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TNB's Nenggiri hydroelectric dam a step towards RE, community development

It represents a significant investment in the country's future energy landscape, integrating both hydroelectric power and HHFS PV system

by SHAUQI WAHAB

TENAGA Nasional Bhd's (TNB) Nenggiri hydroelectric dam project is at 40.5% completion.

The project, undertaken by TNB's wholly owned subsidiary, TNB Power Generation Sdn Bhd (TNB Genco) is set to be fully operational by November 2027.

It is part of Malaysia's broader push towards increasing renewable energy (RE) capacity in line with the National Energy Transition Roadmap (NETR).

The Nenggiri dam in Kelantan represents a significant investment in the country's future energy landscape, integrating both hydroelectric power and a hybrid hydro-floating solar (HHFS) photovoltaic (PV) system.

TNB Genco MD Muhamad Nazri Pajil revealed that the company is exploring further expansion of its RE portfolio through the development of two additional large-scale hydroelectric plants in Lebig, Kelantan, and Pekan, Pahang.

While specific details on the capacity of these projects were not disclosed, he hinted that they could surpass the 300 megawatt (MW) capacity of the Nenggiri plant, owing to the larger size of the planned reservoirs.

As for the Nenggiri project, Muhamad Nazri said the company needs to address landslide issues due to the constant rain in the area, causing difficulties in the earthwork phase.

"We have learned lessons from the landslide at the Kenyir dam in February 2022; we need more safety margin by putting more rock bolts.

"We also need to do more grouting due to the presence of limestone that causes cavities in the dam's foundation," he said during a recent media visit to the Nenggiri project site.

He added that feasibility studies for these new hydroelectric plants have been conducted.

Integrating Solar and Hydroelectric Power

One of the key features of the Nenggiri hydroelectric dam is its integration of a 1,000MW HHFS PV system.

The project is part of the government's NETR goals, in which the government has given TNB the task of generating 2,400MW of HHFS PV systems.

This system is expected to enhance electricity generation capacity by up to 1,000MW, complementing the 300MW output from the ongoing hydroelectric project.

Muhamad Nazri said preparations by TNB Genco, including anchoring works and site set-up, are already in progress.

He added that this project is estimated to commence in the first quarter of 2027 once the water level is raised.

This combination of solar and hydro powers will enable a more reliable and consistent energy output, reducing the country's reliance on fossil fuels, and aligning with Malaysia's goal of sourcing 70% of its electricity from RE by 2050.

"We are allocating extra space at the Nenggiri hydroelectric plant, with three quarters reserved for solar and the remaining quarter for other uses," Muhamad Nazri said.



New settlements with improved facilities are being built, including 93 housing units for Pos Pulat and Kuala Wias villagers, and 191 units for Pos Tohoi residents

giri hydroelectric plant, with three quarters reserved for solar and the remaining quarter for other uses," Muhamad Nazri said.

Last year, TNB announced an RM2 billion investment in floating solar projects, initially highlighting two other hydro plants: The 650MW Sungai Perak station and the 400MW Kenyir station in Terengganu.

While the Nenggiri project could potentially scale up to 400MW, it would require a larger reservoir, impacting more indigenous communities.

Muhamad Nazri noted that the additional 100MW capacity was not pursued due to the social impact it would entail, such as displacing the local residents.

In addition to these developments, TNB Genco is exploring other RE opportunities, including mini hydro plants.

The company has identified potential sites for cascading hydro plants, which generate power through the natural river flow, minimising environmental disruption.

TNB has already announced RM2 billion in investments for HHFS PV projects, following the success of its pilot project at Stesen Jana Kaasa Sultan Azlan Shah in Manjung, Perak.

The company also plans to fast-track the implementation of 2,500MW of HHFS projects, beginning with a 30MW installation at the Chenderoh hydro-reservoir in Perak, followed by similar projects at the Temenggor, Perak, and Kenyir hydro-reservoirs.

Noting the rise of more data centre hubs, the need to increase RE is necessary to sustain the cost of voltage needed.

To do that, TNB Genco is planning to utilise Nenggiri Lake to constantly produce alternating energy daily while creating synergy between the hydroelectric dam and the HHFS PV.

"We will operate the solar panels five hours in the morning while waiting for the water to rise, followed by the operation of the hydroelectric dam for six hours, totalling up to 11 hours of green energy," Muhamad Nazri said.

Socio-economic and Environmental Benefits

Beyond energy generation, the Nenggiri



Muhamad Nazri says preparations by TNB Genco are already in progress



TNB will build a mini gallery for the public viewing of the artefacts, says Zaharudin

dam is expected to deliver numerous socio-economic benefits to Kelantan.

The project will aid in flood mitigation, enhance agricultural irrigation and provide a sustainable water supply.

According to TNB's data, the project could reduce the flood impact by up to 40%.

"We know how much water is produced according to our forecast, so we will know the volume of water needed to keep in the reservoir," Muhamad Nazri said.

Additionally, it will create new economic opportunities in sectors such as aquaculture, eco-tourism and recreational activities around the reservoir.

The project is anticipated to generate around 2,000 jobs during its construction phase, with priority given to locals.

TNB is also committed to supporting the three Orang Asli communities by constructing new residences.

Besides providing many forms of reparations, TNB is also encouraging interested Orang Asli communities involved with the project to apply to work with it once the dam is completed.

"Afterwards, we need 200 to 250 employees to manage the dam, consisting of engineers, management, technicians, skilled and unskilled workers.

"We will employ the Orang Asli according to their skill levels, prioritising them and the locals for employment," he said.

New settlements with improved facilities are being constructed for these communities, including 93 housing units for the natives of Pos Pulat and Kuala Wias village, and 191 units for those from Pos Tohoi.

Furthermore, TNB is providing 5.5 acres (2.23ha) of rubber plantations for each head of household to ensure a sustainable income for the Orang Asli in the future.

Recently, TNB awarded compensation payments totalling RM10 million, initiated on Aug 9 and 14, for the affected communities.

These payments were made to compensate for the clearing of existing crops, including rubber plantations and farms owned by the Orang Asli, to make way for the dam's construction.

Muhamad Nazri also noted that the water stored in the dam will produce cleaner water,

as sediment will settle at the bottom, resulting in improved aquaculture outcomes.

Historic Archaeological Discoveries

Ten of 13 natural caves would be submerged once the dam was fully operational.

Among the caves are Cha Cave, Keledung Cave 1, Chawan Cave, Rahmat Cave and Gemalaha Cave.

Collaborations with the Department of National Heritage (JWN) were initiated to safeguard the archaeological discoveries found during the dam construction and excavation projects.

JWN director of archaeology Zaharudin Abu said a discussion was done with TNB to conduct a Heritage Impact Assessment to find the best way to conduct its construction project without affecting the artefacts in the area.

Artefacts such as pottery, prehistoric human skeletons at Cha Cave, charcoal cave drawings and animal bone fragments were uncovered.

Zaharudin said the biggest discovery is a 14,000 to 16,000-year-old skeleton named "Mek Keledung".

"We safely brought out 71,289 discoveries, including bones, 16 skeletons, stone tools, pottery and more. The 16 skeletons were transferred to JWN for the restoration and preservation processes," he said.

The excavation process was conducted by Universiti Kebangsaan Malaysia's consultant from the Institute of Malay Nature and Civilisation Dr Zuliskandar Ramli.

Zaharudin also said TNB will construct a mini gallery for the artefacts for public viewing.

TNB's efforts in the Nenggiri project reflect the company's dedication to sustainability and environmental stewardship.

Comprehensive impact assessments, including Environmental, Social and Heritage Impact Assessments, have been conducted to address potential effects on the environment and local communities.

TNB is working closely with both federal and state governments, as well as relevant stakeholders, to ensure compliance with all legal and regulatory requirements.



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