Energy storage for microgrids nepal

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There have been a couple of significant announcements regarding green hydrogen projects in Nepal:

Sunil Prasad Lohani, Andrew Blakers, 100% renewable energy with pumped-hydro-energy storage in Nepal, Clean Energy, Volume 5, Issue 2, June 2021, Pages 243-253, https://doi /10.1093/ce/zkab011

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Rural electrification is an important measure for prompt and sustainable growth of the developing nations. Providing electricity access to extreme remote localities is a challenging task for distribution utilities. Microgrids with renewable energy based distributed generation using locally available energy resources may be one of the effective solutions. This paper presents a study on recent developments in microgrid with the Hybrid Renewable Energy System (HRES). A brief discussion and analysis of modeling, control, reliability and energy management of microgrid with HRES is presented. A brief survey and examination of the potential of power generation with HRES in South-Asian nations is also undertaken in this research.

Utilization of wind and solar energy sources are significantly popular for generating electrical energy at remote rural localities [12, 13]. However, energy from these sources is available intermittently so far, therefore continuous power supply may not be ensured [14]. To overcome this drawback electrical power generated by these sources may be integrated along with energy storage devices such as battery. A combination of two or more than two renewable power generation technologies along with energy storage may enhance performance and is termed as hybrid renewable energy system (HRES) [15]; although it is necessary to choose appropriate renewable energy (RE) technology, unit size and energy storage system (ESS) to improve reliability and performance of HRES [16].

HRES along with energy storage, power electronic (PE) controllers and connected load is also referred as microgrid [16]. PE controllers coordinate and control outputs from various generating units of the HRES [22].

Apart from PE controllers, some hardware and software interfaces are also connected for the proper coordination and control of microgrid. The control action of microgrid includes load and energy management, voltage/frequency control, active/reactive power control, security monitoring, black start, etc. Another layer of control may be added to control mode of operation of microgrid i.e. stand alone, grid connected, etc. [16, 23].

HRES include different type of RE technology to generate electrical energy. So, it is necessary to have a defined scheme for interconnection of RE sources in HRES. Wide range of interconnection schemes has been reported in the literature. These schemes may be broadly classified into three categories, i.e. alternating current (AC), direct current (DC), and Hybrid AC-DC HRES (or more widely microgrid). This paper presents a brief insight on modeling, control, optimal sizing and potential of HRES among South-Asian countries [14, 24, 25].