Engaging picture of case-study, ideally a mixture of people and technology

Bangkok T77 P2P Trading Trial

Powerledger, February 2024

Key facts

Location (town + country)	Bangkok, Thailand
Duration (start/end dates)	*22 August 2018, End date: tbd*
Funding source	
Project lead (organisation)	*Bangchak Corporation Public Company Limited (BCPG)*

Project partners	*Powerledger, Thai renewable energy business and Thai utility Metropolitan Electricity Authority (MEA)*
No. of participants	*7*
Case study type	*{Proof of concept/Technical demonstration}.*

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Case study statistics

Parameter	As designed	As built
No. of participants	*7*	*7*
Generation (kWp)	*635 kWp*	*635 kWp*
Storage (kWh)	*0*	*0*
Unit price ($/kWh)	*Fixed rate around 20 % below retail peak rate*	*Fixed rate around 20 % below retail peak rate*
Project cost ($)		

Summary of case (~200 words)

BCPG and Powerledger have jointly recognized a promising opportunity to commercialize an innovative business model centered around distributed energy generation, specifically focusing on sharing surplus generation from solar PV systems. To explore the viability of this concept, they embarked on a trial of Powerledger's P2P energy trading platform. This trial took place at the T77 Community Soi Sukhumvit 77 in Bangkok, Thailand. The project incorporates a total of six commercial participants and one residential apartment complex in close vicinity to each other.

The main aim of this trial project was to assess the feasibility of implementing the proposed P2P trading solution to foster a sharing economy. The project optimizes the utilization of solar PV systems installed on rooftops within the community buildings in an environment with no

available remuneration from the grid for surplus solar energy. The ultimate goal was to showcase the potential benefits and capabilities of the P2P energy trading platform, while simultaneously gathering valuable insights to inform and enhance future projects. By exploring this innovative approach to energy generation and distribution, BCPG and Powerledger aspire to revolutionize the energy sector, creating a more decentralized and efficient energy exchange system.

The successful deployment of the P2P energy trading platform signifies their confidence in the viability and scalability of this model. This transformative initiative not only has the potential to benefit the involved stakeholders, including the communities, but also represents a step forward in the global pursuit of sustainable and eco-friendly energy solutions.

Impact highlights (~4*50 words)

- Impact 1: *Incentivising the installation of additional renewable energy resources through more beneficial return on investment conditions through the opportunity to sell surplus energy at higher P2P rates rather than the usual feed-in rate of zero THB/kWh.*
- Impact 2: *To reduce average electricity cost by creating a sharing economy allowing to sale of excess electricity to peers within the community at rates more favorable than usual grid rates.*
- Impact 3: *To maximize the involvement of residents in energy management by giving them a certain degree of control over their energy usage and energy sources as well as giving them the opportunity and encouraging them to view their electricity usage and transactions.*
- Impact 4: *Increase the self-consumption of the community by balancing surplus generation with local demand thereby reducing the export to the wider grid as well as reducing the reliance on the backup grid by maximizing the usage of locally generated energy thereby increasing the self-sufficiency of the community.*

Project aims and objectives (~250 words)

The trial project's successful deployment seeks to establish a sustainable sharing economy through P2P energy trading within the participating community. Key objectives include proving the viability of P2P energy trading between neighboring energy consumers and convincing regulators to endorse this model and recognize P2P trading as a key activity in the electricity network.

Additionally, the project aims to maximize the utilization of community-building rooftop solar PV thereby increasing self-consumption through educational campaigns aiming at a behavioral

change to shift energy usage to periods of high solar generation which contributes to a more balanced low-voltage network.

The platform also aims to enable community members to sell excess electricity beyond Power Purchase Agreements (PPA) directly to each other, fostering a self-sustaining energy marketplace. Community engagement in energy management is promoted through access to customized user interfaces providing participants with insights into their energy usage and trading statistics.

Ultimately, the project aims to reduce average electricity costs for the community by offering alterative energy sources to consumers at advantageous prices. The increased benefits for prosumers aim to incentivise additional solar/DER installations gradually reducing dependence on conventional energy sources. This in turn reduces the usage of carbon-intensive grid energy, contributing to a reduction of greenhouse gas emissions.

Mr. Bundit Sapianchai, Former BCPG President and CEO:

"*We are developing a Smart Community where residents can live in harmony with the environment. They can generate their own electricity of which the surplus can be traded with the help of cutting-edge technology which also enables us to provide energy management service. With internet of energy, we are transforming the energy industry by making renewable energy accessible for and affordable by all under a concept "Energy for Everyone"".* Link

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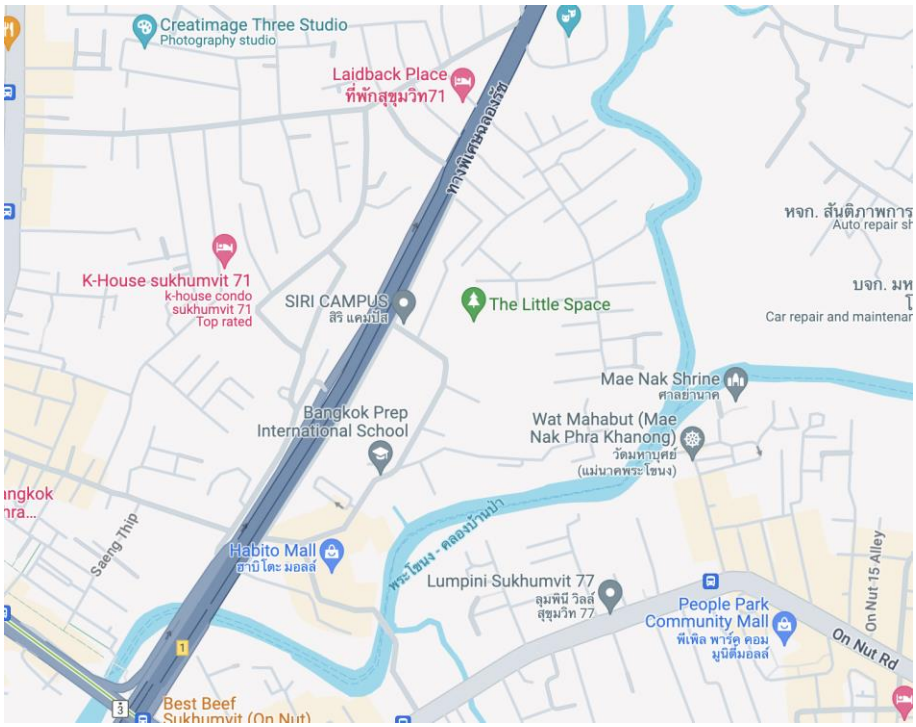
Description of case (≤ 6 pages)

- Market value proposition and key activities: *The project enables buildings within the T77 precinct to trade surplus solar energy, offering cheaper energy options and better returns on renewable investments. Energy transactions are enabled and verified through the usage of near-real-time import and export smart meter readings. Outcomes are visible to participants and the application host (BCPG) through a customized user interface, which displays general usage statistics, transaction information, blockchain details and community highlights.*
- Financing/funding (who contributed funding and under what terms): *Provided by project partners, subject to contract terms.*
- Legal structure (co-operative; partnership; social enterprise; etc): *Powerledger and BCPG partnership*, *BCPG is the application host, Powerledger is the Saas provider*
- Timeframes including for project initiation; funding cycles; detailed design; legals and contracts; participant recruitment; trial duration; decommissioning; etc: *The project was initiated in 2017. Live trading started in 2018 and it is ongoing since without interruption, with extension of the initial trading group in 2021.*
- Stakeholders/project partners involved (organogram): *BCPG as application host and the Metropolitan Electricity Authority (MEA) as network operator and retailer are key stakeholders. Powerledger provides the technology platform. Participants include a dental hospital, a residential apartment complex, an office building, an international school and a shopping centre.*
- Participant types and characteristics: residents (social housing, private rented, private ownership; socioeconomic status); SMEs (types and loads); social institutions (schools, etc). What were the inclusion/exclusion criteria for participating in the case? *The project primarily involves a mix of residents, SMEs and social institutions in Bangkok's T77 precinct. It includes an International School, Dental Hospital, Office Building, Shopping Centre and a residential apartment complex.*
- Participant recruitment methods, incentives and protection (opt-in or opt-out; were participants paid to participate; were they exposed to financial losses or other risks; etc): *The recruitment process was handled by BCPG, they receive financial benefits through reduced electricity bills and have the opportunity to opt-out as per the agreed contract details. No adverse side effects on participants is created through the project as all the required infrastructure was already existent (hardware: smart meters) or delivered by stakeholders (software: trading platform, data protocols, cloud storage etc).*
- Participants' role in co-creation of project and objectives (if any): *The participants had no direct role in the design of the project at this stage.*
- Case study functional requirements.
    - Regulatory structure and requirements (beyond compliance with existing law), e.g. constraints imposed by regulatory sandboxes.
        - *P2P is only allowed in the regulatory sandbox. The Energy Regulatory Commission of Thailand recently announced regulations for utility green tariffs, facilitating a form of P2P energy trading among participants.*

However, certain conditions, such as wheeling charges, apply. Full regulations regarding pure P2P for commercial rollouts are still unavailable.

- Stakeholder requirements (trial design requirements)
  - *All participants buy energy from the rooftop photovoltaic (PV) systems.*
  - *Surplus energy, after consumption, is shared with peers at a price higher than the energy generation cost. This allows participants to generate financial benefits for each kWh they generate and trade with peers.*
  - *Any remaining excess energy is fed back into the grid.*
- Technical architecture (representation of assets: generation; storage; control; load types (electric vehicles (EVs); heating, ventilation and air conditioning (HVAC); small and medium-sized enterprises (SMEs); etc): *The generation assets part of this project were 5 individual solar PV systems with a total capacity of 635 kWp. At this stage, no battery assets or electric vehicles are part of the project. Most of the load requirements stem from SMEs and social institutions. The load is recorded by the main meter and not split in individual load types.*
- Data architecture (including data ontology/standards where used): *ISO standards (time stamps, naming conventions,etc…*
- Financial model (representation of financial flows and markets): *Powerledger charges the client a standard software license and transaction-based fees.*

- Geographical scale: *Trial project limited to the T77 precinct in Bangkok.*



- Governance structure (organogram)
- Electricity network ownership (public or private): *The electricity grid is publicly owned by MEA.*

- Management of changes in case study over time (i.e. participants leaving; assets failing; data losses; etc): *Project expanded from initially 4 to 7 participants in 2021.*

Key takeaways

Prosumers receive a valuable alternative to a zero FiT rate by engaging in P2P sales of their surplus energy to other consumers within their community.

P2P trading can incentivize solar installations in the community

Participants actively engage in P2P trading communities providing they create access to more cost-effective and sustainable energy sources.

Outcomes and achievements (~1 page)

What outcomes are anticipated from the pilot? *Main outcomes anticipated are increased use of local renewable energy and decreased cost of electricity for participants.*
What outcomes were delivered by the pilot? *The anticipated outcomes are delivered by the pilot with solar consumption increasing and rate reduction of P2P rate compared to grid rate of 21 %.*

What was the primary goal of the project? (please tick one) *

☐ **Grid integration** - e.g. management of grid constraints; balancing of demand and supply; promote/include distributed energy resources (DER) generation; optimisation of energy behaviour to benefit system; aggregation of participant energy loads.

☐ **Environmental benefits** - e.g. promote or include renewable energy (RES) generation.

☐ **Empowering individuals** - e.g. participants have greater control over preferences; self-sufficiency (autarky); autonomy.

☐ **Local benefits** - e.g. improvement to local economy (job creation etc); independence from other regions; community as focal point for engagement; shared benefits across the community.

X **Creating market value** - e.g. economic incentives for participants; access wholesale, balancing and ancillary service markets.

Were there any secondary goals of the project? (please tick as many as apply) *

X **Grid integration** - same description as above

X **Environmental benefits** - same description as above

X **Empowering individuals** - same description as above

X **Local benefits** - same description as above

☐ **Creating market value** - same description as above

☐ If other, please give a brief description

***** *These questions are compulsory to answer*

Key takeaways

The project aims at creating a market value by providing economic advantages to project participants through reduces rates.

Additionally, it aims at promoting the usage of RES, thereby creating environmental benefits and optimize the usage of surplus energy.

Lastly, it empowers individuals by providing them dedicated access to new energy sources and creates local benefits by reducing the reliance on the wider network.

Obstacles encountered when conducting the pilot (~1 page)

Highlight the obstacles you came across when conducting the pilot. A few examples are mentioned below:

- Regulatory landscape or obtaining regulatory permission
    - *P2P is only allowed in the regulatory sandbox as of now. Full regulations for pure P2P in commercial rollout are still unavailable, hence a commercial rollout of this project is aggravated.*
- Recruiting and retaining participants
- Interoperability of systems
    - *Network issues sometimes delay the transmission of meter data to Powerledger systems. This can pause the energy trading on the platform.*
    - *Different data formats and encoding standards make it challenging for the systems to exchange information effectively.*
    - *Replacing a meter requires reconfiguration on Powerledger platform especially when the readings of new meter reset/start from a lower cumulative value.*
- Performance of hardware and software
    - *Inability of meters to send live data*
    - *Inability of meters to send interval readings along with/instead of cumulative readings*
- Restricted timeline
- Availability of funding
- Ethics and data protection

Key takeaways

Efficient interfaces between software systems of different stakeholders are key prerequisite for effective project implementation

Reliable hardware systems are important to depict P2P transaction realistically.

Sandbox regulations allow pilot programs and testing, but do not suffice for the implementation of a commercial roll-out.

Key learnings for other pilots (~250 words)

If you were repeating the pilot project: what would you have done differently, what are your key lessons learned and key takeaways?

Enhancing Solar Energy Generation:

- *Increasing the solar capacity and generation in the project enhances the financial gains for participants.*
- *This strategic addition maximizes the utilization of renewable energy sources, aligning with sustainability goals.*

Optimizing Solar Energy Consumption by Adding Batteries:

- *Including a battery in the project addresses excess energy challenges during periods of low demand.*
- *The battery system efficiently captures surplus energy, preventing it from being fed into the grid for zero FiT.*

Dynamic Trading Opportunities for End Users:

- *Empowering end users with live dynamic trading capabilities.*
- *Users can individually set their buy/sell prices based on personalized energy consumption/generation estimates for the day.*
- *Enhances user engagement and customization in the energy trading process.*

Regulatory Support for P2P Solution:

- *Highlighting the necessity of regulatory backing for the successful commercial rollout of P2P energy trading solutions in the region.*
- *Emphasizes the importance of legal and regulatory frameworks to facilitate and legitimize P2P energy transactions.*

Recommendations for policymakers (~400 words)

Please fill in the table below, by including recommendations for policymakers based on your experience of conducting the pilot (in particular obstacles encountered).

What?	Who?	Why- Example from case study?	How?	When?
Investment in adoption of smart meters and DERs (incentivized through P2P instead of zero FiT)	*Central / state government*	*To simplify and accelerate participation in and adoption of P2P trading concepts*	*Direct cash funding for installation of smart meters and DERs; tax benefit amongst others*	*Prior/alongside project implementation*
Creation of policy framework supporting the implementation and recognition of P2P concepts as part of energy market regulation	*Central government / state government*	*To streamline the conceptualization and commercialization of P2P projects*	*Public consultations, feedback mechanisms and stakeholder workshops*	*Prior commercial project implementation*
Implementation of guidelines for customer data protection which enable P2P trading and usage of blockchain	*Central government / state government*	*Ensuring the privacy and security of user data in P2P transactions enhances trust and participation in the system, as seen in successful blockchain applications.*	*Establishing clear data protection standards, regular audits, and secure technology protocols.*	*Prior to or alongside the launch of P2P trading platforms to ensure foundational trust and security measures are in place.*
Educate consumers and businesses about the benefits and	*State governments / Utilities*	*Ensuring customers and businesses are aware of P2P energy trading*	*Through workshops, seminars, online courses, and*	*Initiate prior to and continuously after the introduction of P2P trading platforms to*

operation of P2P energy trading to increase adoption		*thereby increasing interest and participation in projects*	*informational materials distributed across various media platforms.*	*maintain engagement and adapt to evolving market needs.*
Support research and development in blockchain and energy technologies to enhance the scalability and security of P2P platforms	*Central government / state government / academic institutions / private sector partnerships*	*Innovation in technology, particularly blockchain and smart contracts, can enhance the efficiency, security, and scalability of P2P platforms, demonstrated by projects that successfully integrated these solutions.*	*Providing grants, tax incentives for R&D activities, creating innovation hubs, and facilitating public-private partnerships.*	*Ongoing, with a focus on early-stage support to seed innovation and later-stage support to bring successful projects to market.*

Further information/References

- Website: *https://www.powerledger.io/clients/t77-bcpg-and-mea-thailand-thailand*
- Public data sources: *https://www.bcpggroup.com/en/newsroom/news/237/bcpg-organizes-a-visit-to-power-ledger-s-trial-project-in-australia-aiming-to-be-the-first-to-operate-peer-to-peer-energy-trading-project-in-south-east-asia*
- Other relevant documents