

# Cogeneration of Electrical & Heat Energy by Using the Fresnel Lenses & TEG as Heat Exchanger

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Abstract - Energy is one of the major inputs for the economic development of any country. In case of developing countries, energy sector assumes a critical importance in view of the ever-increasing energy needs requiring huge investments to meet them. The per capita energy consumption is too low for India as compared to developed countries. It is just 4% of USA and 20% of the world average. The per capita consumption is likely to grow in India with growth in economy thus increasing the energy demand. The demographics of India are inclusive of the second most populous country in the world, with over 1.21 billion people (2011 census), more than a sixth of the world's population. India is projected to be the world's most populous country by 2025; its population growth rate is 1.41%. Worldwide scenario on the situation of population growth is nothing but the same.

## I. INTRODUCTION

Energy is one of the major inputs for the economic development of any country. In case of developing countries, energy sector assumes a critical importance in view of the ever-increasing energy needs requiring huge investments to meet them. The per capita energy consumption is too low for India as compared to developed countries. It is just 4% of USA and 20% of the world average. The per capita consumption is likely to grow in India with growth in economy thus increasing the energy demand. The demographics of India are inclusive of the second most populous country in the world, with over 1.21 billion people (2011 census), more than a sixth of the world's population. India is projected to be the world's most populous country by 2025; its population growth rate is 1.41%. Worldwide scenario on the situation of population growth is nothing but the same. Current projections show a continued increase in population in the near future. This analysis of the global population growth and energy consumption is also associated with increasing load on nonrenewable energy resources, the conventional fossil fuels such as coal, oil and gas, which are likely to deplete with time and the use of which is also

hazardous to environment. A major portion of the world's electricity production is still fossil-fuel based, but higher fossil-fuel prices together with increasing concerns over energy security and climate change will boost the share of renewable based electricity in the future years (world energy outlook fact sheet 2009).

### A. Objective

- 1) Heat and Electrical Energy at a time.
- 2) Prevent transmission loss.
- 3) Increases Renewable energy capacity.
- 4) Waste Heat Recovery.

### B. Problem Statement

The problems related to our project are:-The solar energy have no. of application in Heat and power generation. But lower energy density, seasonal accessibility & geographical dependence are major challenges. also Enormous amount of fuel is sacrificed in the process of producing electricity and heat differently. Moreover, these separate processes attributes to emission of pollutants.

### C. Future Scope

In present day, we have to spend huge amount of money on fuel and electricity. Also the conventional energy sources are depleting day by day. People are looking towards Renewable energy sources to increase its efficiency. Government has invested huge Amount on solar farm but there is a transmission losses.

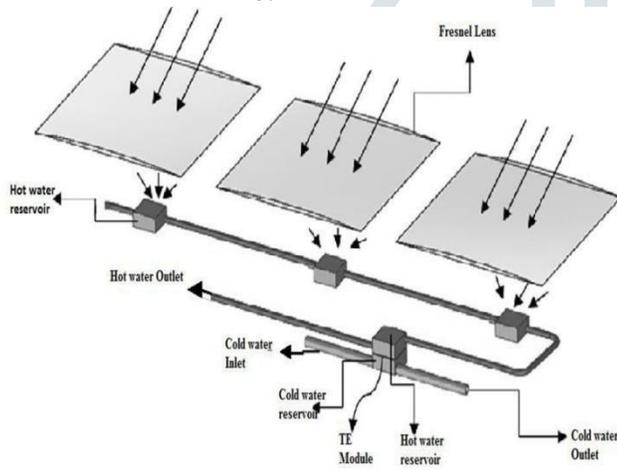
## II. NEED OF COGENERATION

It is well accepted fact that the main sources of energy i.e. fuels are non renewable and depleting very fast. Prices of fuel are trending to be really high since last 25-30 years, putting ahead a challenge to developing

nations to save the energy and primary fuels as much as they can and make them last longer.

Need of cogeneration can be identified where heat and electrical energy are simultaneously required in the same premises. In a traditional method, two separate input and output paths are used to attain the requirements of electricity and heat. Enormous amount of fuel is sacrificed in the process of producing electricity and heat differently.

Moreover, these separate processes attributes to emission of pollutants and green house gases in a considerable amount. CHP systems are attractive because they can deliver a variety of energy, environmental and economic benefits. These benefits stem from the fact that these applications produce energy where it is needed, avoid wasted heat, and reduce T&D network and other energy losses



### III. TECHNICAL DATA

A. Approximate done should be if unit

- 1) Width=250mm
- 2) Height= 175mm
- 3) Depth=0.4mm

B. Materials

Optical plastics are widely used to make Fresnel lens. PMMA is the best material for Fresnel lens as magnifier. It is a good general-purpose material in the visible. Its transmittance is nearly flat and almost 92% from the ultraviolet to the near infrared. Its other physical properties, as rigidity, service temperature, weather ability, are very fit for us to manufacture optical lens.

### IV. DESIGN AND MANUFACTURING

Steps in manufacturing of required size of copper pipes

1. The copper tube of length 1.5m having diameter 0.010m are cut from roll of copper pipe which is available in market and used in air conditioning system.
2. The pneumatic pipe of length 6m having diameter of 0.0010m are use because low cost and high temperature sustainability.

B. Manufacturing Of Lens Panel

1. Total 4 square holes are made on wooden ply to place 4 lenses.

C. Manufacturing Of Insulating Box And Supporting Structure.

1. The pipe system is placed in the wooden box of dimension 0.9x0.21x0.45m<sup>3</sup>.
2. The insulating box is free to rotate at specific angle and the base can be moved to any direction to trace sun rays with the help binding wire.
3. For swinging action a triangular supporting structure is designed, which is made of rectangular steel pipe. This pipe are welded in triangular shape. At the apex point nut is welded. A stud is used through the wooden box into the nut. This stud is used as axel on which the box rotate.

7. Experimental procedure

1. Select The Full Open Condition Of Flow Control Valve On Both Side. After Getting The Steady Flow At Other End Closed The Flow Control Valve At Inlet As Well As Outlet Position.
2. Adjust The Focus Of Focal Point On The Copper Tube By Using Manual Tracking In Single Axis.
3. Adjust The Position After Every 3min By Suitable Angle Using Binding Wire.
4. Record The Temperature After 1hour. Also Record The Readings From Digital Multimeter.
5. Record The Data At Half Open Condition At Same Temperature
6. Repeat The Procedure For Both The Condition.

## A .Proposed Design

## METHODOLOGY

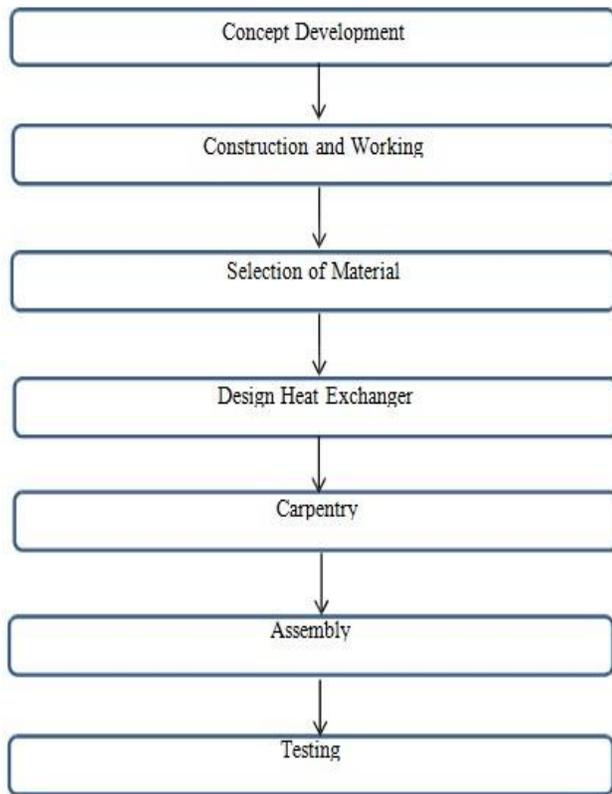


Fig. 2 Flowchart of Methodology

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