

## 电力系统

### 220/20 kV电压序列的技术经济性分析

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#### 摘要:

建立了220/20 kV序列的电网模型, 推导了变电站投资、网损费用及电网投资年费用关系式。引入精神磨损理论分析旧序列电网的隐形价值流失, 通过比较新、旧电网年费用可制定合理的电网改造投资决策。分析了新建区域和旧网改造情况下220/110/10、220/110/20、220/20 kV 3个电压序列的技术经济性, 建议新建区域考虑采用220/20 kV电压序列供电, 投运时间超过15 a且负荷密度大于33 MW/km<sup>2</sup>时, 将原电网220/110/10 kV电压序列改造为220/20 kV电压序列能取得良好的经济效益。

**关键词:** 220/20 kV 负荷密度 电网规划 精神磨损

### Techno-Economical Analysis on 220/20kV Distribution Voltage Series

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#### Abstract:

A mathematical model for distribution network adopting 220/20 kV voltage series is built, and relational expression of substation investment, network loss cost and annual cost of network investment is derived. The spirit-wear theory is led in to analyze the invisible value run-off on distribution network adopting old voltage series. By means of comparing the annual cost of power network adopting new and old voltage series, the rational investment decision-making for distribution network renovation can be drawn up. The techno-economies of three voltage series, namely 220/110/10 kV, 220/110/20 kV and 220/20 kV, adopted for newly built distribution network and for the renovation existing distribution network are analyzed, thus it is suggested that the 220/20 kV voltage series should be applied to the power supply for newly built areas; for existing distribution network, when its being operated period is longer than 15 years and the its load density is higher than 33 MW/km<sup>2</sup>, it is suitable to renovate the existing distribution network from adopting old voltage series 220/110/10 kV to adopting 220/20 kV voltage series and satisfied economic benefit can be attained.

**Keywords:** 220/20 kV load density power network planning spirit-wear

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#### 参考文献:

- [1] 范明天, 张祖平, 刘思革. 城市电网电压等级的合理配置[J]. 电网技术, 2006, 30(10): 64-68. Fan Mingtian, Zhang Zuping, Liu Sige. Rational scheming of voltage levels in urban electric networks[J]. Power System Technology, 2006, 30(10): 64-68(in Chinese).
- [2] 马苏龙. 20 kV电压等级在配电中的应用[J]. 电网技术, 2008, 32(19): 98-100. Ma Sulong. Application of 20 kV voltage level in electrical distribution network[J]. Power System Technology, 2008, 32(19): 98-100(in Chinese).
- [3] Ozay N, Guven N, Tureli A, et al. Echnical and economic feasibility of conversion to a higher voltage distribution[J]. IEE Proceedings of Generation, Transmission and Distribution, 2003, 142(5): 468-

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472. [4] 姜祥生. 城网配电网电压等级研究[J]. 电网技术, 1999, 23(3): 31-35. Jiang Xiangsheng. An investigation on voltage class for urban electric network[J]. Power System Technology, 1999, 23(3): 31-35(in Chinese). [5] 魏庆海, 吕鸣镝, 周莉梅, 等. 配电网采用20 kV供电的前景分析[J]. 电网技术, 2008, 32(23): 62-66. Wei Qinghai, Lü Mingdi, Zhou Limei, et al. Prospective analysis of adopting 20kV voltage in distribution system[J]. Power System Technology, 2008, 32(23): 62-66(in Chinese). [6] 中国电力科学研究院. 20 kV中压配电理论与工程实践[M]. 北京: 中国电力出版社, 2009: 1-8. [7] 姜祥生. 苏州工业园区20 kV 配电工程[J]. 电网技术, 1997, 21(2): 56-58. Jiang Xiangsheng. The 20 kV electric power distribution in Suzhou industrial development zone[J]. Power System Technology, 1997, 21(2): 56-58(in Chinese). [8] Carr J, McCall L V. Divergent evolution and resulting characteristics among the world's distribution system[J]. IEEE Trans on Power Delivery, 1992, 7(3): 1601-1609. [9] Tel T R, Moun A M. 柏林与巴黎的供电比较[J]. 国际电力, 1999, 3(4): 49-52. Tel T R, Moun A M. Comparison of the power supply of berlin and paris[J]. International Electric Power for China, 1999, 3(4): 49-52(in Chinese). [10] Lee K K, Wong K K. Design, operation and maintenance of 22kV closed ring system[C]//The International Conference on Electrical Engineering. Hong Kong: ICEE, 2007: 8-12. [11] Leung Y F, Chan S C, Chan T F. The Challenges, constraints and solutions for electricity distribution in hong kong island[C]//The Nineteenth Annual Symposium of the Hong Kong Institution of Engineers-Electrical Division. Hong Kong: the Hong Kong Institution of Engineers- Electrical Division, 2001: 24-32. [12] 黄磊, 程浩忠, 欧阳武, 等. 城市高负荷密度地区220/20 kV供电方案研究[J]. 电力系统保护与控制, 2009, 37(20): 1-6. Huang Lei, Cheng Haozhong, Ouyang Wu, et al. 220/20 kV power supply scheme in high load density urban areas[J]. Power System Protection and Control, 2009, 37(20): 1-6(in Chinese). [13] 弋东方, 钟大文. 电力工程设计手册(第1册)[M]. 北京: 中国电力出版社, 2005: 45-47. [14] 蓝毓俊. 现代城市电网规划设计与建设改造[M]. 北京: 中国电力出版社, 2004: 281-305. [15] 徐莉, 陆菊春, 张清. 技术经济学[M]. 武汉: 武汉大学出版社, 2003: 233-259. [16] 广东电网公司中山供电局. 中山市“十二五”电网规划[R]. 中山: 广东电网公司中山供电局, 2009.

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1. 梁锦照 夏清 王德兴. 快速发展城市的组团式电网规划新思路[J]. 电网技术, 2009, 33(17): 70-75
2. 韩丰 李晖 王智冬 刘建琴 王乐. 法国电网发展分析以及对我国的启示[J]. 电网技术, 2009, 33(8): 41-47
3. 吴正骅 程浩忠 厉达 姚白沙 董震威. 基于负荷密度比较法的中心城区典型功能区中压配电网接线方式研究[J]. 电网技术, 2009, 33(9): 24-28
4. 刘树勇|顾强|张丽娟|刘聪. “十一五”期间天津500/220 kV电网分区供电方案[J]. 电网技术, 2008, 32(9): 51-55
5. 麻常辉|梁军|杨永军|郭方正|刘亚丽. 基于蒙特卡罗模拟法的输电网灵活规划[J]. 电网技术, 2009, 33(4): 99-102
6. 马苏龙. 20 kV电压等级在配电网中的应用[J]. 电网技术, 2008, 32(19): 98-100
7. 杨高峰, 康重庆, 谷兴凯, 于德龙. 电力市场中基于情景分析的电网规划方案适应性[J]. 电网技术, 2006, 30(14): 64-70
8. 顾益磊|许诺|王西田. 遗传算法应用于电网规划的难点与改进[J]. 电网技术, 2007, 31(Supp): 29-33
9. 张勇|王云辉|沈建涛|陈瑾|王文娟|王晓茹. 输电网短路电流计算[J]. 电网技术, 2007, 31(Supp): 39-42
10. 范明天, 张祖平, 刘思革. 城市电网电压等级的合理配置[J]. 电网技术, 2006, 30(10): 64-68
11. 韦钢, 吴伟力, 刘佳, 张鑫. 基于SE-DEA模型的电网规划方案综合决策体系[J]. 电网技术, 2007, 31(24): 12-16
12. 郭日彩, 袁兆祥, 李宝金. 法国、韩国变电站典型设计概况及对我国电网工程的启示[J]. 电网技术, 2006, 30(6): 73-76
13. 熊浩|李卫国|黄彦浩|张海峰|畅广辉. 基于模糊粗糙集理论的综合数据挖掘方法在空间负荷预测中的应用[J]. 电网技术, 2007, 31(14): 36-40
14. 李晶生. 天津电网“十一五”规划综述[J]. 电网技术, 2006, 30(20): 1-5
15. 郭日彩|许子智|齐立忠|李喜来|李晋|张莲瑛|何长华|管顺清. 美国输电线路典型设计概况及对我国电网工程设计建设的启示[J]. 电网技术, 2007, 31(12): 33-41