

# Results of Your Home Energy Audit



May 13, 2013

Prepared for:  
Oscar Erickson  
6315 Jerilynn Ave  
Richmond, CA. 94806

Prepared by:  
Blake Shurtz  
[Blake@AdvancedHomeEnergy.com](mailto:Blake@AdvancedHomeEnergy.com)  
510.540.4860



**Solutions for a Comfortable, Healthy, Efficient Home.**

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License #877873

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F: (510)529-3079

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# Introduction

American homes produce 21% of the United States' emissions, a greater percentage of CO2 emissions than the combined emissions from autos and light trucks. Most people don't even know that there is significant room for improving their home's efficiency and comfort which would significantly lower their carbon footprint. Often times construction or design defects cause people to spend extra money in an attempt to maintain a comfortable home. But you don't need to trade comfort and aesthetics for energy and water conservation. Our goal is to help you understand and prioritize the conservation and comfort improvements possible in your home. We do this by using diagnostic equipment and employing building science principles to detect the root causes of home performance problems and identify the best possible solutions.

This report summarizes test results and explains technical terms and concepts. The report also includes a list of improvement recommendations.

Our approach is to look at your house as a system with inter-related parts. By understanding the house from a holistic perspective we can make educated recommendations about the priority of improvements and their potential for improving the comfort, health and efficiency of your home.

By improving your home's energy efficiency you can join a growing group of homeowners who have opted for a greener lifestyle and are proactively reducing their carbon footprint.

Congratulations on making a great step in the right direction!



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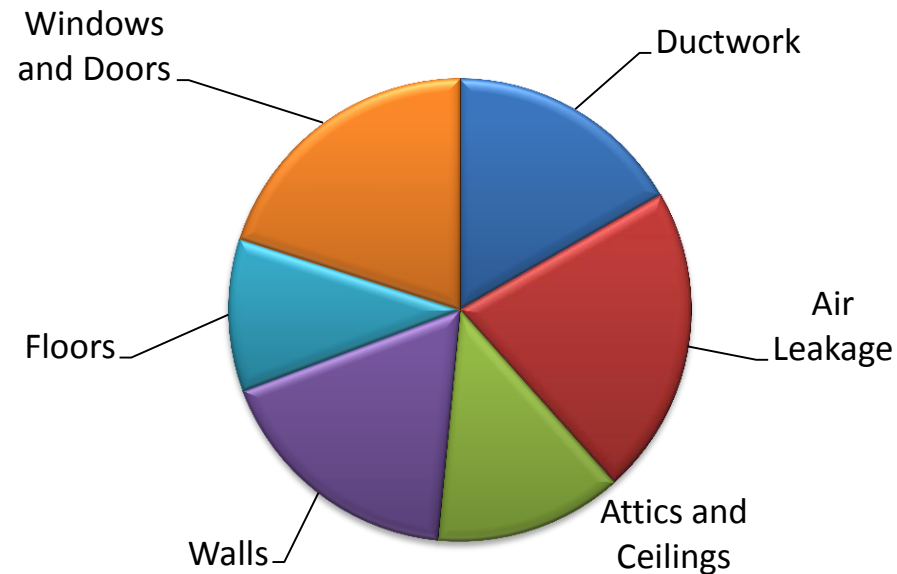
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# Heating Loads

We have calculated your home's actual performance through a method known as Air Conditioning Contractors of America (ACCA) Manual J. This process allows us to precisely understand how each component of your building affects your heating load, and identify which areas are most appropriate to improve based on your health, comfort and efficiency goals.

## Heat Lost in Home, by Component

Component	BTU's	%
Ductwork	5,398	17%
Air Leakage	7,008	22%
Attics and Ceilings	4,247	13%
Walls	5,740	18%
Floors	3,439	11%
Windows and Doors	6,474	20%
<b>Total</b>	<b>32,306</b>	<b>100%</b>



**Your furnace is 86% oversized for your home.**



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# HVAC System Summary

Your furnace provides the heat for your home. Furnaces range in efficiency from 60% efficient to 97% efficient. Furnaces should be sized to replace the maximum amount of heat loss that can occur in your home. An undersized furnace does not provide enough heat to keep your house comfortable during the coldest part of the year. An oversized furnace runs in short, powerful cycles instead of longer, more gradual cycles. This causes drastic temperature swings in the house, prevents your furnace from running as efficiently as it was designed to, and shortens the life of your furnace.

## Main Furnace

**Distribution Type: Ducted**

**Year: 1977**

**Design Efficiency: 75%**

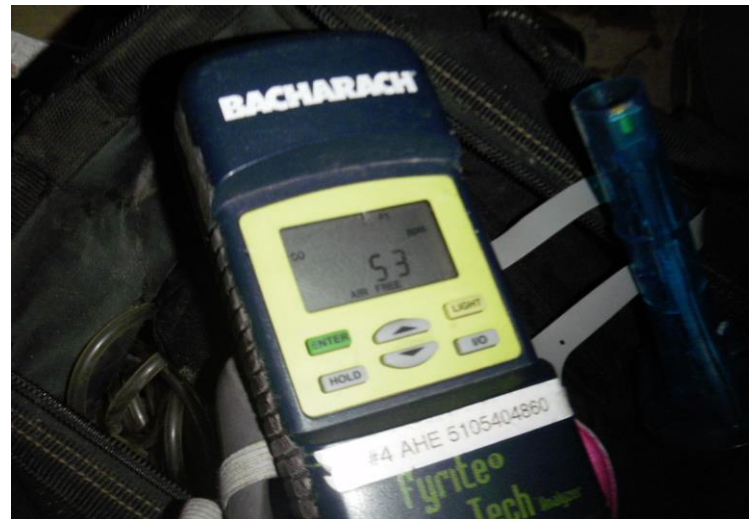
**BTU Output: 60000 BTU's**

**Heating Load: 32306 BTU's**

Your furnace passed our safety tests. We do recommend tuning up the furnace due to the high CO that is being produced in the flue.

Also, the draft pressure in the flue was very low, but it did pass.

More generally, your furnace is very large considering your home's needs. This size manifests itself in the powerful force of hot air coming into your home, as well as the noise at the return register.



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# HVAC Upgrade Example

The efficiency of a modern furnace is truly remarkable. Sealed combustion furnaces, shown in the picture below, are so efficient that their exhaust heat is re-captured through a second heat exchanger, condensing the exhaust gas into a liquid that safely drains away.



**High-Efficiency Sealed Combustion Furnace**



**HEPA air filters**



**Nest Learning Thermostat**



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# Ductwork System

Duct Type: KD Metal

Duct Insulation: R-2

Duct Leakage: N/A

While we were unable to measure the duct leakage due to the presence of insulation, we can assume that it is pretty leaky based on a visual inspection.

Some of the connections between long runs are coming apart, leaving a large 1" gap for heat to escape and for crawlspace air to enter your duct system.

Also, some of the ducts have been knocked in and dented.

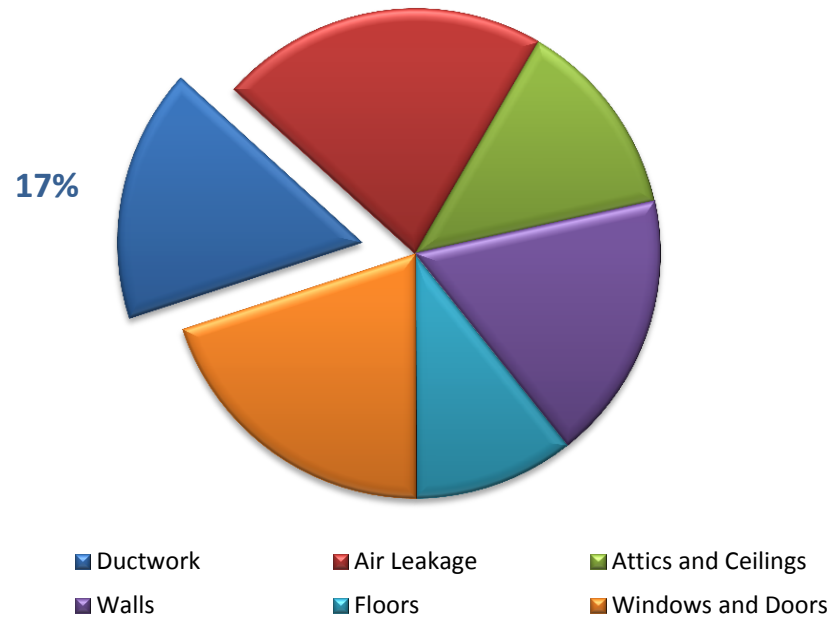
Finally, many of the ducts and boots are uninsulated.

## Prescribed Improvement

Duct Insulation R-Value: R-8

Duct Leakage: 10 %

Heating Load



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# Your Duct System



Return duct disconnect (side)



Return duct disconnect (front)



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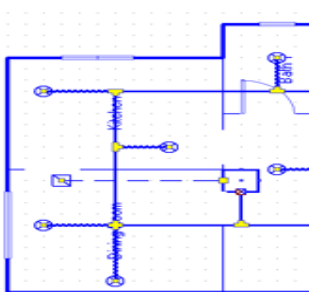
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# Ductwork System Upgrade Example



Duct insulation plays an important role by preventing heat loss in the winter and preventing heat gain in the summer.

A new duct system should leak no more than 6% to the outside saving on operation cost and improving your home's air quality.



For an additional fee, AHE will size your duct work properly by using ACCA Manual D to ensure proper airflow is crucial to improving the overall comfort in your home.



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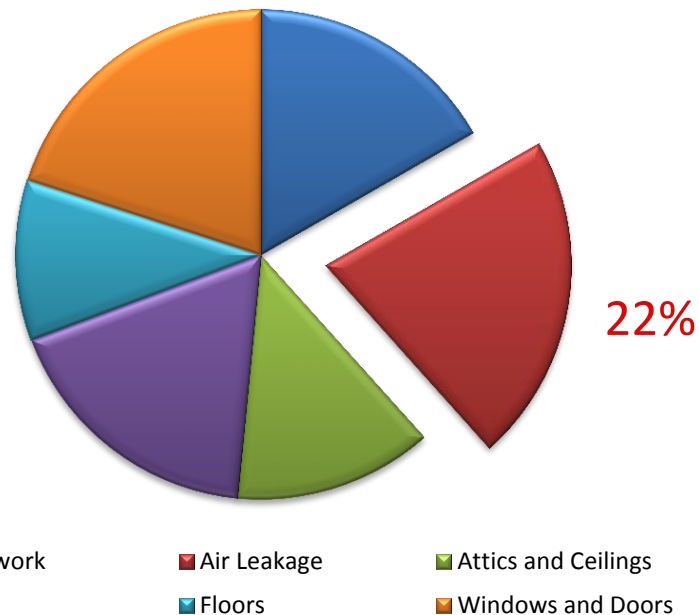
# Air Leakage and Air Sealing

The largest portion of your home's energy use is in creating hot and cold air. **Air sealing** keeps the conditioned air inside. Our technicians ran a blower door test to measure the amount of **air leakage** in your home. Due to the stack effect, air leakage brings air into your home from unfresh sources.

## The Stack Effect



## Heating Load



\*Cubic Feet per Minute @ 50 Pascals of pressure. Used to quantify the air flow through air infiltration or ventilation.



## Solutions for a Comfortable, Healthy, Efficient Home.

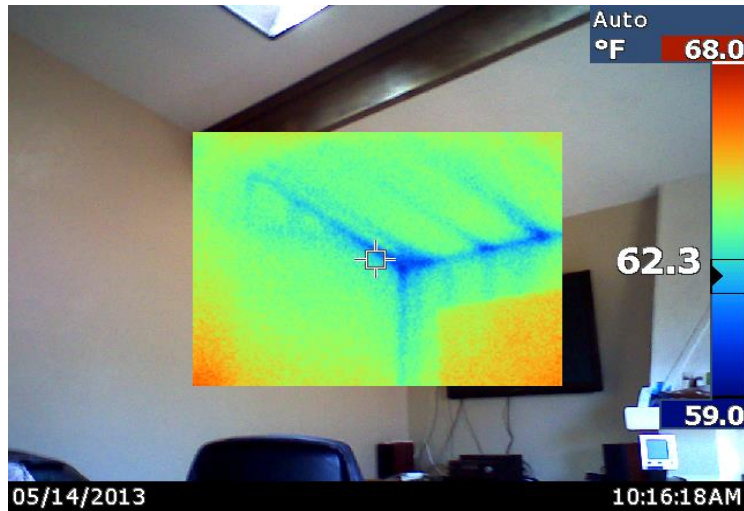
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# Photos of Air Leakage Areas



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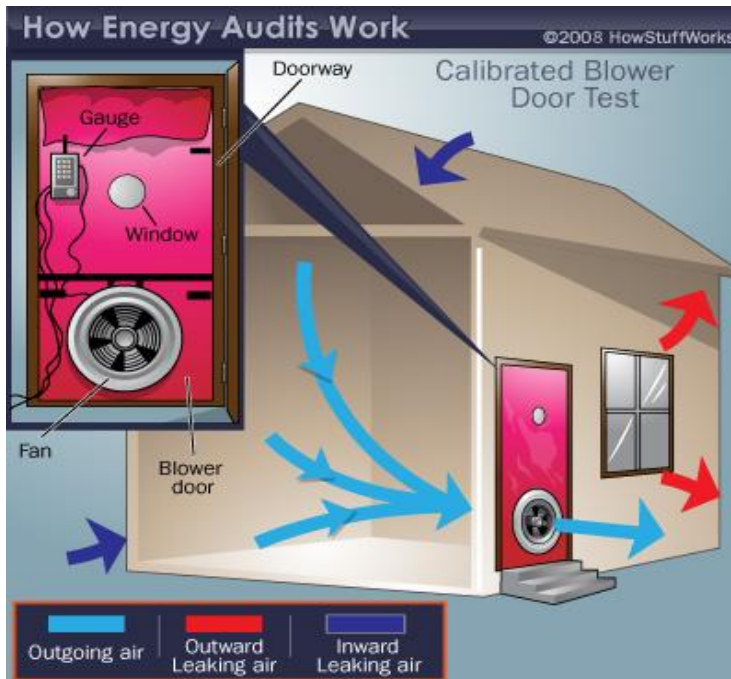
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# Blower Door Test Results

Your home has an **infiltration value**: the percentage of air in your home that exchanges with the outdoors every hour.



## Blower Door Test Results

- Air Leakage: 3329 CFM50\*
- Infiltration Value: 59%

Major sources of cold air infiltration include:

In your home in particular, there are gaps around where the floor meets the drywall. Rather than sealing these from the inside, we can seal them from underneath your home with a spray foam application.

While spray foaming your floor will create an air barrier underneath your home, we recommend some "spot air sealing" work in your attic as well.

\*Cubic Feet Per Minute @ 50 Pascals of pressure



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# Air Sealing Upgrade Example

## Benefits of Air Sealing

- improves indoor air quality (IAQ)
- increases comfort
- increases home's energy productivity



**We want to reduce your home's infiltration value to 36% by air sealing.**



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# Attic Insulation

After air sealing, attic insulation is typically one of the best "bang for your buck" steps you can take towards a more efficient and comfortable home. Well installed attic insulation acts as a barrier to summer and winter heat loss to and from your attic. It's like a nice thick, winter hat for your home that saves you money all year round.

## Heating Loss By Component

13%



- Ductwork
- Air Leakage
- Attics and Ceilings
- Walls
- Floors
- Windows and Doors



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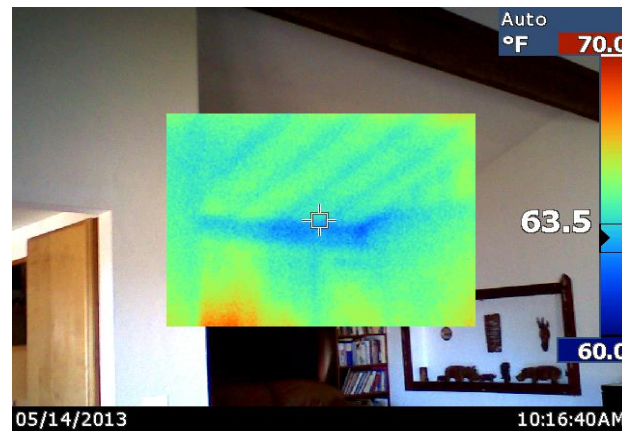
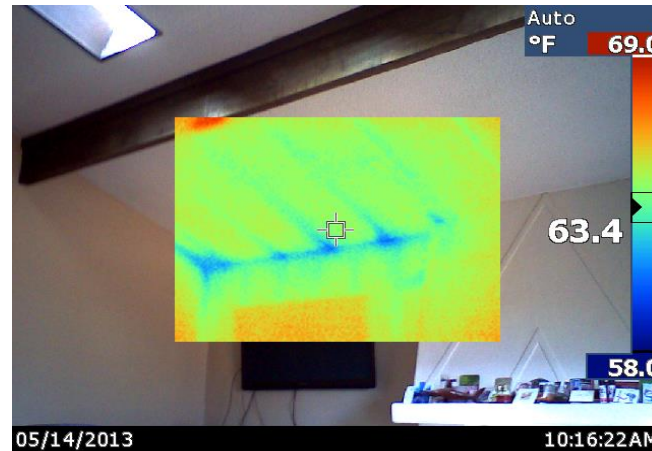
# Cathedral Ceiling

## Main Cathedral Ceiling

- Insulation Type: Fiberglass Batts
- System R-Value: R-19
- Recommended R-Value: R-38

Your cathedral ceiling is most likely insulated with R-19 fiberglass batts. Of course, the only way to know for sure is to drill a hole, but I say this with a high degree of confidence based on:

1. Accessible rafters in attic are insulated with R-19 batts.
2. Your walls are insulated, and infrared shots show the rafters to be the same temperature of the walls. (Besides it would be unusual to insulate the walls and not the ceiling.)
3. Title 24 was passed in '78, which mandated ceiling insulation.



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# 3 Other Attics

## 3 Other Attics

- Insulation Type: Fiberglass Batts or Nada
- System R-Value: R-11
- Recommended R-Value: R-38

Your three attics are partially insulated. There is also a bath fan that is exhausting into the attic. We recommend running the exhaust duct to an easily accessible soffit vent.



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# Attic Insulation Upgrade Example

## Cellulose Spray-In Insulation: greenest and most effective solution

Most homes have some insulation, but usually they are grossly under-insulated or the installation quality renders the insulation useless. Most people think that if you insulate 95% of a surface you get 95% of the performance. That is not true! According to the Building Performance Institute a “Poor” installation of fiberglass batts has gaps over 5% of the insulated area. This results in an R-30 fiberglass batt having an effective R-value of R-7. Most homes can benefit dramatically from re-insulating the attic with complete coverage to an R-38 level.



Before Example: Attic with insufficient insulation



After Example: Attic with R-38 blown-in insulation



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# Your Walls

## Walls

- Wall R-Value: R-13
- Insulation Type: Fiberglass Batts
- Recommended R-Value: R-13

All of your walls are insulated! We have no recommendations.

## Heating Loss by Component

18%



- |                       |                     |
|-----------------------|---------------------|
| ■ Ductwork            | ■ Air Leakage       |
| ■ Attics and Ceilings | ■ Walls             |
| ■ Floors              | ■ Windows and Doors |



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# Your Crawlspace

## Crawlspace

- Insulation Value:Fiberglass Batts
- Assembly R-Value: R-11
- Recommended R-Value: R-19

About 25% of your floor is uninsulated.  
Also, there are large plumbing and electrical penetrations, which, even if insulated, do not create a proper air barrier.

## Heating Loss by Component

10%



- |                       |                     |
|-----------------------|---------------------|
| ■ Ductwork            | ■ Air Leakage       |
| ■ Attics and Ceilings | ■ Walls             |
| ■ Floors              | ■ Windows and Doors |



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# Photos of Your Floor Insulation



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# Windows

Windows are an important component of a well performing building envelope. Windows provide several other benefits in addition to comfort and energy savings: beautiful appearance of new windows, moisture control, reduced noise transmission from outside, convenience of operation and cleaning and increase to property value. It's important, however, to consider the energy savings potential of window replacement compared to other building envelope improvements which may be more cost effective.

## Window Assemblies

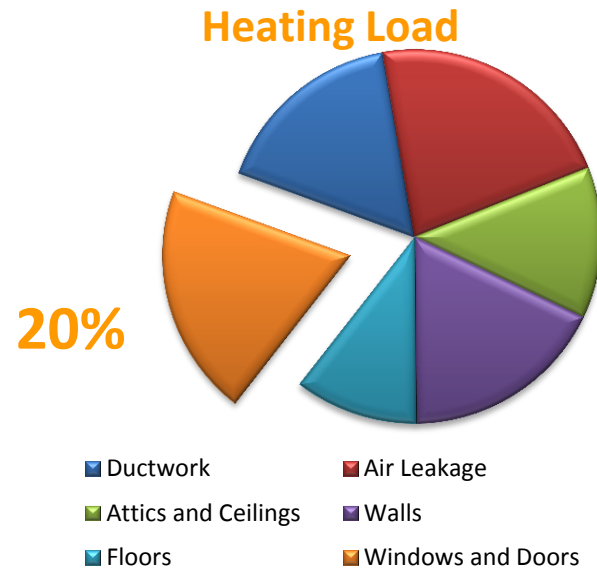
Dual Pane Windows

## R-Value

1.72

Remaining Single Pane

1.01



Your windows constitute 13% of you wall area.



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# Water Heating

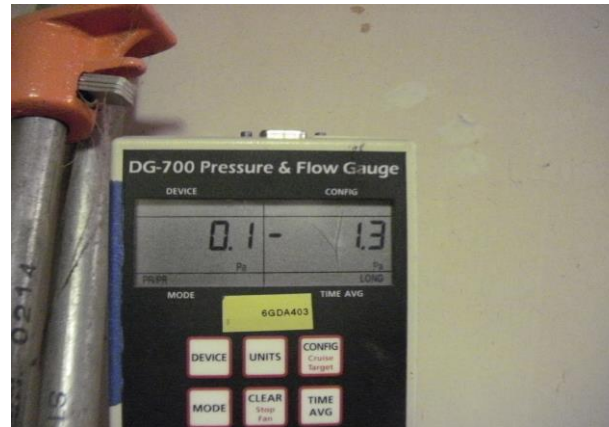
Domestic water heating can be a significant source of energy consumption in a home. The cost of creating hot water in your home will not exceed your gas base load costs which is an important factor when deciding to upgrade to a high efficiency water heating system.

## Standard Tank

- Year: 1977
- Capacity (Gallons): 40
- Input BTU's: 40000
- Whole-Home Pipe Insulation: No

Your water heater has a small gas leak on the flex-line. We do recommend replacing the flex-line, and we have called PG&E to do an inspection.

Besides that, your water heater passed our safety tests. The draft pressure was considerably lower than we would like to see. Low draft pressure increases the risk of CO backdrafting into the garage.



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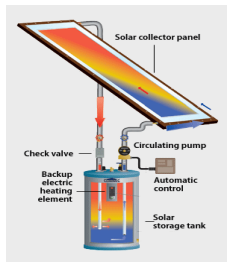
# Water Heating Upgrade Examples



HIGH EFFICIENCY TANK water heaters, such as the A.O. Smith Vertex, utilize a more efficient burner and a super-insulated tank



ETERNAL HYBRID TANKLESS is the ultimate in efficient, effective water heating. Its burner is 98% efficient, and its super insulated 1.5 gallon tank eliminates the "hot water sandwich" associated with some tankless models. It also features stainless steel construction and a 20 year warranty.



Solar water heaters use energy from the sun to heat water. During the day, the collector heats the water directly or indirectly by heating an exchange medium, such as glycol (which won't freeze), which transfers the heat to the water in the storage tank.



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# Solution Roadmap

Assessment Package	Recommend Package	Minisplit System
1) Floor Insulation: R-13 Closed Cell \$5,015 2) Audit Refund -\$300	1) Air Draft Sealing \$890 2) Floor Insulation: R-19 Closed Cell \$6,345 3) Asbestos Abatement \$870 4) Furnace Replacement \$5,000 5) Duct Replacement \$2,808 6) PG&E Advanced Required Measures \$450 7) Audit Refund -\$300	1) Air Draft Sealing \$890 2) Floor Insulation: R-19 Closed Cell \$6,345 3) Asbestos Abatement \$870 4) Minisplit System \$12,580 5) PG&E Advanced Required Measures \$450 6) Audit Refund -\$300
Total Due to AHE \$4,715 Federal Tax Credit -\$500  Net Project Investment \$4,215 Monthly Payment with Financing \$38	Total Due to AHE \$16,063 Advanced Upgrade (Energy Upgrade CA) -\$2,000 Federal Tax Credit -\$500  Net Project Investment \$13,563 Monthly Payment with Financing \$122	Total Due to AHE \$20,835 Advanced Upgrade (Energy Upgrade CA) -\$2,000 Federal Tax Credit -\$500  Net Project Investment \$18,335 Monthly Payment with Financing \$165



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# Thank You!

Thank you for the opportunity to provide an analysis of your home's performance. We hope that you will choose to move forward with our recommendations for making your home more healthy, comfortable, and energy efficient. With unprecedented rebates available for home efficiency upgrades, now is a great time to move forward. Remember, these rebates are limited and available on a first-come, first-served basis.

Warm Regards,  
The Advanced Home Energy Team



AHE has an "A" rating with the Better Business Bureau.  
[www.goldengate.bbb.org](http://www.goldengate.bbb.org)

AHE was awarded Angie's List Service Award  
with an "A" rating.  
[www.angieslist.com](http://www.angieslist.com)



AHE building analysts and diagnosticians are all certified by the  
Building Performance Institute.  
[www.bpi.org](http://www.bpi.org)

AHE has a full-time rebate administrator  
dedicated to processing your rebates.  
<https://energyupgradeca.org/>



AHE was voted "Best Green Building Company" in the SF BayList  
Chronicle poll.  
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