



# SIKA AT WORK

## ULU JELAI HYDROPOWER DAM, MALAYSIA

ROLLER COMPACTED CONCRETE (RCC) FOR DAM CONSTRUCTION

BUILDING TRUST



# ULU JELAI HYDROPOWER DAM, MALAYSIA

## PROJECT DESCRIPTION

Tenaga Nasional Berhad (TNB) is the major power utility company in Malaysia, involved in the generation, transmission and distribution of electricity. TNB has constructed a hydropower plant in the Ulu Jelai District, State of Pahang in Malaysia. The Ulu Jelai hydropower plant project involved the construction and operation of an accumulation reservoir hydropower plant with a total installed capacity of 382 MW and is estimated to generate average 374 GWh of electricity per annum. It is a greenfield project that involves the construction of an accumulation reservoir (Susu Reservoir) with two main water intakes, Telom Intake and Lemoi Intake, located upstream of Susu reservoir. The total surface area of the project reservoir is 950,000 m<sup>2</sup> and the project has a power density of 391.6 W/ m<sup>2</sup>.

The project has a very high rated net head, as compared to other existing hydropower plants in the Malaysian peninsula, enabling the project to have a high power density.

The project activity will increase the share of clean, renewable electricity in Malaysia hence reducing greenhouse gas emissions by displacing electricity produced from thermal power plants. It is estimated that the project will generate average 374 GWh of electricity per annum and will require approximately 1.4 GWh auxiliary power that will be imported from the grid. Therefore, the net power sold to the grid is 372.6 GWh and reduce approximately 250,387 tonnes of carbon dioxide equivalent per year, or 1,752,709 tonnes over a seven year crediting period.

All the electricity generated from the project will be exported to the Peninsular Malaysia National Grid.

The project's reservoir has an elevation of 535 meters. Water from the reservoir is transferred to an underground powerhouse through a headrace tunnel with concrete inverts for power generation. The high elevation differential between the reservoir and powerhouse contributes to the high net head power generation, allowing high power output with a small reservoir size.

The main objective of the project is to generate electricity based on a clean, renewable energy source and contribute to the sustainable development of Malaysia. The project will displace 3 Orang Asli (native Malaysian population) settlements at Kg.Susu, Tiat and Kg.Sg.Pinang. Each household head will receive a new house as part of the project. All crops and prop-



erties within the boundaries of the project will receive compensation as assessed by the valuation and Property Services Department of Malaysia.

#### **Main Features of the project**

- Construction is being carried out by the Tindakan Mewah-Salini Costruttori Consortium (TM-Salini).
- Two Francis turbines with a power output of 191 MW each.
- Project value is approximately € 515,55 million.
- The engineering consultancy and site supervision is being carried out by SMEC (Malaysia) and SMEC (International) consortium.

#### **The main structures comprises:**

- 90 metres high RCC dam
- Un-gated Spillway
- Bottom outlet and hydro-mechanical accessories
- Power intake tower;
- Power water-way underground
- Concrete lined surge shaft and surge tank
- Underground powerhouse
- Transformer chamber cavern
- Surge chamber cavern
- Water transfer tunnels (16 kilometres, excavated by TBM);
- Tunnelling works (Headrace Tunnel, Tailrace Tunnel, Main Access Tunnel and Service Tunnels Approx. 10 km in total).
- Switchyard
- Generation Control Building;
- Access Road



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## SIKA SOLUTION

The design of the RCC mixes took quite long time to define the proper mix for upstream RCC, downstream RCC, upper dam and lower dam ranging from high to low cementitious solutions with long setting times to ensure the bonding of the RCC layers. Plastiment® TM-21 retarder for RCC found an extensive use for RCC production.

More than 30 km of underground structures require a massive use of shotcrete technologies with alkali free shotcrete accelerators steel fibers reinforced even with site batching plant the complex internal logistic required long open time for the base concrete mixes.

Sigunit® L-53 AF MY was adopted as best performing solution for shotcrete accelerator while Sika® ViscoCrete® SC 315 MY was able to ensure a 3 hours open time for shotcrete base mixes.

## PROJECTS PARTICIPANTS

- JV TM-Salini
- Sika Malaysia
- Sika Services

## SIKA PRODUCTS

- Sigunit® L-53 MY
- Sikament®-163 MY
- SikaFibre® CHO 65/35 NB
- Sika® ViscoCrete® SC-315 MY
- Plastiment® TM-21
- Sika Friezinc R
- Sika MonoTop®-620 MY
- SikaFuko® VT-1
- Sika AnchorFix®-S
- SikaGrout®-214
- Sika® Latex
- Sika® Antisol® A
- Sika® Formol EX
- Sika® Intraplast® Z
- Sika® Rugasol® G
- SikaFuko® Swell-1
- Sikagard®-62 MY
- Sikadur®-43/42
- Sika® Waterbar O-25 M
- SikaCrete® Gunite-103



Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



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