

# Residential Energy Auditing

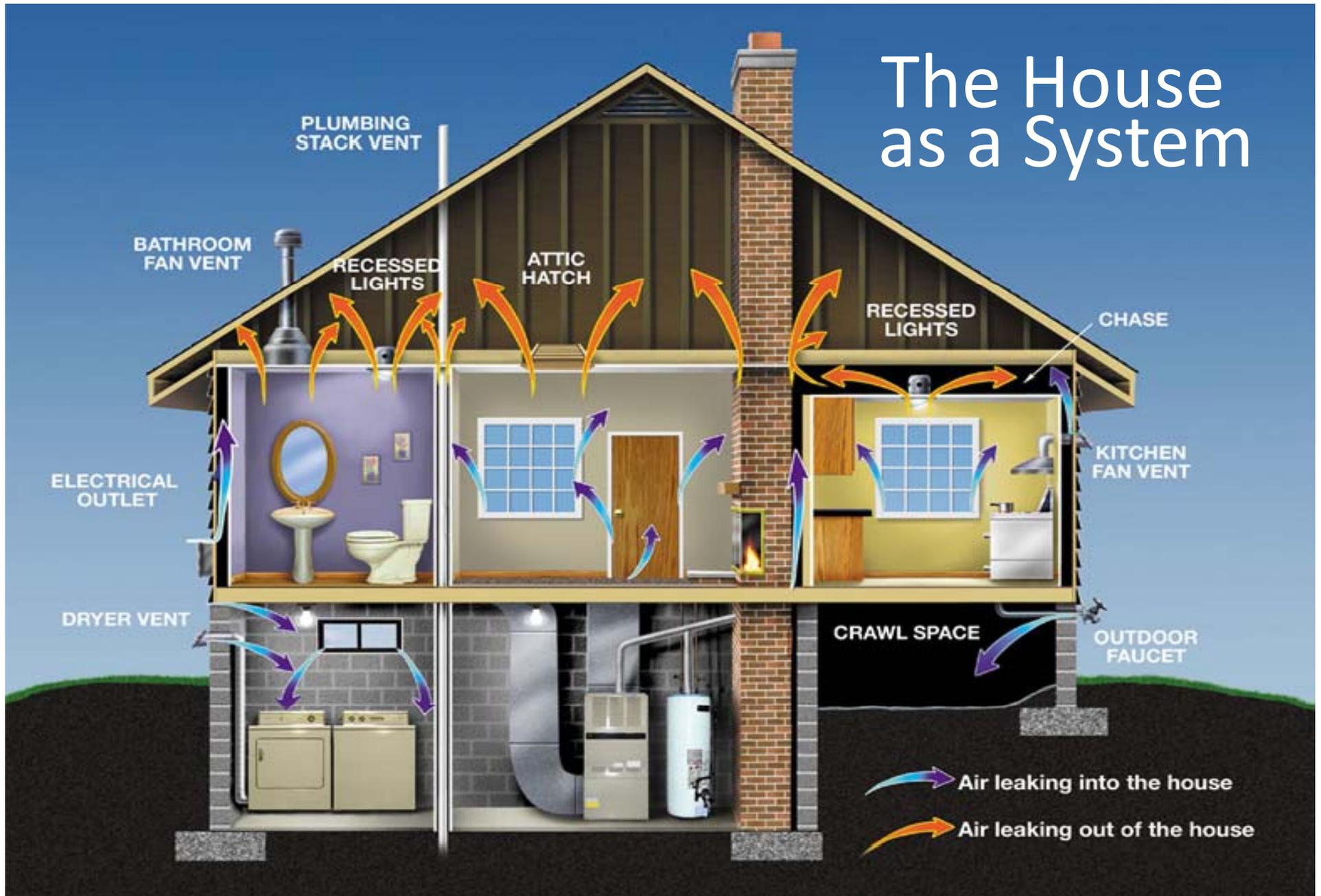


Andy Stone, Executive Director

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

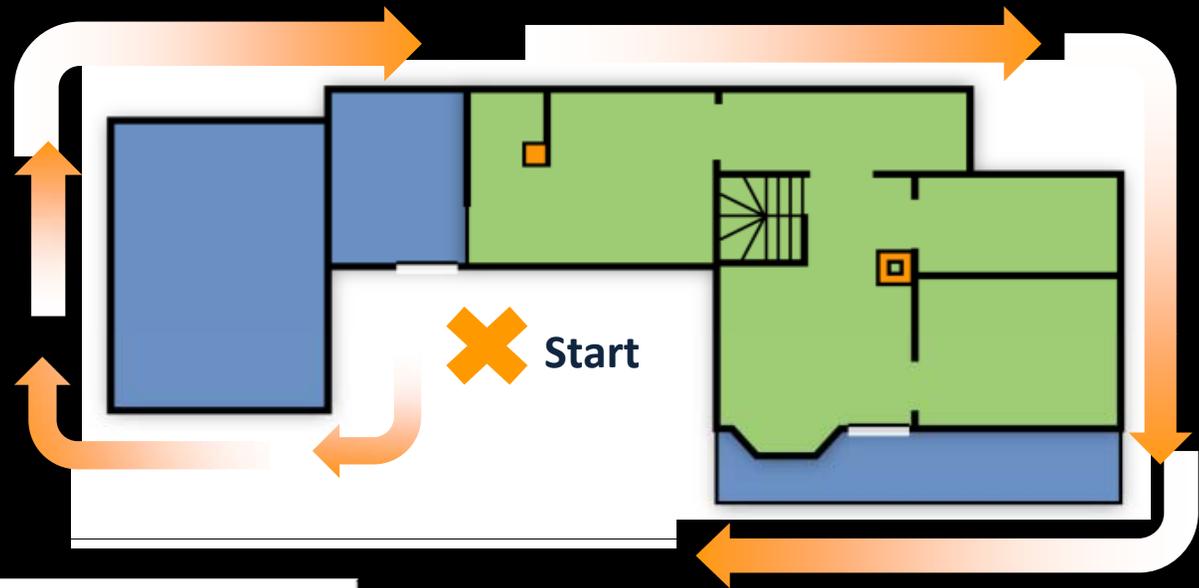
- A thorough inspection of the interior and exterior of the home using a holistic approach**
- Client education and being educated by the homeowner**
- Diagnostic/health and safety tests**
- Creating a computer model (TIPS, EA-QUIP, TREAT, EmpCALC)**
- Development of a comprehensive work scope**

# The House as a System



# Exterior Inspection

# Exterior Walk Around





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# Siding Types



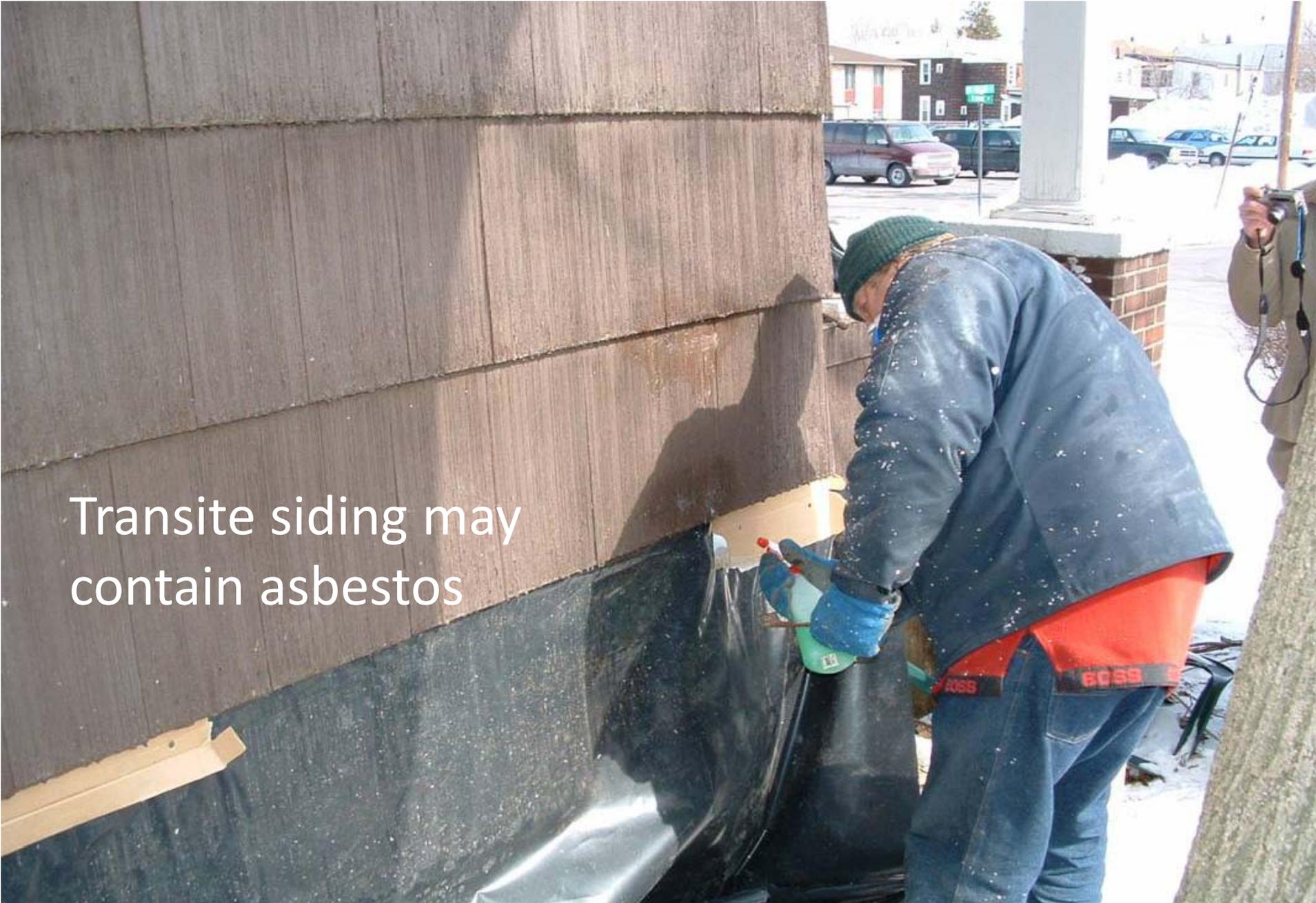
# Special Considerations



Brick



Lead Based Paint



Transite siding may  
contain asbestos



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Think this might be a problem?





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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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# Utility Bill Review

**nationalgrid**  
www.nationalgridus.com

**CUSTOMER SERVICE**  
1-800-642-4272

**AUTOMATED SERVICES**  
1-888-932-0301

**GAS EMERGENCIES**  
1-800-892-2345  
*(Does not replace 911 emergency medical service)*

**OUTAGE AND ELECTRIC EMERGENCIES**  
1-800-867-5222

**CORRESPONDENCE ADDRESS**  
300 Erie Blvd West  
Syracuse, NY 13202

**DATE BILL ISSUED**  
Feb 21, 2012

**ACCOUNT BALANCE**

Previous Balance	324.76
Payment Received on FEB 13 (Check) <i>THANK YOU</i>	- 324.76
Current Charges	+ 277.75
<b>Amount Due ▶</b>	<b>\$ 277.75</b>

*To avoid late payment charges of 1.5%, \$ 277.75 must be received by Mar 16 2012.*

**BILLING PERIOD**  
Jan 18, 2012 to Feb 15, 2012

**ACCOUNT NUMBER** [REDACTED] **PLEASE PAY BY** Mar 16, 2012 **AMOUNT DUE** \$ 277.75

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**ELECTRIC USAGE HISTORY (kWh)**

Month	Usage (kWh)
Feb 11	42.4
Feb 12	41.2

**Daily Averages**  
kWh: Feb 11: 42.4, Feb 12: 41.2  
Cost: Feb 11: \$ 6.35, Feb 12: \$ 4.90

**GAS USAGE HISTORY (Therms)**

Month	Usage (Therms)
Feb 11	6.0
Feb 12	5.5

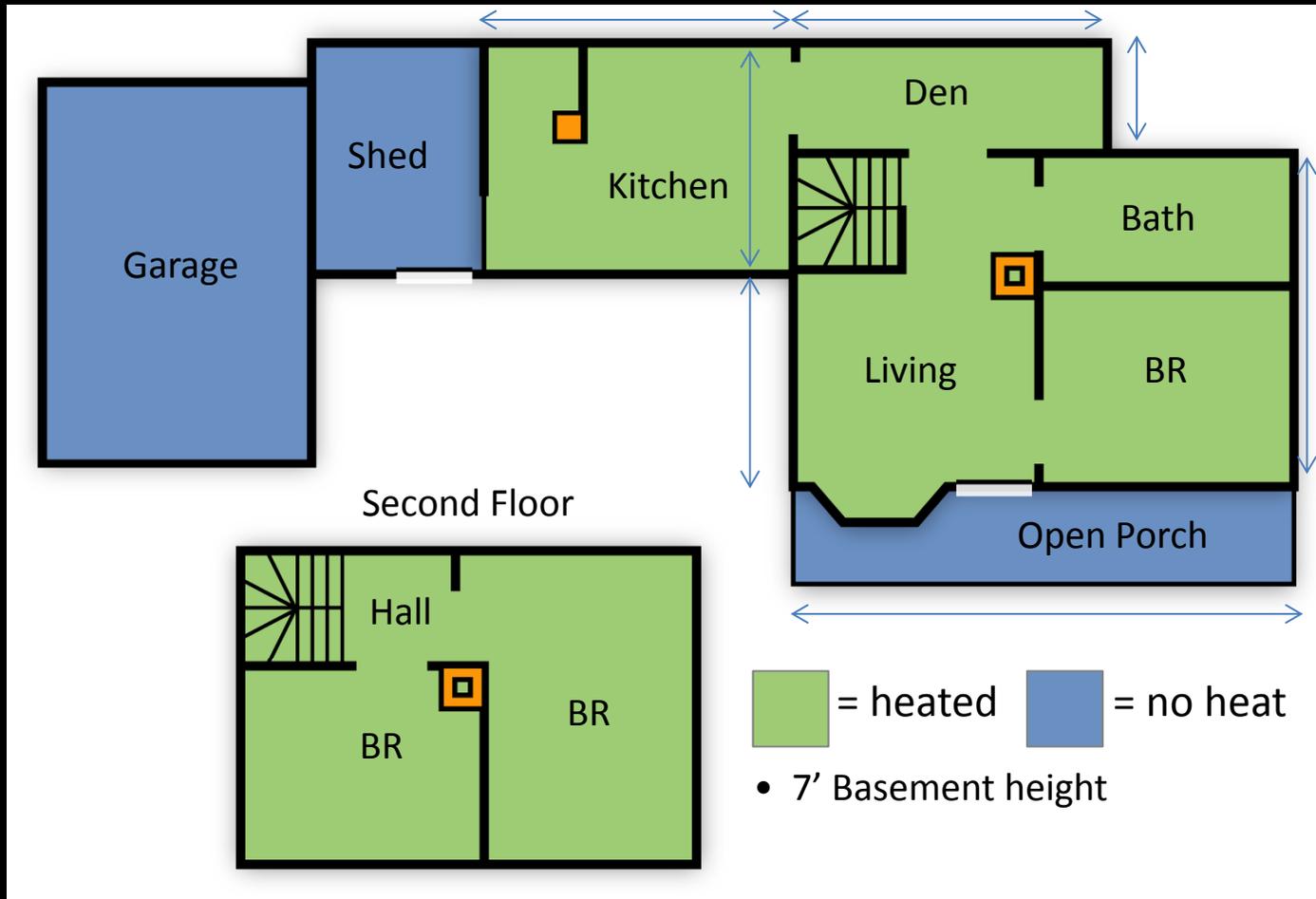
**Daily Averages**  
Therms: Feb 11: 6.0, Feb 12: 5.5  
Cost: Feb 11: \$ 6.90, Feb 12: \$ 5.01

**SUMMARY OF CURRENT CHARGES**

	DELIVERY SERVICES	SUPPLY SERVICES	TOTAL
Electric Service	82.37	55.03	137.40
Gas Service	53.79	86.56	140.35
<b>Total Current Charges</b>	<b>\$ 136.16</b>	<b>\$ 141.59</b>	<b>\$ 277.75</b>

- National Grid buys low cost energy and receives a Residential Consumer Discount monthly payment from the New York Power Authority (NYPA) to be used as a benefit for residential customers. This bill reflects a savings of \$ 2.80 from these benefits.
- Effective January 15, 2012**, business hours for our Customer Service Call Center will be Monday through Friday 7 a.m. to 7 p.m. As always, emergency support is available 24 hours a day, seven days a week.
- Lower Bills in 2012:** Electric rates starting 1/1/12 will be changing. Most customers will see lower bills. Using the same or less energy, bills will decrease. Visit nationalgrid.com for more information.
- PAYMENT CONCERNS?:** We're here to help you. We have several plans that can help you manage your energy bills. Go to www.nationalgridus.com/ paymentoptions to find out more or call us at 1-800-443-1837.

# Footprint Sketch





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# Drop ceilings can hide a multitude of problems





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# Sidewall insulation can be assessed through room outlets

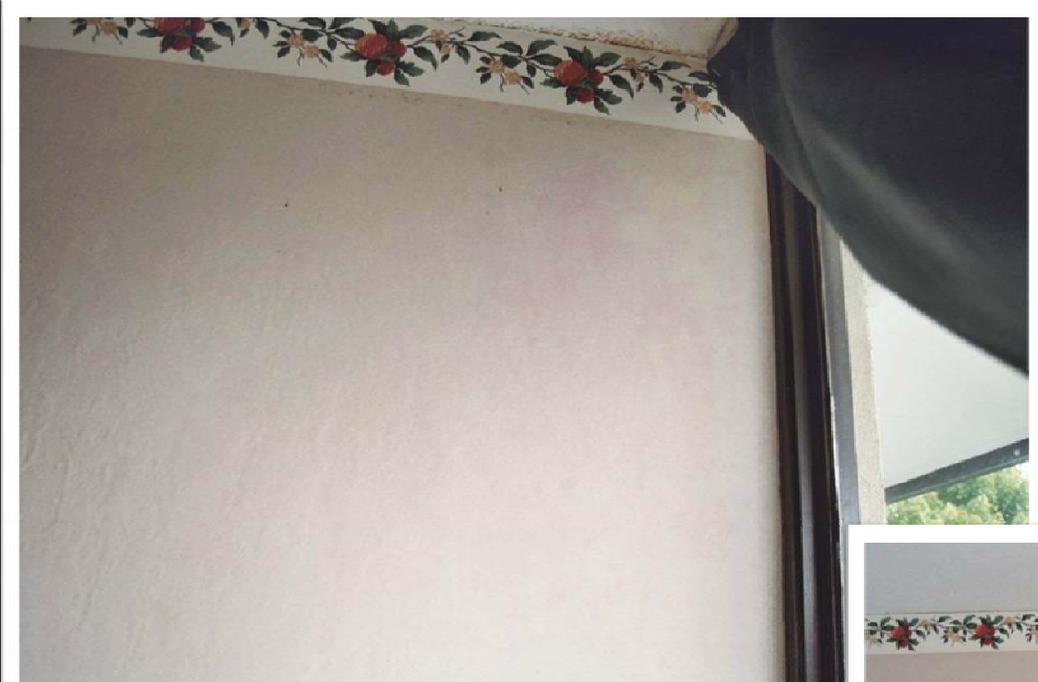




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# The Basement



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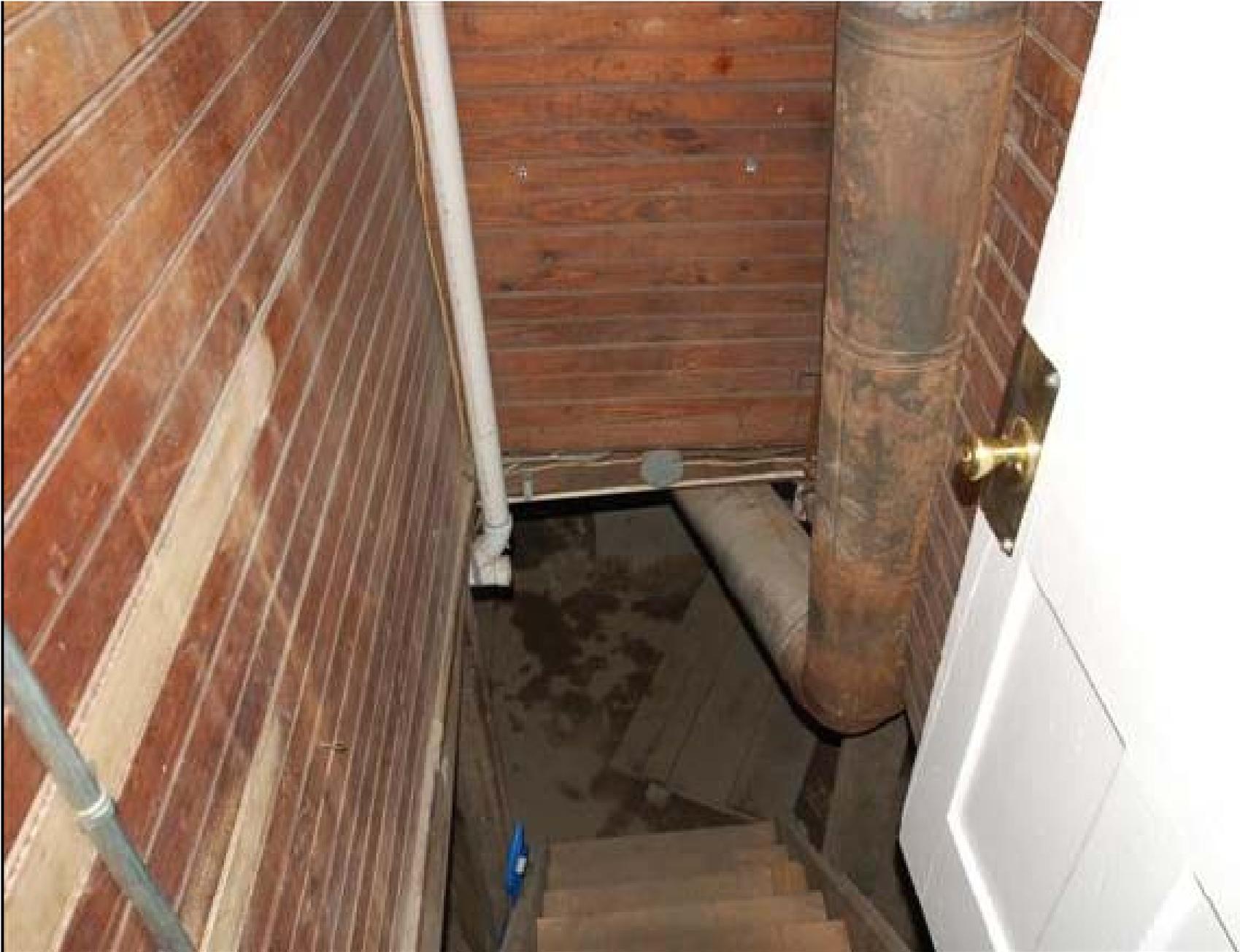
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Improper distribution causes flow restrictions



# Venting Disconnects are common



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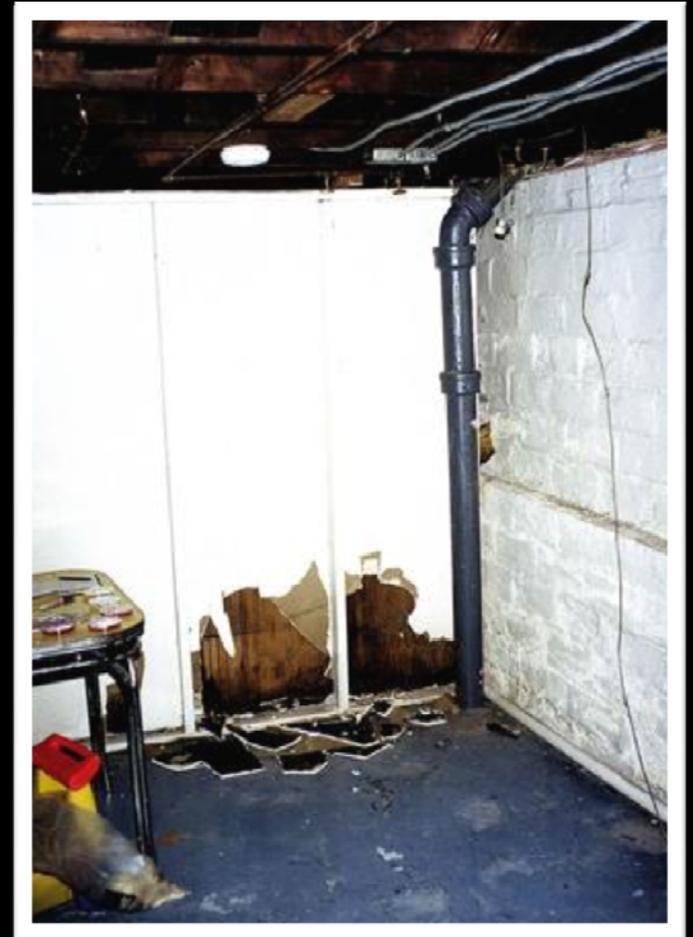


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# Dryer fire caused by plugged lint trap



# The Attic



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# Diagnostic/Health and Safety Tests

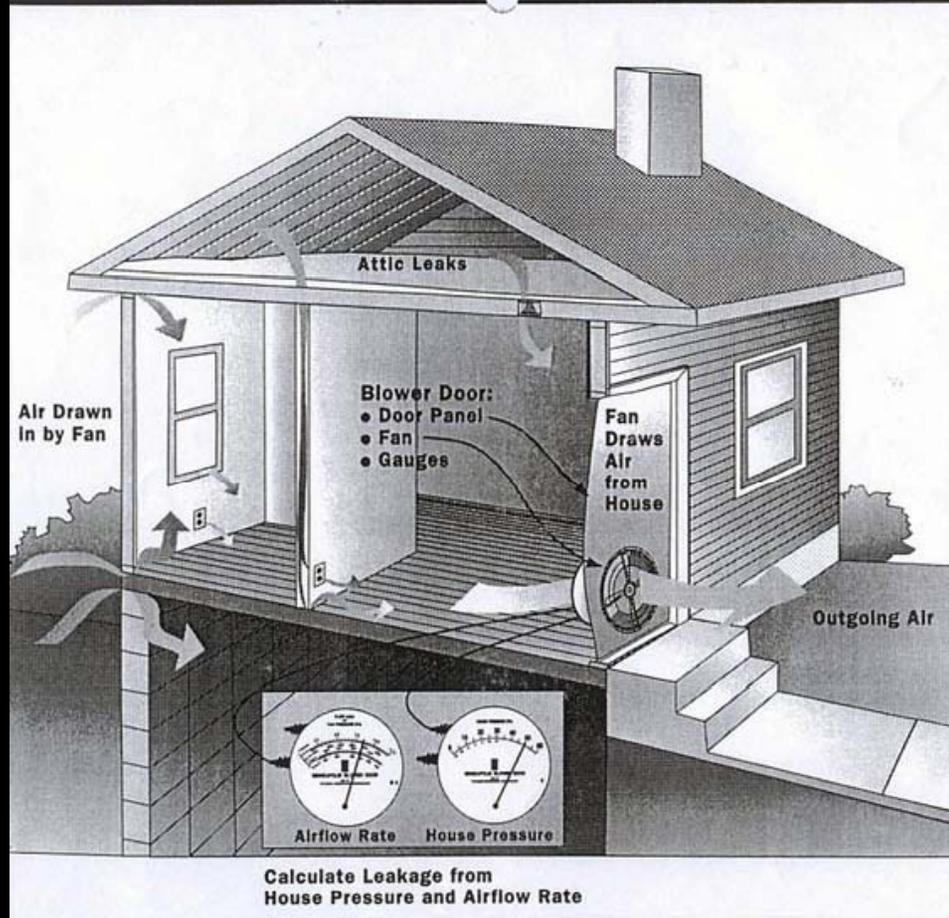
# Carbon Monoxide Testing- Ambient and in Oven



# Blower Door



## Blower Door Depressurization Test



# Combustion Analyzer



# Steady State Efficiency Tests



# Digital Manometer



# CAZ Zone Depressurization

**Make sure the fumes are going up the chimney not dumping back into the house**



# Drilling the Draft Test Hole



# Measuring chimney draft



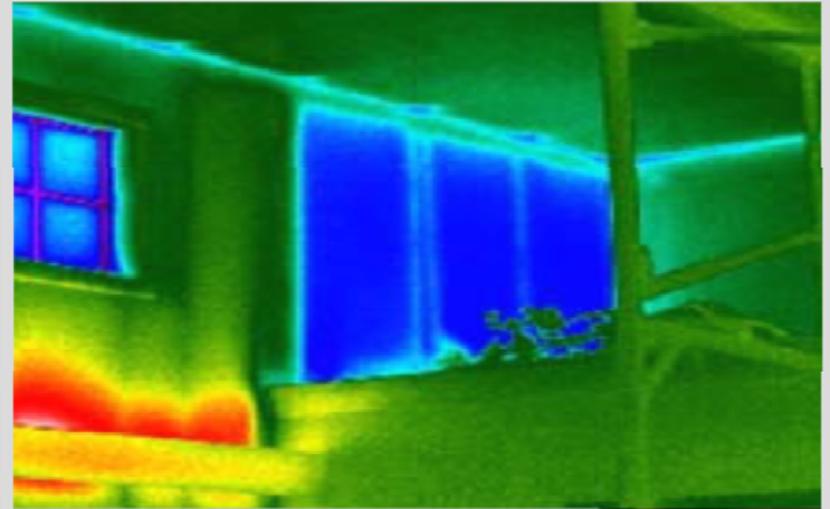
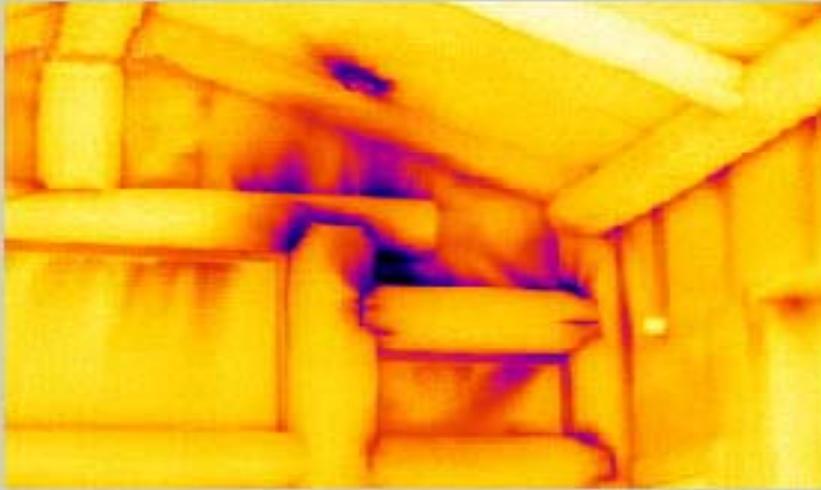
# Worst Case Draft



# Infrared Camera



# Infrared Camera

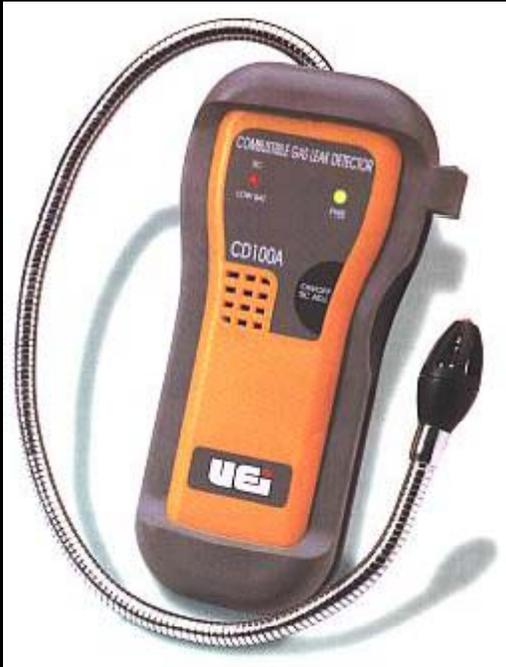


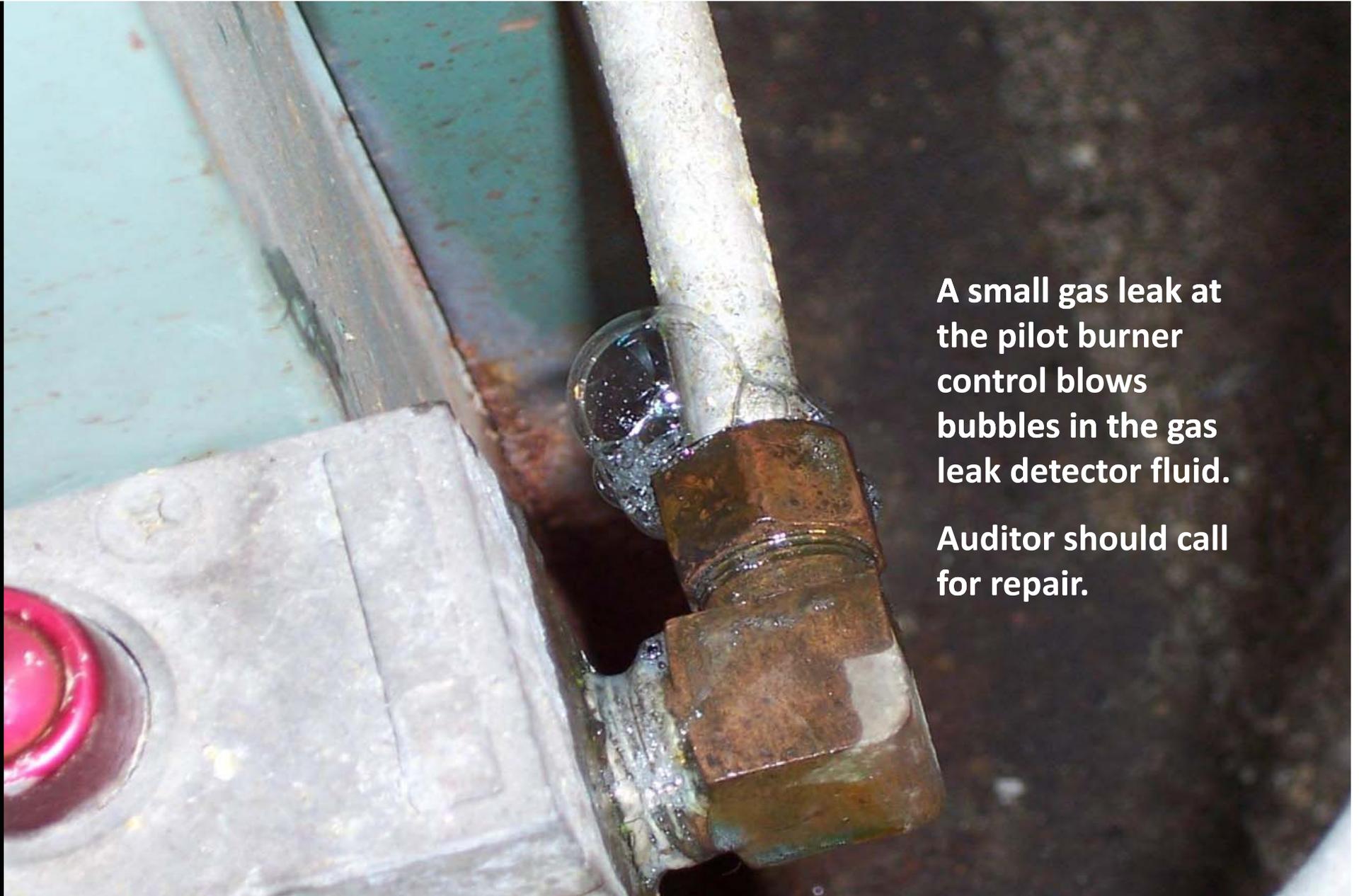
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# Gas Leak Detection





**A small gas leak at the pilot burner control blows bubbles in the gas leak detector fluid.**

**Auditor should call for repair.**

# Multi-Family Buildings



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# Modular Boilers



# Computer Modeling



# Modeling, Analysis, and the Savings to Investment Ratio (SIR)

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	80	15	9.26	17%	1.0
HDist		78	11.93	17%	80	100	100	15	8.9	16%	1.4
HAppl		78	15.29	22%	82	60	60	2	9.76	18%	1.0
<b>TOTAL</b>			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

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

# Typical Workscope

- Attic Insulation
- Sidewall Insulation
- Air Sealing
- Furnace Cleaning
- Furnace Repair
- Duct Sealing
- Baseload Measures
- Setback Thermostat
- Refrigerator
- DHW Replacement
- Doors
- Windows
- Health and Safety Measures/Repairs

**The End Game is:**

**Work scope development that will  
provide the most energy savings  
and net benefit to the customer**