

Home Energy Assessment



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I. Introduction

Planet Orange provides customers with a thorough Energy Assessment which covers the critical energy-consuming components of a building, including:

- Heating & Cooling system
- Ducting Integrity
- Water Heating
- Window & Door systems
- Appliances
- Electronics
- Indoor Water

This document covers some of the basic information in support of improving building efficiency and the specific issues identified during our assessment. Savings estimates are calculated using Department of Energy savings data and return on investment figures. This report has been kept intentionally brief and non-technical.

The assessment includes the following sections:

1. Introduction
2. Energy Assessment Summary
3. Building Energy Facts
4. Property Statistics & Client Concerns
5. Home Energy Statistics
6. Energy Assessment Observations
7. Next Steps

We hope that you find this information beneficial and we welcome the opportunity to work with you on the recommended efficiency improvements.

II. Energy Assessment Summary

The following table summarizes the energy efficiency improvement opportunities we recommend for your home. The list is prioritized (1st & 2nd) by which improvements will most effectively remedy the homeowner concerns (see page 5) and save the most money and energy in your home and best return on your investment. Details for each are provided in the Energy Observations section of the report (see page 7).

Energy Efficiency Recommendation	Estimated Retrofit Cost (\$)	Estimated Annual Energy Savings (\$)
Air seal the Building Envelope: including weatherizing exterior doors, sealing supply air vents, sealing drywall penetrations,	\$ 975	\$ 968
Re-insulate supply ducts located in crawlspace, seal ducts with foil faced tape	\$ 1,350	\$ 729
Install subfloor insulation in crawlspace (R-19)	\$ 3,750	\$ 960
Vacuum clean all heating/cooling duct piping	\$ 495	\$ -
Install radiant barrier in attic roof to reduce solar heat gain	\$ 2,345	\$ 236
Remove and replace attic insulation with recycled denim (R-30)	\$ 4,950	\$ 703

General Comments:

Homeowner concerned with indoor air quality after wood flooring was installed.

Home has an outdoor swimming pool.

Addition was added to home - approx. 300 sq ft.

III. Building Energy Facts

Planet Orange provides customers with a way to measure their building's performance, safety and comfort. We strive to provide our customers with a report which illustrates the current status of the property and suggested improvements that can be made to improve the overall building performance and reduce energy costs for the customer.

Indoor Air Quality

- Most Americans spend over 90% of their time indoors, but indoor air pollutants are generally 2 to 5 times higher than outside air (*source: Environmental Protection Agency*)

Insulation & Air Leaks

- Insulating and Sealing every home in the US would effectively reduce greenhouse gas emissions by approximately 10% (*source: Dept. of Energy*)
- Air and Duct Leakage is a major source of energy waste, representing 25-40% of heating and cooling costs (*source: CBPCA*)

Cost Savings

- Each year in the US, nearly \$13 billion worth of energy in the form of heated or cooled air escapes through holes and cracks in residential buildings (*source: ACEEE*)
- Compact Fluorescent lighting requires 66% less energy than comparable incandescent lighting. Switching to CFL's can reduce your energy usage by 8% on average and is one of the easiest and fastest paybacks of any improvements you can make to your home's energy efficiency.

Carbon Footprint

- Your "carbon footprint" is a measure of your impact on the environment, in terms of the carbon dioxide (CO₂) emitted as a result of your daily activity. In other words, when you heat your house with oil, gas or coal, then you also generate CO₂. Even if you heat your house with electricity, the generation of the electrical power may also have emitted a certain amount of CO₂.

According to the U.S. Department of Energy, approximately 27% of our carbon footprint is generated by our home energy usage in the United States. Each individual property varies somewhat, with regards to the amount used for lighting, heating, etc. However, there are generally accepted breakdowns of energy usage for a typical home and the graph below illustrates this information. Planet Orange uses this data from Dept. of Energy to estimate current energy usage and potential savings. Below you will see the breakdown of energy spent by property owners by sector.

IV. Property Statistics

Year Built	1958
Size / Square Feet	2690
Occupants	2
No. of Bedrooms	3
No. of Bathrooms	2.5
Construction type	2 x 4 wood
Roof type	Wood Shake
Exterior wall finish	Wood Siding
Heating	Natural Gas
Water heating	Natural Gas
Cooling	Electric

Client Concerns

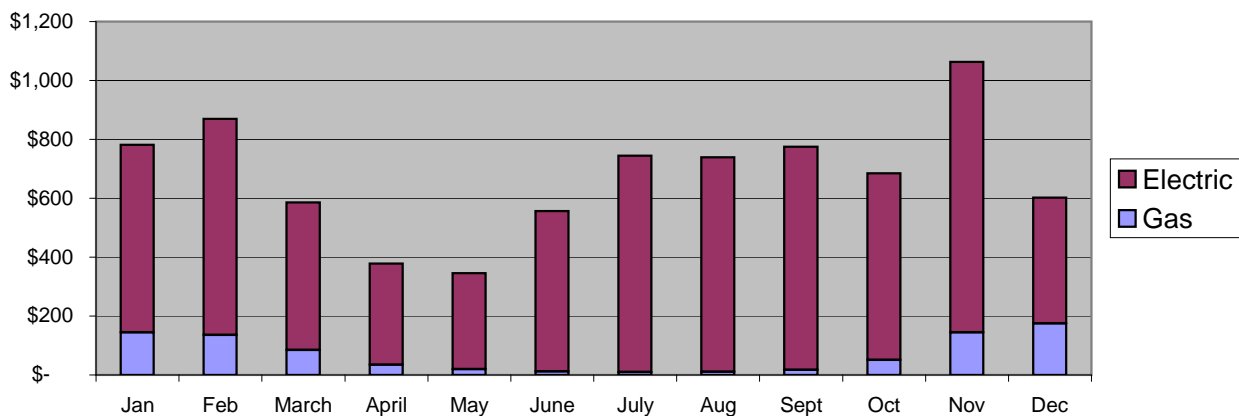
Cold rooms	X	CO2 emissions	
Hot rooms		Condensation	
Drafts	X	Noise	
Utility Bills	X	Respiratory issues	X
Moisture areas		Maintenance	
Termites, Pest		General Interest	

V. Home Energy Statistics

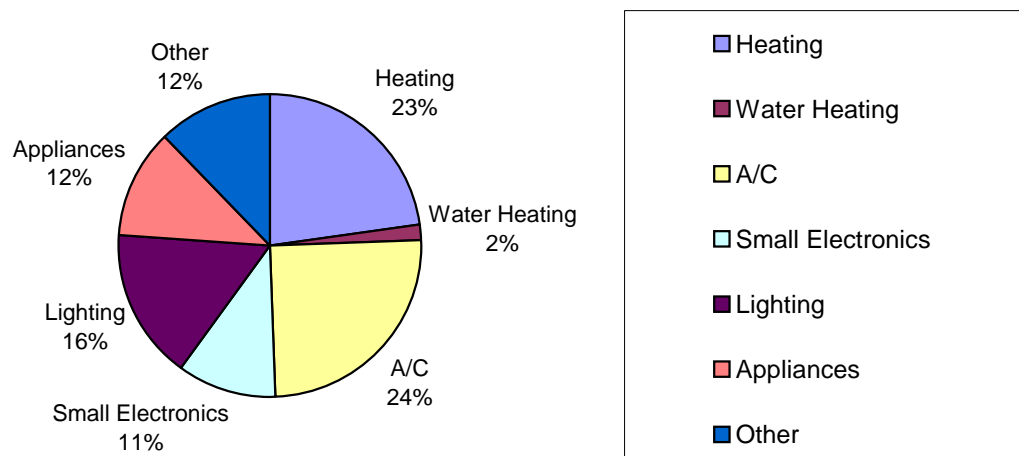
The energy use data we collect helps determine where your energy dollars are being spent and helps identify problems and inefficiencies in your home. A typical PG&E residential customer has a monthly bill of \$140. The average California home's footprint is 11,855 lbs of CO2 greenhouse gas emissions every year.

What is your Carbon Footprint?		29,417	lbs of CO2 / greenhouse gas
Energy Costs for Billing Periods:		April 2009 - March 2010	
Total Gas Costs	\$	842	Total Electric Costs
			\$ 7,286

Energy Costs by Month



Energy Costs by Source



The next section has recommendations on energy savings and how to reduce your carbon footprint.

VI. Energy Assessment Observations

Building Envelope

Insulation

•Why is INSULATION important to you?

A home envelope (or shell) is made up of the outer walls, ceiling, floors, windows, and doors of a house. Insulation is one of the most effective ways to save energy; with potential energy savings up to 20% on heating and cooling costs. R-value is the measurement of the insulation's effectiveness with the larger the number, the better the insulation.

•Your home was observed to have the following insulation characteristics:

	<u>Attic</u>	<u>Walls</u>	<u>Floors</u>
Home's insulation R - Value =	5	12	2

CA Title 24 energy guidelines recommend the following Insulation standards:

CA Insulation R - Value =	30	13	19
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•What energy efficiency measure is recommended to improve the insulation?

Install recycled denim insulation at the attic R-30, Install fiberglass faced blanket insulation at the sub-floor area or crawlspace

Upgrade your insulation and reduce heating & cooling costs by how much?

Upgrade to CA Title 24, improve energy performance by:	15%	3%	21%
Estimated Energy Savings (\$) by upgrading	\$ 703	\$ 24	\$ 960
Estimated reduction in CO2 gas (lbs)	2,566	564	3,498

VI. Energy Assessment Observations

Photos of your home



inside furnace closet, large hole open to dirt crawlspace



air supply vent leakage, seal leaks

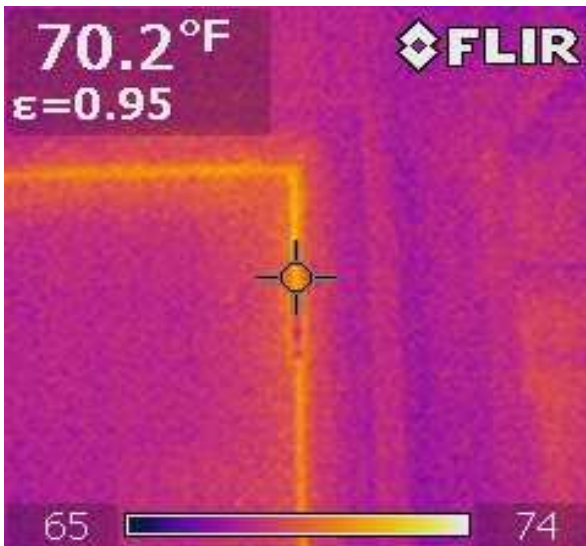


photo of furnace door air leakage, recommend sealing doors



adding insulation and filling in existing voids

VI. Energy Assessment Observations

Radiant Barrier

•Why is a RADIANT BARRIER important to you?

Radiant Heat from the sun penetrates the roof and walls of a house in the summer, but a radiant barrier blocks that radiant heat from entering the home. In the winter, a radiant barrier keeps indoor heat from escaping through the roof and walls and reflects it back into the house. Tests have shown that in attics with R-19 insulation or less, radiant barriers can reduce summer ceiling heat gains by about 16 to 42 percent compared to an attic with the same insulation level and no radiant barrier.

•What was the R-value of the insulation in the Attic?

5

•What energy efficiency measure is recommended to improve this?

Install a foil-faced, radiant barrier to the underside of the roof rafters in the attic

•What are the potential energy savings (\$) by adding a radiant barrier in the attic?

\$

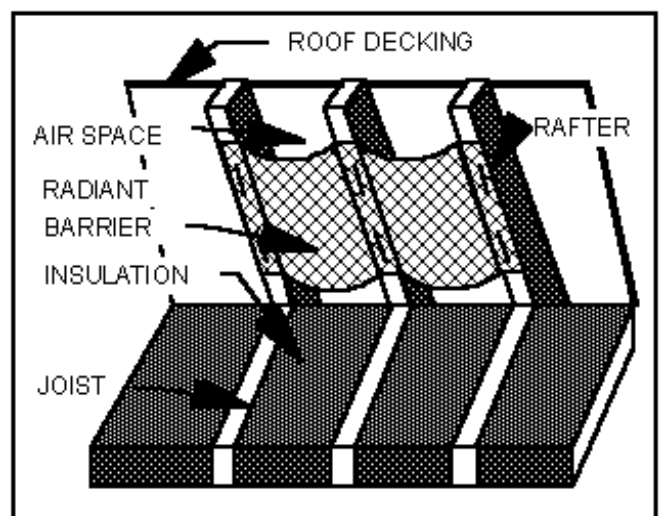
236

•How much CO2 greenhouse gas will this save (lbs)?

1,019



existing attic - no barrier



radiant barrier installation

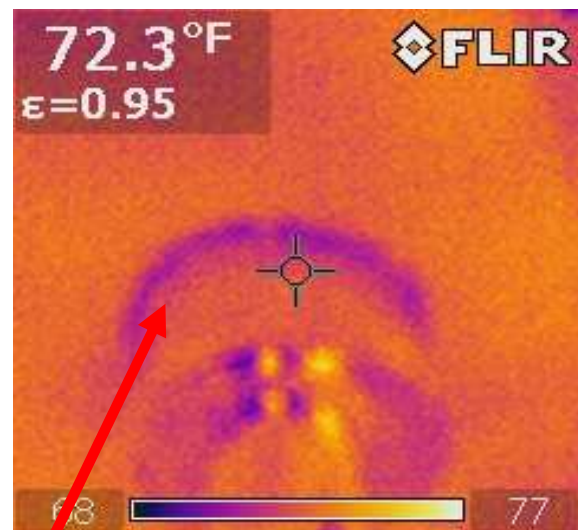
VI. Energy Assessment Observations

Air Leakage

<p>•Why is AIR LEAKAGE important to you?</p> <p>Air leakage may contribute to as much as 30% of your building's heating and cooling costs. Air leakage wastes energy and money, and contributes to health, moisture, noise and dust problems. Also, these openings may serve as an entry way for unwanted pests. Remember, for every cubic foot of air entering the home an equivalent amount of conditioned air is leaving.</p>	
<p>•Where was air leakage observed in the home?</p> <p>Doors Air supply boots / vents</p>	
<p>•What do we recommend to reduce Air Leakage?</p> <p>Seal around all ceiling and wall penetrations with backing and caulk; ie. plumbing fixtures, electrical fixtures, receptacles, HVAC supply boots, Seal exterior doors with weatherstripping</p>	
<p>•What is the estimated yearly energy savings by sealing air leaks?</p>	<p>\$ 968</p>
<p>•How much CO2 greenhouse gas will this save (lbs)?</p>	<p>4,180</p>



air supply vent leakage



furnace flue air leakage

VI. Energy Assessment Observations

Heating/Cooling Efficiency & Duct Leakage

Heating & Cooling

•What conditions did we observe in the home?			
<u>Equipment</u>	<u>Brand</u>	<u>Energy Source</u>	<u>Energy Cost / Year</u>
Furnace	Carrier	Natural Gas	\$ 1,846
A/C	RUUD	Electric	\$ 2,027
•Why is HEATING and COOLING energy performance important to you?			
<p>If your heating or cooling system is more than 10 years old, consider replacing it with a new, energy-efficient model to save on energy. Dirt and neglect are the top causes of heating and cooling system inefficiency and failure. Check your filter every month, a clean filter will prevent dust and dirt from building up in the system, which can lead to expensive maintenance and/or early system failure. However, replacing a furnace or air conditioner can be expensive, we recommend installing insulation, reducing building air leakage and duct sealing before replacing your systems.</p>			
Furnace			
•What are the potential energy savings per year by upgrading your furnace to current Energy Star standards (95% efficient model)?			\$ 137
•How much CO2 greenhouse gas (lbs) will this save?			590
Air Conditioner			
•What are the potential energy savings per year by upgrading your A/C to current Energy Star standards (SEER >=13)?			\$ 304
•How much CO2 greenhouse gas (lbs) will this save?			1,313

VI. Energy Assessment Observations

Duct Leakage & Insulation

- How leaky is your ductwork? How well insulated are the ducts?

The average forced-air duct system loses about 30% of the energy produced by the furnace or air conditioner in the course of distributing air to the rooms. This energy loss can be reduced by sealing duct joints with mastic or high-quality duct tape, and insulating ducts in unconditioned spaces (*US Dept. of Energy*).

% of energy loss due to Duct Leakage	14%	of air is leaking
This is the equivalent of a hole sized	70	square inches

- What energy efficiency measures can be taken to reduce Duct Leakage?

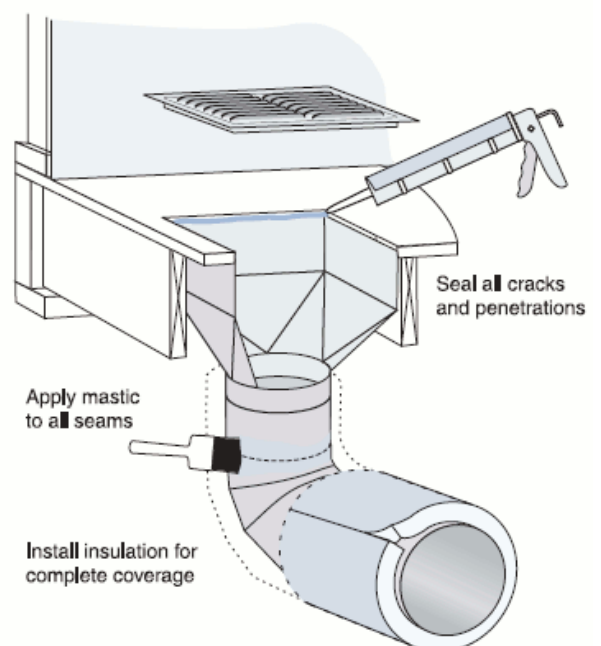
Remove existing duct insulation, tape and seal duct joints and add new duct insulation.

•What are the potential energy savings (\$) by reducing duct leakage to <5%?	\$	729
•How much CO2 greenhouse gas (lbs) will this save?		3,146



photo of home's ducting, wrapped in fiberglass; notice dark dust spots

BOOT AND DUCT CONNECTION HIGHLIGHTS



VI. Energy Assessment Observations

Water Heating

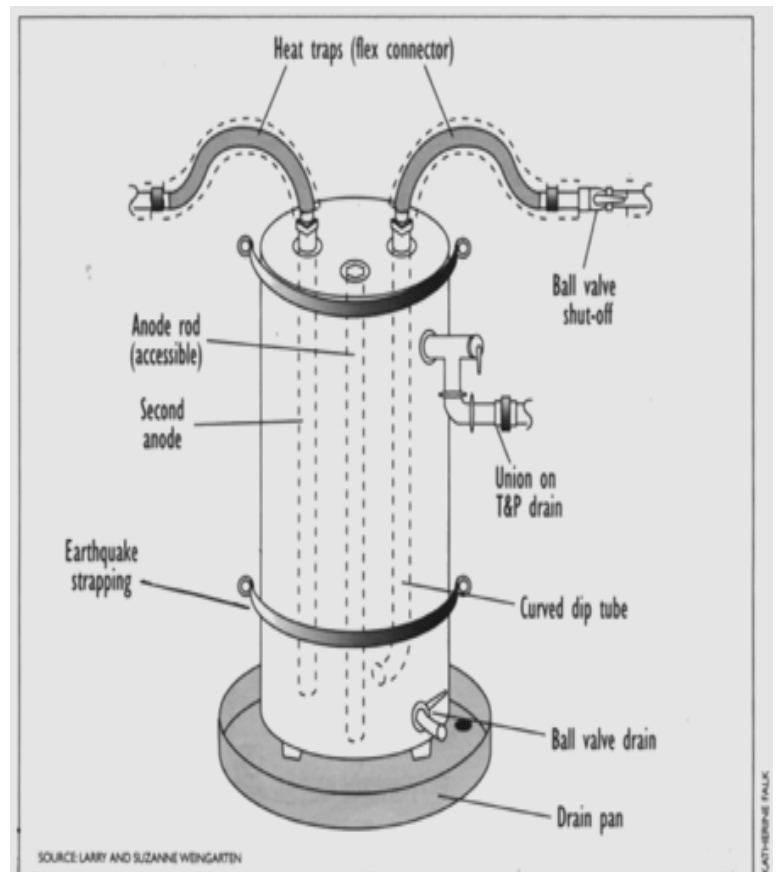
•What did we observe in your home?

<u>Brand</u>		<u>Energy Source</u>	<u>Temp setting</u>
Reliance		Natural Gas	130 deg
<u>Hot water pipes insulated?</u>	<u>Overflow pan installed?</u>	<u>Seismic strapping exists?</u>	<u>Size (gallons)</u>
Yes	No	Yes	30

•What measures can be taken to reduce your water heating costs?

Reduce the temperature setting to 120°F, Install overflow pan to prevent potential flooding, ,

proper water
heater
installation



VI. Energy Assessment Observations

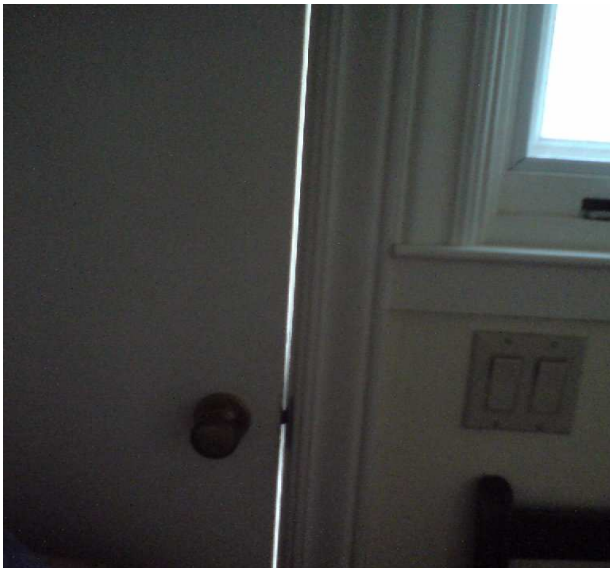
Doors

- Why is DOOR leakage important to you?

Weatherstripping your doors involves sealing the gaps in their four edges. These gaps are often a cause of important drafts and higher air conditioning and heating bills. Also, a safety concern if combustion equipment (water heater, furnace) is located in the unconditioned areas being sealed off by the door.

- What measures can be taken to reduce air leakage at doors?

Install weatherstripping around the door and at the bottom of the door to stop air leakage



Photos of air infiltrating thru doors, exterior door at bath shown



Photos of air infiltrating thru doors

VI. Energy Assessment Observations

Windows

- Why is WINDOW air leakage important to you?

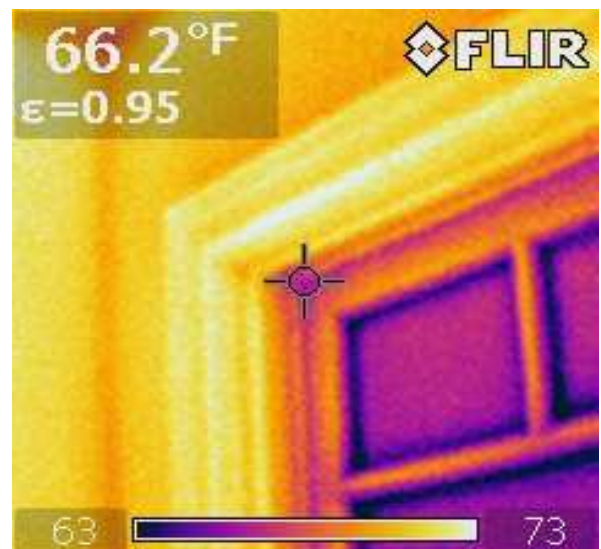
Operable windows may be causing drafts and air leakage in your home. Small gaps in the parts of your windows are a cause of discomfort and energy inefficiency. Caulk and seal all window trim to stop air leaking. Add solar film to windows, films reduce up to 99 percent of the sun's ultraviolet rays and reject up to 79 percent of the solar heat that may otherwise come through a window

- What measure can be taken to reduce air leakage and improve the energy performance of the windows?

Windows are dual pane, wood windows. Thermal imagery revealed minor air leakage around the window frame, no action recommended.



Photos of window air leakage



Photos of window air leakage

VI. Energy Assessment Observations

Lighting

Retrofit existing lamps to CFL

•Why is LIGHTING important to you?

Replacing your lights with ENERGY STAR qualified lighting provides bright, warm light, but uses at least 75% less energy than standard lighting, generates 75% less heat, and lasts up to 10 times longer. To save the most energy and money, replace your highest used fixtures or the light bulbs in them with energy-efficient models. By replacing the five most frequently used light fixtures in your home with ENERGY STAR qualified models, you can save \$70 each year in energy costs.

Electronics

Recommendation: install smart power strips

•Why are home ELECTRONICS important to you?

Consumer electronic products are responsible for approximately 15 percent of household electricity use. Try using the shut-off switch on the power strip; when you don't, electronic transformers still use electricity, called Phantom Power. In the average home, 75% of the electricity used to power home electronics and appliances is consumed while the products are turned off.

Indoor Water

Recommendation: replace sink and shower aerators

•Why is INDOOR WATER use important to you?

By making just a few small changes to your daily routine, you can save a significant amount of water. New and improved high-efficiency toilets use less than 1.3 gallons per flush. Replace aerators at sinks and showers with WaterSense labeled models (2.2 gpm for sinks, 2.5 gpm for kitchen sink, 2.5 gpm for showerheads). The average washing machine uses about 41 gallons of water per load, to achieve savings, wash only full loads of laundry or use the appropriate load size selection on the washing machine.

VII. Next Steps

Let our team provide the expertise and professional experience to retrofit your home with the energy improvement recommendations in this report. Planet Orange Property Services is a full service general contractor. California Contractor License # 938022.

Enclosed is a work authorization with the recommended solutions for your home as listed in Section II - Energy Summary.

Planet Orange is available to guide its customers thru the energy efficiency rebate process from your local utility company. Ask Planet Orange to help guide you thru the process - we're here to help!

The Home Energy Assessment was prepared with a custom software application created by Patrick Aranda. The software uses techniques and building load calculation algorithms as outlined by the US Dept. of Energy and they conform to Home Performance with Energy Star standards.

Thanks again, we look forward to working with you.

Patrick Aranda

BPI Building Analyst, Build it Green GreenPoint Rater