Economic analyses of LiBr-H₂O, H₂O-NH₃, LiNO₃-NH₃ and NaSCN-NH₃ vapour absorption refrigeration systems using different sources of energy, have been carried out to optimize the operating variables. The sources of energy under study, are flat plate solar collector, biogas and liquified petroleum gas. The costs of the system components: evaporator plus absorber, condenser plus generator and the total system cost including the costs of the precooler and preheater in the system, costs of energy and cooling water, are exhibited graphically for a wide range of operating conditions. The analyses have been repeated for the given absorption systems using various sources of energy, separately. The costs of the absorption systems have been obtained after designing their individual components through a computerized design procedure for given operating conditions. The costs of the absorption systems, sources of energy and cooling water include the material, fabrication and installation costs at a standard market rates.

A computerized-design-procedure for the four vapour absorption systems have been presented in detail. Empirical equations for the thermodynamic and thermophysical properties of H₂O-NH₃ solution, LiBr-H₂O solution, pure
ammonia and pure water have been developed. Relations for finding the capital and running costs of the sources of energy and cooling-water have been developed after estimation. Relations for finding the heating values of solar collector, biogas and LPG in terms of temperature have also been obtained.

The analyses were done using three different models:

Model I Economic analyses of the energy sources for optimizing generator temperatures

Model II Economic analyses of the sources of energy plus cooling water for optimizing generator and condensing temperatures along with solution flow ratios.

Model III Economic analyses of the absorption systems including their operating costs for optimizing absorber, condenser, evaporator and generator temperatures along with the solution flow-ratios.

A comparative study between the four absorption systems with different sources of energy has been done. The percentage increase in the costs of the three ammonia systems from that of LiBr-H₂O system has been estimated. Also, the percentage decrease in the costs of LiNO₃-NH₃ and NaSCN-NH₃ systems from that of the H₂O-NH₃ system, operating in the refrigeration mode, has been calculated. Graphs
depicting the optimum system-variables and the corresponding performance coefficients of the systems operating in the refrigeration and air-conditioning modes, have been prepared.