

Paper Number: ICR0064

Title of Paper: An Industrial Application of Gas Driven Heat Pump (GHP) by Using Waste Water Heat Sources

Presenter: S-R Park, J-T Park, H-K Yoon, Korea Institute of Energy Research, Korea

Session: E2-2

Person Contributing Discussion or Question: Rane, Milind V., Associate Professor, IIT Bombay Mechanical Engineering Dept., IIT Powai, Mumbai 400076 INDIA

Comment or Question: (1) What is the initial investment for the system? (2) What is the expected payback period? (3) Is any special technology being used for Engine Exhaust heat recovery, also is the heat from engine cooling circuit also being recovered?

Presenter's Reply: (1) This is the first product for research only. It should be cost a lot. When it compared with the other which is same capacity similar system it will be \$60,000 for system and for pipe connections etc. should be additional cost. (2) I think it will be 3 – 4 years, because \$32,000/year are saved. (3) Not particular, however we have to have a special design for manifold as well as gas/water heat exchanger.

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Person Contributing Discussion or Question: Bouma, Jos. W.J., P.O. Box 17, G130AA Sittard NL

Comment or Question: (1) What was the reason(s) that a gas engine was used instead of an electric drive? (2) What is the annual operating time of the heat pump process? (3) Did you use the higher or lower heating value to calculate the PER values?

Presenter's Reply: (1) The company which the system should be expected to install power system was not enough to operate. The power system expansion was expensive. (2) System is working on about 300 days/year. (3) For PER calculation, high value was used.

Paper Number: ICR0017

Title of Paper: Combined Radiant Floor & Forced Air Heating with Direct Expansions GSHP in a Northern Greenhouse

Presenter: V. Minea, Institut de Recherche d'Hydro-Quebec, Canada

Session: E2-2

Person Contributing Discussion or Question: Baxter, V., Oak Ridge Nat. Lab USA, Box 2008 MS-6070

Comment or Question: How far away from the ground source heat exchanger was the undisturbed soil temperature measured?

Presenter's Reply: The undisturbed soil temperature was measured at 5m away from the ground source heat exchanger (about 15 ft).

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Presenter: V. Minea, Institut de Recherche d'Hydro-Quebec, Canada

Session: E2-2

Person Contributing Discussion or Question: Baxter, V.

Comment or Question: In the presentation, and in "Conclusions" of the paper, it is stated that the goal is to reduce energy consumption by 30% or more compared to fossil fuel. Do you mean "source energy"? Also, Conclusions in paper state that after the first 12 month test period, the energy consumption goal was achieved and the tested system was "further improved." By how much has

the system been improved? Is the energy consumption compared to fossil fuel now 40% reduced?

Presenter's Reply: (1) That means "primary energy source", electrical vs. equivalent fossil fuel energy (kwh). The 30% of energy consumption reduction (kwh/year) could also be interpreted as energy cost reduction because a low price ratio (electricity/natural gas) in Quebec (Canada 1.2). Unfortunately, the system's improvements (superheating control and adequate condensing pressures) have lowered the annual COP and increased the energy consumption. The annual operating costs are finally about 20 -25% lower than the conv. systems.

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Presenter: V. Minea, Institut de Recherche d'Hydro-Quebec, Canada

Session: E2-2

Person Contributing Discussion or Question: Presetcshnik, A. Arsenal Research, Faraday Gasse 3 A-1030 Vienna Object 210

Comment or Question: Was it shown that the disturbed soil is recovering during a full annual period of operation?

Presenter's Reply: Yes, after a full heating dominated period (6 to 7 months in cold climates), the soil has almost completely recovered the initial temperature at 90 cm depth while the ground heat exchanger has been installed. This was one of the reasons of installing the GSHEX at only 90 cm depth.

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Person Contributing Discussion or Question: Rane, Milind V., Associate Professor, IIT Bombay, Mech. Engg. Dept. IIT, Powai, Mumbai 400076 INDIA

Comment or Question: What was the logic behind placing the condenser coils at a depth of about 90mm below the surface?

Presenter's Reply: The reason was to get the ground heat exchanger more efficient by absorbing also the rain, melting snow and solar energy, etc., when the weather conditions change during the spring, summer and autumn. The thermally recovering is also more easy from one heating season to another. Thus, the GSHEX is more dynamic and efficient for heating purposes.