

An Initial Return on Investment Calculator Using the Ground Source Heat Pump Coefficient of Performance

Shubham Dhuppad, MS, Lantz Holtzower, Ph.D., CBC, LEED GA, Rachel Mosier, Ph.D., P.E. and Saurav Kumar Mohanty, MS.

Oklahoma State University.
Stillwater, Oklahoma.

The geothermal coefficient of performance is similar to the annual fuel utilization efficiency rating. These ratings provide an efficiency benchmark for sustainability. Ground Source Heat Pumps (GSHP) are measured by the coefficient of performance. For every 1 unit of energy entering the unit, the unit is putting out 300-400% return. The GSHP have 3 to 4 times more energy output than conventional heating system such as natural gas system which is right now renowned and well versed throughout the country. To determine the initial rate of return on investment, this calculator is considering factors that contribute the most to the optimization of the system. Currently the industry is using a rule of thumb to determine the typical design.

The objective of this research is to formulate an investment calculator which will identify initial capital investment cost and cost to operate equipment, based on dollars per kilowatt-hour. The research is focused on comparison of conventional heating system and to GSHP and to calculate initial return by including all the factors which play important roles in the output. The research is in initial stages, and final product will able to calculate return of initial investment over the period.

The qualitative methodology used in this research is validated in the empirical nature of the data. Values or a range of values for each variable is selected based on data available in the literature. The values were placed in Microsoft Excel and functions were built to calculate the return on investment for GSHP. This methodological framework can be used to evaluate additional building technologies in future sustainable research.

The result from this research will be a calculator which can determine the return on investment in time for a variety of GSHP. The GSHP calculator described herein is unique as it compares all types of manufacturers and provides an annualized cost. For GSHP to be considered a viable option for commercial and residential construction, a simplified method of calculating the ROI is required. This research will attempt to include all variables to create a realistic framework for the ROI of a GSHP. This research will create a calculator that can help owners, architects and contractors with determining the best return on investment for GSHP. The existing calculators for GSHP performance has been limited to those published by the manufacturers themselves.

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