



Results of Your Home Energy Assessment

Homeowner Residence

Audit: Sep 14, 2011

Report: Nov 23, 2011

Prepared for:

Conscientious Homeowner

123 Evergreen Terrace

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om

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Solutions for a more Comfortable, Healthy and Efficient Home

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Introduction to Building Performance

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. Some of the areas we address are:

By improving your home's systems 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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Energy Loss

Where is energy being lost in your home?

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.

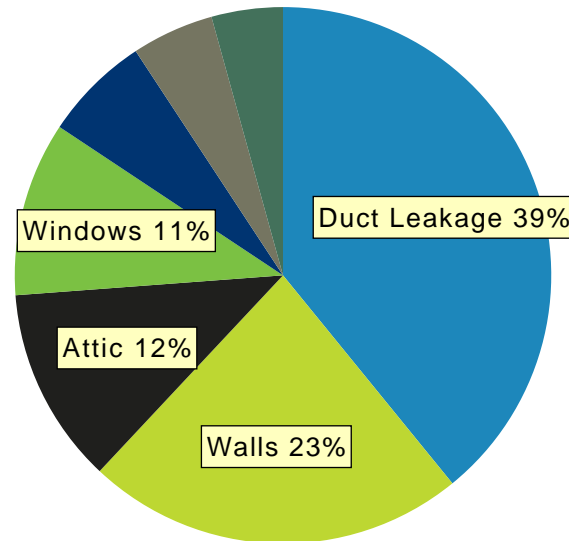
Energy Loss in Your Home

Energy loss, in BTUh* by building component, on the coldest night of the year

Duct Leakage	21,648
Walls	12,647
Attic	6,549
Windows	5,818
Air Leakage	3,552
Floors	2,741
Duct Insulation	2,378
Total	55,333

*British Thermal Unit, a unit of energy. BTUh is used to quantify the heat loss or heat gain through the building envelope, as well as the power needed for domestic hot water

Energy loss by building component, on the coldest night of the year in your area



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Duct Leakage & Insulation

How leaky is your ductwork?

Duct leakage is a major contributor to energy waste and poor indoor air quality. A duct system should act as a closed loop in which no indoor air is lost to the outdoors and no outdoor air is introduced into your home. A well sealed and insulated duct system is a key component to a healthy and efficient home.

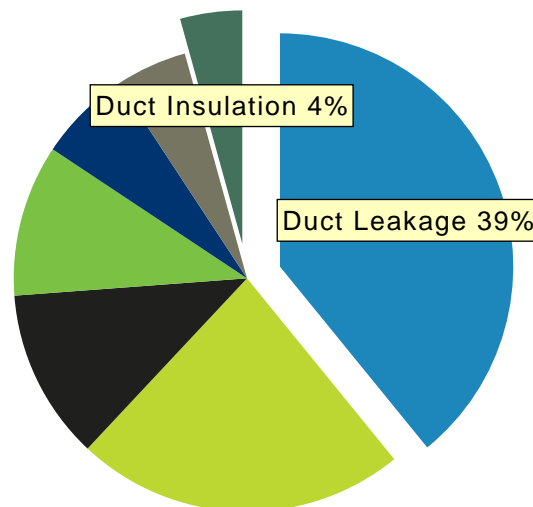
Duct Leakage & Insulation

% of Energy Lost Through Duct Leakage	39.12%
% of Energy Lost from Duct Insulation	4.30%

Insulation Levels:

R0 - No Insulation, R-2

Energy lost in your ducts, on the coldest night of the year in your area



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Photos of Your Duct System

Your heating system is the biggest opportunity in your home for efficiency, comfort, and indoor air quality improvements. The entire system is wrapped in asbestos, which needs to be abated prior to replacing the heating system for air quality and health reasons. Your furnace is nearly 40 years old and, while safe, has issues with the blower fan and is much less efficient than current models. The duct system has large gaps at connections, dark areas indicating leakage, and even a couple of holes. Between 25 and 30% of the heated air leaks into the crawl space on its way inside. Replacing the heating system will improve the family room comfort dramatically, improve indoor air quality by removing a respiratory irritant (asbestos), and improve energy efficiency by helping the heated air make it inside.



Large hole at connection to family room heating duct



Darkened areas indicate excessive duct leakage



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Duct Replacement

Benefits of Duct Replacement

- Dramatically increases indoor air quality by eliminating return air leakage
- Increases comfort through properly designed air distribution to each room
- Increases efficiency by reducing duct leakage and static pressure
- Existing ductwork completely removed and disposed of or recycled



Before: A disconnected duct in your home.

What to Expect

- Triple Sealing Technology uses water based, low VOC mastic
- Ducts designed to meet specifications of ACCA manuals J, D, and T
- Install wireflex or KD duct work
- Target duct leakage is less than 6% where all ducts are accessible



After: Triple sealed wireflex duct work.



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Attic Insulation

How well is your attic insulated?

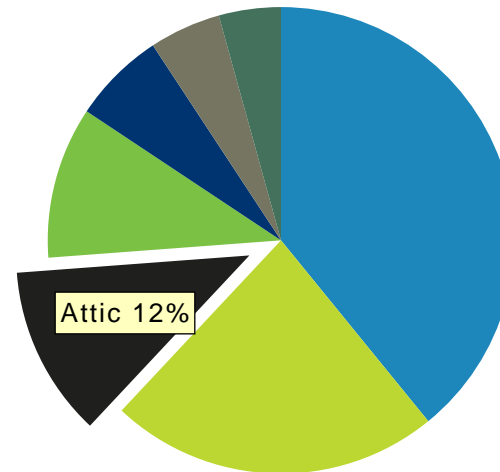
After air sealing, attic insulation is typically one of the best "bang for your buck" steps you can take towards a more efficient and comfortable home. Well installed attic insulation acts as a barrier to summer and winter heat loss to and from your attic. It's like a nice thick, winter hat for your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

Insulation Type & R-Value

Insulation type	56% has Fiberglass, batts R-13 Poor installation quality
Insulation type	44% has no insulation
System R-Value	R-4

Recommended R-Value: Minimum R-30

Energy lost by attic, on the coldest night of the year in your area



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Photos of Your Attic

Your attic was insulated several years ago, but the insulation that was installed is inadequate and was not installed well. Removing the existing insulation and replacing it with R-38 blown cellulose will help your house stay warmer in the winter and keep your heating system from cycling on as frequently. Blown cellulose is made from post-consumer recycled material and is a green product.



attic insulation is poorly installed and insufficient



large area missing insulation



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Air Leakage

How drafty is your home?

Reducing air leakage is often the single most effective step you can take towards a more efficient, healthy and comfortable home. Minimizing air leakage can reduce heating and cooling bills, and improve indoor air quality and comfort. During your energy audit we used a blower door to determine the percentage of air your home exchanges with the outdoors per hour.

Air Changes Per Hour

Envelope leakage at CFM50*	2,553
Natural ACH** (Air Change Per Hour)	0.65
ASHRAE*** Recommended Level	0.35

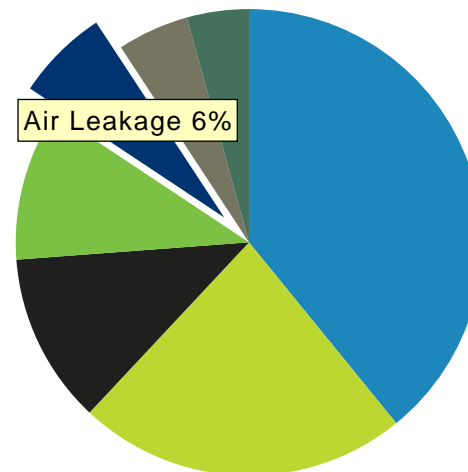
Equivalent to a 11 x 11 in² hole in your home

*Cubic Feet per Minute. Used to quantify the air flow through duct work, air infiltration, or ventilation.

**Air Changes per Hour. The number of times the home's air is replaced from outside in an hour.

***American Society of Heating, Refrigerating, and Air Conditioning Engineers.

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Air Leakage Sources in Your Home

In addition to the windows, the attic and crawl space are major sources of air leakage in your home. Everywhere that wires, pipes, ducts, and flues penetrate the downstairs floor or the upstairs ceiling, heated air escapes through holes in the top of your building and is replaced by cold air entering through holes in the bottom. Sealing these holes and gaps prior to installing new insulation will make the house feel less drafty, and keep the heated air inside.



Hole in floor where duct enters house



Hole in ceiling where flue exits into attic



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Air Sealing

Benefits of Air Sealing

- Improves indoor air quality by reducing air infiltration from crawlspace and attic
- Increases energy efficiency by reducing loss of conditioned air through leakage points i.e. leaks around canlights, plumbing and electrical penetrations
- Increases indoor comfort by reducing draftiness of the home



Before: Example of an unsealed hole.

What to Expect

- Sealing process reduces envelope leakage significantly
- We use materials such as foam board, expanding foam, caulk and fire rated material to seal penetrations to the extent necessary
- Provide certificate of improvement using Blower Door test



After: Example of a sealed hole.



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Windows

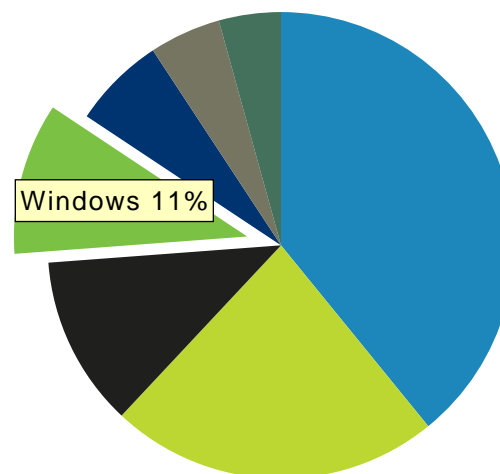
How efficient are your windows?

Windows are an important component of a well performing building envelope. It's important, however, to consider the energy savings potential of window replacement compared to other building envelope improvements as steps like building envelope sealing and insulation are typically more cost effective and will have a greater impact on improving comfort and health.

Window Information

Qty	Panes	Window	Frame Type
6	Single, Clear Glass	Operable Window or sliding glass door	Metal No Break
2	Single, Clear Glass	Window, fixed sash	Metal No Break
7	Double, Low-e, 0.60	Operable Window or sliding glass door	Wood (including Metal Clad) or Vinyl

Energy lost by windows, on the coldest night of the year in your area



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Window Replacement Opportunities

You indicated that you were interested in replacing the two windows that face the back of the house in the living room. These two windows are certainly the most important ones to replace, but are large units that will require special equipment to install due to the height of the exterior from the ground.



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Floor Insulation

How well is your floor insulated?

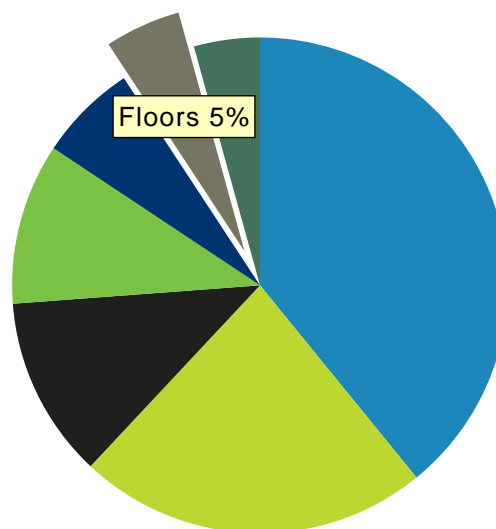
An air tight and properly insulated floor will reduce the amount of crawlspace air infiltration and heat lost through your floors at the same time. This will result in a healthier more comfortable indoor environment.

Insulation Type & R-Value

Insulation type	no insulation
System R-Value	R-3

Recommended R-Value: Minimum R-19

Energy lost by floors, on the coldest night of the year in your area



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Photos of Your Floor Insulation

Your downstairs floor is totally uninsulated. Insulating the floor will make its surface stay much warmer, improving the comfort in the family room and throughout the downstairs.



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Wall Insulation

How well are your walls insulated?

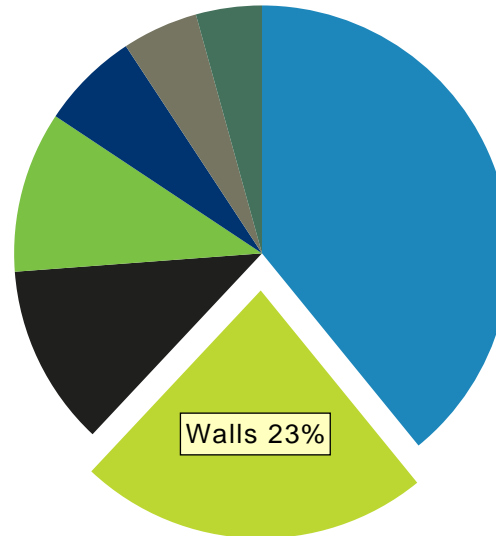
Walls typically account for a large percentage of total heat loss due to the amount of wall surface area to the outdoors. When possible, adding wall insulation to an existing home can greatly improve comfort and efficiency as well as decrease outdoor noise.

Insulation Type & R-Value

Insulation type	no insulation
System R-Value	R-2

Recommended R-Value: Minimum R-13

Energy lost by walls, on the coldest night of the year in your area



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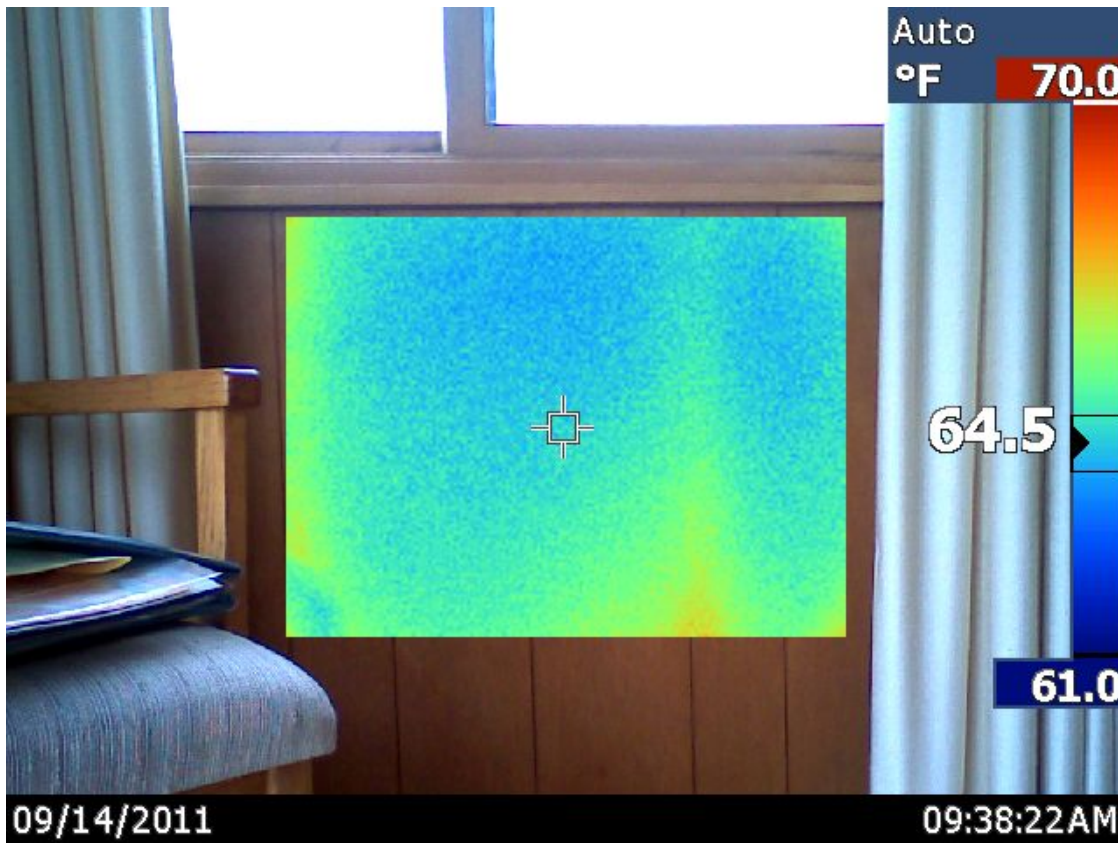
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Photos of Your Wall Insulation

Using an infrared camera and a wooden probe, I determined your exterior walls are not insulated. Insulating them would yield large efficiency improvements and increased comfort. This IR photo shows how the uninsulated wall cavities lose heat quicker than the studs. However, you have indicated that wall insulation is not a priority for you at this time.



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Summary of Your Concerns

Your Concerns	Root Causes	Recommended Solutions
Family room is cold and drafty. Living room is also somewhat drafty	<ul style="list-style-type: none">- Large hole in duct leading to family room- Air leakage throughout building pulls cold air into the downstairs from outside- No wall or floor insulation- Poor attic insulation- Large single pane windows in living room	<ul style="list-style-type: none">- Replacement duct system will be well sealed- Air sealing attic and crawl will reduce draftiness- Floor, Wall, and Attic insulation will help house retain heat- Window replacement in living room will help the room feel warmer and also reduce draftiness
Want to produce electricity on-site with solar panels	<ul style="list-style-type: none">- Solar power is not cost effective for you at this time because electricity consumption is pretty low- Could easily offset all electricity consumption with small solar system	<ul style="list-style-type: none">- Consider installing a solar electric system sized to meet your current electrical consumption- Consider extra capacity if electric car is a possibility for the future



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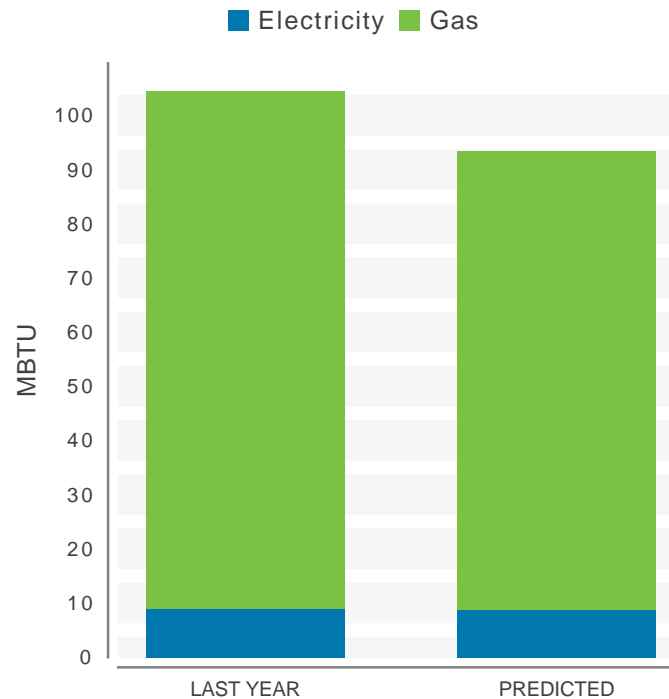
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Savings Prediction

Insulation Package

Included Improvements

- Attic Insulation (Loose Fill)
- Insulation Removal (Batt)
- Air Draft Sealing (Building Envelope)
- Floor Insulation (Ultratouch)
- Credit (Federal Tax Credit)
- Financing (CHF)



Savings

Electricity	2%	48 kWh/yr
Gas	11%	108 therms/yr
Total Savings	11%	10,960 kBTU/yr



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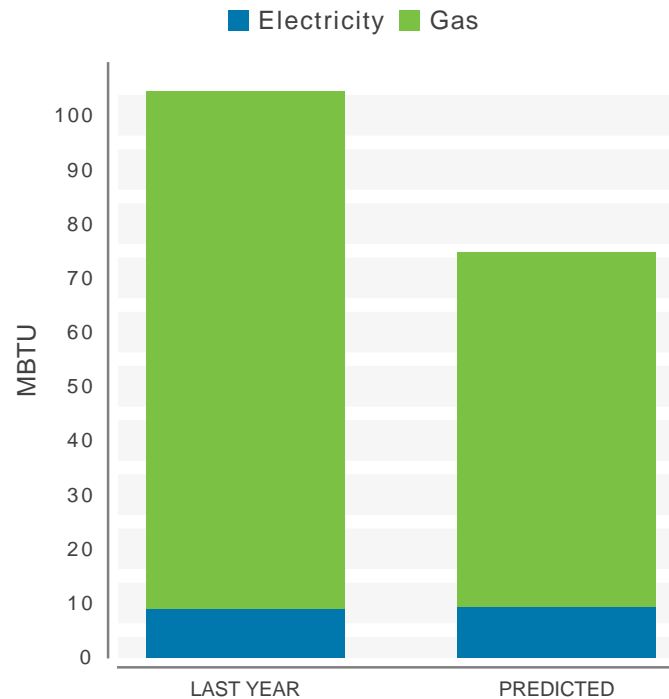
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Savings Prediction

Essential Energy Upgrade

Included Improvements

- Furnace Replacement (High Efficiency)
- Duct System Replacement
- Asbestos Removal
- Attic Insulation (Loose Fill)
- Insulation Removal (Batt)
- Air Draft Sealing (Building Envelope)
- Building Permit Processing Fee
- PG&E Required Measures
- Rebates (Energy Upgrade California)
- Credit (Federal Tax Credit)
- Financing (CHF)



Savings

Electricity	-5%	-119 kWh/yr
Gas	32%	301 therms/yr
Total Savings	28%	29,713 kBTU/yr



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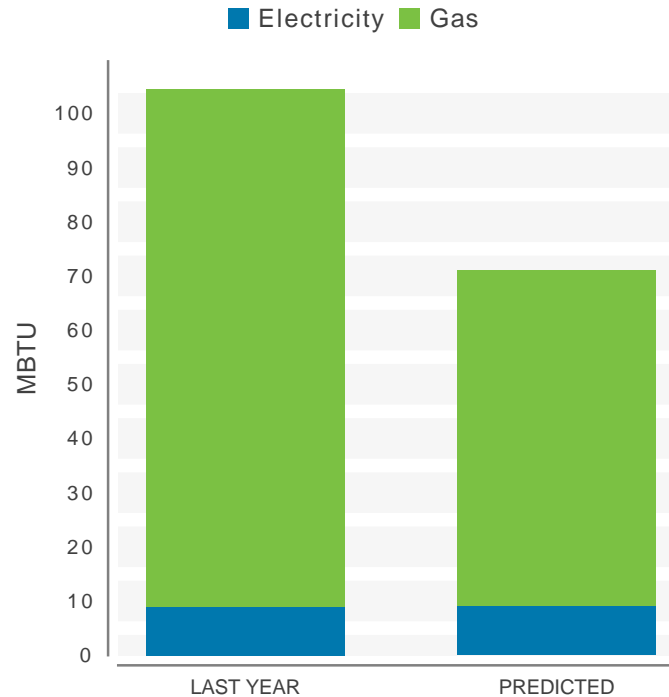
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Savings Prediction

Performance Package

Included Improvements

- Furnace Replacement (High Efficiency)
- Duct System Replacement
- Asbestos Removal
- Attic Insulation (Loose Fill)
- Insulation Removal (Batt)
- Air Draft Sealing (Building Envelope)
- Floor Insulation (Ultratouch)
- Building Permit Processing Fee
- PG&E Required Measures
- Financing (CHF)
- Contingency Clause



Savings

Electricity	-3%	-82 kWh/yr
Gas	35%	335 therms/yr
Total Savings	32%	33,213 kBTU/yr



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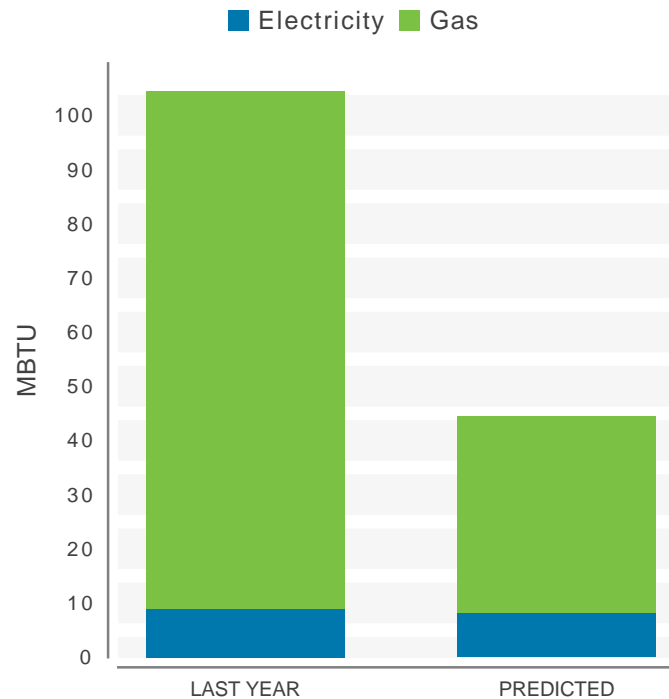
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Savings Prediction

Comprehensive Energy Upgrade

Included Improvements

- Furnace Replacement (High Efficiency)
- Duct System Replacement
- Attic Insulation (Loose Fill)
- Air Draft Sealing (Building Envelope)
- Floor Insulation (Ultratouch)
- Marvin Wood Window Replacement (Living Room)
- Wall Insulation (Cavity Drill and Fill)
- Ceiling Insulation (Cavity Drill and Fill)



Savings

Electricity	8%	202 kWh/yr
Gas	62%	592 therms/yr
Total Savings	57%	59,881 kBTU/yr



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Financing Information

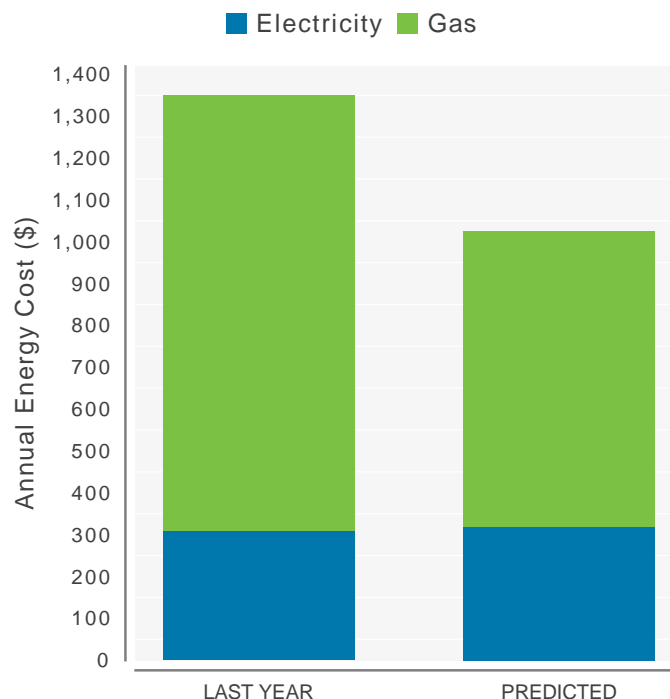
Performance Package

Included Improvements

- Furnace Replacement (High Efficiency)
- Duct System Replacement
- Asbestos Removal
- Attic Insulation (Loose Fill)
- Insulation Removal (Batt)
- Air Draft Sealing (Building Envelope)
- Floor Insulation (Ultratouch)
- Building Permit Processing Fee
- PG&E Required Measures
- Financing (CHF)
- Contingency Clause

Financing

Monthly Loan Payment	\$104.67
Monthly Savings	\$27.16
Monthly Net	- \$77.51



Savings

Electricity	-3%	\$-11 /yr
Gas	32%	\$336 /yr
Total Savings	24%	\$326/yr



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Thank You

Thank you for the opportunity to provide an analysis of your home's performance. We look forward to working with you to make your home more healthy, comfortable, and energy efficient.

Sincerely,

The Advanced Home Energy Team



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