DESIGN SIMULATION OF MULTI-INPUT TRANSFORMER-COUPLED BIDIRECTIONAL DC-DC CONVERTER WITH ANN CONTROLLER

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ABSTRACT:

a control strategy for power flow management of a grid-connected hybrid electrical phenomenon (PV)–windbattery- a based system with associate degree economical multi-input transformer coupled bi-directional dc–dc convertor is bestowed. The planned system aims to satisfy the load demand, manage the facility flow from completely different sources, inject the excess power into the grid, and charge the battery from the grid as and once required. A transformer-coupled boost half-bridge converter is used to harness power from the wind, whereas a duplex buck– boost convertor is employed to harness power from PV beside battery charging/discharging management. A single-phase full-bridge bi-directional convertor is employed for feeding as masses and interaction with the grid. The planned converter design has reduced number of power conversion stages with less element count and reduced losses compared with existing grid-connected hybrid systems. This improves the potency and therefore the dependability of the system.

Keywords: Battery charge control, bidirectional buck– boost converter, full-bridge bidirectional converter.

1. INTRODUCTION:

The fascinating complementary behavior of star insulation and wind speed pattern plus the preceding advantages has junction rectifier to the analysis on their integration ensuing in the hybrid PV–wind systems. For achieving the combination of multiple renewable sources, the standard approach involves mistreatment dedicated single-input converters one for every source, that are connected to a standard dc-bus [1]. However, these converters don't seem to be effectively utilized, due to the intermittent nature of the renewable sources. Additionally, there are multiple power conversion stages that cut back the efficiency of the system. A significant quantity of the literature exists on the combination of star and wind energy, as a hybrid energy generation system primarily focuses on its filler and optimization. The filler of generators in a very hybrid system is investigated. In this system, the sources and storage are interfaced at the dc-link through their dedicated converters. Different contributions are created on their modeling aspects and management techniques for a complete hybrid energy system. Dynamic performance of a complete hybrid PV–wind system with battery storage is analyzed. A passivity/sliding mode management is given that controls the operation of wind energy system to enhance the star energy generating system. Not several makes an attempt are created to optimize the circuit configuration of these systems that might cut back the value and increase the potency and responsibility. Integrated converters for PV and wind energy systems are given. PV–wind hybrid system, planned in [6], features an easy power topology; however, it's appropriate for complete applications. An integrated four-port topology supported hybrid PV–wind system is planned in [8]. However, despite easy topology, the management theme used is complicated. To feed the dc loads, an occasional capability multi-port converter for a hybrid system is given.

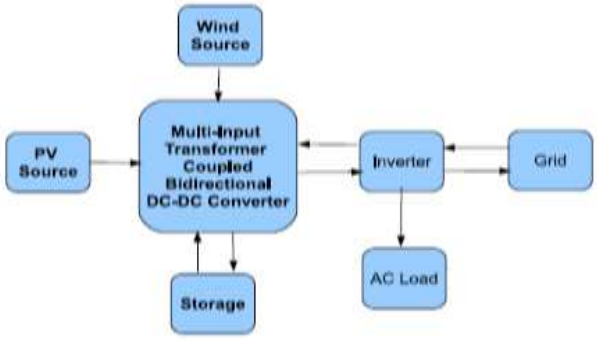

Fig.1.1.Block Diagram.

2. PREVIOUS STUDY:

This topology is basically a changed version of the half bridge topology with a free-wheeling circuit branch consisting of a diode and a switch across the first winding of the transformer. The magnetizing inductance of the electrical device is used to store energy and to interface the sources/storage devices. Li et al. and Xu et al. have planned a decoupled-controlled report dc–dc converter for multiple energy interfaces. The facility density is improved, and therefore the circuit structure is simplified. However, it will interface just one renewable supply and energy storage part. Moreover, the pulse width modulation and phase-shift management strategy are introduced to produce 2 management freedoms and deliver the goods the decoupled voltage regulation at intervals a definite operative vary. All the state of the art on converter topologies conferred so far will accommodate just one renewable supply and one energy storage part. Whereas the planned topology is capable of interfacing 2 renewable sources and an energy storage part. Hence, it's a lot of reliable, as 2 completely different types of renewable sources, like PV and wind, are used either on an individual basis or at the same time while not a rise in the component count compared with the present progressive topologies.

3. PROPOSED SYSTEM:

The planned converter consists of a transformer-coupled boost dual-half-bridge two-way converter united with a bi-directional buck–boost converter and a single-phase full-bridge inverter. The planned converter has reduced range of power conversion stages with less part count and high potency compared with the prevailing grid-connected schemes. The topology is easy and wishes solely six power switches. The schematic of the converter is shown in Fig. The boost dual-half-bridge converter has 2 dc-links on each the sides of the high-frequency electrical device. Dominant the voltage of 1 of the dc-links ensures dominant the voltage of the opposite. This makes the management strategy easy. Moreover, additional converters may be integrated with anybody of the two dc-links. A two-way buck–boost dc–dc converter is integrated with the first aspect dc-link, and a single-phase full-bridge two-way converter is connected to the dc-link of the second aspect. The input of the half-bridge converter is made by connecting the PV array asynchronous with the battery, thereby incorporating AN inherent boosting stage for the theme The boosting capability is additionally increased by a high frequency step-up electrical device. The electrical device additionally ensures galvanic isolation to the load from the sources and therefore the battery. A two-way buck–boost converter is employed to harness power from PV together with battery charging/discharging management. The unique feature of this converter is that MPP trailing, battery charge management, and voltage boosting square measure accomplished through a single converter. A transformer-coupled boost half-bridge converter is employed for harnessing power from the wind, and a single-phase full-bridge two-way converter is employed for feeding as masses and interaction with the grid.

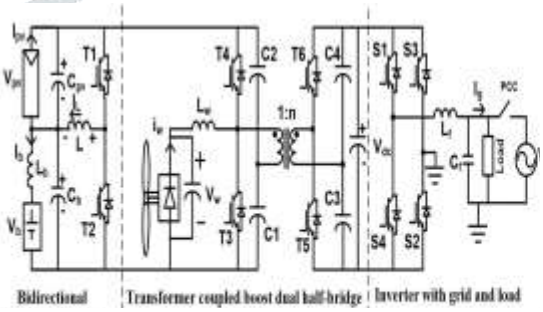

Fig.3.1.Actual power diagram.

4. SIMULATION RESULTS:

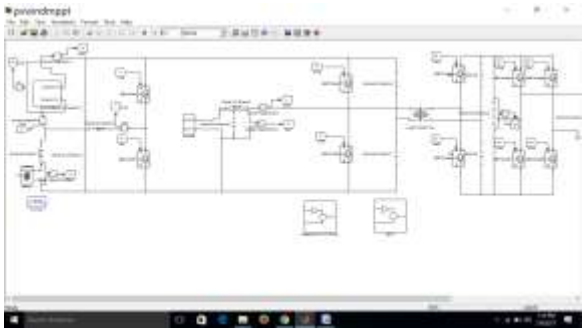

Fig.4.1. Simulation diagram.

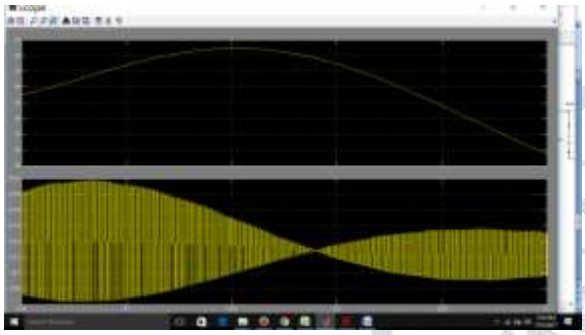

Fig.4.2.current and voltage across the pv system.

The system response for step changes within the source-1 isolation level whereas operational within the MPPT mode is shown in Fig. each the sources square measure operational at MPPT and charging the battery with constant current and also the remaining power is fed to the grid. At the instant a pair of s, the source-1 insulation level is enlarged. As a result, the source-1 power will increase, and each the sources still operate at MPPT. Though the source-1 power has enlarged, the battery remains charged with the same magnitude of the current, and power balance is achieved by increasing the ability equipped to the grid. At instant four s, the isolation of source-1 is delivered to identical level as before 2 s. the ability equipped by source-1 decreases. Battery continues to urge charged at the identical magnitude of the current, and power injected into the grid decreases. An identical result square measure obtained for step changes within the source-2 wind speed level. These results square measure shown in Fig.

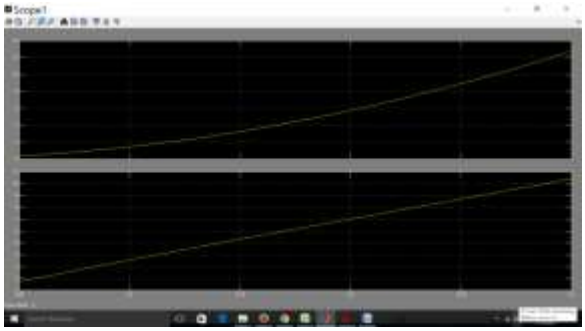

Fig.4.3.curreent and voltage across the wind system.

5. CONCLUSION:

The proposed hybrid system provides a sublime integration of PV and wind supply to extract most energy from the two sources. It's complete by a unique multi-input transformer coupled bi-directional dc–dc device followed by a standard full-bridge electrical converter. A flexible management strategy that achieves an improved utilization of PV, wind power, battery capacities without affecting the lifetime of the battery, and power flow management in a grid-connected hybrid PV–wind-battery-based system feeding ac hundreds is bestowed. Elaborated simulation studies area unit meted out to determine the viability of the theme. The experimental results obtained area unit in shut agreement with simulations and area unit ancillary in demonstrating the potential of the system to work either in grid feeding or in complete modes. The planned configuration is capable of activity uninterruptible power to ac hundreds and ensures the evacuation of surplus PV and wind generation into the grid.

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