

Food for Thought

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"FRIENDSHIP" BETWEEN WATER AND ENERGY

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LETTER TO EDITOR

Date: 21st March 2014 (FRIDAY)

WORLD WATER DAY CELEBRATION ON 22ND MARCH 2014 - "FRIENDSHIP" BETWEEN WATER AND ENERGY

World Water Day is celebrated every 22nd March. It is to mark the importance of water particularly to humans. It is part of Decade for Water (2005 - 2015) activity by United Nations. The theme for this year celebration is 'Water and Energy'. The journey of the "friendship" between water and energy begins when water from the earth's surface evaporates after absorbing the energy from the sun. It then forms clouds and precipitation begins in the form of rain and snow. The influence of rain and snow to the ecosystem is vast. Association of Water and Energy Research Malaysia (AWER) would like to summarise the picture of this "friendship" between water and energy as following.

Water Generates Energy

When water flows from high altitude, it converts the potential energy stored in it to kinetic energy. This brings forth the water wheel that is used to create mechanical power and vice versa. Now, water is stored in dams to create potential energy that is eventually converted to electricity via hydroelectric generation power plants.

As of 31st December 2011, Malaysia has 10.5% or 3,015 MW (MegaWatt) of installed capacity for hydroelectric and it is set to increase in Sabah and Sarawak. Hydroelectric is still the largest portion of renewable energy resource and its carbon footprint is between 6.5 g CO₂

equivalent / kWh (kiloWattHour) for river runoff hydroelectricity generation (mini hydro) to 60 g CO₂ equivalent / kWh for electricity generated from large scale hydroelectric dams. A typical new subcritical coal power plant emits more than 1000 g CO₂ equivalent / kWh.

Water Uses Energy

Raw water needs to be treated to ensure it meets our drinking water quality standard set by Ministry of Health. This requires a substantial amount of energy to treat and supply water. This is mainly due to the electricity consumption by pumping systems that are installed to bring raw water to treatment facility, treatment process itself and to pump treated water to demand zones. The cost to water treatment and supply can be viewed as percentage of ratio between energy cost and total operational expenditure (OPEX) for treatment and supply of water.

Older pumping systems causes higher cost due to inefficient pumps compared to new and high efficiency pumps. Average ratio of energy cost to OPEX in Malaysia is about 25% in year 2012 according to Malaysia Water Industry Guide 2013. The highest ration of energy cost to OPEX is recorded by Perlis (53%) and lowest is in Sabah (6%). Gravity feed water treatment and supply system can reduce energy use in water treatment and supply substantially as potential energy stored in water is used to flow the water. However, densely populated areas with high rise buildings and locations that are far away from water treatment facilities will still cause higher energy usage to supply treated water.

Wastewater Uses and Generates Energy

Domestic, commercial and industrial sectors produce wastewater. This wastewater must be treated to prevent it from polluting our rivers and subsequently the environment. Treatment processes need a lot of mechanical power that is driven by electricity. This increases the use of energy to treat wastewater. Industrial wastewater that carries hazardous chemical may use higher energy input in treatment process.

Nevertheless, sewage and biomass can produce methane. Methane is a renewable energy resource. Such process allows sewage and biomass to be converted into electricity or biogas. Some of the biogas harvested is used for transportation, cooking and industrial combustion process.

The final solid waste can be combusted or treated to be used as concrete admixture, soil improvement material and fertiliser. The treated wastewater from such sewerage facilities can be supplied to non-potable water use in both industrial and non-industrial applications. This will reduce demand for treated water and in total reduce energy cost as some demand zones are closer to centralised sewerage facilities.

Water Grows Energy (biofuel)

In Malaysia, total water consumption is basically divided into domestic, industry (including commercial) and agriculture use which uses 17%, 21% and 62% respectively. Based on statistic by National Water Services Commission (SPAN), in 2012 total demand for treated water for domestic sector is about 5,881 Million Litres per day (MLD). We can roughly estimate that, agriculture sector uses around 21,448 MLD of water (raw water and small amount of treated water) from both direct and indirect use as there is no direct measurement done.

The need to find renewable energy resource that can be grown has mooted the creation of biofuel. Biofuel is created by converting raw products

from agriculture sector starch or oil into usable fuel such as ethanol or methyl ester. In Malaysia, palm oil is used as raw material to produce methyl ester that can be combusted. This however, has prompted many issues related to food or fuel argument. What if biofuel is a more lucrative sector and supply of agriculture products are reduced as food due to this? This was the major factor in food price increase in 2007 - 2008 globally.

Water and Energy Efficiency is Our National Security and Key to Our Survival

The rapid increase in demand for water and energy will drive a violent hunt for resources. Have we ever thought of optimising our use of water and energy? Rushing to meet demand will only bring all civilisations to doom.

AWER has created a planning tool to assist Malaysia to be both water and energy efficient. This is our 3C50 model. We have started some of our work to change policies in Malaysia to gear towards water and energy efficiency throughout the life cycle of water and energy. We have also created online tools that are free to use. To promote energy efficiency to all level of consumers, we have created Click d' Thief that is available via www.click.org.my and to promote water efficiency to domestic consumers, we have created Catch d' Hydro that is available via www.water.org.my.

We are still striving to carry out more research work to enhance water and energy efficiency in Malaysia to ensure our national security is protected and our survival for a tougher future is secured.

Conclusion

Salient points can be repeated numerous times. But, it must also be followed by action from agencies that are empowered and paid to carry out their duties. The "friendship" between water and energy only show that we are still in the early learning stage of harvesting the potentials to obtain water and energy sustainably via technology advancement.

When it starts to rain, we forget what we faced during a water crisis. Until it repeats again, we remember. It is not AWER that said, history repeats itself! But, what we are asking is WHEN WILL THE AUTHORITIES LEARN?

Piarapakaran S.

President

Association of Water and Energy Research Malaysia (AWER)

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