

# ECO-COOLING

## *Ecofriendly and Economic Cooling*

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**Abstract:** Today a huge amount of energy is consumed in air conditioning and cooling units. These units use compression as their basic functionality. Compressor compresses cooling liquid thus providing cool air at the cost of huge amount of electricity. It seems the use of air conditioning is increasing pollution in the environment by releasing poisonous gases into the environment. Therefore there is a great need for developing a system which is eco friendly and have lower power requirement also reducing carbon foot print. Eco-Cooling provides a new way of cooling at optimum cost which is both eco-friendly as well as economic using peltier plates which consumes less energy and cools the surrounding space.

**IndexTerms-** Compression, peltier plate, electricity, cooling, economic

### I. INTRODUCTION

Electricity, which has become a basic necessity of our lives, is in high demand. The increase in demand for cooling system globally in the field of air-conditioning, food preservation, medical services, vaccine storages, and for electronic components temperature control led to the production of more electricity and consequently an increase in the CO<sub>2</sub> concentration in the atmosphere which in turn leads to global warming and many climatic changes. Eco-Cooling is a new alternative because it can reduce the use of electricity to produce cooling effect and also meet today's energy challenges. Therefore, the need for Eco-Cooling in developing countries is very high where long life and low maintenance are needed. The objectives of this system are to develop a working eco cooler to cool a space with Peltier effect.

### II. STUDY OF PELTIER PLATE

The Peltier effect is a temperature difference created by applying a voltage between two electrodes connected to a sample of semiconductor material. This phenomenon can be useful when it is necessary to transfer heat from one medium to another on a small scale. In a Peltier-effect device, the electrodes are typically made of a metal with excellent electrical conductivity. The semiconductor material between the electrodes creates two junctions between dissimilar materials, which, in turn, creates a pair of thermocouple voltage is applied to the electrodes to force electrical current through the semiconductor, thermal energy flows in the direction of the charge carriers. Peltier-effect devices are used for thermoelectric cooling in electronic equipment and computers when more conventional cooling methods are impractical.



Fig 1 Peltier Plate

### III. THERMO ELECTRIC COOLING

The Peltier coefficients represent how much heat is carried per unit charge. Since charge current must be continuous across a junction, the associated heat flow will develop a discontinuity and are different. The Peltier effect can be considered as the back-action counterpart to the Seebeck effect (analogous to the back-emf in magnetic induction): if a simple thermoelectric circuit is closed, then the Seebeck effect will drive a current, which in turn (by the Peltier effect) will always transfer heat from the hot to the cold junction. The close relationship between Peltier and Seebeck effects can be seen in the direct connection between their coefficient.

### IV. HARDWARE IMPLEMENTATION

A model consisting of dc fans connected to an SMPS is used. The SMPS provides required 12v for fans to operate the 2 inlet fans are connected which sucks hot air from surrounding space the hot air circulates inside the chamber which is closed with water soaking pads the hot air directly falls over peltier plate cold junction and releases heat this heat is absorbed by the water pads and thus air becomes cooler and this cool air is thrown out by another fan. Also heat sink provided is to the outside of the chamber and proper heat sinks are used also a fan is used to dissipate the heat generated.

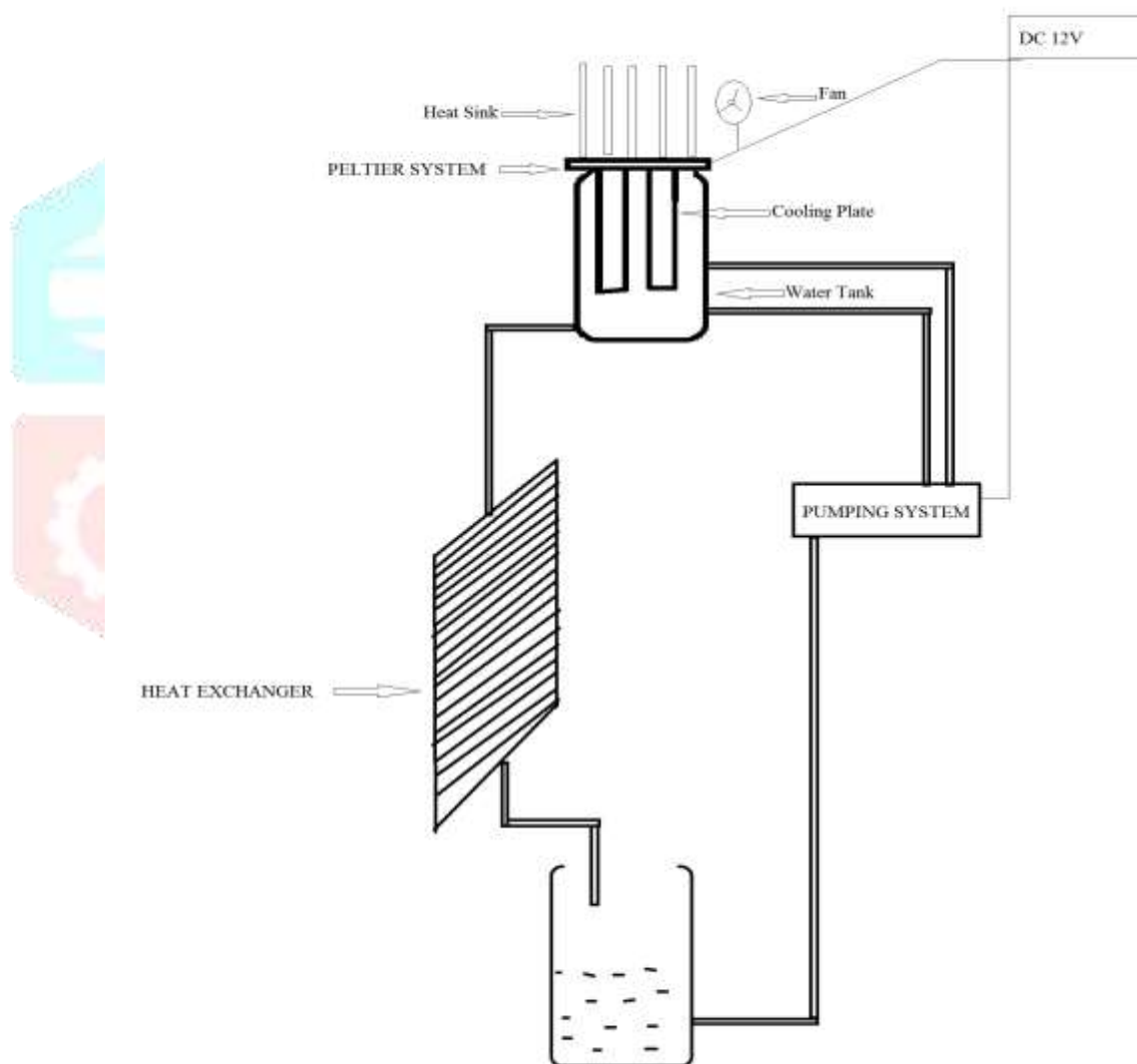


Figure 2 An inner view of Eco-Cooling Model

## V. PRACTICAL CONSIDERATIONS

Temperature change of about 10 degree Celsius is noted, between the incoming and out coming air also difference in air flow is obtained. According to surrounding space the number of fans can be used so as to obtain the desired result of cooling, energy reduction is observed in comparison to an air conditioner and other cooling units. The power consumption in one hour is 50 watts.

## VI. POTENTIAL APPLICATIONS

In general the eco-cooling is both eco-friendly and economic to humans as well as to curtail energy demands so energy can be saved and used efficiently.

### 6.1 Domestic use

In domestic as for household purposes eco-cooling is very efficient and help to reduce electricity bills. Houses can be easily cooled in summers without much electricity and water.

### 6.2 INDUSTRIAL PURPOSE

As in industries large cooling units are installed for cooling as well as removing heat from machines and making them work in cool surrounding the cost of electricity used is very large and thus much energy is wasted by implementing eco-cooling we can easily cool machinery and space that is field so as to efficient working with reduced energy.

## VII. CONCLUSIONS

A Eco-cooling is a model which provides cooling to environment that is in surrounding space and uses less energy than other cooling system and is both eco-friendly as well as economic to human use, with 50 watts per hour.

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