

SOLAR AIR CONDITIONER

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ABSTRACT

The development of renewable energy is on the rise worldwide because of the growing demand on energy, high oil prices, and concerns of environmental impacts. In recent years, progress on solar-powered air conditioning has increased as nowadays, air conditioning system is almost a must in every building if we want to have a good indoor comfort inside the building. Therefore, this paper focuses in the design and construction of a direct current (DC) air conditioning system integrated with photovoltaic (PV) system which consists of PV panels, solar charger, inverter and batteries. The air conditioning system can be operated on solar and can be used in non-electrified areas. As we all known, solar energy is cost effective, renewable and environmentally friendly. This report deals with a wide range of components, however, most of the components and subsystems covered are not only suitable for solar air-conditioning.

Some components are used for electrically, mechanically or heat driven air-conditioning. And of course other sources of mechanical energy or heat could be used for powering these components.

An aim of the report is to describe and explain the working principles of the components and subsystem in such general terms that the report is usable not only to those specifically interested in solar air conditioning, but to anyone interested in air conditioning, heat driven air-conditioning and solar energy.

The last section of the report briefly deals with how the components can be combined to form a complete solar air-conditioning system.

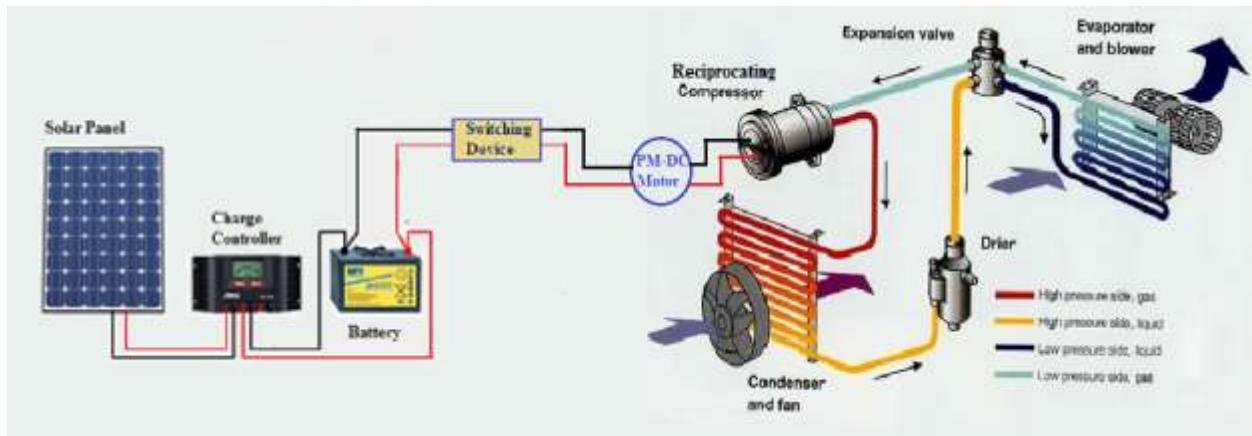
Keyword : - Solar Panel , PMDC Motor , Car Air-Conditioner etc.

1. INTRODUCTION

Air -conditioning is one of the major consumers of electrical energy in many parts of the world today. The demand of air conditioning is increasing due to the effect of climate change and global warming. If we still rely on the conventional electric air conditioning but electricity is generated from fossil fuels, the greenhouse gas emission would continuously worsen global warming; in turn the demand of air conditioning would be further increasing. In subtropical cities, air conditioning is a standard provision for buildings. However, air conditioning would commonly take up half of building electricity consumption.

The purpose of this project is to design and construct a direct current air conditioning system besides describe the component and characteristics of the system including its advantages and limitations. The actual performance of the system will be studied based on operational view and commercial applications.

2. SOLAR AIR CONDITIONER



2.1 Solar Panel

For solar air conditioner, we are using three solar panels each of 125 watt. Solar panel is connected to the battery of 24 V. Solar panel converts solar energy into electrical energy with the help of photovoltaic cells. We are fitting this solar panel on the roof of car. For the convenience, we can also use flexible solar panels of same rating.

2.2 Battery

We are using 12V battery type for the storage of electrical energy having current rating of 15A. Battery is connected to the solar panel with charge controller. Charge controller is used for prevention of battery from overcharging.

2.3 PMDC Motor

We are using PMDC motor having rating of 24V, 15A, 375W, 1500 rpm. V-shaped pulley is fitted on the shaft, due to which compressor is coupled with motor using belt. Motor is connected to the 12V battery. Motor is connected to battery in such a way that it rotates in clockwise direction.

2.4 Air-conditioning unit

For solar air conditioner, we are using air-conditioning unit of Maruti 800 car. The car air- conditioning unit consists of :

- Reciprocating compressor
- Condenser
- Receiver drier
- Blower

3. HARDWARE RESULTS



Assumption:

Price of Solar A/C = Rs.30,000.00

Price of Normal A/C (2HP) = Rs.40,000.00 (Including the installations)

Hour	Electricity Consume of Normal A/C	Electricity Consume of Solar A/C	Electricity Saved
1 hour	1.3 kw	0.7 kw	0.6 kw
10 hours	13.0 kw	7.0 kw	6.0 kw
1 month (10 hours / day)	390 kw	210 kw	180 kw
1 year (10 hours / day)	4,680 kw	2,520 kw	2,160 kw
1 year (10 hours / day)	1,872 Mw	1,008 Mw	864 Mw

4. CONCLUSION

This project focuses on design, construction and testing the performance of solar-powered air conditioning system integrated with photovoltaic (PV) system. The project comes as a solution to reduce the electric demand especially during the summer and can be used efficiently in remote area where the electricity is not available.

Solar air conditioning systems can be a reasonable alternative to conventional air conditioning systems. There are several characteristics that must be considered to know either on the PV system or on the air conditioning system such as electrical equivalent, characteristic curve, and factors affect the output of PV cells.

Solar energy as a power source can reduce peak energy demand and increase the use of renewable energy, while providing energy savings to the end user.

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