

Home Performance Energy Assessment Report & Recommendations



Sample Report

Bonney Plumbing, Heating & Air
Home Performance Division

3906 Kristi Ct
Sacramento, CA 95827
916.444.0551
www.BonneyPlumbing.com



SAMPLE

February 17, 2011

Sample Report

RE: Your Home Performance Energy Assessment

Dear Ms. Home Owner,

As a follow-up to your recent Home Performance Energy Assessment, our staff has prepared the attached results summary and explanation of the data collected during your in-home diagnostic. You will also find recommendations for energy-saving, comfort and air quality improvements appropriate for your home.

The recommendations are custom-designed to fix the causes of discomfort and excess energy use in your home. Although the improvements described are designed to work together, please let me know if you would like to discuss alternatives to any of the suggested improvements. You are welcome to contact me at the number and address on the cover page.

Thank you for this opportunity to improve the comfort and quality of your home.

Best regards,

Bill Horbaly
Heating & Air Operations Manager
Bonney Plumbing, Heating & Air

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Client Comments Regarding Energy and Comfort Concerns

- Interested in overall energy consumption issues
- Concerned about HVAC system
- Concerned about high energy bills

About the Bonney Home Performance Energy Retrofit

You should feel comfortable in your own home. However, your home may have construction or design defects that cause you to spend extra money in an attempt to maintain that comfort.

You can improve the comfort of your home, address air quality issues and lower your energy bills at the same time. The benefits of a Bonney Home Performance Energy Retrofit are beneficial in many ways. Our goal is to help you understand and prioritize the energy and comfort improvements possible in your home. Bonney's North American Technical Excellence (NATE) certified employees are led by our Building Performance Institute (BPI) certified Building Analyst to ensure that the improvements are installed properly and perform as expected.

The Energy Assessment

Instead of offering an inadequate quick fix, our Bonney Home Performance Energy Assessment uses a comprehensive whole-house approach to identifying and correcting comfort and energy efficiency problems in your home. We employ building science principles and use sophisticated diagnostic equipment to detect the cause of home performance related problems. This systematic approach avoids the guesswork typically involved with contracting and allows our professionals to address your home's performance issues accurately.

This Assessment Report summarizes test results and explains technical terms and concepts. The report also includes a list of improvement recommendations and costs to help you determine the improvements that best fit your needs.

It is important to note that normal usage patterns determine the calculations of estimated savings. Your particular lifestyle affects the amount of energy you use in your home. For example, the temperature at which you set your thermostat will cause your heating and air system to run more or less. If you are a person who uses your heating and air system frequently, you will see a substantial savings with the recommended retrofits. If you currently do not use your system frequently, your savings will be less. In fact, the lower your energy usage, the less accurate our projected savings will be. Nonetheless, you will still benefit from a healthy, comfortable, energy efficient home.

The Energy Retrofit Proposal

When you are ready, Bonney Plumbing, Heating & Air will perform the recommended improvements. Specific training allows our employees to use the best practices and top quality materials in all work done at your home. We participate in the national Home Performance with Energy Star program incorporating BPI standards. Bonney is a member of the California Building Performance Contractor's Association (CBPCA). The CBPCA performs occasional spot checks and verifications on the work we complete—so you have the added assurance of independent quality review. After the recommended home performance retrofits are completed, you can expect immediate improvements in comfort, air quality and energy efficiency.

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EVALUATION RESULTS / RECOMMENDED IMPROVEMENTS

Envelope Leakage and Mechanical Ventilation

The diagnostic showed that your home’s envelope is very loose allowing 142 CFM (cubic feet per minute) of air to leak out of your home. This means that the entire volume of air in your home is replaced by unconditioned air every two hours and fifteen minutes (that is 44% air changes per hour or ACH). The Building Performance Institute suggests 25% - 35% ACH for healthy natural airflow. Because of the leaky diagnostic number obtained, it is likely that additional sealing will make a substantial difference to your energy usage. (see the “Air Leakage Summary” table below).

Fresh air is an important part of a healthy home. The air that is leaking out of your home is replaced by unconditioned air that can enter in a way that can pollute the air. For example, air from an open window is fresh and healthy. Yet, if the air is passing through old insulation in walls or attic, it may bring in dirt, dust mites, smells from rodent droppings, etc... The best way to bring in air is through a controlled filtered source that offers balanced ventilation. With air sealing, it is likely that ventilation will be required in your home. (See Recommendations below).

Air Leakage Summary

	Blower Door at CFM ₅₀	Natural Ventilation CFM _{Nat}	Natural Air Changes per Hour
Measured Envelope Leakage	2445	142	44%
Recommended Envelope Leakage ASHRAE	1926	112	35%
Recommended Envelope Leakage BPI	1686	78	25%

Recommendation: Additional Sealing

We recommend that additional air sealing be performed to improve the comfort and health of your home as well as reduce unnecessary energy loss. When leaks are properly sealed, less air escapes through the thermal boundary, increasing indoor comfort and decreasing the amount of energy wasted when heating and cooling your home. Air sealing also helps prevent moisture problems, including mold and mildew, peeling paint, and structural damage in walls and building cavities.

We use a variety of materials and techniques to eliminate air leaks, including sealant foams, rigid baffles, caulking, weather-stripping, and rigid insulation. Areas we seal include penetrations through the sheet rock walls. These penetrations exist at light fixtures, plumbing fixtures, heating and air registers, bathroom fans, light switches and electrical outlets. (Please refer to the pictures starting on page 29.) With air sealing, it is likely that ventilation will be required in your home.

A thorough way to stop air loss in these areas is to apply spray foam insulation in your attic. Spray foam insulation stops air traveling through these penetrations. (See Recommendation: Spray Foam Insulation in the insulation section on page 11 for a thorough presentation.)

- *Potential Savings: 9.5% of Energy Costs, Approximately \$412 / year (Assuming spray foam insulation attic & crawl space w/ additional sealing)*

Recommendation: Balanced Ventilation

A Honeywell Heat Recovery Ventilator (HRV) provides a balanced ventilation system for your home. Balanced ventilation means that the same amount of fresh air is supplied to your home as stale air is exhausted so that a pressure differential is not created. As it does this, the incoming air is preconditioned, meaning that the incoming fresh air is adjusted to a temperature that is closer to your indoor air than the air outside. The preconditioning recovers approximately 60% of the energy contained in the air being exhausted. Furthermore, the HRV uses approximately 75 watts, less than a standard incandescent light bulb. Balanced fresh air ventilation through a Honeywell HRV is an effective and inexpensive way to provide ventilation to your home.

About Air Leakage

Most homes have unseen cracks and gaps in the building's thermal boundary that allow air to escape to the outside. These hidden leakage points are usually found in attics, crawlspaces, duct systems, and around floors, doors, and windows. Air leakage through the thermal boundary makes it harder to control indoor temperatures, and it is also a major source of energy waste. If you combine all the holes and gaps in a typical house, the amount of leakage can be the same as if you left a window or door wide open year-round. Your technician uses a blower door test to measure the extent of leaks in your home.

Sealing these leaks prevents heated air from escaping in winter and keeps cool air in the rooms during the summer. This also reduces the entrance of unfiltered air from the outdoors and the unconditioned spaces of your home (attic, space behind walls and crawlspace).



About Ventilation & Indoor Air Quality

The best way to keep the air in your home clean and healthy is to provide filtered fresh air from outside the home. Chemicals from cleaning products, allergens from animals, smells from cooking, gases from combustion appliances and many other items can all contaminate the air in your home. Continuous filtered fresh air supplied and exhausted through a Heat Recovery Ventilator (HRV) provides a safe, balanced solution. As well, the HRV recovers about 60% of the energy in the exhausted air, creating additional energy savings.

It is important to note that ventilators that cycle on and off allow for a buildup of contaminants before cleaning the air. Continuous operation is preferable for the best indoor air quality.



Duct Leakage & Duct Insulation

Another significant source of wasted energy is the ductwork. Properly insulating and sealing ducting will make rooms more comfortable, by allowing conditioned air to reach rooms more efficiently and by maintaining a better distribution of conditioned air throughout the house. Sealing and insulating ducts also reduces the energy requirements of your heating and cooling systems, thereby lowering your utility bills.

The duct leakage in your home measured at 78 CFM₂₅, which represents a duct leakage of 5.6%. Local utility standards consider duct leakage of 15% acceptable. However, 5% is preferred for energy upgrade retrofits. The duct leakage in your home is at the preferred level. It may be possible to reduce duct leakage further, but it could represent a substantial labor cost for a small return. Please see Measured Air Flow table below.

However, your ductwork has an insulation level of R6. Your ductwork is routed through your attic in such a way that portions of the duct insulation are compressed. This compression reduces the effectiveness of the duct insulation to a negligible amount in some areas. Considering that the temperature of a typical summer attic can reach 140 degrees, and the air in the duct work is about 55 degrees, there can be a temperature differential of almost 100 degrees. This huge temperature differential can create significant energy loss through conduction at the duct walls.

Room by Room Measured Air Flow				3.5 Ton System Suggested CFM	
#	Description	Measured CFM		Suggested CFM	
1	Entry Room	157	11.4%	TBD	
2	Dining Room	123	8.9%	TBD	
3	Kitchen	154	11.2%	TBD	
4	Living Room	153	11.1%	TBD	
5	Bathroom 1	32	2.3%	TBD	
6	Bedroom 1	106	7.7%	TBD	
7	Bathroom 2	41	3.0%	TBD	
8	Bedroom 2	87	6.3%	TBD	
9	Bedroom 3	125	9.1%	TBD	
10	Master Bedroom	253	18.3%	TBD	
11	Master Bathroom	72	5.2%	TBD	
Sub Total		1303	94.4%	TBD	
Duct Loss		78	5.6%	70	5.0%
Total		1381	100.0%	1400	100.0%
Per Ton		395		400	

Recommendation: Deep Buried Ducts

As an effective way to reduce energy loss through duct conduction, consider “deep buried ducts.” This process reroutes existing ducts so that they lay on ceiling joists across the attic floor. We straighten the duct to reduce restrictions and “pinch points”. Then, additional loose fill insulation is applied which buries the ducts.

The deep buried ducts save energy in three ways. First, duct insulation is increased to an effective value of R20, substantially higher than R6. Second, any areas where the duct insulation is pinched or restricted still have an effective insulation level of R20, instead of being an area of increased loss through conduction. Third, the additional insulation above the ceiling reduces heat transfer and convection currents between the living space and attic (see more details about insulation below).

- *Potential Savings: 5.7% of Energy Costs, Approximately \$234 / year (Projected with increasing insulation to R50)*

Recommendation: Spray Foam Insulation – Attic Only

A second approach to reducing duct conduction is to move the heat transfer barrier from the ceiling to the roof sheathing. It is important to note that by moving the thermal barrier to the roof rafters, the temperature difference between living space and attic is reduced from a high variance to only a couple of degrees which creates substantial benefits (see spray foam below). For the effectiveness of the ductwork, there are two advantages. First, the difference in temperature between the inside and outside the ductwork is reduced from almost 100 degrees to about 15 degrees. Conduction is reduced substantially. Second, any duct leakage does not send conditioned air to the outside, but back into the living space. As a result, energy loss from duct leakage is effectively eliminated. With air sealing, it is likely that ventilation will be required in your home.

- *Potential Savings: 7.5% of Energy Costs, Approximately \$306 / year*

About Air Flow in Duct Work

Duct work is an often overlooked but crucial ingredient of an energy efficient home. Poorly designed or installed duct work creates significant restrictions in air flow. The restrictions cause static pressure which reduce the effectiveness of the heating and air system. (Dirty filters also create restrictions. Change them frequently.) Air flow at the registers should cumulatively provide 400 CFM per Ton of air conditioning, which is the BPI minimum. For example, a 4 ton system should provide 1600 CFM of air flow when the measured amounts at each register are totaled. Reduced air flow reduces the efficiency and the life of heating and air equipment, which wastes your money.



Insulation

Your attic insulation was measured at R19 consisting of R13 fiberglass batts topped with loose fill insulation to a level of R19 in some areas. The insulation is in poor shape as it is covered in debris from a previous roof replacement. Furthermore, our infrared camera measured inconsistent coverage. According to EnergyStar.gov, attic insulation levels on our area should be between R30 & R60.

Your wall insulation is assumed adequate at 1987 standards. No obvious locations of missing insulation were noticed by a brief infrared camera inspection.

In the crawl space under your home, R13 insulation is dropping out of the netting that is holding it to the floor. As a result, the value of the insulation is diminished. According to EnergyStar.gov, crawl space insulation in our area should be between R25 & R30.

Recommendation: Additional Loose Fill Insulation in the Attic

Additional loose fill cellulose insulation to R50 would provide additional energy savings in two ways. First, the extra insulation will reduce energy loss due to conductive heat loss from living space to attic. Second, the loose fill cellulose will reduce the energy loss due to convection as air transfer is reduced, although minimally, from living space to attic. If loose fill insulation levels are increased, deep burying the ductwork should be included (see above).

- *Potential Savings: 5.7% of Energy Costs, Approximately \$234/ year (Projected with deep bury ducts)*

Recommendation: Spray Foam Insulation in the Attic & Crawl Space

Spray foam insulation is a very effective energy saving measure. Spray foam insulation applied to the roof rafters in the attic creates a semi controlled temperature environment in the attic. In other words, instead of a 50-degree or more temperature differential between attic and living space, the difference may only be 3 to 5 degrees. The benefit of this low temperature differential has several benefits as demonstrated below.

Spray foam insulation creates an air barrier that practically eliminates outside air infiltration. Temperature differentials between inside and outside spaces drive air, and therefore energy, through walls, ceilings and floors. Attics and crawl spaces are also considered outside spaces. As well as energy loss, air driven through attics, walls, crawl spaces and floors pass through old insulation, dirt, dust, and sometimes rodent droppings or mold before arriving in your living space. Therefore, when spray foam is installed at the roof rafters in your attic, this temperature drive is stopped and energy dollars are saved. Furthermore, poor quality air is no longer forced into your living area from uncontrolled locations, increasing the cleanliness and healthfulness of your home. With air sealing, it is likely that ventilation will be required in your home.

Additionally, insulation values of R50 are typical with spray foam insulation creating significant energy savings.

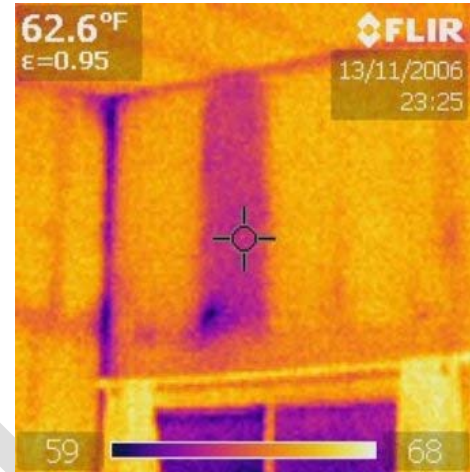
As noted above, with spray foam insulation at the roof rafters places all ductwork in a semi-conditioned area with additional energy saving benefits.

- *Potential Savings: 8% of Energy Costs, Approximately \$347 / year*

About insulation for your attic, walls, and ducting

Our infrared camera allows us to see how well your current insulation is performing. Darker colors represent cooler temperatures while brighter colors represent higher temperatures. Color differences can indicate where insulation is underperforming, and detect leaks in your ductwork and outside walls.

Attic insulation should be rated at R-38 or higher. Attic temperatures can rise to 140°F on summer days, so it is very important for your house to have adequate insulation between the attic and the rest of your house. Wall and floor insulation not only delay heat transfer between the indoors and outdoors, but also act as a sound barrier, allowing you to enjoy a more quiet home. Adding adequate insulation will upgrade your home's energy efficiency while improving your comfort.



Heating and Cooling System

Our analysis shows that your heating and air system is typical of new construction quality. This consists of a heat pump condenser and air handler that are considered “builder’s quality”. This equipment choice is usually installed for its initial low cost, rather than long-term energy savings.

Your heat pump condenser was manufactured May of 2008 and should last approximately 8-10 years. However, information on your air handler is difficult to find. It appears that your air handler is an older unit that was not replaced when the condenser was replaced. The air handler is of a lower quality and may be near the end of its life span. Due to the age of your air handler, an extended maintenance agreement, the Bonney Energy Savings Agreement (ESA), is highly recommended (see details below).

	Existing Heat Pump	Proposed Heat Pump
Brand:	Guardian	Rheem
Model Number:	GHGD42S21S1A	RPRL036JEC
Air Handler:	Single Stage PSC	Variable Speed
Stages:	One	Two
Cooling Capacity:	42,000 BTUH	36,000 BTUH
Heating Capacity:	42,000 BTUH	36,000 BTUH
Efficiency:	13.0 SEER / 11.0 EER / 8.0 HSPF	16.5 SEER / 12.75 EER / 8.75 HSPF
Energy Star Qualified:	No	Yes
Air Flow Configuration:	Horizontal	Horizontal
Manufacturer's Warranty:	5 Years Parts & Compressor Expires May/2013	10 Years Parts 10 Years Compressor

NOTE: The "Proposed" equipment assumes spray foam insulation, balanced ventilation, and sealing upgrades throughout the house to achieve the reduced heating and cooling need.

Recommendation: Smaller HVAC Equipment with Higher Efficiency

A new heating and air system provides improved reliability, comfort and energy efficiency. New systems have a minimum 10-year warranty indicative of increased quality and reliability. A Bonney heating and air system is installed to the highest quality standards, a crucial factor in the life of your equipment. The expected life span of high quality, properly maintained equipment is at least 20 years.

New systems also provide more comfort than older ones for several reasons. First variable speed fans in a new air handler, or furnace, provide the right airflow, as needed, for maximum comfort. Second, a new zoning system can provide the right temperature, to the right room, at the right time.

Third, new thermostats allow the control you need to keep your home at the temperature you want. Portable, wireless controls, internet access and smart phone apps all provide unprecedented comfort options. Fourth, new furnaces and air conditioners are available in two stages, meaning high speed to cool or heat your home quickly, or low speed efficiency when only a little cooling or heating is needed. It is like having two systems in one providing maximum comfort and efficiency.

New systems are also more efficient than your existing system. Variable speed fans use substantially less electricity to circulate the air through your home. A variable speed fan running at low speed uses about 75 watts compared to a 500-watt single stage fan found in older systems. Two-stage equipment allows the heating and cooling created to match the demands of your home more closely, reducing energy waste.

By applying spray foam insulation to your home's roof rafters, or deep burying ducts with additional air sealing and providing balanced ventilation, it would be possible to see energy savings by reducing the size of your heating and air equipment. Smaller units require less energy to run. A smaller, two-stage condenser that runs more efficiently could reduce summer and winter operations costs by 50%.

With reduced infiltration levels because of air sealing, we believe that your equipment will be oversized. A load calculation and proper duct design are highly recommended before you replace your heating and air system. These calculations are included in a Bonney heating and air equipment replacement.

- *Potential Savings: 9.0% of Energy Costs, Approximately \$365 / year*

Recommendation: Hydronic Heat

Hydronic heat is a high quality heat that would be an excellent supplement to a high efficiency heat pump system. Heat pumps work effectively down to approximately 40 degrees Fahrenheit outdoor ambient temperature. Below this temperature, electric resistant heat strips are used to heat your home. The electric heat strips are very expensive to operate. Hydronic heating uses hot water to warm your home's air and is much less expensive to operate than electric heat strips.

In a hydronic system, the water is circulated through a hot water coil in the air handler. The heated coil then heats the air blown over it and into your home. The water is then re-circulated back to the water heater. As a result, the efficiency of the water heater increases as the heated water does not sit in the tank, cooling. Therefore, it uses little energy and is very efficient.

The highly efficient tankless water heaters work especially well in hydronic systems. In fact, the tankless only produces the amount of energy needed to heat the water to the temperature required. Therefore, when the water is used to heat your home, the tankless heater will only fire enough to meet the need of the hydronic coil. As a result, only the amount of gas needed to heat the home is used; very efficient. In addition, no energy is lost due to hot water sitting in the tank. A Bonney hydronic system is an incredibly efficient system for maximum dollar savings.

As well, hydronic heat is a very high quality, comfortable heat source. A hydronic system heats the home slowly, using less energy, in most cases. Therefore, it works very well with energy retrofit homes that experience little temperature change.

- *Potential Savings: 11.5% of Energy Costs, Approximately \$466 / yr, (assuming water heating upgrade and heat pump upgrade)*

Recommendation: Service Agreement (ESA)

For any heating and air system, it is recommended that your system be maintained twice yearly. The Bonney Energy Savings Agreement (ESA) includes a Spring tune up to prepare your air conditioner for Summer service and a Fall tune up to prepare your furnace for the Winter. The tune-ups include safety checks and regular cleaning. A dirty system reduces your efficiency substantially. A layer of dirt as thin as “Saran Wrap” on the evaporator coil in your home can reduce your air conditioner’s efficiency as much as 22%. Keep your filters clean! The ESA will help extend the life of your equipment and decrease your operating costs.

- *Potential Savings: .05% of Energy Costs, Approximately \$21 / yr*

About heating and cooling systems

The heating or cooling created in your home should exactly match the amount of heating or cooling needed from day to day throughout the year. Too much heating or cooling created represents energy, and dollars wasted. Too little means an uncomfortable home.

A properly designed system includes equipment with variable capacity to best meet the needs of your home as the seasons change. Two stage equipment is the solution as it works in high speed or low speed as is needed for maximum efficiency.

As well, oversized equipment will satisfy the temperature load of the home quickly, causing it to “short cycle” turning on and off repeatedly. Because heating and air systems use extra amounts of energy when they start, their peak efficiency is maintained after running for 15 to 20 minutes. Short cycling will cause your system to always be in its lowest efficiency state which increases operation costs. A properly sized system will run longer than an oversized system.

New gas-fired heating systems should have an AFUE rating of at least 95%. The efficiency of central air conditioning systems and heat pumps is measured by its Seasonal Energy Efficiency Ratio (SEER)—the higher the SEER, the higher the efficiency. A SEER rating of at least 14.5 is recommended.



Water Heating

Your current water heater is a Kenmore Power Miser 8 natural gas, 50-gallon, open combustion, 40,000 BTUH, with an energy factor of .57. This unit was manufactured in May of 1996. The warranty expired in May of 2004. At 15 years old, it is very close to the end of its expected life span.

Installation of your water heater is of a poor quality and does not meet current code. Code and safety problems include the following. The drain pan is missing. The temperature and pressure relief drainpipe runs uphill and will not operate properly. The single wall ventilation immediately at the top of the heater requires 6" of clearance to combustibles, yet pipe insulation is within this area creating a fire hazard. It is unlikely that a permit was obtained when the water heater was installed. (Please see pictures starting on page 29.) A Bonney installation includes all code and safety upgrades.

Water heating normally accounts for 13% of a home's overall energy usage. It is calculated that your base water heating cost is approximately \$243 per year.

Recommendation: Solar Thermal

Solar electric systems get a lot of attention, but solar thermal water heating systems save 5 times the energy at 1/5 the cost.

A solar thermal water heating system utilizes a collector that is located on your roof. As the water in the panel heats up, it is circulated through a heat exchanger, which transfers heat to the water in your home. Storage tanks are frequently added to the system to best utilize the energy collected.

- *Potential Savings: 4.8% of Energy Costs, Approximately \$120 / year*

Recommendation: Tankless Water Heater

A tankless water heater only heats water as it is needed to the specific temperature selected. Water does not sit in a tank, slowly cooling only to be re-heated again. As well, it continues to heat as long as there is need; an "endless" supply. It is an incredibly efficient, very convenient way to heat your water.

When a hot water faucet is opened in your home, sensors detect the volume of the hot water required and the temperature of the incoming water. A calculation is then made based on these factors and the desired temperature you have selected on your control. The gas valve is opened only to the amount that is needed for the water to reach the necessary temperature. Therefore, if you need 15,000 or 150,000 BTUH, the tankless only uses the exact amount of gas needed; incredibly efficient.

- *Potential Savings: 2.5% of Energy Costs, Approximately \$62 / year*

Recommendation: Tankless Water Heater & Solar Thermal

For additional savings, solar thermal and tankless water heaters work hand in hand to provide an incredibly efficient water heating system. When stored water from your solar thermal system is not hot enough for your needs, the tankless heater has the ability to supplement with only the energy needed to meet your demand. For example, if the sun is able to heat your water to 80 degrees, but you need 120, the tankless heater will only provide enough heat to heat the extra 40 degrees. This system makes the best use of the sun, and the least use of natural gas for energy. With energy prices becoming more and more volatile, this system provides long term, inexpensive security.

- *Potential Savings: 7.3% of Energy Costs, Approximately \$182 / year*

About Water Heaters

Typical recommendations for improving the energy efficiency of your water heater include insulating your existing water heater or replacing it with a more efficient model, a tankless water heater, or a solar supplemented system. If your water heater is in the garage or outside of your home, pipe insulation is also recommended.

If your water heater is inside your home, a closed combustion unit provides additional safety. Air required for the flame is provided with outside air. As well, exhaust is directly vented out of the home. Both aspects of the closed combustion units reduce the risk of carbon monoxide poisoning.



Windows

Not only are windows a very important part of your home's aesthetics, they play an important role in a Home Performance Retrofit. Small leaks in old windows can add up to a large air infiltration issue, which can cause significant energy dollars wasted. As well, single pane windows and windows with high emissivity allow unwanted temperature changes through convection and radiation. These issues, which create high utility bills, can be resolved through the installation of new, Energy Star Amerimax windows. New windows are also highly desired by new homebuyers.

Your home has double pane, aluminum frame windows that experience high-energy loss due to infiltration and conduction. Replacing windows in your home would provide a substantial energy cost reduction.

Recommendation: Replace with Energy Efficient Windows

Bonney proudly installs Amerimax windows and doors because they are recognized by the National Fenestration Rating Council as being extremely energy efficient. The Ameriglass™ E2 Insulated Glass System features low emissivity glass coated with dual microscopic layers of silver, combined with TrueWARM® Structural Foam Spacer, and Argon gas fill to create a dual sealed glass unit with superior energy efficiency and long-term durability. As well, these windows provide maximum UV protection, superior condensation resistance, reduced sound transmission, and long-term durability. An industry leading lifetime warranty with window breakage protection is included in every Bonney window installation.

- *Potential Savings: 7.6% of Energy Costs, Approximately \$311 / year*

About Windows

Windows are normally a significant source of energy loss in the home through conduction, radiation and infiltration. They are three to four times less effective at stopping thermal transistion than walls. Even small leaks in windows can add up to very large energy losses. As well, metal and wood frames can cause heat to conduct quickly from inside to out or visa versa, increasing your energy needs. Single pane glass, and untreated double pane windows, can also transfer heat and cold increasing your bills.



Pool Pump

Your home has a standard efficiency, single stage pool pump in a standard installation. Your system has two pumps, one for filtration and one for the pool sweep. The pool piping uses ninety-degree fittings that increase head pressure and reduce pump efficiency. It is likely that your pool pump is oversized, wasting energy.

Recommendation: Variable Speed, Two Stage Pump

Variable speed, two stage pool pumps use 85% – 90% less energy than standard pool pumps. Pool pump usage can be as much as 9% of your overall energy usage, so savings in this area are substantial. As well, all Bonney pump installations include re-piping the pump installation for maximum efficiency. This re-pipe includes using forty-five degree elbows for lower head pressure. Bonney installations also include proper pump sizing for your system.

- *Potential Savings: 8% of Energy Costs, Approximately \$200 / year*

About Pool Pumps

Properly sized, variable speed two stage pool pumps are the most effective way to circulate water in your pool. Traditional pumps are oversized, single stage units that are poorly installed. Slight installation changes, as well as the advanced technology, make these pumps incredibly efficient for substantial savings. Short of replacing your existing pump, reducing circulation to 6 hours per day can have a significant impact on your energy usage as well. Pool pumps can use as much as 9% of your homes total energy cost. Efficiency in this area can have a significant impact on your total energy bill.



Urgent Plumbing Issues

During our home performance data collection, we noticed a number of urgent plumbing issues. Most importantly, under the bathroom sinks are corrugated angle stops. Amongst plumbing professionals, these are known as “white devils” because of their tendency to leak or burst. If these were to burst, while no one is home, water damage could be extensive and costly. As well, a low quality sink exists in the single sink bathroom. On this particular sink, the overflow portion will rust through causing leaks. It should be changed in your next remodel. (See pictures starting on page 29) Please see water heater section above for details concerning water heater issues.

Recommendation: Install Stainless Steel Angle Stops

New stainless steel angle stops provide long lasting reliability against leaks and breakage. Bonney can install stainless steel angle stops for \$120 each.

Moisture Mitigation

Your home has a moisture issue because of damaged stucco. (See pictures starting on page 29.) The exterior wall is stained and the potential for water entering the home is increased. If water is entering the interior of the wall, it is likely that mold and mildew are present.

Furthermore, if air sealing is performed, it is recommended that a moisture barrier is installed in the crawl space to prevent moisture from migrating into the home.

Recommendation: Repair Hole in Stucco

Combustion Appliance Testing

We have performed a comprehensive evaluation of your gas-fired appliances including measurement of Carbon Monoxide (CO) to ensure that potentially dangerous levels are not introduced into your home. The table below shows results for your home in parts per million (PPM) along with the maximum concentration of CO considered acceptable according to the Environmental Protection Agency.

Appliance	CO Concentration (ppm)	Maximum Acceptable CO (ppm)
Water Heater	Not Measured (in garage)	100
Heating System	Not Measured (heat pump)	100
Electric Oven	N/A	50
Gas Range	8	10
Ambient Air	0	9

About Carbon Monoxide

Gas fired appliances produce a variety of gases as a result of combustion. These gases must be vented out of the home in order to



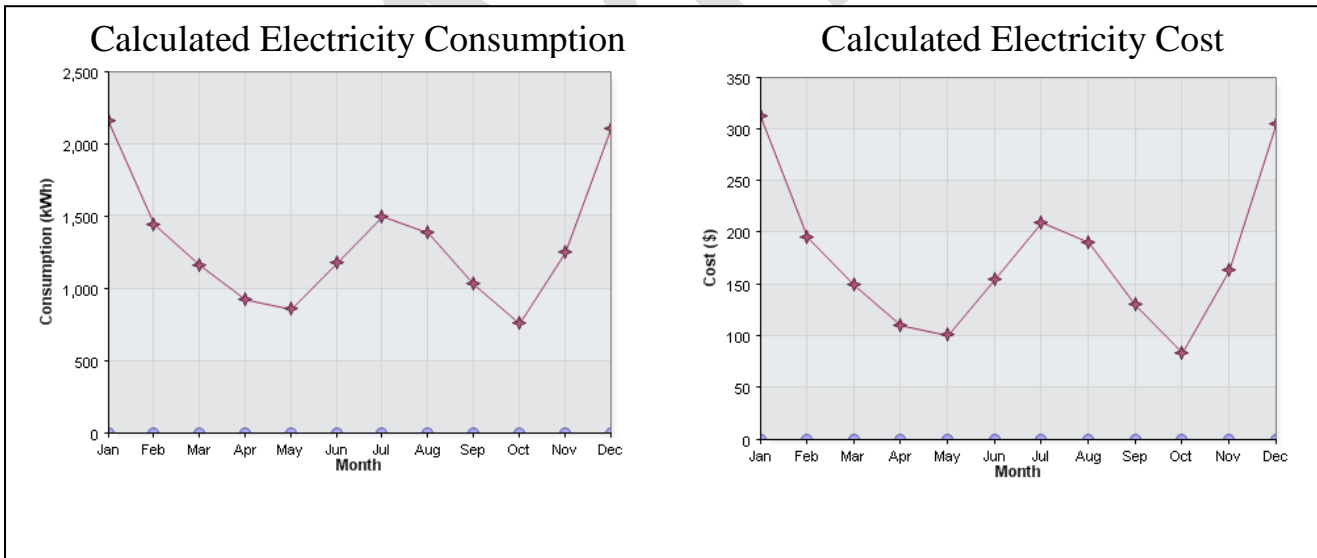
prevent build up to unhealthy levels. While all of the combustion products can be unhealthy, carbon monoxide (CO) is particularly dangerous, even deadly, at high levels. Several factors can create the accumulation of CO including appliances with improper fuel mixtures, broken heat exchangers or improper installation. Correct ventilation is crucial. If a home's natural infiltration is reduced, the need for proper ventilation increases. In a home performance retrofit, worst case scenario CO testing is performed before and after the improvements to ensure safety. As well, BPI requires at least one CO monitor on each floor of the house and any bedroom with combustion appliances.

Energy Bill Analysis / Projected Usage

	Baseline	Heating/Cooling	Total
Electricity	9,000 kWh	7,489 kWh	16,489 kWh
Gas	275 therms	0 therms	275 therms

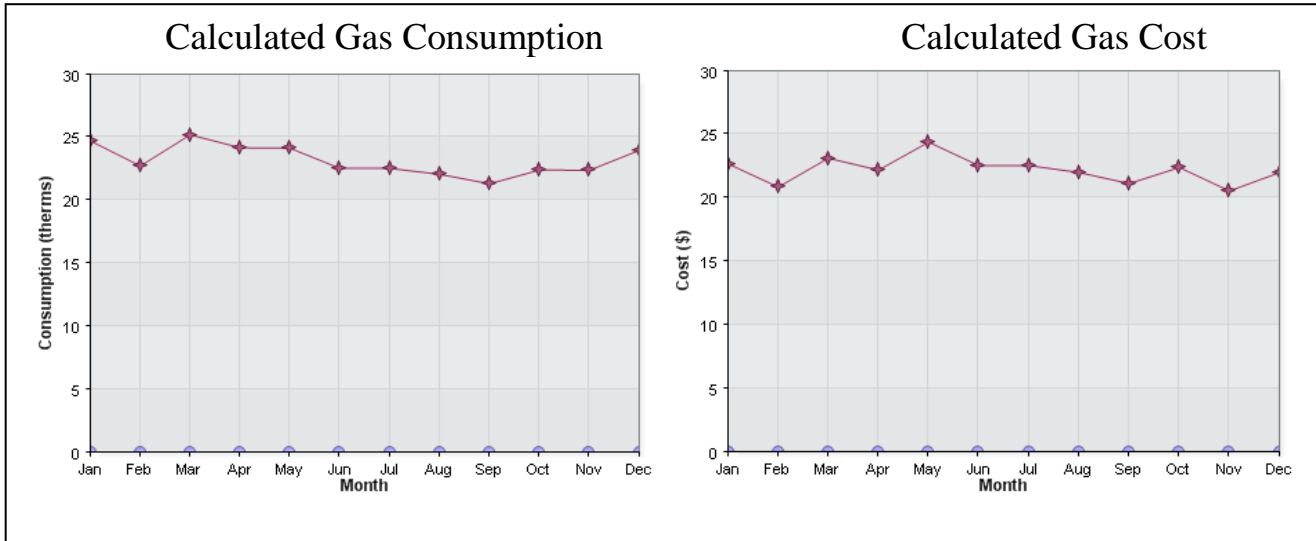
Baseline Electricity Use

Baseline electricity is a significant portion of your electric bill. This includes appliances that operate on a daily basis year-round, such as lighting, kitchen appliances, air cleaners, and pool/fountain pumps. Some of these appliances' usage can be easily improved or reduced. For example, you can replace incandescent bulbs with compact fluorescent bulbs (CFLs) that use 1/4 the power with 10 times the longevity, supplying the same amount of light. Summer time electric peaks show the addition of air conditioners.



Baseline Gas Use

In the same way that baseline electric use shows your normal electricity usage, the baseline gas level shows the gas used for water heating and cooking. Wintertime gas peaks show the addition of heating appliances like a furnace or gas burning fireplace.



	Baseline	Heating / Cooling	Total
Electricity	\$1080	\$1416	\$2496
Gas	\$276	\$0	\$276

Your energy usage is typical of homes with a heat pump for heating and cooling. The recommendations, including hydronic heat, will reduce this electrical load substantially.

Investment Proposal

Following are the key recommendations for improving the comfort, safety, and energy efficiency of your home. This proposal summarizes these improvements prioritized by energy dollars saved verses initial investment. The prices are for standard installations and may change for your specific application. Furthermore, these recommendations do not account for improved health and comfort benefits that can be substantial and should be considered when choosing your improvements. Your Home Performance Consultant can answer any questions you may have.

Individual Measures

- 1) Energy Savings Agreement (ESA) \$XX/yr
Potential Savings: Approximately \$21 / year
 Two heating and air equipment tune ups / year

- 2) Deep Bury Ducts and Cellulose Insulation to R50 (\$XX) – less credits: \$XX
Potential Savings: Approximately \$234 / year
 PG&E Insulation Rebate: \$216
 Bonney Rebate: \$250

- 3) Variable Speed Pool Pump (\$XX) – less credits: \$XX
Potential Savings: Approximately \$234 / year
 SMUD Rebate: \$100
 Two-Year Parts & Labor Warranty

- 4) Spray Foam Insulation at Roof Rafters (\$XX) – less credits: \$XX
Potential Savings: Approximately \$306 / year
 PG&E Insulation Rebate: \$216
 Bonney Rebate: \$500
 Limited Lifetime Warranty

- 5) Solar Thermal Water Heater Supplement (\$XX) – less credits: \$XX
Potential Savings: Approximately \$120 / year
 SMUD Rebate: up to \$1,500
 Federal Tax Credit: \$1,650
 Bonney Rebate: \$250
 25 Year Panel, Two-Year Parts & Labor Warranty

- 6) Spray Foam Insulation Roof Rafters/ Crawl Space(\$XX) – less credits: \$XX
Potential Savings: Approximately \$347 / year
 PG&E Insulation Rebate: \$216
 Bonney Rebate: \$500
 Limited Lifetime Warranty
(\$XX per month financed)

- 7) Spray Foam Roof, Crawl & Additional Air Sealing (\$XX) – less credits: \$XX
Potential Savings: Approximately \$412 / year
PG&E Insulation Rebate: \$216
Bonney Rebate: \$500
Limited Lifetime Warranty
(\$XX per month financed)
- 8) Heat Pump Replacement (\$XX) – less credits: \$XX
Potential Savings: Approximately \$365 / year
SMUD Rebate: \$500
Bonney Rebate: \$250
Fed Tax Credit: \$300
Two Stage HP Condenser & Variable Speed Air Handler
Ten-Year Parts, 10-Year Labor Warranty
(\$XX per month financed)
- 9) Heat Pump Replacement w/ Hydronic Heat (\$XX) – less credits: \$XX
Potential Savings: Approximately \$466 / year
SMUD Rebate: \$500
Bonney Rebate: \$250
Fed Tax Credit: \$300
Two Stage HP Condenser & Variable Speed Air Handler w/ Hydronic Heat
Ten-Year Parts, 10-Year Labor Warranty
(\$XX per month financed)
- 10) Tankless Water Heater w/ Solar Supplement (\$XX) – less credits: \$XX
Potential Savings: Approximately \$182 / year
SMUD Rebate: up to \$1,500
Bonney Rebate: \$500
Federal Tax Credit: \$3,600
25 Year Panel, 2 Year Parts & Labor Warranty on Solar
Twelve-Year Heat Exchanger, Five-Year Parts & Labor Warranty on Tankless
(\$XX per month financed)
- 11) Amerimax Window & Sliding Doors Heat (\$XX) – less credits: \$XX
Potential Savings: Approximately \$311 / year
Bonney Rebate: \$500
Federal Tax Credit: \$200
Lifetime Warranty, Glass & Screen Breakage Warranty
(\$XX per month financed)

- 12) Tankless Water Heater & Gas Line (\$XX) – less credits: \$XX
Potential Savings: Approximately \$48 / year
 Bonney Rebate: \$250
 Fed Tax Credit: \$300
 Twelve-Year Heat Exchanger, Five-Year Parts & Labor Warranty
 (\$XX per month financed)
- 13) Balanced Ventilation – Heat Recovery Ventilator (HRV) \$XX
 Install Honeywell TrueBreeze HRV VNT5150H1000
 Install Honeywell Prestige IAQ Thermostat to control
 Five-Year Parts & Labor Warranty
- 14) Angle Stop Replacement - \$120 each x 5 units \$XX
 One-Year Parts & Labor Warranty
- 15) Stucco Patch \$XX
 One-Year Warranty

Combined Measures

Ultimate Home Performance Package

Potential Savings: Approximately \$1,571 / year, 43% Energy Use

- ✚ Variable Speed Pool Pump
 - ✚ Tankless Water Heater w/ Solar Supplement
 - ✚ Spray Foam Insulation at Roof Rafters, Crawl Space & Additional Sealing
 - ✚ Window & Slider Replacement
 - ✚ Heat Pump System w/ Hydronic Heat
 - ✚ Balanced Ventilation Heat Recovery Ventilator
- Warranties as above

Guaranteed 40% energy cost reduction over baseline

Guaranteed SMUD rebate of \$4,000

Investment: (\$XX) – less credits, rebates & discounts: \$XX

(\$XX per month financed)

Supreme Home Performance Package

Potential Savings: Approximately \$1,159 / year, 33% Energy Use

- ✚ Variable Speed Pool Pump
 - ✚ Tankless Water Heater w/ Solar Supplement
 - ✚ Spray Foam Insulation at Roof Rafters, Crawl Space & Additional Sealing
 - ✚ Heat Pump System
 - ✚ Balanced Ventilation Heat Recovery Ventilator
- Warranties as above

Guaranteed SMUD rebate of \$3,000

Investment: (\$XX) – less credits, rebates & discounts: \$XX

(\$XX per month financed)

Deluxe Home Performance Package

Potential Savings: Approximately \$919 / year, 27% Energy Use

- ✚ Variable Speed Pool Pump
- ✚ Deep Bury Ducts w/ R50 Cellulose Insulation in Attic
- ✚ Solar Thermal Water Heating
- ✚ Heat Pump System

Warranties as above

Investment: (\$XX) – less credits, rebates & discounts: \$XX
(\$XX per month financed)

Investment Recommendations

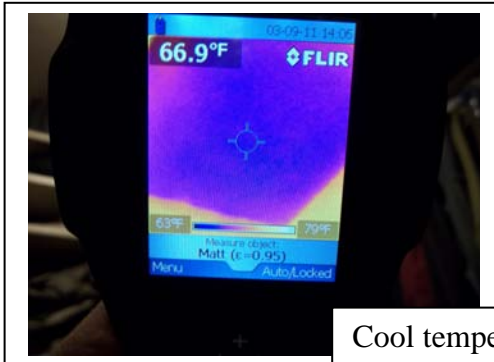
As noted above, the recommendations are listed in order of benefit verses investment. Even though we try to model energy usage as carefully as possible, the estimated savings are based on calculated typical energy usage patterns and may not reflect the actual savings on your utility bill. The potential savings are calculated for comparison purposes.

Each recommendation includes available credits and rebates. Even though the measure may qualify for a federal tax credit, your individual situation will determine the amount for which you are eligible.

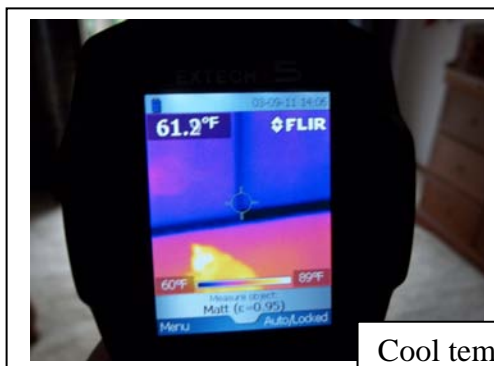
The SMUD Home Performance Retrofit Program offers rebates of \$2,000 - \$5,000 based on your overall energy savings. The minimum threshold is 20% energy savings. Therefore, it is highly recommended that the recommendations you choose meet the minimum 20% energy savings threshold. All of the combined measures packages meet the minimum 20% threshold.

Bonney Plumbing, Heating and Air, has a variety of financing options available for our customers. These options include 8.5% financing through SMUD, 9.9% financing through Wells Fargo, and six-month interest deferred financing through Wells Fargo. Other options are available if these do not fit your needs.

Diagnostic Images



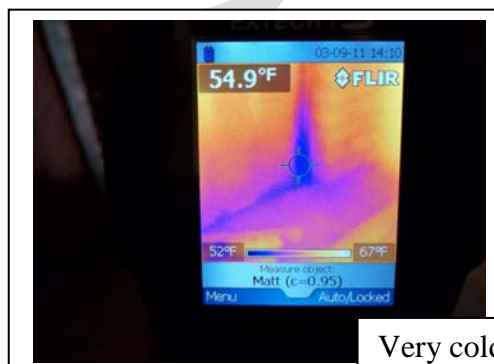
Cool temperatures at attic access require additional insulation.



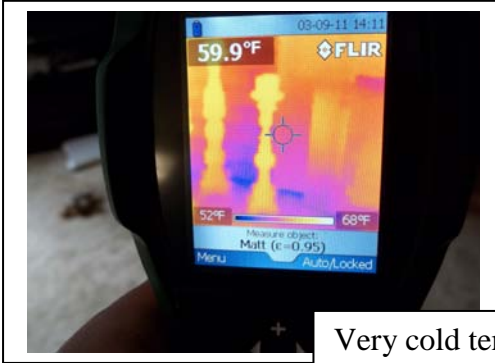
Cool temperatures present at aluminum frames on slider.



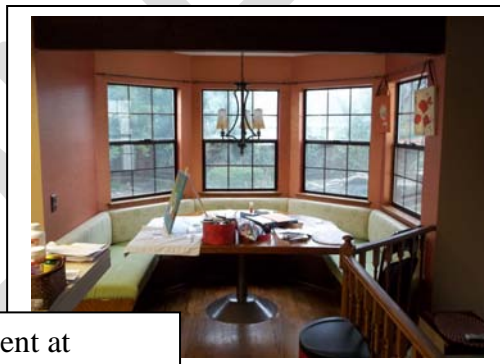
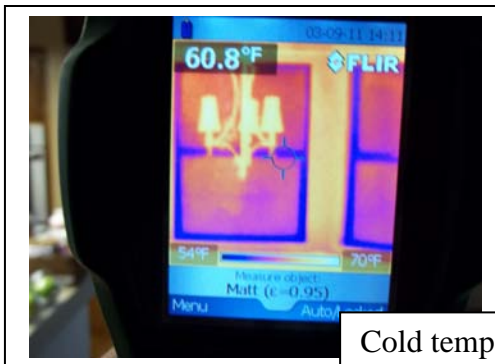
Cool temperatures in ceiling show poor insulation levels



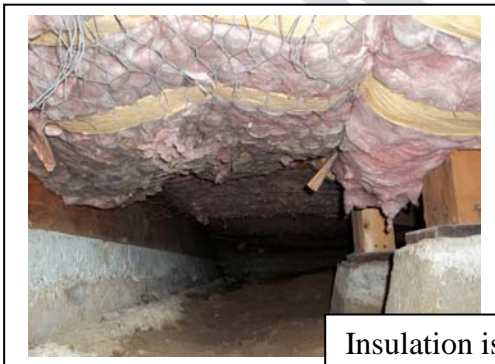
Very cold temperatures show air leakage around fireplace.



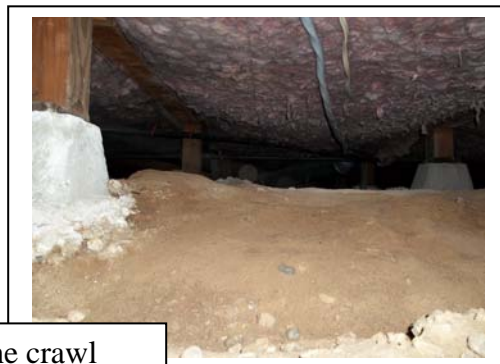
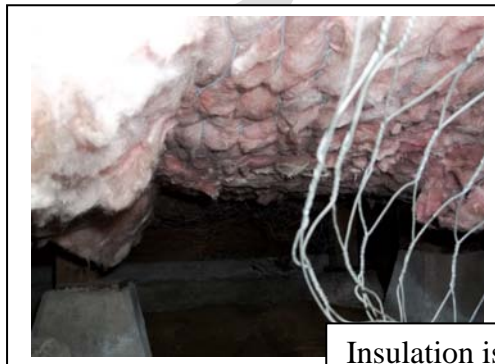
Very cold temperatures show air leakage around fireplace.



Cold temperatures present at aluminum frames on windows.



Insulation is falling in the crawl space under the house.



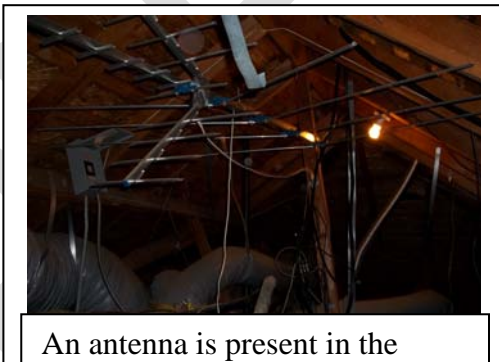
Insulation is falling in the crawl space under the house.



Debris is present in the attic from roof replacement.



Low insulation levels in attic.



An antenna is present in the attic.



Debris is present in the attic from roof replacement.



Debris is present in the condensate drain pan.



Debris is present in the attic from roof replacement.



Debris is present in the attic from roof replacement.



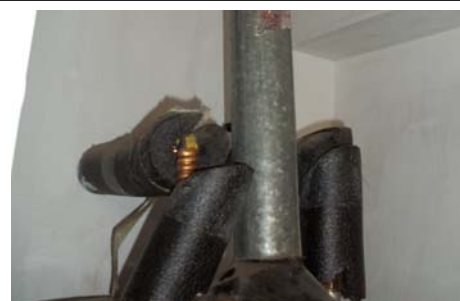
Sheet rock penetrations represent air loss. Sealing is required.



T&P drain line on water heater runs uphill inhibiting function.



The water heater is missing a drain pan as required by code.



Insulation is in combustion safety zone and is unsafe.



Corrugated angle stops have a tendency to leak or burst.



Overflow drain on this style sink has a tendency to rust through.



Corrugated angle stops have a tendency to leak or burst.



Corrugated angle stops have a tendency to leak or burst.



Damaged stucco is allowing water to leak past gutter with a potential of water entering wall causing mold, mildew, or other damage.



Insulation is blocking attic vents.

SAMPLE