DC-DC Converter Using Renewable Energy

[1]Saugaat Gupta, [2]Rahul Kumar

[1,2] B.Tech. Student, Department Of Electrical And Electronics Engineering
SRM Institute Of Science and Technology, Chennai, India

Abstract:- In general we know that non- renewable sources are non-sustainable sources after few years we use renewable energy source only. In our project we are using some renewable energies those are solar energy, wind energy, fuel cell. This report shows the investigation of dc-dc converters for sustainable power source framework. In this by utilizing the sun based and wind we are producing the 220volts power, When these sources are deficient because of the climate conditions we can get the power by utilizing energy component. Power gadget in which electrolysis happen to make hydrogen for age. By and by "electrolysis " is an electrochemical method in which electrical imperativeness is the principle stimulus for manufactured reactions. An electrolytic compound is broken down by going a current through it. Water is crumbled to hydrogen and oxygen by going a back and forth movement through it inside seeing sensible substances called electrolytes. Electric stream makes firmly charged hydrogen particles migrate to the conversely charged cathode, where a diminishing occurs in order to shape hydrogen atoms. The particles confined will merge to vaporous hydrogen molecules (H2). The most crucial part in the advancement of electrolysis units is to use palatable anodes to avoid bothersome reactions which produce contaminating impacts in the hydrogen gas. By Using fuel cell we generate power for the load where solar and wind energies are used for the constant maintenance of power. In this we are using buck-boost choppers to step up and step down power to desired value. Rectifier converts ac to dc, inverter converts dc to ac for load. In our project we are maintaining constant power at load by using renewable energy.

***Index Terms*: DC-DC converters, renewable energy source, regulator, inverter, rectifier.**

I.INTRODUCTION:

This paper presents how to maintain a constant power supply by using renewable energy sources. In this project we are using solar, wind and fuel cell energy sources when any one of source is insufficient to maintain constant power supply to the load ,alternate sources are used to maintain constant power supply. We can use this industries and domestic.
Electrolysis is an electrochemical procedure in which electrical vitality is the main impetus for synthetic reactions. An electrolytic compound is decayed by going a flow through it. Water is deteriorated to hydrogen and oxygen by going a momentum through it within the sight of appropriate substances called electrolytes.
Electric charge flow makes emphatically charged hydrogen particles move to the conflictingly charged cathode, where a reduction occurs in order to shape hydrogen atoms. The particles confined will join to vaporous hydrogen molecules (H2). Of course, oxygen is molded at the other terminal (the strongly charged anode). The stoichiometry of the reaction is two volumes of hydrogen to one volume of oxygen. The most essential part in the improvement of electrolysis units is to use adequate cathodes to avoid bothersome reactions which produce contaminations in the hydrogen gas.

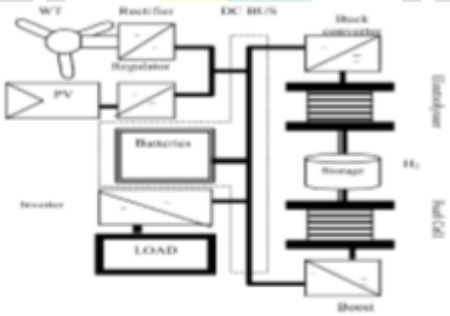
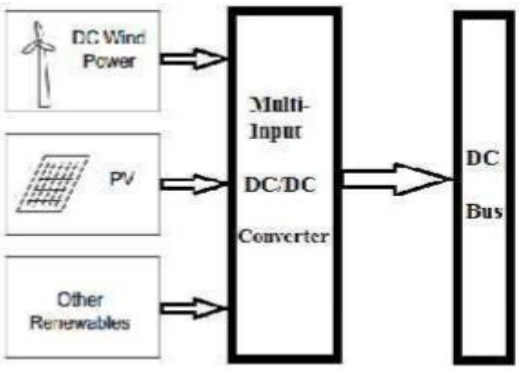


Fig 1 Block diagram representation



Pictorial representation of renewable energy system

A. Methods of hydrogen production through water electrolysis

Regardless of the reality in the revelation of electrolytic water breaking down was initially seen in acidic water. In modern plants soluble medium is favored in light of the fact that consumption is all the more effectively controlled and less expensive development materials can be utilized for acidic electrolysis innovation. Different techniques for hydrogen generation, for example, proton trade layer electrolysis and steam electrolysis have been created as of late. Hydrogen could likewise be created as a result amid chloralkaline generation. The put away hydrogen is bolstered to an energy component to create power.

II WORKING OF TYPICAL RENEWABLE/ NON CONVENTIONAL ENERGY SYSTEM

The fundamental model to depict the components of a Renewable imperativeness system with Hydrogen storage(RESHS) . It consolidates sub-models of the electrolyser, the fuel cell, the batteries, the power interfaces (buck and lift converters)and the limit structure In this we are using the reasonable power sources are wind and the photo voltaic cells. By utilizing these we can produce the power.

III. PROPOSED TOPOGRAPHY AND DIFFERENT STATES OF OPERTION

Fig. 2. Proposed two fold information converter As been examined in area I, the lift converter is made of a PSC cell which can be utilized to build up a MIC while utilizing in parallel with a voltage load. This system has likewise been pursued for determination of the proposed converter where the lift converter is associated in parallel with the voltage sink. In this converter Vin1, Vin2 and Vo are the info voltage of the Y-source converter, the information voltage of the lift converter and the yield voltage, while Vin1 < Vin2 < Vo. The proposed converter can draw control from two voltage sources at the same time or independently. The exchanging control plan and power the executives will be additionally examined in area III. As indicated by the conditions of the switches S1 and S2, there will be four modes which are as per the following.

Mode I. S1 off, S2 on: The equal circuit of this mode is appeared in Fig. 3 (a). In this mode, Din and Do1 are directing while Do2 is invert one-sided as a result of the conduction of S2. The inductor L2 is charged by Vin2 while the heap is sustained by the impedance organize. By applying KVL in cross sections 1 and 2 which are indicated in Fig. 3 (a), the voltage over the inductors VL1, VL2 are separately acquired which are additionally introduced in TABLE I, where N1 N2 and N3 are the turn proportions of the winding 1, 2 and 3 of the transformer individually and furthermore, VC1, VC2 are the voltage over the capacitors C1, C2 and VL is the voltage over the essential twisting of the transformer (N1). Mode II. S1 on, S2 off: The equal circuit of this mode is appeared in Fig. 3 (b). In this mode, Din and Do1 are invert one-sided on account of conduction of S1, while Do2 is leading. VL1, VL2 in this mode are displayed in, which are gotten by applying KVL to similar lattices. Mode III. S1 off, S2 off: The proportionate circuit of this mode is appeared in Fig. 3 (c). In this mode, Din, Do1 and Do2 are leading. Consequently, the two sources are associated with the heap and providing it. VL1, VL2 in this mode are displayed in, are gotten by a similar strategy. Mode IV. S1 on, S2 on: The equal circuit of this mode is appeared in Fig. 3 (b). In this mode, Din, Do1 and Do2 are turn around one-sided on account of conduction of S1 and S 2. VL1, VL2 in this mode are exhibited .

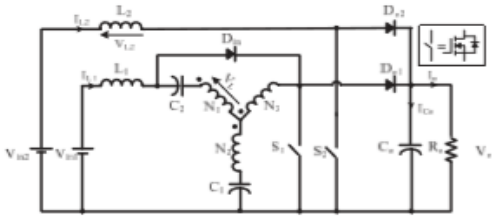


Fig 2 Proposed two fold information converter

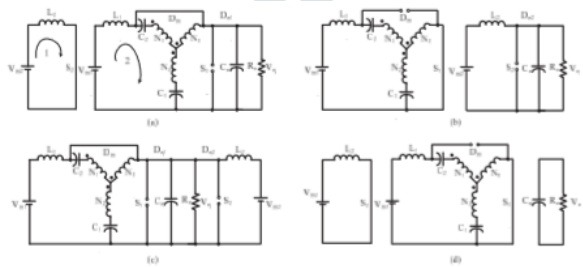


Fig. 3.Operation states of the proposed converter:(a) Mode I, (b) Mode II, (c) Mode III, (d) Mode IV

IV.CONVERTER USING DC-DC BOOST

Boost converter is included four segments as showed up in fig. 4, which join the capacitor, MOSFET, diode and inductance. The name proposes, it adventures up the data voltage which makes the yield voltage more important than the information voltage. The converter is control through the MOSFET which go about as a switch. The ON and OFF of the switch controls the yield voltage by changing the voltage of the inductance so as to enable the PV module control the load at most extraordinary voltage. The movement of the lift converter is explored in predictable conduction mode (CCM). In interminable conduction mode the inductance current streams steady iL(t) > 0 as showed up in fig. 5. The time basic of the inductor voltage more than one time period must be zero in resolute state.

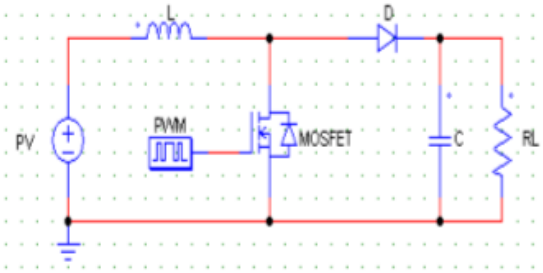


Fig 4 Boost converter representation

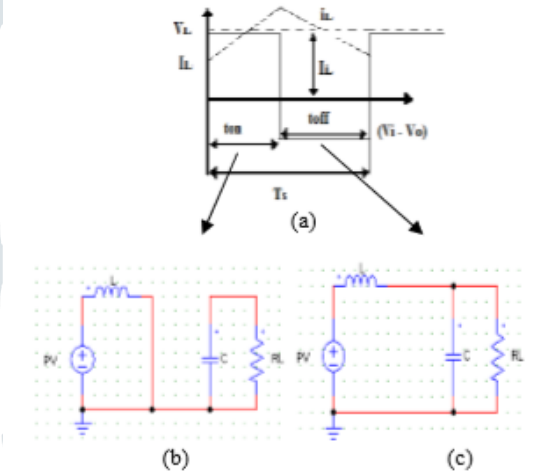


Fig 5(a) Steady state waveform for CCM (b) When switch ON (c) When switch OFF

V. FUNCTIONS OF OPERATING SYSTEM OF DC-DC CONVERTER

It is combined and connected with PV module, weight and PWM generator. Propelled PI controller will by and large boost the yield control from photo voltaic module by adjusting the commitment cycle so the photo voltaic module will reliably be at its most extraordinary power reliably. This is done by determinedly assembling trial of voltage and current from weight using the mechanized relative and fundamental controller to augmentation or decrease the voltage associated with the beat generator (PWM) in order to change the commitment cycle of the converter.

VI. IMPLEMENTATION IN SYSTEM

The suggested shut circle controller for feasible power source system showed up in fig. 6 The PV cell module gives 18.5 V voltage in perfect state of climate. At first at the yield organize no yield voltage accordingly PI send pennant to switch ON and thus hugeness set away in inductor. Right when turn can't abstain from being turn OFF inductor discharges the significance at the yield compose, which sense by voltage sensor and send it to incorporate fragment. In the interim inductor current is sense by current sensor and sends it to investigation part. Yield voltage is separated and required estimation of voltage which is responsibility for modernized PI. The comparator produces PWM beats by separating modernized PI yield and reference triangular standard. PWM beats send to the switch the MOSFET switch with the target that DC-DC help converter works in ceaseless conduction mode. Hence the yield voltage is kept at 24V unsurprising voltage level utilizing electronic PI controller.

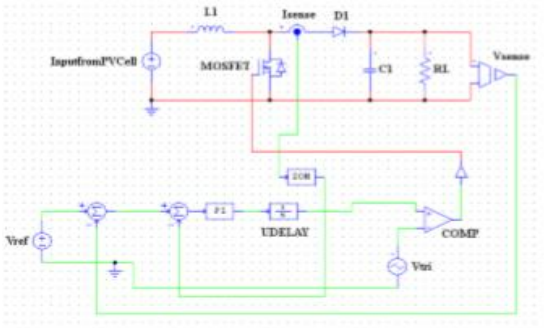


Fig 6 Shut circle controller

VII. RECENT DEVELOPMENT IN DC-DC CONVERTERS

The productive delicate exchanged lift converter can be expanded by utilizing a helper organize notwithstanding the lift inductor, support switch, and lift diode as appeared in Figure 7. The picked converters are proposed for the most exceedingly dreadful working conditions of: least information voltage, Vin = 48 V; most noteworthy yield voltage, Vo = 200 V; and most prominent yield control(2 kW for each cell); trading repeat, fs = 10 kHz; inverter yield beat width, δ = π. The fundamental circuit chart of the DC-DC converter is a changed course of action (LCL type) full converter with capacitive yield filter. The converter works in slacking PF mode for incredibly wide assortments in weight and supply voltage, as such ensuring ZVS for all the basic switches. The top current through the switches decreases with weight current. The key piece of the square wave input voltage is associated with the deafening framework and the consequent sine surges of current and voltage in the resonating circuit are figured using built up AC examination. For a rectifier with an inductor yield channel, a sine wave voltage appears at the information, and the typical terrains at the consequent DC yield voltage exchanging condition and furthermore to retain the voltage flood over the switches at the turn-off case.

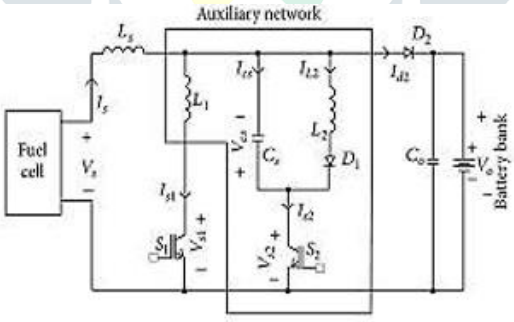


Fig 7 Lift converter

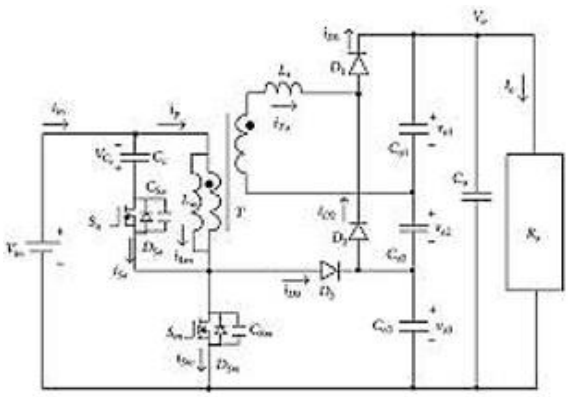


Fig 8 Lift converter using diode

VIII. DC-DC CONVERTER CIRCUIT WITH TOPOLOGY

1. With Transformer 2. Without Transformer

Analysis of selected converters

The picked converters are planned for the most exceedingly terrible working conditions of: least information voltage, Vin = 48 V; most prominent yield voltage, Vo = 200 V; and most prominent yield control(2 kW for each cell); trading repeat, fs = 10 kHz; inverter yield beat width, δ = π. The basic circuit chart of the DC-DC converter is a changed course of action (LCL type) full converter with capacitive yield filter. The converter works in slacking PF mode for incredibly wide assortments in weight and supply voltage, thusly ensuring ZVS for all the basic switches. The top current through the switches reduces with weight current. The key piece of the square wave input voltage is associated with the loud framework and the consequent sine surges of current and voltage in the reverberating circuit are figured using built up AC examination. For a rectifier with an inductor yield channel, a sine wave voltage appears at the information, and the typical grounds at the resulting DC yield voltage

IX. SIMULATION RESULTS

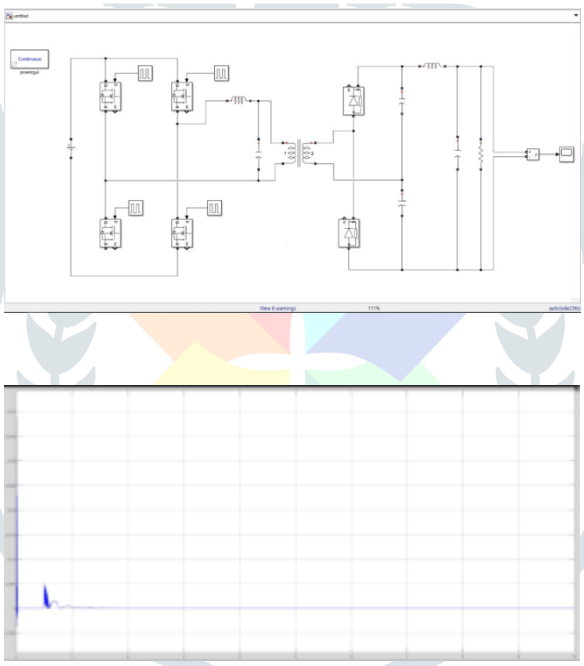


Fig 9 With transformer

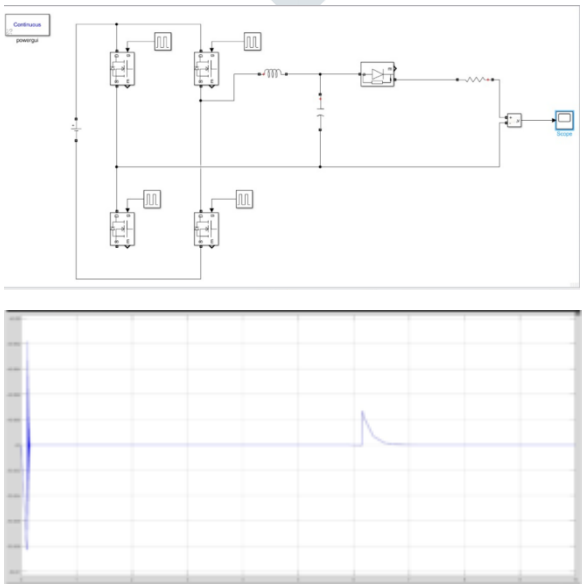


Fig 10 Without transformer

X. CONCLUSION

This report exhibits an examination of DC-DC Converters for Renewable Energy System here, dc-dc converters are used for venture up and venture down the voltage by utilizing sun oriented and wind vitality we are producing 220 volts if this sources are inadequate due the climate conditions we can keep up the consistent power supply by utilizing power module .The reproduction and exploratory outcomes demonstrate that we are keeping up the steady capacity to the heap. The electrolysis technique which builds the hydrogen generation and capacity rate from wind-PV frameworks. Amid times of abundance load request over the info inexhaustible assets, an energy unit working on put away hydrogen would give a parity of intensity . By taking adequate qualities we get the 220 volts consistent capacity to the heap. Lastly by utilizing inverter we are changing over that DC to 230volts AC which will be provided to the heap.

XI. REFERENCES

[1] M. Park, M. Michihira, and K. Matsuura, "A Novel MPPT Control Method using Optimal Voltage of PV with Secondary Phase-Shift PWM Control DC-AC Converter," International Conference on Electric Power Engineering, Aug. 1999.

[2] F. Z. Peng, H. Li, G. J. Su, and J. S. Lawler, "A New ZVS Bidirectional DC-DC Converter for Fuel Cell and Battery Application," IEEE Transactions on Power Electronics, Vol. 19, Jan 2004.

[3] K. Wang, C. Y Lin, L. Zhu, D. Qu, F. C. Lee, and J. S. Lai, "Bi-directional DC to DC Converters for Fuel Cell Systems," PET'98.

[4] G. J. Su, F. Z. Peng, and D. J. Adams, "Experimental Evaluation of a Soft-Switching DC-DC Converter for Fuel Cell Applications," PET'02.

[5] H. Matsuo, Wenzhong Lin; F. Kurokawa, T. Shigemizu, and N. Watanabe, "Characteristics of the Multiple-Input DC-DC Converter," IEEE Transactions on Industrial Electronics, Vol. 51, June 2004.

[6] B. G. Dobbs, and P. L. Chapman, "A Multiple-Input DC-DC Converter Topology" IEEE Power Electronics Letters, Vol. 1, March 2003.

[7] H. Matsuo, K. Kobayashi, Y Sekine, M. Asano, and Lin Wenzhong, "Novel Solar Cell Power Supply System using the Multiple-Input DC-DC Converter," IEEE INTELEC, Oct. 1998.