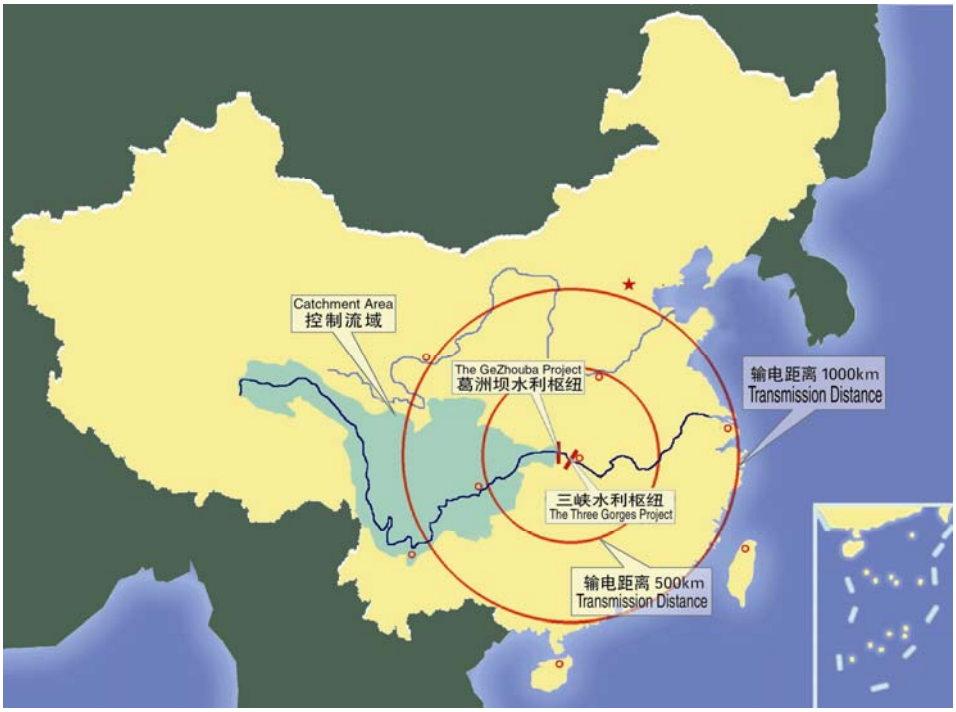
Three Gorges Project

Full view of Three Gorges Project



The location and scope of power transportation of the Three Gorges Project

The Three Gorges Project is the largest water conservancy project in the world. It is situated in the middle reach of of Yangtze River. The dam site is in Sandouping of Yichang City, Hubei Province.

The Project consists of dam, flood release structures, power stations, navigation structures. The implement scheme is “the first grade development, one-time construction, water storage by stages, continuous resettlement”.

The dam is concrete gravity dam, overflow dam is in the middle, the two power plants are on both sides. The total length of dam axis is 2309.47m with the crest elevation of 185m and the maximum dam height of 181m. The normal reservoir storage water level is 175 m, the total reservoir storage capacity is 39.3 billion m^3, of which flood control reservoir storage capacity is 22.15 billion m^3. The Three Gorges Project has the comprehensive functions of flood control, power generation, navigation, etc. The first goal of the Three Gorges Project construction is flood control. When the construction is to be finished, it will impound flood coming from Upper Yangtze River, which makes flood control standard of Jing River reach downstream enhance from 10-year to 100-year period. The Three Gorges Project has 26 units with a single unit capacity of 700 MW, the total installed capacity of 18200 MW, and annual power production of 84.68 TWh. Its huge and clean energy will be sent continuously to Middle China, East China, Guangdong Province and Chongqing City, etc. Navigation construction is double-line five-steps ship lock and a vertical ship lift. Annual one-way transportation capacity is 500 million tones. The completed project can improve 660 km long navigation passing from Yichang City to Chongqing City, the ten-thousand-ton-rank fleet can arrive at directly Chongqing City.

The resettlement of the Project involves 19 counties and cities in Hubei Province, Chongqing City. According to investigation from 1991 to 1992, the main inundation goods indexes are as follows: population in inundation area is 0.844 million, inundated crops and orange lands are 24.5×10^3 ha. Considering the factors of population increasing and second time migrant in construction area, the total population of resettlements will come to 1.13 million. The guideline of immigrants in reservoir area is “development and resettlement”.

The Three Gorges Project is adopted the way of river diversion by stages and three phases in construction. The total construction period is 17 years and it will be completed in 2009. Construction and the first stage project needs to be prepared, and cutoff realized is the sign during the first phase (1993-1997); the goal in the second phase (1998-2003) is to realize the initial reservoir stage, power production by the first group of units in the left power plant, and navigation in ship lock; the goal in the third phase (2004--2009) is to realize all units to be put into operation and complete the all construction work.

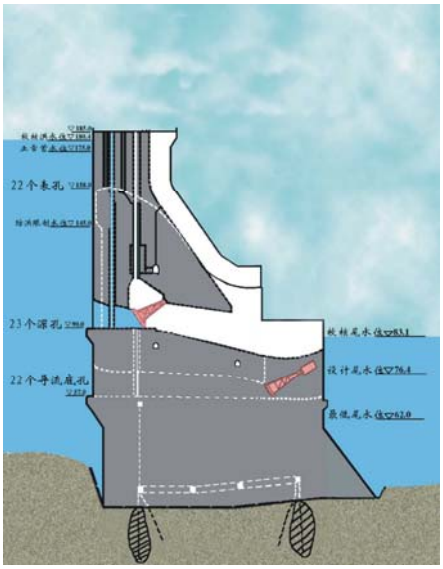
The preliminary static budgetary of the Three Gorges Projects estimate is 90.09 billion RMB (calculate as the price at the end of May, 1993, not including the factors of price increasing, construction period debt interests), of which engineering structures investment is 50.09 billion RMB and the reservoir inundation resettlement cost is 40 billion RMB. It is estimated that the dynamic total investment will be controlled within 180 billion RMB, if the factors of price increasing, construction period debt interests are taken into consideration, as the Project has a long construction period.

The 9484 km long of power transmission project of the Project with the 500kV capacity will be completed (6519 km by A.C. line and 295km by D.C. line). The total capacity of A.C. line is 22.75×10^6 kVA, and the capacity of D.C. transmission station is 18×10^6 kW. The huge capacity of power from Three Gorges Project is sent out by 15 loops and 500 kV transmission line radiating to the middle, south, west and east of China, tolatly in ten provinces and cities.

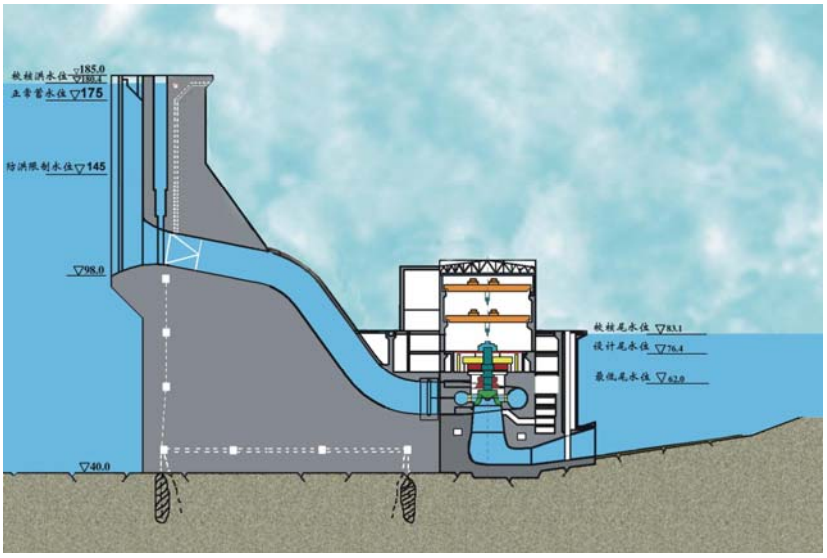
Main features

Item		Unit	Initial stage	Last stage
dam type			concrete gravity dam	
dam length		m	2309.5	
crest elevation		m	185	
total reservoir storage		m^3	39.3×10^8	
flood control storage capacity		m^3	22.15×10^8	
reservoir surface area		km^2	1084	
normal water level		m	135, 156	175
flood control water level in the first stage of operation		m	135	145
100-year flood	maximum reservoir water level	m	162.3	166.9
	maximum discharge flow	m^3/s	56700	56700
1000-year design flood	maximum reservoir water level	m	170	175
	maximum discharge flow	m^3/s	73000	69800
check flood (10000-year plus10%)	maximum reservoir water level	m		180.4
	maximum discharge flow	m^3/s		102500
	maximum downstream water level	m		83.1
power plant	maximum water head	m	94	113
	rated water head	m	80.6	80.6
	minimum water head	m	61	71
	installed capacity	MW	18200	18200
	number of units		26	26
	single capacity	MW	700	700
	guaranteed output	MW	3600	4990
	installed using hours	h	3960	4650
	guaranteed rate	%	97	95
	yearly average electricity generation	TWh		84.68
ship lock	type		double-line five-steps ship lock	
	tonnage		ten thousand-tone flight	
	dimensions of chamber	m	$280\times34\times5$	
	annual one-way pass through capacity	t	50×10^6	
ship lift	type		one-line one-flight vertical lift type	
	maximum passing through tonnage		3000t passenger and cargo ship	
	dimensions of chamber	m	$120\times18\times3.5$	
	annual passing through capacity	t	3.50×10^6	

Key structures layout for Three Gorges Project



Typical cross section of overflow dam



Typical cross section of power plant