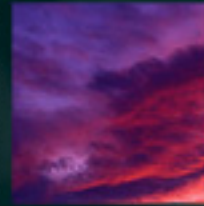
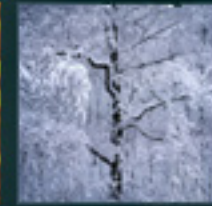
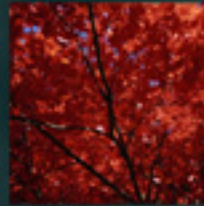




Conservation Services Group



The Shape of Things to Come

How High Natural Gas Prices Will Affect the Cost-Effectiveness of Energy Improvements

Bruce Harley, Technical Director

Conservation Services Group

RESENT Conference March 1, 2004

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House 1 – Ranch

- Full basement, ducts in basement
- Just meets REScheck tradeoff
 - Floor R-19
 - Walls R-19
 - Ceiling R-30
 - Windows U-0.40
- 80% furnace, .54 water heater, 10 SEER



Upgrade House 1

- Ducts sealed 300 -> 120 CFM25
- Just meets HERS 86
 - Floor R-19
 - Walls R-19
 - Ceiling R-38 Cellulose
 - Windows U-0.34
 - ACH: 0.5 -> .35
- 90% furnace, .60 water heater, 10 SEER



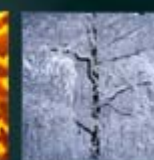
House 2 – Colonial

- Full basement, ducts in bsmt & attic
- Just meets REScheck tradeoff
 - Floor R-19
 - Walls R-13
 - Ceiling R-38
 - Windows U-0.31
- 80% furnace, .54 water heater, 10 SEER



Upgrade House 2

- Ducts sealed 375 -> 175 CFM25
- Just meets HERS 86
 - Floor R-19
 - Walls R-13
 - Ceiling R-44 Cellulose
 - Windows U-0.31
 - ACH: 0.5 -> .35
- 90% furnace, .56 water heater, 10 SEER

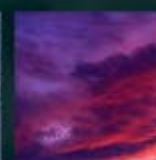


Example	Heat	Cool	HW	Tot MMBtu	Score
Ranch base (MA base)	62.9	4.3	27.1	94.2	80.8
Ranch base (REScheck)	61.3	3.4	27.9	92.6	80.4
Ranch upgrade	40.2	3.1	25.3	68.6	86.2
Colonial base (MA base)	79.7	4.1	30.4	114.2	81.9
Colonial base (REScheck)	82.1	2.7	31.3	116.2	81.0
Colonial upgrade	55.5	2.8	30.4	88.6	86.1



Costs

	Ranch	Colonial
Ducts	200	250
Cellulose	110	220
Windows	450	0
Air sealing	250	350
Furnace	650	700
Water heater	300	75
Total	\$ 1,960	\$ 1,595



Payback with varying gas price

Cost / therm							
0.8	0.9	1	1.1	1.2	1.3	1.4	1.5
Simple payback							
Ranch							
9.88	8.78	7.90	7.18	6.59	6.08	5.64	5.27
Colonial							
7.50	6.67	6.00	5.46	5.00	4.62	4.29	4.00



Conservation Services Group



ENERGY STAR
HOMES

Service Provided to

MAYNARD MA 01754

Account Summary

Previous Bill	360.58
Payment - Thank You	-360.58
Total Charges for Gas	370.19
Amount Due	\$370.19

Gas Used

Rate 06-Residential Heating

Meter Q015124

Feb 14, 2004 Actual Read 1224

Jan 16, 2004 Actual Read - 930

CCF Used in 29 Days 294

Times Therm Factor X 1.0280

Therms Billed this Meter 302

Charges for Gas Used

Delivery Charges

Customer Charge 6.63

Distribution Charges

1st 50 .54100 X 50 Therms 27.05

Over 50 .24660 X 252 Therms 62.14

Distrib Adj .01600 X 302 Therms 4.83

Delivery Charges Total 100.65

Supplier Charges

Cost of Gas .89250 X 302 Therms 269.54

Total Charges for Gas 370.19

Date	Therms
01/16	306
12/13	235
11/13	161
10/10	46
09/15	19
08/13	18
07/15	26
06/12	61
05/14	96
04/15	185
03/15	288
02/13	313



Payback with varying gas price

Cost / therm							
0.8	0.9	1	1.1	1.2	1.3	1.4	1.5
Simple payback							
Ranch							
9.88	8.78	7.90	7.18	6.59	6.08	5.64	5.27
Colonial							
7.50	6.67	6.00	5.46	5.00	4.62	4.29	4.00

First Year Savings (\$):

Heating	257
Cooling	6
Water Heating	28
Lights & Appliances	-3
Photovoltaics	0
Service Charges	0
Total	288

First Year Cost	142
Net Saving	146

Present Value of Savings (\$):

Heating	4206
Cooling	95
Water	461
Lights & Appliances	-42
Photovoltaics	0
Service Charges	0
Total	4720

Improvement Cost	1960
Net Savings	2760

Assumptions:

Improvement Cost (\$)	\$	1960
Interest Rate (%)		6.0
Loan Term (yrs)		30

Assumptions:

Improvement Cost (\$)	\$	1960
Discount Rate (%)		3.0
Fuel Escalation Rate (%)		1.0
Improvement Life (yrs)		20

Differences

From
Ranch base

To

Ranch upgrade

Ceiling w/Attic

R30,FGA,X-16 U=0.054

R37,CE10",8-16 U=0.028

Windows

U:0.40, SHGC:0.45 U=0.400

U:0.34, SHGC:0.45 U=0.340

Duct Leakage

300.00 CFM @ 25 Pascals

120.00 CFM @ 25 Pascals