

<b>Employer:</b>	"NEK" JS Co., "MONTAZHI" JS Co.
<b>Project:</b>	"Chaira" PSHPP
<b>Subproject:</b>	Four reversible units "Toshiba" with rated capacities of 200 MW - in turbine mode and 186.2 MW - in pumping mode. Outdoors Switchgear – 400 kV. Common plant facilities.
<b>Design:</b>	Starting up and adjustment works on 4 reversible units, Outdoors Switchgear - 400 kV, common plant facilities and control system TOSMAP-GS800 Series PLC of TOSHIBA.
<b>Main contractor:</b>	
<b>Subcontractors:</b>	
<b>Kinds of activities:</b>	Starting up, tuning, and commissioning works
<b>Performance:</b>	Finished in 1998.

---

### **Short information concerning the project:**

The first stage of "Chaira" Pump and Storage Hydro Power Plant (PSHPP) was introduced in 1995, with units № 1 and № 2 - 216 MW each in generating mode of operation and 169 MW each - in pumping mode. The second stage of "Chaira" PSHPP was introduced by Permit № 306 /18.08.1999 of the Directorate of National Building Control, with units № 3 and № 4, having capacities of 216 MW each in generating mode and 169 MW each in pumping mode, accordingly.

With respect to its technical parameters, "Chaira" PSHPP is the biggest Bulgarian water power plant. Along with this, it takes a leading role among the operating Hydro Power Plants and Pump and Storage Hydro Power Plants in the world.

The construction of "Chaira" PSHPP began in 1980. Due to financial problems, the first stage was finished in 1995. Most of the underground facilities were built in this period: the underground machine room, pressure head tunnels - 2 nos. having total length of 4 300 m, underground penstock № 1 with length of 1 800 m; the dam of the lower compensating basin - "Chaira"; units № 1 and № 2 were commissioned.

The performance of "Chaira" PSHPP - II stage took place in the period between 1996 and 1999. The main portion of the funds (74%) was provided by the World Bank, with credit agreement from 1993 for the project "Energy-1". The remaining portion was financed with personal funds of NEK Ltd.

The second stage of "Chaira" PSHPP included the building and installation works on penstock № 2 - 1 800 m long, water tower № 2, installation of main transformer № 2, installation of units № 3 and № 4.

The research and design work was performed by "Energoproject" JS Co., Sofia. The construction and installation of the power plant was made entirely by Bulgarian companies. Main contractor of II stage is "Montazhi" JS Co., with subcontractors "Energomontazh-VEC" JS Co., "Hydrostroy - Sesstrimo" Ltd., "Hydrostroy - Rilci" JS Co., "Start engineering", JS Co. In accordance with the conditions of the credit agreement, the consultant company "Harza" from the USA took part in the performance of the second stage.

The plant equipment for the first stage (pump-turbine № 1 and motor-generators № 1 and № 2) is supplied by "Toshiba" - Japan.

The equipment for the second stage, in its predominating part, is made by Japanese technology, by Bulgarian producers - "Vapsarov" JS Co., Pleven and "Elprom - ZEM" JS Co., Sofia.



Having total capacity of 864 MW in generating mode, and 676 MW in pumping mode, "Chaira" PSHPP has a very important role in the power system of the country, like:

- It increases the efficiency and safety of the power system in Bulgaria, providing smooth operating mode of NPP and TPP throughout the days, nights and years.
  - Common system control of the load schedule.
  - Frequency reserve of the power system.
  - Quick emergency reserve of the power system.
- It makes the electric power system of Bulgaria a desirable partner for mutual work with the neighboring electric power systems.

