

# Residential Energy Auditing

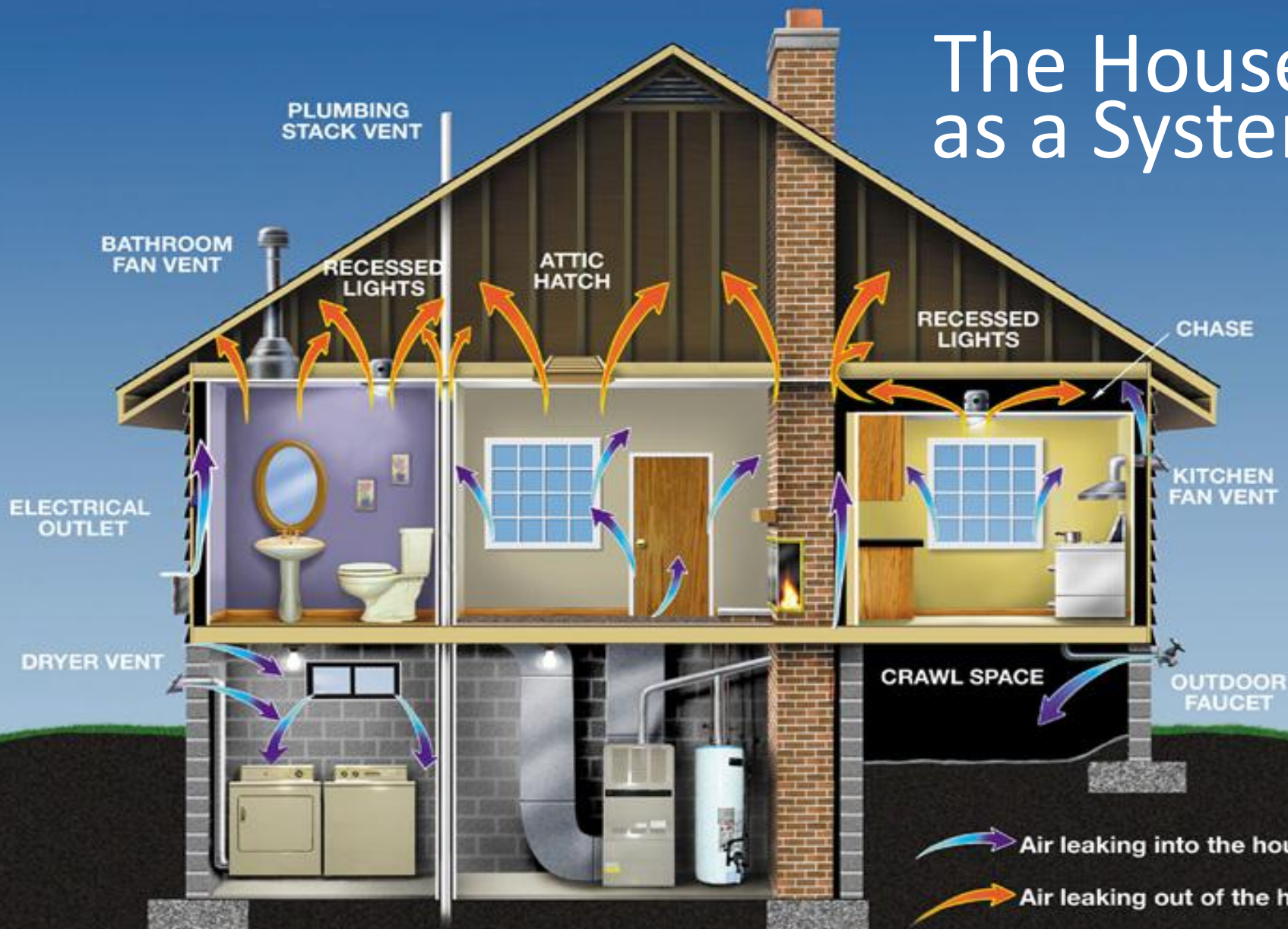


New York State Weatherization Directors Association

# **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**

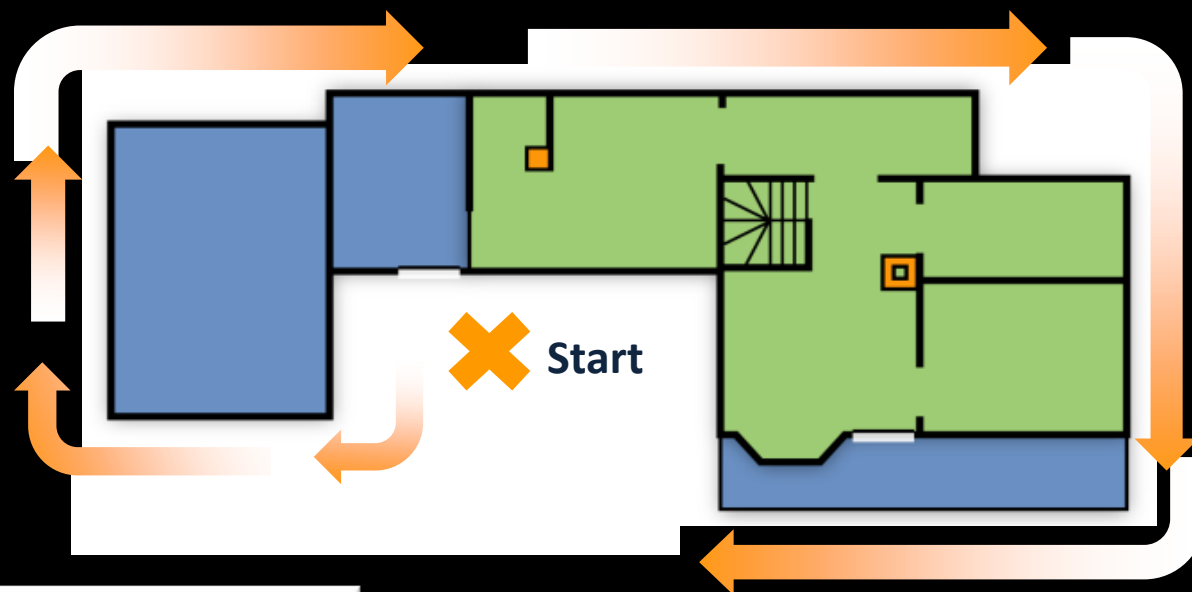
# The House as a System



# Exterior Inspection



# Exterior Walk Around





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# Siding Types



# Special Considerations



Brick



Lead Based Paint



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Think this might be a problem?









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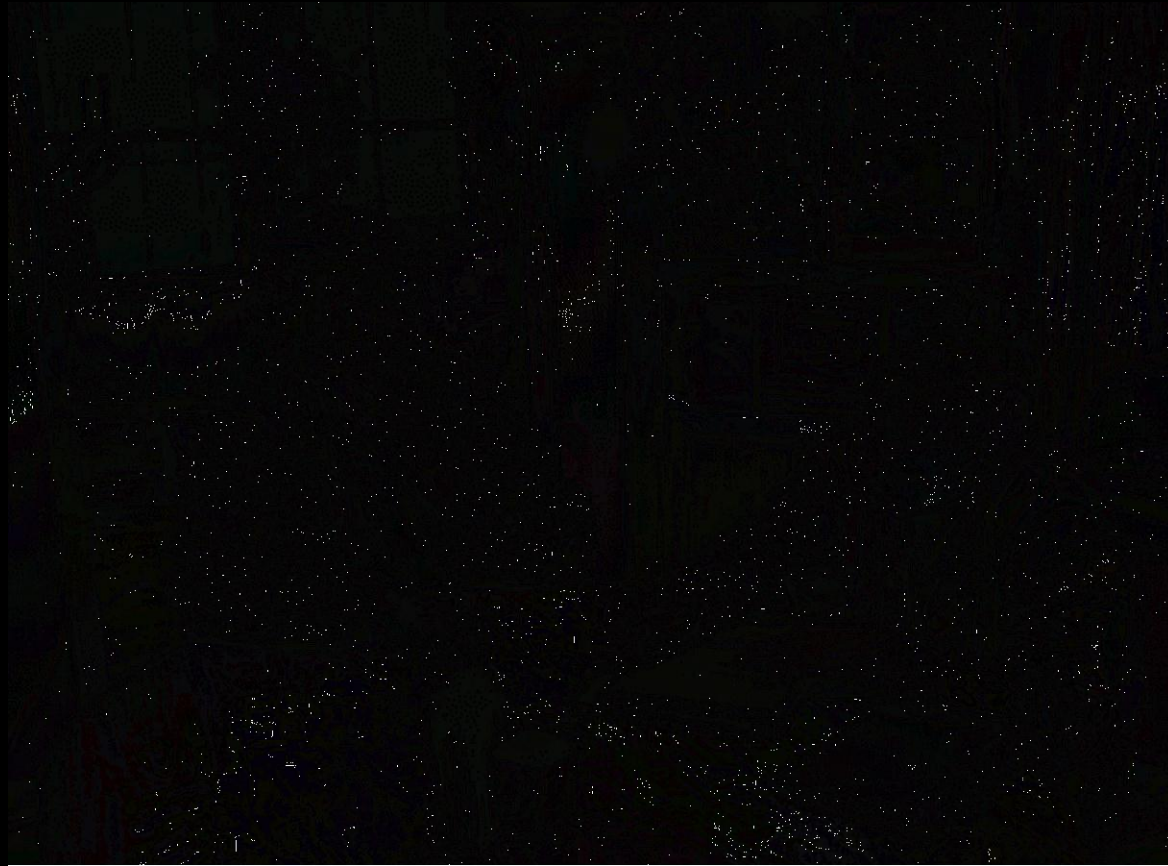
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# Interior Inspection



# 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? ..... ☐ Yes ☐ No
- 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 ..... °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

www.nationalgridus.com

SERVICE FOR

BILLING PERIOD  
Jan 18, 2012 to Feb 15, 2012

ACCOUNT NUMBER

PLEASE PAY BY  
Mar 16, 2012

PAGE 1 of 4

AMOUNT DUE  
\$ 277.75

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)	THANK YOU - 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.

**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>

**ELECTRIC USAGE HISTORY (kWh)**

Daily Averages	Feb 11	Feb 12
kWh	42.4	41.2
Cost	\$ 6.95	\$ 4.90

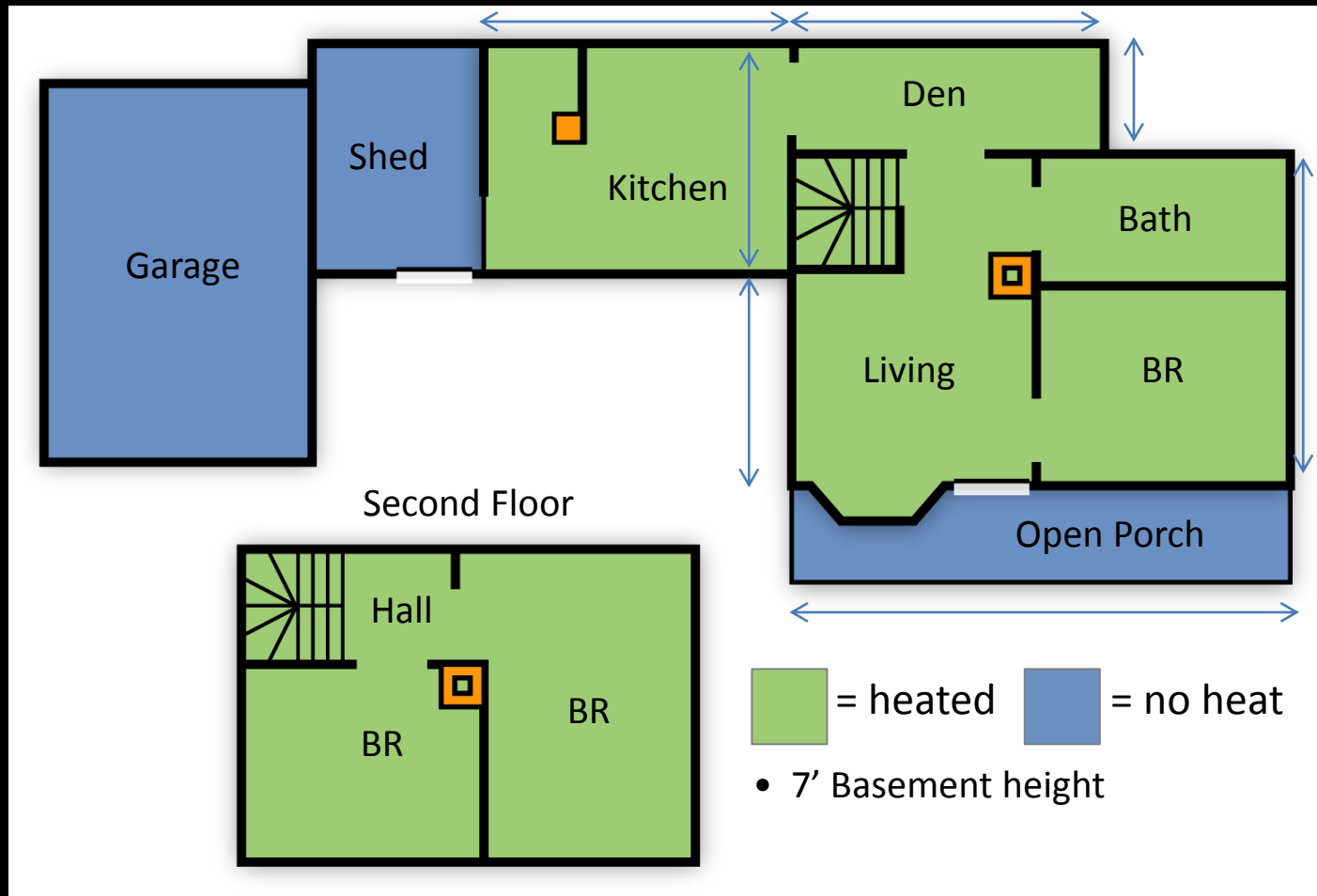
**GAS USAGE HISTORY (Therms)**

Daily Averages	Feb 11	Feb 12
Therms	6.0	5.5
Cost	\$ 6.30	\$ 5.01

**Notes:**

- 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 \$ 2.30 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](http://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](http://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











# The Basement



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Improper distribution causes flow restrictions



**Venting Disconnects are common**



























# The Attic



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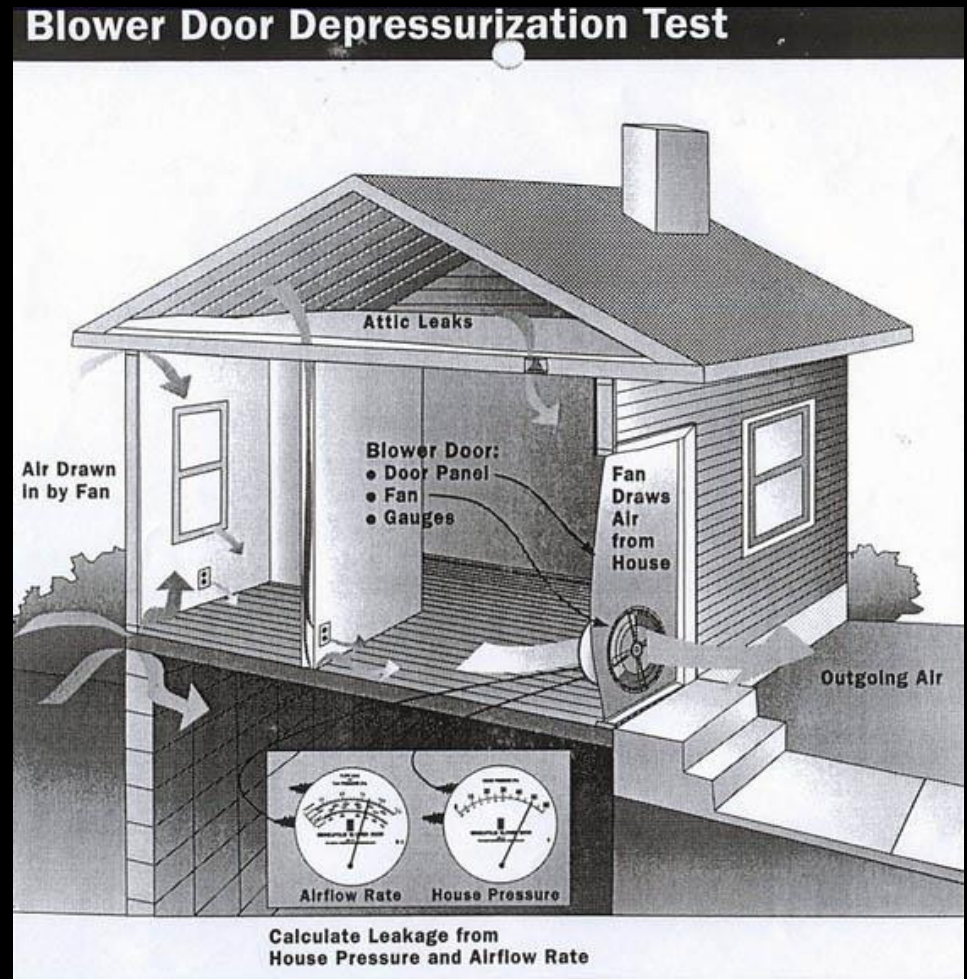
# Diagnostic/Health and Safety Tests



## Carbon Monoxide Testing- Ambient and in Oven



# Blower Door





# Combustion Analyzer

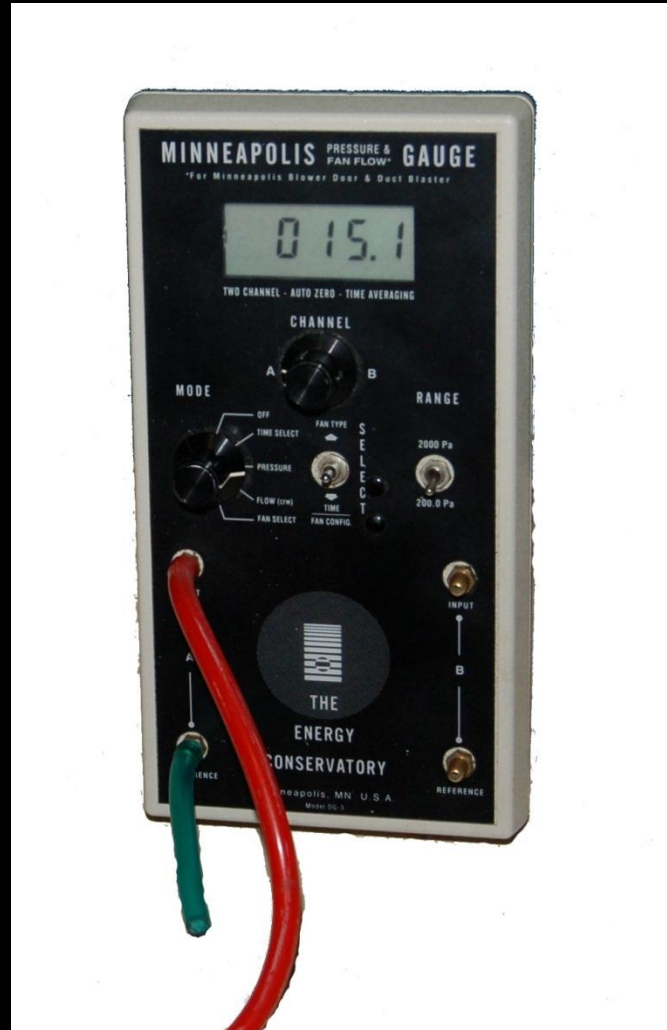


# Steady State Efficiency Tests





# Digital Manometer



# CAZ Zone Depressurization

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





# Measuring chimney draft





# Worst Case Draft

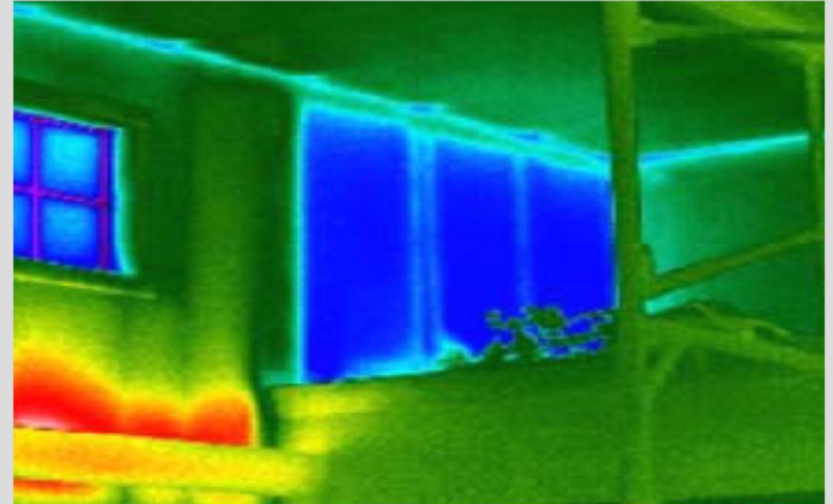
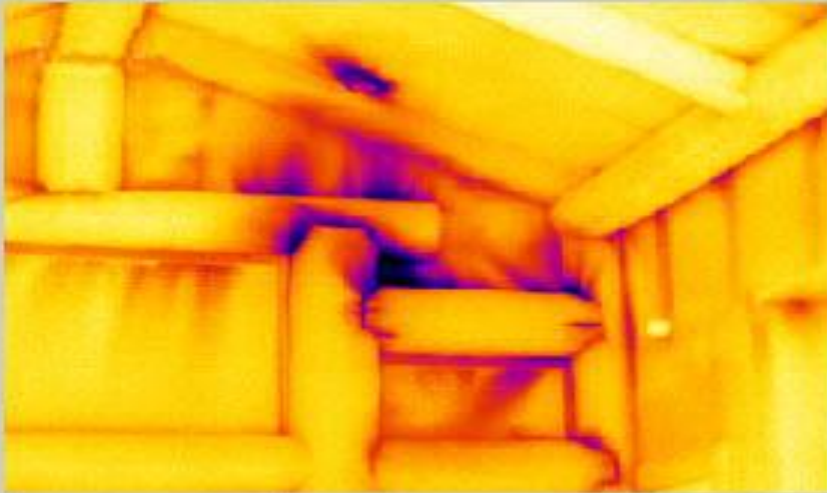




# Infrared Camera



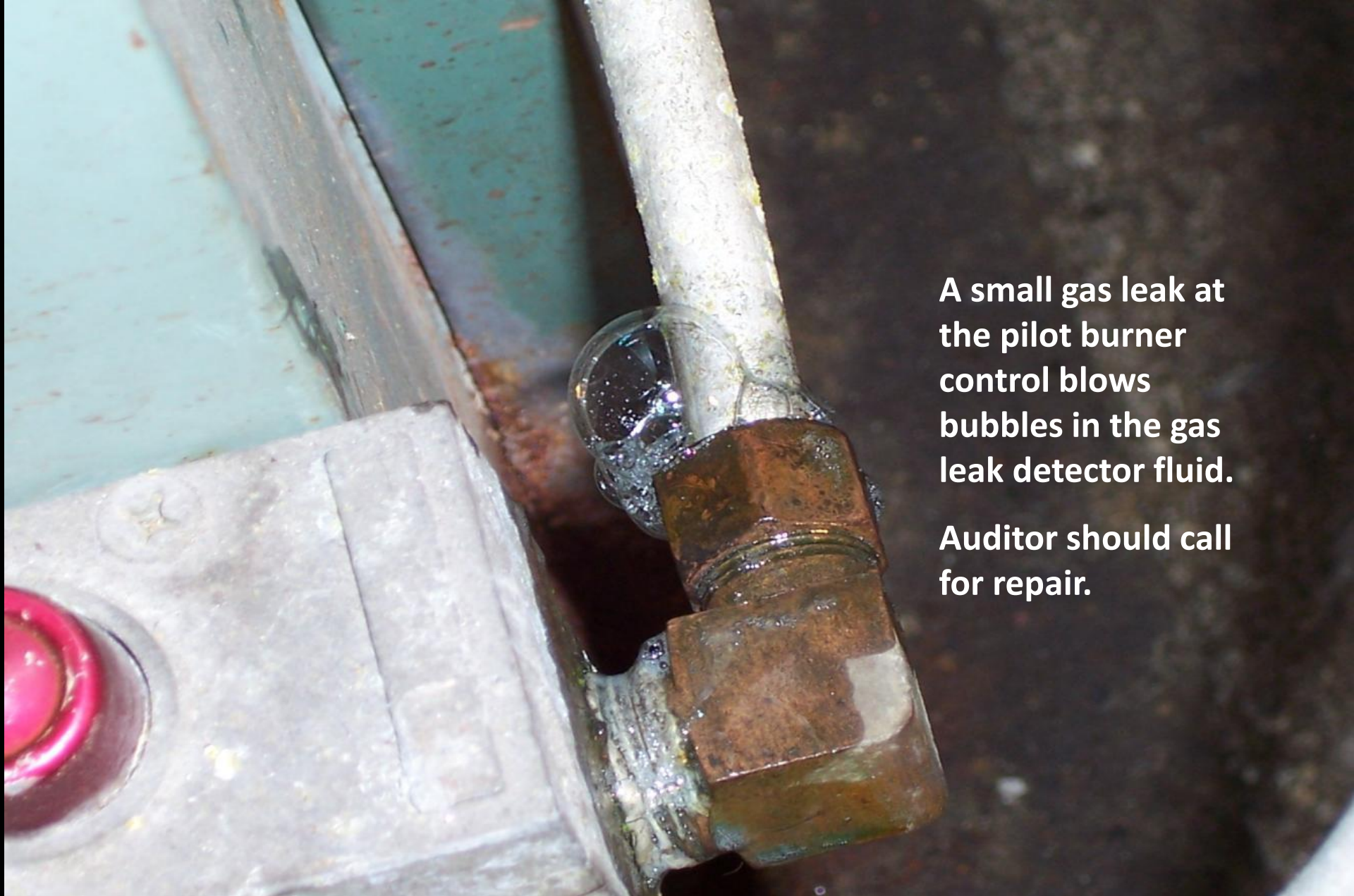
# Infrared Camera





# 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



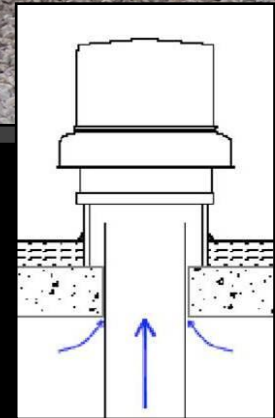
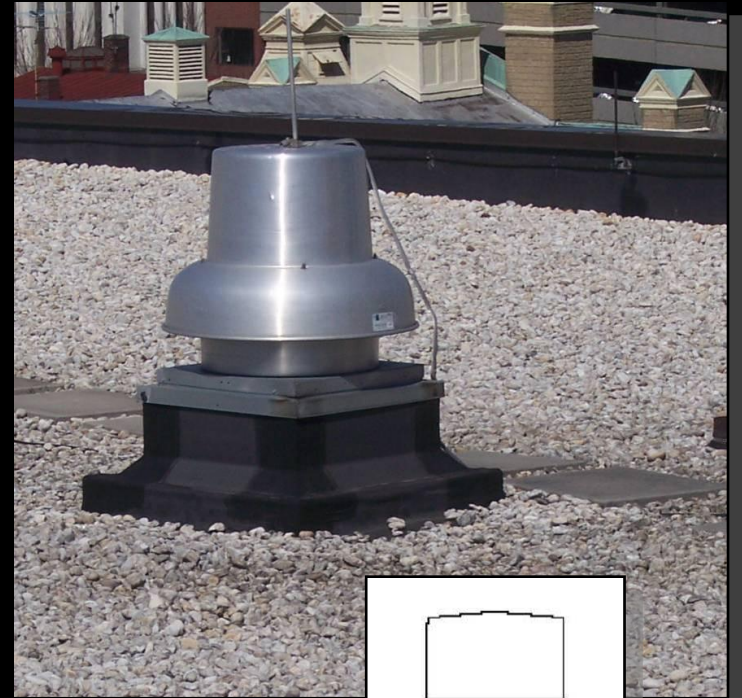


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# Roof Inspection

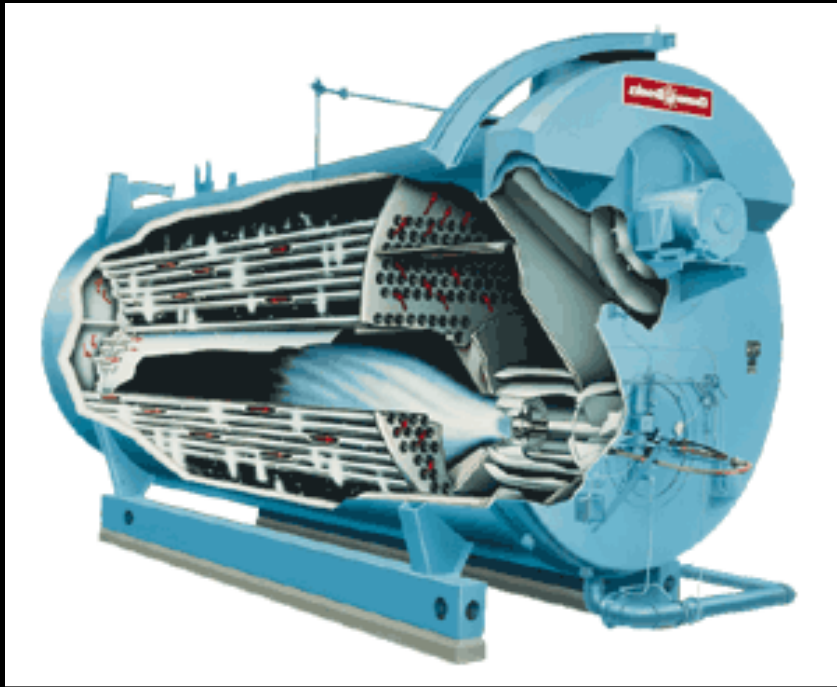


# Stack Effect





# Boilers



# Modular Boilers





# Thermostatic Control Valves (TRV's)



# Water Heating





# Non-heating - Baseload Usage



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# 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	HHAC	(%)	Area	Postvalue	Cost	Life	HHAC	(%)	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

Enter the post-weatherization area if the workscope calls for the area to change.

09/06/2007 12:48

# 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 Repairs



The End Game is:

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