

Theun-Hinboun original weir and head pond image below:



Image for Theun-Hinboun Expansion dam on Nam Gnouang below:



The first hydropower plant of the Theun Hinboun Power Company (THPC) is located in both Bolikhamxay and Kammouane Provinces in Lao PDR with commercial operation started in 1998 under a 30-year BOT “build–operate–transfer” agreement with option for a 10 year extension. After the concession period the plant reverts to the Lao government.

The Project is located about 100 km upstream of the confluence of the Nam Kading river with the Mekong. The company is owned by Electricité du Laos (EdL) as the 60% major shareholder with the remaining shares evenly distributed between Norwegian Statkraft SF and GMS Lao Company Limited.

This first run-of-river project in Laos has a capacity of 220 MW and generates 1,100 GWh/year, 95% of which is purchased by Electricity Generating Authority of Thailand (EGAT). A weir/dam was created to hold back water in a head pond on the Nam Theun river and an underground tunnel carries water from the head pond down to a power station located in Na Hin town below.

The initial project is a 220 MW trans-basin water diversion project that cost \$260 million to construct. Asian Development Bank (ADB) loaned \$60 million from the Asian Development Fund for the Lao PDR to implement this first joint-venture hydropower project with foreign investors.

The Theun Hinboun hydropower project is considered a commercial success and has yielded annual Government revenues up to US \$30 million or more over the first decade. Royalties of five percent are paid to the Ministry of Finance and dividends to the state.

Theun-Hinboun Powerhouse image below:



After a decade of operation, it was decided to expand the project to a new total capacity of 500 MW by capturing and regulating the water volume of the Nam Gnouang River, which is one of the tributaries to the existing project. A total of 440 MW would then be sold to EGAT and the remaining 60 MW sold to Electricité du Lao (EDL).

A new Nam Gnouang dam, 20 kilometers upstream from the existing Theun-Hinboun Dam, created a reservoir to regulate river flows into the Theun-Hinboun headpond, increasing power output in the dry season. The expansion also included a 900-meter long penstock and transmission line.

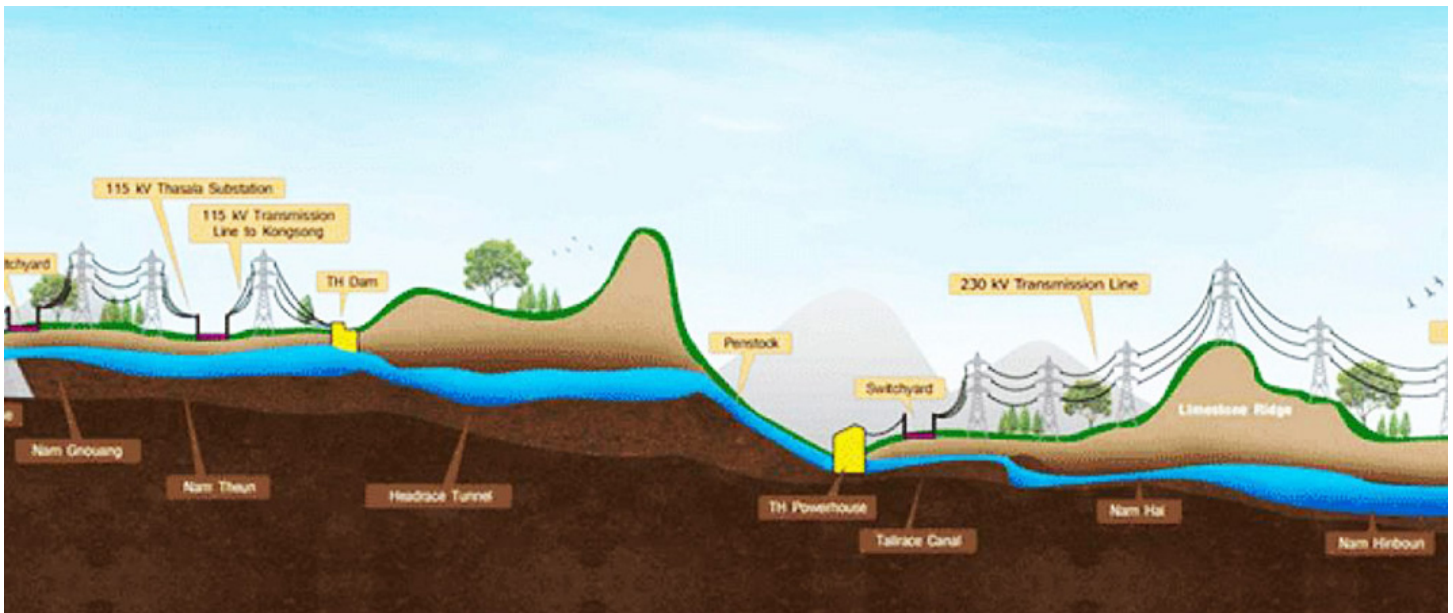
The Nam Gnouang Dam, 480 m wide and 65 m high, created the Nam Gnouang Reservoir, which stores the rains that fall in the area from May-October each year. The dam has five gates that are opened only to discharge water to avoid flood events during the wet season. In normal operation the dam releases water through the Nam Gnouang Powerhouse, which generates up to 60 MW of electricity for domestic supply to Electricité du Laos (EDL).

From the Nam Gnouang Powerhouse the water flows into the Nam Theun and into the existing head pond above the original Theun-Hinboun Weir/Dam. This has been modified to take more water than before from the Nam Theun with a new intake and tunnel system that channels water to an expanded Theun-Hinboun Powerhouse, 240 m below in Na Hin town in the Khounkham valley.

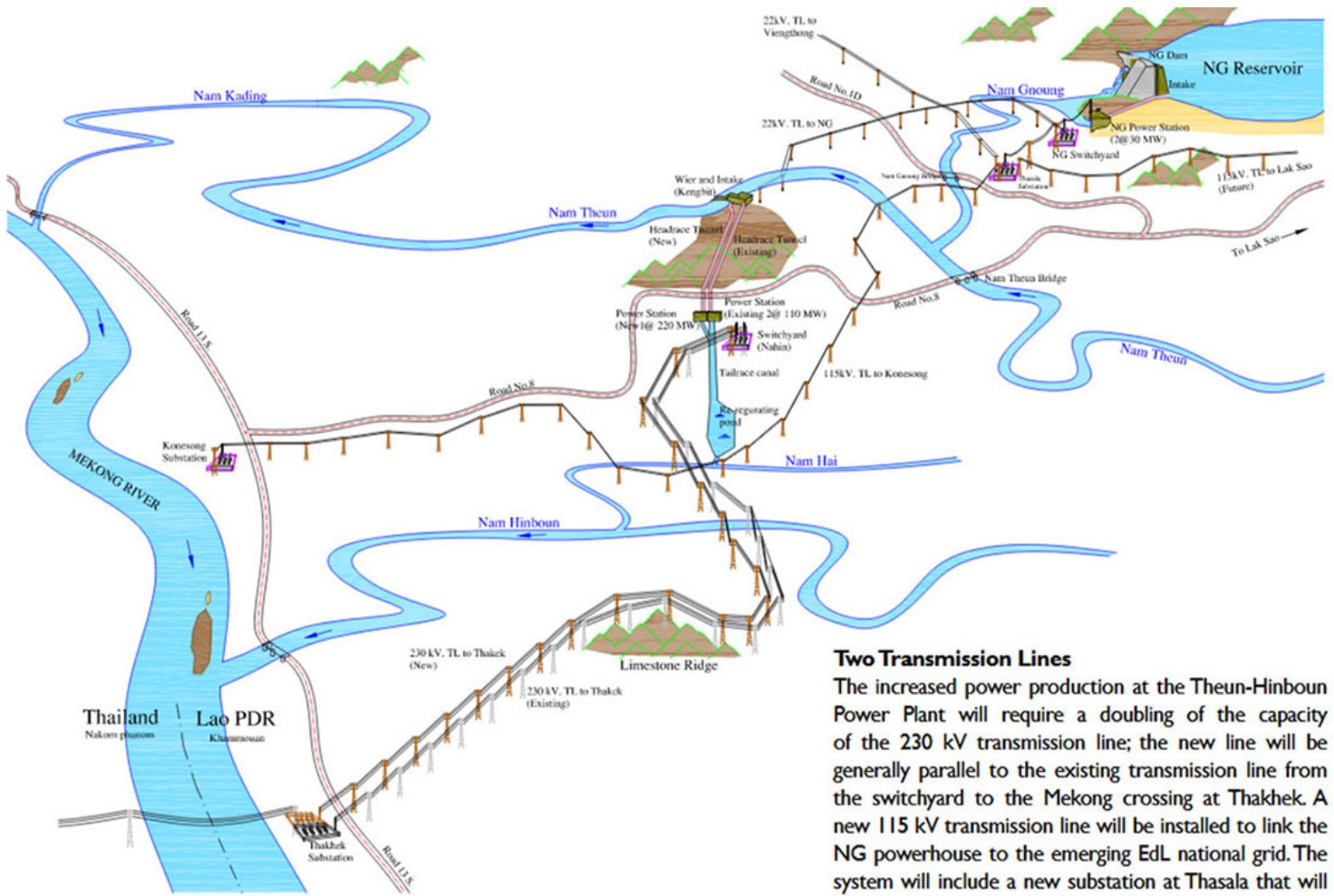
There a new 220-MW Francis Unit generator operates alongside the existing two 110-MW turbines. These give THPC an export capacity of 440 MW, sold to Thailand through two 230 kV transmission lines. The total combined generating capacity of THPC is now 500 MW with much of the water from the new reservoir being used to generate power twice.

The hydropower project of THPC (excluding the expansion and Nam Gnouang Projects) is a 'run-of-river' dam hydropower project which diverts water from the Nam Theun through a tunnel into the power plant located at the valley 240 meters lower than the dam level. The water then flows to the spillway and regulating reservoir before being released into the Nam Hai (river) which is a tributary of Nam Hinboun.

Theun-Hinboun Layout below after expansion project:



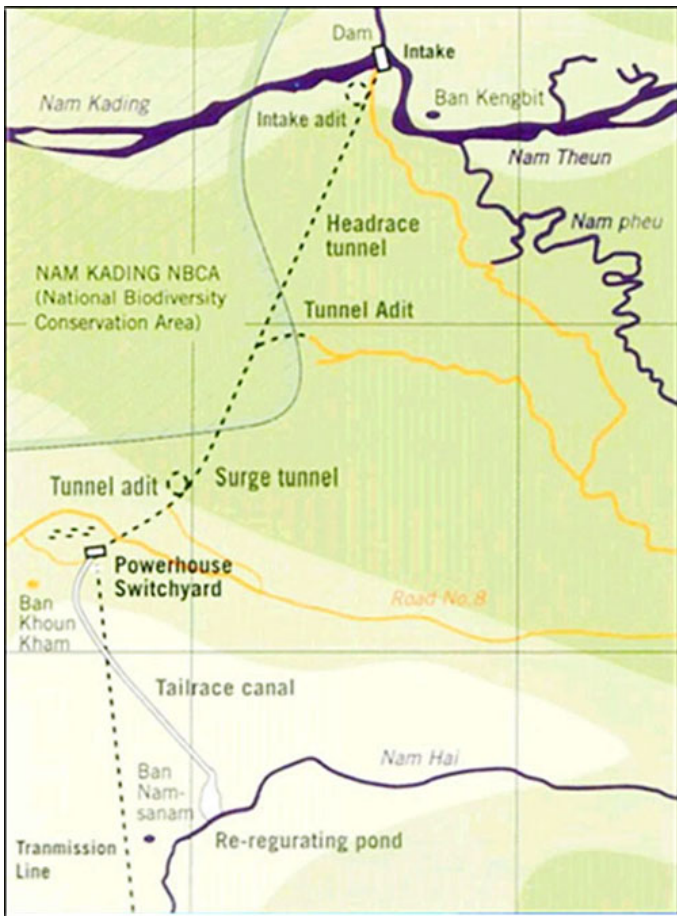
Theun-Hinboun Layout below:



Two Transmission Lines

The increased power production at the Theun-Hinboun Power Plant will require a doubling of the capacity of the 230 kV transmission line; the new line will be generally parallel to the existing transmission line from the switchyard to the Mekong crossing at Thakhek. A new 115 kV transmission line will be installed to link the NG powerhouse to the emerging EdL national grid. The system will include a new substation at Thasala that will be used for local distribution and to connect with other projects proposed in the region.

Theun-Hinboun tunnel diagram below:



NG Dam and Powerhouse

Reservoir Full Supply Level	455 metres above sea level
Max Effective Storage Volume	2,262 million cubic metres
Roller Compacted Concrete Dam	65 m high (upstream face); 480 m long
Dam Discharge Capacity	10,700 m ³ (five radial gates)
Net Head	47 m
Turbines	2 x 30-MW Francis Units: 60 MW for domestic use

TH Dam and Powerhouse

Reservoir Full Supply Level	400 metres above sea level
Reservoir Operating Volume	29 million m ³
Net Head	230 m
Concrete Gravity Free-Overflow Weir	27 m high; 330 m long (weir and gates combined)
Two Concrete-Lined Headrace Tunnels	Length: 5,289 m and 5,496 m
Turbines	two 120-MW Francis Units (original project - turbines upgraded) one 220-MW Francis Unit (expansion project)

TH Dam and Powerhouse

Province	Khammouane
River	Nam Theun
Drainage areas	4,903 km ²
Average annual precipitation, power station	4,000 mm
Average annual flow	180 m ³ /s
Reservoir full supply level	398.64 masl
Headrace tunnel (machine-bored) length and diameter	5,300 m; 6.9 m*
Surge tunnel, length and diameter	950 m; 5.6 m*
Penstock (Underground), length and diameter	840 m; 5- 5.8*m
Power station type	Surface
Gross head	235 m*
Plant design flow	110 m ³ /s*
Turbine type (2 x 120 mw; 1 x 220 mw)	Vertical Axis Francis
Turbine inlet valve (spherical), diameter	3.1 m*
Transmission line to Thakek Substation, rating, length	230 kV, 82 km

Nam Gnouang Reservoir, Dam and Powerhouse

Province	Bolikhamsay
Catchment area	2,942 km ²
Average annual precipitation at Powerhouse	1,500 mm
Average annual flow	95.1 m ³ /s
Reservoir area	105 km ²
Reservoir full supply level (FSL)	455 masl
Reservoir low supply level (LSL)	420 masl
Dam height	65 m
Dam crest length	480 m
Dam concrete volume	480,000 m ³
Type of spillways	Gated Ogee
Powerhouse type	Surface
Gross head	56 m
Turbine type (2 units)	Vertical Axis Francis
Plant capacity	60 MW

Location map below shows Theun-Hinboun Projects at the top in gray and pink ovals:

