Malaysia's Pilot P2P Energy Trading: Bridging between electricity grids and demand side

Dr Wei-nee Chen, Chief Strategic Officer
Sustainable Energy Development Authority (SEDA) Malaysia

Status of RE in Malaysia



- As of end of 2018, national power mix = **34,370MW**; RE **6%** (excl large hydro)**,** incl large hydro* **22.5%**; natural gas 43% & coal 31%;
- Since 2011, RE is largely driven by **Feed-in Tariff** (SEDA), post 2016 **- Large Scale Solar** (auctions – Energy Commission) and **Net Energy Metering** (rooftop - SEDA) schemes;
- In 2019, SEDA was tasked by the Ministry of Energy, Science, Technology, Environment and Climate Change to develop a **Renewable Energy Transition Roadmap** (RETR) 2035;
- The roadmap will develop strategies to achieve the committed target of **20% of RE*** in the national installed capacity mix by 2025 and develop aspirational RE scenario up to 2035;
- Among RE resources, solar PV has the highest technical potential and the roadmap identified **P2P energy trading** is one of the strategies to scale up distributed RE generations.

** Excludes large hydro > 100MW*

P2P pilot project: Peer-to-peer electricity trading across the electricity network (TNB's grid)

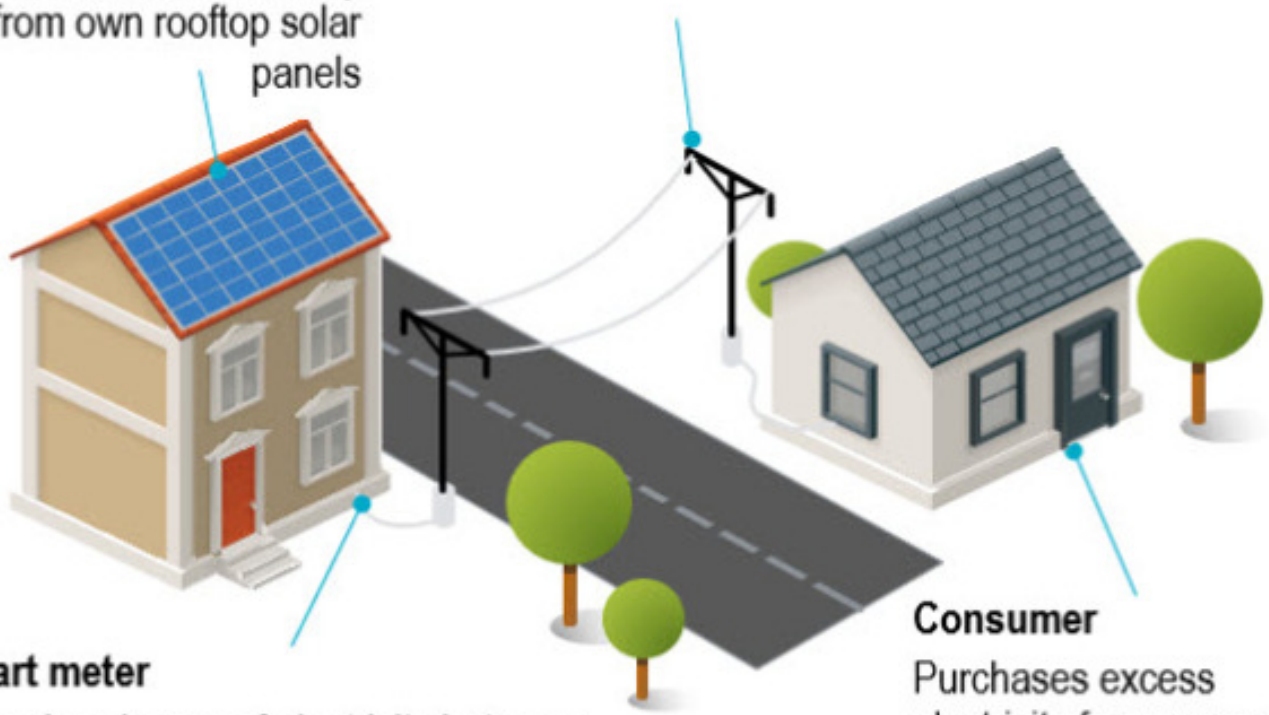
Concept of P2P pilot project in Malaysia

Prosumer (NEM user)

Produces excess electricity from own rooftop solar panels

TNB's grid

Use of TNB's grid



Smart meter

Record exchange of electricity between prosumer, consumer & TNB, tracked via blockchain platform

Consumer

Purchases excess electricity from prosumer when available; rest of the time to purchase from TNB

Timeline: 8 month pilot project

2 months

Alpha phase

To be conducted with real data and processes with no financial transaction

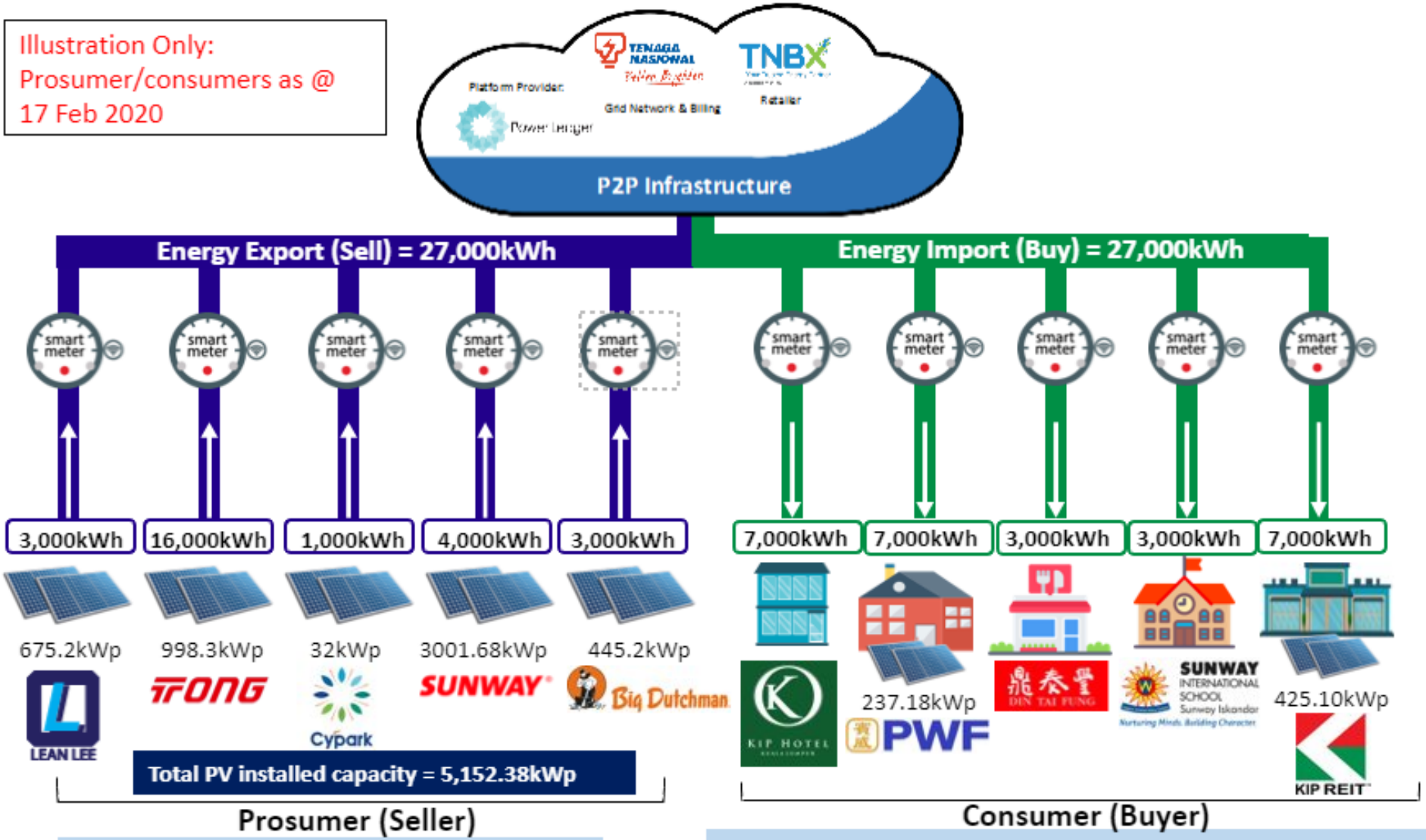
6 months

Beta phase

Includes commercial transaction: Solar prosumers are paid for solar electricity sold to electricity consumers

PEER-TO-PEER (P2P) ENERGY TRADING CONCEPT

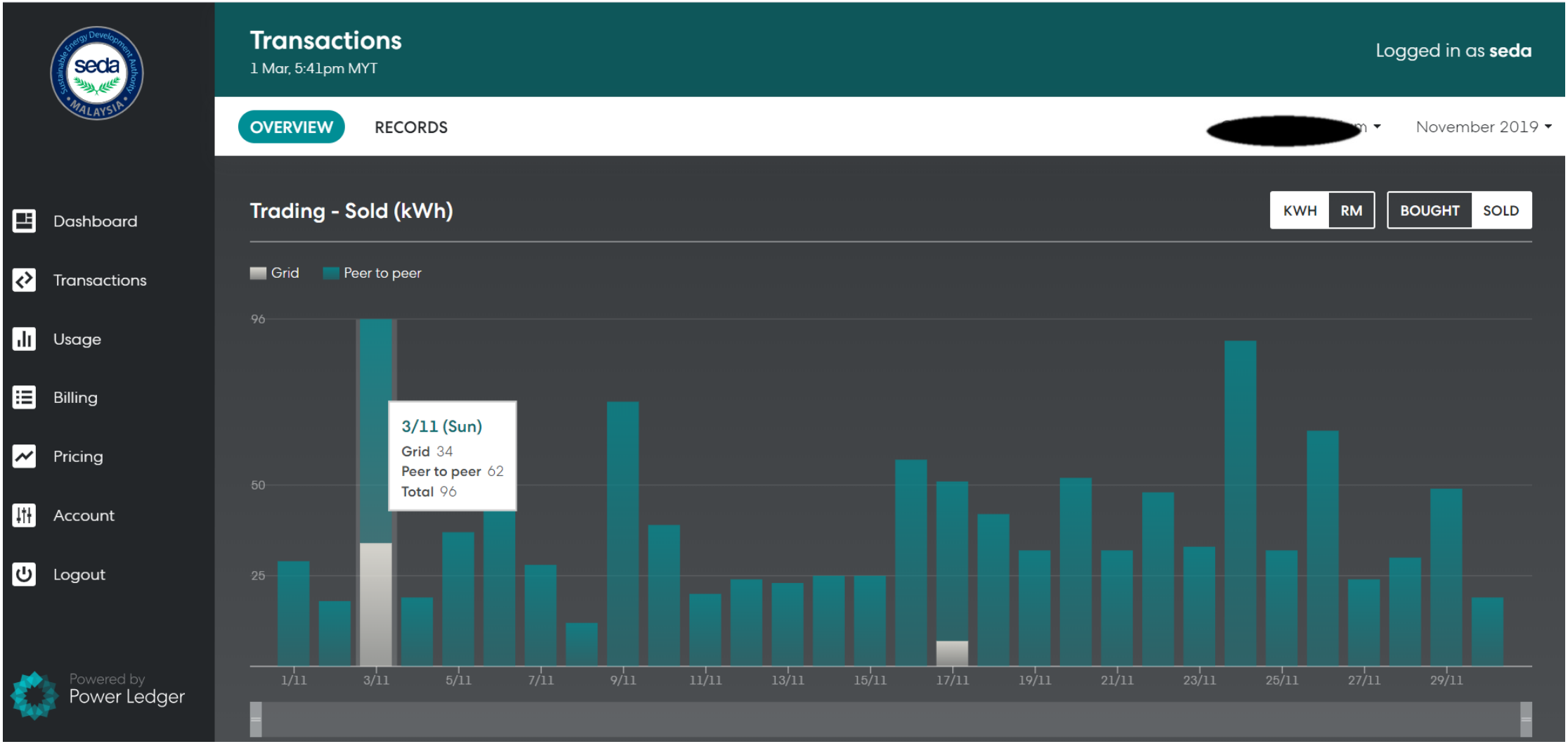
Illustration Only:
Prosumer/consumers as @
17 Feb 2020



Tariff (Prosumer)
TNB Tariff: RM 0.355/kWh (e.g. Tariff E2)
*P2P Selling Price: RM 0.3905/kWh
Margin: RM0.0355/kWh (10%)

Tariff (Consumer)
TNB Tariff: RM 0.509/kWh (e.g. Tariff B)
P2P Buying Price: RM 0.3905 + RM0.063 = RM0.4535kWh
Saving: RM0.0555/kWh (11%)
Sandbox network charges during sandbox duration, no retailer fee imposed during pilot run.

Snapshot of energy trading for a prosumer in November 2019



Key Takeaways

- P2P energy trading is regarded as the next generation **energy management** technique for smart grid that can enable prosumers to actively participate in the energy market[1];
- P2P energy trading is one of the promising paradigms of smart grid in the near future; ability to **balance** local generation and demand, has a potential to enable a large penetration of RESs in the power grid[2];
- Prosumers can manage their energy usage if ToU is available, and optimize energy arbitrage opportunity ("negawatt");
- Theoretically, P2P reduces peak demand and transmission congestion[2] (if energy trading is carried out @ distribution level), reduces grid investment & maintenance costs;
- P2P enables virtual net metering (VNM), has the ability to aggregate solar prosumers to form virtual power plants (VPPs) and fractionalize energy assets (e.g. utility scale energy storage), and provide these as (ancillary) services.

1 Tushar, Wayes & Saha, Tapan & Yuen, Chau & Smith, David & Poor, H.. (2020). Peer-to-Peer Trading in Electricity Networks: An Overview.
2 Zhang, Chenghua & Wu, Jianzhong & Cheng, Meng & Zhou, Yue & Long, Chao. (2016). A Bidding System for Peer-to-Peer Energy Trading in a Grid-connected Microgrid.

Challenges

- Regulatory readiness as electricity market is still highly regulated;
- Determination of network charges for P2P (e.g. should network charges include capacity payments to conventional plants?);
- Political willpower

THANK YOU

Sustainable Energy Development Authority (SEDA) Malaysia
Galeria PjH, Aras 9, Jalan P4W, Persiaran Perdana
Presint 4, 62100 Putrajaya, Malaysia.

T • +603 8870 5800
F • +603 8870 5900
www.seda.gov.my
weinee.chen@seda.gov.my

Sabah Branch:
Likas Square Commercial Centre,
Unit 32, Level 1, Lorong Likas Square,
Jalan Istiadat Likas, 88400 Kota Kinabalu, Sabah.

T • +6088 252 101/251 462
F • +6088 257 337
GPS Coordinate:
5°59'32.8"N 116°06'31.0"ET

@SEDAMalaysia
SustainableEnergyDevelopmentAuthority-SEDAMalaysia