

# Residential Energy Auditing

# **An Energy Audit generally consists of:**

- A thorough inspection of the interior and exterior of the home using a holistic approach**
  - Insulation levels
  - Air sealing opportunities
  - Mechanicals
  - Diagnostic and H&S data collection
  - Measurements
- Client education and... being educated by the homeowner**
- Creating a computer model (TIPS, TREAT, EmpCALC)**
- Development of a comprehensive work scope**

# A Good Energy Auditor is:

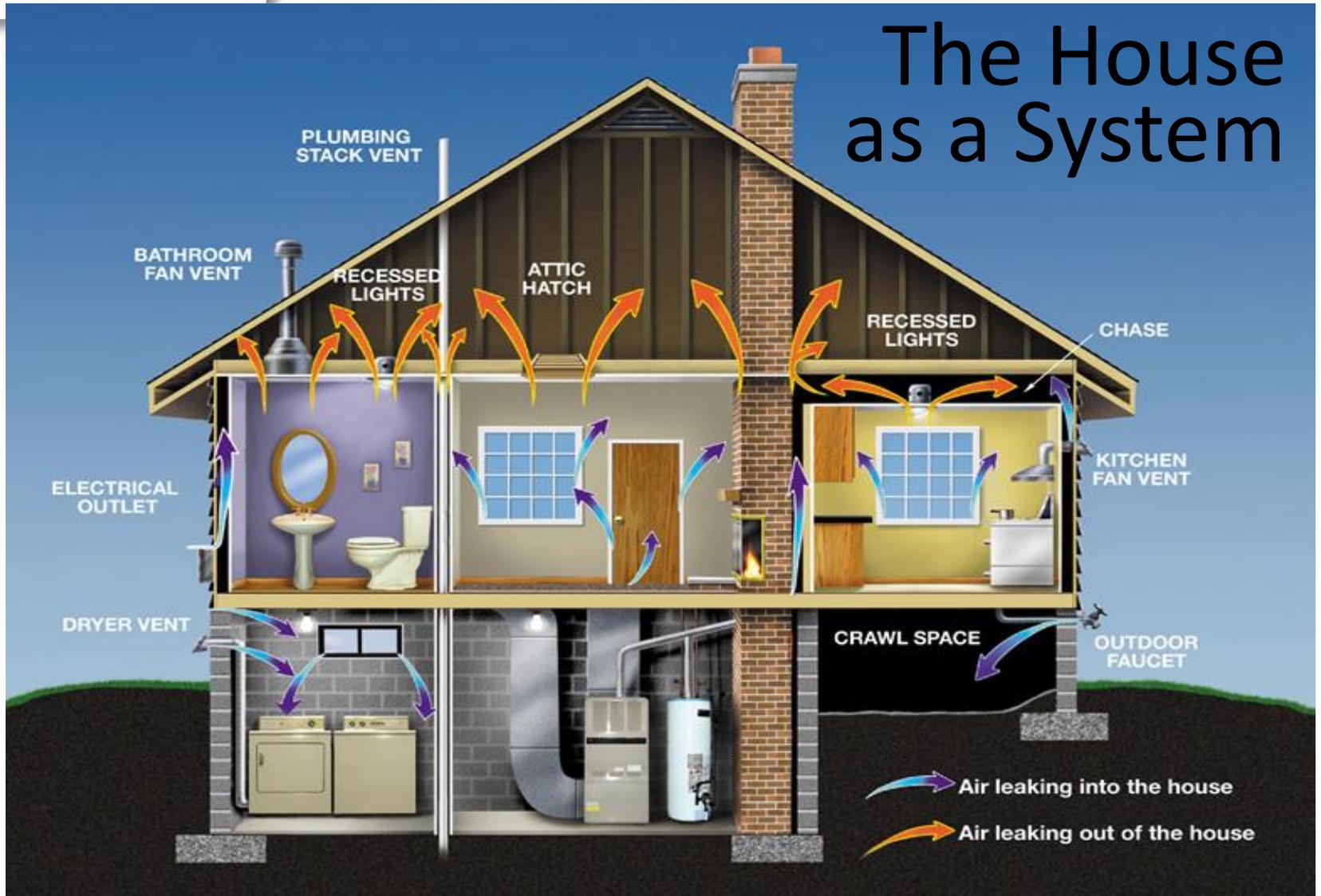
- **Data Analyst**
- **Spec writer**
- **Production Manager**
- **Energy Coach**
- **Building Inspector**
- **Diagnostician**
- **Quality Control Inspector**

# Observation and Critical Thinking



Eyes, Ears, Nose  
and Brain

# The House as a System





Education. Advocacy. Innovation.

# Exterior Inspection

# Where's the envelope?













May 2015

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Association



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# Siding Types



# Special Considerations

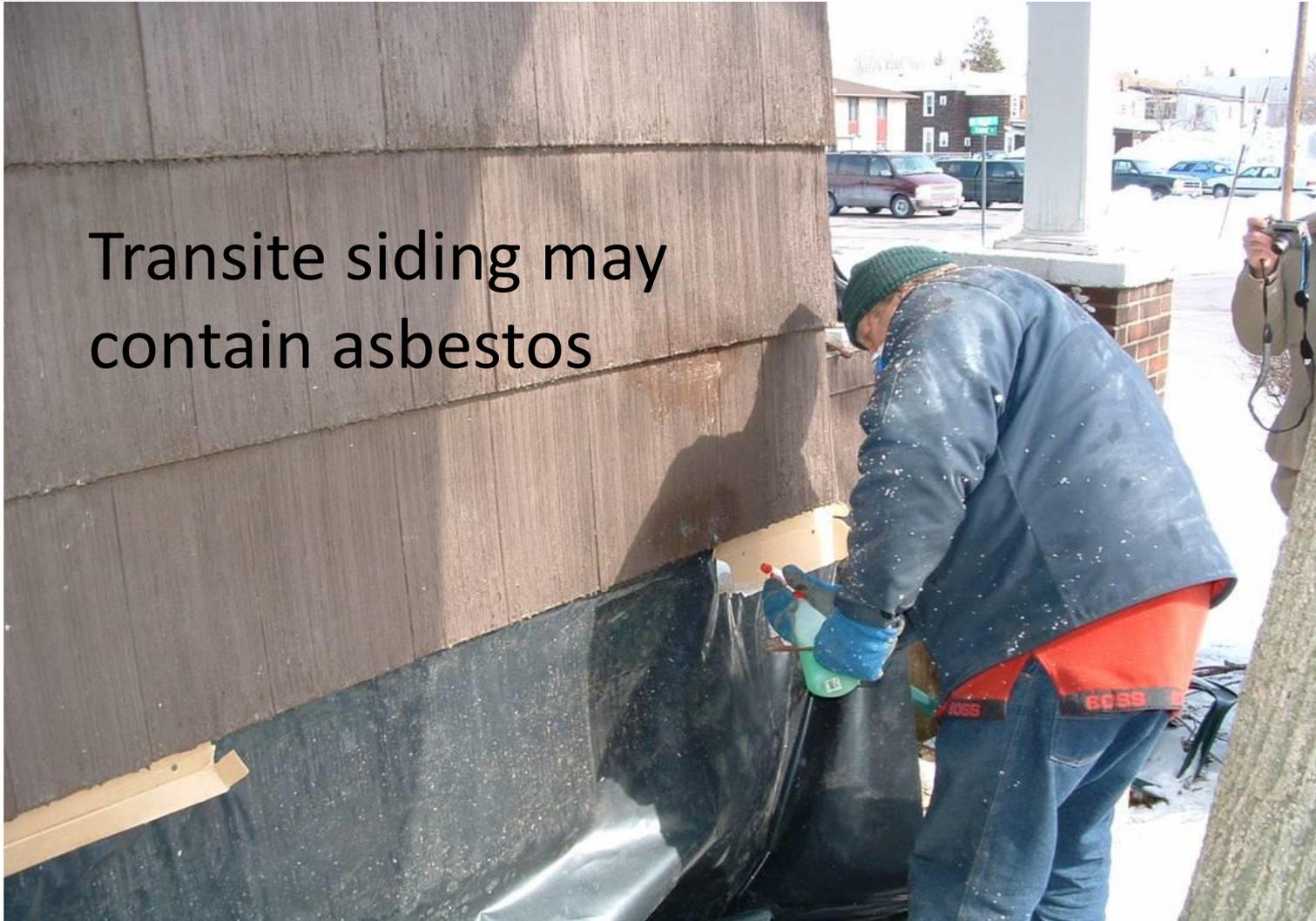


Brick



Lead Based Paint

Transite siding may  
contain asbestos



























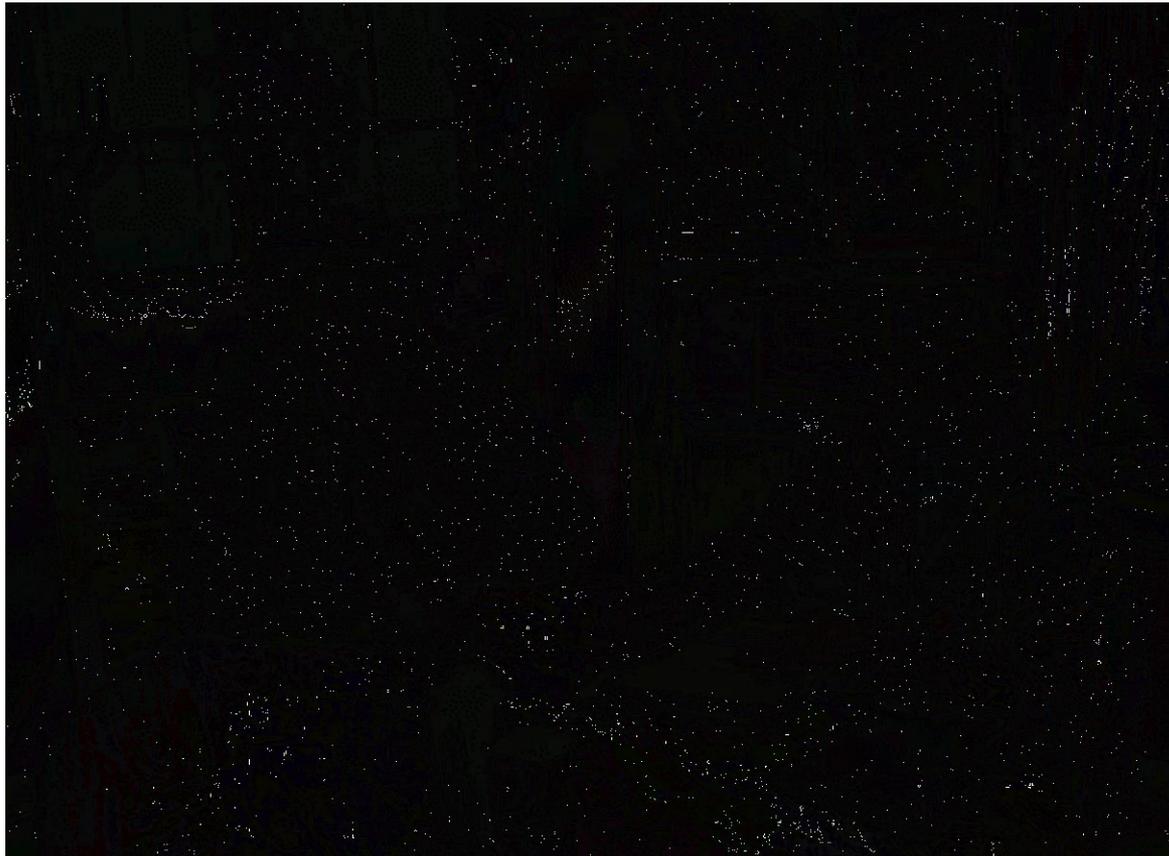




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# Interior Inspection

# Customer Interview





# Client Questionnaire

NYS DIVISION OF HOUSING AND COMMUNITY RENEWAL  
WEATHERIZATION ASSISTANCE PROGRAM  
DHCR # 11

### CLIENT QUESTIONNAIRE

Unit # \_\_\_\_\_ Building Address \_\_\_\_\_

#### HEATING, HOT WATER

- How long have you lived here? \_\_\_\_\_
- Was the heating system operating last winter? .....  Yes  No
- Has any work been done to your heating system in the past 2-3 years? .....  Yes  No
- Do you use a separate space heater during the winter months? .....  Yes  No  
What fuel? .....  Electric  Kerosene  Other
- Do you have a working fireplace? .....  Yes  No  
How often is it used? .....
- When was the last time the chimney was cleaned? .....
- Do you use a wood stove? .....  Yes  No  
How much wood did you use during the last heating season? .....
- Did you use your cookstove for heat during the past winter? .....  Yes  No  
What type of fuel is your cookstove? .....
- Does your home or certain rooms ever get too warm? .....  Yes  No  
If yes, explain where .....
- Does your home or certain rooms ever get too cold? .....  Yes  No  
If yes, explain where .....
- Do you have any noticeably drafty areas? .....  Yes  No  
If yes, explain where .....
- When was the last time your heating system was cleaned and tuned? .....
- Do you change your furnace filter regularly? .....  Yes  No  
If yes, when was it done last? .....
- Do you have a setback thermostat? .....  Yes  No  
What is the highest setting .....  
°F
- What is the lowest setting ..... °F
- Where is the thermostat located? .....
- Do you close off any rooms? .....  Yes  No  
If yes, which rooms? .....
- Do you have an air conditioner? .....  Yes  No  
If yes, what type? .....

#### HEALTH & SAFETY

- Do you or any member of your household suffer from frequent headaches, flu, colds or nausea during the heating season? .....  Yes  No
- Do you or any member of your household have medical problems that are irritated by high heat? .....  Yes  No  
If yes, is the affected person presently receiving doctor's care for the problem? .....  Yes  No
- Is there any condensation build-up in your home? .....  Yes  No  
If yes, where? .....
- Is there mold or mildew in your home? .....  Yes  No
- Does your basement get wet during certain times of the year? .....  Yes  No  
If yes, when and where? .....
- Does ice form in your attic during the winter? .....  Yes  No
- Is there ice build-up on your roof during the winter? .....  Yes  No
- Does your roof leak? .....  Yes  No
- Has your home been certified as free from lead-based paint? .....  Yes  No
- Has any member of your household been tested for lead exposure? .....  Yes  No  
If yes, what were the results? .....
- Did you receive the lead booklet entitled " " ? .....  Yes  No

#### VISUAL INSPECTION COMMENTS OR CONCERNS NOTED BY AUDITOR

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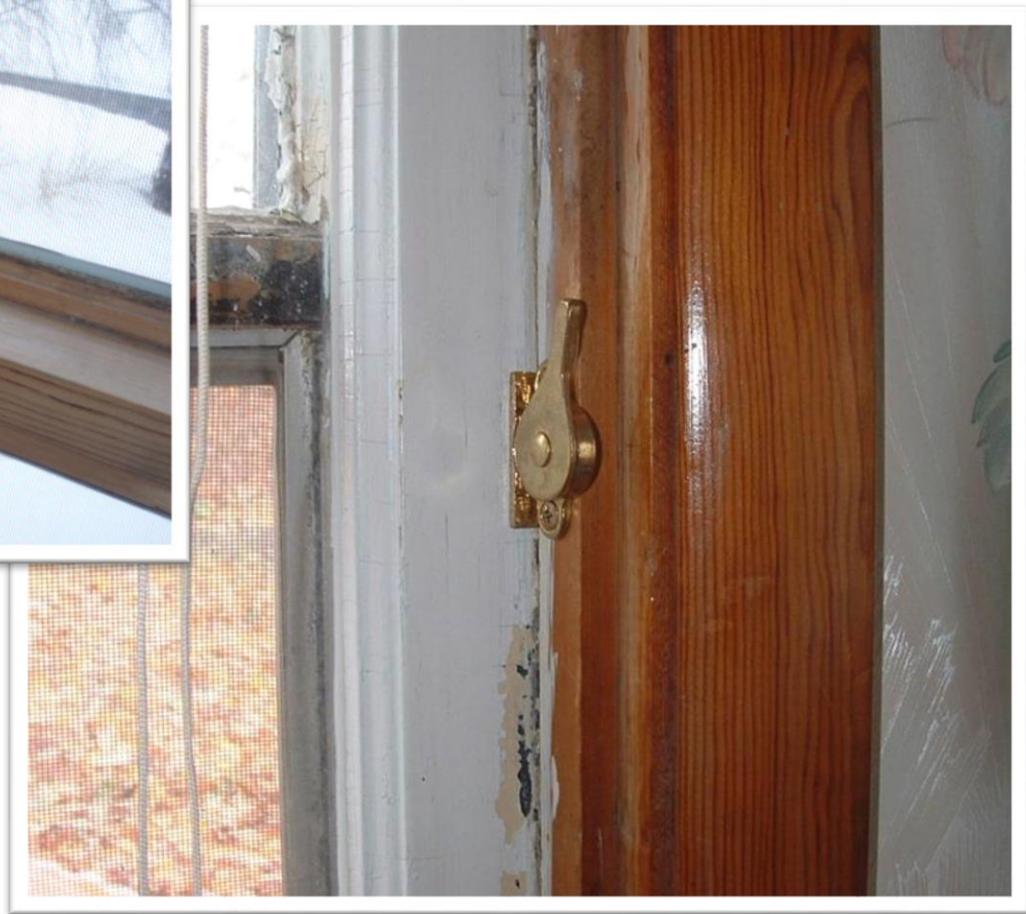
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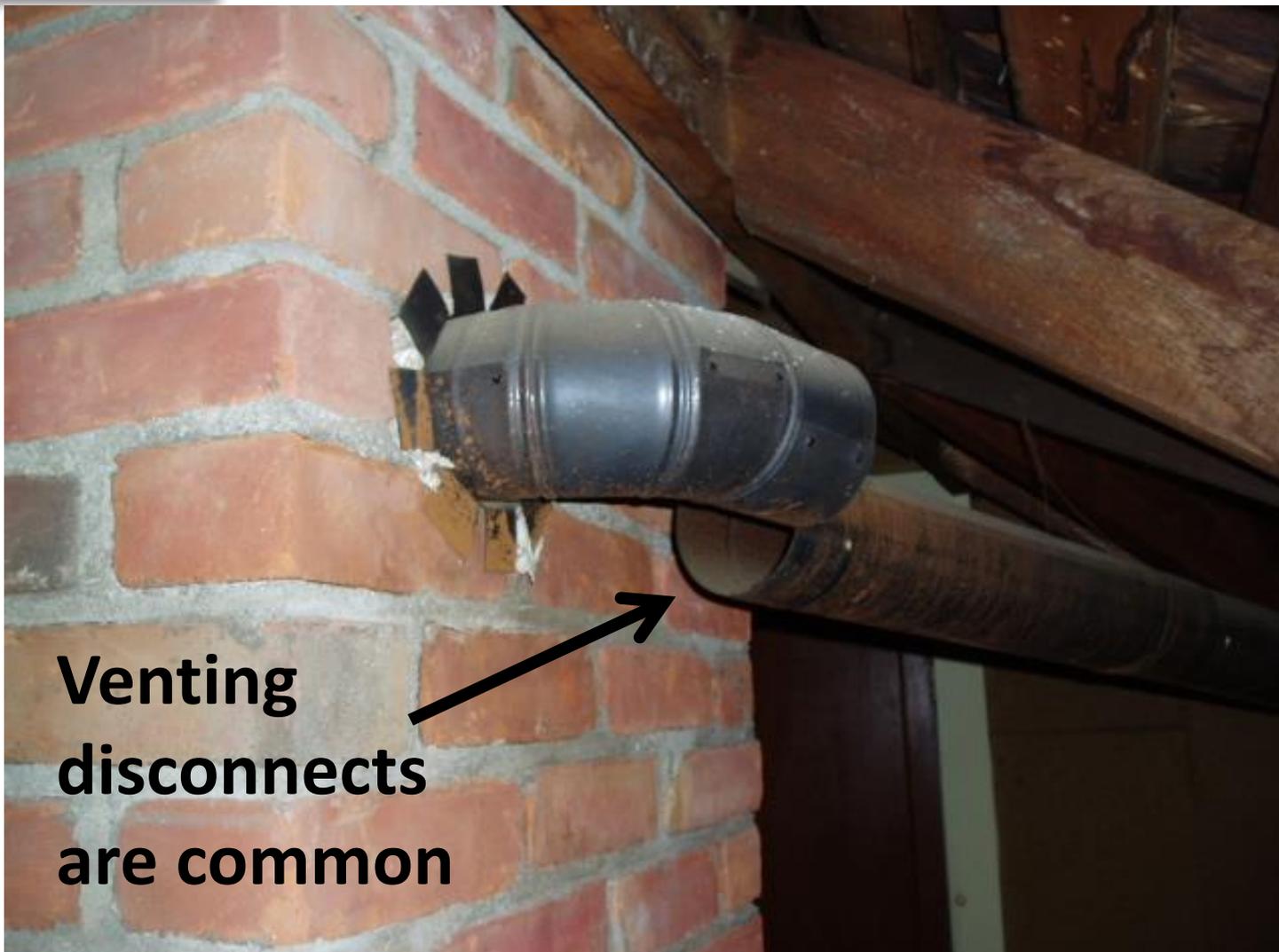
# The Basement







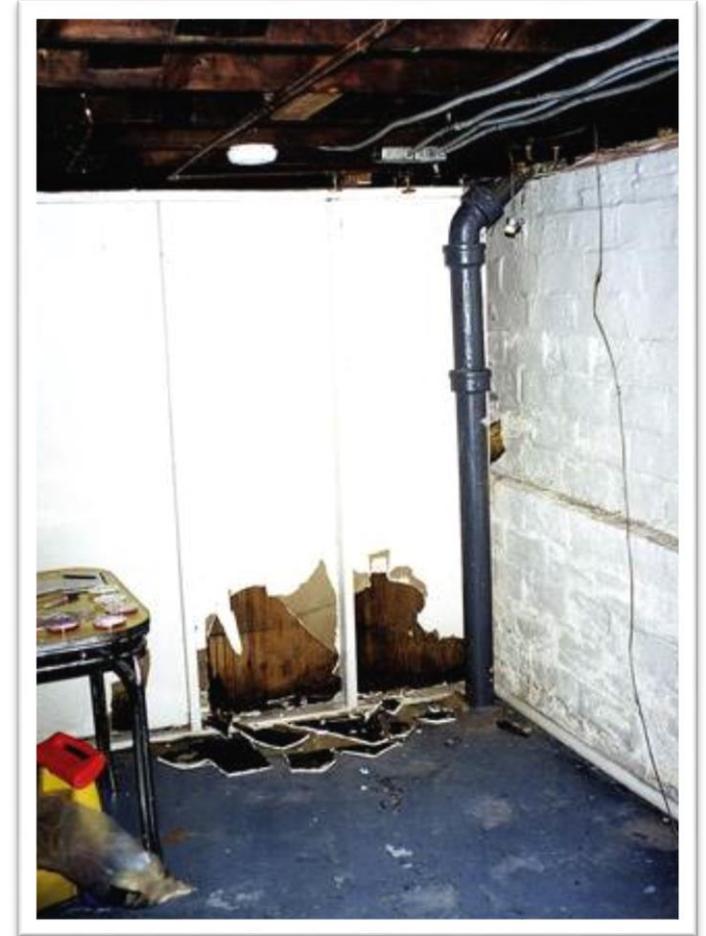




**Venting  
disconnects  
are common**





















# Dryer fire caused by plugged lint trap





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# The Attic





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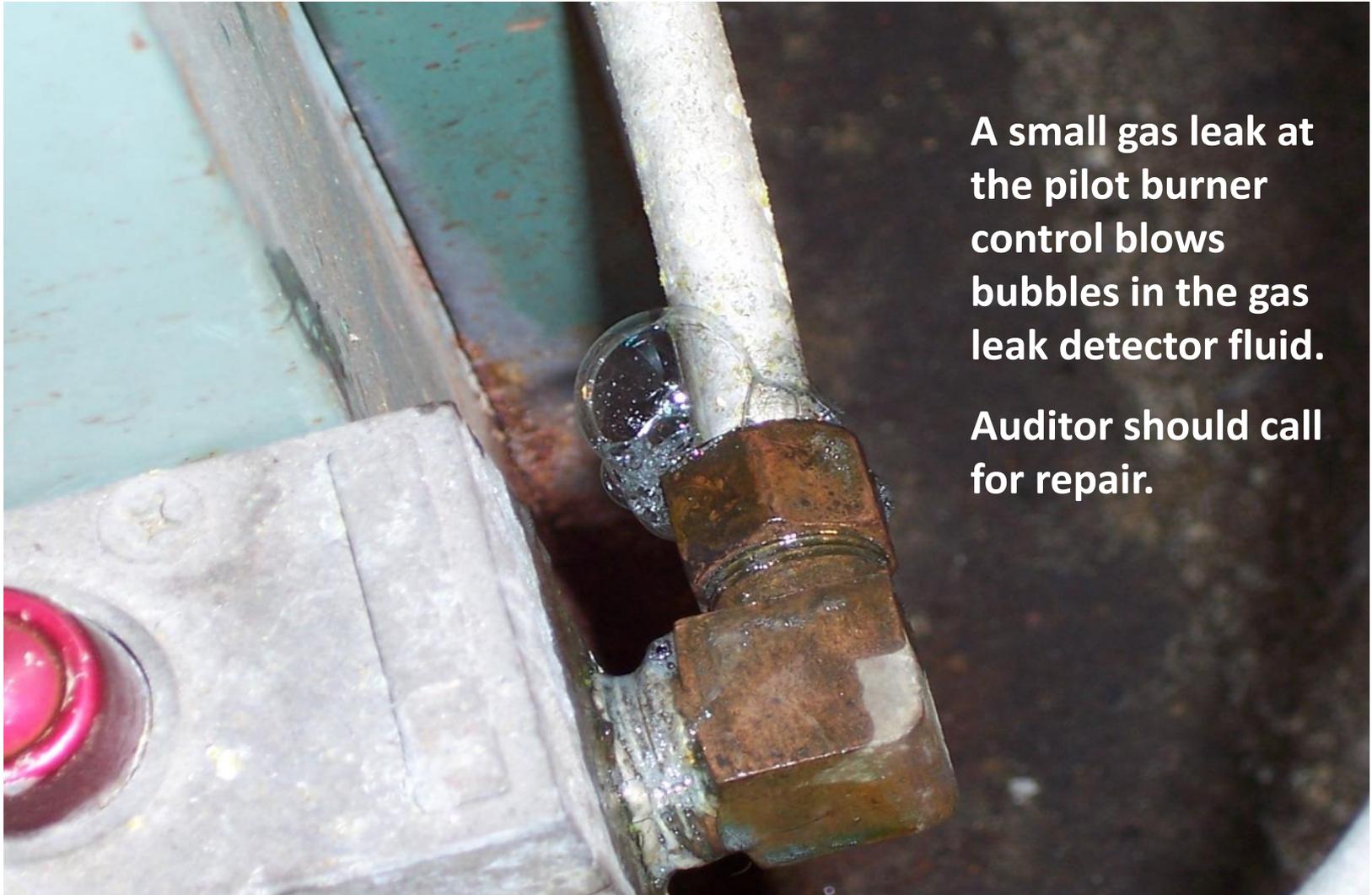
# Diagnostic/Health and Safety Tests

## Carbon Monoxide Testing- Ambient and in Oven



# Gas Leak Detection





**A small gas leak at the pilot burner control blows bubbles in the gas leak detector fluid. Auditor should call for repair.**

# CAZ Zone Depressurization

**Make sure the exhaust gas is going up the chimney not dumping back into the house**



# Combustion Analyzer



# Steady State Efficiency Tests



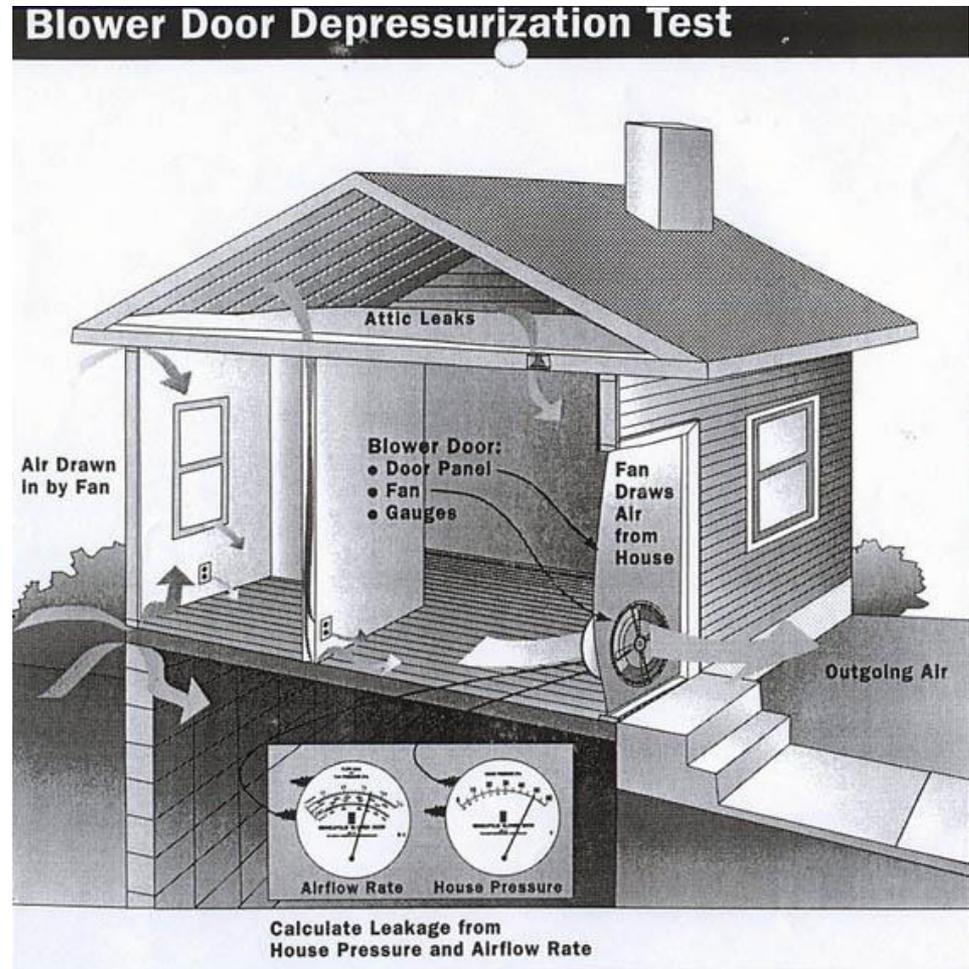
# Measuring chimney draft



# Worst Case Draft



# Blower Door

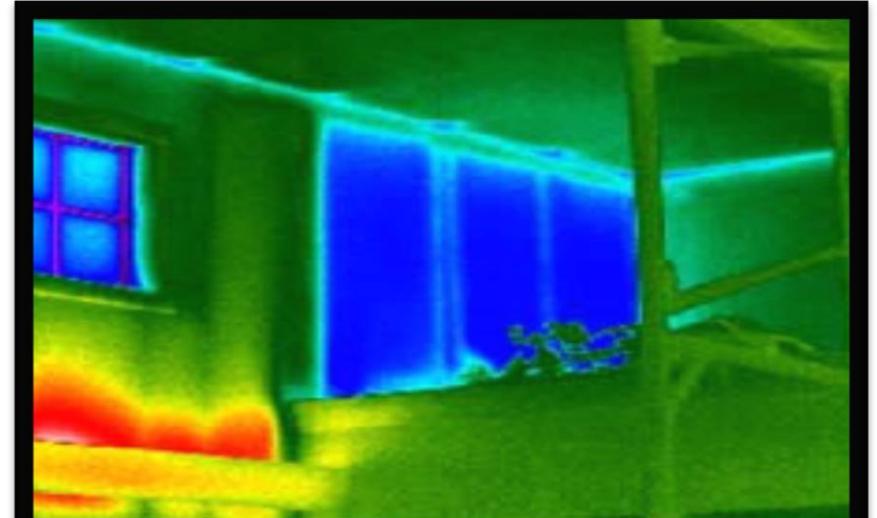
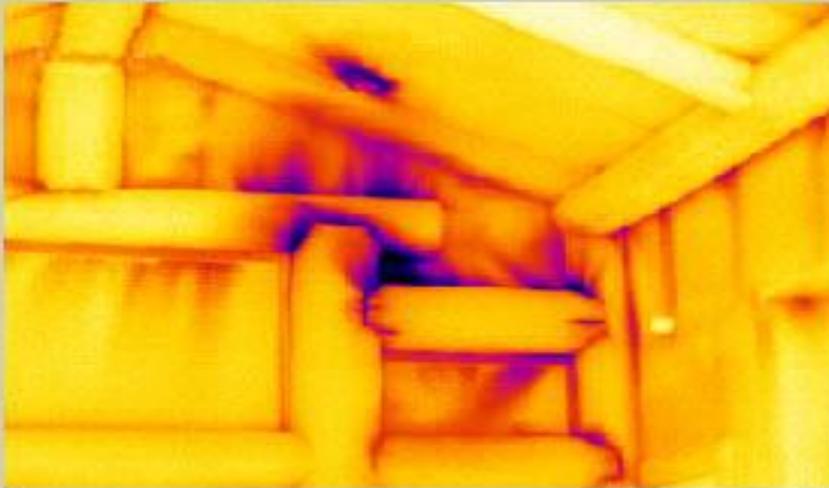


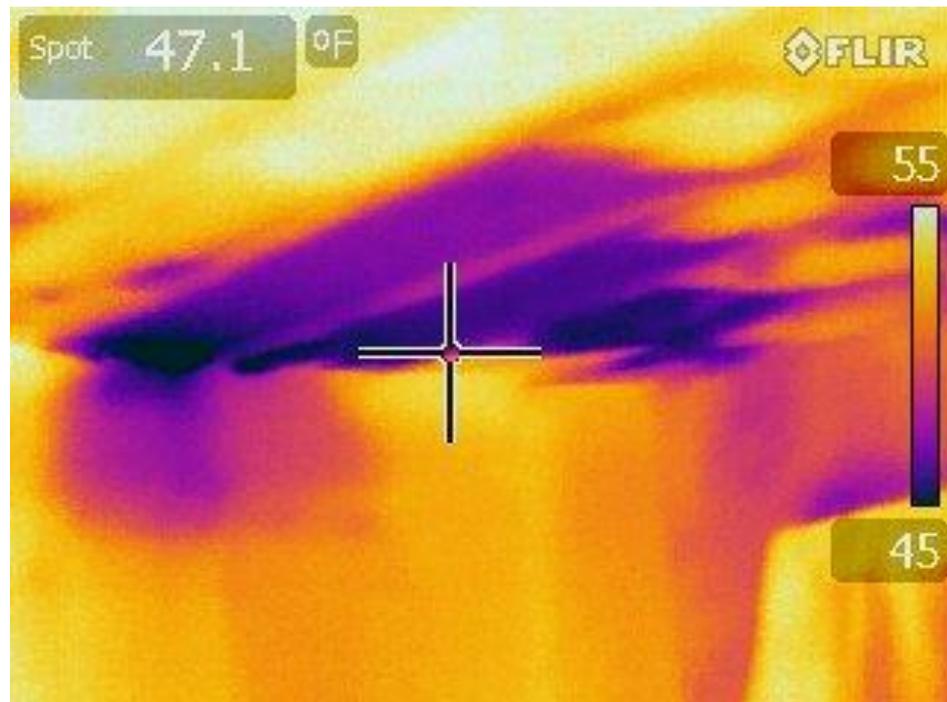
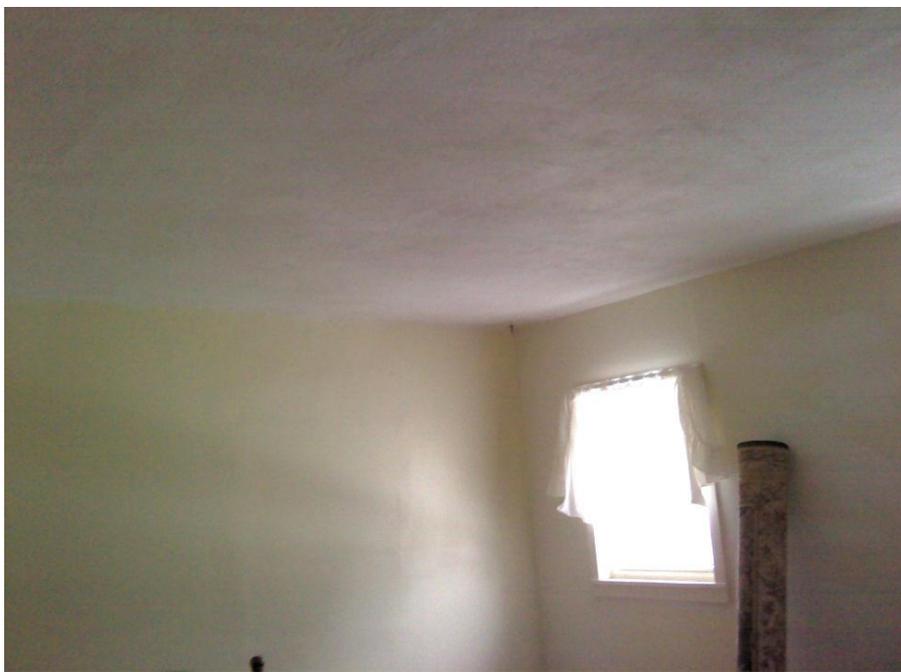
# Digital Manometer

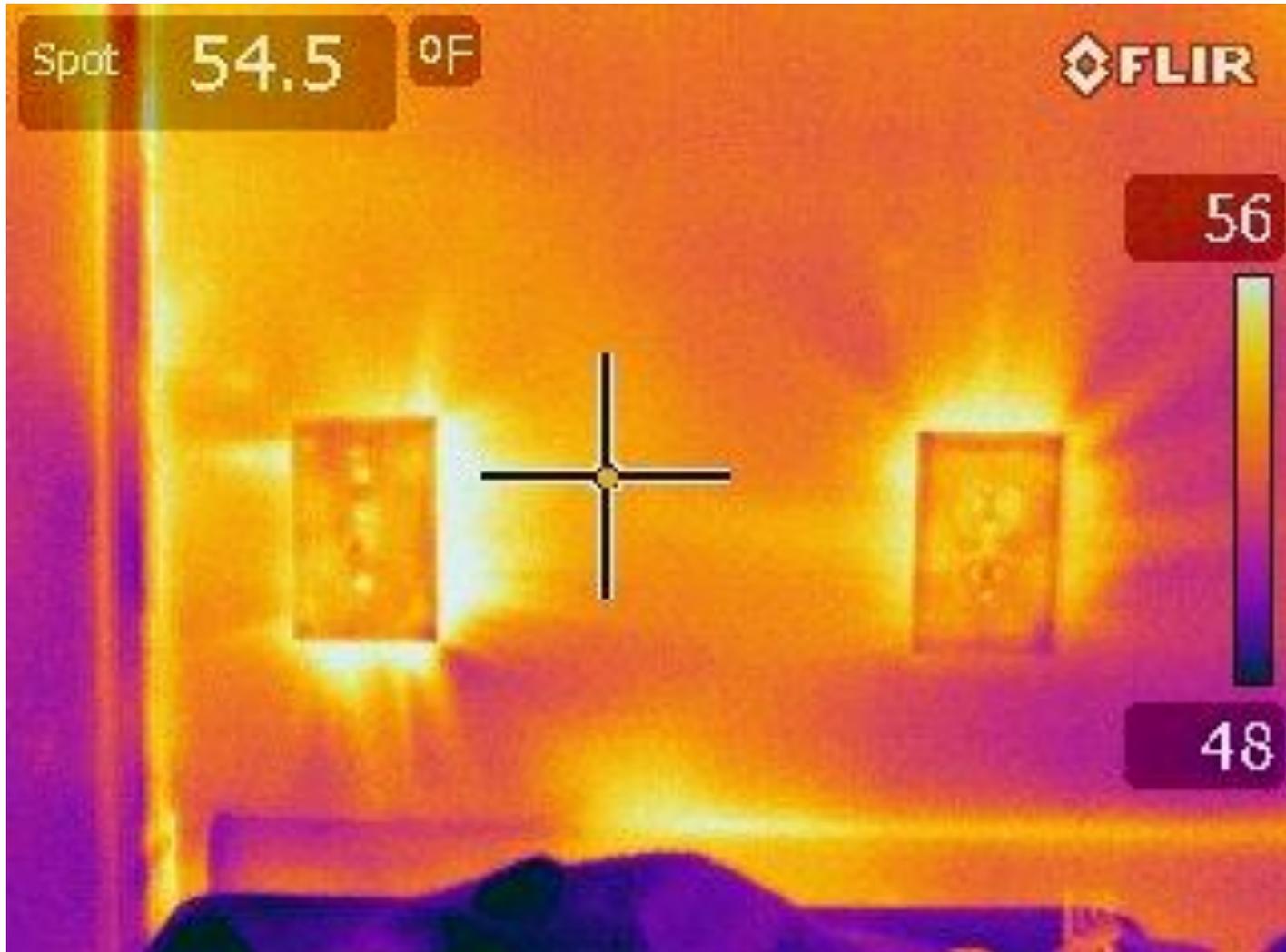


# Infrared Camera



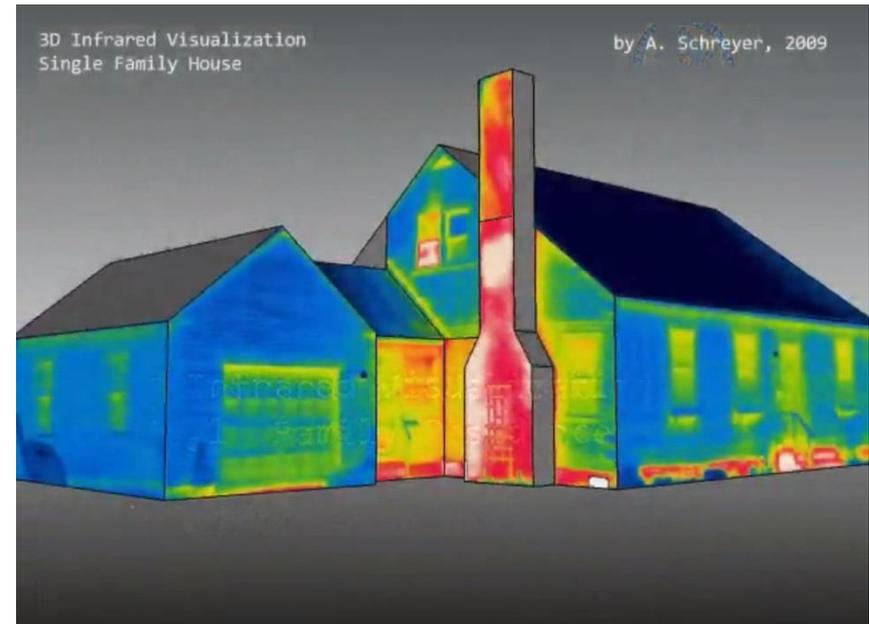






# Infrared Scanning

Infrared combined with a blower door is greater than the sum of its parts.



# Computer Modeling



ESB Subgrantee System - Current Contract/Amend = C090049 / 0 For Agency ONON

File Edit Tools ESB Reports Window Help

Agency Contract Bldgs Exit Print Insert Delete Save Close

**Building Data Entry Window**

Contract No/Prog Year: C090049 / 2007 Start Date: 04/01/2007 End Date: 03/31/2008 Agency: ONON Building Search

Building No: 1 Address: 123 Energy LN, Syracuse, NY 132040000

Bldg Project Client/Unit/Demo. Cost Measures Audit TIPS Cond. TIPS Model TIPS WkScope Other WkScope

Model EF: 11.53 Proposed EF: 9.0 TOTAL TIPS Investment: \$2,883

| Building Model |       |          |       |      | Proposed Measures |           |      |      |       |      |     |
|----------------|-------|----------|-------|------|-------------------|-----------|------|------|-------|------|-----|
| Item           | Area  | Prevalue | HNAC  | (%)  | Area              | Postvalue | Cost | Life | HNAC  | (%)  | SIR |
| Wind1          | 107   | 0.48     | 5.87  | 8%   | 107               | 0.48      | 0    | 0    | 5.87  | 11%  | 0.0 |
| Wind2          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Wind3          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Other1         | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Door1          | 35    | 0.3      | 1.20  | 2%   | 35                | 0.3       | 0    | 0    | 1.2   | 2%   | 0.0 |
| Door2          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Wall1          | 1,218 | 0.08     | 11.14 | 16%  | 1218              | 0.08      | 0    | 0    | 11.14 | 21%  | 0.0 |
| Wall2          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Wall3          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Wall4          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Ceil1          | 886   | 0.08     | 8.10  | 12%  | 886               | 0.02      | 800  | 25   | 2.03  | 4%   | 1.3 |
| Ceil2          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Ceil3          | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| Floor1         | 886   | 0.06     | 6.08  | 9%   | 886               | 0.06      | 0    | 0    | 6.08  | 11%  | 0.0 |
| Floor2         | 0     | 0.0      | 0.00  | 0%   | 0                 | 0.0       | 0    | 0    | 0     | 0%   | 0.0 |
| ALeak          |       | 1,603    | 9.89  | 14%  |                   | 1,500     | 80   | 15   | 9.26  | 17%  | 1.0 |
| HDist          |       | 78       | 11.93 | 17%  |                   | 80        | 100  | 15   | 8.9   | 16%  | 1.4 |
| HAppl          |       | 78       | 15.29 | 22%  |                   | 82        | 60   | 2    | 9.76  | 18%  | 1.0 |
| TOTAL          |       |          | 69.50 | 100% |                   |           |      |      | 54.24 | 100% |     |

Rec. Appl. Size: 32,100 To 38,520 BTU/Hr \*Not to be used for steam Proposed MAT/LAB\$: \$1,040

# Computer modeling and the Savings to Investment Ratio (SIR)

Enter the post-weatherization area if the workscope calls for the area to change. 09/06/2007 12:48

start ESB Subgrantee Syst... Microsoft PowerPoint ... 12:48 PM

## The End Game is:

Work scope development that will  
provide the most energy and  
comfort benefit to the customer  
while ensuring safety