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新能源与分布式发电

宁夏电力系统接纳新能源能力研究

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摘要：

宁夏风能、太阳能资源丰富，新能源发电发展迅速。根据宁夏新能源发电和负荷的历史统计数据、规划预测数据，详细分析了影响电网接纳新能源能力的相关因素，包括新能源出力特性、负荷特性、机组性能和外送通道，并指出新能源参与系统调峰，年电量损失较小；风电与光伏发电互补性差，不利于电网接纳；新能源并网通常会恶化负荷特性；直流外送将提高电网为新能源提供的调峰能力。这些结果为进一步研究宁夏电网接纳新能源能力、宁夏新能源并网调度运行奠定了基础。

关键词：

Research on Ningxia Power Grid's Ability of Admitting New Energy Resources

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Abstract:

Ningxia Hui Autonomous Region is rich in resources of wind energy and solar energy, so the new energy resources-based generation develops rapidly in Ningxia. According to the historical statistical data of new energy resource-based generation and load in Ningxia region as well as the prediction data of Ningxia power grid planning, the related factors impacting Ningxia region's ability of admitting new energy resources, including output characteristics of new energy resources, load characteristics in Ningxia region, performance of generation units in Ningxia power grid and the channel to transmit power outwards from Ningxia power grid, are analyzed in detail. It is pointed out that when new energy resources take part in peak-load regulation the annual network loss can be reduced and the power transmission outwards by HVDC power transmission will arise the peak load regulation ability of new energy resource-based generation provided by power grid; however, the complementarity between wind power generation and photovoltaic generation is not satisfied and it is not favorable to power grid to admit new energy resource, otherwise, the load characteristic of power grid will usually be deteriorated under the connection of new energy source-based generation with power grid. These research results could be available for further research on Ningxia power grid's ability to admit new energy resource-based generation and the dispatching of Ningxia power grid while new energy resource-based generation is connected to Ningxia power grid.

Keywords:

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参考文献：

[1] Chai C，Lee W J，Fuangfoo P，et al．System impact study for the interconnection of wind generation and utility system[J]．IEEE Trans on Industry Applications，2005，41(1)：163-168． [2] 屠强，衣立东，尚勇，等．电网区域化综合测风系统在风电开发中的应用研究[J]．电网与水力发电进展，2008，24(1)：3-7． Tu Qiang，Yi Lidong，Shang Yong，et al．Research on the application of power grid

based synthetical regional wind power measurement system[J]. Advances of Power System & Hydroelectric Engineering，2008，24(1)：3-7(in Chinese). [3] 邢文琦，晁勤. 含不同风电机组的风电电网仿真研究[J]. 电网技术，2009，33(7)：103-106. Xing Wenqi，Chao Qin. Simulation study on wind power system containing various wind turbine generators[J]. Power System Technology，2009，33(7)：103-106(in Chinese). [4] 耿华，许德伟，吴斌，等. 永磁直驱变速风电系统的控制及稳定性分析[J]. 中国电机工程学报，2009，29(33)：68-75. Geng Hua，Xu Dewei，Wu Bin，et al. Control and stability analysis for the permanent magnetic synchronous generator based direct driven variable speed wind energy conversion system[J]. Proceedings of the CSEE，2009，29(33)：68-75(in Chinese). [5] 衣立东，朱敏奕，魏磊，等. 风电并网后西北电网调峰能力的计算方法[J]. 电网技术，2010，34(2)：129-132. Yi Lidong，Zhu Minyi，Wei Lei，et al. A computing method for peak load regulation ability of northwest China power grid connected with large-scale wind farms[J]. Power System Technology，2010，34(2)：129-132(in Chinese). [6] 孙保功，叶鹏，邵广惠，等. 基于非线性内点方法的风电接入能力研究[J]. 中国电机工程学报，2010，30(10)：23-28. Sun Baogong，Ye Peng，Shao Guanghui，et al. Wind power penetration limit assessment based on nonlinear interior point algorithm[J]. Proceedings of the CSEE，2010，30(10)：23-28 (in Chinese). [7] 范高锋，赵海翔，戴慧珠. 大规模风电对电力系统的影响和应对策略[J]. 电网与清洁能源，2008，24(1)：44-48. Fan Gaofeng，Zhao Haixiang，Dai Huizhu. The impact and countermeasure of large scale wind power on power system[J]. Power System and Clean Energy，2008，24(1)：44-48(in Chinese). [8] 王晓兰，王明伟. 基于小波分解和最小二乘支持向量机的短期风速预测[J]. 电网技术，2010，34(1)：179-184. Wang Xiaolan，Wang Mingwei. Short-term wind speed forecasting based on wavelet decomposition and least square support vector machine[J]. Power System Technology，2010，34(1)：179-184(in Chinese). [9] 袁铁江，晁勤，李义岩，等. 大规模风电并网电力系统经济调度中风电场出力的短期预测模型[J]. 中国电机工程学报，2010，30(13)：23-27. Yuan Tiejiang，Chao Qin，Li Yiyan，et al. Short-term wind power output forecasting model for economic dispatch of power system incorporating large-scale wind farm [J]. Proceedings of the CSEE，2010，30(13)：23-27(in Chinese). [10] 吴义纯，丁明. 风电引起的电压波动与闪变的仿真研究[J]. 电网技术，2009，33(20)：125-130. Wu Yichun，Ding Ming. Simulation study on voltage fluctuations and flicker caused by wind farms[J]. Power System Technology，2009，33(20)：125-130(in Chinese). [11] 迟永宁，刘燕华，王伟胜，等. 风电接入对电力系统的影响[J]. 电网技术，2007，31(3)：81-85. Chi Yongning，Liu Yanhua，Wang Weisheng，et al. Study on impact of wind power integration on power system[J]. Power System Technology，2007，31(3)：81-85(in Chinese). [12] 刘伟，彭冬，卜广全，等. 光伏发电接入智能配电网后的系统问题综述[J]. 电网技术，2009，33(19)：1-6. Liu Wei，Peng Dong，Bu Guangquan，et al. A survey on system problems in smart distribution network with grid-connected photovoltaic generation[J]. Power System Technology，2009，33(19)：1-6 (in Chinese). [13] 李春华，朱新坚，胡万起，等. 光伏/燃料电池联合发电系统的建模和性能分析[J]. 电网技术，2009，33(12)：88-93. Li Chunhua，Zhu Xinjian，Hu Wanqi，et al. Modeling and performance analysis of photovoltaic fuel cell hybrid power generation systems[J]. Power System Technology，2009，33(12)：88-93 (in Chinese). [14] 杨卫东，薛峰，徐泰山，等. 光伏并网发电系统对电网的影响及相关需求分析[J]. 水电自动化与大坝监测，2009，33(4)：35-39. Yang Weidong，Xue Feng，Xu Taishan，et al. Grid-connected photo- voltaic's influence on power systems and some related issues[J]. Hydropower Automation and Dam Monitoring，2009，33(4)：35-39(in Chinese). [15] 王一波，伍春生，廖华，等. 大型并网光伏发电系统稳态模型与潮流分析[J]. 清华大学学报：自然科学版，2009，49(8)：1093-1097. Wang Yibo，Wu Chunsheng，Liao Hua，et al. Steady-state power flow analyses of large-scale grid-connected photovoltaic generation system [J]. Journal of Tsinghua University：Science and Technology，2009，49(8)：1093-1097(in Chinese).

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