units.

PA = Program Administrator

Societal Benefit/Cost = PV avoided cost / (non incentive cost + participant cost)

Societal net benefit = PV avoided cost - non incentive cost - participant cost

Societal benefits = PV avoided cost + externalities. Externalities are expressed in physical units.

Societal costs = participant cost + non incentive cost

PA cost = non incentive cost + incentive cost

APS Energy Wise Low Income Weatherization Program

EXHIBIT A

Exhibit 2

Low Income & Weatherization Program

Agency	Budget 2004	Budget 2005
Community Action Human Resources Agency	\$31,046	\$60,000
Coconino County Community Services Dept	\$10,277	\$20,000
Gila County Community Action Agency	\$31,189	\$60,000
Maricopa County Human Services Dept	\$117,573	\$226,000
Northern Arizona Council of Government	\$86,738	\$167,000
City of Phoenix Neighborhood Services	\$108,792	\$209,000
Southeastern Az Human Resources County	\$13,883	\$27,000
Western Arizona Council of Government	\$43,886	\$85,000
Tribal Government - Navajo	\$0	\$46,000
Tribal Government - Intertribal Council	\$0	\$54,000
Management - third party	\$50,000	\$50,000
Training, technical support, monitoring and evaluation	\$0	\$11,000
Marketing and promotion	\$6,616	\$10,000
APS administration	\$0	\$75,000
Total	\$500,000	\$1,100,000