

A REPORT ON TECHNICAL VISIT AT SARDAR SAROVAR DAM



Basic Information:



- Country - India
- Location - Navagam, Gujarat
- Coordinates - 21° 49' 49" N 73° 44' 50" E
- Owner(s) - Narmada Control Authority

Dam and spillways:

- Type of dam - Gravity, concrete
- Impounds - Narmada River
- Length - 1,210 m (3,970 ft.)
- Height (foundation) - 163 m (535 ft.)
- Spillway capacity - 84,949 m³/s (2,999,900 cu ft./s)



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Reservoir:

- Total capacity- 9,500,000,000 m³ (7,701,775 acre·ft)
- Active capacity- 5,800,000,000 m³ (4,702,137 acre·ft)
- Catchment area- 88,000 km² (34,000 sq. mi.)
- Surface area- 375.33 km² (144.92 sq. mi.)
- Max. Length - 214 km (133 mi.)
- Max. Width - 1.77 km (1.10 mi.)
- Normal elevation- 138 m (453 ft.)





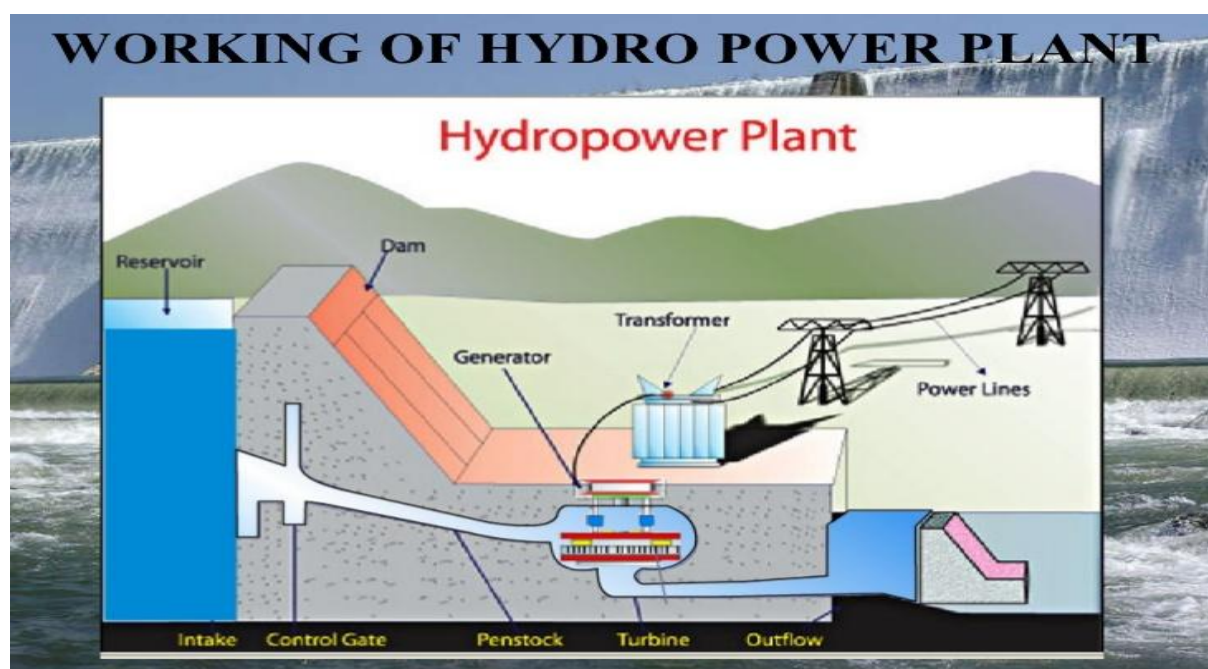
Power station:

- Operator(s) - Sardar Sarovar Narmada Nigam Limited
- Commission date- June 2006
- Turbines- Dam: 6 x 200 MW Francis pump-turbine
Canal: 5 x 50 MW Kaplan-type
- Installed capacity - 1,450 MW

Introduction:

The Sardar Sarovar Dam is a Gravity dam Constructed across Narmada River near Navagam, Gujarat in India. It is the largest dam and part of the Narmada Valley Project, a large hydraulic engineering project involving the construction of a series of large irrigation and hydroelectric multi-purpose dams on the Narmada River. The project took form in 1979 as part of a development scheme to increase irrigation and produce hydroelectricity.

One of the 30 dams planned on river Narmada, Sardar Sarovar Dam (SSD) is the largest structure to be built. It has a proposed final height of 163 m (535 ft.) from foundation. The project will irrigate more than 18,000 km² (6,900 sq. m), most of it in drought prone areas of Kutch and Saurashtra. The dam's main power plant houses six 200 MW Francis pump-turbines to generate electricity and afford a pumped-storage capability. Additionally, a power plant on the intake for the main canal contains five 50 MW Kaplan turbine-generators. The total installed capacity of the power facilities is 1,450 MW.





The dam is one of India's most controversial dam projects and its environmental impact and net costs and benefits are widely debated. The World Bank was initially a founder of the SSD, but withdrew in 1994. The Narmada Dam has been the centre of controversy and protest since the late 1980s.

Some important facts about the Sardar Sarovar dam are:

- The dam has a spill way with capacity to discharge 87,000 cubic meters per second, the third highest rate in the world, Gazenba in China and Tucurri in Brazil
- The canal is designed to transport more than 11.5 billion cubic meters of water annually.
- The project will contain more than 600 different structures such as head regulators, cross regulators and escapes.
- The Narmada river project will contain a 602.5 meter long Aqueduct; the world's largest aqueduct built using 3,870,000 m³ of concrete and 22,904 tons of steel.
- The entire length of the canal is more than 75,000 kilometres long, longer than the entire Indian Railways network.
- The project will irrigate more than 1.9 million hectare of land.
- The Narmada project can supply potable water to more than 9,500 communities and 131 cities.
- Actual construction of SSP Dam, Power Houses, Main canal and Branch Canals began in 1980's.
- The River Bed Power House (RBPH) & Canal Head Power House (CHPH) will generate more than 1,450 MW.
- The dam foundation included more than 2,14,000 m³ of excavation, 2,50,000 m³ of rock excavation, 2,56,000 m³ of pre-cooled concrete and 53,000 tons of reinforcement steel.
- Two Cable Cranes used for placing the concrete, each having 28 ton capacity and spanning more than 1.5 km were the longest ever in the world.
- More than 2,500 construction machineries and 20,000 labourers are working on this Project.
- At present, works of more than 15,000 km length of canal network are in progress and construction is simultaneously going on at more than 600 different locations.
- The concrete used to build the Sardar Sarovar dam can lay a road that can encircle the equator.

Narmada Canal

Narmada Main Canal is a contour canal. It is the biggest lined irrigation canal in the world. It is about 458 km. long up to Gujarat -Rajasthan border. It has a capacity to flow 1133 cumecs (40000 cusecs) at its head-at Kevadia and reducing to 71 cumecs (2500 cusecs) at the Gujarat -Rajasthan border. The canal extends further in the state of Rajasthan to irrigate areas in Barmer and Jhalore districts of Rajasthan. The cross section of the canal, at its head is 73.1m x 7.6m



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(Bed width x Full supply depth), with 2:1 inner side slope. It has a velocity of water in the initial reach is 1.69 m/sec.

The dam will irrigate 17,920 km² (6,920 sq. m) of land spread over 12 districts, 62 talukas, and 3,393 villages (75% of which is drought-prone areas) in Gujarat and 30 km² (280 sq. m) in the arid areas of Barmer and Jalore districts of Rajasthan. The dam will also provide flood protection to riverine reaches measuring 30,000 ha (74,000 acres) covering 210 villages and Bharuch city and a population of 400,000 in Gujarat. The vast network of distribution system, including field channels, will have an aggregate length of about 75,000 km. With CCA of 18.419 lakh ha in Gujarat.





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Important point's about Narmada main canal:

- No of gate: 5
- Type of gate: radial gates
- Size of gates: 12.20 m X 15.50 m
- Discharge capacity: 11355 cumecs
- Design velocity: 1.689 m/s
- Canal bed width:73.6m
- Length of main canal: 458 km

Solar Power Generation:

Total Power Generation capacity of 1450 MW comprising an underground River Bed Power House (RBPH) with six units each of 200 MW reversible type vertical shaft Francis turbine, a surface Canal Head Power House (CHPH) with five units each of 50 MW conventional type



Kaplan turbine, a GIS switch yard complex, and the 400 KV power transmission network up to MP-Gujarat and Maharashtra –Gujarat borders in Gujarat.



Projected benefits:

The benefits of the dam as listed in the Judgement of Supreme Court of India in 2000 were:

The argument in favor of the Sardar Sarovar Project is that the benefits are so large that they substantially outweigh the costs of the immediate human and environmental disruption. Without the dam, the long term costs for people would be much greater and lack of an income source for future generations would put increasing pressure on the environment. If the waters of the Narmada river continuous to flow to the sea unused there appears to be no alternative to escalating human deprivation, particularly in the dry areas of Gujarat.

The project has the potential to feed as many as 20 million people, provide domestic and industrial water for about 30 million, employ about 1 million, and provide valuable peak electric power in an area with high unmet power demand (farm pumps often get only a few hours power per day). In addition, recent research shows substantial economic multiplier effects (investment and employment triggered by development) from irrigation development. Set against the futures of about 70,000 project affected people, even without the multiplier effect, the ratio of beneficiaries to affected persons is well over 100:1.



Height Increases:

- The height of the water level when we visited the site was 106 m.
- In February 1999, the Supreme Court of India gave the go ahead for the dam's height to be raised to 88 m (289 ft) from the initial 80 m (260 ft).
- In October 2000 again, in a 2-to-1 majority judgment in the Supreme Court, the government was allowed to construct the dam up to 90 m (300 ft).
- In May 2002, the Narmada Control Authority approved increasing the height of the dam to 95 m (312 ft).
- In March 2004, the Authority allowed a 15 m (49 ft) height increase to 110 m (360 ft).
- In March 2006, the Narmada Control Authority gave clearance for the height of the dam to increase from 110.64 m (363.0 ft) to 121.92 m (400.0 ft). This came after 2003 when the Supreme Court of India refused allow the height of the dam to increase again.
- In August 2013, heavy rains raised the reservoir level to 131.5 m (431 ft), which forced 7,000 villagers upstream along the Narmada River to relocate.



With the Chief Engineer and Assistant Engineer



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Dam Front