

ELEMENTS — ZERO ENERGY

Home Energy Upgrade Assessment

Spies Residence
November 29, 2012

Prepared For:

Spies Family
28 Cecil Ave
San Jose
95128

Prepared By:

ELEMENTS

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Dear Soren,

Thank you for inviting us to your home for a consultation. Your decision to have a Home Energy Assessment is the first step towards transforming your house into a truly comfortable, economical and sustainable home. Your house is an interactive system that is intended to support your material comfort, good health and peace of mind. By assessing and integrating the performance of the building shell (floors, walls & ceilings), the heating and cooling systems, the appliances and the other systems, we will help you achieve improved health, safety and comfort, while increasing your home's energy efficiency and durability.

*As you will see in the following pages there are several interventions that we recommend. For Brief Summary see page **2** and for the Recommendations page **3**; also for the Zero Energy options you will see at the end of the recommendations a **(ZE)**.*

*A Zero Energy Home is possible with **5** important steps:*

- 1. Seal House Envelope (Leakages, Insulation & Openings - windows and doors)*
- 2. Provide AIR circulation - Mechanical ventilation*
- 3. Reduce the use of energy without sacrificing comfort*
- 4. Convert all your Gas equipments in Electric*
- 5. Produce on site the energy you need (Electric Energy)*

Sincerely

The ELEMENTS Team

1. OVERVIEW – Your Home

Occupants	Who lives here	2 adults
	Health	Good
	Time spent in the home	60%
	Indoor pollutants	N/A

Building	Location	San Jose, CA, which has a mild climate with only moderate heating and cooling needs
	Age & Size	Built around 1938 – 1 story, approximately 750 square feet
	Construction	Wood framed walls
	Exposure	Front of the house (Entrance) – 174 South

Your Concerns	<ul style="list-style-type: none"> • Improve Home Energy Efficiency • Better Comfort • Use less Energy
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BRIEF SUMMARY	<ul style="list-style-type: none"> • The total consumption of GAS and Electricity specific to the use of YOUR Furnace is \$61 <ul style="list-style-type: none"> ○ The lost of the Furnaces 37% (average) - therefore we will have \$39 ○ The lost of the Duct System is 0% (average) - therefore we will have \$39 ○ The lost of the Your Home is 59% (average) - therefore we will have \$16 • Approximately from a total of \$61: <ul style="list-style-type: none"> ○ YOU are getting only \$16 (26%) and approximately \$45 (74%) is lost.
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1. OVERVIEW – Recommendations (Professional Upgrades)

		Suggested Professional Upgrades	Benefits
BASIC	Safety & Air Quality	<ul style="list-style-type: none"> Furnace Flue pipe and another pipe in the middle of the house to be checked by a specialized Asbestos removal company The pipe in the Attic could be a Radon Pipe – to be checked 	✓ Healthier Home
	Air Sealing	<ul style="list-style-type: none"> Seal Home leakages (0 CFM50 – ZE) New exhaust fan in the bathroom & Mechanical ventilation (ZE) 	✓ Lower Gas Bills
	Insulation	<ul style="list-style-type: none"> Upgrade Insulation in the Attic (R38) Walls Insulation Crawlspace / Floor Insulation (Foam – ZE) 	
	Heating & Cooling System	<ul style="list-style-type: none"> New Furnaces, Air conditioner and Duct System Gas or New Electric Heating-Cooling System (ZE) 	✓ Lower Electrical Bills
	Water System	<ul style="list-style-type: none"> Move the Existing Water Heater outside the building envelope Electric Tankless Water Heater (ZE) 	✓ Lower Water Consumption and Bills
ESSENTIAL	Lighting	<ul style="list-style-type: none"> Upgrade some lights in CFL and/or LED 	
	Windows and Doors	<ul style="list-style-type: none"> New Windows and new back door The entrance door needs particular attentions regards the weather stripping or upgrade it. 	✓ Lower carbon footprint
SUSTAINIBLE	Other & Renewable Energy	<ul style="list-style-type: none"> Solar Panels (Photovoltaic) after the new roof (ZE) Cook top and Stove from Gas to Electrical (ZE) Take out the 2 flue pipes (visible from the attic) 	✓ Increase Value of your house

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2. DIAGNOSIS – General Exterior & Interior

Roof

The roof is in low condition. Consider to upgrade it soon.

Gutters & Downspouts

Your gutters and downspouts are in average condition.

Leaking gutters and downspouts can allow water to reach the house and foundation rather than being diverted away.

Siding

Siding should be at least 6" above the soil level and the ground should slope away from the house.

Ventilation (Crawlspace and Attic)

Overall, they are in good condition.

Asbestos

Maybe the **Furnace Flue pipe and another pipe** in the middle of the house (visible in the attic – see picture) – to be checked by a specialized Asbestos removal company.

Also, the pipe in the attic could be a Radon Pipe and it should be outside the attic– **to be checked**



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2. DIAGNOSIS – Energy Efficiencies & Losses

Bills

Your **bills** are made up of energy used for **heating** (gas) and what is known as the **base load** (both gas and electricity). The base load comes from activities undertaken all year such as turning on lights, showering, using computers, televisions and etc.

- The Electrical usage is more connect with YOU (lighting, computer television, etc.) instead the Gas usage is more connect with your house (efficiency of the water heater, furnace, duct system, insulation, etc.).

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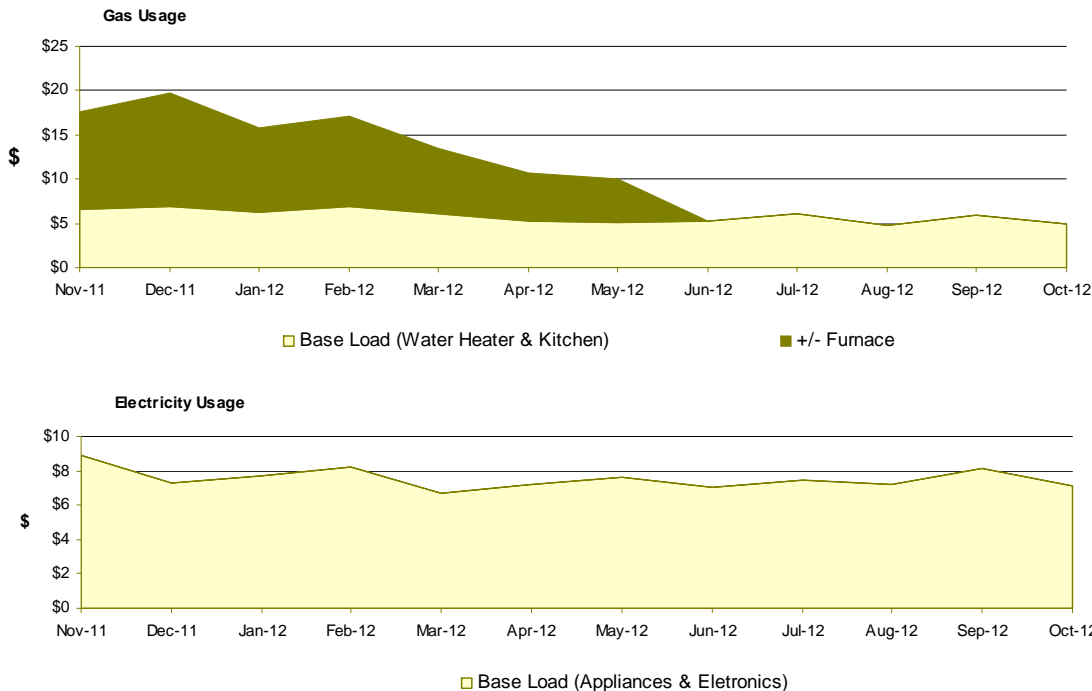
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Your Annual Gas Usage

• GAS	- Base Load → Water heater + K	= \$	70	(53%)
• GAS	- Furnace → Heating	= \$	61	(61%)
TOTAL		= \$	131	(100%)

Your Annual Electricity Usage

• Base Load	= \$	91	(100%)
TOTAL		= \$	91 (100%)

2. DIAGNOSIS – Energy Efficiencies & Losses

The Equipment

Heating & Cooling Equipment, like your car or your health, should be checked **annually** to be sure they are in top working order. Experts suggest that **furnaces and air conditioners** should be upgraded approximately every 10-15 years, both for health and energy efficiency. Old equipment can leak **dangerous gases** and can be especially wasteful of energy.

Furnace

- **The Furnace is old and low/ average condition.**
- **It has an Efficiency probably between 56 and 70%**
- The newest space heating equipment (Furnace) obtains the maximum amount of energy from the fuel before sending the waste gases up the flue pipe. You could consider upgrading it for a **new high efficient furnace with an efficiency of 95-97%.**
- **COMBUSTION SAFETY TEST**
 - **Spillage Test: PASSES**

Carbon Monoxide

Inefficient combustion can cause production of **CO**, the leading cause of death by poisoning in the US. Equipment should be checked regularly for production and leakage of significant amounts of this deadly gas.

- **A Carbon Monoxide (CO) monitor is the minimum solution and you have one!**



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IMPORTANT: All GAS appliances and equipments must be checked frequently from specific technicians for safety reasons.

2. DIAGNOSIS – Energy Efficiencies & Losses

Walls, Floors & Ceilings Insulation

Heating and Cooling costs are 40% of your energy bill, especially if your conditioned air is escaping.

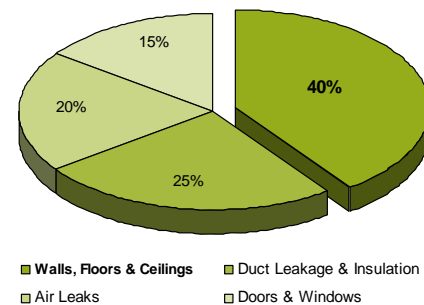
About 40% of the energy used to condition your home can be lost as heat radiates either in or out of your home through **un-insulated** walls, floors and ceilings.

Other contributions to energy loss (Ducts, Air Leaks, and Doors & Windows) will be discussed on the following pages.

Because warm air rises, a well sealed and insulated attic can cut down on air loss and contribute significantly to energy and cost savings in your home.

Since surface temperature around your body is the primary influence on whether you feel warm or cool, **insulating ceiling/attic, walls and floor can significantly affect your comfort**, and lead to a reduction in use of the furnace and thus reduced energy consumption.

Contributions to Energy Loss in a Typical House



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Insulation

Lack of insulation means walls, floors, and roofs lose or gain heat instead of keeping it where it's wanted. Occupants experience this as feeling too cold in winter and hot in summer, even if the temperature in the room is adequate.

- Outside the temperature was **64** degree; in your home the temperature was not uniform, from **57 to 73**



- | | | |
|----------------------|---|-------|
| • Walls | - With Infrared Camera it seems that the insulation is NOT present | - R0 |
| • Cathedral Ceiling | - | - N/A |
| • Attic | - The insulation is present R19 (but NOT uniform) | - R13 |
| • Crawlspace / Floor | - The insulation is NOT present | - R0 |

2. DIAGNOSIS – Energy Efficiencies & Losses

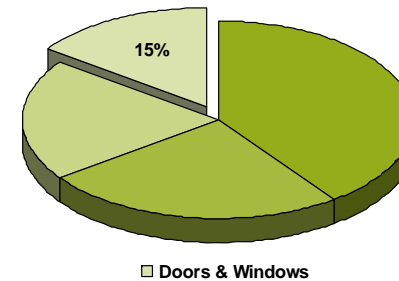
Doors & Windows

Doors and windows are openings in your buildings skin. **Heat loss** and gain is the price we pay for having these openings, but what we gain – access, views, fresh air – is worth the price.

At the same time, it is important to **block unnecessary air leakage** by properly sealing around the openings.

It is also wise to install the most efficient, insulated doors and windows possible **when the time comes to upgrade**.

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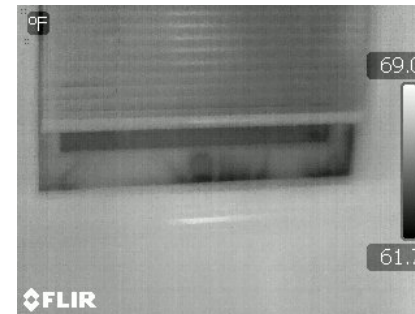
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Windows & Patio Doors

The most efficient windows and patio doors are double or triple paned with insulated frames made from wood, vinyl or fiberglass, which transmit a tiny fraction of the heat lost by aluminum frames. The majority windows and patio doors at your house are in good condition. Insulated frames with properly installed weather-stripping are important to minimize heat loss. **Glass should be double or triple paned to reduce radiant heat loss.**



- Your Windows (wood with single glass) and the back Door are in low-average conditions.
- Your entrance door needs a particular attention regard the weather stripping.

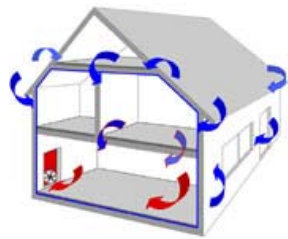
2. DIAGNOSIS – Energy Efficiencies & Losses

Home Air Leaks

A typical home in California is built with a wood frame covered by siding on the outside and plasterboard on the inside. What can't be seen, once the home is finished, is that many the connections in the frame of the house are left unsealed, allowing **air free passage between the inside and the outside**.

Each window and door provides another **place for leakage**, and dropped ceilings; recessed lighting and plumbing pipes do the same.

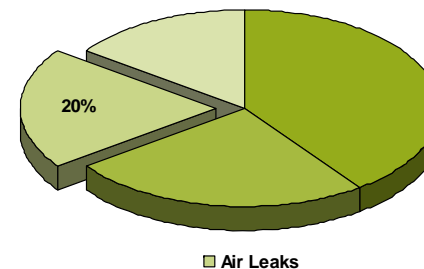
Sometimes, most leaks are invisible from inside the house, but can be seen clearly with Infrared (IR) Photography.



A well-sealed home should leak **significantly less** than **1 cubic foot** or air per minute (CFM) **per square foot (ft²)** of floor space when depressurized with a Blower Door to 50 Pascal.

- Air Leakage in your home = 1,554 at CFM50
- Your home leaks an average **151% MORE** than the whole building ventilation required by the ASHRAE 62.2-2004 [between 753 and 527 (70%)]

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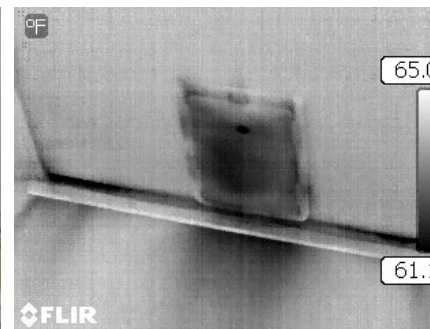
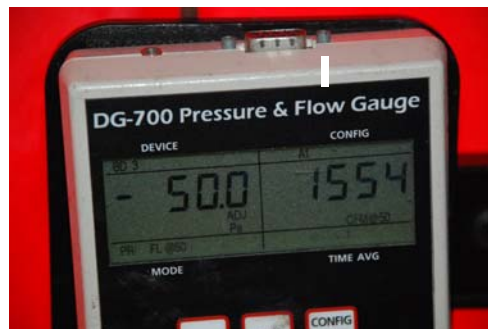
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All Openings allow constantly the movement of **AIR** from outside, the attic and crawlspace to the **Living Space** and vice versa.

2. DIAGNOSIS – Energy Efficiencies & Losses

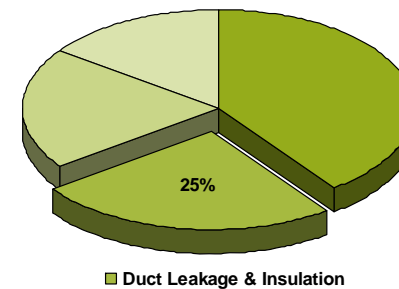
Duct Leakage & Duct Insulation

Ducts carry the warmed and cooled air throughout the home. Duct leakage causes both **loss** of conditioned air to the attic and/or crawlspace, and distribution **of polluted air** picked up from wherever the ducts are located.

Insulation fibers, pest droppings, microorganisms and moisture can easily be circulated around the home, leading to allergies, asthma and other respiratory symptoms.

Well-installed duct insulation keeps the ducts from losing or gaining heat from their surroundings, leading to the delivery of air at the optimal temperature without wasting energy.

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Duct Insulation

Local Codes require a minimum amount of insulation (6") on the entire length of the ducts to prevent energy waste.

Duct Leakage

New homes should have less than **6%** leakage. Old homes should have at least less than **15%** leakage. **Leakage from ducts not only allows energy to be lost, but also can bring in pollutants.**

- **Your Heating Unit doesn't have Duct System.**



All Openings allow constantly the movement of AIR from the Crawlspace to the Living Space and vice versa

2. DIAGNOSIS – Energy Efficiencies & Losses

Water Heating

Standard Water Heaters warm water in a tank and keep it available for use when needed. Newer heaters have **insulated tanks** to prevent standby losses, but older tanks should be wrapped in a **blanket**. Both kinds should have the hot water **pipes insulated** along their entire length if possible.

Settings

Water heaters should be set to deliver **120°** water to the farthest tap. This saves energy, prevents scalding and protects against the growth of dangerous bacteria.

- **Your Water Heater is in average condition and it is 10 years old (based on the Owner info)**

Flue Pipe & Carbon Monoxide

Inefficient combustion can cause production of **CO**, the leading cause of death by poisoning in the US. Equipment should be checked regularly for production and leakage of significant amounts of this deadly gas.

- **The flue pipe is in average shape**
- **COMBUSTION SAFETY TEST**
 - **Spillage Test:** **PASSES**
 - **Draft Test: -3.8 – (min: -1.15)** **PASSES**
 - **CO Test: 5 & 19PPM – limit 25PPM** **PASSES**

Hot Water Pipes (distribution)

- **All Water Pipes are insulated**



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IMPORTANT: All GAS appliances and equipments must be checked frequently from specific technicians for safety reasons.

2. DIAGNOSIS – Energy Efficiencies & Losses

Lighting

Lighting can account for **15-20%** of your total energy bills. One of the less expensive and easiest ways to improve energy efficiency in the home is to use the most efficient lighting possible. Compact fluorescent lights (CFL) and LED can reduce your **lighting cost by 50 and 75%**. Putting lights on sensors or timers can help make sure they are off when they should be.

Appliances

A large part of your base electricity load is your appliances – major and minor. Old appliances can be real energy hogs. Electric stoves, ovens and dryers are especially energy hungry.

- **Energy Star options should be considered when it is time to replace appliances.**
- **Generally, electricity is almost 3 times more expensive than GAS.**

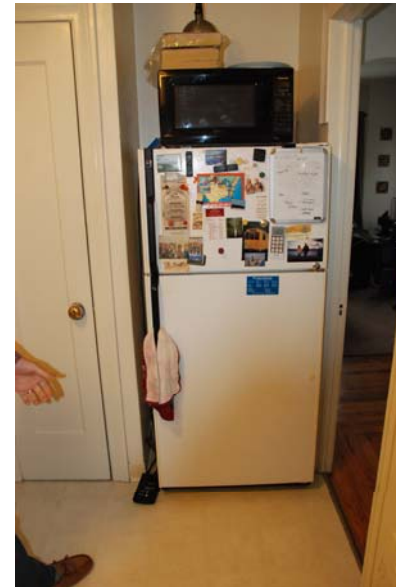
Electronics

Electronics and their chargers consume from **5-15%** of the energy used in a typical home.

Old Exhaust fans consume energy without do anymore their work.

Transformers are especially power-hungry and remain hot even when not charging any appliance.

It is highly recommended that all electronics be plugged into controllable **power strips with switches, remote controls or timers** to control the constant consumption of electricity. **(GREAT FOR COMPUTERS)**



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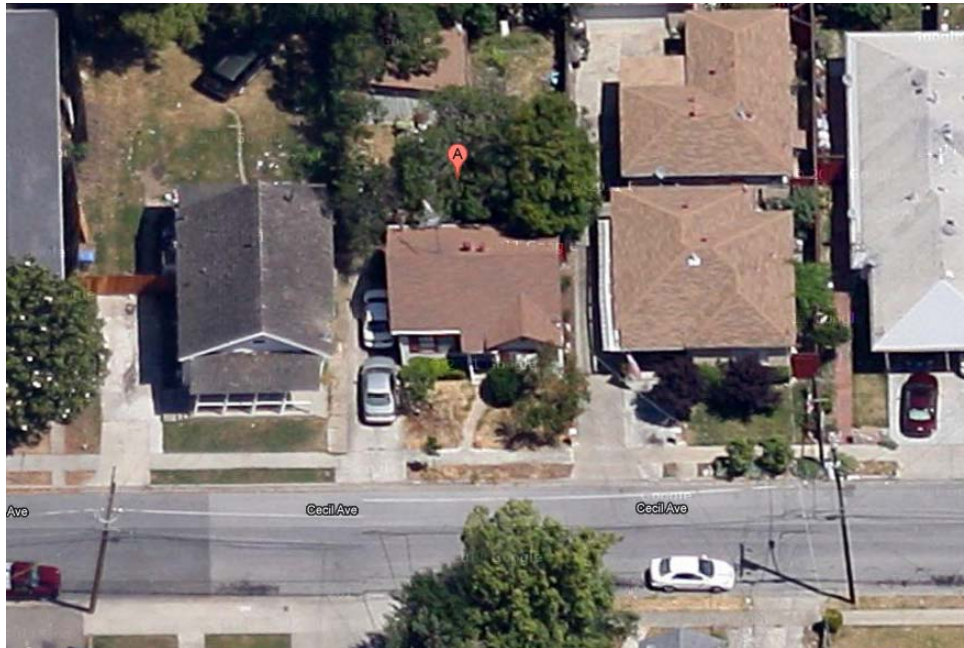
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2. DIAGNOSIS – Energy Generation

Solar and Wind power can go a long way toward making your **home energy-neutral (Sustainable ELEMENTS)**.

Electricity generated can be used immediately or fed back into the power grid, allowing you to use the energy later, when you need it. Financially electricity generated from solar panels can represent a great **savings** since most solar energy is produced during peak hours, when energy is more expensive, but used off-peak, when it is **less expensive**. It is realistic to end up with no net electric bill by the end of each year.



The roof is not in good shape, but has a good exposure on SOUTH side and enough open space to consider Solar Thermal and /or Solar Panels (Photovoltaic).

In case you are considering it:

- **Tree shades to be checked**
- **Install Panels after new Roof**

Solar Photovoltaic Panels

Solar panels can generate all the energy you need, as long as there is limited shading between 10am and 3pm during the summer. Even a small amount of shading or debris on the panels greatly reduces their effectiveness.

Solar Hot Water

Heating water on the roof is easier than generating electricity since shading and orientation are less critical. Warm water can be fed into your water, reducing the need for the water heater to fire up.

Residential Wind Energy

Recently, rooftop wind turbines have become available for residential use in California. They are less expensive to install than solar panels for a similar energy output, are relatively quiet and have a low visual profile.

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3. TIPS

Simple more things you can do

1. Turn Off Your Electronics

If you're going to be away from your computer or other electronic appliance for more than an hour, turn it off. Turning them back on requires much less energy than leaving them on standby, hibernate, sleep or "energy-saver" mode.



2. Eliminate your Vampire Load

Plug your TV and accessories into a power strip and switch off the whole strip when not in use. Programmable devices can be on a separate plug if needed. Similarly, put your printer, fax and other computer accessories on a power strip and unplug cell phone chargers when not in use.

3. Eliminate Your Second Fridge, and Keep your Main Fridge Working Optimally

Unplug the extra fridge except before parties when you need the extra space. Twice a year, brush off the grime that accumulates on the coils of your main fridge so you can set your thermostat higher for the same effect. If you've got space in your fridge, fill it with water bottles – they'll hold the cold even when the door is opened. On the other hand, it's important to allow space for cold air to be circulated in the freezer, so be careful not to overfill it.

4. Shift Your Load to Off-Peak Times

Electricity demand goes down at night, rises in the morning, and peaks at mid-day. Because power sources have to produce the electricity around the time of its use without capacity for long-term storage, our peak demand causes the expansion of dirty coal-fired power plants and other polluting forms of energy generation



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Rebates, Incentives & Financing Options

1. Utility (PG&E) Rebates & Other

- REBATES for homeowners from PG&E:

<https://energyupgradeca.org/overview>

<http://www.fypower.org>

2. Federal Tax Credits

- TAX CREDITS for homeowners through Energy Star: _

http://www.energystar.gov/index.cfm?c=tax_credits.tx_index

3. Green Mortgages

- Energy Efficient Mortgage (EEM) - For more details:

http://www.energystar.gov/index.cfm?c=mortgages.energy_efficient_mortgages

http://ecoenergyloan.com/?page_id=37

4. NEXT STEPS

Where do I go from here?

Once you finish reviewing the report, we will schedule a meeting with you to answer questions or clarifications regarding the assessment and review our recommendations in order of priority. We will also discuss the next steps to commence the energy remodel work.

Please contact us:

✓ 408.634.6690

✓ alfredo@e3-elements.com

ELEMENTS is your one-stop shop from Energy Assessment by BPI accredited technicians to a HERS Rater for new and existing residential projects in the Bay Area.

We assist our clients in 'greening' their new and existing homes and making them energy smart. Our services are focused on achieving healthy, sustainable and green results.

By bringing all aspects of green sustainable design and energy expertise under one roof, **ELEMENTS** clients experience a seamless, holistic, and collaborative approach to achieving the optimal level of green that you desire.

*Being a green company, our goal is to make your project beautiful, functional, and highly resource efficient. We take great pride in creating and designing the **GREEN ELEMENTS of your home***

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