

Methods for determining the optimal level of generating capacity reserve in the long-term development of electric power systems.

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This article presents the problem of determining the optimal level of generating capacity backup in the long-term planning of electric power systems (EPS). This involves refining the composition or identifying inefficient EPS power generation facilities to ensure the standard value of the adequacy indicator, in this case, the probability of deficit-free operation, based on the criterion of minimum capital and operating costs. To solve this problem, the Markov chain Monte Carlo algorithm application is proposed. Since each unit of power equipment is characterized by different parameters and also has a different degree of influence on adequacy, during the operation of the proposed algorithm, these characteristics form an optimal trajectory towards the intended goal from the standpoint of adequacy. This takes into account both the characteristics of the power equipment and dynamic importance coefficients, which show the influence of the power equipment on the adequacy indicators. The algorithm's operation is demonstrated by experimental calculations on a test circuit of the EPS.

Key words: generating capacity reserve, balance reliability, probability of deficit-free operation, Markov chain Monte Carlo algorithm, random forest method, modeling.