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TNB makes its mark with 2nd cleaner coal-fired power plant

Using the same technology and generating the same amount of electricity as Manjung 4, Manjung 5 set to be commissioned this October

by **SHAHEERA AZNAM SHAH**

THE latest addition to the Sultan Azlan Shah Power Plant by Tenaga Nasional Bhd (TNB) in Perak sets a benchmark for coal-fired power plants in South-East Asia, as it is the first to employ utilities technology.

Commonly known as Manjung 4, the 1,000MW plant employs the ultra-supercritical (USC) technology, which is the current gold standard for coal-fired plants in the world.

Running on General Electric Co's (GE) engine, the plant is managed by TNB's wholly owned subsidiary, TNB Janamanjung Sdn Bhd.

"With this, we can safely say that this is the most advanced technology around. The USC technology means less consumption of fuel and better for the environment," said TNB Janamanjung MD Datuk Shamsul Ahmad during a recent media visit.

Designed to be better than its siblings, Manjung 4 achieves up to 42% efficiency every day, making it the most efficient coal-fired plant in South-East Asia, while the previous three units of the plant only achieve up to 37%.

"The USC boiler is currently the most advanced technology available. We are proud to be the first to introduce it in South-East Asia. This technology has resulted in 1.5% better efficiency and 3% less emissions of carbon dioxide.

"When we talk about the environmental aspect, even 0.1% makes an impact. Thus, whatever you can do to improve your environment will make sense. In a wider sense, 3% really does make a difference," GE regional sales GM East Asia Massimo Gallizioli told *The Malaysian Reserve* during the visit.

He said Manjung 4 operates at a temperature and pressure above the critical point of water, which is responsible for the higher efficiency. Not just that, the coal requirement daily for the combustion is also less, leading to lower emissions of nitrogen oxide, carbon monoxide and sulphur dioxide.

It is not called clean coal technology for no reason. The USC boiler is equipped with a seawater-based flue gas desulphurisation system, which absorbs more than 90% of the

sulphur dioxide emissions through sea water, which later oxidise into harmless particles.

Costing RM6.5 billion, Manjung 4 is the first coal-fired plant in Malaysia designed to adopt the clean coal technology and meet The World Bank standards on effluence emissions.

The power supplied by Manjung 4 is an extension to the other three units at the power plant: Manjung 1, 2 and 3, making TNB Janamanjung Malaysia's largest source for electricity.

"TNB Janamanjung supplies 20% of the electricity required by Malaysians in the peninsula. We produce the baseload of the country. Our Manjung 4 can support the electricity needs of two million households," said Shamsul.

The Energy Commission reported that the grid system's maximum demand in Peninsular Malaysia stood at 16,901MW as recorded on June 11, 2014, with the highest daily demand of 355.8GWh recorded on June 24, 2014.

The plant, which began commercial operations on April 14, 2015, is located on a 325ha man-made island off the Lekir coast in Manjung, 10km south from Lumut district.

Coal — the Heart of the Plant

At the heart of the plant, coal is fed into the combustion chamber of the boiler.

"We consume 30,000 metric tonnes (MT) of coal for electricity generation every day. Now coal is providing almost 51% for the power generation in Malaysia, while gas is about 45% and another smaller portion by hydro.

"Moving forward, you will see coal making a major contribution," said Shamsul.

Shipped from Kalimantan, Indonesia, Shamsul said neighbouring Indonesia produces more quality sub-bituminous coal than other coal-producing countries like South Africa, Australia, Russia and South America. Hence, it emerges as the best option.

"We import our coal from Kalimantan because of various reasons. The proximity of Kalimantan is definitely a benefit to us compared to other coal resources.

"Each ship that we charter carries 70,000MT

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of coal in one trip. Upon arrival, the coal has to be unloaded within three days," he said.

The coal vessels berth at Lekir Bulk Terminal (LBT), located 2.2 km from the power plant.

LBT is a performance-guaranteed port, which means the vessels docking at the port cannot stay for more than they are scheduled.

The port, which can accommodate three vessels simultaneously and receives around 90 vessels per year, is connected to the power plant via a conveyor belt.

Environmental Controls

"As part of our operations at the plant, we also take precautionary measures by monitoring the air quality and acid rain. We want to ensure that the environment surrounding the power plant is safe and does not harm the population within the plant perimeters," said Shamsul.

The power plant is being monitored continuously by the Department of Environment under the Ministry of Natural Resources and Environment to comply with the environmental standard set by The World Bank.

"We take weekly rain samples and monitor the pH level of several locations within a radius of 1km, 3km and 5km from our plant. We also monitor the treated water that we discharge

out," he said.

Shamsul said the by-products of the combustion do not go to waste. The ash from the coal combustion is sold to cement companies. The plant is said to be able to capture 99.97% of the ash released in the process.

"In the interest of our green initiatives, we don't dispose the by-products. We learnt that the bottom ashes can be processed as cement. Thus, we sell them to cement companies," he said.

Manjung 5, Newest Addition to the Family

A further extension of the Manjung plant is heading its way. Using the same technology as Manjung 4, the fifth unit is under construction by a consortium comprising Sumitomo Corp and Daelim Industrial Co Ltd.

"It's at 98% of construction and is going through the commissioning process. The construction of the newest addition to the family takes 45 months and is set to be commissioned this October," said Shamsul.

Built at a cost of RM6.5 billion, Manjung 5 will generate 1,000MW of electricity in addition to the 3,100MW already produced by the existing units.



Manjung 5 is now 98% complete and scheduled for commercial operation in October

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