CHARTER V

CONCLUSION AND RECOMMENDATION

Conclusion

In this study the real dynamic thermal performance analysis of a single effect solar absorption cooling system with working fluid pair LiBr–H2O is performed.

The results show that, The system runs unsteadily and does not work on a suitable state. Some running parameters of the system need to be adjusted. The numeric value of cooling COP of this system is low in general. The designed cooling capacity is 35 kW. However the practical average cooling load is about 24.61 kW. Thus there is more space to improve the performance of the system. The lower numeric value of COP results from higher Qe. Because the calculation was based on the data which were measured at the external of chiller, the calculated Qe was consist of tow fractions. One is the heat supplied to generator, another is the heat lost to surrounding. Thus the COP calculated by external measurements should be named as the real COP in practical system, not a pure (net) COP of chiller. However the real COP is more valuable for practical application than the pure (net) COP.

The cooling COP of the system increase slightly when increasing the heat source temperature, instead only an increase in the difference between the inlet and outlet temperature of the generator. And, when the temperature of supplying hot water approaches to some higher level, the COP decreases. The irreversibilities in the system that reduces COP to a lower value than the ideal ones are due to the pipes have higher heat loss from the temperature difference between the surroundings.

The performance of the absorption system is strongly influenced by the operating temperatures. The COP would be expected to increase more with increasing heat source temperature. But, as the heat source temperature increases, the heat transfer in all the heat exchangers of the system also increases. The increased heat also results in increased heat transfer irreversibility and a smaller increase of the COP and more heat losses can occur in the generator during the heat transfer process.

In fact, chilled water at a lower temperature has a bigger potential to create cooling effect [6], so to decrease the mass flow rate through Evaporator properly will increase the heat exchange in evaporator thereby the COP of the system will increase.

By the economic analysis, the payback period decrease under both effects of the price of electricity increasing and capital cost decreasing, also the cooling load generated by the system per capital cost is increased. This results is possible because energy shortage and environment factors result to increase the cost of energy. Also, following technology developing and mass production of the system and components the cost of system will decrease.

Although the initial cost of solar cooling system is higher than conventional air conditioner, the lower costs of operation and maintenance make the system being competitive. And the running time of system is to be longer, the more benefits could be gotten especially considering the environmental impacts.

All the above findings refer to a particular application in Phitsanulok, Thailand. The author believes that similar results can be obtained in countries with high solar availability. However, before any decision is taken, the system needs to be optimized further.

Finally by considering the problem of pollution of the planet due to the burning of fossil fuels, the adoption of solar energy to power absorption chillers, even with marginal economic benefits, should not be underestimated.

Recommendation

1. If it is possible to operate the system daily on fixed starting and ending time. So there is residual heat stored in storage tank from previous days. Also that is more desirable for collecting the valuable long term data to analyze and optimize the system.

2. It is desirable to decrease the mass flow rate through evaporator properly. That will increase the performance of the system.

3. Furthermore it is necessary to adjust the mass flow rate through each part to find the suitable work state.

4. As a research purpose if it is possible to fix sensors at inside of chiller, the net cooling COP can be calculated.