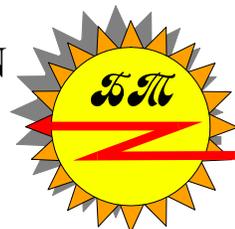




РОГУНСКАЯ ГЭС
Технические Характеристики

THE ROGUNSKAYA HYDRO POWER STATION
Performance Characteristics



THE ROGUNSKAYA HYDRO POWER STATION PERFORMANCE CHARACTERISTICS

The Rogunskaya Hydro Power Station is one of the largest on the Vakhsh, which regularities the all works of currently construction. When the construction of Rogunskaya Hydro would be over, it will be possible practically the full assimilation of the potential of the river, and also to regulate the water power of Amu-Darya river.

Making the regulation of the water power the Rogunskaya Hydro not only increase output electric power more than 0.7 Bill.kW.h, but the most important it will let to operate in any kind of necessary regime, the output summer electric power, but the more deficit bases electric power in this region, that is why it would be important not only for Tajikistan but for all countries of Central Asia, and also the south neighbour countries.

The main importance are making possible to irrigate large areas of the land, water resources will save fuel for power production. Besides, the Rogunskaya Hydro reservoir could be improve the situation in the Amu-Darya river and helps the problems of the Aral Sea.

Reference

The Rogunskaya Power Station is constructing in the Republic of Tajikistan on the Vakhsh river (tributary of Amu-Darya) in ninety km. higher from the Nurekskaya Hydro.

Performance characteristics of hydro unit.

1. Height of the dam, in	335
2. Reservoir storage, mill. m ³ :	
- full	13,3
- usable after the 50 years	8,6
3. Additional guaranteed water discharge, k m ³	4,4
4. Installed capacity, MW	3600 (6x600)
5. Power output, bill. KW-h	13,1
6. Increase power output, bill. KW-h	0,7

The main volume of construction and assembly works on the hydro unit.

1. The rock fill - earth dam, mill. m ³	71,0
2. Open - cut earth excavation, mill. m ³	30,0
- Wrench out of rock	14,0
3. Underground rock excavation, mill. m ³	5,1
4. Concrete, mill. m ³	2,5
- Underground	1,5

The effectiveness of water power, specific performances.

<u>1.The whole project</u>	
1.1. Addition finance, mill. US\$	1286,4
1.2. Term of repayment of additional investments, years	3,5
1.3. Specific of investments, US\$	
- for 1 kW installed capacity	833
- for 1 KW-h power output	0,26
- for 1 m ³ of water	0,24
1.4. Prime cost for 1 kW-h energy, US\$:	0,008
<u>2.Starting complex</u>	
2.1. Necessary addition volume of finance, mill. US \$	483,7
2.2. Total energy output per year, Bill. KW/h	4,5
2.3. The term of repayment of additional investments if construction is stopped, years	4,5
2.4. The term of repayment of additional investments if the construction is being work for putting into operation 3-d and 4-th aggregates and increasing the pressure up to 150 m., years	2,5

Assignment of the water unit.

The Rogun water unit has the complex irrigation - energy assignment.

Power Engineering.

The Power energy output the 18 bill. kW-h in a year in Republic of Tajikistan and now really stability deficit of electric energy. The waiting size till 2000 year forms 4.0 bill. kW-h. Moreover, more energy need north regions of Tajikistan where are concentrated the main industrial units.

Excepting of own needs, we have the possibility to transfer energy output from Rogunskaya Hydro to the far and nearest foreign countries. We have the contract with Pakistan about selling the power energy 5,5 bill. kW-h in a year.

We are making the ways to transfer electric power to Kazakhstan through Leninabad region. The deficit of electric power in Kazakhstan is more than 10 bill. kW-h per year. The deficit in Leninabad region is more than 4,0 bill. kW-h.

Now Afghanistan also have more needs of power energy and in the further the needs of power energy will be increase with the connection after the improving the political situation. One of the grand potential customer of energy power in Afghanistan is Ainak, which is situated near Kabul, has much brass copper.

The 18 bill. kW-h in a year in Republic of Tajikistan now really tries stability deficit of electric energy. In fact the size in 1990 year is putting for 1,24 bill. kW-h.

At any cases, which we are looking for the main significance of Rogunskaya Hydro includes not only in the power output, but also the Rogunskaya Hydro is a basis station on the Vakhsh river and with its regulation reservoir which is letting to work the water 'power in any energy regime, manufacture not only the summer energy power, but the deficit basis energy power and for covering the peak loads. In this case it will be more effective the mutual work of Rogunskaya Hydro with the countries, which the main volume of power energy output produced with the Heat stations: Uzbekistan, Kazakhstan, Turkmenistan and Pakistan.

Irrigation.

The project of Rogunskaya Hydro foresees the irrigation of 350 thou. hectares of the new lands, mainly in Uzbekistan and Turkmenistan. In today conditions we have many areas of irrigation lands, but they don't use effectively and loading the new lands is not effective.

The role of Rogun reservoir in present day conditions first of all is including irrigating the existing Langs. The improving of their irrigation we can increase the production of cotton in Surhandarya and Karshi regions of Uzbekistan about 210 thousand ton, and also the fine-fleeced cotton about 100 thou. Ton.

The significance would be have the Rogunskaya Hydro to improve the ecology situation in the basin of Amu-Darya river and to decision the problems of Aral Sea. The regulation of the Rogun reservoir for many years will be let to increase the tributary to the lower of the Amu -Darya river. It will be help to carry out the measures for increasing the water of the tributaries of the river and to ensuring the optimal hydrological regime of the tributary pond, which is being to construct in the mouth of the Amu Darya River. It is necessary to notice that the Rogun reservoir is situated in the uninhabited region and the Rogunskaya Hydro is the spring of clean fresh water.

Present day of waterpower condition.

<u>1. The mastering of investments in</u> <u>% of volume of works:</u>	
- the investments	41% (802,4 mln. US\$)
- the preparations for the zone of underwater	12,3%
- the object of civil houses	53%

The general leaser for the construction of Rogunskaya Hydro is the administration of Rogunskaya Hydro the State company "Nuraphzo" which has the large experience in the constructions of Nurekskaya and Baipazinskaya Hydroes.

The building Organization is more than 4,0 thousand of men and is the work will be begin, this number will be increase till 6,5 thousand of the men. There is the complex of the subsidiary dwelling houses and Base, which are securing the fulfillment of 150 - 180 millions US\$ of investments in a year. The transport communications and the crossing bases near the railway station and the supply with the power energy were decided. The hydromechanics and the electrotechnic equipment made and delivered for two urgent units, for the I-st and partial for the 2-hd aggregate.

Strategy of the construction in present day conditions

The Starting complex.

The taking stock of the heavy economic conditions the Republic of Tajikistan and the absence of the external economic relations the program of the construction the Rogunskaya Hydro foresees to lead the turning capacities with aims to output power energy in the process of the construction. The profits of the realization the power energy will serve as one part of investments to continue and complete the construction of Rogunskaya Hydro.

Today elaborating graph foresees construction I-st turn of station with starting two aggregates in the lower pressure 160-170 m. Capacity of the I-st station - 1200 MW. Year output of energy is 4,5 bill. kW.h. Total volume finance of the starting complex is 483,7 mill. US\$.

Necessary expenditure for completing construction is 1286,4 mill. US\$.

Graph financing starting complex Rogunskaya HPS is performance in the table №1.

Table № 1, mill. US\$

Name of works	Total	For the 1-st starting complex	Years of financing					
			I	II	III	IV	V	VI
Capital investments	1228,2	425,5	30,0	50,0	60,0	60,0	70,0	74,9
-including construction woks	830,0	320,0	25,0	45,0	58,0	58,0	69,0	74,6
Construction equipment's costs	58,2	58,2	10,0	15,0	25,0	13,2	-	-
Total	1286,4	483,7	40,0	65,0	85,0	73,2	70,0	74,9
Starting of aggregates							№5	№6

The term of repay of investments is 5 - 6 years.

**The basic characteristic of the Feasibility Study
of 1-st stage of 1-st turn Rogun HPP.**

The basic task of the project is the development of Rogun HPP's variant of construction, which minimizes the first stage expensive, but allowing finishing it in further whole volume.

It was carried out at the expense only of the beginning of dam construction with reservoir with additional output of the energy on the working cascade Vakhsh HPP. In the further on originally received effect can be increases at the expense of gradual escalating of a dam and installation of two units of HPP of total capacity 800 MW.

As a result the construction of 1-st stage of 1-st turn Rogun HPP will be carried out in the following sequence:

1. Construction of a dam (without HPP) with NHL (nominal head level) - 1050 m.
2. Construction of a dam (without HPP) with NHL - 1100 m.
3. Construction of a dam (without HPP) with NHL - 1150 m.
4. Construction of a dam with HPP with NHL - 1180 m.

The basic parameters of these consecutive stages:

№ n/n	Stages	Volume of reservoir, bil. m ³	Additional output, bil. m ³	Cost, mil. \$US
1	Dam with NHL -1050	0.18	0.13	124.7
2	Dam with NHL - 1100	0.6	0.45	160.8
3	Dam with NHL - 1150	1.56	0.80	196.9
4	Dam with NHL - 1180 plus HPS 800 MW	2.78	5.6	443.5

The costs given in the Table in further on process of working projection can be increased on 10-20 %.

The efficiency of 1-st stage of 1-st turn Rogun HPP as separate object, will be supplied under the increasing of the working tariffs twice in accordance with international criterias.

It is important to note, that during development of the Feasibility Study of 1-st stage of 1-st turn Rogun HP the opportunity of refusal from complex and expensive measures on protection of a salt-layer in the foundation from erosion was proved, and also to exclude an arise earthquakes any moving process of this break.

Expression, confirmation and coordination of the project of Rogunskaya Hydro

I. Diagram of the complex using the Vakhsh river (1959 - 1965 years).

Choice the paramount project.

Confirm: 1.the decision of Scientific Soviet from 20.06.1963 № 47
2.resolution of the State Plan of the USSR from 25.12.65. №21

II. The technique-economic substantiation of Rogunskaya Hydro (1965-1972 years).

The choice of the dam outline and type of the dam and the size of the waterunit.

Approved: the decision of the State Expertision committee of the State Plan of the USSR from 27.02.74 year № 6.

III. Technical project of Rogunskaya Hydro (1974 - 1978 years).

The project's main objects.

Expression: 1. The technical counsel of Hydroproject - the minutes № 72 from 26.12.79 year.
2. The N.T.S. Min. energy of the USSR - decision № 70 from 27.06.79 year.
3. The State construction and S.K.S.T. - conclusion № 380 from 27.11.1980 (after the decision with all the interest republics.)

IV. The Finishing of the technical project.

1. 1986 year - the level of technical decisions.
Expertise:Min. energy of the USSR - decision № 248 from 27.12.85 years and № 60 from 01.12.86 years.
2. 1992 year - dependable of objects of hydrounit, ecology, Normal headwater level.
Expertise: S.E.C. of State Plane of the USSR - the conclusion from 05.07.90 year and State Expertision - conclusion from 04.10.90 year.
3. 1993 year-the interests of the republics the social and political aspects and so on.
Expertise: Ministry of Economy of the USSR - the order X9108 from 16.11.1992 year.

V. Construction.

1. The preparing period.Open:1976 year - with the order of Ministry of Energy of the USSR X2344 from 14.10.76 year.
2. The title list of construction. Open: 1981 year - with the order of the Council of Ministers of the USSR from 26.03.81 year N2 536-R.

Technological equipment of Rogunskaya Hydro.

I. Turbines equipment.

Turbines	
1. Type- PO 310/3207-B-600	B - 600
2. Capacity	- 615 MW
3. Rated heads	- 200+320 m (R.h. - 245 m)
4. Runner diameter	6,0 m
5. Speed:	
normal	- 166,7 rp/min
drive	- 310 rp/min
6. The speed from right side	
7. The height of draw off	- 14,7 m
8. Equipment:	Electro hydraulic regulator of speed, column of management for cylinder bolt, the unit oil rated installation.

Before turbines bolts:

1. Type - cylinder (runners) for turbines.

II. The electromechanical equipment.

Generators:

1. Type - CBΦ- 1275/250= 3644
2. Nominal capacity - 600/666 MW/kVA
3. Power factor - 0,9
4. Voltage - 15,85 + 5% kV
5. Fly. moment - 65500 tm²
6. The segmental guide bearings are accommodated in oil baths with built - in oil coolers
7. The hydraulic turbine generator is furnished with a thyristor excitation system.

The chief main transformers.

1. Type 630000/500 three phase power, 500 kV
2. Power output 630 MVA
3. Voltage 15,75/525 kV
4. Transports weight 400 ton.

**Chairman of the Open Joint Stock Holding
Company «Barki Tojik»**

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