

Only 80 m height .

Zydowo Pumped-storage Power Station

The first conception of such power station was prepared as early as in 1932. Nine years later, the project was ready and implied creating a 45 MW power station equipped with two pumps 16 MW each. Work on that project was resumed in the 50 s.

According to the plan from 1957, the power station was to be equipped with turbines, pumps and frontal weir. In 1961 a preliminary project was ready and soon work started. In 1964 a 220/110 kV network station was built, and a contract for deliveries of turbines was signed with Skoda Pilsno a year later.

The scale of the enterprise can be described with the following numbers: earth work 1,2 mln m³, concrete work 70 thousand m³, asphalt expansion 26 km.

The power station started to work in 1971. It includes a filtering dam on the River Radew (50 m long, 6,3 m high), water intake chamber for feeder pipelines (18,5 m high). Lake Kamienno is the upper reservoir (its maximum area 100 minimum area 78 ha, capacity 3,30 mln m³), and Lake Kwiecko, situated 80 m below, is the lower reservoir (maximum area 140 ha, capacity 3,30 mln m³).

Maximum flow through the pipelines from the upper to the lower reservoir (where the River Padew starts) is 240 m³/s; maximum fall 82,70 m.

Derivation: one working canal 1316 m long, concrete, 12 m wide at the bottom, 9 m deep, flow 240 m³/s, water speed 2,2 m/s; 2 steel pipelines 560-450 cm in diameter,

3 x 467 running metre long, weight 4140 ton.

The power station has got two reversible Francis runners and one classic Francis runner, which produce

power of 156 MW altogether.

The power of the pumps is 2 x 68,0 MW.



aGoogle translate about upper tank Zarnowiec -Poland

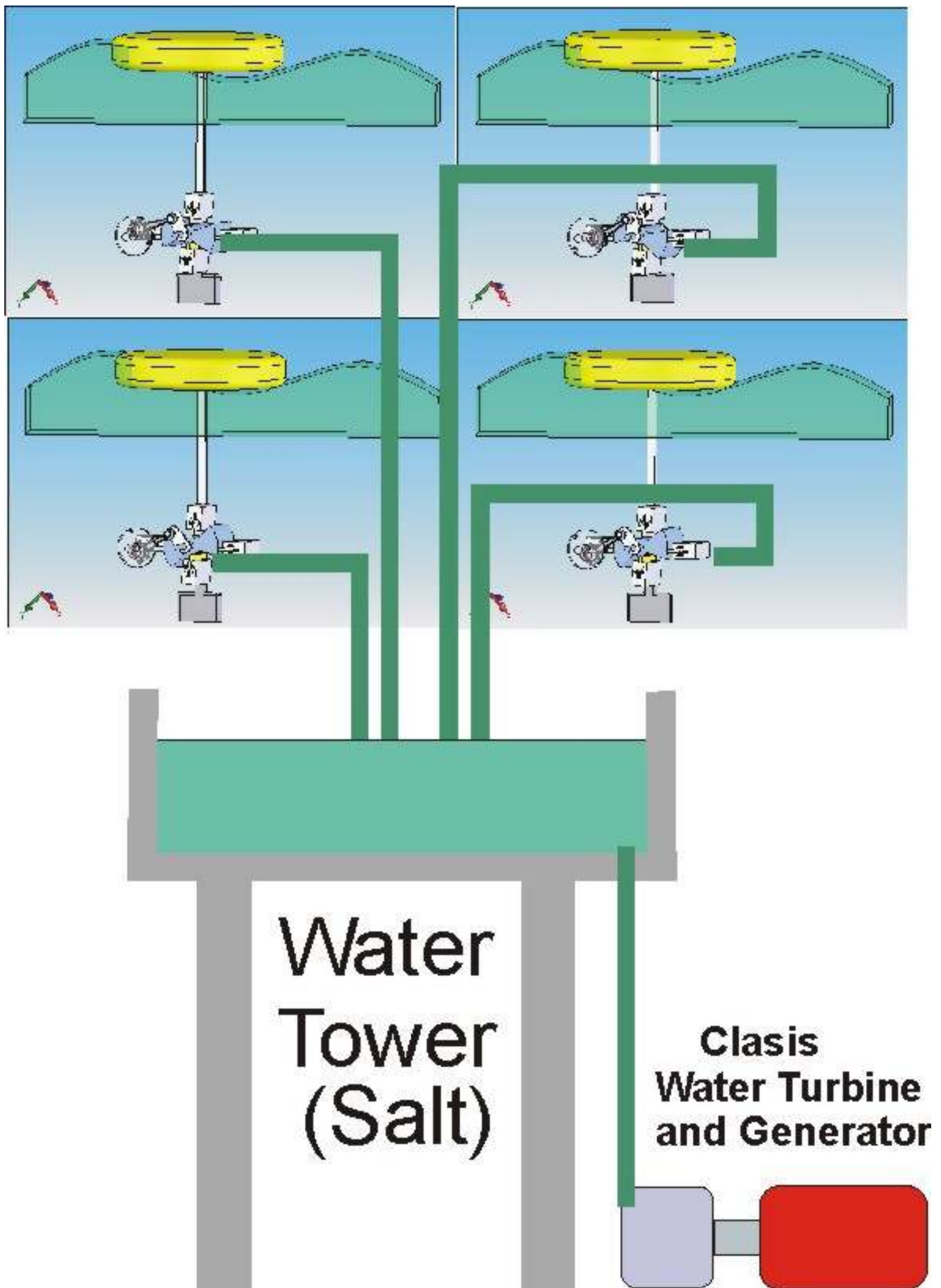
<http://www.ewz.home.pl/>

The tank top is entirely artificial creation. With a total area of 122 ha of usable storage capacity of 13 600 000 m³ water tank is a "battery" of electricity in excess of 3 600 000 kWh. This allows the quantity of water supply for about 5.5 hours of the power system by 716 MW. Max power demand in the region reaches a Pomeranian the size of 600 MW (peak winter evening). A comparison of these two figures gives an idea as a major source of power is hydroelectric power station Zarnowiec. Re-supplement of water in a tank top requires approximately 6.5 hours of work in four hydrozespo3ów traffic pomps. The duration of the operation of the plant cycles , resulting from the usable capacity of the reser voir in the statistical average working conditions of the power system, ensure the recovery longest lasting injuries and evening peak. Daily fluctuations in water level in a tank top, arising from the cyclical operation of the plant amounts to 16 m .

The quantity of earth moved was 4 800 000 m³.

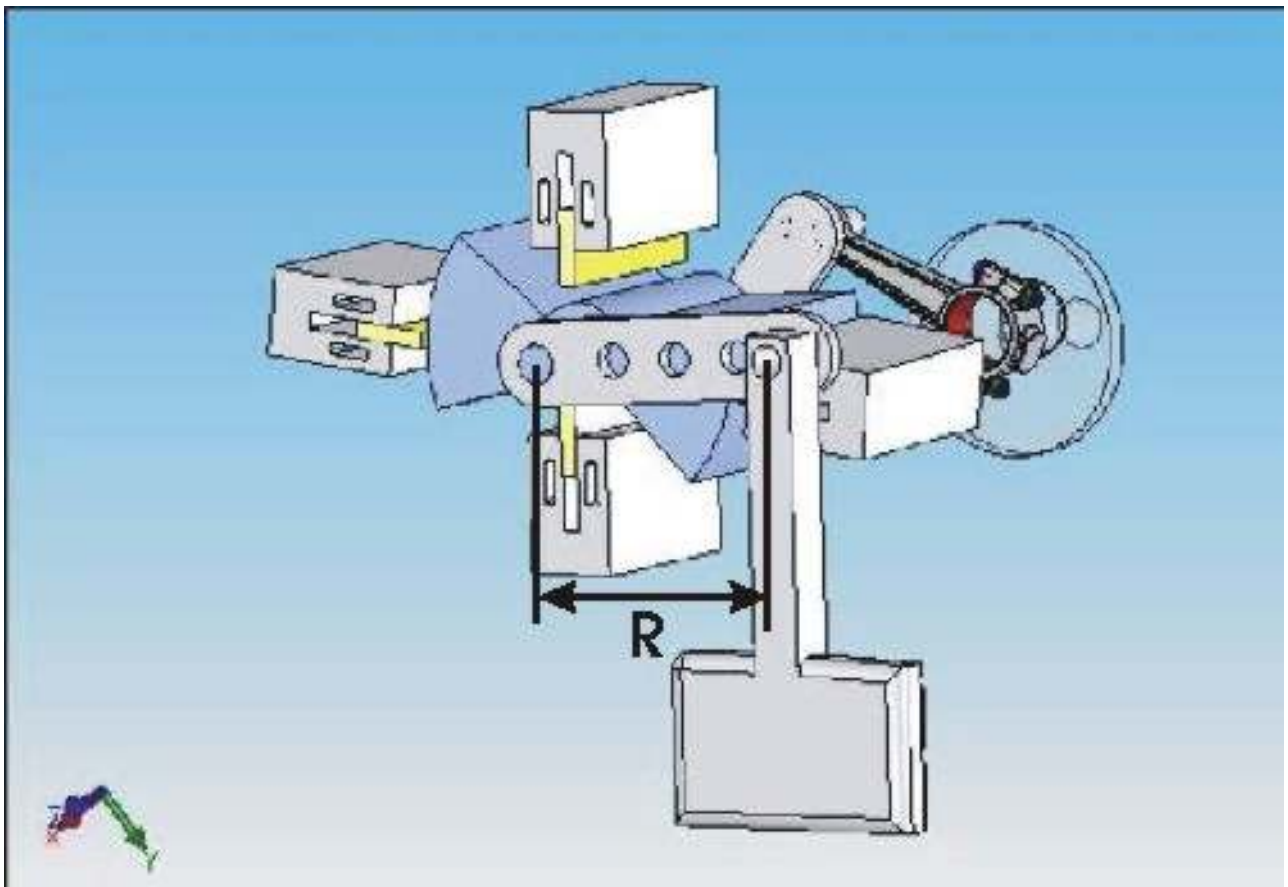
aFour steel water pipelines leading to derywacyjne Pompo-turbines have a length of 1,100 meters each and are divided into eight sections . Their diameter varies from 7,100 mm at the chamber inlet to 5400 mm in the gym. The thickness of sheet steel used in their construction changes accordingly, from 15 to 32 mm. Pipeline route is divided into eight sections, which are supported on fixed and mobile supports. For the construction of pipelines used 18,500 tonnes of high quality steel with higher strength . The maximum water flow of four pipelines is 700 m³ / s, or as many as the average annual flow of the Vistula River in the vicinity of Warsaw. Operation of the plant is fully automated and run off and individual hydrozespo3ów is executed remotely from the National Power Applications in Warsaw. In addition, the remote

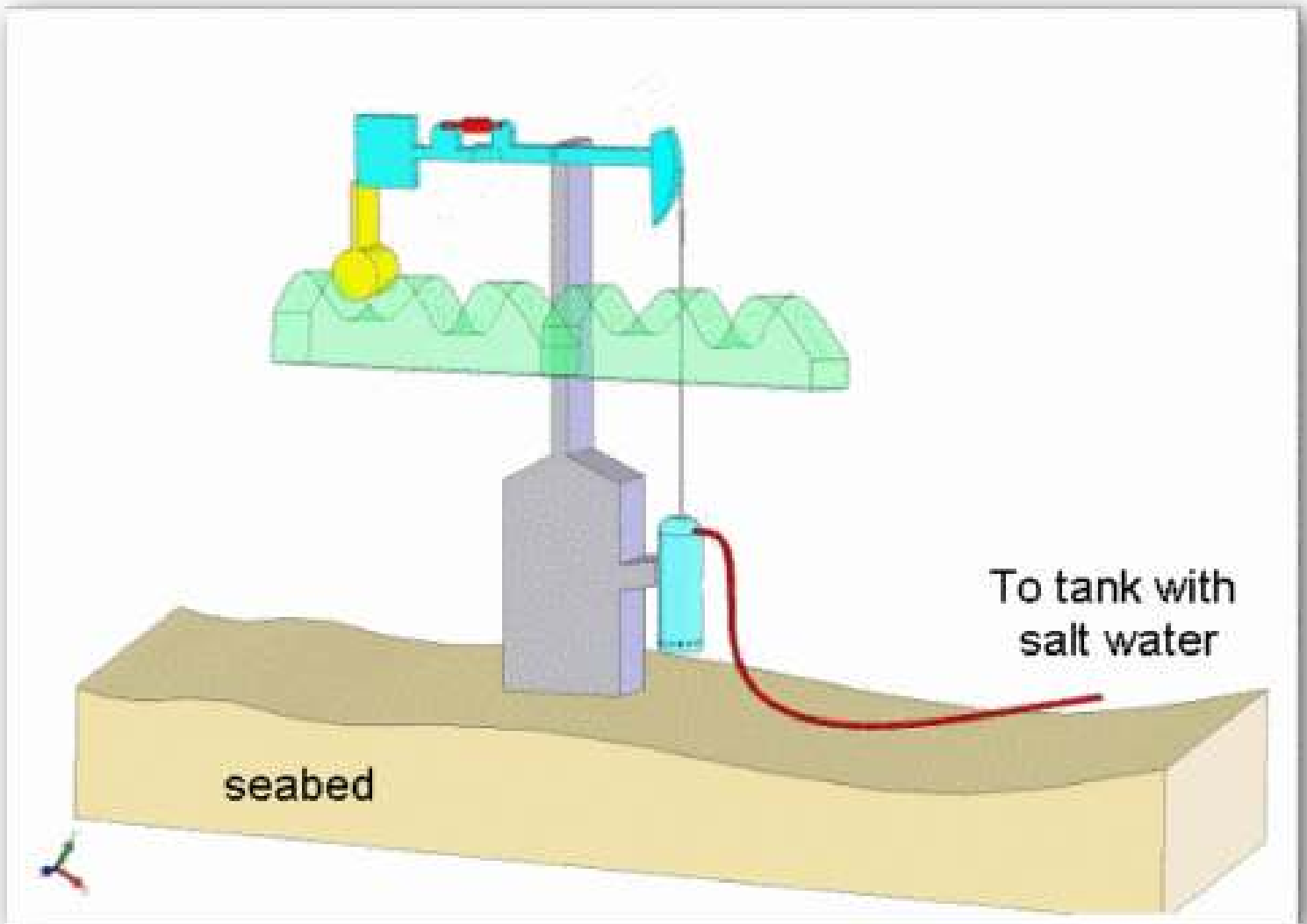




Dispatcher National Power Applications regulates the capacity of the plant oddawanej by hydrozespo3y working in the turbine. Hydrozespo3y allow smooth adjustment of power in the so-called. Automatically adjusting power and frequency: ARCM within the limits of 120 MW to 190 MW. As a result, it allows you to cover 90% of the entire scope of regulator y power in the range of 60 to 716 MW - is great for improving the technical parameters - motor power. A total of a year hydrozespo3y work about 8 000 hours, and within days of each hydrozespo3ów runs on average twice what gives the total annual amount of the riots, about 3000 times.







<http://www.new4stroke.com/oil500.gif>



Fig. 1—Bird's-Eye View of Pilot Seawater Pumped-storage Power Plant, Okinawa Pref. in Japan. The octagonal shape shows the upper dam. The sea is the lower reservoir. The outlet of the tailrace is surrounded by tetra-pods for protection from waves.

<http://www.new4stroke.com/salt%20water%20pumped%20storage.pdf>