Three Gorges Dam: Delivered at Design Capacity - and an Invoice That Never Closes

The World's Largest Power Station Met Its Engineering Targets on Its 17-Year Plan. What It Cannot Settle Is the Argument About Everything Else.

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Key Facts

Cost: Audited final settlement 207.873 billion yuan (2013; ~US$34 billion then); approved static budget 90.1 billion yuan (1993 prices); true economic cost contested

Date: Approved April 1992; construction December 1994; full generating capacity July 2012; ship lift 2016

Category: Hydropower

Executive Summary

The Three Gorges Dam is the largest power station ever built: 22.5 gigawatts, delivered broadly to its seventeen-year programme and, by China's National Audit Office, within its final budget - an outcome so rare in megaproject history that it deserves serious study. It is also a project that relocated well over a million people, drowned thirteen cities, and carries unresolved debates over siltation, seismicity and flood control. This investigation does both jobs at once: it explains the delivery machinery that worked - staged construction, a dedicated national funding mechanism, early revenue - and it refuses to call the result an uncomplicated success.

Executive Lessons

- Hypothecated Funding Beats Annual Appropriations

The Three Gorges Construction Fund - a national electricity surcharge - gave the programme a continuous, dedicated revenue stream insulated from annual budget politics. Megaprojects die of funding dribble; this one never went thirsty.

- Design for Revenue Before Completion

First power flowed in July 2003, nine years into a seventeen-year programme. Phased commissioning turned the project into a self-financing asset mid-build and gave engineers an operating feedback loop while construction continued.

- Stage the Impossible Into Deliverable Tranches

River diversion, left-bank plant, right-bank plant, underground plant, ship locks, ship lift: each tranche was commissioned and proven before the next peaked. Scale stopped being a risk because it was never attempted all at once.

- Delivery Success Is Not Project Success

On time and on budget did not settle siltation, seismicity, resettlement hardship or flood-control limits. Governance frameworks that score only cost and schedule will certify projects that history judges more harshly.

- Resettlement Deserves Engineering-Grade Governance

The concrete programme had world-class controls; the relocation of over a million people had demonstrably weaker ones - auditors found resettlement funds misappropriated in the early years. Social programmes need the same QA, audit and accountability as works contracts.

- Publish the Caveats Yourself

China's own 2011 acknowledgement of ecological problems and the National Audit Office's public findings did more for the project's credibility than any promotional record. Institutions that document their own caveats retain control of the narrative.

- A Single Structure Cannot Own a Basin-Scale Problem

The 2020 floods showed the dam absorbing record inflows and downstream districts still flooding. Flood control is a portfolio - reservoirs, forecasting, land use and evacuation - and overselling one asset invites backlash at the first extreme event.

Timeline

- 1992-04: The National People's Congress approves the Three Gorges Project - with roughly a third of delegates abstaining or voting against, the largest dissent in NPC history.
- 1994-12-14: Construction formally begins at Sandouping under a seventeen-year programme plan.
- 1997-11: The Yangtze is closed and diverted at the dam site, enabling main-channel works - the programme's first great staging milestone.
- 2003: The reservoir begins filling to 135 m and the first five-stage ship lock enters service; in July the first 700 MW generating unit produces power - revenue starts nine years into the programme.
- 2006-05-20: The main dam wall is completed at 2,309 m long and 185 m high; state media hail the end of the core concrete works.
- 2008: Trial impoundment toward the 175 m full pool begins; relocation officially totals about 1.13 million people.
- 2009: The original seventeen-year programme concludes with all 26 originally planned main units in service; the underground six-unit extension continues.
- 2010-10-26: The reservoir first reaches its full 175 m operating level, enabling design-capacity generation and flood storage.
- 2011-05: China's State Council publicly acknowledges urgent ecological and geological problems around the reservoir and commits to remediation.
- 2012-07: The final (32nd) main generating unit enters service; the station reaches its full 22.5 GW design capacity.
- 2013-06: The National Audit Office reports the final settlement at 207.873 billion yuan - within budget - while noting past misappropriation of resettlement funds.
- 2016-09: The ship lift - the world's largest - enters trial operation, completing the navigation works later than originally envisaged.
- 2020: Record monsoon floods test the reservoir (inflow peaks of 75,000 m³/s); the plant simultaneously sets a world record of 111.8 TWh annual generation.
- 2024-12: Thirtieth anniversary: cumulative generation passes 1.7 trillion kWh; the Ministry of Water Resources credits the project with nearly 70 flood interceptions; a new US$11 billion ship-lock waterway is later launched to relieve chronic lock congestion.

Sources

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