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OVER VIEW ON NEW TECHNOLOGIES OF GLOBAL ENERGY IN UTILIZATION AND POWER SOURCES

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ABSTRACT

Global electrical energy utilization is consistently expanding and there is a need to build the power age limit. Traditional power age plans have genuine natural issues like environmental change, high oil cost, and water and oil contamination. These issues are the significant drive for the quest for new economical energy sources. The answer for this issue could be renewable energy sources, which give noteworthy level of required introduced limit expansion and furthermore wipe out the unsafe discharges from the regular power age sources. The accessibility of renewable energy sources are totally founded on day by day and regular examples. Be that as it may, the power required by the shoppers could have altogether different qualities than renewable energy sources. Consequently, it would be extremely hard to work a power framework introduced with just renewable age units because of the trademark contrasts and the high vulnerability of the accessibility of the renewable sources. The method for completely misusing the renewable energy is by network association, typically at conveyance level. The acquaintance of renewable energy source with the dispersion framework will significantly affect the clients and utility types of gear. The utility is worried because of high infiltration level of renewable energy sources in appropriation systems as it might present danger to control framework as far as security, voltage guideline and power quality issues.

The ongoing advancements in interfacing of renewable energy source to circulation supply (matrix) have been proposed with shunt dynamic channel which can at the same time make up for issues like power factor adjustment, current unbalance and current music and

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furthermore infuse energy created by renewable energy power sources to lattice with a low THD. Notwithstanding when there is no energy accessible from the power source (when there is no sun or wind) the shunt dynamic channel can even now work, improving the power nature of the electric lattice. To give better proficiency and to fulfill the required interconnecting guidelines a very much planned controller is important. In such manner, controllers assume a significant job and control methodologies connected to matrix incorporation converters are increasing more significance.

Keywords- *New technologies, renewable energy systems, sources*

INTRODUCTION

Taking into account that the real part of ozone harming substances is carbon dioxide, there is a worldwide worry about lessening carbon outflows. In such manner, various strategies could be connected to decrease carbon discharges, for example, upgrading renewable energy organization and empowering mechanical advancements. What's more, supporting instruments, for example, feed-in levies, renewable portfolio guidelines and assessment strategies, are utilized by governments to create renewable energy age alongside executing energy use productivity for sparing energy. Numerous nations have begun to introduce offices that utilization renewable energy sources for power age. The significance of elective energy sources meets up with environmental change difficulties related with the over the top utilization of petroleum derivatives. There are three essential inspirations that animate the development of renewable energy technologies: energy security, monetary effects and carbon dioxide outflow decrease. The expression "elective energy" alludes to any type of energy other than the ordinary sources of energy, including hydropower. As of late the emphasis has been on renewable energy sources.

IEA (2012d) alludes to two huge worldwide patterns that ought to portray the sending of renewable technologies over the medium term. To begin with, as renewable power technologies scale up, from an all out worldwide supply of 1,454 gig watts (GW) in 2011 to 2,167 GW in 2017, they should likewise spread out geologically. Second, the later long periods of high petroleum product energy utilize has driven renewable technologies to turn

out to be progressively focused on a cost premise with their choices in various nations and conditions. As indicated by IEA figuring's, wind is the most aggressive kind of renewable energy innovation among different choices, if nearby conditions, for example, financing, CO2 discharge levels and petroleum product costs demonstrate good (OECD, 2010). When discussing clean technologies, there are two essential ideas of energy technologies: energy supply technologies, which alludes to elective sources of renewable energy (e.g., wind and sunlight based power), and energy effectiveness technologies, or those technologies which are enlisted to improve energy use productivity, (e.g., consolidated heat and power (CHP), virtual power plants (VPP) and brilliant meters).

It ought to be noticed that changing the energy area and supplanting traditional energy with renewable energy is transformative related with innovative change and framing markets. Jacobson and Bergek (2004) demonstrate that the changing procedure for specific types of renewable energy, for example, wind and sun oriented, will occur after 2020, regardless of whether the development rate of utilization is firmly expanding throughout the following decade. Additionally, renewable energy markets are not effectively framed because of cost hindrances and the financing of non-renewable energy sources. The rest of this examination continues as pursues. In Section 2 we present the distinctive renewable energy supply technologies including sun oriented, wind and hydro control, geothermal and different sources. In Section 3 diverse energy use productivity technologies are examined. These incorporate electric vehicles, joined warmth and power, virtual power plants and the utilization of keen meters. The last segment gives an outline and finishes up.

Renewable Energy Supply Technologies

The renewable energy supply is constantly expanding. A lot of venture has been made during ongoing years and the headway of innovation has empowered nations to create renewable energy more expense adequately. It is determined that the quantity of nations delivering over 100 megawatts (MW) of renewable energy will increment altogether by 4 2017 (IEA, 2012d). Because of some negative and irreversible externalities accompanying ordinary energy creation, it is important to advance and create renewable energy supply technologies. These technologies may not be similar with customary energizes as far as generation cost, however

they could be tantamount on the off chance that we think about their related externalities, for example, their ecological and social impacts. Likewise, it ought to be noticed that economies of scale could assume a key job in diminishing the unit creation cost. Transmission and appropriation costs, just as technologies, don't contrast much among the regular and renewable energies. Beneath we present certainties about the advancement of the primary renewable energy supply technologies.

Energy efficiency technologies

As recently referenced, there are two principle answers for diminishing CO2 emanations and to beating the environmental change issue: supplanting petroleum products with renewable energy sources however much as could reasonably be expected and through upgrading energy proficiency. We talked about the cutting edge techniques for specialized and financial practicality of extending the utilization renewable energy sources and the likelihood of substitution in the initial segment of this survey. In this part pursues, we talk about energy productivity technologies. Energy proficiency for a power system could be considered in various stages, for example, the power age, transmission, conveyance and utilization. The various technologies that are right now accessible incorporate electric vehicles (EV), joined warmth and power. (CHP), virtual power plants (VPP) and keen matrices, every one of which are talked about underneath.

Overview of renewable energy technologies

This area gives a diagram and brief portrayal, including basics, of the diverse renewable energy technologies, wind, sun based, bioenergy, hydro, and geothermal energy. One of the main viewpoints to consider is the expense of renewable energy technologies. Nonetheless, this isn't a simple inquiry to answer on the grounds that, similarly as with numerous energy technologies, numerous elements influence cost and various sources of data utilize various criteria for assessing cost. As a rule, the ecological advantages of renewable energy technologies are hard to consider regarding cost investment funds through less contamination and less harm to nature. When attempting to compute the expense of these technologies is regularly best to adopt a real existence cycle cost strategy, as these technologies frequently

have high straightforward capital expenses however low task and support costs. Furthermore, obviously, there is typically no fuel cost! Table 1 underneath shows normal energy age costs (in kWh) for an assortment of renewable energy technologies in Europe. The table plainly demonstrates that the base to average age costs for these technologies fluctuate broadly between various technologies, and inside a similar innovation, as indicated by contrasts in national markets and asset conditions. This implies one innovation can be less expensive in one nation than in another.

The enhancement of generally electrical framework execution is one of most significant angles for the long haul financial suitability of appropriated renewable energy systems. So as to accomplish a portion of these advantages, power electronic interfaces are important to coordinate with the current electrical power framework. The power electronic interfaces offer interesting capacities over conventional interconnection technologies. As the cost of power hardware and related control systems decline, these sorts of interconnection interfaces, alongside their advantages, will turn out to be increasingly common being used with a wide range of renewable energy sources.

With the expanding utilization of renewable energy systems and its mechanical headway, it is winding up progressively critical to comprehend the joining of these systems with the electric power systems. The new markets and advantages for appropriated renewable energy applications incorporate the capacity to give auxiliary administrations, improve energy productivity, upgrade power framework dependability, and permit client decision. The propelled power electronic interfaces will permit disseminated renewable energy systems to give expanded usefulness through improved power quality and voltage/VAR support, increment electrical framework similarity by decreasing the flaw commitments, and adaptability in tasks with different other conveyed renewable energy sources, while diminishing generally interconnection costs.

OBJECTIVES OF THE STUDY:

Keeping in view the above research holes, the accompanying destinations were gone ahead for the present work:

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- To study demonstrating of microsourcs, energy stockpiling frameworks, convertor and burden utilizing HOMER programming for half and half frameworks.
- To build up the improved techniques for techno-financial examination and to check the practicality of the proposed designs.
- To carryout Techno-Economic Analysis of Hybrid Systems in (I) Islanded and (ii) Grid Connected Modes
- Improvement of Technical, Environmental and Economic parameters and Analysis of Hybrid Power Systems Using Dispatch Strategies for a given setup utilizing proposed calculation.

METHODOLOGY

A renewable energy source is a natural asset which can recharge with the progression of time, either through organic generation or other naturally repeating procedures. The renewable resources are a piece of earth's natural condition and the biggest segments of its ecosphere. The renewable resources might be the wellspring of power for renewable systems. Be that as it may, if the rate at which the renewable asset is expended surpasses its renewal rate, renewal and manageability won't be guaranteed. This chapter manages the need of renewable energy sources and its different structures.

The pace and degree of the commitment of new and renewable sources of energy and related technologies will depend, to a huge degree, on logical research coordinated towards their advancement and broad usage. The present R&D consumption on renewable-energies is 6-8% of the all out use on Research and Development in Energy, of which about half goes to atomic energy. While such research is growing quickly around the world, the coordination and data sharing is poor; duplication is across the board, and certain significant angles are generally disregarded and get little consideration. Besides, at present the heft of research is being done in created nations, a lot of it will later on be widely re-adjusted for use in creating nations.

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A sun oriented warm framework gives warm energy to different procedures. In locales of virus atmospheres a lot of poor quality warm energy is required to warmth air for solace, and high temp water for washing, cleaning and other residential and modern needs. Different mechanical reviews demonstrate that up to 24% of all modern warmth is devoured for warming liquids to a moderate temperature. Along these lines, sun based energy is most appropriate for poor quality warm applications. Indeed, even in high temperature warming applications, a lot of fuel can be spared by utilizing sun based energy for preheating. Thus, assembling of sun based water warmers has turned into a flourishing industry in a few nations. Sun powered warm energy is additionally being used in drying and procedure enterprises. It can likewise be changed over and used as mechanical and electrical energy similarly as in any ordinary warm systems.

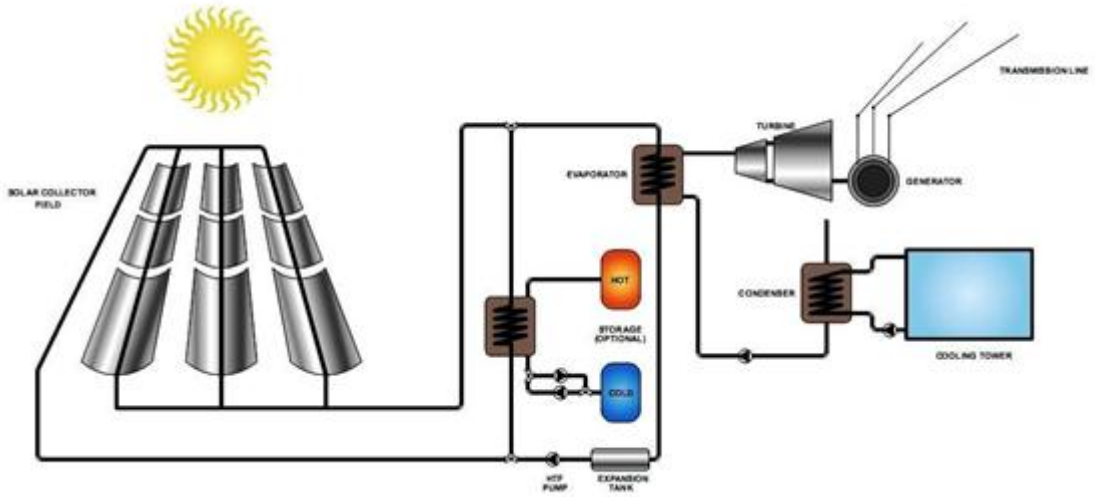

Fig.3.1. Solar Thermal Power Generation

Solar photovoltaic systems convert solar energy legitimately into electrical energy. The fundamental change gadget utilized is known as a solar photovoltaic cell. A solar cell is fundamentally an electrical flow source, driven by a transition of radiation.

The productive power use depends on proficient age in the cell, yet additionally on the dynamic burden coordinating in the outside circuit.

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DATA ANALYSIS

The exhibition of the proposed controllers for the shunt active filter interface unit under steady state conditions is introduced here. The design and simulation of proposed DC-DC converter to remove the most extreme power from renewable energy sources at the info side of shunt active filter is likewise introduced. Simulations are performed for static straight, static non-direct and dynamic non-straight loads with 'IRPT Controller for Shunt Active Filter based RES-Grid Interface Unit' and 'ICosφ Controller for Shunt Active Filter based RES-Grid Interface Unit'. The hardware implementation of the framework has been done uniquely with 'ICosφ Controller for Shunt Active Filter based RES-Grid Interface Unit' for static direct, static non-straight and dynamic non-direct loads under steady state conditions.

Another issue with current controller is the transformer immersion. In the transformer, a dc predisposition current created by little voltage awkward nature, can be instigated because of the little contrasts in lift inductors and additionally switches. The dc current predisposition will increment or diminishing the transistor flows. The present control will modify the obligation cycles in the switch such that these irregular characteristics will in general vanish and the transformer volt-second parity is kept up. At last, the present control is more qualified to particularity where current sharing should be tackled when running in parallel. Among the downsides of the present control it tends to be referenced that it requires an additional present sensor and it has a helplessness to clamor and in this way light separating of criticism sign is required.

Table 1 Power sharing between Renewable Energy Source and Grid under Static direct burden

Load factor	Power factor	Grid power		Renewable Energy Source Power		Load Power	
		P (kW)	Q (kVar)	P (kW)	Q (kVar)	P (kW)	Q (kVar)
1	0.7	6	-0.1	-0.4	4.1	5.6	4
	0.8	5.8	-0.1	-0.2	3.7	5.6	3.6
	0.9	5.6	0	0	2.5	5.6	2.5
	0.7	4.4	-0.2	1.2	4.2	5.6	4

0.75	0.8	4.1	-0.2	1.5	3.8	5.6	3.6
	0.9	4	0	1.6	2.5	5.6	2.5
0.5	0.7	3.0	-0.2	2.6	4.2	5.6	4
	0.8	3.0	0	2.6	3.6	5.6	3.6
	0.9	3.0	0	2.6	2.5	5.6	2.5
0.25	0.7	1.5	-0.1	4.1	4.1	5.6	4
	0.8	1.5	0	4.1	3.6	5.6	3.6
	0.9	1.5	0	4.1	2.5	5.6	2.5

In view of writing, it is discovered that, need of voltage feed forward and cross-coupling terms are the real downsides in synchronous reference frame. Additionally, the stage edge of the grid voltage is an absolute necessity in its execution. On account of control structure executed in stationary reference frame, if PR controllers are utilized for current guideline, the multifaceted nature of the control moves toward becoming lower contrasted with the structure actualized in dq frame. Furthermore, the stage point data isn't a need, and separated grid voltages can be utilized as format for the reference current waveform.

CONCLUSIONS

Among all the renewable energy sources, solar photovoltaic, wind energy systems and power modules are quickly creating and turning into the most encouraging renewable energy systems around the world. The solar photovoltaic and energy unit systems regularly require power molding systems which incorporate DC-DC converters and inverters so as to supply neighborhood stacks or send power to grid. To improve the nature of power from renewable energy sources, extra filtering units are required which prompts increment in the general expense of interest in the whole framework. So as to amplify the achievement of the renewable energy power age, profoundly dependable, financially savvy and easy to understand grid integration units are required. With the expanding worry over power quality, broad research has been done on the improvement of grid integration topologies for renewable energy sources.

In this research work, a savvy and effective three stage shunt active filter interface unit for renewable energy source-grid integration with two newly proposed controllers, is proposed. Model models for the equivalent are designed, mimicked and tried for different loads and

shifting framework conditions. A nitty gritty study of the current renewable energy source - grid interface units uncovers that the current controllers are progressively unpredictable and count concentrated. Additionally power sharing between grid-renewable energy and burdens does not occur productively with the current IRPT controller for the interface unit. The creator proposes the 'IRPT Controller for Shunt Active Filter based RES-Grid Interface Units' with couple of changes in the current IRPT controller so power sharing among grid and renewable energy happens proficiently. Anyway the proposed IRPT controller likewise includes more strides for reference current count and is discovered inadmissible under unbalance conditions as observed from simulation of the framework.

With this foundation, a new basic, simple to execute calculation has been proposed, which is computationally less escalated. The proposed 'ICosφ Controller for Shunt Active Filter based RES-Grid Interface Units' additionally has been recreated to check its adequacy for the shunt active filter interface for the renewable energy sources. It has been found to yield preferable outcomes over the proposed 'IRPT Controller for Shunt Active Filter based RES-Grid Interface Units' and performs well under unbalanced conditions. The proposed 'ICosφ Controller for Shunt Active Filter based RES-Grid Interface Units has henceforth been actualized in hardware. The model of a three-stage framework associated with various static direct, static non-straight and dynamic non-straight loads alongside a shunt active filter with the proposed controller has been designed and created in the research center. The model has been successfully tried for various framework conditions just as various burden conditions and has yielded substantial outcomes.

Taking all things together, in this research work, a shunt active filter interface for renewable energy source with newly proposed controller has been designed, demonstrated, mimicked and executed in hardware to draw out an a lot less complex, financially savvy answer for the renewable energy source - grid integration.

REFERENCES

[1] Joseph A. Carr, Juan Carlos Balda and H. Alan Mantooth, "A Survey of Systems to Integrate Distributed Energy Resources and Energy Storage on the Utility Grid", *IEEE Conference* on *Energy 2030*, Atlanta, Georgia, pp. 1-7, 17-18 Nov 2008.

[2] S. Kusugawa, J.Baba, M. Ohshima, and E. Masada, "Supply power quality of a micro grid based on distributed generations in relation with power converter control", European Conference on Power Electronics and Applications, Dresden, pp 10-P10,11-14 September 2005.

[3] S.M.Muyeen, Rion Takahashi, Toshiaki Murata, J.Tamura, and M.H.Ali, "Application of STATCOM/BESS for Wind power smoothening and hydrogen generation," *Electric Power System Research*, vol. 79, no.2, pp. 365-373, 2009.

[4] Y. H. Chung,H.J.Kim, K.S. Kim, J.W.Choe and J.Choi,"Power Quality control center for the micro grid system," *IEEE 2nd International Conference on Powerand Energy (PEC'08)* pp 942 - 947, 1-3 Dec. 2008.

[5] A.Domijian, A.Montenegro,.KeriA.J.F,Mattern and E. Kenneth "Simulation study of the world's first distributed premium power quality park," *IEEE Transon Power Delivery* vol. 20, pp. 1483-1492, 2005.

[6] A. Joshi, and A.Ghosh, "The concept of operating principles of a mini custom power park," *IEEE Trans on Power Delivery*, vol. 4, pp. 1766-1774, 2204.

[7] M.E Meral, A.Teke,K.CBayindir, and M Tumay, "Power Quality improvement with an extended Custom Power Park," *Electric Power Systems Research*, vol. 79, pp. 1553-1560, 2009.

[8] A Ghosh and Ledwich, "Power quality Enhancement using Custom Power Devices", Kluwer Academic, 2002.

[9] S.K. Khadem, M.Basu and M.F. Conlon, " Power Quality in Grid Connected Renewable Energy Systems: Role of Custom Power Devices", *Internationalconference on Renewable Energies and Power Quality (ICREPQ'10)*, Granada,Spain, 23-25 March 2010.

[10] L. G. B. Rolim, A. Ortiz, M. Aredes, R. Pregitzer, J. G. Pinto, and João L. Afonso, "Custom Power Interfaces for Renewable Energy Sources", *IEEEInternational Symposium on Industrial Electronics* , Vigo, Espanha, 4-7,pp.2673-2678,2007.

[11] J.G. Pinto, R.Pregitzer, Luis F.C. Monteiro, and Joao L. Afonso "3 Phase 4-wire Shunt Active Filter With Renewable Energy Interface" *International Conferenceon Renewable Energies and Power Quality (ICREPQ'07)*, Spain, March 28-30,2007.

[12] Adrian Timbus, Marco Liserre, Remus Teodorescu, Pedro Rodriguez and FredeBlaabjerg, "Evaluation of Current Controllers for Distributed Power Generation Systems" *IEEE Transactions on Power Electronics*, Vol.24, no.3, pp 654 – 664, March 2003.

[13] FredeBlaabjerg, Remus Teodorescu, Marco Liserre and Adrian V. Timbus " Overview of Control and Grid Synchronization Distributed Power Generation Systems" *IEEE Transactions on Industrial Electronics*, Vol.53,no.5, pp1398-1409,October 2006.

[14] FradeBlaabjerg, Remus Teodorescu, Zhe Chen and Marco Liserre "Power Converters and Control of Renewable Energy Systems", 'Technical Report', Aalborg University, Institute of Energy Technology, Denmark.

[15] Emílio F. Couto, Júlio S. Martins, and João L. Afonso," Simulation Results of a Shunt Active Power Filter with Control Based on p-q Theory" *InternationalConference on Renewable Energies and Power Quality (ICREPQ'03)*,Vigo, Apr2003.

[16] J.G. Pinto, R.Pregitzer, Luis F.C. Monteiro, Jose Batista and Joao L. Afonso , "Development of Power Quality Monitor used for Shunt Active Filter Studies"

International Conference on Renewable Energies and Power Quality (ICREPQ'07), Spain, 28-30 March,2007.

[17] Fang Liu, Xing Zhang, Zhen Xie, Po Xu,andLiuchen Chang, "Shunt Active Power Filter for Harmonic and Reactive Current Compensation in Wind

[18] Conversion Systems," *IEEE Power Electronics Specialist Conference*, Rhodes, pp 2329 - 2332 , 15-19 June 2008.

[19] Kelvin Tan, Kim Bourne Ng, Susanne Sugiarto andHanny H. Tumbelaka, "Shunt Active Power Filter Harmonic Mitigation Technique in a Grid-Connected Permanent Magnet Wind Generation System" *Australian PowerEngineering Conference (AUPEC'06), Melbourne, Australia, pp 1-6.*

[20] Samira Dib, BrahimFerdi and ChellaliBenachaiba, "Wind Energy Conversion Using Shunt Active Power Filter", *Fourth International Conference onElectrical Engineering(CIGE'10),* University of Bechar, Algeria, 03-04 Nov2010.

[21] Ismail H. Altas, EmreOzkop, and Adel M. Sharaf "A Novel Active Filter Strategy for Power Mitigation and Quality Enhancements in a Stand-Alone WECS" Conference paper, pp 88-91.

[22] Tim Archer, Kelvin Tan, and Susanne Sugiarto, "VS-CCI and VS-CCI/APF Configuration for PMSG Wind Energy Conversion System", *AustralasianUniversities Power Engineering (AUPEC'07)* pp. 1-6, 9-12 Dec, 2007.

[23] Mukhtiar Singh,VinodKhadkikar,Ambrish Chandra, and Rajiv K. Varma, "Grid Interconnection of Renewable Energy Sources at the Distribution Level With Power-Quality Improvement Features" *IEEE Transactions on PowerDelivery*, Vol. 26, no. 1, pp. 307-315, January 2011.

[24] Bhim Singh , and Sunil Kumar, "Control of DSTATCOM in 3-Phase 3-Wire Distribution System using Modified Icosφ Algorithm" National Conference on

Emerging Trends in Electrical, Instrumentation & Communication Engineering, Control Theory and Informatics, Vol.3, No.2, 2013.

[25] A Ghosh, "Compensation of distribution system voltage using DVR", *IEEETrans on Power Delivery*, Vol.17(4), pp 1030-1036,2002.

[26] B. BehzadJazi , H. A. Abyaneh , and M. Abedi, " Power Quality Improvement Using Active Filter capability in Back to Back convertor Installed for variable speed DFIG wind energy system", *19th Iranian Conference on ElectricalEngineering,(ICEE'11)*, pp 1-6, 17-19 May 2011.

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