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Improvising Grid Interconnection Capabilities through Implementation of Power Electronics

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Abstract : The swift reduction of fossil fuels from nature has crucial need for alternative energy sources to cater vital demand. It is essential to boost alternative energy sources to cover the continuously increasing demand for energy while minimizing the negative environmental impacts. Solar energy is one of the reliable sources that can generate energy. Solar energy is freely available in nature and is completely eco-friendly, and they are considered as the most promising power generating sources due to their easy availability and other advantages for the local power generation. This paper is to review the implementation of power electronic devices through Solar Energy Grid Integration System (SEGIS) to increase the efficiency. This paper will also concentrate on the future grid infrastructure and various other applications in order to make the grid smart. Development and implementation of a power electronic devices such as PV inverters and power controllers play an important role in power supply in the modern energy economy. Solar Energy Grid Integration System (SEGIS) opens pathways for promising solutions for new electronic and electrical components such as advanced innovative inverter/controller topologies and their functions, economical energy management systems, innovative energy storage systems with equipped advanced control algorithms, advanced maximum-power-point tracking (MPPT) suited for all PV technologies, protocols and the associated communications. In addition to advanced grid interconnection capabilities and features, the new hardware design results in small size, less maintenance, and higher reliability. The SEGIS systems will make the 'advanced integrated system' and 'smart grid' evolutionary processes to run in a better way. Since the last few years, there was a major development in the field of power electronics which led to more efficient systems and reduction of the cost per Kilo-watt. The inverters became more efficient and had reached efficiencies in excess of 98%, and commercial solar modules have reached almost 21% efficiency.

Keywords : solar energy grid integration systems, smart grid, advanced integrated system, power electronics
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