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Topic of Research: Integration of Doubly fed induction generator based WECS to distribution system

Findings

The demand for renewable energy has been steadily rising over the world for the last few decades and is still growing significantly. Renewable energy sources, including solar, wind, and biomass, may be considered the most practical alternative energy source due to the depletion of nonrenewable energy sources, such coal, water, nuclear power, and others. Given that it is risk- and pollution-free, abundant in nature, etc., solar energy is frequently accepted as one of these energy sources. Developing countries like India require a tremendous amount of energy for sustained growth. A variety of solar energy schemes, including the Jawaharlal Nehru National Solar Mission (JNNSM), are put into place by the government in 2010 to help India achieve its clean energy targets. A new analytical technique that is derived from a fundamental power flow equation and adjusted for an unbalanced feeder is used to determine the best size and placement of Type-IV DGs (DGs that supply active power while consuming reactive power in return) on a wide scale in an unbalanced distribution system. The introduction of a DG that demands reactive power raises major concerns about the quality of the power, and this problem is made worse when the DG is linked to an imbalanced feeder. This is accomplished by determining the power loss at each node, and a new power economy factor is developed for unbalanced feeds while taking power loss reduction approach into consideration. It is then further decreased to get the ideal size and seating of DG. IEEE 34 and 123 bus systems imbalanced systems were utilised for results validation, and it was discovered that the technique resulted in a sizable energy loss decrease in the distribution system. When DG is added to an unbalanced three-phase distribution system, the system becomes more difficult since the power quality degrades and the equipment may be damaged. This is especially true for three-phase four-wire systems. With the goal of minimising loss, Type IV, or induction generators, are sized and placed in wind-farms in the best possible way. They are also combined in an imbalanced distribution system with reactive assistance utilising UPQC (Unified Power Quality Conditioner). The penetration level, which here is kept below the limit to prevent too violent tripping of the circuit breaker, determines the size of the DG. The iterative PSO approach has the potential to reduce power loss. The recommended approach is tested on unbalanced IEEE 34 and 123 bus systems.