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**B.V.BHOOMARADDI COLLEGE OF ENGINEERING AND TECHNOLOGY**

**Vidyanagar Hubli – 580031.**



**DEPARTMENT OF MECHANICAL ENGINEERING**

**A project report on**

**“PERFORMANCE STUDIES ON SOLAR AIR DRYER”**

**Under the supervision of**

**M.B.GORWAR**

**Submitted By**

**SANGANAGOUDA**

**2BV06ME063**

**SANTOSH HIREMATH**

**2BV06ME067**

**MANOJ MANNARI**

**2BV06ME036**

**ANANTH KALIBHAT**

**2BV07ME411**



**CHAPTER 1****INTRODUCTION**

The fossil fuels and environmental implications imposed by their use has made it imperative for exploration of alternatives to fossil based fuels. The pollution menace has made cities more suffocating and has drastically increased expenditure on health by several folds. Our country is bestowed with a large amount of solar energy that is promising resource to meet energy demands in a cost effective way. The growing population has forced technocrats to devise more efficient methods of energy generation and utilization.

The concept of Nega-Watt lays emphasis on conservation of energy through techniques devised for proper utilization and savings. Thus one MW of energy conserved is more valuable compared to an additional MW of energy generated, hence impetus of present system is towards minimization of pressure on environment. The use of renewable energy has provided a succor to pollution menace and other measures of combat include development of cleaning-up technologies like CDM. The impetus here is to minimize Green house gases (GHG) responsible for numerous environmental hazards. Developed countries are permitted to invest on projects in developing countries with rationale to reduce global level emissions. The cost of reduction in pollution of energy systems used in developed countries is higher compared to same quantum of improvement in technology used by developing countries. Thus cost of mitigation of pollutants in Asian countries is cheaper in comparison to reduction of pollution levels in European countries as under developed countries are using less efficient energy systems.

Sun drying is still the most common method used to preserve agricultural products in most tropical and subtropical countries. However, being unprotected from rain, wind-borne dirt and dust, infestation by insects, rodents and other animal, products may be seriously degraded to the extent that sometimes become inedible and the resulted loss of food quality in the dried products may have adverse economic effects on domestics and international markets. Some of the problems associated with open-air sun drying can be solved through the use of a solar dryer which comprises of collector, a drying chamber and sometimes a chimney. The conditions in tropical countries make the use of solar energy for drying food practically attractive and environmentally sound. Dryers have been developed and used to dry agricultural products in order to improve shelf life Most of these either

use an expensive source of energy such as electricity or a combination of solar energy and some other form of energy . Most projects of these natures have not been adopted by the small farmers, either because the final design and data collection procedures are frequently inappropriate or the cost has remained inaccessible and the subsequent transfer of technology from researcher to the end user has been anything but effective. Drying may be an interesting method in order to prevent deterioration. There is spoilage of chilly and other food crops that could be preserved using drying techniques in India and other developing countries. Seasonal crops like chilly are not presently dried for export, or for local consumption during period of scarcity. Large quantities of the chilly spoil in rural area due to conventional drying methods. It is, therefore envisaged that the design of a simple solar dryer could contribute greatly in solving this problem. Solar dryers are usually classified according to the mode of air flow into natural convection and forced convection dryers. Natural convection dryers do not require a fan to pump the air through the dryer. Therefore research efforts will be focused on designing and constructing a simple natural convection dryer.

### **1.1 General introduction**

Renewable energy sources can be replenished in a short period of time and are regarded as energy resources for tomorrow. The five renewable sources used most often include solar energy, hydropower (water), wind, geothermal, and biomass. The solar energy is the main form of energy for sustenance on life on Earth as other forms of energy are derived from Sun. The solar energy exists since billions of years and will continue to support life on earth solar energy can be converted directly or indirectly into other forms of energy, such as heat and electricity. The major drawbacks of solar energy are: (1) the intermittent and variable manner in which it arrives at the earth's surface and, (2) the large area required collecting it at a useful rate. Solar energy is used for heating water for domestic use, space heating of buildings, drying agricultural products, and to generate electricity.