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Trading energy among peers

Academicians share their insight into what the energy sector may be like in the future, writes **Nur Zarina Othman**

CAN solar energy be a source of income for households? Malaysia is blessed with abundant and consistent sunshine. As a result, many Malaysians have installed solar panels at home to show their support for more environmentally friendly sources of energy, as well as to reduce electricity bills.

Imagine selling your solar power to your neighbours, or giving electricity as a gift to a friend.

The growth in interest is showing with the recent increase in solar PV generation installations in Malaysia, which is in line with Sustainable Energy Development Authority's (SEDA) target to have a 20 per cent renewable generation by 2025.

P2P ENERGY

Although peer-to-peer (P2P) energy trading is not a new concept in other countries, it is relatively new here and its adoption is still in the research phase, but it could soon be a reality for all Malaysians.

Leading the study and working on building a sustainable framework for P2P implementation in Malaysia are academics from Monash University Malaysia, led by the School of Engineering lecturer Dr Tan Wen Shan, Monash University Malaysia Asean Fund Project Leader and head of discipline (Mechatronics Engineering), School of Engineering Associate Professor Ir Tan Chee Pin (or Edwin) as well as Department of Marketing (School of Business) lecturer Dr Stephanie Cheah, who is the person in charge of matters related to solar policies in Malaysia.

Fully enabled P2P trading, according to Cheah, would cut out the middleman and allow transparent dealings among equals, as opposed to being treated as a consumer by a corporation.

We are now the producers and consumers or, simply put, the "prosumers" who can also sell our excess of what we have generated to neighbours, or buy electricity cheaper than what we would usually pay to our utility company. This will ultimately reduce the use of fossil fuels and that is the main concept of P2P trading.

Tan said energy sharing could happen among tenants in a multi-rise and adjacent buildings, or among anyone on the same network.

"For example, if my solar panels at home produce excess electricity while I am



Many Malaysians have installed solar panels at home.

at work, I could sell the surplus energy to my neighbour who doesn't have solar panels. Similarly, organisations that have multiple assets may sell or donate electricity to neighbouring households or businesses as part of their social commitment," he said.

CHALLENGES

In solar energy implementation, P2P trading empowers to trade without an intermediary at an agreed price. However, P2P trading is multi-faceted and dynamic, and this may jeopardise the national energy security.

"Hence, the specific problems," said Edwin, "include how to design a prosumer-centric energy trading with P2P within a community that will ensure sustainable engagement, how to secure transactions among the prosumers securely without an intermediary, and what are the additional benefits that we can gain from P2P trading from a power systems' perspective."

All the challenges must be resolved to build a sustainable framework for P2P implementation in Malaysia.

Therefore, the team has designed a prosumer-centric energy trading model within a community that will ensure sustainable engagement using a motivational game theory.

"The first aim of our research work was to use the motivational game theory to design a proper price scheme, with the consideration of various tariffs, that will ensure a win-win situation for both prosumers and the power utility company, for maintaining sustainable engagement," said Edwin.

The team also shared that by comparing P2P trading with the Net Energy Metering (NEM) scheme, prosumers can save up to 200 per cent more (depending on the conditions and types of prosumers) on the electricity bill, and are capable of achieving about six per cent more carbon dioxide reduction monthly.

"The expected profit gain by the power utility company, TNB, remains the same with negligible difference, for both P2P trading and NEM schemes."

ENTER BLOCKCHAIN

P2P energy trading involves a large number of transactions between prosumers

and consumers, and needs a technology that allows for low-cost authentication, validation and settlement while protecting privacy.

So, to answer the question on how to secure the transaction between the prosumers without an intermediary, Tan's answer is "blockchain".

According to him, as a distributed ledger technology, blockchain can be implemented for P2P transactions, as it is capable of ensuring the transparency of transactions, and makes the transactions history unalterable, thus guaranteeing a high security.

"We are in discussion with the Selangor Human Resource Development Centre for the development of a blockchain platform," said Tan.

WORKING TOGETHER

The third challenge in their quest to prepare the nation for P2P energy trading is

by working closely with TNB Sdn Bhd to further explore the potential of the P2P market in Malaysia.

One of the ideas is to explore the use of P2P trading to relieve the power flow congestion in the smart grid, thus reducing the need for the costly grid expansions in the near future. Nonetheless, the project will showcase a viable solution to develop an integrated low-carbon township in the Klang Valley.

The research project conducted by the Monash University Malaysia team is in line with the United Nations' Sustainable Development Goals (SDGs) number seven (for affordable and clean energy), 11 (sustainable cities and communities), 12 (responsible consumption and production) and 13 (climate action), which can impact both global and local societies by reducing carbon emission and electricity cost for prosumers.



Dr Tan Wen Shan