

Engineering Service: Hydro Power Plant Development

Features

Providing engineering services for hydroelectric power plant development including identifying potential sites, feasibility studies, design, construction, operation and maintenance, with following features:

- ◆ Viewpoints from the utility, as the operator of the facility
- ◆ Achieved effective utilization of water resources by developing 160 hydroelectric power plants in Japan, including 9 massive pumped-storage type power plants
- ◆ Accumulated a thorough knowledge of technologies for constructing, installing, and introducing power generating facilities (e.g. dams, tunnels, underground power facilities, intakes, tailraces, and spillways) while taking into consideration both cost performance and environment friendliness.

Basic Concept or Summary

TEPCO provides engineering services for hydroelectric power plant development, including the following items.

1. Business feasibility evaluation
 - Economic and financial analysis
 - Sistem analysis
2. Site Surveys
 - Flow gauging on rivers
 - Water quality survey
 - Topographical survey
 - Geological survey
 - Environmental monitoring and analysis
 - Social monitoring and analysis
3. Hydrological Survey
 - Flow measurement
 - Runoff analysis
 - Flood flow study
 - Dam operation planning
4. Pre-feasibility and Feasibility Studies
 - Potential site survey
 - Power generation plan
 - Basic design
 - Construction planning
 - Project cost planning
 - Economic and financial analysis
5. Detailed Designs for Hydroelectric Power Facilities (civil engineering facilities, electrical equipment, and mechanical appliances)
 - Dam: Concrete dam (types: gravity dam, arch dam, buttress dam) (construction method: RCC method, ELCM method, etc.)
 - Rockfill dam, earthfill dam
 - Water channel: intake, tailrace, surge tank, pipeline, and spillway
 - Power powerhouse: semi-underground powerhouse, underground powerhouse, and surface powerhouse
 - Electrical equipment and mechanical appliances: turbines (type: Francis turbine, Pelton turbine, and propeller turbine)
 - Generators, transformers, ancillary equipment, transmission lines, and switch devices
 - Hydraulic model test
 - Efficient operation study
 - Behavior and stability analysis under static or dynamic load
 - Detailed cost calculation
 - Preparation of tender documents and drawings
 - Detailed design of bridges and tunnels for transferring generators and accessing roads
 - Detailed design of environmental countermeasures



Kusan water site (Indonesia)



Hydroelectric power potential survey (Zambia)

6. Construction Supervision
 - Assistance with procedures
 - Assistance with contractor evaluations
 - Assistance with negotiations and contracts
 - Construction supervision
 - Inspection and management
 - Acceptance tests
 - Monitoring environmental and social aspects



Planned site for the construction of a hydroelectric power plant in the downstream Wailoa river (Fiji)

7. Operation and Maintenance
 - Maintenance and checking of hydroelectric power facilities for efficient operation
 - Forecast of rainfall and inflow and spillway gate operation
 - Monitoring and stability investigation for rehabilitation and improvement
 - Instructions for efficient reservoir operation
8. Technology Transfer
 - On-the-job-training in F/S, D/D and C/S stages
 - Training operation and maintenance
 - Training in theoretical and practical techniques
 - Site visits to other power source facilities for diversification and new skill development
9. Technical Support
 - Dispatch of experts in each phase of the project

Effects or Remarks

- ◆ Effective utilization of water resource
- ◆ Design with consideration for the environment
- ◆ Technology transfer, including operation and maintenance

Installation in Practice or Schedule

Domestic ◆ Achieved development of 164 hydroelectric power plants (installed capacity:8,983MW) including nine pumped storage power plants (including the world's largest Kannagawa power plant: pumped-storage power generation with a final output of 2,820MW) and ordinary hydroelectric power plants.

Overseas ◆ Preparatory Survey for Rehabilitation project Baluchaung No.2(2012)
 ◆ "Hydroelectric Power Plant to protect Rice Terrace World Heritage Site Project in the Philippines" (2010)
 ◆ "Preparatory Study on the Hydroelectric Power Plant Rehabilitation and Expansion Project in Bakaru, Indonesia"(2010)
 ◆ "Feasibility Study (F/S) on the Kusan Hydroelectric Power Plant, Indonesia" (2005), "Preparatory Study on the Kusan Hydro Power Plant Project" (2009)
 ◆ "Study on Hydropower Renewable Energy Development Project in the Wailoa Down stream in Republic of the Fiji Islands" (2009)
 ◆ "Zambia Rural Electrification Master Plan Development Survey" (2007)
 ◆ "Fiji Renewable Energy Report" (2007)
 ◆ "CDM Feasibility Study on Tatang Hydroelectric Site, Vietnam (2005)"
 ◆ "Development Option Review for Ulu Terengganu Hydroelectric Power Plant Project, Malaysia(2003)"
 ◆ "Feasibility Study on UluJelai Hydroelectric Scheme Development, Malaysia (2002)"
 ◆ "Shanxi Xilongchi Pumped Storage Power Project, China (2002)"

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