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New developing model for technologically and energetically studied hydroelectric power plant

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ABSTRACT: In this article, the electricity produced in the months of 2019 of Ohangaron HPP was studied technologically and energetically, a new HPP model was developed as a result of experimental analysis. Factors affecting the production capacity of the hydroelectric power plant were studied and based on the relevant recommendations, the hydroelectric power plant model with a relatively high production capacity was recommended.

KEY WORDS: electricity produced, **energy saving, electrical energy, experimental analysis, factors, hydro,** hydroelectric power plant, hydroelectric power plant model, power plant, technological process, water flow, **irrigation regime, water resources.**

I.INTRODUCTION

"Ohangaron GES" unitary enterprise (UK) is located in Angren, Navgarzan town, Plotina, Tashkent region. The enterprise was established in July 2009.
Ohangaron HPP is a dam station consisting of two units with a capacity of 10.5 MW each, using the water resources of the Ohangaron River. The operation procedure of the hydroelectric power station is completely subject to the irrigation regime of the Ohangaron reservoir hydroelectric complex discharge facilities. [1-3].

II. LITERATURE SURVEY

The units were commissioned in June 2010. The main type of activity is the production and sale of electricity. The main facilities of the existing hydropower complex include:
• a dam with a height of 100 meters;
• W = 200 million m water reservoir;
• Deep water flow - a water outlet consisting of a deep water intake;
• Pressure tunnel;
• Gate room;
• Water well - damper;
• Free flow discharge tunnel;
• An open road to the confluence with the river.

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The station building of Ohangaron HPP is located on the right bank of the existing open water well section connecting the pressurized and non-pressurized parts of the "Driving" tunnel.

The main structures of Ohangaron HPP include:

1. Turbine pipes
2. Station building with exit channel
3. External switch for voltage 35 kV
4. Production building (IChB)
5. Compressor
6. Hardware workshop of oil installations and open oil storages
7. Farm yard structures
8. Plot of drinking and fire water supply facilities
9. After extinguishing the fire, the building of the industrial sewerage of oily water with an underground oil collector.

Located outside the station:

10. Reservoir area
11. Area with water wells. [1].

III. METHODOLOGY

The 21 MW Okhangaron Hydroelectric Power Plant is located downstream of the Ohangaron Reservoir Dam, 21 km northeast of Angren. The HPP is attached to the Ohangaron reservoir, and its operating mode depends on irrigation requirements. The capital category - III, structures are designed for earthquakes of 8 points, occupy the area to the right of the Okhangaron hydroelectric complex, which include: inlet pressure pipes, HPP building and discharge channel.

By creating pressure, the 100 m high and 1633 m long Okhangaron Reservoir dam along the ridge blocks the channel of the Okhangaron River above the Angren coal mine. Power reservoir 200 mln. m3 seasonal regulation designed to increase the water supply of irrigated lands and industrial and communal water supply, the standard reserved water level is limited to 1070.5 m. The threshold mark is designed to transfer 400 cubic meters of water per second from the existing depth of 1010 m. The Ø 7.8 m pressure tunnel of the water outlet made of reinforced concrete is divided into two sections by a wall along its length, the openings at the end of the pressure tunnel are blocked by two-row flat emergency repair and working segment doors.

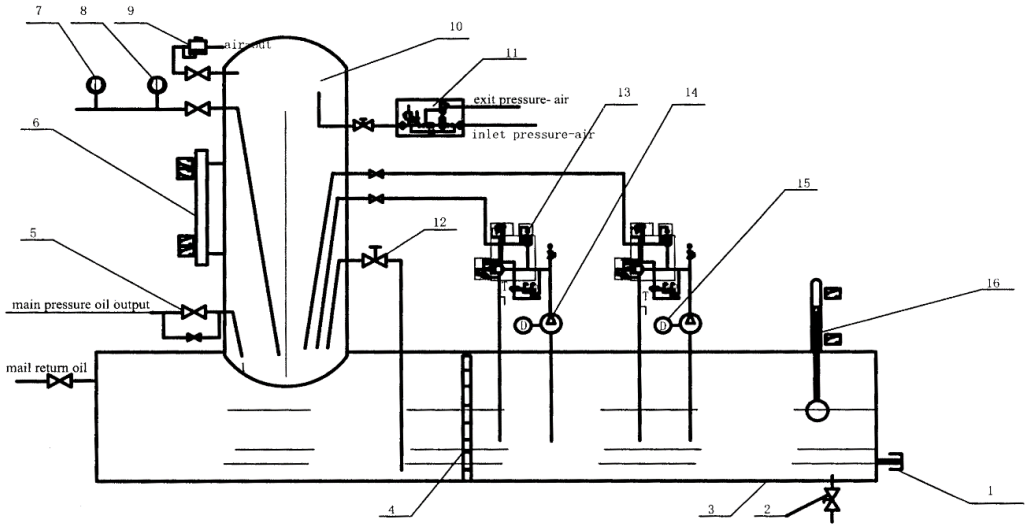

Fig 1. Oil pressure unit (OPU)
1- water in the oil alarm, 2- shut-off valve, 3- return oil chamber, 4- oil filter screen, 5- shut-off valve, 6- damper fluid magnetic level alarm, 7- electroplating connection manometer, 8- pressure indicator control, 9- safety valve, 10- tank under pressure, 11- automatic cleaning equipment, 12- shut-off valve, 13- combination valve, 14- screw pump, 15- electric motor, 16- liquid level alarm.

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IV. EXPERIMENTAL RESULTS

The construction of the hydroelectric power station began in 1996 and was completed in 2010. Pressure pipelines, HPP building, outlet channel and other structures were completed according to working drawings. Parameters of hydromechanical and power equipment, loads on doors and lifting mechanisms correspond to design solutions. Pipes, hydro turbines and auxiliary equipment were tested, the object was put into operation in June 2010 by the act of the State Commission.

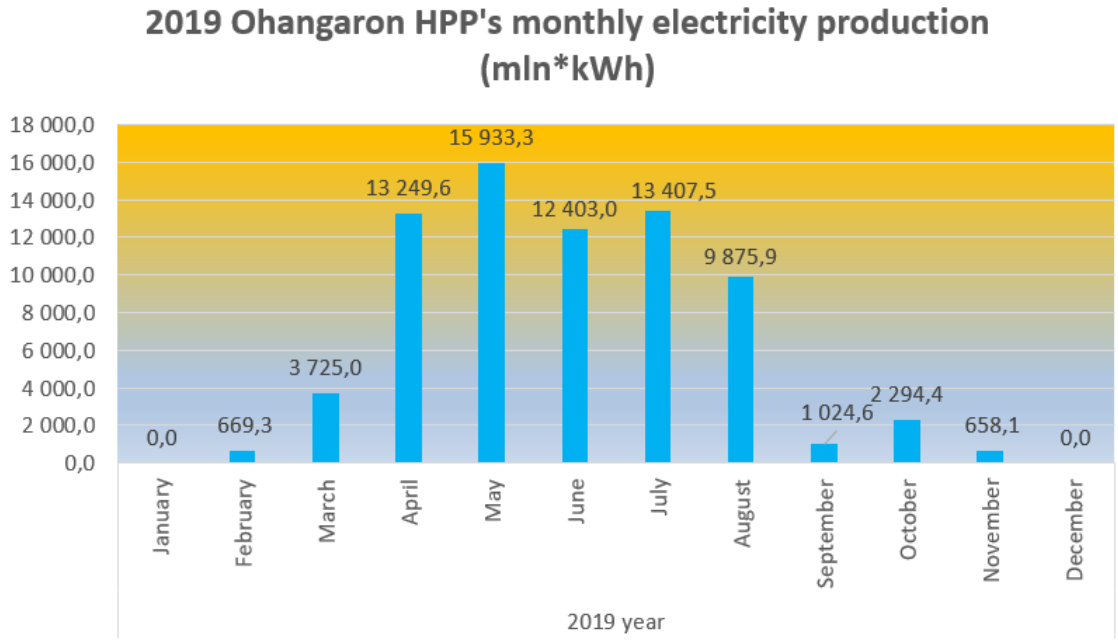

Fig. 2 Ohangaron HPP's monthly electricity production in 2019 (mln*kWh)

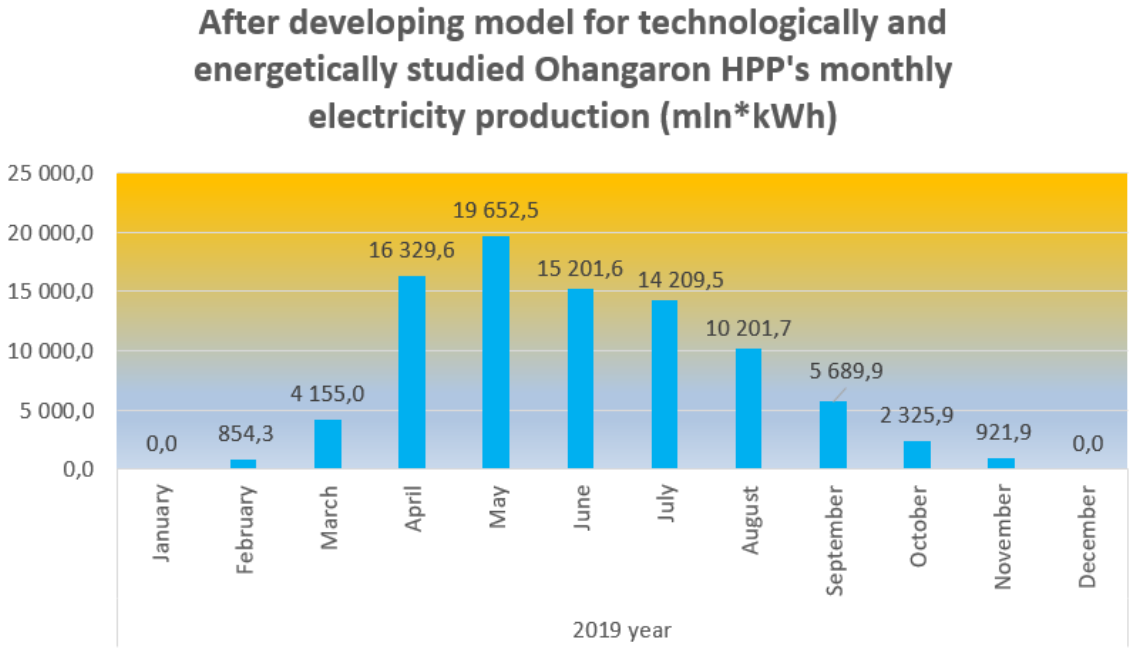

Fig.3 After developing model for technologically and energetically studied

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Ohangaron HPP's monthly electricity production (mln*kWh)

The hydroelectric plant operated for 9 years and produced 563 million kilowatt-hours of electricity, without any failures and 46 measuring devices are placed in the station building in the pipelines and outlet channel, the control is automated, the sensor readings are output to the computer. The frequency of monitoring the condition of structures and equipment is determined by the project and instructions, control is assigned to the operation department.

V. CONCLUSION AND FUTURE WORK

Thus, as a result of developing model for technologically and energetically studied hydroelectric power station, it will be increasing to 16 301.1 mln*kWh for a year. It will recommended for future plans of Ohangaron HPP, as well as it will use for other hydroelectric power plants in new future.

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