

陈 聪,李 薇,李延峰,祝 颖.生物质发电厂优化选址建模及决策研究[J].农业工程学报,2011,27(1):255-260

生物质发电厂优化选址建模及决策研究

Biomass power plant site selection modeling and decision optimization

投稿时间: 5/29/2010 最后修改时间: 12/22/2010

中文关键词: [生物质](#) [发电厂](#) [选址](#) [线性规划](#)

英文关键词: [biomass](#) [power plants](#) [site selection](#) [linear programming](#)

基金项目:生物质发电成套设备国家工程实验室项目基金

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中文摘要:

生物质发电厂运行过程中, 生物质的运输费用占有较大比例。优化生物质发电厂厂址, 具有重要的意义。针对生物质发电厂选址问题, 提出了一种区间线性规划模型, 模型充分考虑了选址过程中生物质量、运输价格等信息不确定性, 并在生物质建设运行成本最小、能源消耗最低和运输过程中对环境排放的废气最少的目标下, 确定优化厂址、生物质电厂个数及秸秆燃料供给方案。并以装机容量为45000 kW的生物质发电厂为假设案例。计算得出建厂的数量为1; 生物质电厂建设运行最小成本为(1.84, 2.77)亿元, 最佳厂址坐标区间为[(258.70, 232.99), (254.54, 225.89)] km, 以及区域生物质能源系统中各个收储站的运输方案。通过文中模型得到的结果客观可行, 实现了经济与环境的双赢, 对于决策者可以提供科学客观的依据。

英文摘要:

During the operation of biomass power plant, the transport costs of straw and other transportation fuels account for a large proportion of the cost of the operation of biomass power plant. It is significant to optimize the biomass power plant site. Interval linear programming model was proposed for the biomass power plant site selection. The uncertainty of the information was fully taken into account which included the quantity of biomass, transportation prices and so on. And the number of biomass power plants, optimum site and transportation schemes were obtained with minimum cost, minimum energy consumption and lowest effect on environment. Taking a hypothetical biomass power plant with installed capacity of 45 000 kw for example, the calculation results with the model for the hypothetical example were that: the number of biomass power plant was 1; minimum cost for biomass power plant construction and operation was 0.184 and 0.277 billion respectively; and the coordinate of optimum biomass power plant site was from [(258.70, 232.99) to (254.54, 225.89)] km. Additional, transportation schemes were also determined, which can provide a scientific basis for decision-makers.

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