

Contract Abstract Report

Verification of Geothermal Energy Savings

Prepared for: APPA Deed Scholarship/ Deed Administration

By: Daniel Martin, Student/Intern

Pamela Tierney, Energy Services Program Manager

September 2013

Wyandotte Municipal Services

3200 Biddle Avenue

Suite 200

Wyandotte, MI 48192-0658

Telephone: (734) 324-7113



Electric, Steam, Water

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Project Title:

Verification of Geothermal Energy Savings

Dates Begun and Ended:

6/2013 the project began. The project has ended 9/13/13.

Date Scholarship Awarded:

The scholarship was awarded 6/2013 by the DEED board.

Purpose of Project:

The purpose of this project is to evaluate the performance of the geothermal ground source heat pump systems and compare them to the conventional heating and cooling systems that contain a separate furnace and air conditioning unit. We will then take the performance of these modules to see where efficiency can be increased to reduce the peak value, improve our utility load factor, and possibly gain more geothermal customers. This in turn will lower operation costs for our utility and consumer costs as well.

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Educational Institution Name and Address:

N/A

Student Name/ Supervisory Personnel:

Daniel Martin, Student/Intern

Pamela Tierney, Energy Services Program Manager

Project Subject Areas:

Geothermal, Geo, Heating, Cooling, Residential, efficiency, cost, municipal, electric, gas, consumption, green, reducing peak values, load factor.

Problem Statement:

There are many variables which affect the savings of homes with geothermal ground source heat pump systems. We are looking to see which variables have the biggest effect on savings for the customer and which will cause the cost to increase. In addition to the savings for the customer, we are researching how these Geothermal systems can help our municipal systems and what savings we can benefit from as well whether it be reducing the peak value, improved load factor, and even reducing the cost of the utilities while continuing to improve on our service.

Project Description:

For this project, our main goal was to evaluate the savings that geothermal ground source heat pumps can create. To find the savings of these systems, I evaluated them on a few levels. The data I have collected includes gas usage, electrical usage, size of home, occupants, efficiency of equipment, cost of equipment, and location. These numbers will be analyzed and compared between the conventional homes and geo homes. This comparison will tell us where we can save the most for the customer as well as the benefits for our utility.

Summary of Results:

The project has been completed and the results are in. I have collected data on over eighty homes which includes, size of home (sq. feet), number of residents, equipment efficiency, annual electricity consumed (2012), annual natural gas consumed (2012), water heater type, conventional or geo heating / cooling system, annual geo costs, HVAC costs, geo project costs, and total annual costs. There are 40 homes in the sample with a conventional heating/cooling system and the other half has a geothermal heating/cooling system. All of the homes are located in Wyandotte, MI. The main reason for noting the location is for the comparison to other utilities from other areas around the country. Different climates can have a major impact on the use of geothermal energy and may greatly influence results that you obtain when conducting a study of geothermal heating/cooling from another region.

In Wyandotte, we have seen that geothermal heating/cooling can cut costs to the consumer, the utility, and the environment. We have found that after about an average of 22 years, the geothermal heating and cooling system will have paid for itself and continue to save the customer and the utility money. On average, a geothermal system in Wyandotte will save the consumer about \$580 dollars per month while the utility will make about \$580 dollars more per month. That means it is a win-win situation for everybody. In addition to saving money, geothermal units will provide an improved load factor on the electrical grid by supplying a constant demand instead of a vary demand based on how hot or cold it gets outside. A constant draw will allow the power plant to produce energy more efficiently and cause less stress on components. In other words, I feel this project was a success and we can see how geothermal units can save the utility and the consumer money all while helping everything to run more efficient.