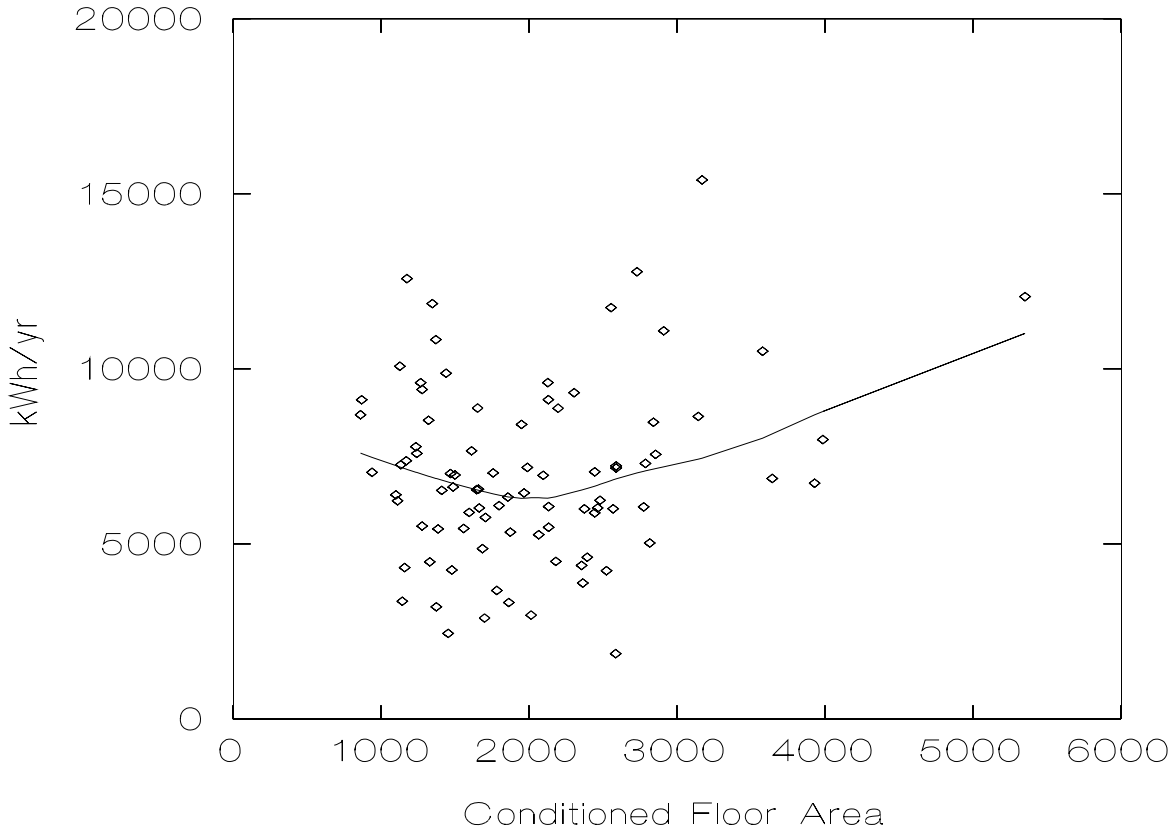
Rising to New Standards

California – Integrated Energy Policy

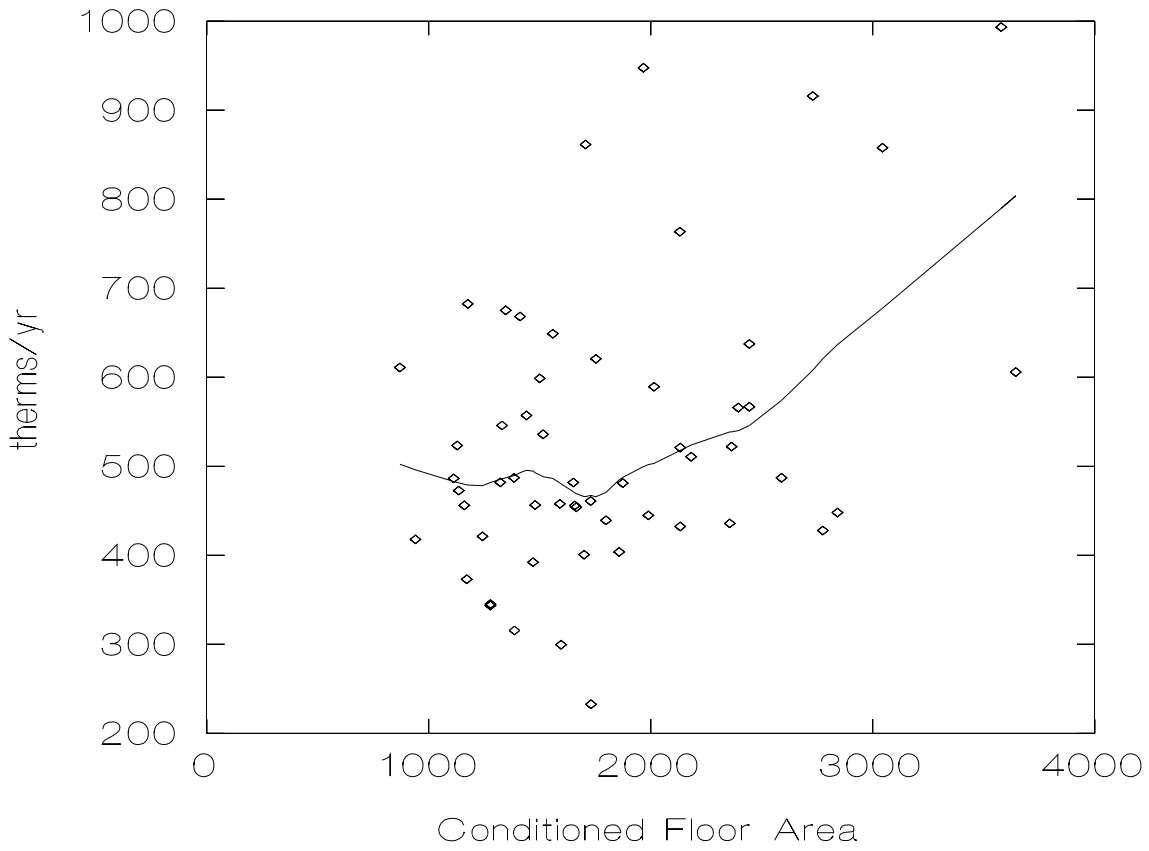
- New Homes Shall Be ***Net-Zero-Energy*** By 2020 (inspired by the 2030 Challenge from Ed Mazria)

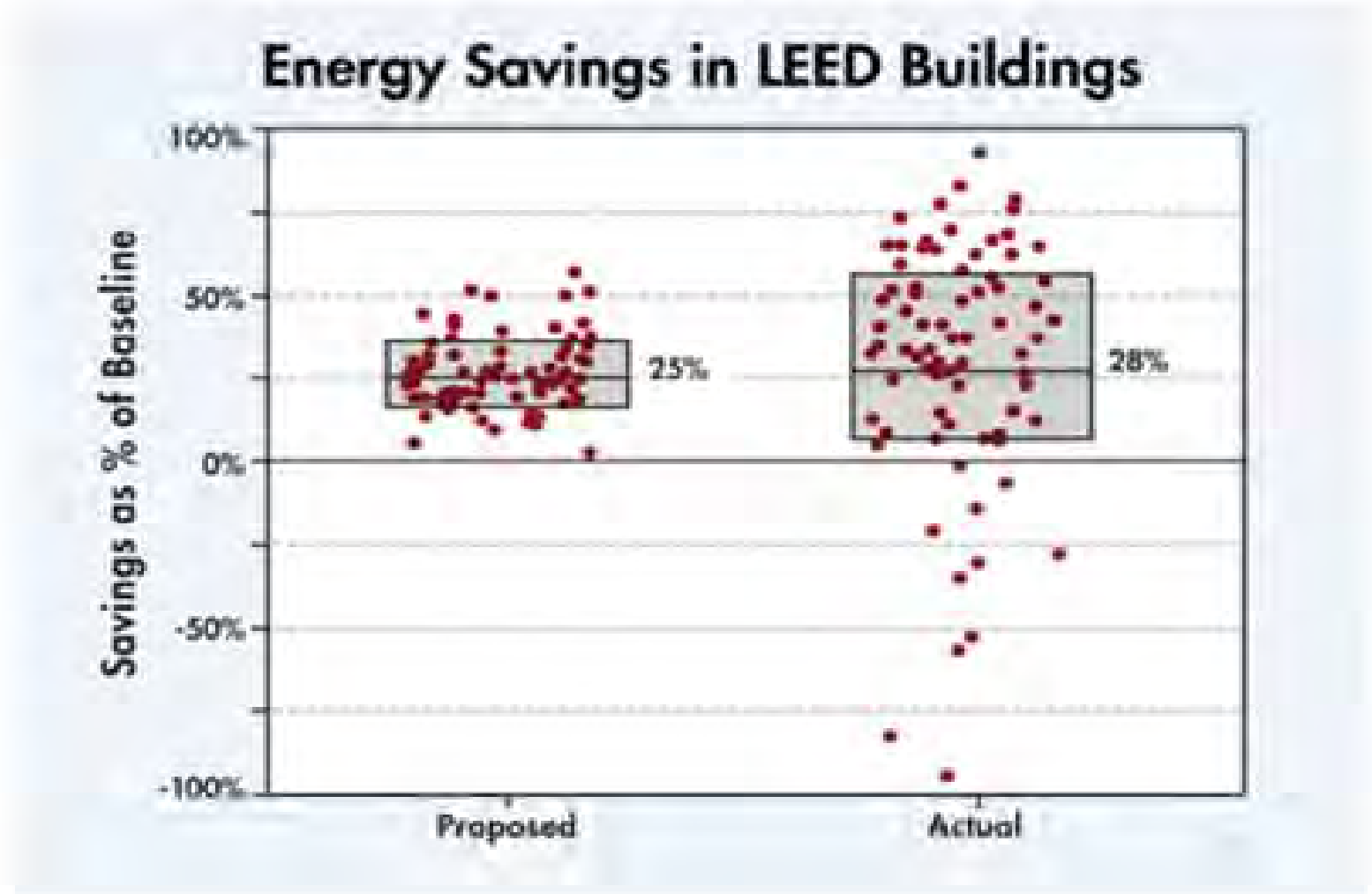
- HVAC Industry Shall Be "Revitalized"

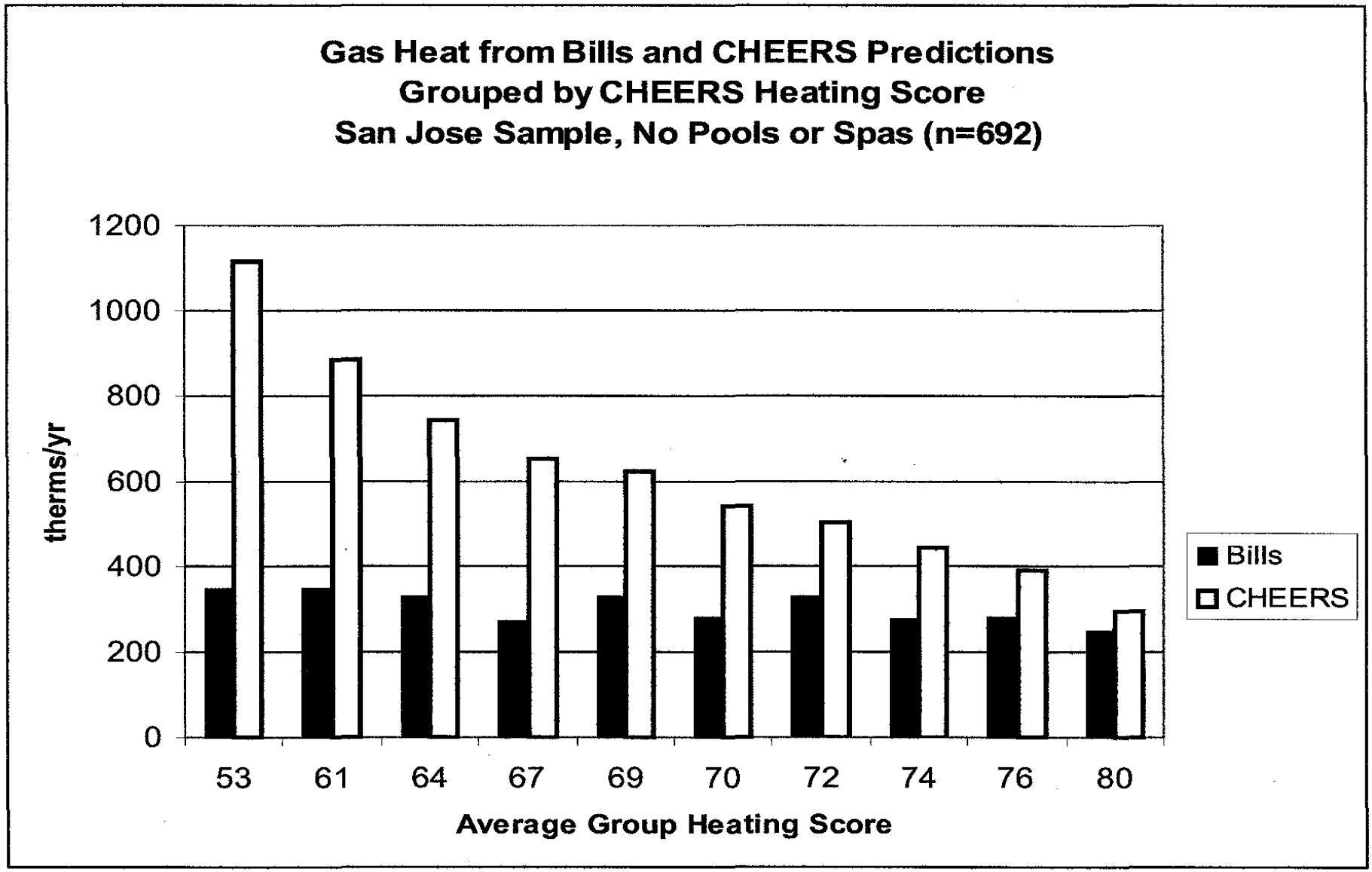
How Much Electricity Does A New California Home Use?

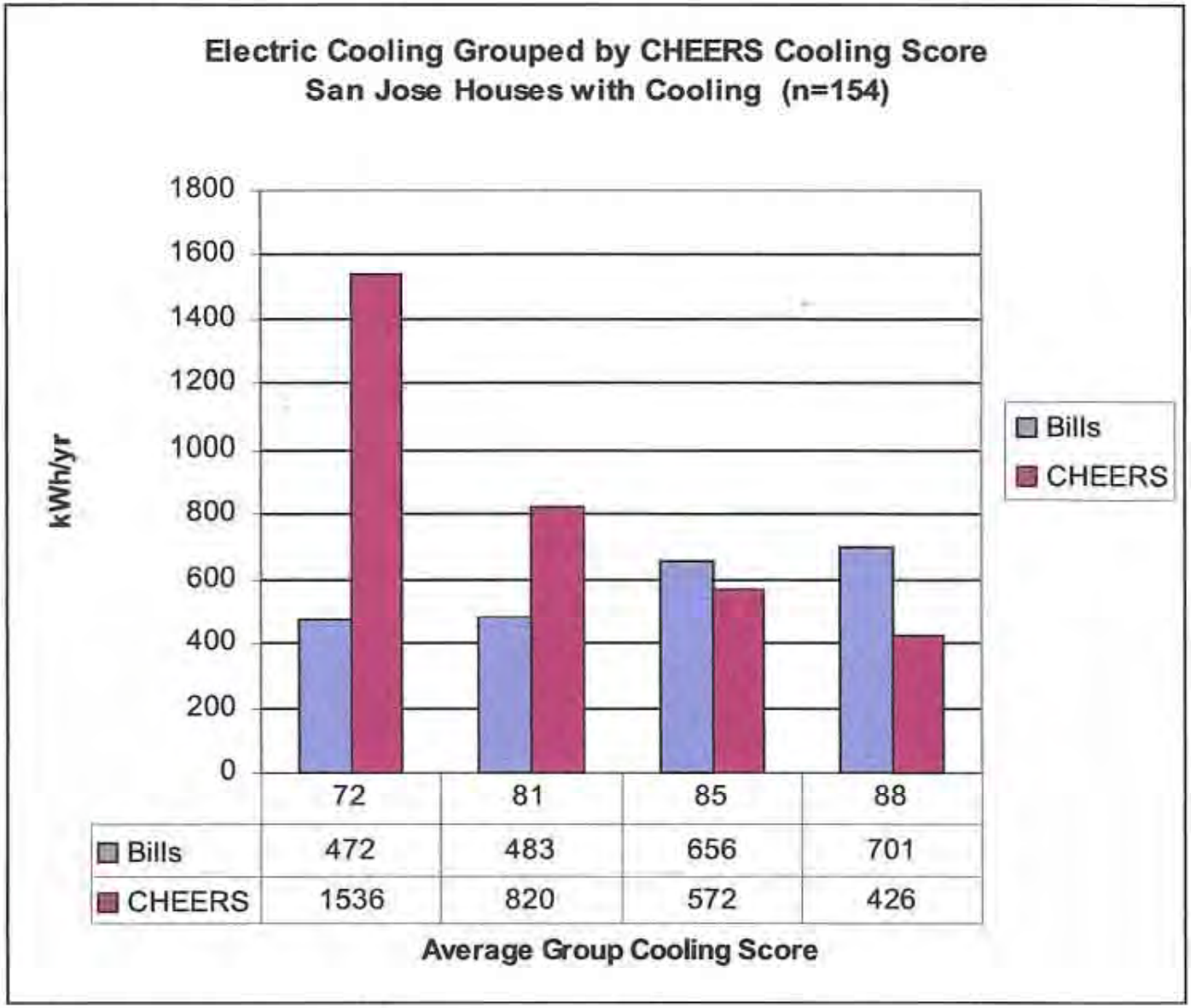


How Much Natural Gas Does A New California Home Use?




Energy Savings in LEED Buildings
Savings as % of Baseline
100%
50%
0%
-50%
-100%
25%
28%
Proposed
Actual


Gas Heat from Bills and CHEERS Predictions
Grouped by CHEERS Heating Score
San Jose Sample, No Pools or Spas (n=692)
therms/yr
1200
1000
800
600
400
200
0
53
61
64
67
69
70
72
74
76
80
Average Group Heating Score
Bills
CHEERS


Electric Cooling Grouped by CHEERS Cooling Score
San Jose Houses with Cooling (n=154)
kWh/yr
1800
1600
1400
1200
1000
800
600
400
200
0
Bills
CHEERS
72 81 85 88
Bills 472 483 656 701
CHEERS 1536 820 572 426
Average Group Cooling Score

Fan Energy and System Sizing Survey Results

	Survey low	Survey High	% difference
Fan: watts/square foot	0.13 W/SF	0.92 W/SF	708%
Heating: Btu/square foot	9 Btu/SF	110 Btu/SF	1,222%
Cooling: square feet/ton	1,739 SF/ton	200 SF/ton	869%

Building Performance Test Equipment is Driving Industry Changes

- Test equipment started to become available in 1985.
- Now (over 2 decades later) we have the ability to evaluate the true installed performance of all residential energy features.
- As we evaluate each energy feature - large opportunities for improvement are found in every category.

Opportunity For Energy Savings

- It's Common To Average 50% To 80% Energy Savings on Both New and Retrofit Projects.

- When Done Correctly; Comfort, IAQ, Durability and Health & Safety Issues Are Also Taken Into Account With the Savings

Redding, California
Showcase Home – Case Study

Redding, California
Showcase Home

Bill guaranteed at $76.00 per year for air conditioning, $241.00 per year for heating, **$317.00** per year total, $0.09/sq.ft.-year, 3,500 square foot home

Redding, California Showcase Home Performance Monitored By DOE Building America Program

- High-end custom home (Realtor's Showcase of Homes)
- Conventional architecture
- Conventional framing
- Conventional insulation (batts in walls, loosefill in attic)
- Conventional HVAC system (ducts in the attic)

Redding, California Showcase Home Performance Monitored By DOE Building America Program

- Actual cooling costs reduced **81%** (83% compressor, 68% fan, report page 10)
- Actual heating costs **49%** reduction in gas usage, 65% fan energy reduction (report page 10)
- Cost of energy improvements were 0.4% of home cost, or $5,139.00 (see report page 11)

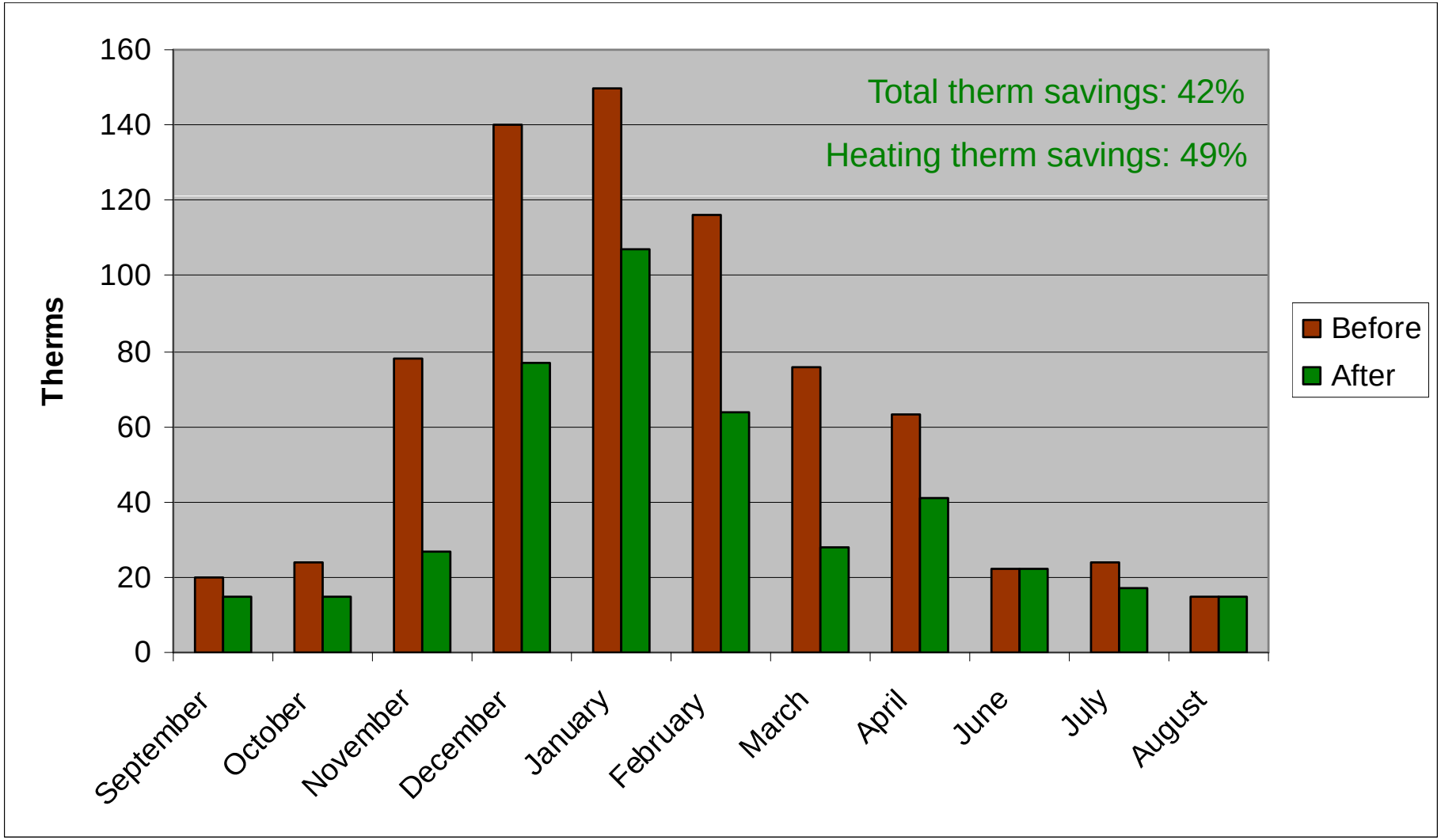
Redding, California Showcase Home Performance Monitored By DOE Building America Program

- Air conditioner size **2 tons** (1,760 square feet per ton, one quarter of typical)
- **60% better** performance than the geothermal heat pump next door
- Building America's computer model DOE-2 was not able to accurately predict the heating and cooling savings – under predicting actual savings by **43% and 46%** respectively

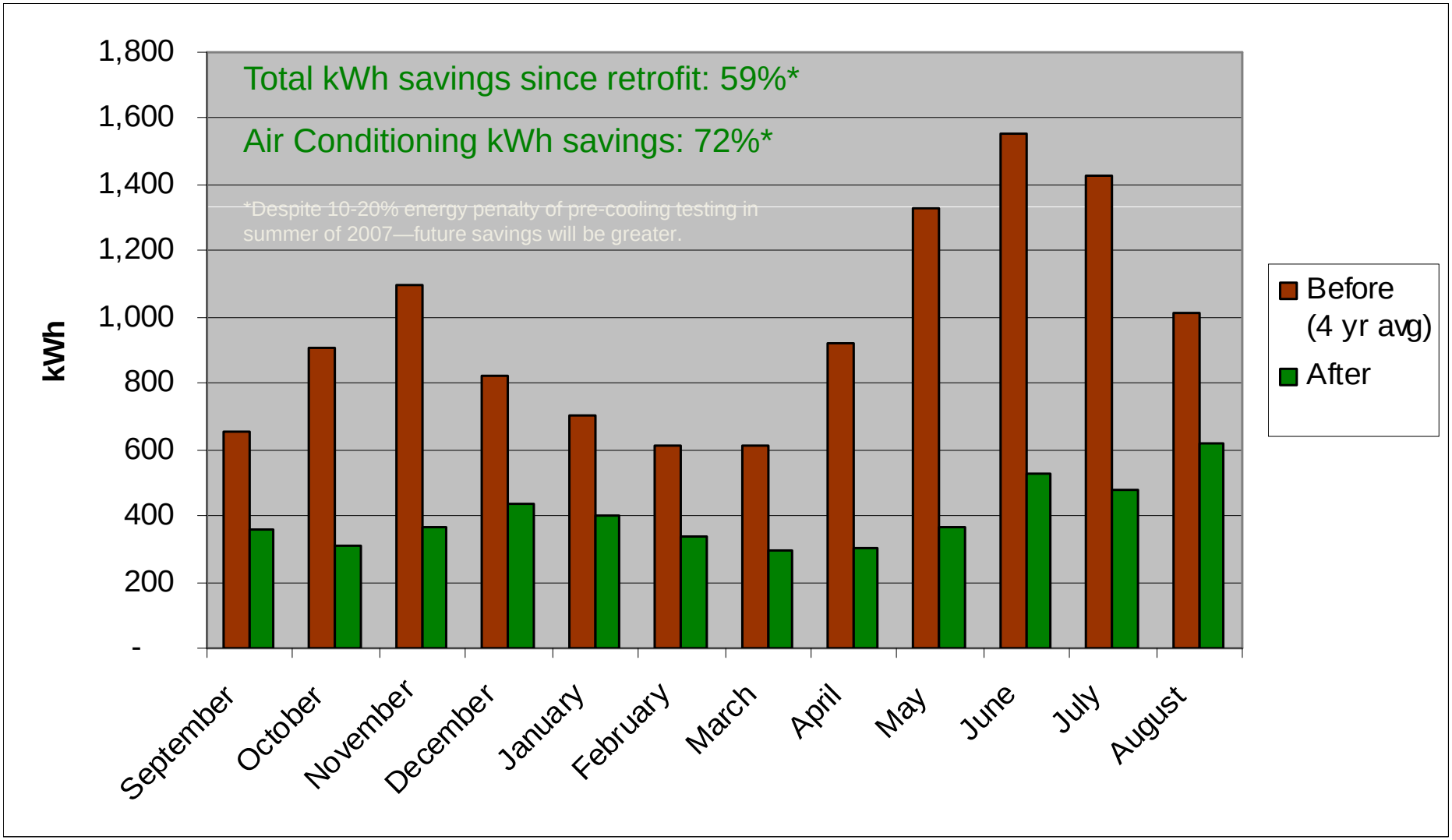
Sacramento, California
SMUD Advantage Home
Case Study

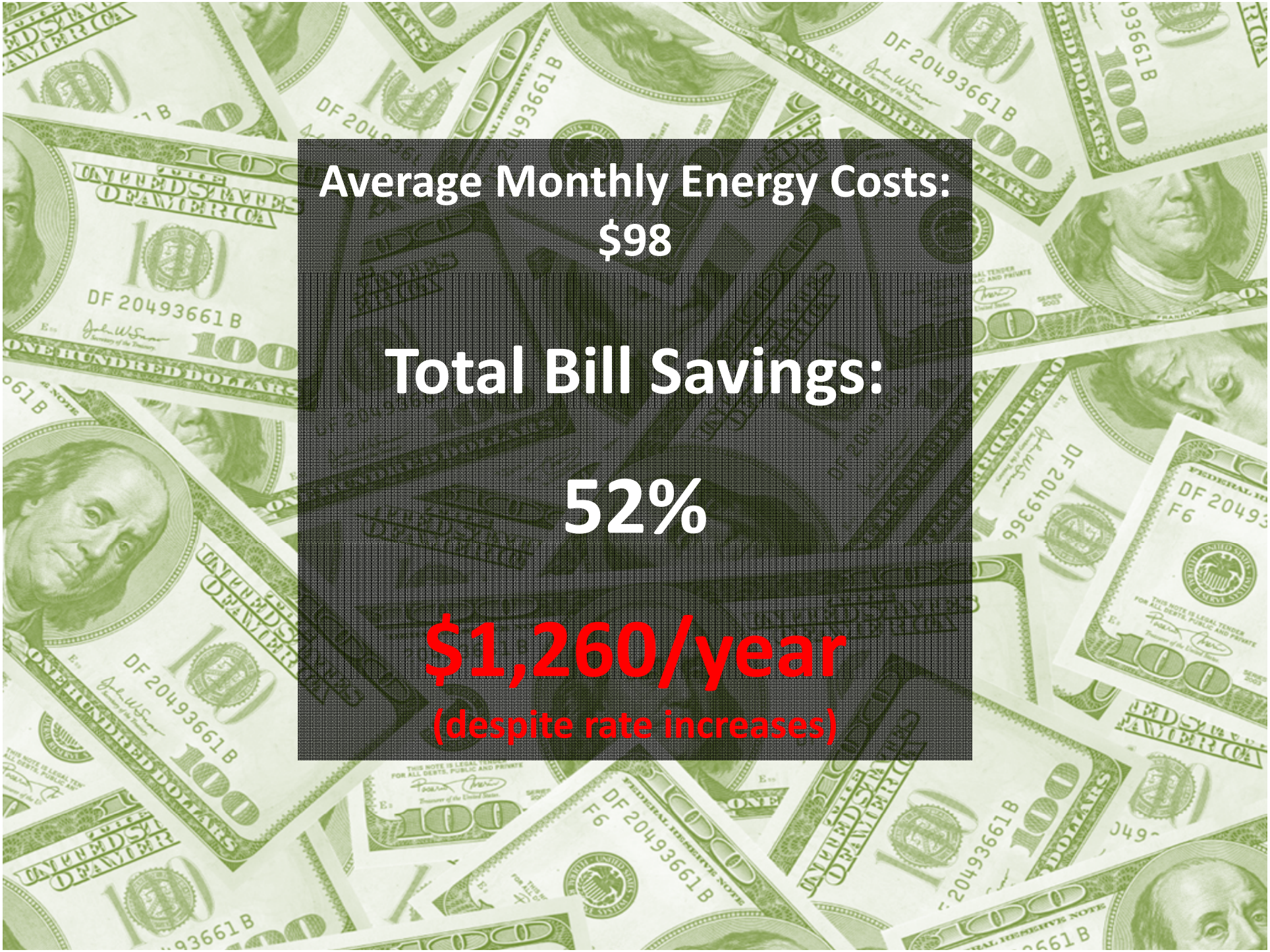
- Home built in 1998, retrofitted in 2007
- Utility Program Standards, 30% better than T-24
- Already had high performance windows (low-e^2)
- 2800 square foot, slab on grade, two stories

Natural Gas Savings

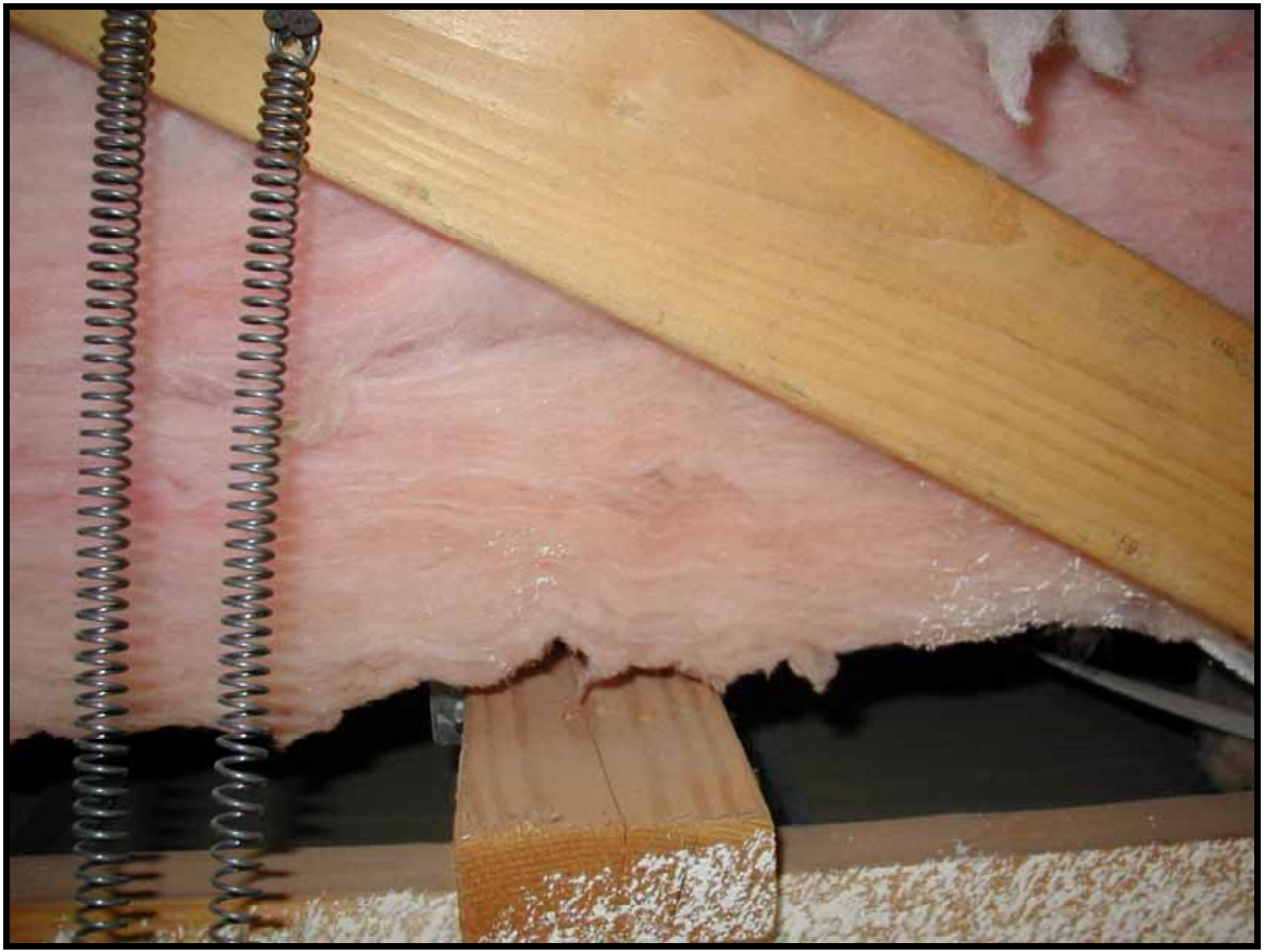


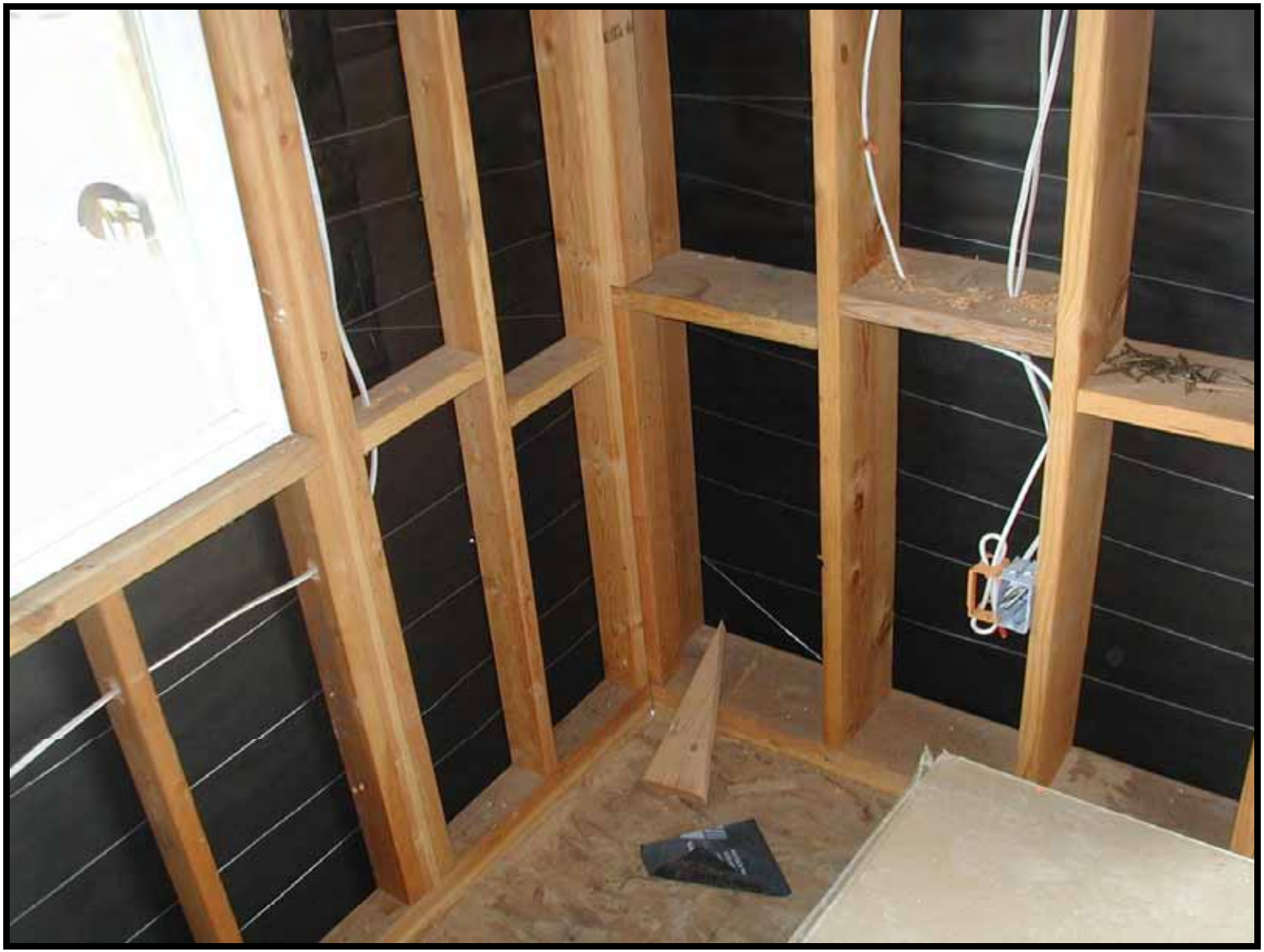
Electric Savings

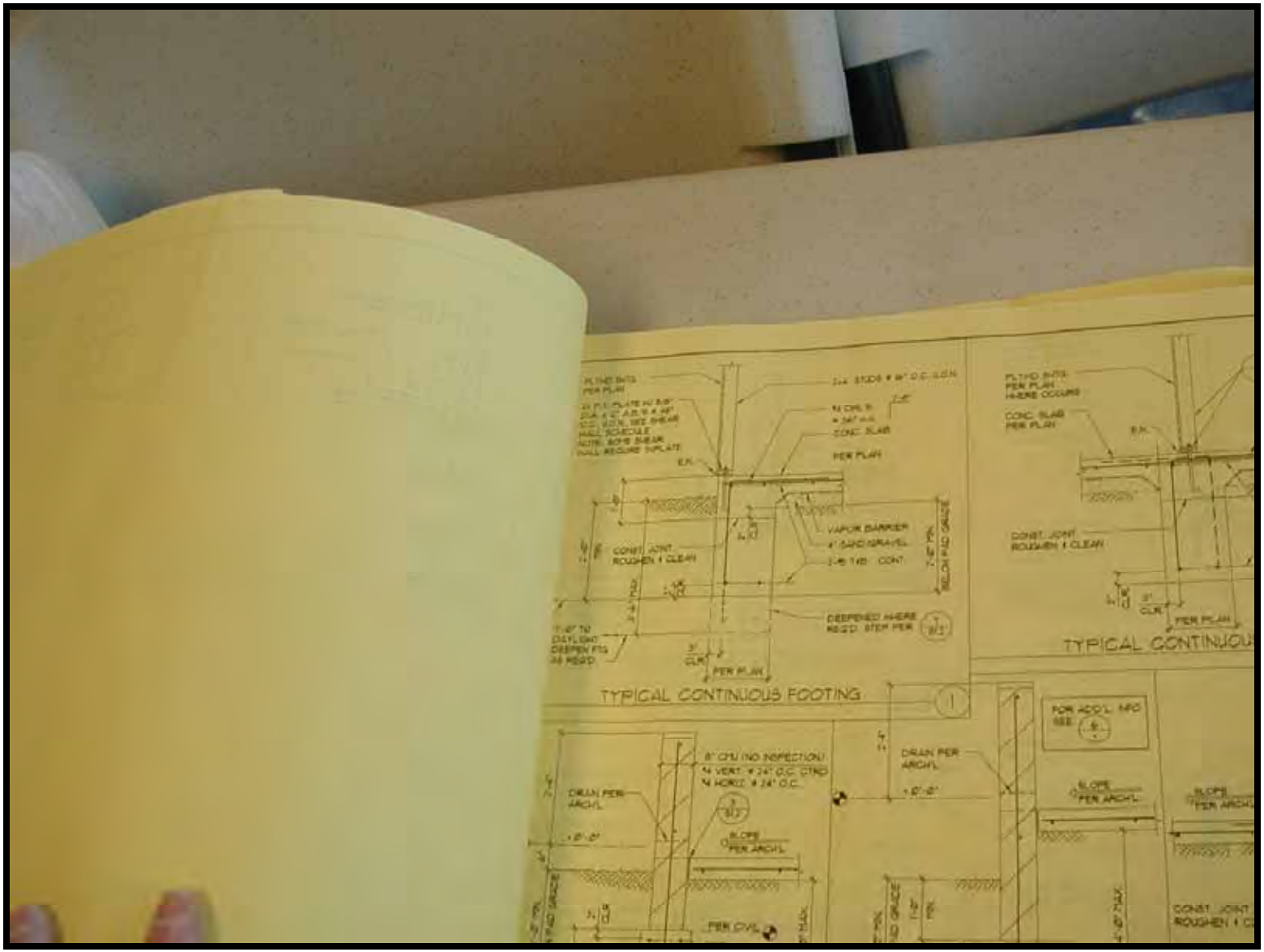



Average Monthly Energy Costs:
$98
Total Bill Savings:
52%
$1,260/year
(despite rate increases)

SOLARA






TYPICAL CONTINUOUS FOOTING
TYPICAL CONTINUOU

Homes constructed today have a **cost-effective opportunity for energy-efficiency improvement** of about:

a) 0% - 20%

b) 20% - 40%

c) 40% - 60%

d) 60% - 80%

Over the last 10 years the overall thermal performance of new residential envelopes has increased how much?

a) 0%

b) 15%

c) 30%

d) 60%

Retrofitting a conventional storage type natural gas water heater with a tankless natural gas water heater has a simple payback of?

a) 10 weeks
b) 10 months
c) 1 year
d) 3 years
e) 10 years
f) 100 years