iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** III **Month of publication:** March 2020

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

Investigational Study of Solar Photovoltaic DC Operated Refrigerator with using Thermal Storage

Arshad Shaikh[1], Prashant Gunjarge[2], Chandrakant Kapur[3], Prof. A. M. Halmare[4]
[1, 2, 3, 4]*Department of Electrical Engineering, Karmaveer Dadasaheb Kannamwar Engineering College, RTMNU University, Nagpur, Maharashtra, India.*

Abstract: ***A demonstrate, environmentally-safe answered that remove the require for cell/accumulator solar photovoltaic powered refrigeration structure that remove the dependency on an electric network which eliminates the need for battery and stock thermal power for economical application when sunrays are not present. The revolution use a changeable speed, Direct current condensation structure, coupled to solar photovoltaic console through a noval electronic control .***
The environmentally-safe structure is perfect for use in household and business purpose ,freezing .it is specially perfect for off-networks features
Keywords: ***Refrigeration , Peltier effect, Thermal storage, Solar Panel, charge controller, 16X2 LCD display***.

I. INTRODUCTION

Even though the PV power aqua ammonia system has been commercialized, aqua ammonia system needs attention of the analyst after all they are occupying the 91% market of the family utilization. Johnson expanse centre solar photovoltaic powered structure make use of photovoltaic panel , vapour condenser ,Thermal storage and reservoir and various electric control .The procedure that construct freezing feasible is the changing of sunrays into a DC electric power, attain by the photovoltaic panel. The DC electric power Drives the condensing to flow refrigerant through a vapour compression freezing coil that draw out the hotness from an insulated enclosures s . This enclosures comprise the thermal reservoir and a shape change substance .This substance chilling as heat is draw out from the enclosure . This procedure successfully design an " ice-pack," authorizing temperatures conservation inside the enclosures not in the present of sunrays.

Actual measurement of the highly wrapped container, phase change thermal storage device, changeable speed compressor, and solar photovoltaic panel allow the refrigerator to stay behind cold/ chilling all many year long . To better the change of solar power into thermal energy, a condensing the power technique fully make use of the available power .Other energy optimization choose carefully include.

1) Smoothing the power voltage through a capacitor , providing the supplementary current during condensing start-up
2) Observing the rate of change of the smoothed power voltage make using of a controller to decide if the compressor is running under or above the accessible power maximum , authorizing adapting of the compressor speed if required.
3) Returning the capillary tube in the refrigerator structure with an expansion valve, increasing power efficiency in unquestionable operating circumstances.

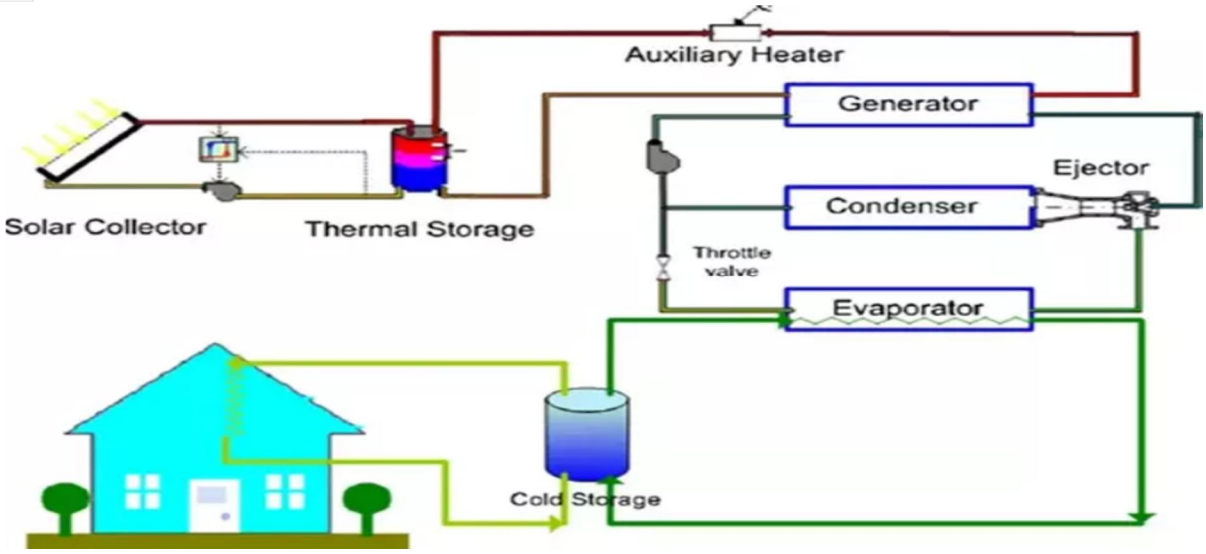
These adaptation to the compressor working help to cause to the changing of the majority of the obtainable solar energy into stored thermal energy . Feature may include a chilled side water loop or incorporation of the evaporator into the thermal storage . Electric control also can be added to support energy from an different energy source such as an electric grid.

II. METHODLOGY

A. Peltier Device

Thermoelectric cooling utilize the peltier effect to design a warmness flux at the joint of two various types of substances. A peltier at a fairly low temperature or thermoelectric heat pump is a rigid–state active heat pump which shift heat from one side to other ,with utilization of electric power , rely on the administration of the current . such an instrument is also called a peltier device or Thermoelectric cooler (TEC). It can be used for both cooling as well as heating Although in practice the important feature is cooling. It can be also used as temperature assessor that for both cools or heats.

This mechanism is not so much commonly put in the application to freezing than vapour-compression freezing . The main advantage of peltier cooler is that there is no any moving part compare to vapour compression refrigerator. It also has long life, small size and flexible in shape or size. Many companies try to devlope various type of peltier cooler



B. Solar Panel

The term solar panel is utilize informally for Photo-Voltaic module

A PV module is a construct of photo-voltaic cells mounted in a frame work of installing . PV cells utilize sunrays to generate DC power or electricity. A group of PV modules is called a PV panel, and a structure panels is an array. Arrays of PV system supply solar electricity to electrical instrument . The energy supplied by the PV panel is 25W, 12v and 12 amp respectively .

C. Thermal Energy Storage

TES is attained by various mechanism/technology. Depending on the specific technology , it give permission to the excess thermal power to be stored and used for daily purpose at scales ranging from separate action , usage sample are the stabilizing of energy demand at a both time such as daytime and nighttime. Storage media include water or ice-slush tanks, masses of native earth or bedrock entranced with heat exchangers by means of boreholes ,deep aquifers strata shallow lined pits filled with grid and insulated at the top as well as eutectic solution and phase change materials

III. BENEFITS

A. Environmentally Friendly: Harnesses the energy of the sun to reduce dependence on fossil fuels and eliminates the need for batteries that can be damaging to the Earth upon disposal

B. Longevity: Operates continuously for years as proven by prototype units tested at various locations around the world

C. Scalable: Suits applications in a wide range of sizes, from portable 50-liter coolers to building-size air-cooling systems

IV. APPLICATIONS

A. Refrigerators

B. Freezers

C. Ice-makers

D. Coolers

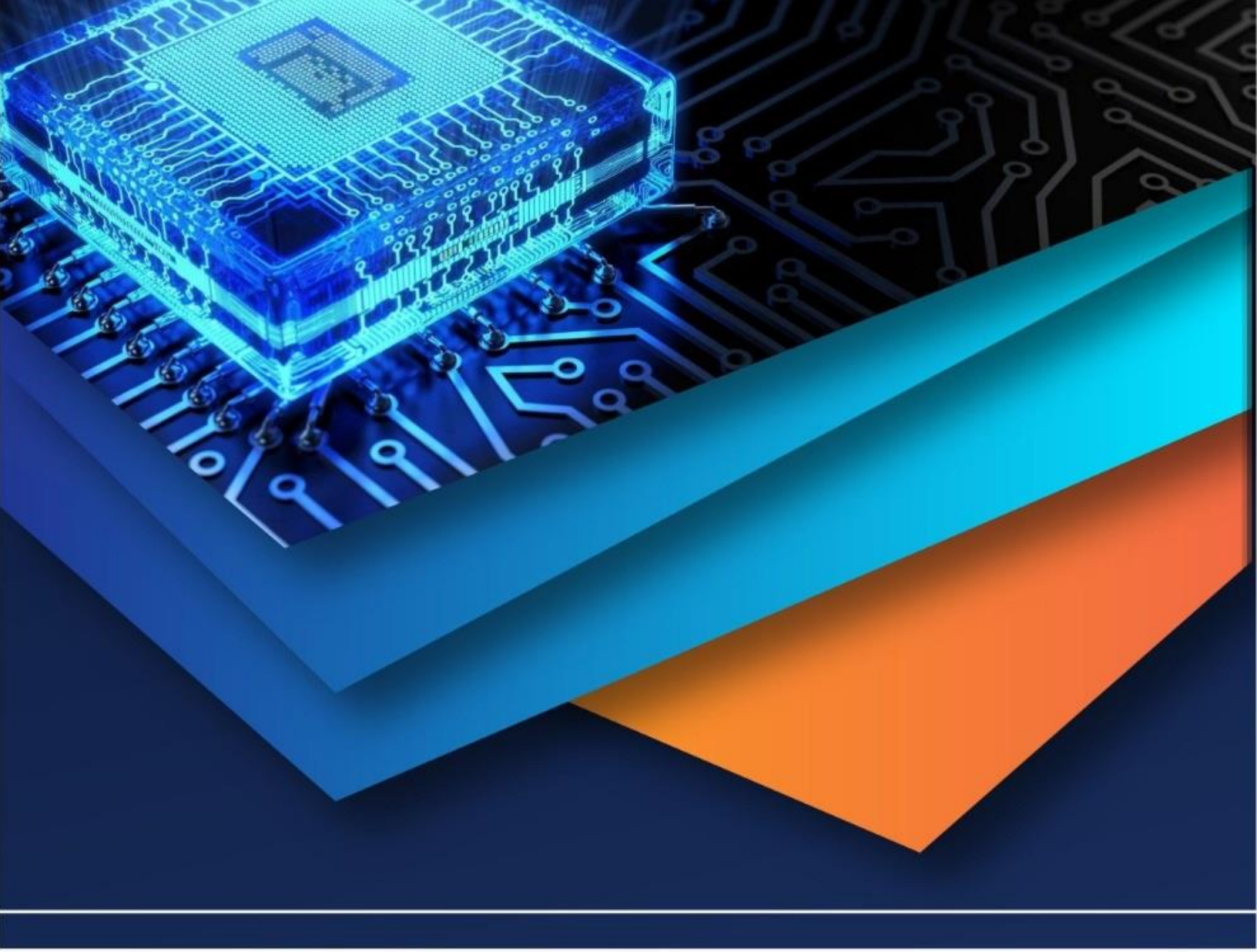
E. Building air-cooling systems

V. CONCLUSION

Concluding all , we know that very well pollution is increses day by day therefore solar thermal Refrigerator is solution for to control the pollution such as air and water so the replacing the power sources by solar panel and thermal storage we can reduce the industrial pollution. We can replace the domestic refrigerator by using solar thermal refrigerator this type of refrigerator will reduce the effect of the ozone layer or global warming on the Earth.

REFERENCES

[1] "Encapsulated Phase Change Materials (EPCM) Thermal Energy Storage (TES)" Retrieved 2 November 2017.
[2] Deepak Toppo, Rajan Kumar, Hari Kumar Singh,. " Studies Of A Solar Powered Refrigerator With Thermal Storage System".
[3] Ioan Sarbu ,Calin Sebarchievici "A Comprehensive Review of Thermal Energy Storage". Published: 14 January 2018.
[4] Thakkar Mohit Pravinchandra, Dr. Jatin Patel. " Peltier Cooling Module''.2015.
[5] Yogi Goswami, " Solar Energy The Official Journal of the International Solar Energy Society."



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY