

Innovative model for cheaper energy supply

IN Malaysia, many households with rooftop solar panels are quietly transforming into energy producers. When a home generates more energy than it uses, the surplus power can be stored for later use or exported to the grid.

It could also be traded between neighbours and businesses through peer-to-peer (P2P) energy trading. The idea is simple: a household with spare solar-generated energy offers the surplus for sale to neighbours who need it. A digital platform measures the energy, records the transaction and facilitates payment.

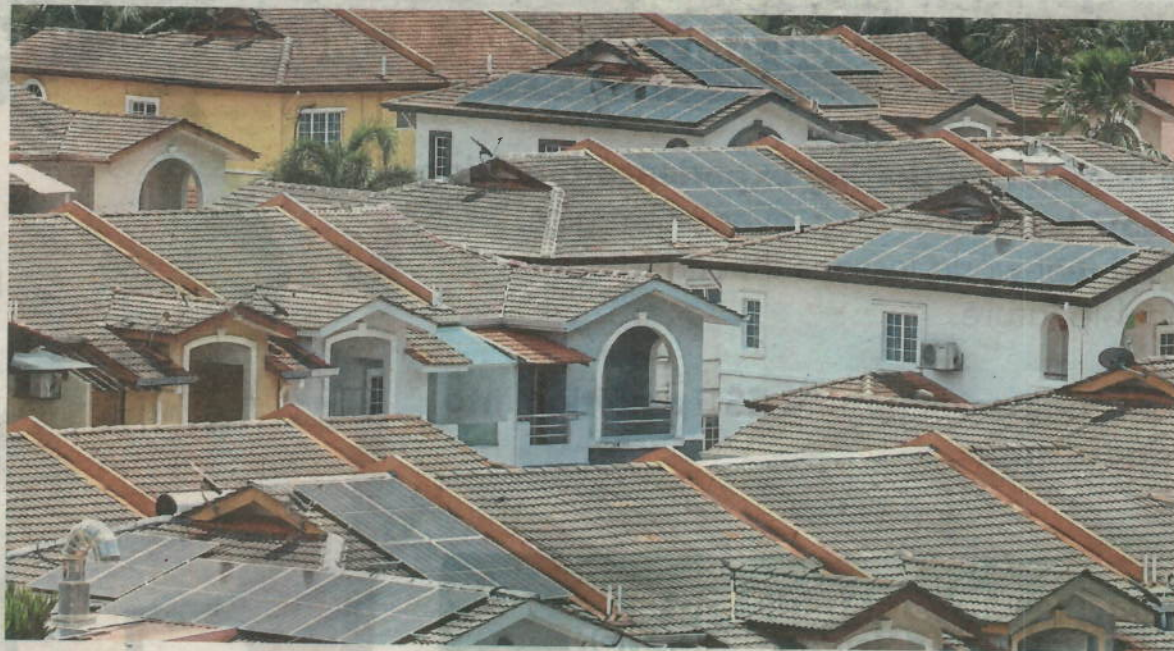
The result can be cheaper local supply, a new source of income for the supplier and reduced pressure on long transmission lines. Powerledger, the Australian developer of a blockchain-enabled trading platform, has piloted the technology in multiple urban settings.

Community pilots such as the Brooklyn Microgrid project in the United States have shown how local trading can support community resilience during unexpected power outages.

In Japan, commercial services have begun offering local trading solutions supported by AI for agricultural cooperatives.

In Malaysia, P2P energy trading is one of the strategies to be explored under the Renewable Energy Transition Roadmap (RETR) 2035 by the Sustainable Energy Development Authority (Seda) to augment the solar photovoltaic rooftop market.

P2P energy trading is supported by several technologies. An Internet-of-Things (IoT) device, such as a smart meter, provides households with near real-time measurement of energy generation and consumption. Meanwhile, a distributed network platform, such as block-



chain, provides a secure, tamper-proof ledger technology that records energy transactions and manages payments. To match energy supply with demand, a market matching algorithm is implemented to ensure that network constraints are adhered to.

There are clear advantages to P2P energy trading. First, it enables shorter delivery distances, thereby reducing transmission losses and further improving operational efficiency.

Second, energy providers are able to recover some investment by selling surplus energy. For buyers, they have access to local renewable energy supply and sometimes pay less than they would to the energy grid provider.

In return, higher local use of solar energy can reduce peak loads and carbon emissions associated with energy generation.

But P2P energy trading also raises practical challenges. Conventional energy distribution

networks were generally built for one-way flows from power plants to end users. On the other hand, local trades are bilateral and can affect voltage and protection settings.

Malaysia's power grid is in the process of transitioning towards a more bilateral system. This effort is important to ensure that energy trading platforms will not compromise safety or reliability.

Privacy and cybersecurity must also be taken seriously. Platforms that record energy consumption and transaction data must be protected against adversaries and misuse to ensure secure adoption of the system.

Equity is also a concern. Early adopters tend to be better-off households that can afford panels and batteries.

Without deliberate policies, P2P energy markets risk creating winners and losers within the same community.

Realising P2P energy markets will take a coordinated effort.

Regulators must create clear sandbox rules, distribution utilities must test technical safeguards, network platform providers must meet privacy and security standards, and researchers must continue to develop scalable, privacy-preserving data dissemination and payment models.

When these aspects are in place, pilot runs can safely demonstrate what is practical and what needs improving.

P2P energy trading will not replace the existing conventional grid. Instead, it can complement the grid by unlocking more value from distributed renewables, improving resilience in local communities and giving households more control over their energy bills.

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