

Welcome to Old Cedar Hill Farm, let's take a look at what makes this house perform so well. This house was certified through the EarthCraft Virginia program in 2015 with the house scoring a 38 on the HERS Scale. A code built house would score a 100 on the HERS scale and much like golf, the lower the score the better. A score of 38 indicates that this house uses 62% less energy than an average house built today.

To start with what makes this house special it is situated with the length of the house running east-west and the north side of the house is built into a hill helping to shield the north side of the house from the cold north winds in the winter. This positions the rear porch roof perfectly for mounting solar panels and there is an existing conduit from the attic to directly over the power panel to help facilitate the addition of solar panels.

The upper exterior walls of the house are 6" thick providing room for R-19 insulation. Using 2x6 framing also allows you to spread the studs out from 16" on center to 24" on center which saves on lumber while also providing increased overall wall insulation. The exterior plywood on the walls has all seams taped with gasketed tape to promote air tightness, is then covered with housewrap that is also taped. To cut down on the thermal bridging through the studs, the exterior walls are wrapped with an inch of rigid foam, staggering the seams of the foam insulation and the seams of the plywood and taping all seams of the insulation resulting in an increased R-value of 29 for the walls. The combination makes for a very airtight building envelope that slows the transmission of extreme temps from the outside to the inside of the house.

On the inside one of the first things you notice is the high clearstory windows. The overhang on the outside of the house is designed to allow for full sunshine through these windows during the winter months while not allowing direct sunshine to enter during the summer months. The sunshine during the winter months lands on the interior walls and dark tiled floor which acts as a heat sink and slowly releases the heat into the house for hours. Oftentimes allowing the HVAC systems to run less.

Also we see that all of the fixtures are LED's and they are using very little energy to light the house. The HVAC units can be seen hanging on the wall. They are Fujitsu mini-splits and there are four units in the house, 2 upstairs and 2 down. The main living area unit is a 27 SEER unit. The average code built homes today have 14 SEER units. The air from the units is moved around the house by the Haiku Fans which still top the Energy Star list for most efficient fans moving 1200 cubic feet of air per Watt.

All the appliances are Energy Star and all electric.

All the functioning water piping in the house is in one internal wall, there are no plumbing pipes in the external walls. Since all the water piping is in the one wall and the water heater is downstairs directly below this wall, all water fixtures are no more than 25 feet from the water heater making the wait for hot water at the fixtures minimal. Even though several sinks are on

exterior walls, there is no plumbing in the exterior walls. The one exception to this rule is that the back patio was plumbed for a future outdoor kitchen. These are shut off from the inside to prevent freezing.

The downstairs bedrooms have custom made functioning transoms over the windows to allow for the movement of conditioned air throughout the level. Ceiling fans in each room also facilitate the movement of conditioned air.

The water heater in the basement is a heat pump water heater. The water heater utilizes heat from the ambient air in the house and heats the water with it expelling cooler air into the room. The process also helps to remove humidity from the air and directs it from the house. The water heater is set to full heat pump mode but can be changed to function in a hybrid heat pump/electric water heater mode if desired.

The basement walls are Superior Walls pre-cast in a factory here in VA and brought to the house. The entire basement was assembled onsite in under 4 hours. The panels are made from 5000 PSI concrete which is impervious to moisture so there is no moisture entering the basement through the walls. They were also delivered pre-insulated. We added additional insulation to bring the basement walls to an R-20. There is also 2 inches of rigid foam under the slab giving it an R-value of 10.

On the outside we can see the porch on the upstairs the full length of the house and the patio below also. The combination of these makes for wonderful outside living spaces that are utilized for a good portion of the year and do not need to be heated or cooled. Simply delightful to enjoy the wildlife or listen to the rain under the cover of the roof.

The structural rafters of the roof end flush with the walls which allowed for the roof seams to be taped and then ice and water shield to cover the entire roof. That was covered with 2 inches of rigid foam which was also taped and sealed to the rigid foam on the exterior walls. Then long 2x4's were laid on edge over each rafter and timber locked to the rafter to hold them in place. The 2x4's create the overhangs that you can see here on the outside. A second layer of plywood was then added over the 2x4's and then more ice and water shield and shingles. This combined with the blown in insulation between the rafters on the interior of the house makes for an R-value of 50 in the roof. This over roofing, allows for a vented roof to help prevent heat build up while not allowing the heated air to enter the house. This means that the temperatures in the attic storage area are basically the same as in the rest of the house.

The end result of all of this is a very air tight house so there is an ERV that removes stale air from the kitchen and lower areas while at the same time supplying fresh air to all three of the bedrooms. This system recaptures some of the energy used to condition the air leaving the house and adds it to the incoming fresh air from the outside. This system is also coupled with a whole house dehumidifier that removes moisture both from fresh air coming in as well as from

air within the house. The dehumidifier is controlled by the humidistat in the hallway leading to the master. The fresh air ventilation is also controlled from this location

This very energy efficient house holds its temperature very well with little to no drafty areas, and when the HVAC is needed it minimizes the costs to run it. So this is a comfortable environment controlled house that costs very little to live in.