

NH REACH – Furnace Cleaning

2007 NLIEC

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Presentation Outline

- REACH
- NH Furnace Cleaning Project
- Program Implementation
- Program Challenges
- Usage Impact Analysis
- Energy Insecurity Analysis
- Furnace Efficiency Impacts
- Summary

REACH

REACH

- Residential Energy Assistance Challenge Option Program
- Pilot projects that aim to reduce the energy vulnerability of LIHEAP-eligible low-income households
 - Minimize health and safety risks that result from high energy burdens
 - Reduce home energy vulnerability and prevent homelessness
 - Increase efficiency of energy usage
 - Target assistance to those most in need

NH Furnace Cleaning Program

Program Overview

- FY 2003 Award of \$754,154
- October 2003 – September 2006
- Goals
 - Clean furnaces in 5,100 homes
 - Inventory heating systems needing repair or replacement
 - Analyze impact on energy consumption and household energy security

Program Actors

- NH Office of Energy and Planning
- Tri-County Community Action Agency
- Community Contact Offices (8)

NH Office of Energy and Planning

- Communication with OCS
- Program management and oversight
- Evaluation oversight

Tri-County Community Action Agency

- Program management – track completes and budget
- Program procedures
- Furnace cleaning vendor contracts, work orders, invoices
- Community Contact Office oversight

Community Contact Offices

- Client outreach
- Program application
- Vendor identification

Program Implementation

Program Intake

- Began March 2004
- Crisis applicants asked to apply
- LIHEAP applicants from 2004 were called
- Applications completed in person, by phone, by mail
- Clients asked to identify a cleaning vendor

Furnace Cleaning Contracts

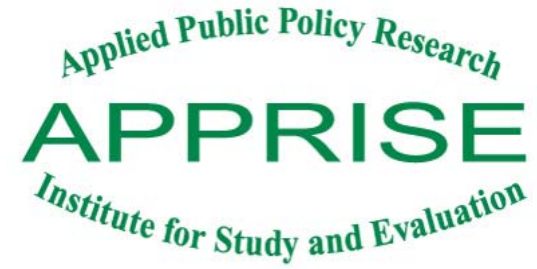
- Work order described the scope of work
- Contractor enrollment form
 - Price for cleaning (\$70-\$200)
 - Geographic area served
 - Serve non established customers?
- Minor repairs allowed (stay below \$200 limit)
- Itemized bill and heating system inventory required

Work Order

Clean and tune shall include the following measures as applicable:

- clean, brush and vacuum unit thoroughly
- check operation of all controls
- check for tightly fitting cleanout
- check chimney base and flue pipe
- check chimney for obstructions
- check all gaskets, replace if necessary
- check barometric damper operation
- replace filters as necessary
- clean pump strainer and inner housing
- clean electrodes and replace if necessary
- optimize firing rate
- check for oil leaks
- check pump pressure
- flush low water cut-off
- clean or change water glass
- lubricate all motors
- clean blower, change belts if needed
- replace nozzle
- check thermostat operation
- adjust fuel/air for proper combustion

Work Order



| Efficiency test results | Pre | Post | Expected |
|--------------------------------|------------|-------------|--|
| Smoke: | _____ | _____ | 0 to 1 |
| Net stack Temp: | _____ | _____ | 350 to 650, to 550 if flame retention burner |
| O2: | _____ | _____ | 5 to 9 if old, 3 to 6 if new |
| CO2: | _____ | _____ | 8 to 11.8 if old, 10.5 to 13.4 if new |
| Draft at breach: | _____ | _____ | -.02 to -.04 inches of water column |
| Draft over fire: | _____ | _____ | -.01 to -.02 |
| Combustion efficiency: | _____ | _____ | greater than 75% |

Please explain system deficiencies on Inventory Form if these results cannot be obtained.

Production

| | 2004 | 2005 |
|-----------------------|-----------|----------|
| Cleanings | 1,923 | 122 |
| Major Repairs | 7 | 8 |
| Replacements | 55 | 31 |
| Cleaning/Repair Costs | \$210,684 | \$19,159 |
| Replacement Costs | \$120,061 | \$75,158 |

Program Challenges

Challenges

- Funding for furnace repair and replacement
- # of furnaces needing repair or replacement
- When to shut down a furnace?
- Vendor participation
- Vendor capacity
- Line between cleaning and repair

Challenges

- Difficulty reaching clients
- Collecting information from clients over the phone
- Shutting down marginal furnaces
- Late availability of funds for repair/replacement

Usage Impact Analysis

Usage Impact Methodology

- Study group: 2004 program participants
- Comparison group: LIHEAP recipients
- Fuel usage: obtained from fuel vendors
- Degree day weather normalization
- 37% of treatment group and 26% of comparison group had data for analysis

Usage Impact Results

| | Pre | Post | Gross Change | Net Change |
|--------------------------|-----|------|--------------|------------|
| Fuel Oil Usage (gallons) | 990 | 1046 | 56 | 13 |

Usage Impact Results

| By Number of Cleanings in Past Five Years | | | | | |
|---|---------------------|------|--------|-----|-------------------------|
| # of Cleanings | Gallons of Fuel Oil | | Change | | |
| | Pre | Post | Gross | Net | Compared to 5 Cleanings |
| | | | | | |
| 0-2 | 1016 | 1045 | 29 | -14 | -99 |
| 3-4 | 957 | 1017 | 60 | 18 | -67 |
| 5 | 1040 | 1168 | 128 | 85 | -- |

Energy Insecurity Scale Analysis

Energy Insecurity Scale Questions

- Worried about home energy bill
- Needed help to pay bill
- Couldn't afford to use energy to the extent needed
- Reduced consumption to uncomfortable or inconvenient levels
- Could not use entire home

Energy Insecurity Scale Questions

- Left home for all or part of the day
- Did not pay home energy supplier
- Used kitchen stove or oven to provide heat
- Reduced basic household expenses
- Threatened with disconnection or discontinuation of service
- Service disconnected or discontinued

Energy Insecurity Scale

| | |
|-------------------|--|
| In-Crisis | Loses energy service, regularly forgoes basic necessities, constrains energy use to unsafe or unhealthy levels, uses unsafe heating techniques. |
| Vulnerable | Regularly constrains energy use to unsafe or unhealthy levels, forgoes basic necessities, borrows from family or friends, uses unsafe heating techniques. |
| Stable | May have more than occasional arrears, but never threatened with loss of energy service. Never foregoes basic household necessities, but may temporarily constrain energy use. |
| Capable | May have arrears, but not at risk for loss of service. Arrears don't have a negative impact on basic household necessities or household comfort and convenience. |
| Thriving | Engages in a full range of home energy uses of its choice without financial strain or worry. |

Energy Insecurity Scale

| | Pre | Post | Comparison (Pre) |
|------------|-----|------|---------------------|
| In-Crisis | 48% | 39% | 43% |
| Vulnerable | 32% | 41% | 35% |
| Stable | 7% | 5% | 7% |
| Capable | 6% | 10% | 5% |
| Thriving | 8% | 5% | 9% |

Energy Insecurity Scale

| Change in Energy Insecurity | |
|-----------------------------|-----|
| Improved | 32% |
| No Change | 42% |
| Worsened | 26% |

Energy Insecurity Scale

| Post In-Crisis Prior to Furnace Cleaning | |
|--|-----|
| In-Crisis | 54% |
| Vulnerable | 37% |
| Stable | 4% |
| Capable | 3% |
| Thriving | 2% |

| Pre In-Crisis After Furnace Cleaning | |
|--|-----|
| In-Crisis | 67% |
| Vulnerable | 26% |
| Stable | 4% |
| Capable | 1% |
| Thriving | 2% |

Furnace Efficiency

Furnace Efficiency

| | Pre | | Post | |
|---------------|--------------------------|-----|-------|----|
| | All Observations | | | |
| | N=233 | | N=134 | |
| Smoke scale>1 | 44 | 19% | 4 | 3% |
| Smoke scale>2 | 24 | 10% | 2 | 1% |
| Smoke scale>3 | 16 | 7% | 1 | 1% |
| | Obs with Pre/Post (N=42) | | | |
| Smoke scale>1 | 4 | 10% | 0 | 0% |
| Smoke scale>2 | 2 | 5% | 0 | 0% |
| Smoke scale>3 | 0 | 0% | 0 | 0% |

Furnace Efficiency

| | Pre | | Post | |
|---|---------------------------|-----|-------|-----|
| | All Observations | | | |
| | N=317 | | N=307 | |
| Stack temp < 350° Or > 650 ° | 41 | 13% | 35 | 11% |
| | All Obs (N=311) | | | |
| CO ₂ < 8 or CO ₂ > 14 | 39 | 13% | 13 | 4% |
| | Obs with Pre/Post (N=186) | | | |
| Combustion Efficiency > 75% | 173 | 93% | 182 | 98% |

Summary and Recommendations

Summary

- 2% needed major repair
- 5% needed replacement
- 90% did not have furnace cleaned every year
- Some evidence for usage reduction, energy insecurity improvement, health and safety improvement

Recommendations

- Assist households who do not do regular cleaning and maintenance
- Identify households with unsafe equipment
- Provide partial assistance for furnace cleanings

Contact Information

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