

## Solar Energy Used For Induction Cooker Working

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### ABSTRACT

Now days non-renewable energy sources vanishes very rapidly i.e. coal, petrol, diesel, LPG gas. In our country mostly LPG gas is used for cooking purpose but day by day it's prices is increases. So cooking become very costly and dangerous because LPG gas not available easily and it is very explosive one.

Electrical energy is another option for cooking purpose. Per unit cost of electrical energy is also increases. Due to lack of electrical energy there is no surety of continuous supply of electrical energy. So suggest here a project which replace the non-renewable energy sources and accept the renewable energy source like solar energy. Solar energy is a safer, easier, cheaper and faster compared to other cooking systems.

**Keywords—Non-renewable energy; renewable energy; LPG gas; solar energy .**

### I.INTRODUCTION

At every moment our lifestyle is changed. It becomes more fast, comfortable, easier, safer but our cooking style is not change. Still having only two basic option for cooking purpose one is LPG gas and another one is electrical energy. Now time come to switchover from conventional energy source to non-conventional energy source i.e. from LPG gas to solar energy. Solar energy is a free source of energy which is available for 24 hrs. for 365 days of year. By using solar cells covert solar energy into electrical energy. In future every human being may use solar energy for most important work i.e. cooking.

### II.BASIC BLOCK DIAGRAM

The complete system is very easy to install. The basic block diagram of solar based cooking using induction cooker shown in figure 1. The different blocks are such as panel of solar, solar MPPT controller, battery, inverter and induction cooker. Let us see each block in detail.

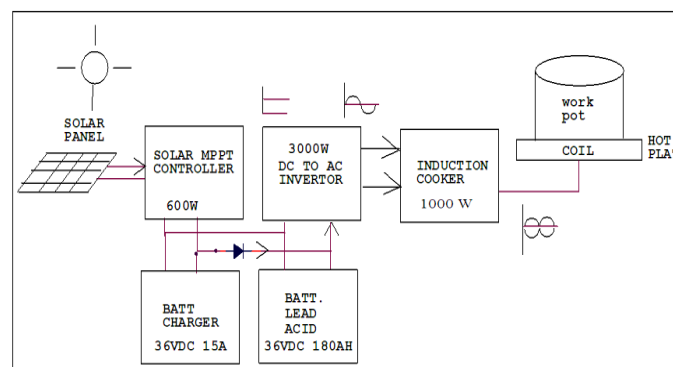


Figure 1 : Basic block diagram

*A. Panel of Solar*

Solar panels are known by different name like photovoltaic module or set of solar photovoltaic modules, a solar thermal energy panel. Solar modules use light energy from the sun generate electricity through the photovoltaic effect. Now days amorphous silicon p-i-n solar cells by LP-CVD zinc oxide coated is very efficient [4].Electrical connections are made in series to achieve a desired output voltage and in parallel to provide a desired current capability.

Each panel is rated in accordance with its DC output power under standard conditions, typical specification ranges from 100 to 320 watts. Suppose select 200 watt panel and for 1000 watt of induction cooker require 5 panel. Each panel of 200 W having voltage of 12V and give the output current of 16 A. All the panel connected in parallel so total amount of current 80 A. Efficiency is 66% so the watt is 660 W. Then current is 660/12 is 55A. Cost of solar panel is 32 Rs. Per watt.

*B. Project battery*

An electric battery consists of a number of electrochemical cells, connected either in series or parallel. A cell which is a basic unit of battery, may be defined as per power generating device Which is capable of converting stored chemical energy into electrical energy. Here in this system secondary or rechargeable battery is used. Examples of secondary cells are lead-acid cell, nickel-zinc cell. Stationary batteries are used for load leveling system which stores energy when demand is low and later on, uses it to meet peak demand. In this project use a couple of batteries each of 12 V and 150 Ah, capacity forming 24 V and 300 Ah capacity. This generates 5 hours of output approximately.

*C. Power converter*

The dc to ac power converters are known as inverters. In other words, an inverter is a circuit which converts a dc power into ac power at desired output voltage and frequency. The ac output voltage could be fixed or variable frequency. This conversion can be achieved either by controlled turn on, turn off the devices (eg. BJTs, MOSFETs, IGBTs, MCTs, SITs, GTOs, SITHs). In this system voltage sources inverters with pulse width modulated (PWM) inverters and half bridge topology is used.[1] Having a rating of 1.5 kVA inverter with standard output specification 230V, 50 Hz to suit our requirement. Here series resonance topology is used[2].

*D. Solar MPPT controller*

MPPT means “Maximum power point tracking” is used for grid connected inverters, solar battery charges and similar devices use to get maximum possible power from one or more photovoltaic devices, typically solar panels. Sun rays follows on the solar panels sometimes shadow is take place due to which production of voltage and current become unequal it may damages the solar panel .Sometime solar panel may burn out. Solar MPPT controller controls the undervoltage as well as overvoltage conditions which occur in solar panel and it protects the solar panel and battery charging unit.When production of voltage is less in that case it boost the voltage and it buck the voltage when production of voltage is excess.

For this project requires the 600 W of solar MPPT controller.

E. Induction cooker

In case of induction cooker induction heating is used. Induction heating is the process of heating an electrically conducting metal by electromagnetic induction, where eddy currents are generated within the metal and resistance leads to Joule heating of the metal. In induction cooker a multi winding coil is present through which a high-frequency Alternating current is passed[3]. Heat may also be generated by magnetic hysteresis losses in materials that have significant relative permeability. The frequency of AC used depends on the object size, material type, coupling and the penetration depth .

III. STUDY

The two big disadvantages of LPG are safety and cost. Keeping a pressurized at 274 times less space than it would normally occupy requires extremely sturdy metal tanks and it’s hardly surprising that LPG containers do occasionally explode. Since LPG is highly flammable transporting it by road and storing it in large tanks in populated areas should be much more dangerous. The disadvantage of electricity is it’s non reliable supply due to load shedding. Sometime a fault is take place in the system due to overloading. It also pollute the atmosphere due the burning of coal.Solar energy is radiant light and heat from the sun harnessed using a range of ever-evolving technology such as solar photovoltaic. Now days cost of photovoltaic cell is decrease continuously. Per sq meter area KCAL value.

Table I Cooking gas and electricity prices

Sr. No.	Year	Cooking gas cost per cylinder	Electricity cost per unit
1.	2017-18	750	7.24

Table I gives the cooking LPG gas and electricity yearly cost.

The one gas cylinder is required for one month the cost of cooking by LPG gas is Rs 750 and yearly cost is Rs 9,000. By considering transportation and maintenance cost Rs. 2,000 than yearly cost is Rs 11,000 .

The formula and calculation gives the amount required for monthly cooking by using electricity.

$$(Wattage \times \text{Hours used per day}) / 1000 = \text{Daily kilowatt-hour}$$

( kWh). The 1000 W induction cooker is run for 3 hours a day than daily and monthly cost of cooking is given below.

$(1000 \times 4) / 1000 = 4$  Units. The rate of 100 unit to 300 unit for household use is Rs. 7.39[5] . So daily cost of cooking is Rs 29.56 and monthly cost of cooking is Rs. 916.36 and yearly cost of cooking is Rs. 10996.32

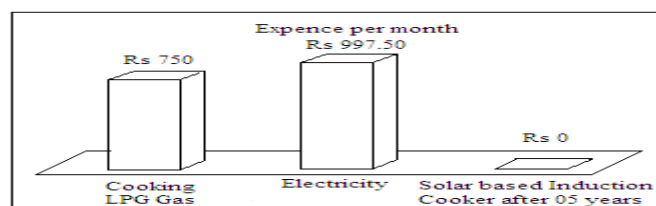


Figure 2 : Bar graph of monthly cost of cooking

The figure 2 gives the monthly cost of cooking.

Table II Cost of component

Sr. No.	Particular	Cost in Rupees
1.	Cost of pannel	32,000/-
2.	Solar MPPT controller	1,000/-
3.	DC to AC inverter	1,000/-
4.	Induction cooker	1,000/-
5.	Battry charger unit	1,000/-
6.	Battry	8,000/-
Total		44,000/-

Table II gives the cost of component.

For solar based induction cooker installation cost Rs.44,000. The monthly cost is Rs.733.33. After 5 years there is no need to spend any rupees for solar based cooking and saving of Rs.8800 per year.

#### IV. CONCLUSION

In this away here conclude that solar energy is best option for induction cooker as a input energy source.

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