



## **Sizing Of A Stand-Alone Hybrid PV/Wind Power System For The City Of Setif In Algeria**

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To today the use of renewable sources in energy production is still small compared to non-renewable energy sources such as fuel fossil and nuclear energies. So renewable energy sources must be increased by adopting a hybrid energy source schemes to increase the system reliability and security [1].

One of the most promising hybridization approaches is the combination of PV panels to other resource. Indeed, this is a well-developed technology that can be used in a large scale [2]-[5]. In addition, battery storage could be needed [6], [7]. When the energy storage capacity may be limited, the use of supercapacitors could be a viable solution [8]. Renewable energy sources do not provide a constant power, but their complementary combination provides more continuous electrical output and is often supported by storage devices such as batteries to increase the system reliability [9]. In case of the renewable sources are not able to cope with the load demand, they can be hybridized with traditional energy sources, such as diesel generators (for stand-alone applications) [10],[11].

For control purposes, different strategies based on operating modes and combining technical-economic aspects are considered for the energy management of stand-alone hybrid power systems [1], [2], [12]. For the city of Setif, it is proposed a hybrid power systems using PV generators and wind power.

The objective of this work is to optimize and size a power generation system resulting from the combination of two energy sources (photovoltaic and wind) for the power supply of a pumping system located in the region of Setif.

This paper deals with the sizing of a stand-alone hybrid photovoltaic and wind power system without battery storage to supply the electric load demand of the city of Setif, in Algeria. The proposed optimal design study is focused on economical performances and is mainly based on the loss of the power supply probability concept. The hybrid power system optimal design is based on a simulation model developed using bond graph. In this context, a practical load demand profile of pumping system is used with real weather data.

**Keywords:** Sizing, Hybrid, Photovoltaic, Wind, Pumping System