



Poverty Conference 2006

Low-Income Weatherization *“Current Successes and Future Directions”*

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What is Weatherization?

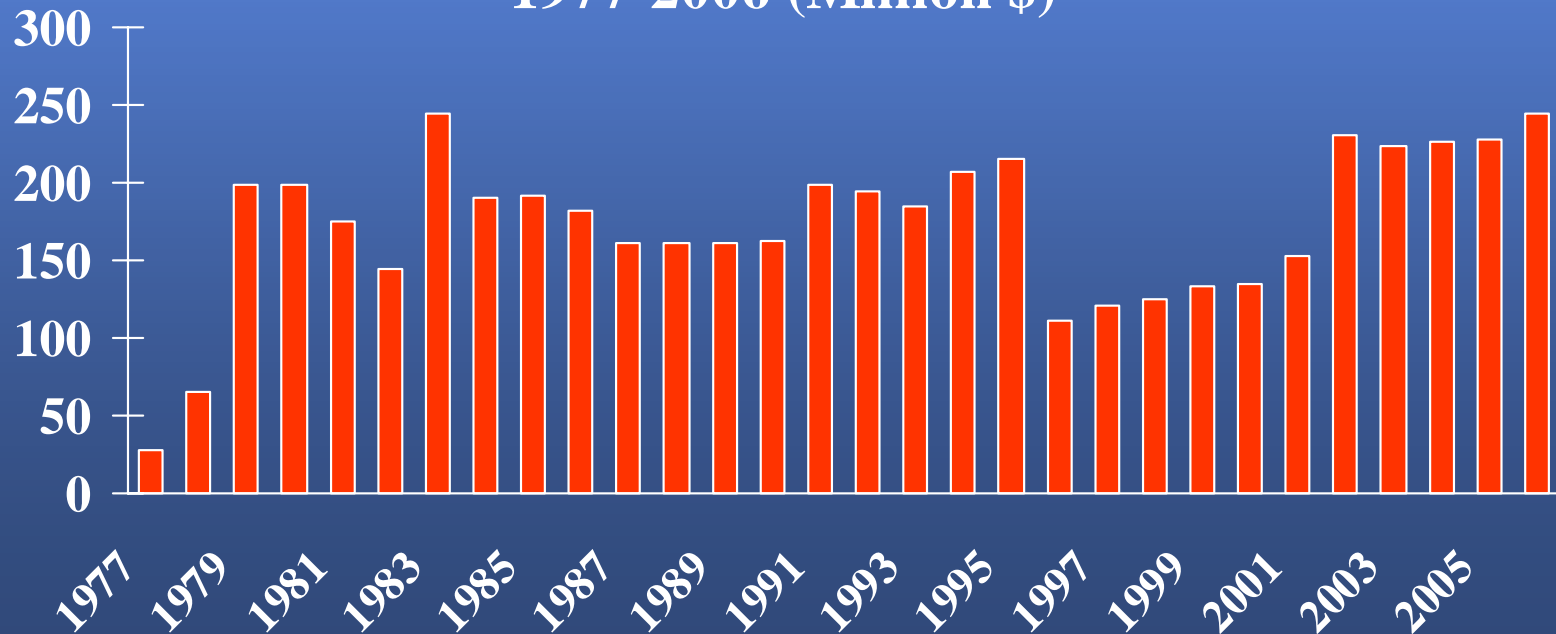
An Overview:

- The Weatherization Assistance Program reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety.

What is Weatherization?

- Nation's core program for delivering energy efficiency services to low-income homes

**Weatherization Funding
1977-2006 (Million \$)**



What is Weatherization?

- Operates in every state, District of Columbia, and among Native American tribes



What is Weatherization?

- Services delivered to single-family, multi-family, and mobile homes

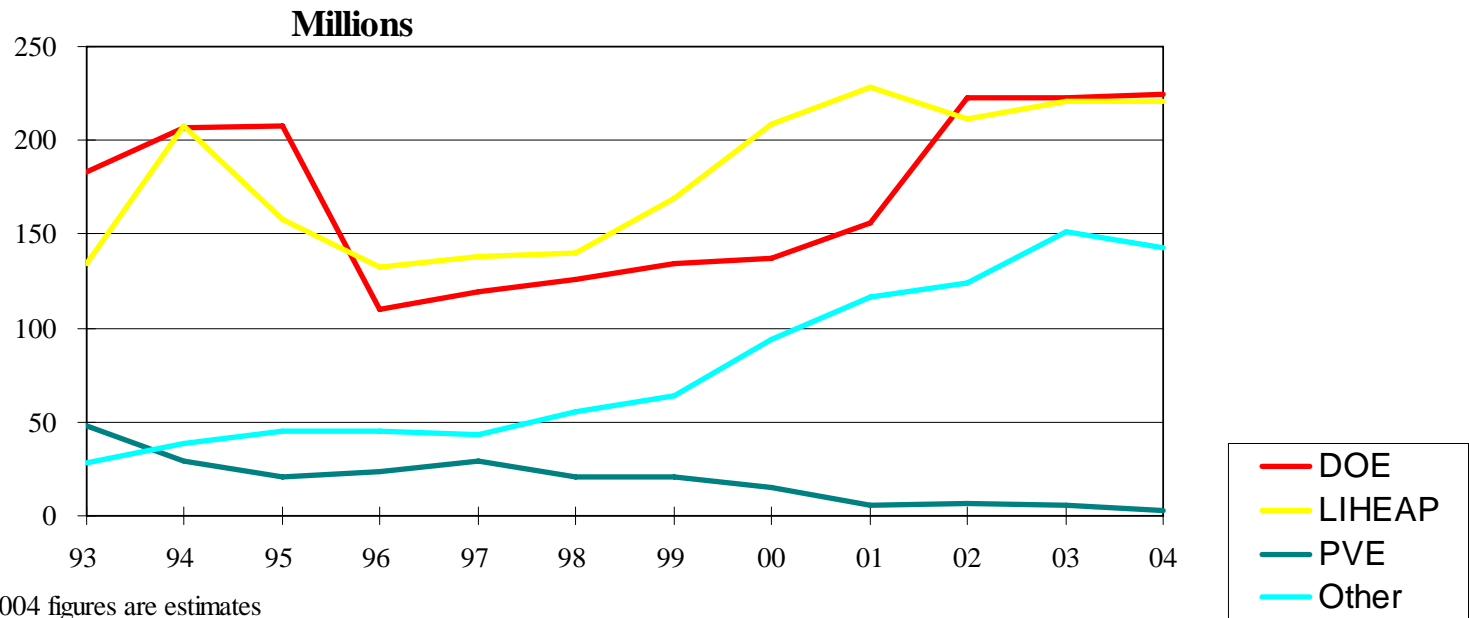


Program Funding

- DOE provides core program funding
- States can use LIEAP funds from HHS, leverage funding from utilities and others

Program Funding

Weatherization Program Funding from Each Source, 1993-2004

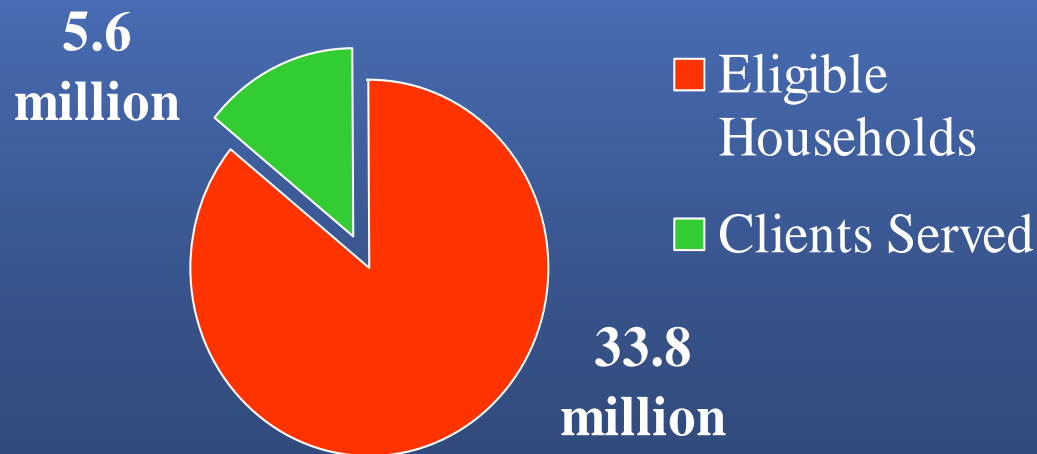


Why Weatherization?

- Heavy energy burden on low-income
 - Typically spend 16% of annual income on energy, compared with 5% for other households

Why Weatherization?

- Low-income families often choose between heat and other necessities
- 33.8 million households currently eligible for Weatherization services



Why Weatherization?

- Increases energy efficiency of the home
- Reduces energy costs year-round
- Provides long-term relief from expensive energy bills
 - Measures continue to save money every year
- Alleviates arrears, breaks destructive cycle of shut-offs and re-connections

What Results?

- Average annual energy savings = *\$358 first-year savings per household
- Returns \$1.53 in energy-related benefits for every \$1 invested in the program
- Avoids 1 metric ton of carbon dioxide emissions for every gas heated home weatherized.
- Avoids 2 metric tons of carbon dioxide emissions every year for electric heated homes weatherized.
- Creates 52 direct jobs for every \$1 million of funding nationally.
- Reduces national energy demand by 18 million barrels of oil per year.

** Calculated January 2006 based on 20-year EIA annual price projections discounted to present value.*

Who Implements Weatherization?

- U.S. Department of Energy awards grants to states and tribal organizations
- States contract with local agencies to deliver services to low-income households
- Network of over 900 agencies reach every county in every state across the nation

How Does Weatherization Work?

- Client applies for services
- Energy audit conducted; technicians identify energy-related problems
- List of cost-effective measures developed
- Energy efficiency measures installed
- Client education
- Post-work inspection

Client Applies for Service

- Must meet income eligibility guidelines
- May receive priority
 - Elderly, disabled, family with children, household with high energy burden
- Renters eligible, must get approval from property owner
- When demand is high, client may be added to waiting list

Energy Audit

- Weatherization is a highly technical program
 - Energy professionals trained to conduct comprehensive energy analysis
- Diagnostic tools improve identification and remediation of energy problems
 - Also test for health and safety hazards (e.g., carbon monoxide)
- DOE-approved energy audit guides work

Energy Audit Conducted

- Auditor explains process to client
- Collects information on the home
 - Including results of diagnostic tests



Energy Audit Conducted

- Uses audit software or other method to estimate potential energy savings
- Develops list of cost-effective measures
- Identifies energy-related health and safety measures needed
- Oregon Weatherization Assistance Program (WAP) uses REM/Rate but is currently in development of its own database and energy calculator

Diagnostic Tools: Blower Door

- Blower door test identifies air leakage
- Panel with fan is placed in a doorway to de-pressurize home
 - Exaggerates leakage so it can be measured



Diagnostic Tools: Blower Door

- Gauges indicate level of air leakage
- Used with other devices to locate leaks



Diagnostic Tools: Pressure Pan(then) and Manometer

- Leaky ducts will increase heating and cooling costs by 10-30%
- While blower door runs, pressure pans were placed over air register (then)



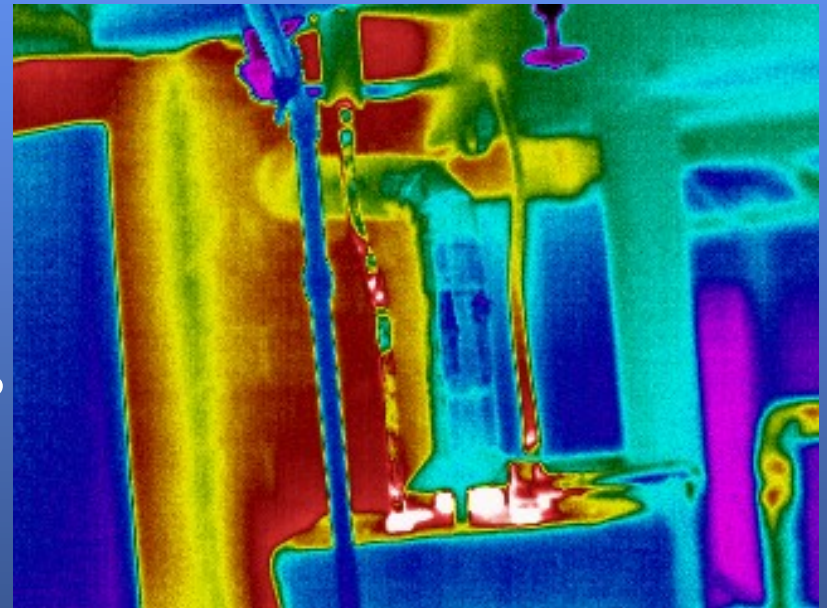
Diagnostic Tools: Duct Blaster and Manometer

- Manometer measures pressure created by air leaking into ductwork
- Results help locate large leaks
 - Registers near leaks have higher readings
- Duct blower is used for more accurate readings and to balance systems



Diagnostic Tools: Infrared Camera

- Illustrates heat loss
- Guides air sealing and insulation
- Helps to educate clients
- Quality control for insulation and other measures



Diagnostic Tools: Combustion Analyzer

- Tests heating system for efficiency and safety
- Analyzes composition of flue gases
 - Indicates inefficient combustion, hazardous by-products (e.g., carbon monoxide)



Diagnostic Tools:

Worst Case Draft Test

- “Backdrafting” can draw toxins into home
 - Negative pressure can pull carbon monoxide, radon, moisture, sewer gas, etc. into house
- To identify hazard, house is put in “worst case” condition by:
 - Turning on exhaust fans, dryer, furnace fan, etc.
 - Opening or closing basement door (depending on location of exhaust fans)
- Manometer measures pressure difference between furnace room and outside
 - Negative pressure difference means backdrafting is possible

Diagnostic Test: Gas Leak Detector

- Identifies natural gas leaks from stoves and furnaces
- Important health and safety test
- Effective tool for client education
 - Highlights dangers of gas leaks

Diagnostic Tools: Eyes, Ears, Intuition

- Complex diagnostic instruments require knowledgeable, capable users
- No substitute for observant auditor
- Visual inspections key to identifying many problems
- Experienced technicians know to look for source of the problem, interaction issues

Energy Efficiency Measures: Air Sealing

- Blower-door guided air sealing locates leaks, indicates when “optimal” balance achieved
 - Visual inspections may miss “hidden” leaks, through floors, sealed fireplaces, cabinets
- Must know when to stop air sealing
 - Maintain minimum ventilation requirements
 - Ensure cost-effectiveness of measure

Energy Efficiency Measures: Insulation

- Potential areas for insulation include attic, ceilings, floors, and walls



Energy Efficiency Measures: Insulation

- Blown insulation most effective
 - Holes discreetly cut in walls or ceiling
 - Insulation is blown into space through a tube



Energy Efficiency Measures: Insulation

- Reduces air infiltration and heat loss
 - Dense-pack insulation often installed before air sealing, since it reduces leaks so effectively



Energy Efficiency Measure: Duct Sealing and Insulation

- Duct system may need sealing and/or balancing
- Duct tape is NOT be used
 - Apply mastic sealant
- Ducts in unconditioned spaces will be insulated



Energy Efficiency Measures: Heating System

- May need tune-up or basic repairs
- Can replace hazardous or inoperable furnaces
 - Due to funding limitations, leveraged resources often used to replace heating systems
 - Unvented space heaters pose large health and safety threat



Energy Efficiency Measures: Cooling System

- Technicians can tune-up or repair cooling systems
- Ducts may require sealing and/or balancing
- May add fans, ventilation for health and safety



Energy Efficiency Measures: Base Load Reduction

- Electricity consumption can be reduced through lighting, refrigerator, or water heater measures
- Equipment may need simple tuning
- Can replace to improve efficiency
- Base load reduction may help leverage utility resources

Energy Efficiency Measures: Other

- Wrap water heater tank and pipes
- Install set-back thermostat
- Repair/Replace broken and/or inefficient windows or exterior doors



Health and Safety

- Do no harm
- Conduct weatherization in a lead-safe manner
- May check for carbon monoxide, gas leaks, moisture/mold, electrical hazards
- Wear protective clothing, equipment
- Ensure safety of clients

Client Education

- Client education is a critical component
 - Ensure savings
 - Prevent health hazards
 - Prolong life of measures/equipment
- Conducted before and after measures are installed

Client Education

- Instructions on equipment operation and maintenance
- Tips on energy-saving actions
- Information on carbon monoxide and other hazards



Post-Work Inspection

- Blower door test ensures successful air sealing
 - Identifies any remaining air leaks
 - Indicates need for ventilation
- Insulation and other measures checked for quality and completion

Bridge Stories

- Before weatherization, Gracie A. lived in a house where temperatures barely rose above 40 degrees.
- A carbon monoxide test was done, and deadly levels of carbon monoxide were detected.
- A weatherization team installed a sealed, combustion heater as well as reinsulated her house.
- The assistance provided resulted in her health improving immediately.



Bridge Stories

- Though Sarah C. rarely turned on the heat in her home, her utility bill ran nearly \$250 each month.
- Weatherization discovered an electrical short that caused a constant flow of electricity.
- They fixed the problem, installed insulation in her floor and ceiling, and tuned the heating system.



Bridge Stories

- Before weatherization, Camille H. warmed her home with two space heaters and by boiling pots of water on a gas stove.
- Family members helped Camille purchase a new furnace.
- Weatherization technicians tested the system and installed energy efficiency measures throughout the house.



Improved Training Delivery

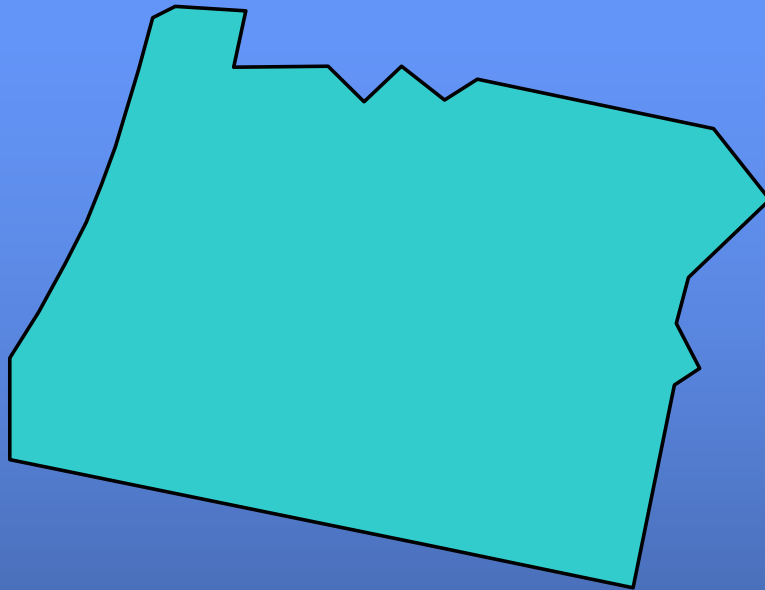
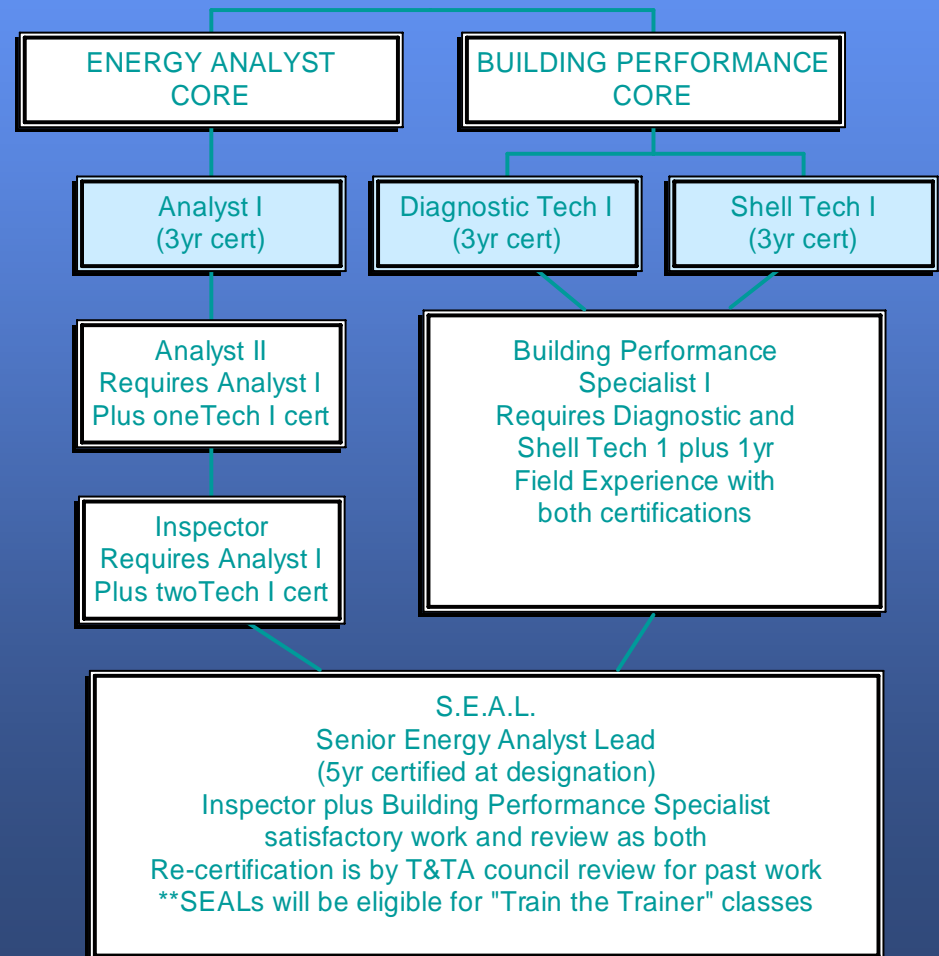


- In classroom and in field
 - Mobile home weatherization
 - Siding removal and sidewall insulation
 - Health and safety
 - Heating systems
 - Overview of new field standards
 - Diagnostics procedures
 - Blower door
 - Duct blaster
 - Worst-case draft testing
 - Etc...

OREGON

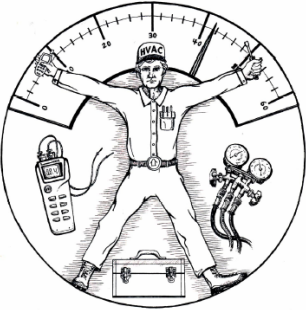
R.E.A.P. CERTIFICATION

Residential Energy Analyst Program



Oregon agencies increased output by 45% in one year post inception of training programs.

Oregon Mechanical Systems Field Guide



Best Practices for Improving the Safety,
and Efficiency of Existing Heating,
Cooling, and Water Heating Systems

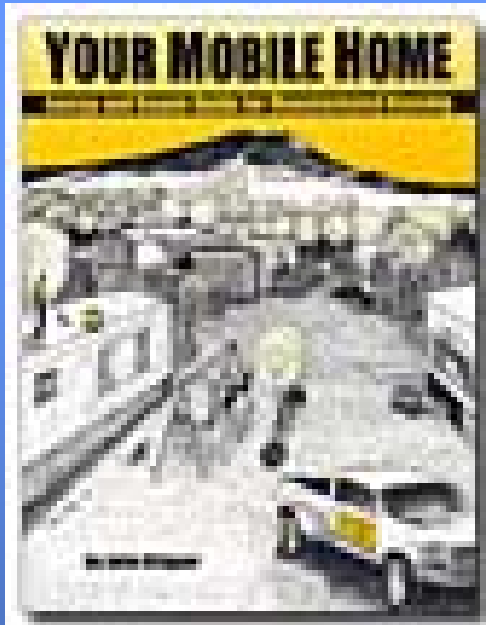
Saturn Weatherization Field Guide



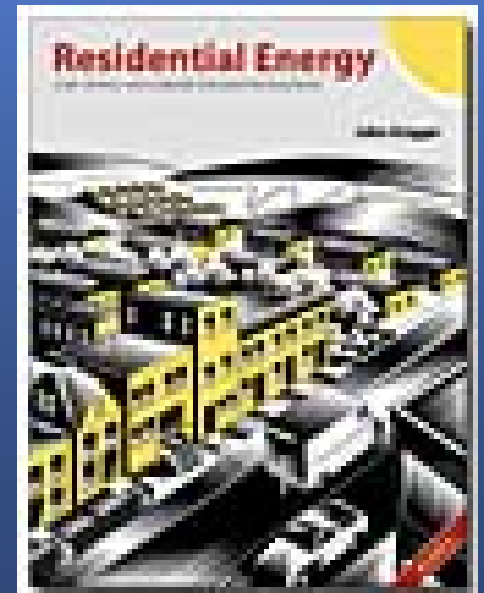
Best Practices for Improving the
Comfort, Safety, and Efficiency
of Existing Homes

Update Field Standards

- Review of other state Wx field standards
- Based on review of best practices
- Flexible and adaptable document for future changes
- Review by Oregon Wx Technical Committee



Curriculum Development



Methods for Sustaining Program



- Comprehensive training program
- Regular technical committee meetings.
- Experimental/research philosophy in field
- Peer mentoring network
- Peer trainers
- Certification or merit-based rewards
- Proficiency testing

DOE Weatherization Plus- Next Generation

- Describes the whole-house approach to weatherization
- Incorporates advanced technologies
- Provides resources for community based efforts to: conserve energy, boost economic activity and improve the environment

Population Manufactured Dwellings



In 2005, 44% of all low-income homes weatherized in Oregon were manufactured homes



Population Multi-Family Communities



In 2005, 22% of dwellings weatherized in Oregon were multi-family units.



Special Populations

Native Americans

- Native American total population in the state of Oregon represents 1.6%.(approx. 55,000 people)
- Approx 25,000 are part of the nine federally recognized tribes in Oregon
- 5,400 persons are low-income eligible in those tribes
- **FACT:** 24% of Native Americans in Oregon are low-income; higher than any ethnic population in the state

Special Populations

Native Americans

- Oregon has specific set-aside funds from DOE and BPA for this population (3%)
- In 2005, 4.6% of its total funding (all grant resources) were spent on this population
- Agencies leveraged \$3.35 for every one dollar provided in federal set-aside
- Served a total of 236 men, women and children
- Tribes need more funding, training, and economic opportunity to increase self-sufficiency

Funding Resources

- DOE
- BPA
- LIEAP
- State Sponsored Programs
- Utility Programs
- Petroleum Violation Escrow
- Settlement Awards

Oregon WX Program Analysis

Multiple Benefits of Weatherization Programs

- Direct: Energy Conservation, Education
- Indirect: Housing, Environment and Homeland Security

**This report specifically addresses
Local and Statewide Economic Impacts associated with
Oregon's Weatherization Program**

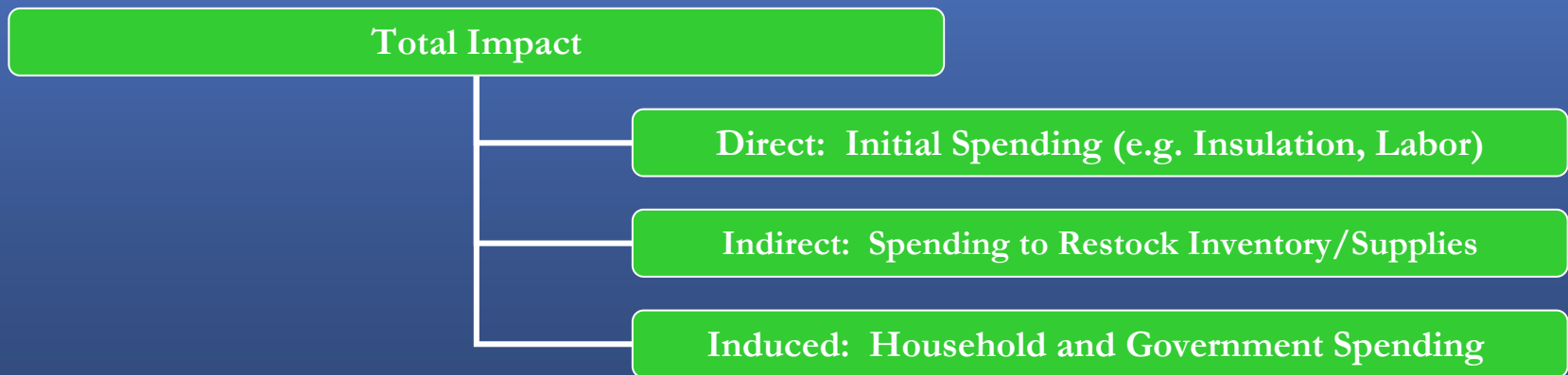
The Data

- Surveys: Agencies, OHCS
- Invoices: Sub-contractors, Agencies
- Interviews: Contractors, Agency Directors
- Program Spending (Labor and Materials)
- Administrative Expenditures and Energy Savings

Methods

Input Output Analysis

- How dollars move through the economy and “multiply”
- Aspects (Earnings, Employment, Output)
- Kinds of Spending (Direct, Indirect, Induced)



Rural and Urban Economies

Our Findings: Program Spending

- **Output** - For every weatherization program dollar spent in Oregon counties--up to another \$.83 cents is generated locally and \$1.11 statewide.
- **Earnings** - For each dollar spent on employee compensation through county weatherization programs, up to another \$1.43 in labor income is produced within local communities.
- **Employment** - Each job associated with weatherization programs produce up to another 1.3 jobs locally, and 1.7 jobs statewide.

Our Findings: Energy Savings

- Dollars that would in most cases “leak” to out-of-town utility companies are instead spent in residents’ own communities.
 - Every household dollar spent as a result of energy savings yields up to another \$.63 within Oregon counties, and generates an additional \$.85 statewide.

Our Findings: Administrative

- Administrative expenditures maintain the safety of program recipients and employees—as well as further the technology and efficiency of current weatherization program measures.
 - For every dollar spent on administrative costs, another .88 cents is generated statewide—and every administrative-related job yields another one and a quarter jobs across Oregon.

Conclusions

- According to our research, the economic effects of the Oregon Weatherization Program are significant--sometimes doubling the initial impacts made by program expenditures.
- Increased household spending as a result of energy savings also stimulates local economies--resulting in additional jobs, earnings and overall economic growth.
- These findings are valuable to both program managers and legislators at the state and federal levels. As agencies compete for limited funding, it is necessary to demonstrate that programs not only assist direct recipients, but entire communities across the state.

Suggestions for Further Research

- More research could be performed to examine:
 - Long Term Impacts
 - Affordable Housing
 - Health and Safety Benefits
 - Emotional Well-Being
 - Social Capital

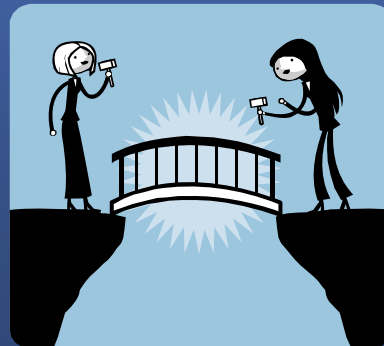
- Understanding weatherization outcomes and how they differ across communities will assist local program directors in developing realistic objectives for their programs, and will contribute to the formation of short and long-term weatherization goals for the State of Oregon.

The Low-Income Weatherization Builds Bridges!

✓ For Families

✓ For Communities

✓ For the Nation



THANK YOU FOR COMING

Presented by

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