

Facts

about the Pak Beng Hydropower Project

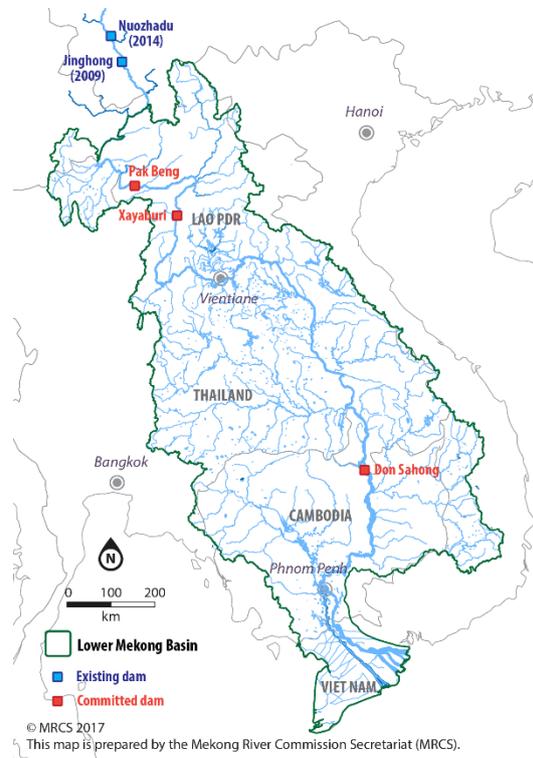
* Information presented in this document is extracted from the project documents submitted by Lao PDR, except where stated otherwise.

Location

The Pak Beng Hydropower Project is the first in the cascade of hydropower projects on the mainstream of the Lower Mekong River, located at 298 metres (m) above the mean sea level (masl) and 2,188 kilometres (km) distance from the sea. The dam site is in the Pak Beng District, Oudomxai Province, northern Lao PDR, about 530 km downstream from Jinghong Hydropower (on the Lancang River or Upper Mekong River within China), 180 km from Chiang Saen (the first hydrological station on the Lower Mekong River), 174 km upstream of Luang Prabang and 258 km from Xayaburi Hydropower. The project site is situated in the north part of the Lower Mekong Basin, where the landform is mostly hills and mountains covered by natural forests.

Run-of-river project

The developer has indicated that the Pak Beng Hydropower Project is designed and operated as a run-of-river hydropower project with a total storage capacity of 559 million cubic metres (m³) at a normal water level of 340 masl, with daily regulation of capacity. This suggests that the outflow from the reservoir is equal to the inflow to the reservoir, meaning that the reservoir would not reserve water in the wet season for dry season power generation. Hence, the proposed project should not create a potential impact due to inter-seasonal flow distribution in the mainstream.



Power generation

The Pak Beng Hydropower Project consists of 16 bulb turbines of 57 megawatts (MW), totalling an installed capacity of 912 MW. The annual average energy production is 4,765 gigawatt per hour (GWh) (or the annual utilisation time of 5,225 hours): 2,947 GWh in the wet season of June–November and 1,818 GWh in the dry season of December–May. Up to 10% of the power produced by the project will be made available to Électricité du Laos (EDL) and the surplus power will be supplied to Thailand.



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Infrastructure and design

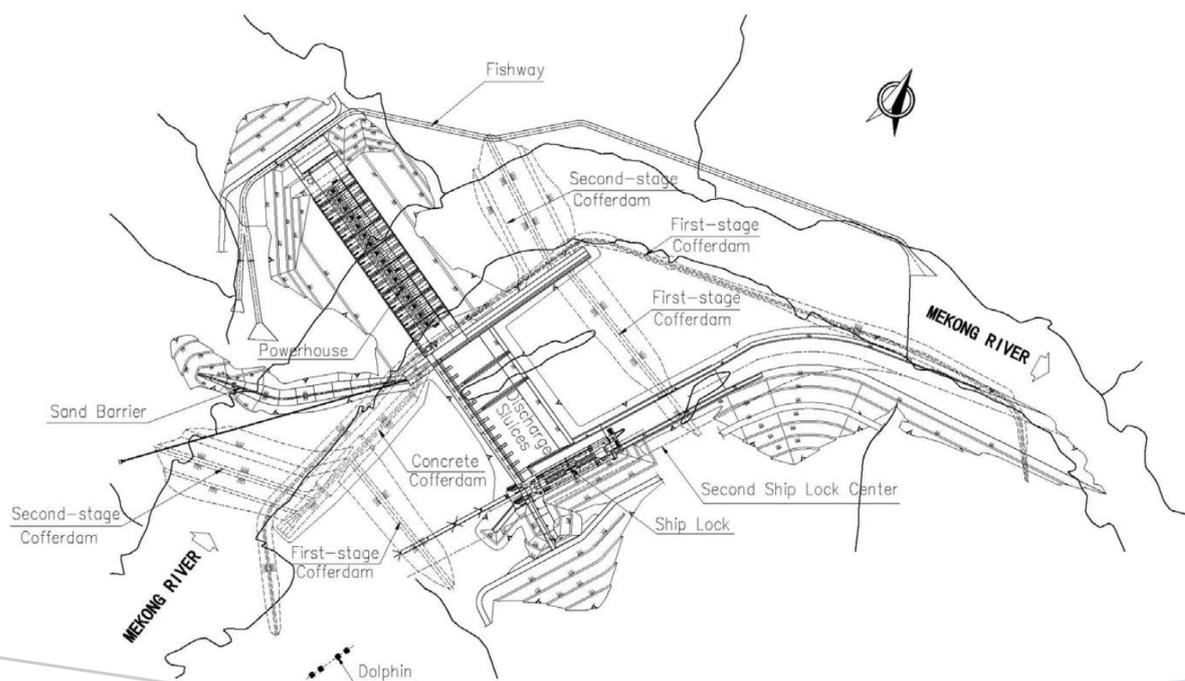
The complex structures of the project consist of water retaining structures, flood release structures, a powerhouse, a navigation ship lock and a fish passage.

The **water retaining structures** include a gravity dam, a powerhouse, discharge sluices and a ship lock. The dam crest elevation is 346 masl, the maximum dam height is about 64 m, and the dam crest length is 896.70 m. The powerhouse is located at the left side of main river channel, the discharge sluices are located at right terrace, and the ship lock is arranged on the right bank.

The **flood release structures** consist of discharging sluices and sand outlets. The discharging sluices are located on the right side with 14 sluices of 15 m wide × 23 m high. A stilling basin with energy dissipation is designed just behind the sluices. The sand outlets are within the powerhouse section, with an opening of 2.5 m wide × 5 m high, at 288.50 masl. They are constructed between every two generating units, with a total of 8 sand outlets.

The **powerhouse** consisting of 16 bulb turbines is on the left side of the main river channel, with a design discharge of 5,771 m³/s. The powerhouse section is 82.5 m long parallel to the water flow direction and 410 m in total along the dam axis. The main powerhouse spans 21 m, and the spacing of generating units is 20.5 m. An erection bay is constructed at both ends, and the auxiliary powerhouse is located on the downstream side of the main powerhouse, while the outgoing transmission line platform is situated on top of the auxiliary powerhouse.

The **navigation structure** is a one-way one-step ship lock for 500-ton ships, and a space for the ship lock for upgrading into a double-way lock is reserved. The maximum working head of the navigation lock is 32.38 m, and the size of the lock chamber is 120 m long × 12 m wide × 4 m deep. The one-line lock is being designed at the present time.



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The **fish passage** is arranged on the left bank of the river, it is approximately 1.6 km long, 10 m bottom width and 17.2 m top width. The slope is about 1.85%. Several pools will be set along the fish passage and serve as rest pools. The planned fish bypass channel entrance is some distance of about 1 km downstream of dam wall. An observation room is set downstream of the service gate, and a counting, observing and trapping facility will be equipped in this room.

The dam and water transfer structure are designed based on a **500-year return period** (26,800 m³/s or 341.20 masl at reservoir) and checked based on a 2,000-year return period (30,200 m³/s or 343.74 masl at reservoir). Additionally, structures for energy dissipation and protection are based on a 50-year return period.

The Social Impact Assessment identified 26 villages in three provinces of Oudomxay, Xayabury, and Bokeo in Lao PDR to be **directly impacted** by the project with the **total family of 923** or **population of 4,726**.

Operation consideration

The main considerations of the operation of the proposed hydropower project focus not only on energy generation, but also on navigation requirements, the impact on natural reef of Keng Pha Dai and the requirement for sediment management. Located on a navigable stretch of the Mekong mainstream, the project includes a navigation structure, which enables the passage of ships up to 500 tons. Additionally, to avoid the significant impact on navigation, the proposed dam does not use peak load regulation by operating with a low head and large discharge, i.e. the dam will only generate power as per inflow. The reef of Keng Pha Dai is collectively recognised as a natural monument for demarcating national border between Thailand and Lao PDR.

Considering this important landmark, the appearance of the natural reef is surveyed and water level is consequently maintained at 335 masl in the dry season and 340 masl in the wet season, to ensure visibility of the reef. Furthermore, the proposed dam is equipped with a sediment flushing facility such as discharge sluice gate and low bottom holes under the powerhouse to ensure settled sediment carrying downstream properly. Comprehensive hydrological and sediment monitoring, before and after construction and during operation, will also be undertaken.

Developer and cost

The developer of the project is Datang (Lao) Pak Beng Hydropower Co., Ltd. The construction period is expected to be five years. The project is estimated to be worth around **2,372 million USD**, in which 96% is attributed to hydropower construction and 4% is attributed to power transmission. Studies by the developer suggest reserving a total budget of 1.3 million USD for hydrological network construction, 0.5 million USD for sediment monitoring and 0.6 million USD for annual operation and maintenance of the network.

Mekong River Commission Secretariat (MRCS)

P.O. Box 6101, 184 Fa Ngoum Road, Unit 18,
Ban Sithane Neua, Sikhottabong District,
Vientiane 01000, Lao PDR

Tel: (856-21) 263 263

Fax: (856-21) 263 264