INDUSTRY COMPARATIVE ANALYSIS OF GROUND HOG TRIPLE SOLAR SOURCE HEAT PUMP TECHNOLOGY VERSUS GROUND SOURCE GEOTHERMAL & AIR SOURCE HEAT PUMP TECHNOLOGIES.

• The Ground Hog solar heat pump uses all three natural, and free solar energy resources available in its proprietary operation cycle. These solar energy resources consist in use of intense solar energy beamed directly to a refrigerant charged solar collector panel, free flowing outside ambient air temperature elements, and stabile, constant earth stored temperature.
• By combining all three of these solar resources into one proprietary system product, the Ground Hog triple solar source heat pump technology accomplishes maximum efficiency performance using less electricity to operate the compressor, and supplemental auxiliary heat. This engineering innovation is accomplished through constant modulation of the closed circuit refrigerant management cycle. In this process, solar generated heat energy is used to immediately increase the refrigerant pressure, and temperature sent directly to the condenser thereby radically reducing the compressor's energy consumption, and operating load.
• The air, and ground source geothermal heat pump technologies rely solely on use of one solar energy resource in their operating cycle, and function with temperature sensing thermostat control without regard to increased performance benefits gained using refrigerant modulation principles. This poses fundamental limitations in operating efficiency, and creates questionable investment cost appreciation for the end user consumer whose primary goal is to achieve stellar operation efficiency performance, coupled with minimal investment cost. Furthermore, both technologies are restricted, governed by prevailing earth or air temperatures in delivery of their operating performance, and must be engineered to achieve maximum efficiency performance. It is commonly known throughout the HVAC industry that reliance on either of these solar resources alone cannot assure peak, and complete operating performance without using excessive amounts of supplemental auxiliary heat, or in the case of geothermal energy systems, incur substantial earth drilling, excavation, or engineering design investment costs to assure maximum operating performance.
• The Ground Hog triple solar source heat pump provides a more cost efficient solution in addressing these industry wide deficiencies, and uses an expanded solar energy approach to achieve superior performance. To begin, It operates using one high efficiency rated two stage, variable speed or multi stage outdoor air source compressor unit connected to one solar panel of 4 X 8 or 4 X 6 foot design weighing less than 200 pounds, and one single closed earth loop consisting of 25 % total length of the outdoor condenser coil (customarily 50 feet in length) installed in the earth either vertically or horizontally. The three solar source components are to create our proprietary modulating refrigerant management circuit. The kwh power equivalent yield generated by the sole solar panel is rated up to 10.6 kwh or 90,000 BTU output performance as compared to a traditional HVAC systems. This then accounts for a major increase of BTU gain in the overall system performance capability. The earth loop connection increases, and boosts the systems operating performance by constant use of geothermal earth heat extraction or heat rejection principles. Using the earth as our heat sink also enables the Ground Hog solar system to provide pre-heated water generated during operation run cycles through its desuperheater component additive. The integrated, proprietary air source outdoor compressor unit operates constantly regardless of outdoor ambient air temperature swing. This function enables full collection, and use of all available free flowing solar air heat elements while managing the critical refrigerant cycle flow distribution between the solar collector panel, and the geothermal earth loop.
• The Ground Hog solar heat pump system includes a proprietary variable speed air handler with proportionately sized kwh heat element capacity, and its patented delta control. However, as a contractor courtesy, industry alternative variable speed or high efficiency air handler products can be substituted, and installed with our solar heat pump. In this case, the standard

manufacturer supplied supplemental heat kit operating efficiency can also be enhanced by installing our patented “Heat Pump Maximizer” delta control (www.heatpumpmaximizer.com ). This patented, time control technology incorporates a temperature comparing relay to determine the exact amount of heat produced by the outdoor unit, measured against the delta T air temperature differential between indoor room air entering, and leaving the air handler evaporator coil. This unique, precise means of temperature differential calculation, and regulation eliminates excessive outdoor unit run time, reduces auxiliary heat short cycling resulting in more operating cost efficiency, and a warmer home.

• The Ground Hog solar hybrid heat pump is equipped with isolation valves to isolate connections to the earth loop or solar panel, and is delivered pre-charged with refrigerant. This has been done to position our system as a true hybrid triple source solar heat pump available for immediate sale as a rescue, restore to service product for the replacement or retrofit markets. This engineering implementation also provides the selling contractor flexible installation scheduling of the solar collector or earth loop components, and facilitates future service maintenance ease.

• The Ground Hog solar heat pump system is an Energy Star accredited technology that has an important cost recovery advantage beyond operating efficiency, and overall cost containment in comparison with air source or geothermal ground source heat pump technologies. This advantage is significant in monetary financial reward consideration as legislated, and approved under current federal tax code. The current approved solar energy federal tax credit is equal to 30 % of the project equipment expenditure with no maximum credit limitation for eligible solar property used to heat, cool or provide hot water for use in a building structure. The 30 % tax credit expires on 12/31/2019. Thereafter it reduces down to 26 % through 12/31/2020, 22 % through 12/31/2021, and 10 % through January 1st 2022 and forward. There may be other local state or municipality financial leverage or eligible incentives available in your area. Please reference the www.dsireusa.org published web site data base regarding these solar technology inspired opportunities.