

Looking at alternative energy options for Brunei

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AS Brunei now looks at alternative energy sources to power the country's electricity demands towards the Brunei Vision 2035, then it is about time that we should seriously consider the various possible and viable options available.

In his presentation entitled "A Preliminary Prospective View of Renewable Energy Mix for Electricity Generation in Brunei Darussalam" at the recent Second International Conference of the Institution of Engineering and Technology (IETBIC), Rodney Tan, Senior Lecturer, Department of Electrical & Electronics Engineering, UCSI University, Malaysia, examined a few of the potential energy sources that could replace the current electricity generation which is powered by natural gas and diesel and the potential challenges faced in each of the different methods.

"The intensifying burning of fossil fuels will cause the global climate change. Global warming is rising at an alarming rate, and we must look at ways to generate renewable energy to lessen the effects of this," Tan told The Brunei Times.

Among the alternative energy sources currently being researched, Tan examined hydro, solar thermal, solar photovoltaic, wind, tidal and osmotic renewable energy generation as options.

According to the 2009 statistics from the Department of Electrical Services, Brunei was installed with generating capacity of 695MW producing 3,071.2GWh of power with the demand of 2,980.3GWh, meaning that the country was generating more electricity than the demand.

Research studies show that the power generation capacity will grow up to 1,036MW with the demand rising to 4,100GWh in 2030 and the oil reserve would deplete in the year 2038.

Hydro power is considered the most mature renewable energy generation technology available currently, and a small hydro power plant generating less than 100MW capacity could be considered in the Temburong district along the Sungai Temburong river.

However, as the Ulu Temburong National park is located in the district, the challenge and consequences of building such a plant with minimal impact to the tropical rainforest must be evaluated through Environment Impact Assessment.

Tan also spoke about solar thermal and solar photovoltaic energy generation. "As Brunei is a country that receives reasonable amounts of strong sunlight and thermal energy throughout the year, it is possible to generate electricity from solar thermal generation," he said.

"The challenge of such energy generation is that it requires large areas of wide, flat land for the high temperature solar collection towers and continuous accurate solar tracking to track the sun to sustain the heat to generate the power," he added.

Most of the flat regions found in Brunei are located along the coastline of the Muara, Tutong and Belait districts, which are areas already preoccupied with oil refinery residential towns, and therefore may not be a viable option.

According to studies, Brunei receives daily an average of 435 to 533 Watts per metre square of solar energy, which is good enough for energy generation, which also requires a large area of flat land to build the arrays required. The Tenaga Suria Brunei project in the Belait district was the initiative carried out by the Ministry of Energy to promote Green energy, and has the generation capacity of 1.2MW and is estimated to generate 1,344MWh per year.

Theoretically, it requires only one per cent of Brunei's land area to produce 9,617,750 MWh per year, which greatly surpasses the total electricity demand of 2,929,000 MWh in 2006.

Research into wind power generation showed that countries within the South East Asian countries have an average wind speed of less than 5 metres per second, so it may not be a viable option for Brunei.

However, a smaller wind turbine with a capacity of 100kW can be considered to harness the wind energy along the coastlines of the Tutong and Belait districts.

Tidal wave currents could be converted into electrical energy with underwater tidal turbines. The research that has been done shows that areas Northern Muara district has the potential to harness tidal energy for electricity generation.

As the area is a designated fishing area, there has to be consideration for the impact on the local marine ecology.

The osmotic process that takes place at the sea river junction between sea salt water and river fresh water can create energy through Osmotic or salinity gradient power generation.

There are two methods which can be used to generate electricity through osmotic energy, which is "Pressure Retarded Osmosis" and "Reverse Electrodialysis", either of which could potentially be used at the large sea river junctions in Brunei.

Tan expressed that a combination of the methods he mentioned could be utilised to generate renewable energy.

Hydro, solar photovoltaic and tidal have the highest potential of electricity generation in the country.

"It is the low demand of electricity which gives Brunei the advantage to achieve greater percentage of renewable generation in the future compared to other countries in the world."

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He is currently working as a Senior Lecturer in the Department of Electrical & Electronics Engineering at UCSI University, Malaysia. The Brunei Times



General view of Wave Star Energy's new 500-kilowatt test section located at the North Sea outside Hanstholm, Denmark. The floats produces energy by being lowered down to the surface of the sea and moved by the waves. Picture: EPA