

CONSTRUCTION OF PRODUCTION FACILITIES



Quality control at the stage of construction of RusHydro Group's facilities

Quality control at the stage of construction and installation works is carried out in order to:

- verify the compliance of the works with the town-planning code, design documentation, the requirements of technical regulations, the engineering surveys;
- provide reliable and trouble-free operation of power facilities and reduction of non-productive costs during the operation stage.

Quality control:

- consists of technical requirements to the final result and assessment of conformity of the result to the technical requirements, internal normative documents and legislative acts;
- is conducted by all construction participants, the contractor, the developer (customer) and the designer (within the framework of the author's supervision);
- provides operational input, acceptance control, and also accounting of works performed, the final check of the executed works and preparation of the conclusion on conformity;
- in addition to internal oversight, includes an external oversight system implemented by the Federal Service for Environmental, Technological and Nuclear surveillance and other state technical oversight bodies

Documents regulating the issues of quality control during the construction phase:

- Technical policy of PJSC RusHydro
- Corporate standards of construction and installation works of RusHydro (level of construction customer):
 - 01.02.132-2015 Hydroelectric power stations. Quality control of work in the construction process. Norms and requirements;
 - 70238424.27.140.046-2009 Hydroelectric power stations. Manufacture of construction and installation works. Norms and requirements;
 - 04.01.71-2011 Hydropower construction. The procedure for determining the cost of construction and installation works. Methodical instructions;
 - 01.02.85-2013 Hydropower construction. Calendar-network planning of projects for the construction of hydro-generation facilities. Norms and requirements.

Regulation and supervision

Control of the conformity of the quality of construction and installation works, applied materials and structures, is governed by the requirements of the Russian Federation legislation, industry standards and requirements, corporate technical standards, regulatory requirements for project documentation.

In addition to the requirements of the Federal legislation and subordinate legislation¹, at all stages of construction work, industry standard and quality control standards developed by RusHydro are applied.

¹ Urban Development Code and Resolution of the Government of the Russian Federation No. 468 of 21.06.2010 "On the Procedure for Conducting Construction Supervision during the Construction, Reconstruction and Overhaul of Facilities".

Development of the Unified Conformity Assessment System (UC AS) for the construction (reconstruction and overhaul of capital construction projects) and requirements for the controlling procedure of the UC AS is conducted by the Supervisory Board of the unified system of conformity assessment in the field of industrial, environmental safety, security in energy and construction. The oversight over their execution is carried out by the Federal Service for Ecological, Technological and Nuclear Supervision.

At the stage of construction at the stations, an automated system of diagnostic control is introduced, which performs automatic collection of devices indications and their computer processing, for the analysis of the condition of the hydro-site structures. At delivery by the building organ-

isation to the customer of the measurement equipment and all data of observations of hydrotechnical facilities in operation are handed from the building companies to the customer.

In the reporting year, no people were economically displaced or compensated in connection with the construction of new facilities. [EU22]

Indirect economic impact of key structures on the regions of presence [203-2]

Project	Indirect economic impact
Zaramagskiye HPPs	After the commissioning of the station, its tax revenues to budgets of all levels will amount to 0.9 billion rubles annually, which will enable the HPP to become a key budget contributor in the region. The uniqueness of Zaramagskaya HPP-1 consists primarily of a 14.5 km derivation tunnel, which is unparalleled in Russia. Its width is 4.5 m, its height is 5 m, water will pass through the tunnel in 80 minutes. The construction of the tunnel began in 1982, during the Soviet times, no more than 30% of its length was built
Nizhne-Bureyskaya HPP	The socio-economic effects of the project for the Far East and Russia: <ul style="list-style-type: none"> ■ reduction of current generation costs for the Unified energy system of the East; ■ the possibility of switching nearby villages from expensive fuel oil and coal boiler heating to electric boiler heating with a reduction in the heat tariff for consumers; ■ creation of jobs for the laid-off builders of the Bureyskaya HPP (2,000 people) and a reduction in outflows from the Far East; ■ subcontractor work for domestic producers and firms; ■ increase in tax revenues to budgets of all levels; ■ growth in the purchasing power of the population of the Amur Region
Ust-Srednekanskaya HPP	The launch of the HPP is the source of power for the Matrosov Mine (the Natalinskoe gold deposit) and contributes to the growth of the economy of the region due to the development of the mining sector
1st stage of Sakhalinskaya GRES-2	The commissioning of the first stage of Sakhalinskaya GRES-2 will create the prerequisites for socio-economic development of the western coast of Sakhalin by creating new jobs, housing and social infrastructure. The necessary reserve of capacity will be provided for the prospective new consumers
CHPP in Sovetskaya Gavan	The commissioning of a CHPP plant in Sovetskaya Gavan allows to: <ul style="list-style-type: none"> ■ ensure reliable, uninterrupted and cost-effective energy supply to consumers in the Sovetsko-Gavanskiy and Vaninskiy regions; ■ increase the reliability of energy supply to the energy center of Sovetskaya Gavan; ■ ensure the region's growing electricity needs related to the expansion of the seaport, the construction of the largest coal terminal in the Far East and the development of a transport hub; ■ ensure the replacement of outgoing capacities and inefficient equipment of the Mayskaya GRES; ■ centralise the heat supply to Sovetskaya Gavan; ■ ensure the growth of tax revenues to budgets of all levels
CHPP Vostochnaya in Vladivostok on the site of Central steam-water boiler facility	The Vostochnaya CHPP will fully cover the heat load of the adjoining area of the Central steam-water boiler facility. Due to the redistribution of the load to CPVB -2, new consumers of the city will be provided with heat, including Patroclus and Green Corner. The thermal power reserve that is created with the thermal power station will create favourable conditions for the further development of the city

Programme of construction of new heat generation facilities in the Far East

The development of the Far East is one of the highest priorities of the state. Thus, the Federal Target Programme for the Development of the Region has been developed, and the Ministry for the Development of the Far East has been created. [103-2], [103-3]

RusHydro Group contributes to the development of the region. The Company's most important investment project is the construction of four facilities on the territory of the Far East within the framework of the execution of the Presidential Decree dated November 22, 2012 No. 1564 "On the Further Development of the Open Joint-Stock Company Federal Hydro-Generating Company-RusHydro".

Financing of projects for the construction of new facilities is carried out mainly from budget funds intended for the development of power in the Far East. For these purposes, the state, under Presidential Decree No. 1564 of November 22, 2012, allocated 50 billion rubles in the framework of the additional capitalization of PJSC RusHydro. [201-4]

The implementation of these projects is the first stage of the Far Eastern Energy Development Programme aimed at replacing the outgoing power capacities and developing the infrastructure of the decentralised energy supply sector. The programme will achieve the following effects for the regions of the IPS of the East by 2025:

- total increase in the gross regional product of the Far Eastern Federal District;
- additional tax revenues for energy companies of the Far Eastern Federal District and related industries (mechanical engineering);
- development of the construction industry: additional housing can be connected to heating service;
- employment growth through the creation of new jobs in industries such as construction, operation of energy facilities and mechanical engineering. [203-2]

PROGRAMME OF MODERNIZATION, TECHNICAL REHABILITATION AND REPAIRS

Comprehensive modernization programme

A significant number of powerful hydroelectric power plants were commissioned in the 1950s and 1960s, and by the early 2000s, there was a need to upgrade and replace existing equipment. Due to the economic difficulties of those years, it was not possible to replace obsolete and worn-down equipment; hence, PJSC RusHydro had to resort to periodic repairs and the replacement of separate units.

Since the middle of the 2000s, a number of stations of PJSC RusHydro had their equipment replaced, but the pace of asset renewal did not allow breaking the trend of aging HPP equipment as a whole.

In December 2011, the Board of Directors of the Company approved the Programme for the comprehensive modernization of generating facilities of PJSC RusHydro (PCM), designed for the period through 2025.

PCM is a unique project for the upgrade of generating facilities in the energy sector.

As part of the RusHydro Programme, it is planned to replace more than half of the main equipment at HPPs:

- 154 turbines (55% of the total number of turbines),
- 119 generators (42% of the total number of generators);
- 176 transformers (61% of the total number of transformers);
- 396 high voltage switches;
- ~ 8 thousand units of secondary switching equipment;
- more than 4,000 units of auxiliary equipment;
- in addition, it is planned to perform the reconstruction of hydraulic structures.