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Application Analysis of Geothermal Heating and Refrigeration Technology in South China

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ABSTRACT

Geothermal energy one of the new energy source, is large reserves, wide distribution and no pollution.Geothermal heating technology has received more and more applications in northern China.Due to the short heating time and high cost, geothermal heating technology is seldom applied in southern China.Geothermal refrigeration can improve the utilization rate of geothermal resources and improve the economy of geothermal heating projects.In this paper, the application technology of geothermal heating and refrigeration technology in south China is comprehensively analyzed, and the economic benefits are calculated, which provides reference for the application of geothermal refrigeration technology in south China.

1. INTRODUCTION

Geothermal heating is a new type of clean clean energy. In the field of heating, geothermal resources, with large reserves, wide distribution, and other significant characteristics of pollution-free, geothermal heating gradually become one of the alternatives to traditional energy heating. Geothermal cooling can improve the utilization efficiency of hot water type geothermal resources, improve the efficiency of geothermal heating project. This paper, taking jiangsu province as an example, combined with the two kinds of demand for heating and cooling, geothermal heating cooling technology are analyzed comprehensively the application technology in south China region, estimates the economic benefits, for the reference for the applications in southern China geothermal cooling technology.

2. THE DEMAND ABOU HEATING,COOLING,IN JIANGSU PROVINCE

In north China region, geothermal heating has gained more and more application of geothermal heating project shows good environmental and economic benefits. In southern China heating demand is the north is small, but forced heating line south of the Yangtze river delta region, such as jiangsu, anhui, Shanghai and other places, from the north cold, and damp climate, the body feels colder. With the improvement of living standards, south of line heating area is gradually increasing demand for heating. In southern China climate, hot summer has strong refrigeration requirements.

Jiangsu province is located in the heating line. Does not belong to the area south of xuzhou in jiangsu province national compulsory heating area, but the natural climate conditions and geographical position as a compulsory heating area, winter low temperature, freezing time, winter heating has become people's life need. New residential district more perfect supporting facilities, the heating rate increased year by year.

3. POTENTIAL GEOTHERMAL RESOURCES IN JIANGSU PROVINCE

Jiangsu geological condition is superior, is better under the condition of deep geothermal energy development and utilization. Geothermal resources in jiangsu province are mainly concentrated in subei basin and basin in the south of jiangsu. Subei basin is one of the most abundant geothermal resources of jiangsu province, part of the land, is located in the north - south yellow sea basin belongs to Mesozoic to Cenozoic formation of the typical continental downfaulted basin, basin with high heat flow value. Northern jiangsu basin geothermal resource in total about 229.8 x 108 tons of standard coal, geothermal fluid in recovery of about 197000 x 104 m3, geothermal fluid recoverable heat about 618 x 104 tons of standard coal. Subei basin, the average geothermal gradient is 22 ~ 35 ℃ / km. Jiangsu basin is located in the south of jiangsu province, belongs to Mesozoic tectonic uplift, heat distribution of Mesozoic and Paleozoic carbonate reservoir.

Geothermal field is constant, the drainage system developed in jiangsu province, shallow geothermal energy resources. From city to city in jiangsu province 14 ~ 18 ℃ isothermal layer temperature, the province area soil initial average temperature below 25 ℃, is conducive to the use of shallow geothermal energy. In jiangsu province is wide plains of shallow geothermal energy resources are abundant, development and utilization prospect is good.

4. GEOTHERMAL HEATING REFRIGERATION TECHNICAL ANALYSIS

4.1 Geothermal heating refrigeration technology principle

Geothermal heating is the use of underground contain heat energy in a way, at present it has more than 30 countries in the world is the use of geothermal energy for heating. Geothermal heating technology can be divided by heat source heating depth and shallow heating refrigeration technology, including shallow geothermal mainly including source of shallow water, soil, etc. In the deep geothermal heating generally adopt the direct use of geothermal energy or heat pump heating technology. Heat pump heating are mainly two kinds of ground source heat pump and absorption heat pumps. Ground source heat pump type according to the heat source heat pump can be divided into soil, underground water source heat pump and surface water source heat pump. Commonly used shallow geothermal heating source of soil or water source heat pump heating.

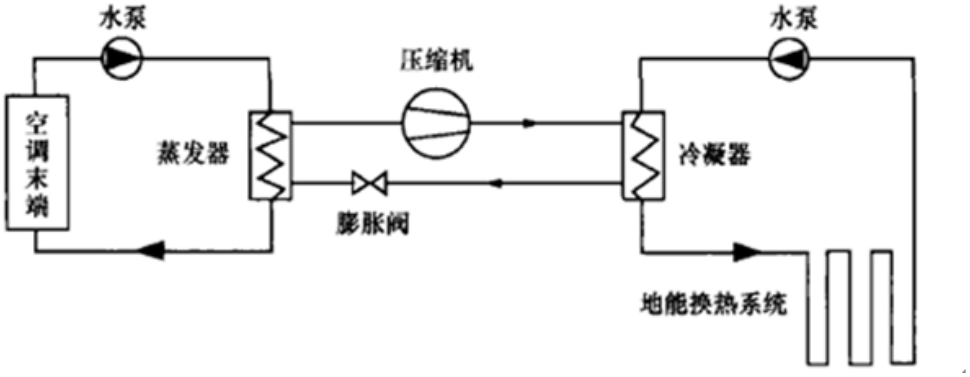

Figure 1: ground source heat pump working principle diagram

4.2 Application cases

A project in south China with a total construction area of 54200 m2. Among them, the underground layer and the ground is given priority to with food and beverage, 2 ~ 5 layers is given priority to with office on the ground, refrigeration and heating area of 43008 m2, maximum heating load is 5077 kw, maximum cooling load is 8073 kw.

Project by buried pipe heat source well + ground source heat pump technology, solve the problem of heating and cooling, heating and cooling system of the green, low carbon environmental protection. Heating refrigeration system construction contents include geothermal Wells and underground pipe network, a ground source heat pump room system, heating refrigeration system for return water pipe network and terminal part, fresh air system, etc.

Run in the summer of 110 day, winter running 90 days, air conditioning period run 14 hours a day on average, 65% of average load rate of the host computing (according to the cooling load simulation), summer energy 182.9 x 104 kw · h, winter 126 x 104 kw · h power consumption, save electricity for the whole year 463 x 104 kw · h. Projects throughout the year to reduce carbon emissions by 463 * 104 * 0.7/1000 = 3240 tCO2. The project total investment 23 million yuan, recovery period of investment is 9.74 years.

5 CONCLUSION

Geothermal heating and cooling project application project in jiangsu, Shanghai and other places have made good social and economic benefits, in line with national the basic national policy of energy saving and emission reduction, is helpful for reducing emissions of pollutants, is beneficial to environmental protection, to build an energy-efficient and environment-friendly harmonious society will play a promote role.

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