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REVIEW OF MICRO-GRID WITH DUAL RENEWABLE ENERGY GENERATING SOURCES

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Abstract

There are a wide range of places in the world which are without energy accessibility and there also are varieties of power grids linked with areas which obtain energy for few hours. Maximum of the places are wealthy in renewable energy assets like wind, sun and bio-mass however nevertheless going through the power scarcity. As we recognize that there are various quantities of energy produce assets like solar, water and wind however they cannot fulfill the favorable needs of human beings and the solution for this is deployment of the hybrid micro-grid. The paper provides evaluate on hybrid micro-grid based totally on renewable energy producing sources like wind and solar.

Introduction

The term "MICRO-GRID" is defined as a set of interrelated disbursed electricity sources and masses with nicely clean electric barriers that proceeds a single convenient entity with appreciate to the grid and may join and disconnect from the grid to facilitate it to work in both grid linked or island modes. Primarily based on this definition the distributed energy resource (DER) installations possibly could be taken into consideration as micro-grid based on three (3) traits: actually defined electric barriers, grasp controller to manage and operate dispensed energy resources and load as a single controllable entity and the era potential established should cross above the peak vital load. These above stated characteristics further gift micro-grids as small scale power structures with the skills of self-supply and islanding that may generate, distribute, and adjust the float of electricity to neighborhood customers. The importance of the deployment of hybrid renewable strength based micro grid is promising component inside the future of energy structures. With this purpose the micro grid architecture is designed such as high penetration of disbursed generators connected to the grid via controllable energy digital based devices, in conjunction with the inclusion of conversationstrategies,electricpowergaragestructures[1].DFIGdeviceisdeployedforwind electricity conversion which is a doubly fed induction generator. A solar photovoltaic (PV) array is used to transform sun strength, that's evacuated on the not unusual DC bus of DFIG using a DC-DC boost converter in a value powerful way and the voltage and frequency are controlled through an indirect vector of the line side converter, which is incorporated with droop characteristics [2]. The assessment on grid integration and power problems associated with the integration of renewable power systems into grid and role of energy digital gadgets and bendy AC Transmission systems related to those troubles are really explained [3]. The micro grid is characterized by using the integration of dispensed power resources and controllable masses in a strength distribution community. Such integration introduces new precise challenges to micro-grid control which have never been uncovered to traditional energy systems [5]. An isolated micro-grid along with assets like wind, sun, biogas with battery Provision of utility grid insertion is likewise wished if general micro-grid sources falls quick of offering the overall load. To establish an efficient strength control method, a significant controller takes the choice primarily based at the fame of the loads and assets [7]. There is a top notch advantage of micro-grids in destiny power systems and energy sources like hydro and wind gives the pleasant capability for emission unfastened electricity for destiny micro-grid systems [8].

Literature Review

Velmurugan et al (2018) the research paper entitled "Hybrid Renewable Energy Based Micro Grid" describes the effect of fossil fuels on the worldwide global warming. The paper defines the importance of micro-grid and an idea

that integrates the DER (Distributed Energy Resources) to develop an impartial electric infrastructure. This paper gives the significance of the deployment of hybrid renewable electricity primarily based on micro grid as a promising factor within the future of strength of systems. With this aim the micro grid architecture is designed such as high penetration of dispensed mills connected to the grid through controllable energy electronic primarily based gadgets, along with the inclusion of communication techniques, electrical power garage structures.

Tiwari and Goel (2017) the research paper entitled "Design and control of Micro-Grid fed by Renewable Energy Generating Sources" describe the management of a micro-grid at remote place fed from wind and solar, based on totally hybrid electricity sources. DFIG systemisdeployedforwindstrengthconversiontha t'sadoublyfedinductiongenerator.Asolar photovoltaic (PV) array is used to convert sun electricity that is evacuated at the common DC bus of DFIG the use of a DC-DC boost converter in a free effective way and the voltage and frequency are controlled via an indirect vector control of the line side converter, that's incorporated with droop characteristics. The system additionally works at the absence of wind power supply. The machine is a hybrid idea based totally on sun and wind and is designed for whole computerized operation taking consideration of all the realistic situations.

Kumar et al (2016) the research paper entitled "Grid Integration and Power Quality Issues of Wind and Solar Energy System: A Review" Provides evaluation on grid integration and energy quality issues associated with the integration of renewable energy systems in to grid and function of power digital devices and bendy AC Transmission systems related to these problems. In this paper, current tendencies in energy electronics for the combination of wind and photovoltaic (PV) energy mills are presented.

Kumar and Tiwari (2016) the research paper entitled "Renewable Energy Resources with Smart Micro grid Model in India" describes energy crisis going through humans of India with the increase of power intake. Even for power generation from renewable resources. Renewable electricity along with sunlight, wind, rain, tides, and geothermal heat will have to depend upon natural assets. This paper describes dynamic call for response and smart micro- grid for residential and business intake within the context of renewable strength production, including the proposed management approach. The objectives of this research, renewable electricity resources with a smart micro-grid have played an essential function.

Lee et al (2016) the research paper entitled "Design and Implementation of a Micro grid Energy Management System" describes micro grid and is characterized by using the combination of dispensed electricity sources and controllable hundreds in an electricity distribution network. Such integration introduces new, unique challenges to micro grid control that have in no way been exposed to standard energy systems. To use these demanding situations, it's miles vital to redesign a conventional electricity control gadget (EMS) in order to cope with intrinsic characteristics of micro grids.

Kumar and Bhimasingu (2015) the research paper entitled "Renewable energy based micro grid system sizing and energy management for green buildings" affords the hybrid energy gadget model for building with economically most suitable. The system is modeled and the superior system configuration is anticipated with the help of Hybrid Optimization Model for Electrical Renewable (HOMER). The common sense is illustrated with a case observe primarily based at the practical data of a building located in southern India.

Zaheeruddin and Manas (2015) the research paper entitled "Renewable energy management through micro grid central controller design: An approach to integrate solar, wind and biomass with battery" describes an isolated micro grid consisting of sources like wind, solar, biogas with battery. Provision of utility grid insertion is also given if total micro grid sources falls short of supplying the total load. To establish an efficient energy management strategy, a central controller takes the decision based on the status of the loads and sources. The status is obtained with the assistance of multi-agent concept (treating each source and load as an agent).

Ravichandrudu et al (2013) the research paper entitled "Design of Micro-grid System Based on

Renewable Power Generation Units" describes the significance of micro-grid based systems in destiny strength structures. Renewable power sources such as wind and hydro provide the satisfactory potential for emission loose strength for destiny micro-grid systems. This paper presents a micro-grid gadget based on wind and hydro strength resources and addresses troubles associated with operation, manipulate, and balance of sthe system.

Che and Chen (2012) the research paper entitled "Research on Design and Control of Micro grid System" describes the popularity of micro-grid across the globe in current years. The configuration problem of micro-grid gadget is defined briefly first. After which the tracking gadget of micro-grid machine is discussed. Exclusive manipulate methods of micro-grid device and their advantages and shortcomings are analyzed later. The comparative evaluation of different control methods is done. Ultimately, a laboratory-scale micro-grid gadget is proposed as an example to verify the micro-grid manages method.

Zhao et al (2011) the research paper entitled "Design and Implementation of an Integrated Micro-Grid System" describes the Micro-grid in detail with its impacts on huge strength grid of dispensed programs. In this paper, an included micro-grid machine with flexible shape and dependable multi-micro-grids system structure is proposed which incorporates an expansion of distributed generations and strength garage systems. The small micro-grids can operate one by one or within the form of one huge micro-grid. And this device, the usage of grasp- slave manipulates strategy, can switch flexibly between grid-linked operation mode and independent operation mode.

Existing System

Wind and solar energy resources, are extra favorite than bio-mass based system as latter is susceptible to deliver chain issue. However, wind and solar energies suffer from high level of power variability, low capability usage element mixed with unpredictable nature. Because of those factors, firm energy cannot be assured for self-sufficient system. Even as the battery energy system (BES) can be helpful for reducing electricity fluctuation and growing predictability, utilization thing may be extended by means of working each energy source at ideal operating point. The most fulfilling working point also referred to as Maximum Power Point Tracking (MPPT), calls for regulation of the working point of wind power generator and sun PV (Photovoltaic) array in time period of speed and voltage to extract most of the electricity from enter system.

Drawbacks of Existing System

DFIG may also function as variable velocity operation with decrease in energy rated converters. But, to work the gadget as a micro-grid, the generated voltage ought to be balanced and THD (Total Harmonics Distortion) must be inside requirement of IEEE-519 preferred at no-load, unbalanced load as well as non-linear load. Furthermore, each the wind and sun energies sources need to function at MPPT. None of the authors has reported some of these problems. They have got no longer supplied performance parameters e.g. power satisfactory, system efficiency and so on under one kind of operating conditions. Furthermore, in addition they lack experimental verification.

Proposed System

This paper gives a micro-grid fed from wind and solar primarily based renewable energy generating sources (REGS). DFIG is used for wind power conversion whilst crystalline solar photovoltaic (PV) panels are used to transform solar strength. The management of overall scheme allows providing of first-class electricity to its clients for all situations e.g. no-load, nonlinear load and unbalanced masses. The controls of both generating assets are ready with MPPT. Within the presented scheme, the hunch feature is embedded on top of things of line side converter (LSC) of DFIG. This characteristic varies the gadget frequency based totally on state of free of the battery and slows down deep discharge and over-charge of the battery.

Various advantages of proposed method are there as follows:

DFIG is used for wind electricity conversion while crystalline sun photovoltaic (PV) panels are used to convert solar strength. The control of ordinary scheme allows to offer great strength to its consumers for

all conditions e.g. no-load, nonlinear load and unbalanced masses. The controls of each producing resources are prepared with MPPT. Emmanuel et al. have proposed a droop based totally control device for micro-grid with the help of standalone battery converter.

Reference	Title	Technique	Research Findings
Velmurugan et al	Hybrid Renewable Energy Based Micro Grid	DER	Presents the importance of micro-grid and the concept that integrates the DER (Distributed Energy Resources) to develop an independent electric infrastructure
Tiwari and Goel	Design and control of Micro-Grid fed by Renewable Energy Generating Sources	DFIG	Presents the control of a micro-grid at an isolated location fed from wind and solar based hybrid energy sources
Kumar et al	Grid Integration and Power Quality Issues of Wind and Solar Energy System: A Review	Power Electronics	Presents review on grid integration and power quality issues associated with the integration of renewable energy systems
Kumar and Tiwari	Renewable Energy Resources with Smart Micro grid Model in India	Smart Micro-Grid	Describes energy crisis facing people of India with the increase of energy consumption
Zaheeruddin and Manas	Renewable energy management through micro grid central controller design: An approach to integrate solar, wind and biomass with battery	Central controller	Presents an isolated micro grid consisting of sources like wind, solar, biogas with battery

Conclusion

The paper presents the micro-grid concept and its importance in future power systems. There are number of power generating sources like water, wind, solar etc. that are used by the power generating agencies but still we are facing electricity shortage. The paper presents a review on micro-grid based on hybrid wind and solar renewable energy generating sources.

References

[1] D.Velmurugan, S.Narayanan, K.Tharani, C.Praveen, "Hybrid Renewable Energy Based Micro Grid", International Research Journal of Engineering and Technology, 2018.

[2] Shailendra Kr. Tiwari, Puneet K. Goel, "Design and Control of Micro-Grid fed by Renewable Energy Generating Sources", IEEE, 2017.

[3] Varun Kumar, A.S. Pandey, S.K. Sinha, "Grid Integration and Power Quality Issues of Wind and Solar Energy System: A Review", IEEE, 2016.

[4] Manikant Kumar, Dr. Pratibha Tiwari, "Renewable Energy Resources with Smart Micro grid Model In India", International journal of scientific & technology research, Vol.5, Issue 11, 2016.

[5] Eun-Kyu Lee Wenbo Shi, Rajit Gadh, Wooseong Kim, "Design and Implementation of a Micro grid Energy Management System", Sustainability, 2016.
[6] Y. V. PAVAN KUMAR, Ravikumar BHIMASINGU, "Renewable energy based micro grid system sizing and energy management for green buildings", Springer, 2015.
[7] Zaheeruddin, Munish Manas, "Renewable energy management through micro grid central controller design: An approach to integrate solar, wind and biomass with battery", ELSEVIER, 2015.
[8] Dr.K.Ravichandrudu , M.Manasa , Mr.P.Yohan Babu ,G.V.P.Anjaneyulu, "Design of Micro-grid System Based on Renewable Power Generation Units", International Journal of Scientific and Research Publications, Volume 3, Issue 8,2013.
[9] Yanbo CHE, Jian CHEN, "Research on Design and Control of Micro grid System", PRZEGL D ELEKTROTECHNICZNY, ISSN 0033-2097,2012.
[10] Bo Zhao Xuesong Zhang Hangwei Tong, Li Guo Yanbo Che Bin Li, "Design and Implementation of an Integrated Micro-Grid System", IEEE, 2011.