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Value of wastewater

Indah Water Konsortium is ensuring sewage byproducts are recycled and sold, thereby generating revenue and preserving the environment. >2&3

Treated for reuse: The Setia Alam water reclamation treatment plant is distributing water to industries nearby through underground pipelines. — Photo: SAM THAM/The Star

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The purified water from the water reclamation treatment plant is used to clean its filters. (Right) It is also stored in the drum at the plant to clean the ultrafiltration system. — Photos: SAM THAM and MOHD SHAHRIL ROSLI/The Star

Meeting industrial demand for water

First water reclamation plant in Setia Alam provides supply to nearby factories

By VIJENTHI NAIR
vijenthi@thestar.com.my

TREATED sewage wastewater is now being supplied to industries.

With increasing demand, Indah Water Konsortium (IWK) is looking at ways to reuse its treated water instead of just discharging it into rivers.

IWK chief executive officer Faizal Othman said they were continuously looking for practical applications of the three byproducts from sewage, which are bioeffluent, biosolid and biogas, in other words – wastewater, sludge and gas.

"Our task is to collect the sewage, treat it to meet Environment Department (DOE) standards and return it to the environment.

"The three byproducts are valuable resources that could be reused, but are mostly returned to the environment.

"The Green Technology Master Plan advocates the recycling of a third of wastewater and 100% of sludge by 2030. So we have adopted the waste-to-wealth approach by selling our byproducts while preserving the environment.

"We are focused on the concept of 4R, namely reduce, reuse, recycle and replace to promote a circular economy," he said.

A circular economy is an economic system aimed at minimising waste and making the most of resources.

Faizal said IWK operated and maintained about 7,000 sewage treatment plants (STP) nationwide, across 19,134km network of pipelines, and about 200 plants are added to their assets annually.

Faizal said IWK treated 5,600MLD (million litres per day), which was equivalent to 2,000 Olympic-sized swimming pools.

Its service covers most of Malaysia, excluding Kelantan, Sabah, Sarawak and certain parts of Johor.

"There are about 18,375MLD of raw water resources. National water consumption is 10,786MLD, and from this, 4,332MLD is used for non-domestic purposes.

"The volume of water treated by IWK and national water usage for non-domestic purposes is almost the same so we would like to fill this gap.

"We can potentially meet 15% of non-domestic demand, which is about 670MLD of water, if we have the proper infrastructure in place."

Faizal said some countries use treated water that go through an ultrafiltration and reverse osmosis process for drinking, as the water is no different from the bottled water sold with white caps in the market.

"But a more practical approach in Malaysia would be to look at supplying for non-human consumption purposes like industries.

"In some areas, up to 40% of the water supply is used by industries. If it can be replaced by treated wastewater, there will be more water for other sectors like residential and offices," he said.

The ultrafiltration process transforms wastewater from murky (right) to clear (left).

Different challenges

Faizal said the challenge was to meet demand and provide logistical support.

"Some users need different grades of water, so you have to filter further. The best method of supplying water is via underground pipeline.

"Some STPs are located far from industrial areas and sending water by lorry is neither cost-effective nor environmentally friendly. We have listed about 10 STPs that can be utilised to meet industry's demand.

"Places with more rural concentration are not practical. Laying pipelines in mature township such as near Pantai 2 Regional STP – the biggest sewage treatment plant in Asia Pacific, is a challenge too. IWK treats 250MLD there but there are no factories nearby which need the water supply.

"The nearest industrial area is probably Kuchai Lama, and if we had to lay pipes underground, it may cause traffic obstruction during the construction process. Many people will not be happy about it.

"Because of the difficulties, we are only reusing about 1% of the treated wastewater within the complex for purposes such as cleaning and flushing toilets.

"We are looking at ways treated wastewater can be used for other purposes. Perhaps, pockets of forest can be cultivated where the water can be supplied by lorry. With pocket forests, the wastewater can be better used," he said.

The first water reclamation plant attached to an STP is in Setia Alam. It is fitted with ultrafiltration and reverse-osmosis systems to purify the water to meet industry demand.

Terasek E Hydra Sdn Bhd, a water reclamation company, built the plant which began operations in January.

Its managing director Jared Loo said they were distributing 5MLD to industries nearby via underground pipelines.

"We have been working with IWK since 2014 by transporting treated wastewater from Pantai 1 STP to be reused for landscaping, cleaning and construction purposes.

"Last year, we decided to bring the water purification technology from Singapore and try it out at the Setia Alam STP.

"Treated wastewater goes through phases of filtration to meet industrial requirements. In Setia Alam STP, we take in 8MLD water, treat it further and distribute 5MLD of purified water, or 70% of it.

"The balance of 30%, which does not make the cut is filtered again and again. No water is wasted in the process.

"There is demand in the surrounding industrial area and we plan to expand the plant to increase our capacity. With the main pipeline successfully built, it will be easier to

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About 30% of water that does not make the grade goes through the ultra filtration process again.

There are plans to increase capacity at the water treatment plant to meet demand.

Loo checking the filters at the water reclamation plant in Setia Alam.

connect the pipes to factories that will need the water in the future.

"We are also planning to expand and build such plants in Penang," he said.

Recyling sludge and gas

Faizal said IWK produces 100,000 tonnes of sludge annually and the bulk is sent to landfills.

"The sludge is rich in bio contents and can be a good form of fertiliser. Some local authorities are interested in using it as soil conditioners.

"In 2007, we tied up with Rubber Research Institute of Malaysia for the use of our biosolids as fertiliser for their rubber trees. The trees grew faster and bigger and the quality of latex was maintained.

"We also collaborated with Universiti Putra Malaysia to add value to our biosolids by transforming it into pellet form called bio-pallens.

"Early this year, we tied-up with the Forest Research Institute of Malaysia where we supply our biosolids to them for forestry applications.

"However, the amount of sludge used has not reached operational scale. There is still a lot of research to be done for better applications."

Faizal said that Malaysian standards prohibit the application of sewage water directly onto food crops.

Faizal said biogas from some plants were used to generate electricity and reduce operational costs.

"There are six plants with facilities to reuse methane, with the potential of generating up to 10,000m3 per day and produce 20MWh per day.

Faizal says IWK is continuously looking for practical applications of its sewage byproducts.

"We need a certain volume of gas to generate electricity. At present, we have managed to reduce electricity consumption by about 20% at the plants. We save up to RM2mil a year through this."

Faizal added that there was a future in the green industry and encouraged students to research on sustainability.

"There are opportunities to research on green technology. A circular economy is being embraced by many industries in the world.

"In the Asia Pacific region, Malaysia has the opportunity to be in the forefront by coming up with new ideas and technologies to provide solutions.

"I am very excited about the journey IWK is pursuing to realise our mandate on compliance with environmental regulations and work towards overall resource management especially in the water and energy industry.

"We would like to invite partners to come on board for initiatives towards a greener country," said Faizal.

The plant is currently distributing 5MLD to industries nearby through underground pipelines.