Arizona Department of Housing

AZ WAP Audit and Inspection Process and Procedures Manual

Approved through 2.23.2027

DOE Approved on 12.21.2022

This document is meant to describe an overall procedure that will allow a Weatherization Assistance Program (WAP) Energy Assessor to conduct a thorough blower door/manometer guided diagnostic assessment of a single family site built or manufactured home in the WAP, as well as perform modeling via digital software, scope development. This procedure is in no way a substitute for formal building science training. This is a guide designed to complement individuals that have been properly trained by professional building science instructors. All testing to follow shall adhere to the Building Performance Institute (BPI) protocols with respect to function, results, and emergency thresholds and guidance therein.

This guide is illustrated using the 'DG-700' Digital manometer produced by the Energy Conservatory, and is meant to be used in conjunction with the SWBSTC Digital Manometer handouts provided by the South West Building Science Training Center. Data collected in this procedure will be the same with this model manometer as it will with the Retrotec or Infiltec versions.

There are a lot of elements that go into a proper home energy audit. This guide encompasses pressure diagnostics, visual inspections, computer energy modeling, scope development, and final inspections/QCI. The AZ WAP program allows you to perform work on a home based on a "Site Specific Audit" which includes modeling the home utilizing Arizona's approved energy modeling software. The following procedure should be conducted in all WAP homes regardless of priority lists or site-specific decisions.

Contents

There are two main data collection procedures when conducting pressure diagnostics on a home. First there are the tests that measure only the pressures created in the home using the installed equipment in the home. In other words, the actual blower door does not necessarily need to be set up. Only a few hoses and your manometer will be required for these tests. For the purposes of this guide, it will be assumed that the blower door is set up in the front door of the home, but the fan cover is on. The second procedure is when you have the blower door fan running, create a 50 Pascal pressure difference and measure against that known pressure. At no point should your blower door fan and ANY other exhaust fan or air handler fan be running at the same time.

This guide should be used in conjunction with the DG-700 Digital Manometer color handout produced by the South West Building Science Training Center.

Visual Inspections following BPI protocol, should always occur prior to ANY pressure diagnostic testing to ensure all conditions are safe to performing pressure diagnostic testing. This will be explained in further detail later in this document.

STEP 1 - SETTING BASELINE & SETTING HOUSE INTO BASELINE MODE

Baseline Mode is having all exterior doors and windows closed, and all interior doors open. All exhaust fans and air handlers turned off. Your goal is to separate the indoors from the outdoors. During an initial assessment, you are simply collecting data. You should not fix anything to set up for pressure testing. If there is a manual or mechanical damper connected to an evaporative cooler, or to the duct work that separates an evaporative cooler from an air conditioning (AC) system, you should close it. If no damper is present, then that is how that house has been operating and your initial test data should reflect that. In the case of a doggy door, you should fasten it closed with some painters tape or an available cover manufactured for the door. It is important to maintain your "Adjusted Baseline" throughout all of the testing until you have completed the "CAZ" test. If you accidentally lose the "ADJ" under the "A" channel window, you must reset the baseline on your gauge before conducting a CAZ test.

Once the home is set up, follow the directions on *fig. 1. Setting Baseline*

- You should have a hose to the outside on your channel A 'Ref' port.
- All other pressure ports should be open.
- You will be monitoring numbers in the A channel window.
- Press "Baseline"
- Press "Start"
- Wait for the number in the A channel window to settle and lock on a number (approx. 30 seconds)
- Press "Enter"

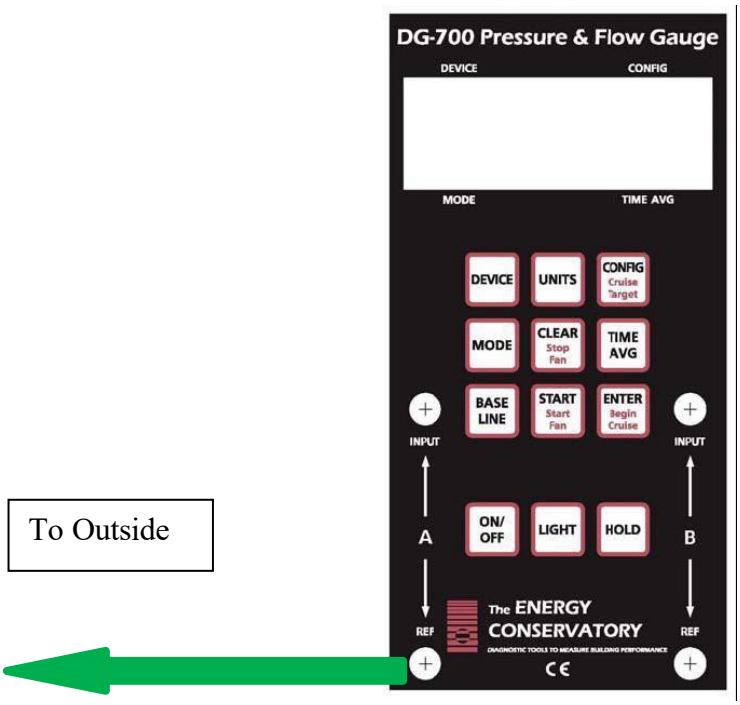

FIG. 1

NOTE: Baseline is not intended to compensate for wind in any way. It is simply looking at the natural pressure between the inside of the home *With Reference To* the outside. You should not attempt to do a Baseline on a windy day as inaccurate numbers are highly likely.

STEP 2 - DOMINANT DUCT LEAKAGE

Your next test will be to determine the “Dominant Duct Leakage”. Refer to Fig 2

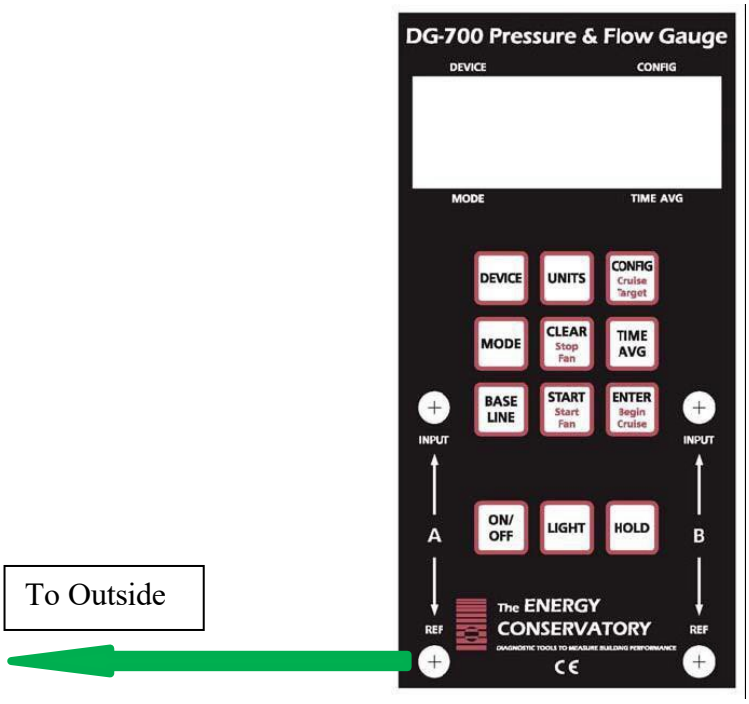

FIG. 2

You should notice that nothing is changing with how the manometer is set up, and nothing is changing with how the house is set up. You will be pressing no buttons on your manometer.

- Turn on air handler. If you have multiple air handlers, turn one on and record the number, then turn on the second unit and record the number for both. Then shut down the first unit to record the impact only the second unit creates on the home, etc.
- Make sure air handler(s) are running at full speed.

NOTE: Some high efficiency heating and cooling equipment may have multi-speed fans. These need to be running at full capacity. This can usually be accomplished by setting the Thermostat to the lowest possible temperature setting for AC and waiting for 8 minutes, or the highest temperature possible for heating systems.

You are still monitoring the "A" Channel numbers. As the air handler accelerates to full speed, you will usually see a pressure appear on your manometer. While you do need to keep the number in mind for other tests coming up, for the purposes of the "Dominant Duct Leakage" test, the positive or negative is the more important piece of information.

A positive pressure implies that you have more leakage on the RETURN side of the duct system than the supply side.

A negative pressure implies that you have more leakage on the SUPPLY side of the duct system than the return.

NOTE: This test does not show either side as being leak free. Just that one side may be leaking MORE than the other. If you see no pressure changes at all, there could be several things to consider.

1. You may have left a window or door open to the outside. Double check this first. And if so, close it and start over from "Setting Baseline"
2. You may have left the cover off of your blower door fan. If this is the case, cover the fan and start over with "Setting Baseline"
3. Your duct system may be leaking EQUALLY on both the return and supply sides, and that will be determined later in this procedure.
4. Your house may have excessive shell leakage and that will be determined later in this procedure.

Record your "Dominant Duct Leakage" number and specify if it was a negative or positive number. Record this data for each Air Handler Unit (AHU) working alone and in combination with other AHU's operating.

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1=-0.3

1+2= -1.3

2=-1.0

Note that both Air handlers must be running for the next test "Room Pressures" and these numbers will have an impact on your CAZ procedure.

STEP 3 - ROOM PRESSURE TESTING

This test is designed to see what happens to the pressure balances in the home when interior doors are closed. **This test only applies to rooms/homes with forced air systems. Houses with only Evaporative Coolers and no forced air ducted systems, ductless AC and heating units/systems, do not require room pressure testing.** Refer to Fig 3.

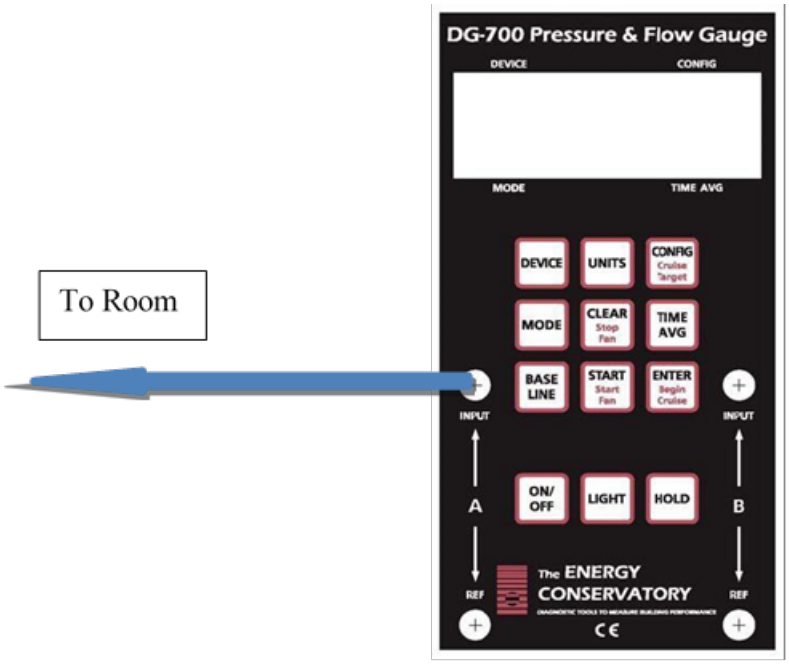


FIG. 3

You will be testing various ROOMs with reference to INSIDE.

For a room to qualify for a room pressure test, it must have a supply register, and / or a return register and / or an exhaust or supply fan and a door. This includes bathrooms and laundry rooms, for the purpose of CAZ testing.

The procedure for this test is to perform all room pressure testing clockwise from the blower door. If your door is set up in the front doorway, you would look at it and walk to your right hand side and test the first qualified room you come too. All interior doors should be open, with the exception of the room being tested, when performing this test.

- Place 'INPUT' pressure hose a few feet into room.
- Close door. Record pressure number and if it is positive or negative.
- Open the door and move to the next room, following the same process.

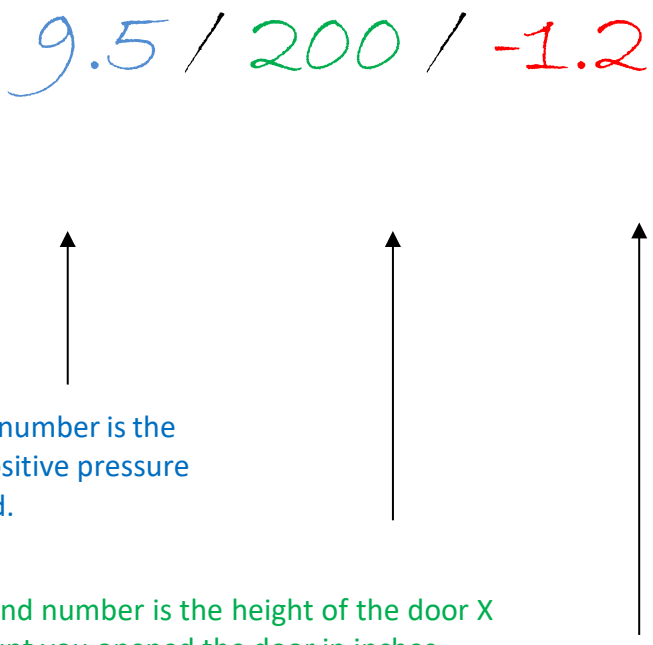
The Arizona WAP dictates that no room should exceed +/- 3 Pascal's of pressure. If your room DOES exceed 3 Pa, the next step is to determine what it will take to alleviate the pressure. You can do this by cracking the door open slowly until the pressure drops to within limits, then calculating the net free square inches you opened the door, by multiplying the height of the door in inches by how many inches you cracked it open.

EXAMPLE: If my manometer reads 9.6 Pascal's and I cracked the door two and a half inches to get the pressure down under 3Pa. I would measure the Height of my door, in this example, 80 inches and multiply that number by 2.5. That would let me know that this particular room needs approximately 200 Square Inches of "Passive Return"

Conversely, if you are testing rooms with a supply register but no return system, and do not see a pressure exceeding 3Pascal's, that should be considered a flag for further investigation. For example: A low room pressure could indicate a crushed or disconnected duct, or maybe excessive shell leakage in that room. Once done with the actual room pressure, you may collect one more piece of information while at each room that is used for the next test. Once you have collected the room pressure and the amount of area needed to relieve that pressure, look around that room for any type of exhaust fan.

NOTE: A clothes dryer is an exhaust fan.

If you see an exhaust fan, turn it on, close the door and note the new pressure. If the room goes into a negative pressure, this is VERY IMPORTANT information for the CAZ test and should be noted. A good example of note keeping for this particular test would look like this.



This first number is the initial positive pressure recorded.

This second number is the height of the door X the amount you opened the door in inches.

The third number shows that there was an exhaust fan that created a negative pressure.

STEP 4 - "CAZ TEST"

NOTE: The CAZ test, as far as health and safety goes, is the single most important test an energy assessor performs. You MUST have a baseline on your manometer prior to performing this test. If you have no formal training in this area, STOP. You are not qualified to perform this test alone.

Refer to Fig. 4 – "CAZ Test" for manometer set up.

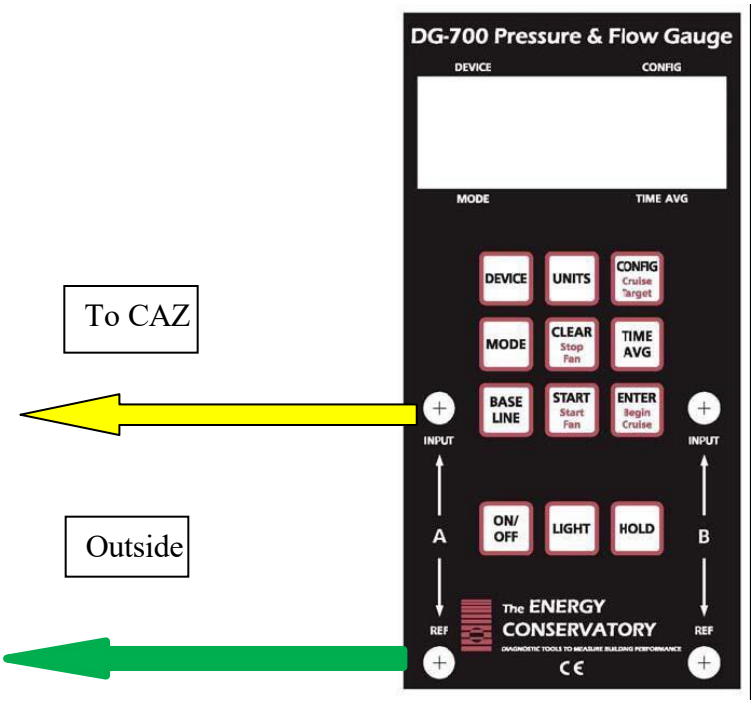


FIG. 4

The first step in a proper CAZ test is to set the actual CAZ into "Worst Case Scenario". In MOST cases this is easily accomplished with 3 simple steps involving information you have already collected to this point. If your Dominant duct leakage from step one is a NEGATIVE number follow these next three steps:

1. Turn on all exhaust fans. This includes the range hood, bath fans and the dryer.

Your air handler should still be running if you have followed every step to this point.

2. Close all interior doors that have a positive pressure, and open all interior doors that have a negative pressure behind them, any doors that appear to have no pressure behind them at all should be closed. (*It is very possible to have a bathroom with an operating exhaust fan where the door will still be closed because there is more supply air than is being exhausted by the fan. This was determined by your Room Pressure Tests)*
3. Run 'Input' hose to each individual CAZ WRT outside and record the number.

NOTE: If there is a door between the main body of the home and the CAZ, e.g.: Water heater in a closet. Test your CAZ with that door open, then check again with the door closed and record the GREATER negative number. For example, a reading of -3.9 is GREATER than -3.1 and therefore your CAZ TEST Number for that particular CAZ is -3.9.

IF your Dominant Duct Leakage Number from step 2 was a POSITIVE number, you should follow steps 1 through 3 above, but test each CAZ with air handler ON then again with air handler OFF to see which has the greater negative depressurization. NOTE you may have scenarios where multiple AHU's will have an impact on what creates "worst case scenario".

No home in the WAP program should have a CAZ zone with a pressure more negative than "- 3.0Pa"

The CAZ test should only be performed under the supervision of a trained professional.

STEP 5 - COMBUSTION SAFETY

Once your home is in "worst case scenario" that is when you will perform all "Combustion Safety Tests". These tests should only be performed by someone that has been professionally trained or certified.

Emergency problems (e.g., gas leak, ambient CO levels that exceed allowable BPI 1200 thresholds) will be communicated clearly and immediately to the customer and appropriate solutions will be suggested

FUEL LEAK DETECTION:

- An electronic gas leak detector shall be base lined outside in a clean air sample area before being brought into a CAZ area.
- Test all gas, oil or propane fuel lines at all connections and the entire lengths of any flexible piping for leaks per BPI 1200 guidelines. Any positive leak indications from an electronic detector should be verified with soap and water solution.
- Scope of work shall specify any repairs needed to correct fuel leaks of any kind.

COMBUSTION AIR REQUIREMENTS:

- Combustion air will meet *IRC 2012 Section G2407.5* guidelines at minimum, or your local code requirements (whichever is more stringent).
- Volume of air indoors to supply a device will be no less than 50 Cubic Feet per 1000 BTU/hr of input for all devices in the space. Air volume must be always accessible, and measured shell leakage of the building cannot be below 0.4 Air Changes per Hour (ACH).
- If outside air is to be brought into the CAZ, at a minimum you will supply two separate inlets. One that terminates within 12 inches from the ceiling, and another that terminates within 12 inches of the floor. If inlets are horizontal (through a wall) 1 square inch, Net Free area will be provided for every 2000 BTU/hr of input of all equipment in the CAZ, OR combustion air can be brought in vertically (From vented attic space) providing a minimum of 1 square inch, Net Free area per 4000 BTU/hr of combined input for all atmospheric vented appliances.

FLUE PIPE / EQUIPMENT INSPECTION:

- All flue pipes will be visually inspected to verify they are the right size per manufacturer's specifications.
- Slope a minimum of ¼" rise per foot of run.
- Are free from blockage or excessive damage, leaks, disconnects, or other safety hazards.

SPILLAGE TESTING:

- In worst case depressurization mode, all natural draft and fan assisted Category 1 gas appliances and oil fired appliances must be tested for spillage at the diverter or where applicable per ANSI/BPI Standards. If a device continues to "spill" flue gasses after 2 minutes, it must be tested again at natural conditions to determine if the failure is pressure induced or an issue with the device itself. Any failure of spillage testing requires specifications on how to mitigate the issue under any operating conditions and shall be addressed in the scope of work to be completed.

UNDILUTED CARBON MONOXIDE TESTING:

- Carbon Monoxide production levels must be measured in all combustion appliances. In atmospheric, natural drafts appliances, this will be performed at the exhaust ports before the gases can mix with dilution air. In Mechanically Assisted or Sealed Combustion appliances this test is performed at the outdoor termination of the flue pipe.
- No appliance can exceed 200ppm undiluted, or 400ppm 'Air Free' at steady state efficiency. The BPI 1200 reference chart should be referred to during this test.
- If CO levels exceed these limits in worst case conditions, they should be re-tested at natural conditions to determine if the failure is due to CAZ pressures or the device itself and appropriate actions to mitigate the problem should be added to the scope of work.

STEP 6 - EXTERNAL STATIC PRESSURE TEST

Refer to Fig. 6 for manometer set up.

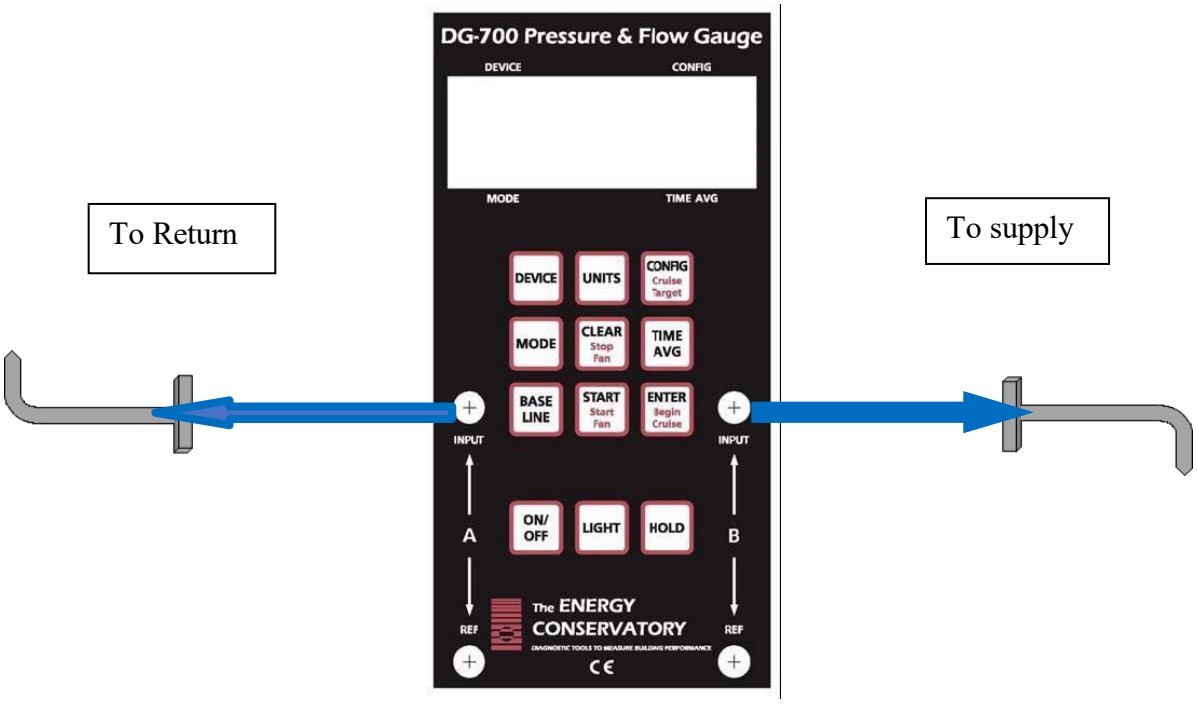


FIG. 6

The static test is meant to measure the static pressures created in the Air Handler itself when operating normally. There actually needs to be two tests performed. One with the air filter in place, and one with it removed and equipment operating without an air filter. In both cases, all interior doors of the home should be opened back up, and all the fans that were turned on for "Worst Case Scenario" should now be turned back off. Any supply registers that have been closed or covered should be opened up.

Static Pressure Test

These tests are performed by drilling two 5/16" holes into both the supply and return plenums as close as you can get to the air handler without drilling into an Air Conditioning coil. Insert a draft probe into each hole insuring that both probes are pointing *into* the air-stream. In other words, your probe in the supply plenum would be pointing TOWARDS the air handler, while the probe in the return plenum would be pointed AWAY from the air handler. To switch the units of measurement on a DG-700 simply press the "Units" button once. You will record a number (i.w.c) that looks similar to this: .5000 Repeat this test with the air filter removed and record that number as well. Most heating and cooling air handler equipment has a manufacturer's tag with the model number and serial number on it. Usually on that same tag you will also find the "Max External Static Pres. xxxx iwc"

Because you are testing pressures separately on both channels of your manometer you can simply add the two numbers together ignoring the "-"(Negative) sign. For example:

Supply = 0.350 iwc

Return = -0.410 iwc

Total TESP = 0.760

Static Pressure Test

Compare your number to the number on the tag. This will tell you if the duct system is operating at excessively high static pressures due to an undersized return system among other things. You will notice that the number increases with an air filter and even more with dirty filters. Both the supply and the return sides should be about Half of the max pressure recommended by the manufacturer (as close to equal as possible for a properly balanced system).

Alternatively, you can look up the "Blower Performance Chart" provided by the manufacturer of the air handler unit. This chart estimates the volume of air the unit is moving based on the Total External Static Pressure. ACCA standards recommend an air flow in air conditioning units to be between 350-450 CFM per ton of air conditioning capacity. It is recommended in hot dry climates that you get to the higher end of that range for optimum efficiency.

STEP 7 - INITIAL BLOWER DOOR

First step in preparing for an initial blower door test is to set the house back into BASELINE mode. *Note, you should still have a baseline on your gauge before conducting this test. If this is not the case, a baseline should be performed again prior to the blower door test. All exterior doors and windows should still be closed, and all interior doors should now be open, and exhaust fans OFF, from the static pressure testing. Your air handler can now be turned off. You should set all atmospheric combustion appliances in the home to OFF or PILOT/VACATION and place your vehicle keys on the water tank so that you cannot drive away without returning all equipment to operation positions.

As an energy assessor, you must now make a decision as to whether you want to "pressurize" or "de-pressurize" for your testing. Here are some considerations.

If any of the following conditions exist, you CANNOT depressurize:

- You find mold anywhere in the home
- You find Vermiculite insulation in the attic
- You suspect any friable asbestos is present in the home
- There is a fire burning in a fireplace within the home
- You suspect there may be lead dust from lead based paint in the home

You may NOT want to depressurize if there are any ashes in a fireplace within the home, however wet newspaper carefully laid out will usually hold the ashes down on a depressurization test. When looked at carefully, there are really only two benefits to depressurization testing.

1. The blower door is designed to give you access to the rings in the fan only when set up in Depressurization mode.
2. You can feel infiltration on your skin when the door is operating at 50pa.

Initial Blower Door

When you consider the dollar value of infiltration repair in some climate zones in Arizona, being able to feel infiltration is not really much of a benefit, but the potential to pull Mold spores, Lead dust, or Asbestos into the family's living space can be extremely hazardous. If you do choose to Pressurize with the blower door, check for 'Up-Ducts', and temporarily hold all exhaust fan dampers closed with tape. Make sure that the manual gates that can be closed are in fact closed, and the spring or barometric controlled dampers are temporarily held closed.

NOTE: In order to 'Pressurize' for blower door testing, you MUST turn the entire fan around. You CANNOT flip the flow reversing switch that is on some fans, this will give very in-accurate numbers.

To "Pressurize" see fig 7

To "Depressurize" see fig 8 for manometer set up.

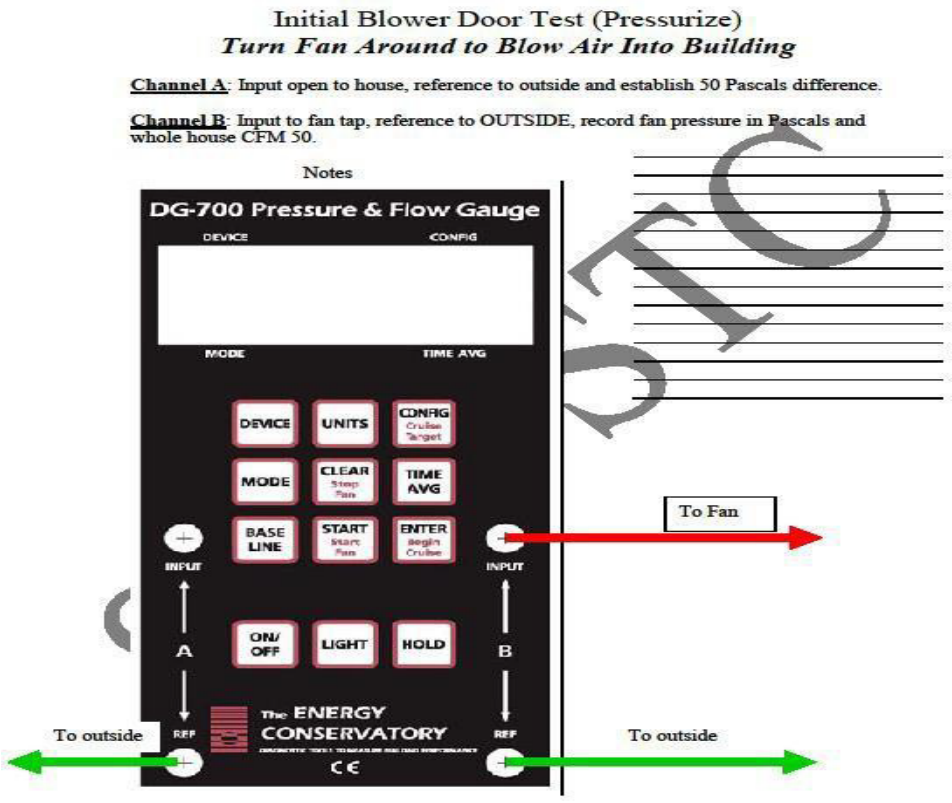


FIG 7

Initial Blower Door

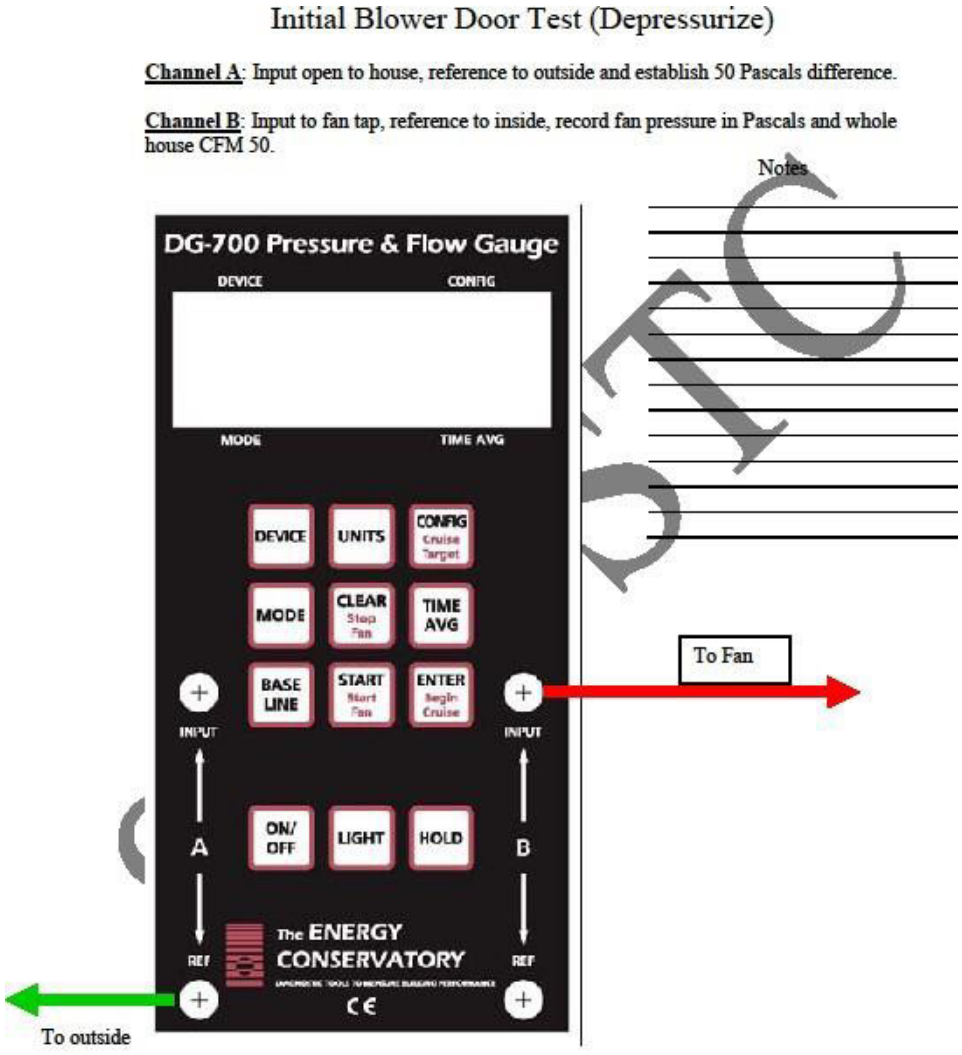


FIG 8

Initial Blower Door

Once you are all set up, choose which ring you feel will be appropriate for the home you are testing. There are a couple rules of thumb that many people like to use. The reality is that it is in fact just a guess at this point. Experience has shown that starting with the 'A' ring is ideal. To start you should turn your rheostat clockwise increasing the fan speed until you achieve 50Pa on your 'A' channel. This shows the HOUSE With Reference To Outside. From this point forward, all testing will be performed with the house at this 50Pa pressure differential with reference to the outside.

At this point a couple of things must happen. First you should verify that you have a minimum of 25Pa on your 'B' channel. If you do, you can skip ahead to the next step. If however you're 'B' channel is less than 25Pa, you will have to add another flow ring to your fan to increase the pressure inside the fan housing in order to produce an accurate CFM Flow number. Once you have 50Pa on your 'A' channel and a minimum of 25Pa on your 'B' Channel you will need to push the "MODE" button. This will switch the 'B' channel window from 'Pa' to 'CFM50'. You should also notice that at the top left hand side of that same window you will see "OPEN". This is referring to your fan configuration. If you have an open fan, then the number you see above 'CFM50' in the 'B' channel window is your CFM50 number. If you had to use a flow ring to get to this point you will have to tell the gauge which ring is in the fan. Press the "CONFIG" button and you will see the word "OPEN" scroll through the options available to the DG-700.

You would press the button once for "A" ring, twice for "B" ring and so on. If you accidentally skip past your ring, just keep pressing "CONFIG" and you will see it scroll back to its original setting.

The number you need here is pretty simple. It is a "CFM@50Pa" number. This is the whole house leakage number and is very important in weatherization for a few reasons. If you look carefully at the two windows in your manometer, you will see how this number is formed.

AIR SEALING BUDGET PROCEDURE

Let's say for example that the test reads:

2000CFM50

The "2000" is the number in the 'B' channel, and directly below that you will notice "CFM". In the 'A' channel, you should always see "50" and below that number "Pa". So when you break it down, you have 2000 Cubic Feet per Minute moving through the fan at 50 Pascal's of pressure.

The Arizona Weatherization Assistance Program does not utilize a "priority List". All measures must be modeled through approved Energy Modeling Software to determine the Savings to Investment Ratios (SIR). The WAP scope will be determined based off of the SIR from highest to lowest and shall incorporate approved Health & Safety measures as detailed in the State Health & Safety Plan.

STEP 8 - PRESSURE PAN TESTING

SEE FIG 9

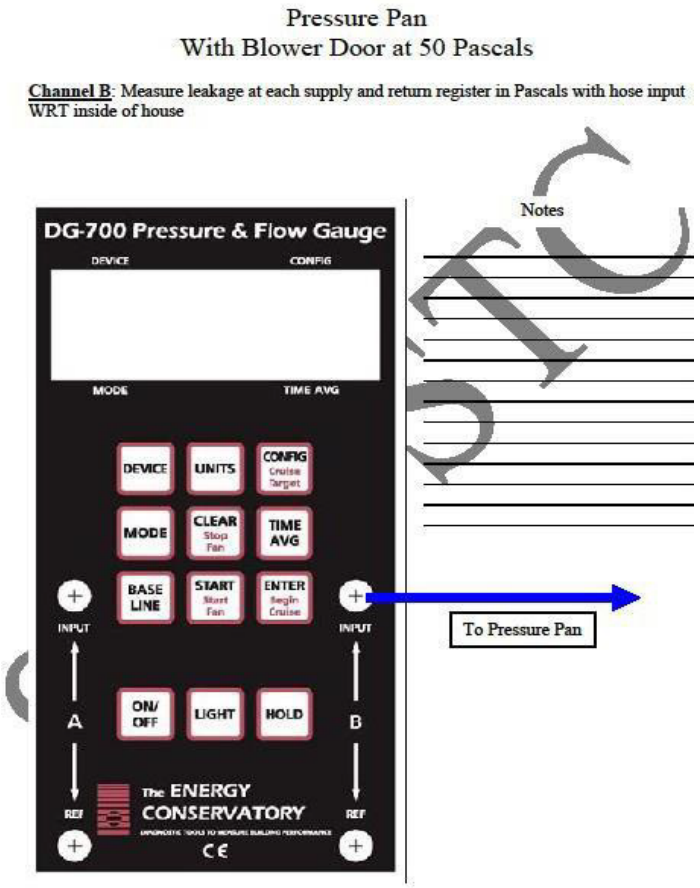


FIG 9

Pressure Pan Testing

In this test you are looking for the answers to two main questions.

1. Is the duct system leaking?
2. Where is the location of the majority of the leaks?

This test will NOT tell you how much leakage there is, only that there is leakage, and the approximate location of that leakage.

You will notice that at this point we have removed our green reference hose from the 'A' channel reference port. You are now able to disconnect yourself from the blower door by removing the pressure hoses from the manometer. DO NOT ADJUST THE RHEOSTAT. If left alone, the blower door will maintain the 50Pa pressure difference between the indoors and outdoors. Though you will no longer see it on your manometer, that pressure is there.

NOTE: This test only works if the home is at 50Pa of pressure. If you could not achieve that pressure you will have to use an alternative method to estimate duct leakage or temporarily seal shell leakage, or run a second blower door so that you can achieve 50Pa of pressure.

You must now hook up your pressure pan to the 'B' channel input tap with a pressure hose. Starting from the blower door, you will want to go clockwise around the house, ground floor first then second floor clockwise from the top of the stairs and record ALL the pressures you find in EVERY supply and return register. Any reading of 1.0Pa and over is an indication of a leaky duct system. The larger the number the closer to the leak you are in most cases. The goal of the WAP program is to see the duct system become as leak free as possible. Less than 1pa at all supply and return registers indicates a "relatively leak free system".

Note: If two registers are within 6' of each other in the same run, you should tape one register off completely and just record the pressure in the other register. If your pressure pan does not completely cover any register, it is acceptable to tape that register off enough to where your pressure pan will then completely cover it.

ESTIMATING TOTAL DUCT LEAKAGE

Estimating Total Duct Leakage to the Outside:

Because your priority lists, or a computer modeling software will require a total duct leakage measured @25Pa or @50Pa you can use the "Pressure Pan / Duct Sealing potential calculator" included in this manual to calculate a total leakage number based on average pressure pan readings collected in this test.

STEP 9 - ZONAL PRESSURES (aka. Pressure mapping)

See FIG 10

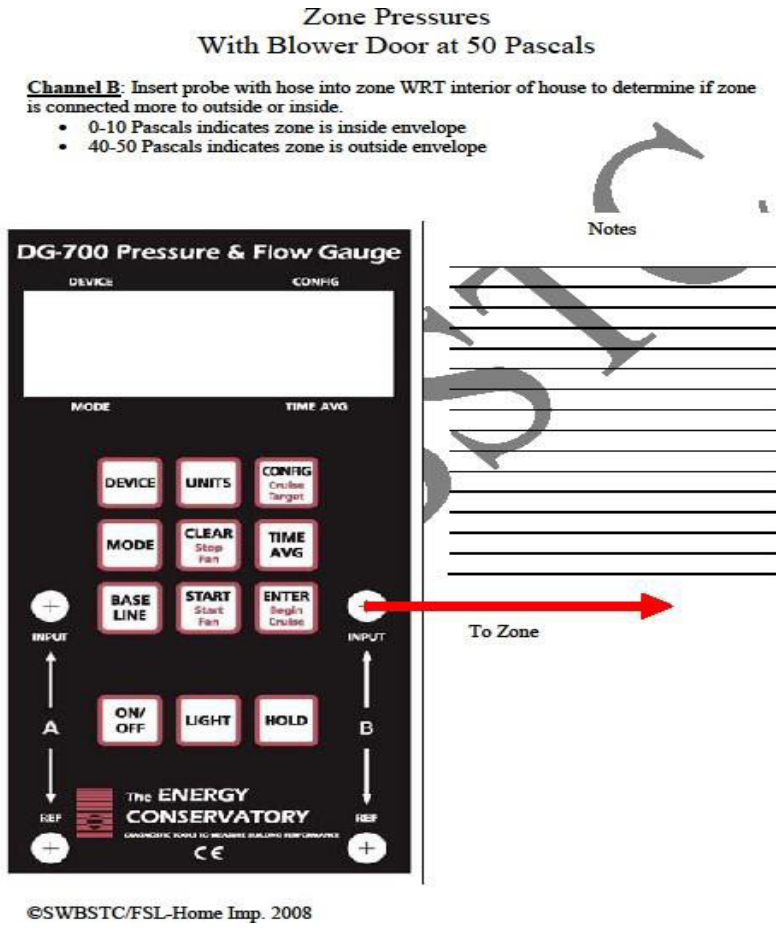


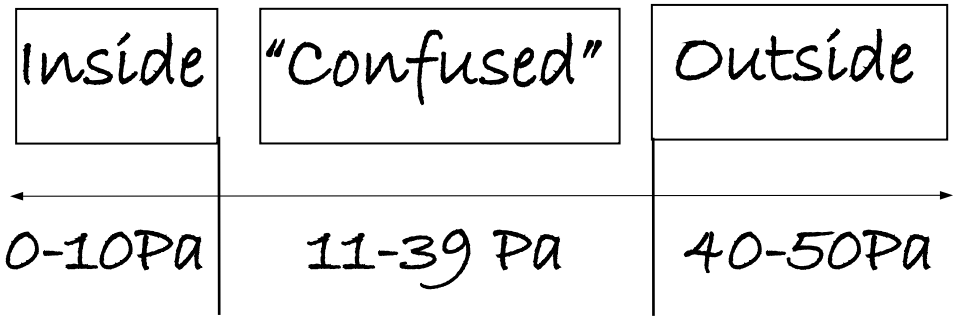
FIG 10

NOTE: House must be at 50Pa for this test to work properly.

The Zonal tests or "Pressure Mapping" are the tests that show the energy assessor where the *actual* air barriers of the home are located. Up to this point, we generally assume that the sheetrock on the inside of the exterior walls, the ceiling and the floor make up the surfaces that separate the inside conditioned air from the outside. Zonal tests will demonstrate where the air barriers are located in reality. You cannot visually *see* air barriers, but your manometer can.

Note: Although the WAP only requires you to *report* the zone that contains the duct system, that in no way implies that only one zonal test needs to be taken. A good energy assessor will take upwards of twenty quick tests or more and determine *exactly* where the actual air barriers are for better or worse.

When determining air barriers, there is a scale that tells you what is inside the pressure boundary and what is outside that boundary, and what is neither in nor out, but 'confused'.



With a pressure hose connected to your manometers 'B' Channel 'Input' Tap, and the other end attached to your pressure probe or pressure pan, and with the blower door still running the house at a 50 Pascal pressure difference with the outside. You can begin testing any areas you suspect may have faulty pressure boundaries as well as verifying areas where the pressure boundary should in fact be.

Good areas to always test are:

1. Drop soffits
2. Chases
3. Interior walls
4. Archways
5. Wet walls
6. Ceilings
7. Floors (if home is not slab on grade)
8. Interior walls alongside staircases
9. Build-outs around showers and baths

In general, what you are looking for is that anything that *should* be inside your home e.g. Interior walls and soffits are in fact inside the pressure boundary. Meaning you see readings of 10 or less Pascal's on your manometer. Whereas areas that *should* be outside the home e.g. Attics, attached garages and crawlspaces, are reading above 40 Pascal's on your gauge. If you have attended quality professional building science training, you will know that in direct contact with your pressure boundary should always be a continuous thermal boundary. That is easy to spot. It's the insulation. At ANY time, if you know there is insulation covering a plane, and a zonal test shows that plane is less than 40 Pascal's, that insulation is NOT performing properly. Conversely you may test a ceiling plane and get a reading of above 40 showing that the ceiling plane is an effective air barrier, but later on in your audit you see that the insulation is up at the roof deck, you are in fact looking at an un-insulated attic. The thermal boundary must be 100% continuous around the envelope of the building (exterior walls, floor and ceiling / roof deck) and the pressure boundary must be 100% continuous around the envelope, and most importantly, the pressure boundary and the thermal boundary must be in 100% contact with each other to perform properly. While your eyes can locate the thermal boundaries, only your manometer and blower door can locate the pressure boundaries. So take lots of tests. Find the pressure boundaries everywhere in that home and determine if it is in contact with the thermal boundary. That is why this test is also known as 'Pressure Mapping'.

The visual inspection should occur before any and all pressure diagnostic testing is conducted. Various Health & Safety hazards in and around the home may be exacerbated by performing pressure driven testing. The following process is a recommended general method for conducting visual inspections and may not encompass all issues that may be present in the various types of residential structures found in Arizona.

Pre-Site Audit Preparation

Prior to arriving at a residence, the client information should be reviewed, address and age of home should be verified, and agency BPI certified auditor or contracted service provider should ensure all required forms as detailed in the AZ WAP State Plan/H&S Plan are on hand or digitally accessible.

Upon arrival at the residence, the Auditor/Inspector should introduce themselves by providing the resident with their name and company affiliation and verify that the applicant or legally designated individual, is present and ready for the audit/inspection to take place.

Begin by conducting a brief visual inspection to determine project feasibility; home is free of pest infestations, imminent hazardous situations such as the smell of gas/fuel leaks, serious visible structural issues/concerns, hoarding, unsanitary conditions, etc.

Once this brief sensory inspection is complete, review all required initial paperwork with the applicant or legal designee and acquire signatures as/where required. Explain the initial audit process and ask questions pertaining to any safety concerns, energy concerns, comfort issues/concerns, etc. Explain to the applicant or legal designee that access to all locations throughout the residence will be required to conduct a full weatherization assessment. If access to all areas are not allowed, inform the applicant that the home may be deferred until a full and complete audit/inspection can be completed.

Exterior Visual Inspection

Begin by conducting an exterior inspection of all surfaces, accessible closets, water, electrical, and gas sources. Check for moisture concerns around the perimeter of the residence, and any possible slab/crawlspace concerns. Visual defects and damage to the exterior should be noted. At the same time all surface types, measurements, and orientation, should be recorded. Windows and doors should be measured and type/material should be recorded as well as orientation and condition of each. Be sure to note adjacent shading and document everything with pictures.

If accessible, access the roof to assess all areas. Note any damage or areas of concern as well as any noticeable potential drainage issues. Record type and condition of roof and note any recommendations that may be necessary to safely perform weatherization. Note any missing components such as “T-tops”, damaged vent stacks, etc. If rooftop HVAC/Cooler equipment is present, take pictures and record manufacturer information (including model and serial numbers if accessible/visible), and visually examine all duct, electrical, and plumbing connections. Note any concerns or issues if applicable.

If the residential structure has a crawlspace and it is safely accessible, record conditions and characteristics. Be sure to detail any concerns and/or hazards that are visible. List all information on the audit form and document with pictures to support items/issues found. Provide measurements for access point when possible.

Interior and Attic Visual/Sensory Inspection

Interior/Conditioned Space Visual Inspection

As with the process for pressure pan testing and to maintain consistency, work clockwise from the front door. Inspect all outlets, light switches, as well as all adjacent surfaces. Note any items/issues of concern within the conditioned space that may need to be included in the scope of work to address health and safety concerns applicable to WAP work.

Garage/Carport/Non-Conditioned Attached Storage Area Visual Inspection

Inspect pressure boundary separations from these unconditioned areas, verify seals/walls/partitions are functional and providing adequate pressure barriers from the conditioned space. **Zonal testing will assist in defining the connection to the conditioned space and where/what the pressure boundary is**. Make note of any necessary addition of weather-stripping/thresholds, or repairs of surfaces, to provide a consistent air barrier/pressure boundary. Proceed with checking all electrical outlets, switches, plumbing penetrations/lines for leaks, etc. Note any findings or concerns in your audit report. **Don't forget to document with pictures**.

Attic Visual Inspection

Identify best attic access location that will provide the least disturbance to the occupant and reduce any undue mess and/or contamination to the living space. Inspect access for dam and gasket (if applicable/within conditioned space). Check type of existing insulation. If vermiculite is present, assume it contains asbestos unless tested and proven otherwise. Refer to proper testing protocol as detailed by BPI. Locate and identify any abnormal build-outs/soffits, etc., that would disrupt consistent thermal and pressure boundary contact. Identify any top-plate penetrations or openings to the conditioned space. Note these with picture and written documentation.

Inspect any knee walls (if applicable) and determine if insulation is needed, strapping is needed, or if any knee wall insulation adjustment/re-work is necessary. Note these with picture and written documentation.

Identify any other anomalies or issues of concern and note them on your RDE/Audit Document. Again, document everything with pictures.

Crawlspace/Under Mobile Home Visual Inspection/Data Collection

When assessing crawlspaces and underneath mobile homes, safety should always be considered first. Assess the surrounding areas for hazards that may negatively impact the crawlspace. Assess the skirting or above-grade crawlspace walls.

Ensure you have adequate space in accordance with OSHA regulations. It is a good practice to have a "spotter" at the exterior of the entrance. Again, refer to OSHA confined space guidance.

Once it has been determined entry will be safe, move forward with the assessment beginning with the inspection of the structural members and type, plumbing penetrations, electrical runs, gas pipe, etc., located under the home. Note and picture document any concerns or hazardous conditions identified. Inspect the type and condition of the belly and insulation, note and picture document observations. If duct is below the belly (near or on the ground) make sure to document and make the proper recommendations for repair, replacement, or adjustment to ensure proper duct is installed and is adequate for ground contact if necessary.

Wall Inspection (All Types)

Determine type of wall construction, material on interior as well as the exterior, note any damage and document with pictures. Check to the best of your ability, the type and approximate R-Value of any present insulation. Record the method of determining approximate R-Value and document with pictures if possible. Note "wet walls" and check for penetrations that may need to be addressed to provide a consistent air barrier, include in audit report along with pictures.

Interior Floor and Ceiling (All Types)

Document floor material and condition, record any abnormalities or observed damage. Note if duct system is in the floor or ceiling. Detail and picture document register condition as well as visual condition of duct boots and visible sections near registers, etc. Record potential measures needed for repair, replacement, capping and filling with insulation, etc. Record, where possible, the type and amount of insulation in the ceiling and floor (if applicable). Determine if adding insulation is possible and include in energy model if needed or possible.

Baseload Items and Equipment

Recording and documenting baseload items and equipment is a key component to a comprehensive energy assessment. These are items that operate year-round and are not necessarily driven by climate. Baseload items would include but are not limited to; lighting, refrigerators, freezers, stoves/freestanding ranges, washing machines, dryers, etc. It is important to document these items to determine what may be repaired or replaced, and may decrease the overall baseload consumption of the household. Only some items are eligible for repair or replacement with weatherization funds, but all should be accounted for to get a true sense of complete consumption.

When assessing utility bills, we look at the "shoulder months" or the months that do not require heating or cooling to determine baseload consumption in households. If you draw a horizontal line across the two lowest months on a utility bill, this will show what is used consistently (below the line) and what is attributed to heating and cooling costs (above). Record all model and serial numbers and document with pictures.

Mechanical Equipment

Mechanical equipment would include all HVAC equipment and water heaters/systems. All accessible mechanical equipment must be recorded (model and serial, if available) and documented with pictures. Size, type and electric/fuel information, static pressures (if applicable) shall also be detailed to the best extent possible. Make sure to detail the type of system, location, and not any safety concerns observed. For HVAC systems, if it is a ducted, be sure to detail the type, location, and insulation factors for that duct system. Contractors are ultimately responsible for proper modeling, design, and installation of all new/modified HVAC units and duct systems. All BPI testing procedures and protocols shall be followed in accordance with the WAP, the AZ WAP State Plan, and the AZ WAP Policies and Procedures.

Energy Modeling through Approved Software

As the AZ WAP does not currently follow a priority list, Computerized Energy Modeling must take place for each project to determine the cost effective (SIR of ≥1.0) list of measures to be included in the scope of work package.

Following the approved AZ WAP State Plan, buy-down provisions have been thoroughly detailed and have proven to be beneficial for installing measures that without inclusion of funding that does not have a SIR of ≥1.0 requirement, may not be possible. The energy model shall include all relevant information collected through the initial Energy Audit process. The Improvement Analysis Report shall include all items with accurate estimates or actual associated measure costs to provide a scope of work detailing all items to be completed. As detailed in the AZ WAP State Plan, there shall be "NO MEASURE SKIPPING/LEAPFROGGING". All items with an initial SIR of ≥1.0 MUST be completed prior to any items below a SIR of ≥1.0, including those after the buy down process has been applied.

Health and Safety measures also MUST be completed within the scope and budgets should be closely evaluated to ensure all applicable measures will be completed. DOE funding has specific requirements that if not followed, DOE funding will not be available for projects not compliant.

The Following will detail a high-level process for data entry in both REM and OptiMiser.

REM Design

REM/*Rate*™ and REM/*Design*™ desktop applications have been the industry standard for HERS® Ratings and home energy analysis/weatherization. Both programs are also great for use within residential energy efficiency rebate programs. They provide valuable information about energy performance to electric and gas utility companies as well as their program implementers and evaluators who want to predict and assess new and existing single family homes. IECC code compliance is also supported by REM software.

Using the Residential Diagnostic Evaluation (RDE) form, the following steps shall be taken; The first screen you will arrive at should, at minimum, include the project/property info or a reference to said project. The second screen should

detail the organization completing the REM, with the organization's name at minimum. The third screen should include the climate location and the utility data. The fourth screen should detail the General Design Characteristics collected on the RDE. The fifth screen should detail the Building Envelope Characteristics collected on the RDE. The sixth screen should detail the Glazing Characteristics (Window/Door Glass Info). The seventh screen should detail the Mechanical Equipment Properties (HVAC, Heating/Cooling, Water Heater, etc.). The eighth screen should include the Duct System Characteristics collected on the RDE. The ninth screen should include the baseload information also collected on the RDE.

Once all of the existing information is entered following the previous steps, the Improvements must be entered. Click on the "Reports" tab and scroll to the "Improvement Analysis". At this point you will enter the items to be improved/upgraded as well as the associated costs and the life expectancies as detailed by the approved Life Expectancy list from DOE, for each measure. Once completed, this will generate a list in order of SIR from highest to lowest and will provide the list of measures that must be completed in order, provided adequate funding.

To adequately follow ASHRAE 62.2-2016 requirements, ventilation information will need to be calculated using different software or shall follow the manual version as detailed through BPI/ASHRAE guidance. The Pre and Post results must be saved to the client file.

Print/save the Improvement Analysis page to the client file.

OptiMiser

Optimiser is a home energy audit (this will take the place of the actual RDE document as all data will be recorded digitally during the audit process) and modeling software. OptiMiser has a three-step auditing process which automates the audit for efficiency. Progress through these steps is indicated by the three buttons on the Workflow. Each button opens a dashboard of steps showing progress on substeps, with icons indicating which steps have been visited and check boxes to indicate completed steps. OptiMiser includes 16 databases that are used to set the stage for the audit, by automatically adjusting the house characteristics, weather, and local utilities to match the location, age and usage of the property.

System Requirements:

Optimiser is a Windows based program. It does not run on IOS (Apple) or Android.

- Intel Core i5 or greater processor
- 8GB RAM
- 64GB Hard drive

Software and Weather Updates

Weather Updates are available at the beginning of the month. To download the latest files, click the Tools menu and press Download New Weather Data. You will also get prompted for weather updates at the beginning of each month. However, the actual weather data may not be available until the 5th business day of the month.

Project Screen

This is Optimser Home/Customer Information Screen. This screen contains the Auditor, Customer and Project information. From here you will Receive, Send, and Open projects.

Green – Optional
Red – Required for accurate modeling and reporting
Black – completed or "touched"

Auditor: This section displays the project information including: Auditor, certifications, phone numbers and programs.
Owner: Utility holder or Building Owner information. Most of these fields will be supplied for you as part of the project file when you download.
Project: System information on the project. The project name, start/stop time, duration and dates.

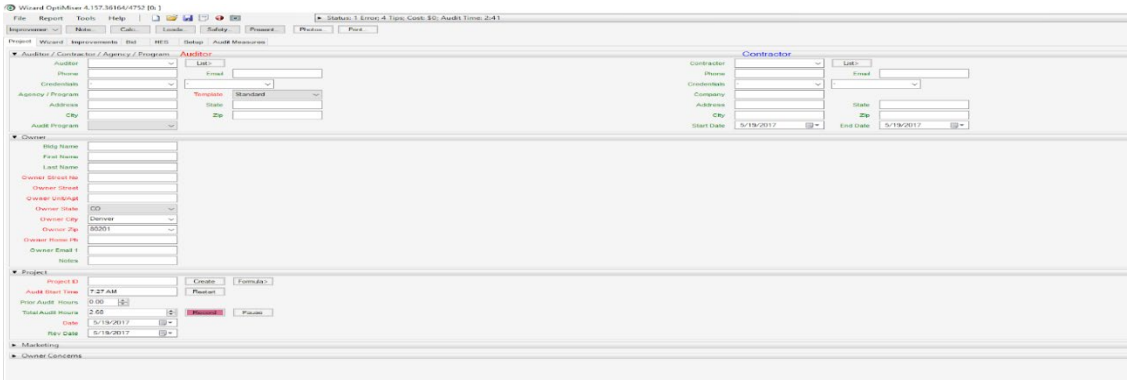
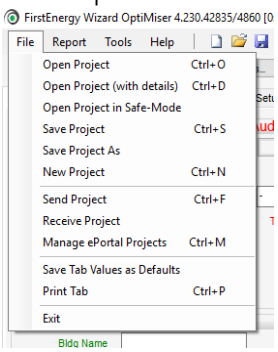


Figure 1 - Customer and Audit Information

Opening a Project

1. Click File Open.



2. Select the Project to Edit.
3. Click Open.
4. Complete the Auditor Information section.
5. Click Wizard Tab.
6. Click Start Wizard

The following screens demonstrate the Detail Viewed. This maximizes the amount of information you can enter for the home. The simple view only collects the minimum information needed for building modeling. The more information you enter the more accurate the building model. Optimiser will automatically adjust the calibrations based on typical characteristics for the age and geographic area of the home. As you complete a section you can navigate to the next section by using the Next button or by clicking on the section. Sections do not need to be completed in order and you can move to the previous section by clicking Back or by clicking on the section you want to work on. As you complete a section the field name will move from Green to Black. Sections that are Grey do not need to be filled in. They are activated by characteristics entered.

Building Information

These are the base building characteristics (Age, Size, Occupants, and Type)

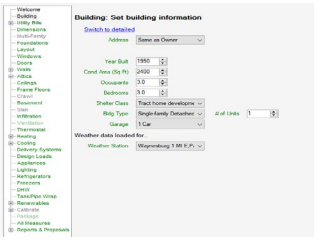


Figure 2 - Simple View

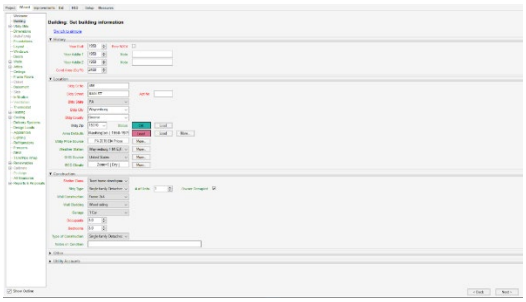


Figure 3 - Detailed View

Utility Bills

In most cases the customer's Electric bills will be collected at intake. There may be cases where we do get the usage or do not get enough to accurately build an electric usage model. This screen gives you the opportunity to see the supplied data and add additional information.

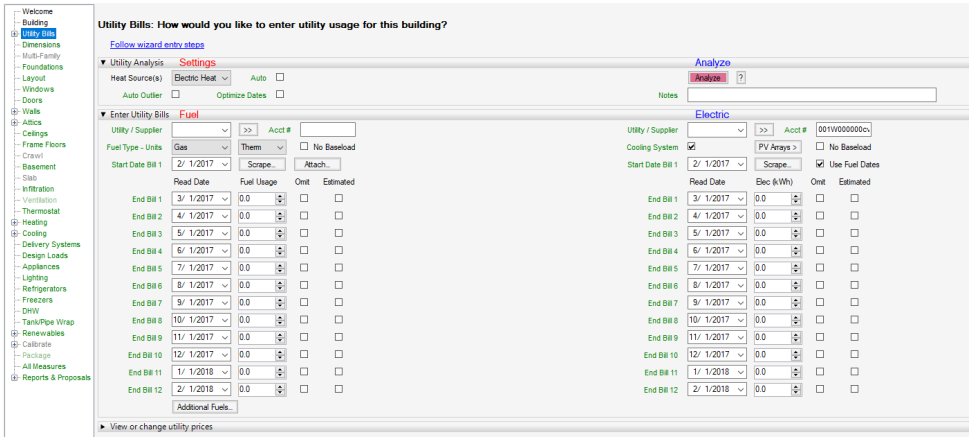


Figure 4 - Fuel and Electric Bills

Building Dimensions

The next several screens are information about the property. If you use the detailed view on the dimensions screen the data will carry out through the next section. Example: if you fill out basement, crawlspace, slab on grade those entries will populate the Foundations screen.

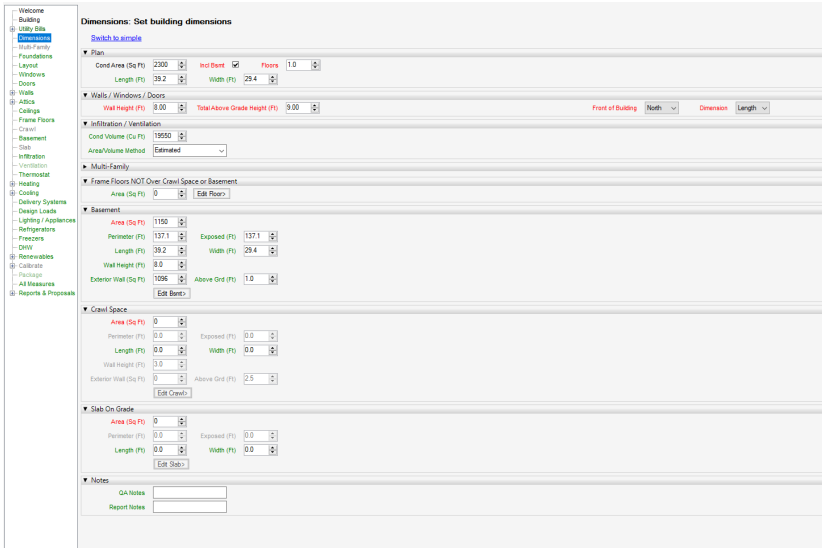


Figure 5 - Building Dimensions

NOTE: Under Plan there is a check box for Incl. Basement. If the home has a basement and there are supply vents for heating and air be sure to leave this box checked. This then includes the basement in the conditioned volume of the home.

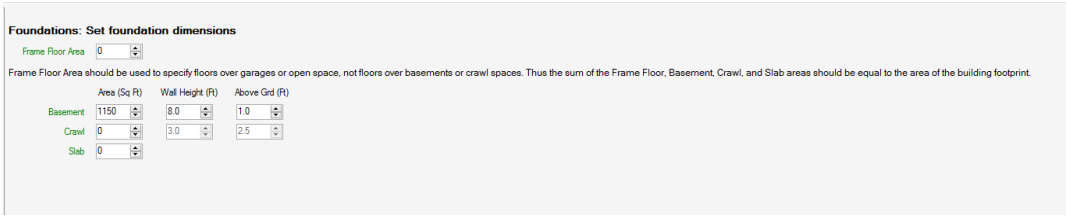


Figure 6 - Foundations each will adjust based on square footage

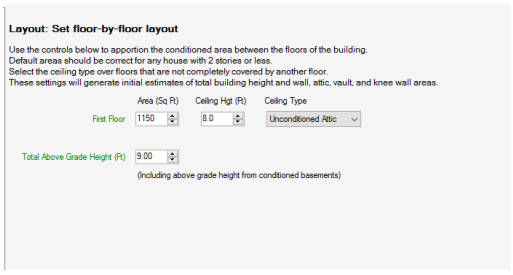


Figure 7 - Floor Layout

Foundation Square footage must match the square footage of the home. As you enter the different square footage amounts for each foundation type the others will decrease.

Floor by Floor layout – additional floor areas will appear based on the number of floors selected under Building Plan.

From this point forward, you will notice 2 areas on the screen. Base and Improved. Base describes the current condition. Improved is the suggested improvement(s).

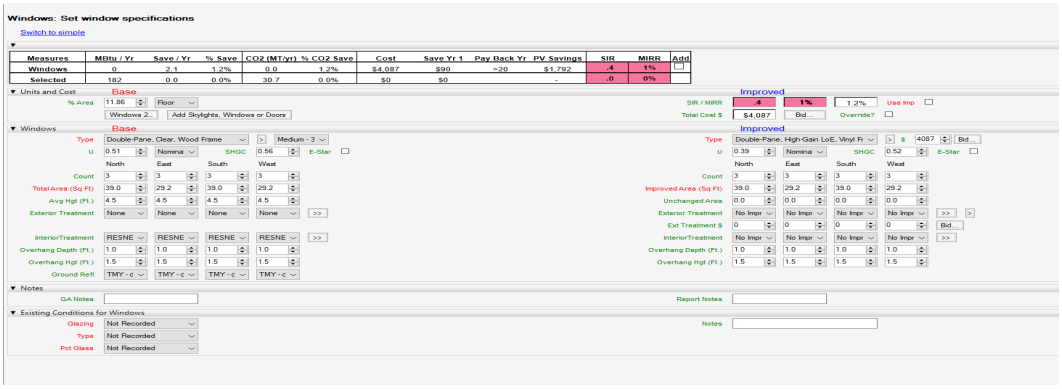


Figure 8 - Windows

Windows can be shown as a percentage of Floor space or Wall Space. For modeling purposes when including sunscreens, the square footages should be detailed.

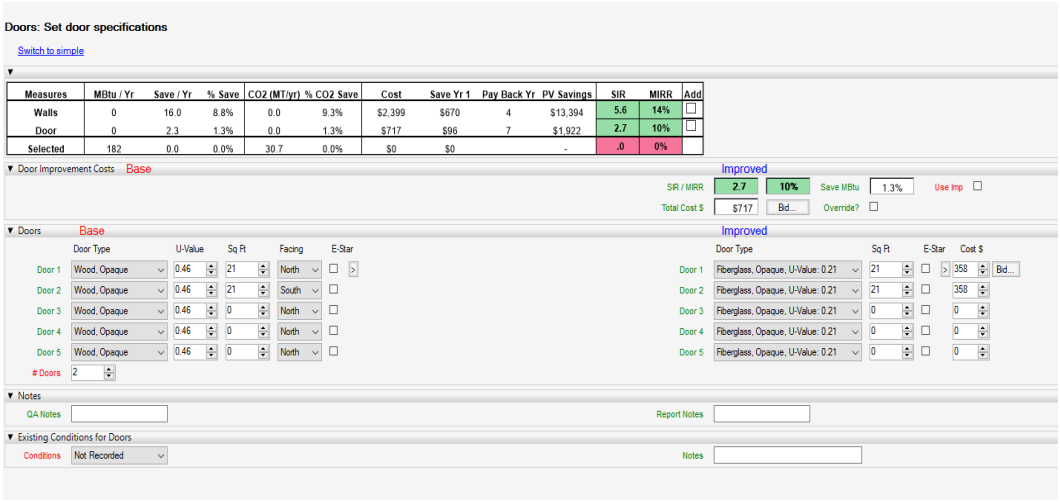


Figure 9 - Doors are defined as entry doors to the living space exposed to the exterior

NOTE: When you look at Windows and Doors you will notice there is no Sliding or French Style patio doors. These styles can be entered as either. Just make sure you select the correct framing and glazing and the appropriate square footage.

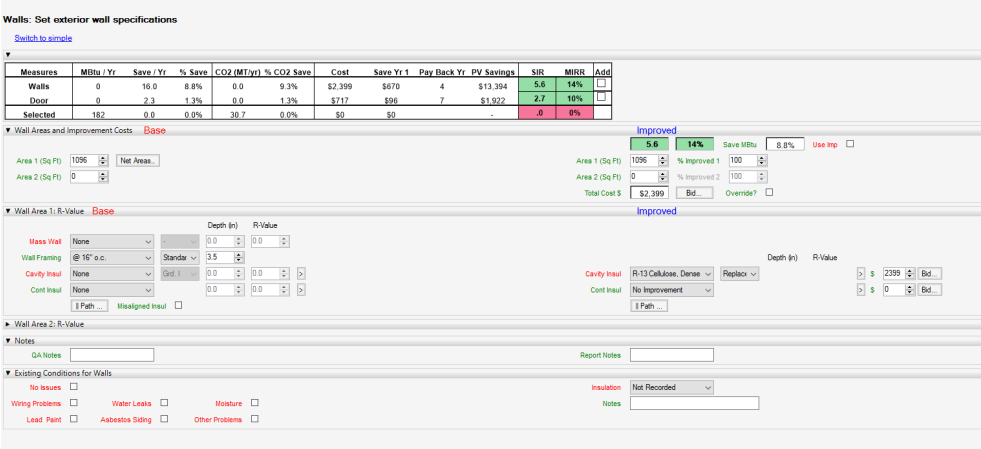


Figure 10 - Walls and construction

Your knowledge of building materials and construction methods will be useful in determining wall insulation. Unless the homeowner has had this done, you will need to rely on your knowledge and experience, and visually check where able.

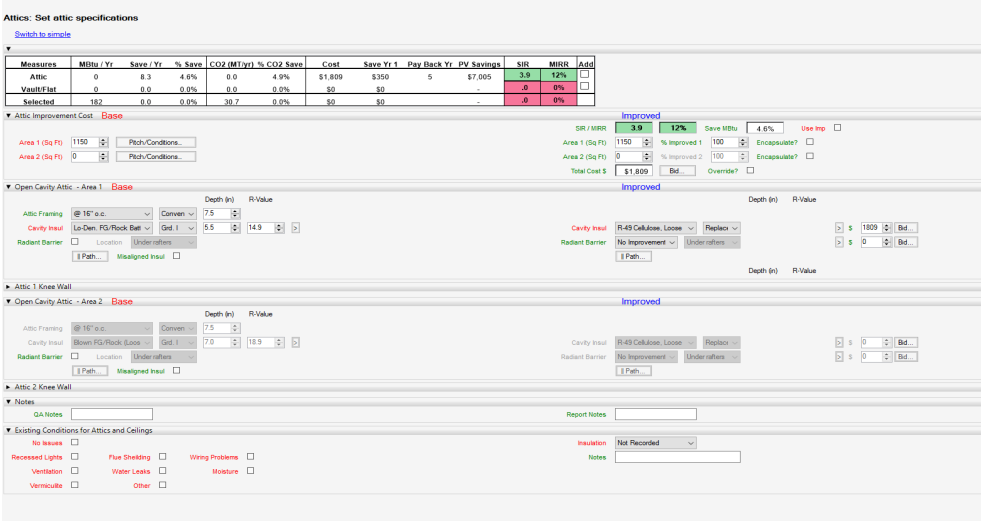


Figure 11 - Attic configurations

Ceilings

This the ceiling over the attic space. Details about the roof pitch, insulation between the roof beams or Closed/Open cavity for vaulted or cathedral ceilings.

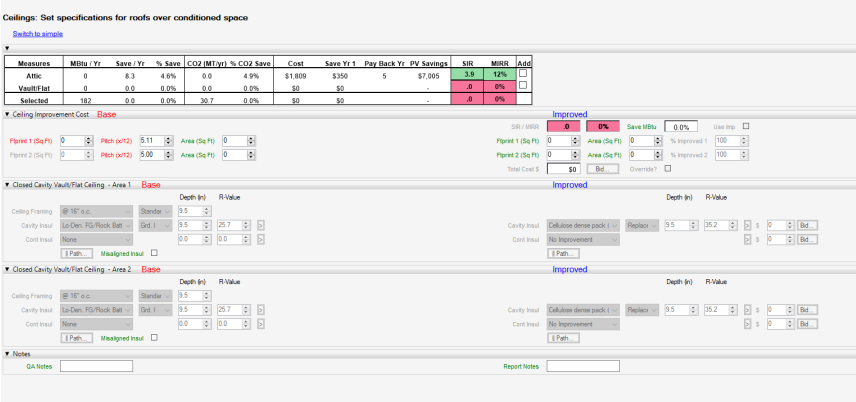


Figure 12 - Ceilings (underside of Roof Decks)

Frame Floors

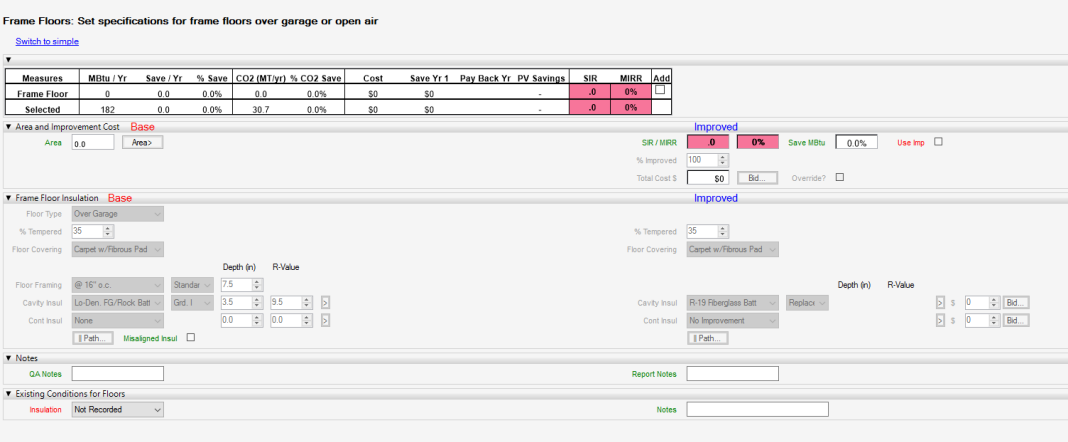


Figure 13 - Frame Floors

This typical space over an open garage or cantilevered areas in the construction of bi-level and tri-level homes. This section addresses those areas where the floor of the space is exposed to the weather elements.

Basement, Crawl Space, and Slab

The following 3 areas are dependent upon the building dimensions and foundation information you entered in the previous screens. If they are greyed out in the Navigation pane on the left you do not have to complete them.

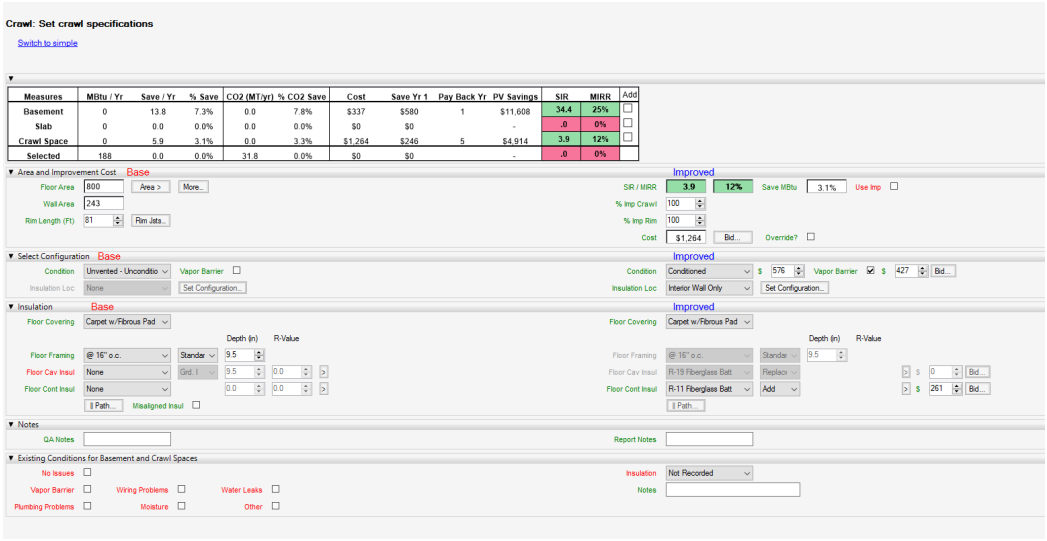


Figure 14 - Crawl Space

Basement

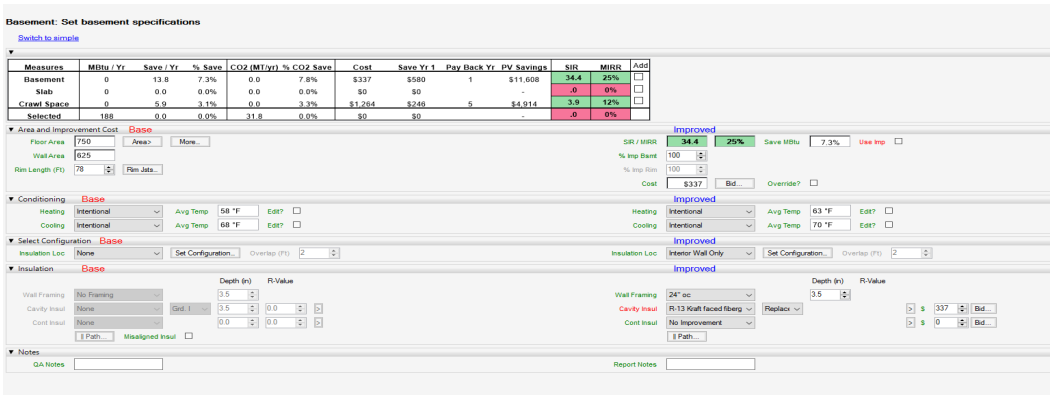


Figure 15 - Basement Configuration

Slab

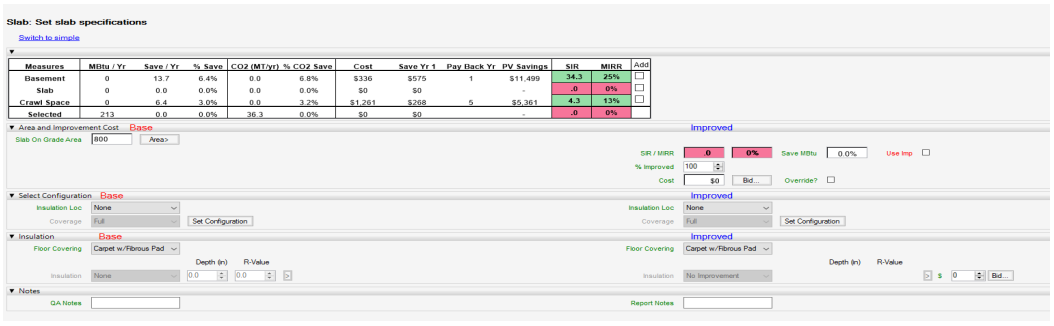


Figure 16 - Slab

Infiltration and Ventilation

From pressure diagnostics performed as detailed in the above sections, these areas provide data on air flow through the home. If you are not performing a blower door inspection these sections do not need to be completed.

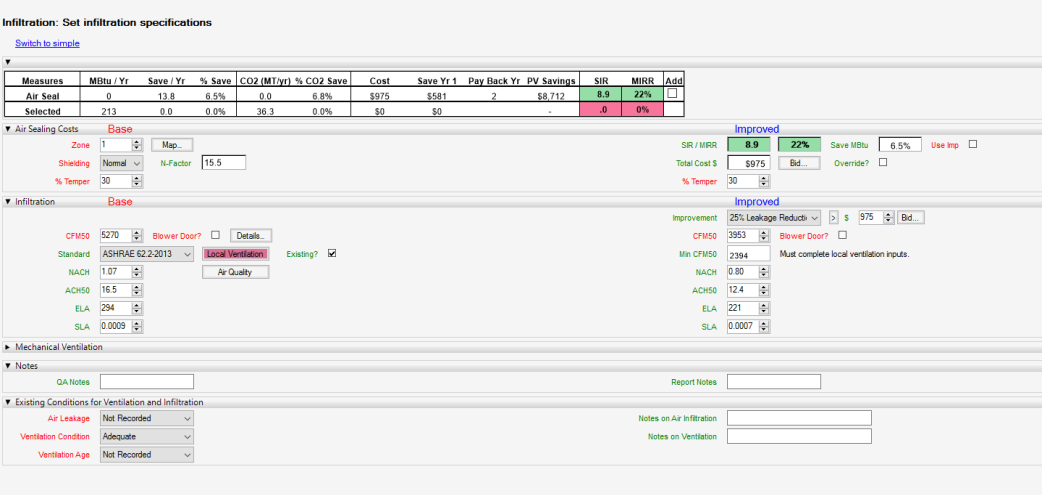


Figure 17 – Infiltration

To adequately follow ASHRAE 62.2-2016 requirements, ventilation information will be entered in this section.

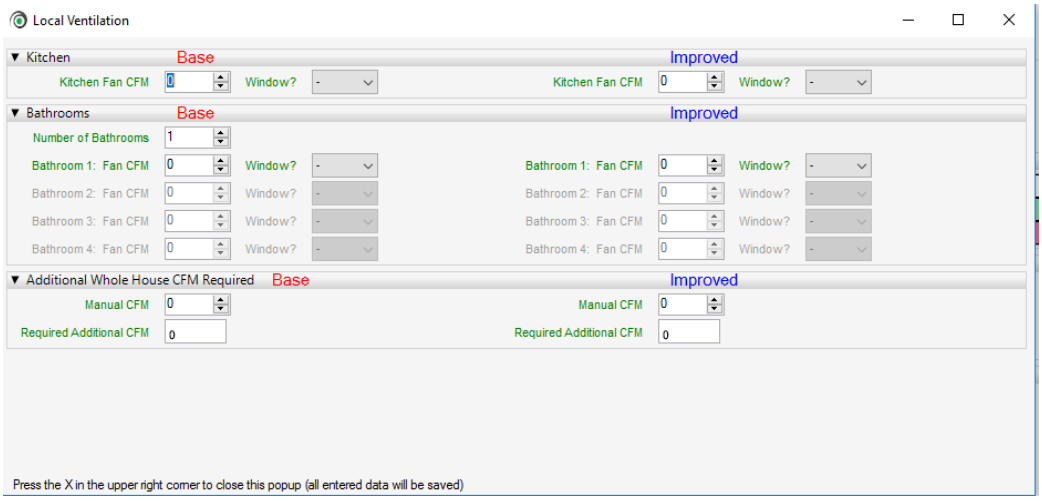


Figure 18 – Ventilation

Thermostat Controls

This section details the type of thermostat and heating and cooling temperature selections.

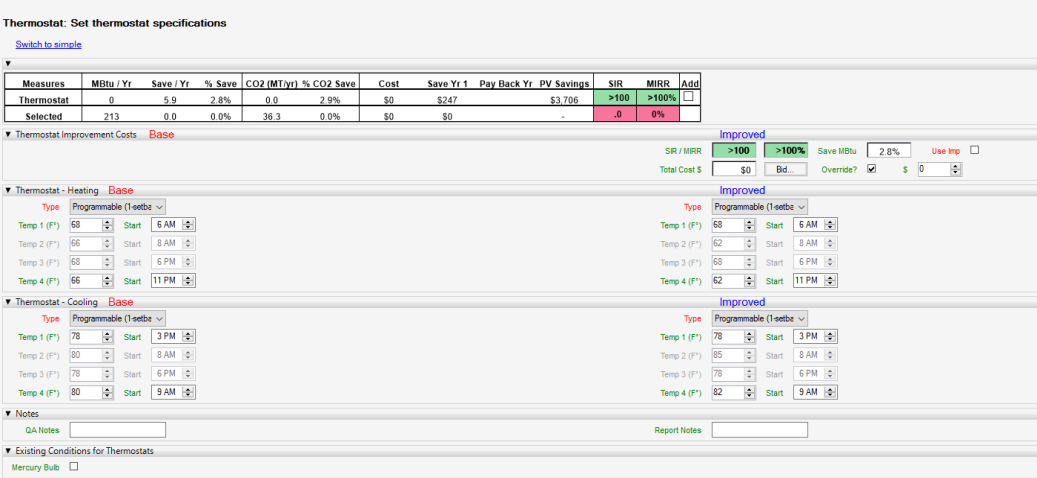


Figure 19 - Thermostat

Heating, Cooling and Delivery

Heating and Cooling go hand in hand. If you select Central Heat Pump - Ducted a couple of new fields will open for the cooling properties. The new fields will populate the cooling section so you won't have to enter it twice. The Delivery system is assumed to be shared, so you will only have to fill the information out 1 time. If you choose furnace and central air you will be asked if they share the delivery system. If they don't you will have additional fields to complete under Delivery Systems. You can enter up to 3 heating and cooling systems.

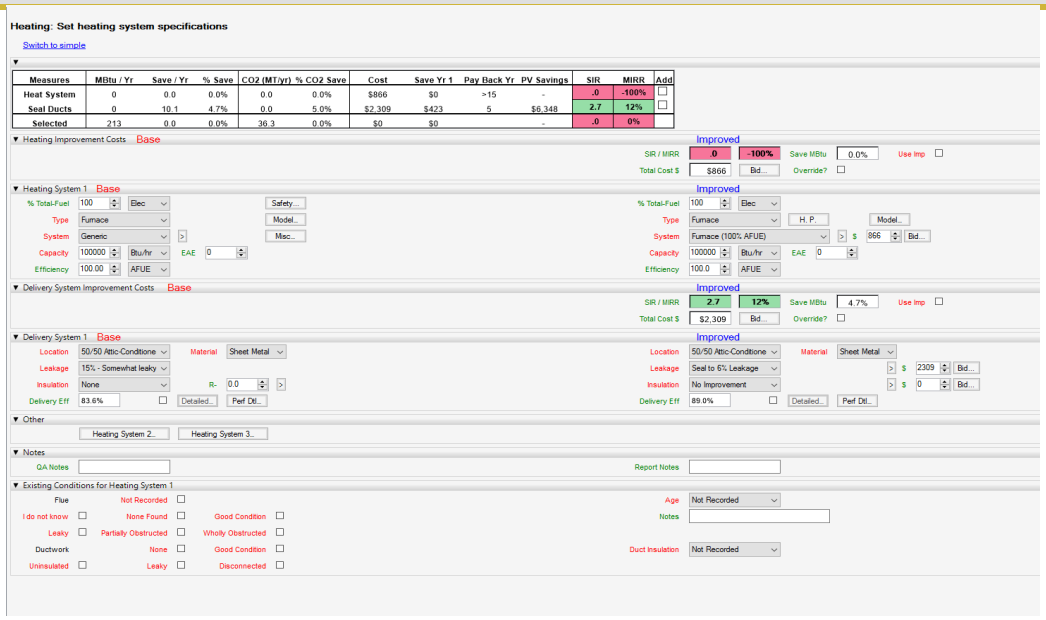


Figure 20 - Heating Systems

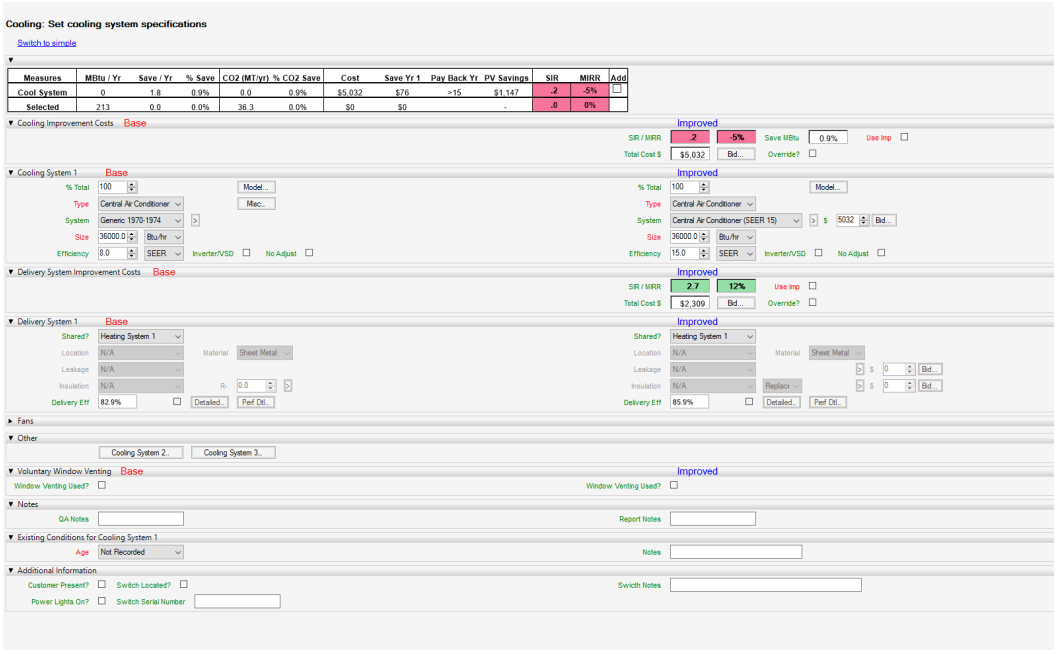


Figure 21 - Cooling Systems

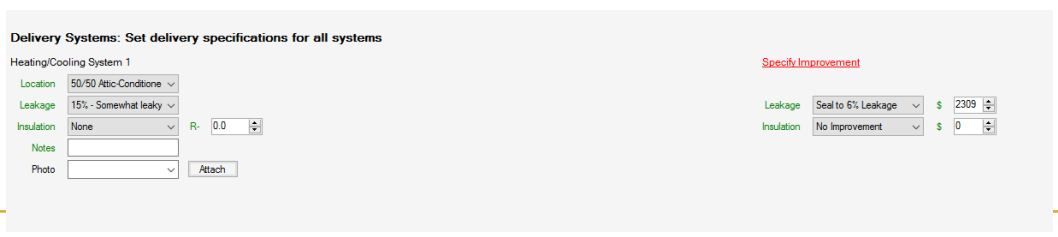


Figure 22 - Delivery Systems

Combustion Safety

If your fuel type for Heating, Range, Dryer and Water heater, is Gas, Oil, or Propane you should click the Safety button next to Fuel Type. You can complete the testing for all 4 without having to hit Safety each time.

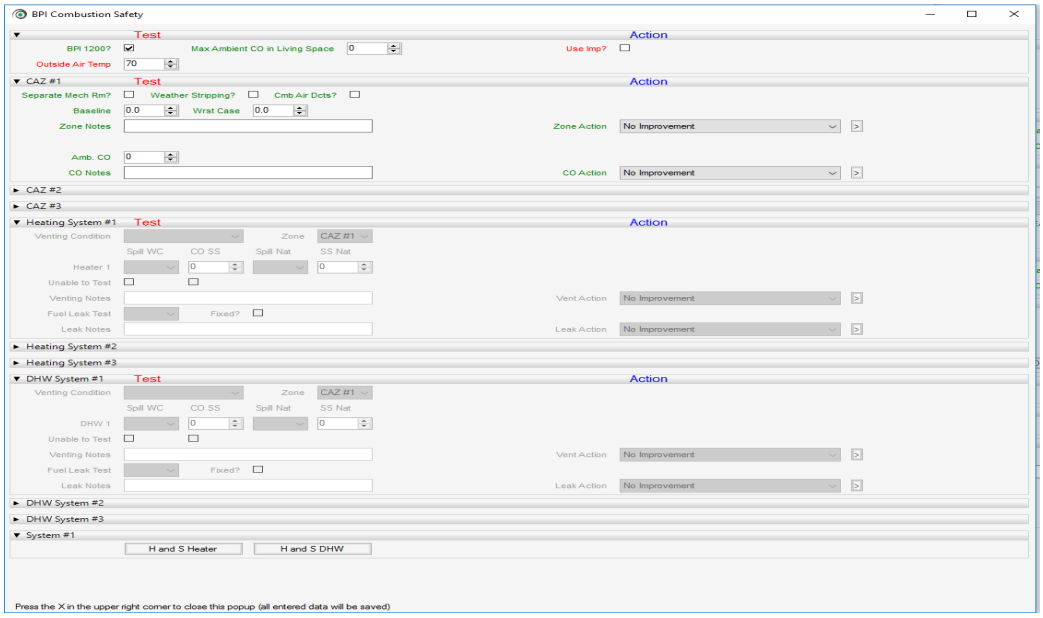


Figure 23 - CAZ and Safety

Lighting and Appliances

The next 5 sections collect information on lighting and appliance usage. These make up almost 50% of the electric usage in a home. In the case where electric is not the heat source this jumps to almost 90%.

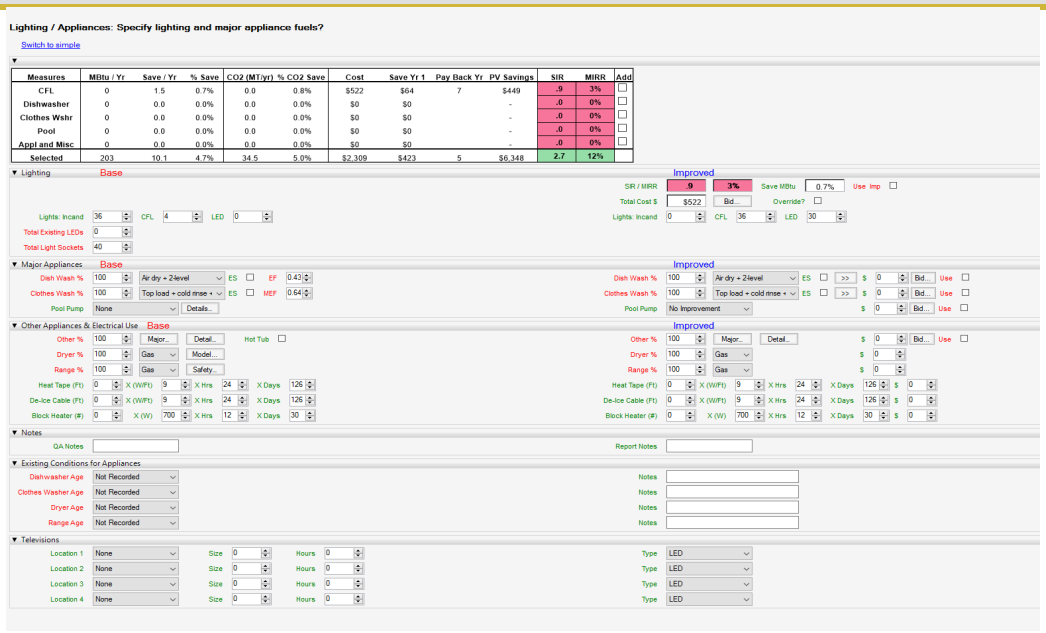


Figure 24 - Lighting and Appliances

Energy Modeling and Scope Development

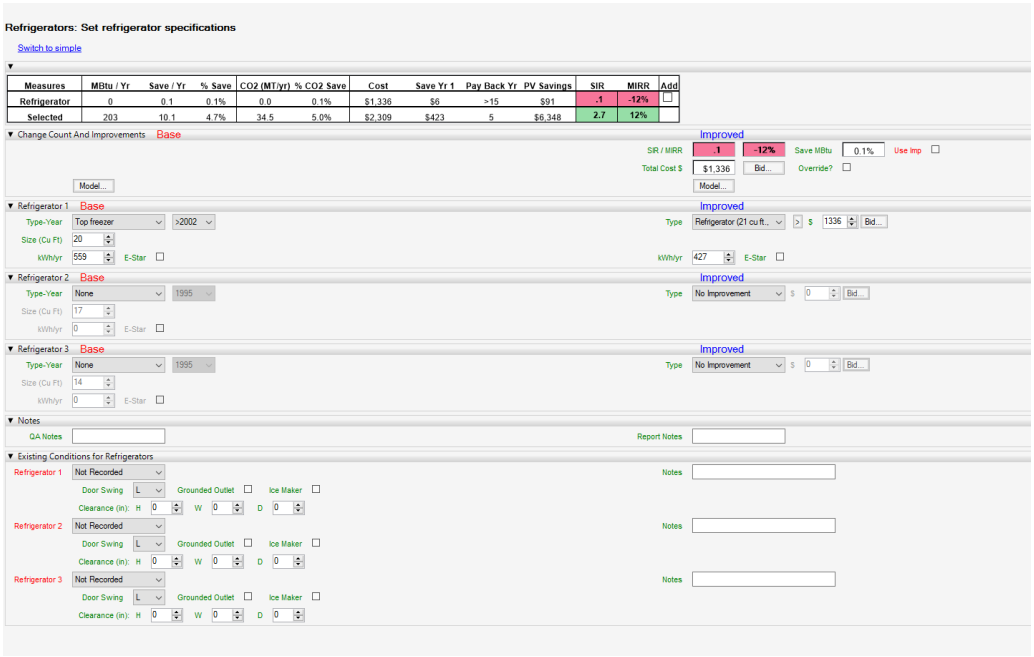


Figure 25 - Refrigerators

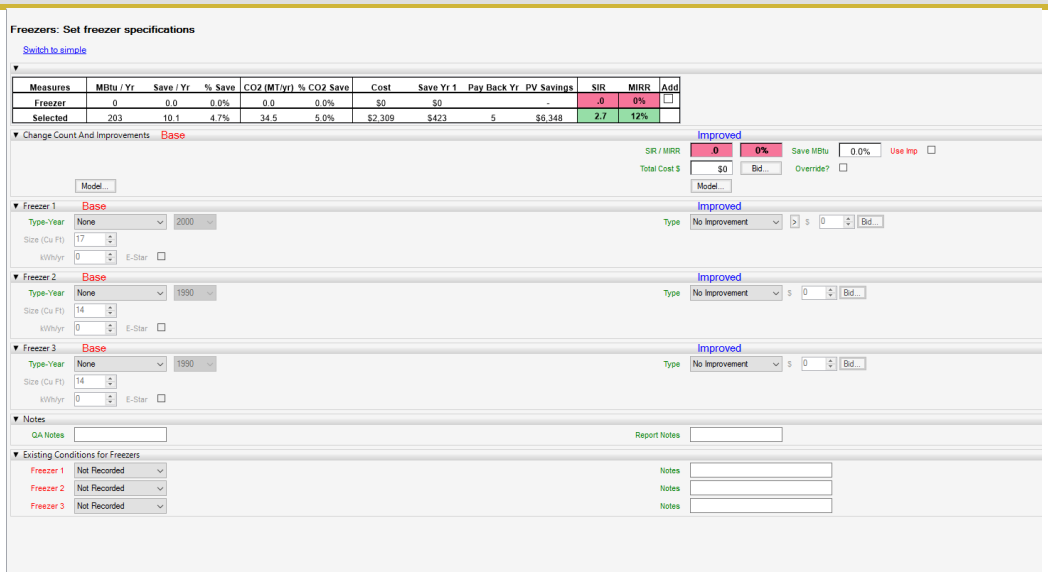


Figure 26 – Freezers

Hot Water Heater and Temperature

Remember, if this is a gas appliance, you will need to enter the CAZ and Safety information.

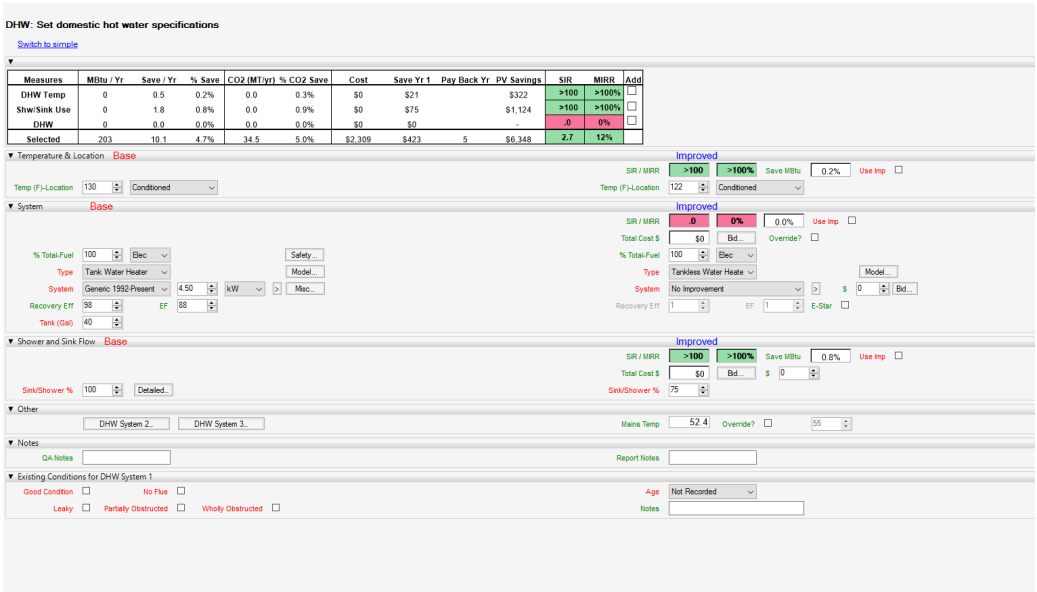


Figure 26 – Water Heaters

Improvement Details

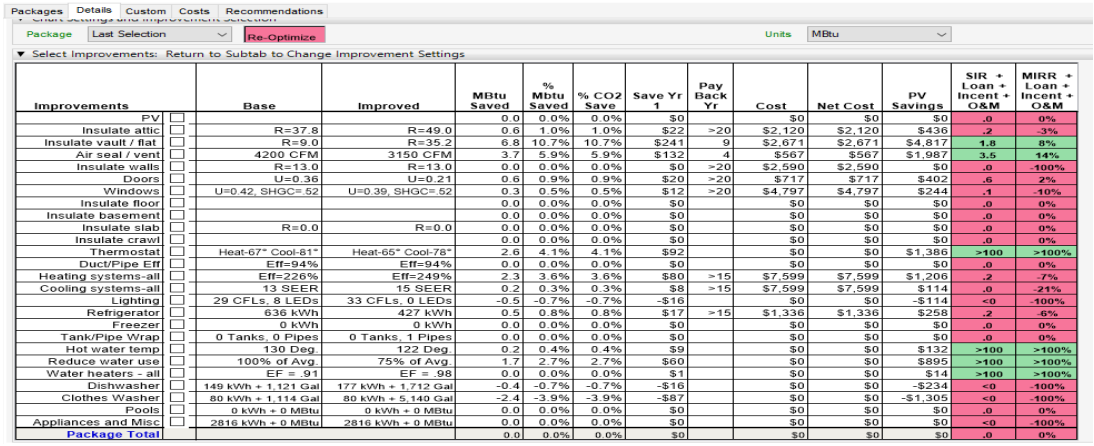
This section lists out the Improvements you selected in the sections beginning with Windows. This is your opportunity to review the improvements you suggested and determine which will have the highest rate of return for the home owner. You can select and deselect improvements here.

Green – Highest Rate of return

Yellow – Weighted decision based on cost

Red – Highest Cost and Longest payback period.

The colors will change based on the improvements selected. Green may go to yellow or yellow to red.



Packages | Details | Custom | Costs | Recommendations

Package: Last Selection | Re-Optimize | Units: MBtu

Select Improvements: Return to Subtab to Change Improvement Settings

Improvements	Base	Improved	MBtu Saved	% Mbtu Saved	% CO2 Save	Save Yr 1	Pay Back Yr	Cost	Net Cost	PV Savings	SIR + Loan + Incent + O&M	MIRR + Loan + Incent + O&M
PV			0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Insulate attic	R=37.8	R=49.0	0.6	1.0%	1.0%	$22	>20	$2,120	$2,120	$436	.2	-3%
Insulate vault / flat	R=9.0	R=35.2	6.8	10.7%	10.7%	$241	9	$2,671	$2,671	$4,817	1.8	8%
Air seal / vent	4200 CFM	3150 CFM	3.7	5.9%	5.9%	$132	4	$567	$567	$1,987	3.5	14%
Insulate walls	R=13.0	R=13.0	0.0	0.0%	0.0%	$0	>20	$2,590	$2,590	$0	.0	-100%
Doors	U=0.36	U=0.21	0.6	0.9%	0.9%	$20	>20	$717	$717	$402	.6	2%
Windows	U=0.42, SHGC=.52	U=0.39, SHGC=.52	0.3	0.5%	0.5%	$12	>20	$4,797	$4,797	$244	.1	-10%
Insulate floor			0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Insulate basement			0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Insulate slab	R=0.0	R=0.0	0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Insulate crawl			0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Thermostat	Heat-67° Cool-81°	Heat-65° Cool-78°	2.6	4.1%	4.1%	$92		$0	$0	$1,386	>100	>100%
Duct/Pipe Eff	Eff=94%	Eff=94%	0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Heating systems-all	Eff=226%	Eff=249%	2.3	3.6%	3.6%	$80	>15	$7,599	$7,599	$1,206	.2	-7%
Cooling systems-all	13 SEER	15 SEER	0.2	0.3%	0.3%	$8	>15	$7,599	$7,599	$114	.0	-21%
Lighting	29 CFLs, 8 LEDs	33 CFLs, 0 LEDs	-0.5	-0.7%	-0.7%	-$16		$0	$0	-$114	<0	-100%
Refrigerator	636 kWh	427 kWh	0.5	0.8%	0.8%	$17	>15	$1,336	$1,336	$258	.2	-6%
Freezer	0 kWh	0 kWh	0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Tank/Pipe Wrap	0 Tanks, 0 Pipes	0 Tanks, 1 Pipes	0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Hot water temp	130 Deg.	122 Deg.	0.2	0.4%	0.4%	$9		$0	$0	$132	>100	>100%
Reduce water use	100% of Avg.	75% of Avg.	1.7	2.7%	2.7%	$60		$0	$0	$895	>100	>100%
Water heaters - all	EF = .91	EF = .98	0.0	0.0%	0.0%	$1		$0	$0	$14	>100	>100%
Dishwasher	149 kWh + 1,121 Gal	177 kWh + 1,712 Gal	-0.4	-0.7%	-0.7%	-$16		$0	$0	-$234	<0	-100%
Clothes Washer	80 kWh + 1,114 Gal	80 kWh + 5,140 Gal	-2.4	-3.9%	-3.9%	-$87		$0	$0	-$1,305	<0	-100%
Pools	0 kWh + 0 MBtu	0 kWh + 0 MBtu	0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%
Appliances and Misc	2816 kWh + 0 MBtu	2816 kWh + 0 MBtu	0.0	0.0%	0.0%	$0		$0	$0	$0	<0	-100%
Package Total			0.0	0.0%	0.0%	$0		$0	$0	$0	.0	0%

Figure 34 - Improvement Details

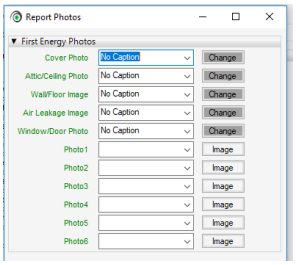
Recommendations

This section will produce a scope of work detailing the list of measures to be completed in rank of SIR from highest to lowest. Measures with the highest ranking MUST be completed before any items less than that measure in order.

Photos

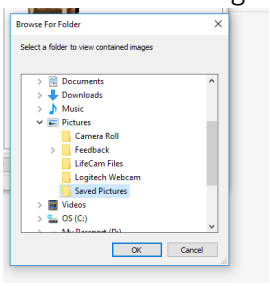
Photos can be included in the report. At a minimum you should take a picture of the residence for the Cover photo.

You can 11 photos with captions. The caption is limited to 140 characters.



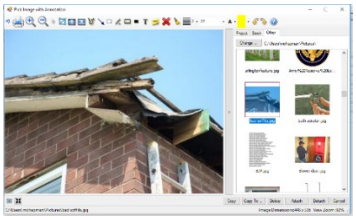
To add your photos:

1. Select Change next to the photo you want to add.
2. Click Other Tab. The directory defaults to your camera roll.
3. Click Change to locate your photos directory.



4. Click Ok.

5. Select the Photo you want.



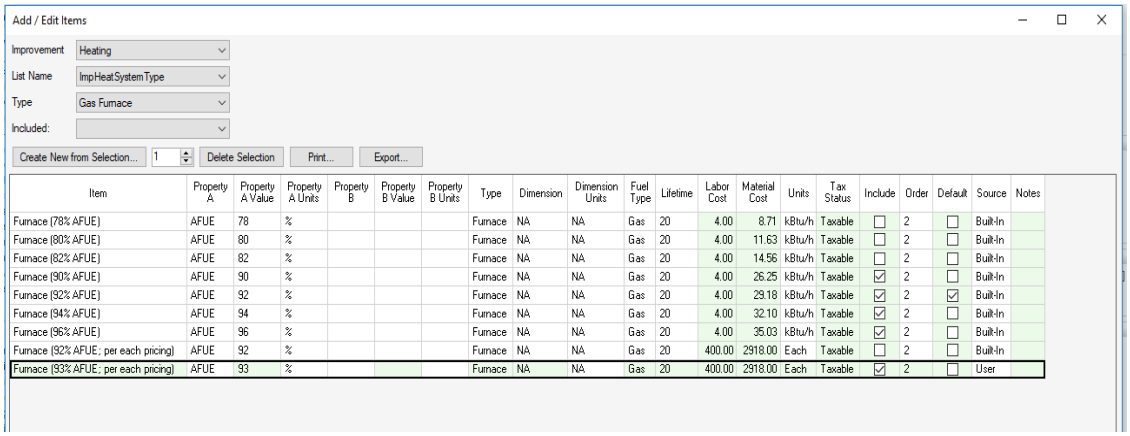
6. Click Attach.

Printing

1. Click Print
2. Review your Recommendations. Make changes if necessary.
3. Click the X to close the Recommendations window.
4. The Report Generator will start. Optimiser does a final save on the audit.
5. Click OK to close the Optimiser message window.
6. Print the report and review with the Homeowner/Resident.

Editing Costs and Setting Defaults

The 'Add/Edit Items' Popup accessed with the '>' button allows access to several features. Improvement material cost and labor costs can be changed, and the auditor can choose which improvements appear on the OptiMiser improvement tabs. Additionally, the auditor can choose the default improvement that appears on the improvement tabs. The improvement lists can also be printed or exported to a .csv file.



Item	Property A	Property A Value	Property A Units	Property B	Property B Value	Property B Units	Type	Dimension	Dimension Units	Fuel Type	Lifetime	Labor Cost	Material Cost	Units	Tax Status	Include	Order	Default	Source	Notes
Furnace (78% AFUE)	AFUE	78	%				Furnace	NA	NA	Gas	20	4.00	8.71	kBtu/h	Taxable	☐	2	☐	Built-In	
Furnace (80% AFUE)	AFUE	80	%				Furnace	NA	NA	Gas	20	4.00	11.63	kBtu/h	Taxable	☐	2	☐	Built-In	
Furnace (82% AFUE)	AFUE	82	%				Furnace	NA	NA	Gas	20	4.00	14.56	kBtu/h	Taxable	☐	2	☐	Built-In	
Furnace (90% AFUE)	AFUE	90	%				Furnace	NA	NA	Gas	20	4.00	26.25	kBtu/h	Taxable	☑	2	☐	Built-In	
Furnace (92% AFUE)	AFUE	92	%				Furnace	NA	NA	Gas	20	4.00	29.18	kBtu/h	Taxable	☑	2	☑	Built-In	
Furnace (94% AFUE)	AFUE	94	%				Furnace	NA	NA	Gas	20	4.00	32.10	kBtu/h	Taxable	☑	2	☐	Built-In	
Furnace (96% AFUE)	AFUE	96	%				Furnace	NA	NA	Gas	20	4.00	35.03	kBtu/h	Taxable	☑	2	☐	Built-In	
Furnace (92% AFUE; per each pricing)	AFUE	92	%				Furnace	NA	NA	Gas	20	400.00	2918.00	Each	Taxable	☐	2	☐	Built-In	
Furnace (93% AFUE; per each pricing)	AFUE	93	%				Furnace	NA	NA	Gas	20	400.00	2918.00	Each	Taxable	☑	2	☐	User	

You can add or remove items in the Improvements drop by checking the Include checkbox. You can also set which system is the Default.

To add an item to the list:

1. Click Create New from Selection
2. Double-Click in each Field to edit the field.
3. Click the X in the corner of the box and item will be saved.

You can only edit one improvement a time from this screen. However, you can edit as many Type's within that improvement as you want.

Change Labor and Material Costs

To change the labor or material cost for an Improvement, click in the 'Labor Cost' or 'Material Cost' column in the 'Add/Edit Items' window and enter the new cost. The cost is expressed in terms of the units in the 'Units' column. For example, if the units are $/kBtu/hr the costs are per kBtu/hr of the installed furnace. If installing a 100 kBtu/hr furnace and the material cost is $9/kBtu/hr the material cost of the improvement is 9 * 100 = $900.

Scope Development

Developing the scope of work for each residence shall be specific to each individual project/structure. As all residences are different in some fashion, it is rare that the exact same work may be performed, the same measures may be provided but the extent of the actual work typically varies. That said, each initial home assessment should be carefully evaluated to ensure all items to be proposed have nothing short of a positive impact to the residence and the occupants.

All necessary and allowable Health and Safety measures must be included in the scope, all energy efficiency items in rank from greatest to least SIR shall be included, and if any items are being bought down, all items in the original package of measures with an SIR of 1:1 or greater MUST be completed as detailed in the AZ WAP State Plan.

Once the scope is developed, the agency or their representative, MUST have the applicant or their legal representative, sign off on the scope acknowledging their approval and understanding of the work to be performed. The sign off must occur PRIOR to any work starting as to avoid any confusion or concern.

Final Audit and QCI Process

A final audit must be completed on each project. The final audit will be conducted in the same fashion as the initial and will follow BPI, as well as AZ WAP State Plan guidance and requirements. For ALL projects with DOE funding utilized, a QCI must be completed and pass inspection prior to reimbursement. This can be the final audit and must follow DOE, BPI, and AZ WAP guidance with respect to the QCI process. If issues are found, the individual conducting the QCI must revisit the project and ensure all items of concern have been addressed and no additional items of concern are present.

The final audit/QCI shall be recorded and picture documented (where necessary and applicable), be maintained in the client file, and be available upon request.

It shall be the responsibility of the Final Auditor/QCI to report any issues of concern and need for additional training to the Sub-grantee who in turn, will provide this information to the ADOH Energy Specialist for follow-up as deemed necessary.

Once projects are deemed complete by the Final Auditor/QCI, the Sub-grantee may submit the project as complete in the AZ WAP Database and proceed with the reimbursement request process as detailed in the AZ WAP State Plan and the AZ WAP P&P Manual.