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农村水能与太阳能混合发电系统的设计与应用

Design and application of rural hydro-solar hybrid power system

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中文摘要:

针对农村水能和太阳能2种可再生能源混合发电创新模式,该文设计了一种互补型的混合发电系统。在系统特点分析的基础上,构架了总体设计方案。在混合发电系统的设计过程中重点应用了混合直流系统构建技术、光伏谐波抑制与无功补偿技术、共享型微机监控技术等关键技术。核心技术的应用使光伏电站可为水电站提供直流电源和无功补偿、为电网提供谐波抑制;同时通过共享型微机监控技术使水电站和光伏电站共享现有控制单元、数据通讯网络、工作站及服务器,节约了投资成本。实践和计算表明,农村水能与太阳能混合发电系统的设计能够节约一次性投资成本超过50%,并产生长期的谐波抑制和无功补偿效益;每1 kW电量能节约0.4 kg标准煤,减少0.997 kg二氧化碳(CO₂);同时具有保护大坝和节约国土资源等社会效益。

英文摘要:

According to the generation innovation model with two renewable energy mixed for rural hydropower and solar energy power, this paper discussed the design of a hybrid-type hybrid power generation system. Based on the system characteristics, the general design plan was designed. Focused on mixed DC systems harmonic suppression and reactive power compensation in construction technology, photovoltaic technology, shared-key technologies such as computer monitoring technology in hybrid power system design process were applied. Core technology made the application of photovoltaic power stations provide DC power supply for hydropower station and provided for the power grid harmonic suppression and reactive power compensation. The share-type technologies that share-type hydropower station computer monitoring technology and photovoltaic power stations shared local control unit, data communication networks, workstations, and servers, were cost-saving. Practices and calculations show that rural hydropower and solar hybrid power system designed saves a initial investment cost over 50%, and generates long-term harmonic suppression and reactive power compensation benefits; installed capacity per kW can save the normal vectors 0.4 kg and carbon dioxide emissions 0.997 kg. And the power system can realize protection and social benefits such as land and natural resource conservation.

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