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NB

ENERGY INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

NB/T 11555-2024

Specification for preparation of special report on normal pool level selection for pumped storage power stations

抽水蓄能电站正常蓄水位选择专题报告编制规程

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Table of Contents

Foreword

This document was issued on 24 May 2024 by the National Energy Administration of the PRC and takes effect on 24 November 2024.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 27.140, Chinese classification P 59.

This specification was prepared in accordance with the requirements of the Notice of the General Department of the National Energy Administration on issuing the 2023 plan for the formulation and revision of industry standards in the energy field and the plan for the translation of foreign language versions, document Guo Neng Zong Tong Ke Ji [2023] No. 111. The drafting group carried out extensive investigation and research, carefully summarised practical experience, and prepared this specification on the basis of wide consultation.

The main technical content of this specification is: general provisions; basic requirements; introduction; design bases and boundary conditions; analysis of power market demand; hydropower calculation; selection of the continuous full-power output hours; selection of the installed capacity; formulation of the normal pool level alternative schemes; comparison and selection of the normal pool level schemes; determination of the treatment range for the reservoir inundation-affected area; and conclusion.

This specification is administered by the National Energy Administration, was proposed by and is under the routine administration of the General Institute of Hydropower and Water Resources Planning and Design, and the Hydropower Planning, Reservoir and Environmental Protection Standardization Technical Committee of the Energy Industry (NEA/TC16) is responsible for the interpretation of the specific technical content.

Chief drafting organizations of this specification: General Institute of Hydropower and Water Resources Planning and Design; PowerChina Northwest Engineering Corporation Limited; PowerChina Zhongnan Engineering Corporation Limited.

1 Scope

NB/T 11555-2024 is the Chinese specification for writing the special report that fixes the normal pool level of a pumped storage power station at the feasibility study stage. It exists because that single elevation is the decision from which every other number in the project follows. The normal pool level of the upper and lower reservoirs, together with the drawdown between them, determines the usable storage volume and therefore how many hours the station can run at full output; it fixes the head, and with it the machine selection and the ratio between maximum pumping head and minimum generating head that the pump-turbine must tolerate; it sets the dam heights and the excavation quantities; and it

decides how much land is flooded and how many people must be resettled. Raise it by ten metres and the station stores more energy but the dams grow, the cut and fill balance changes and the inundation area widens; lower it and the plant becomes cheaper but less useful to the grid. This document is the framework for arguing that trade-off in a form a reviewer can check. It sets what the report must contain and to what depth: the hydrology and geology results, the boundary conditions including the major social and environmental factors, and the design bases across layout, electromechanical works, construction planning, resettlement, environmental protection and investment. It requires a power market analysis that establishes the supply area, the development purpose and the demand scale and reasonable layout of pumped storage in that system - because a pumped storage station is built for the grid rather than for the river. It then requires the hydropower calculations: electric power and energy balance, flood routing, reservoir sedimentation and backwater, and the water balance for initial impoundment and normal operation, from which the operation rules and the benefits follow. On that basis the report selects, in order and each by formulating, comparing and choosing among alternative schemes, the continuous full-power output hours, the installed capacity and finally the normal pool level itself, before determining the treatment range of the reservoir inundation. A separate rule covers stations built on an existing reservoir, where the storage capacity available, the intake and outlet flow conditions, the coordinated operating mode and the effect on the original reservoir all have to be analysed. Six appendices give the required report contents and the engineering characteristics tables for the station and for each set of alternative schemes. It was issued on 24 May 2024 by the National Energy Administration and took effect on 24 November 2024.

1.0.1 This specification is formulated in order to standardise the principles, the work content, the depth and the technical requirements for the preparation of the special report on normal pool level selection for pumped storage power stations.

1.0.2 This specification applies to the preparation of the special report on normal pool level selection for pumped storage power stations at the feasibility study stage.

1.0.3 The preparation of the special report on normal pool level selection for a pumped storage power station shall be based on the results of the pre-feasibility study stage of the project and shall be carried out under conditions in which the layout of the project complex at the feasibility study stage is basically settled. Following the principle of technical feasibility and economic reasonableness, it shall analyse the requirements of the power system, justify and determine the continuous full-power output hours and the installed capacity, select the normal pool levels of the upper and lower reservoirs through a comprehensive technical and economic comparison, and determine the treatment range of the reservoir inundation effects.

1.0.4 In addition to complying with this specification, the preparation of the special report on normal pool level selection for a pumped storage power station shall also comply with the