CONTRIBUTION OF THE SCIENTIFIC AND ENGINEERING COMMUNITY TO HYDROPOWER DEVELOPMENT OF THE USSR

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The scientific and engineering community has played a major role in the history of Soviet hydropower development, it has made a significant creative contribution to the development and improvement of the technical level of power construction, generator building, and power economy.

During the first, quite strenuous months of existence of Soviet power, V. I. Lenin in "Outline of the Plan of Scientific Works" defined the basis of the future plan of the State Commission for the Electrification of Russia (GOELRO), having indicated the need to enlist the scientific and engineering community through commissions of specialists to help solve the problems of transforming the country on the basis of electrification and utilization of water resources. As a result, as early as 1918 the Electrical Engineering Council (TsES), which brought together many types of scientists, was created with the active participation of the old Bolshevik and activist of the Russian Engineering Society (RTO), L. B. Krassin. The sections of the TsES worked out the rules and regulations, planned power construction projects and investigated the possibility of producing at domestic plants the needed machines and equipment, and examined the projects of the first electric stations.

Activists of the scientific and engineering community, including L. G. Aleksandrov, A. V. Vinter, G. O. Graftio, M. A. Shatelen, and others played a leading role in the work of GOELRO, which was formed in February 1920, and its commissions. The chairman of GOELRO was the outstanding power engineer and Bolshevik G. M. Krzhizhanovskii, who was well acquainted with the active members of RTO and other organizations of the scientific and engineering community and enlisted their assistance.

To discuss the problems associated with the refinement and realization of the GOELRO plan, the Council of People's Commissars (Sovnarkom) decided to hold, in Moscow, the Eighth All-Union Electrical Engineering Congress, which was opened in the fall of 1921.

The Congress was preceded by a wide discussion of the GOELRO plan in various locales. The suggestions of the community were set forth in 218 reports. An important feature of the Congress, which was attended by 1300 delegates from 102 cities, was the successful combination of theoretical reports, which gave a prediction of the development of science and technology, with reports devoted to concrete plans of development of the national economy of the country.

L. G. Aleksandrov, in the report "Economic Zoning of Russia," gave an account of the principles of formation of large regions ensuring the effective distribution of productive forces. A number of reports were devoted to the use of the water power of the Northwest, Transcaucasus, Central Asia, and Ukraine. M. A. Velikanov in his report on waterways of Siberia considered the construction of a cascade of hydroelectric stations on the Angara with a total capacity of at least 20 million horsepower. Much was discussed at the Congress, including problems of selecting the type of Dnieper hydroelectric station, expediency of constructing hydroelectric stations on the Volkhov and Svir rivers where appreciable reserves of peat are located, etc.

The Congress approved a one-dam type of Dnieper hydroelectric power scheme, the significance of which was especially great in connection with the acute shortage of fuel. Honorary chairman of the Congress was V. I. Lenin, who wrote in his address to the delegates: "By means of your Congress, by means of all electrical engineers of Russia and of the best, most progressive scientific forces of the entire world, with heroic efforts of the vanguard of workers and peasants, we will conquer this problem, we will develop electrification of our country."


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V. I. Lenin highly valued the results of the work of the Congress, pointing out that it provided "... a check by the best engineering and scientific forces of Russia of the plant which is solely scientifically verified..."*

The decree of the government concerning encouragement of the creation of scientific and technical societies [1], which was made a month and a half before convocation of the Eighth Electrical Engineering Congress, promoted the development of activity on the part of the power engineering organizations to fulfill the GOELRO plan.

For a general review of the works performed for fulfillment of the GOELRO plan, an All-Union Conference on Electrical Supply was held in 1924, at which reports on the state of planning and construction of electric power stations were discussed, including the reports of I. G. Aleksandrov on the planning of the Dnieper hydroelectric station, G. O. Graftio on the construction of the Volkov hydroelectric station, and A. V. Vinter on the construction of the Shatur state regional electric power plant.

Great work was done by the power-engineering community to prepare for the first five-year plan. The results of the work of local organization in this area were examined in 1928 at the First All-Union Power Congress, which combined the Ninth Electrical Engineering and Fourth Thermal Engineering Congresses. The Congress elected an All-Union Power Committee (BÉK), which unified all organizations of the power community. The staff of the BÉK was composed of active workers I. A. Aleksandrov, E. V. Bliznyak, B. E. Vedeneev, A. V. Vinter, M. V. Kirpichev, G. F. Prosura, M. A. Shatelen, and others. G. M. Krzhizhanovskii was elected chairman of BÉK.

The First All-Union Power Congress was preceded by a number of large branch conferences, among which we need note the First All-Union Hydraulic Engineering Conference held in May 1928. It was pointed out in the proceedings of the conference that the "Conference is the first, not only in post-Revolutionary time, but the first in Russia in general, since there had never been any such conferences where all branches of hydraulic engineering were combined" [2]. The conference discussed 38 reports on the planning of large-scale hydraulic construction, irrigation, industrial water supply, and waterways. The five-year plan for large-scale hydraulic construction called for the expenditure of 2.9 billion rubles. The first experience of designing large hydroelectric projects was generalized and the need to create a large, single design organization, namely Gidroelektroproekt, was recognized. The general specifications for designing hydraulic structures were examined and approved for the first time in the history of hydraulic engineering. The conference examined the plan of scientific investigations in the area of hydropower engineering and hydraulic engineering and recommended acceleration of the creation of an All-Union center of hydraulic-engineering science.

At its first conference the hydraulic engineering community raised problems which are even now urgent problems of the day: development of lagoon irrigation—one of the radical means of combatting soil erosion, concentration of means at decisive structures, etc.

In May 1931 the First All-Union Congress of the Society of Hydraulicians and Hydraulic Engineers was held in Moscow. In addition to setting up the newly created organization of the hydraulic-engineering community and determination of its tasks, the Congress summed up the results of hydraulic construction in the first five-year plan and examined the plan of projects in this area for the next 15 years. The Congress arrived at the conclusion that it was necessary to take an inventory of water resources in order to provide project and planning organizations with data for future planning. Along with a discussion of the method of water-power calculations for hydroelectric stations, problems of calculations of cooling ponds were examined, mainly on the basis of the then-published work of N. M. Bernadskii on this matter.

Quite important was the work of the scientific and engineering community on the preparation of the 15-year plan of electrification of the country. This plan had to be drawn up on the basis of the experience gained from accomplishing the GOELRO plan and with correct consideration of the new potentials of the Soviet State. The primary materials, in the preparation of which more than 1000 specialists participated, were discussed at regional and branch conferences. About 300 scientists and engineers worked on the publication of 8 large volumes (more than 250 printers sheets), one of which was prepared by the power-engineering community. In the section "Hydro-power Plants and Storage for Water Power" it was reported that, by the time the work had been compiled, 15 hydroelectric plants with a total capacity of 96,845 kW were in service, of which the Volkov and Zemo-Avchal'sk hydroelectric power stations accounted for 73,000 kW, and 18 hydroelectric power stations had been built, including the Dnieper, Nizhne-Svir, Nivsk, and others, with a total capacity of 994,000 kW. The work gave a thorough analysis.

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