



VPP Project and P2P power transaction Trial using BLOCKCHAIN technology

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1. Overview of Kansai VPP Project

2. Overview of P2P power transaction Trial using BLOCKCHAIN technology

3. Key messages



Electric Power Companies in Japan



Installed Generating Capacity as of March 31, 2018

Power System Map of KANSAI



PV generation suppression for the first time in Japan



Virtual Power Plant (VPP)

Traditionally, the adjustment of energy demand and supply including output adjustment at a thermal power plant was conducted at the "supplier's side". Virtual Power Plant (VPP) is a system functioning as a power plant. The adjustment capability for energy demand and supply provided by consumers' facilities are effectively utilized through the introduction of IoT technology into consumers' equipment scattered across the electric power system for its collective control.



O An aggregator provides a variety of services for retailers, system operators, power generation provider using renewable energy, consumers and communities through the collective remote control of their equipment and the restriction and creation of energy demand.



KANSAI VPP Project in FY2018

Consortium of 17 companies is conduting large-scale demonstration. Kepco, Fuji Electric, Sumitomo Electric, Nihon Unisys, Yokogawa Solution, Sansha Electric, NTT Smile Energy,Enegate, ELIIY Power, Daihen, Mitsubishi Corporation,

Kyocera, Sharp Corporation, Panasonic, Fukushima Industory, Kinden, Looop

(role allocation) object resources in FY20								
	EMS	AC	Hot water	EV•PHV	battery	PV	generator	
domesti c	HEMS	AC	residential HP Water heater	private car	small size battery	rooftop PV	residential cogeneration	
	Enegate		KEPCO Sumitomo Electric Nihon Unisys Enegate	KEPCO Sumitomo Electric	NTT Smile Energy ELIIY Power Mitsubishi Corporation Kyocera Panasonic Sharp、Looop	Mitsubishi Corporation		
C&I	BEMS FEMS	commercial AC	commercial HP water heater	company owned car	large scale battery	megasolar power plant	cogeneration private generator	
	Sumitomo Electric Daihen, Kinden Fkushima Industory Yokogawa Solution			Enegate	KEPCO Fuji Electric			

Some more companies joined the project for 2018.

In FY2018 project, based on the result of last year, each server has improved control precision such as control value grasp and feedback control.



9

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O As of March 2017, renewable energy of 56GW was introduced.2.7times compared with when FIT began.

O Solar generation accounts for 95%(32.94GW) of new introduction after FIT.



Expanding market of surplus PV power after FIT ¹¹

- •10 year-purchase period of FIT is gradually expiring after November 2019
- •3GW from 560,000 houses is expected to expire in FY2019 continuing to arise.
- Self consumption is expected to increase because FIT price decreses below purchase rate from a power company.



Customers' options against FIT expiration

Basic options after FIT expiration

- self consumption using EV and battery etc.
- direct transaction with retailer and aggregator

Temporary buyer absence of surplus power

- TSO is asked to purchases surplus energy in case there is no bidder temporarily.
- TSO is asked to absorb surplus energy free of charge in case there is no contracted buyer.

(customers' options for surplus energy)
(1) sell to retailer or aggregator
(2) self consumption
(3) P2P transaction

12

Evolution of BLOCKCHAIN Technology



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13

power business cases using blockchain as of June 2018 ¹⁴







various patterns of P2P power transaction

		scheme	Case	remarks	
DC private owned line molded		transaction controlled with battery and PCS on the both sides of prosumers and consumers AE BE BE BE Batt PCS Batt PCS	 Digital Grid (Urawa Misono) Sony CSL (Okinawa) 	 unapplicable without private owned lines PCS and battery necessary 	
grid m ol	modulation with battery	transaction controlled with battery on prosumer side 電力系統 MBatt	 Good Energy Sonnen, tennet molded 	 surplus power suppied modulated with battery battery necessary 	
d e d	non control	non control as it is 電力系統	Power Ledger molded	 non control as it is on the both sides of prosumers and consumers simple hardware 	

monetizing price for P2P transaction

If P2P rate is lower than retail rate from utility company, there is a merit of the consumer. If P2P rates higher than purchase rate after FIT expiration, there is a merit of the prosumer side







problems

- ⊖ Can prosumers be regarded as transaction entity in light of The Electricity Business Act of Japan?
- ⊜ Do customers have to pay the same wheeling fee as regulated?
- ⊛ Is partial supply approved to purchase supplementary energy from a local utility company?
- ④ Where should smart meters be installed in light of The measurement Law of Japan?

 Introduction of P2Ptransaction using blockchain technology to collectively power receiving condominiums and micro grids

- Application of blockchain technology to:
 - Increase environmental value market of renewable energy
 - Power the transaction of various equipment like Evs
 - Manage demand-response and 'negawatt transaction'

21

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- Electric power business tends to shrink when there is a massive introduction of renewable energy
 - Electric power companies should address this issue as soon as possible
 - Solutions include innovative services and digital transformation such as IoT / AI technologies
- The biggest challenge is monetization
 Facilitating the creation of VPP trading markets is needed
- Technical and institutional frameworks and improvement in the business environment are also necessary
 - Enabled with P2P power trading using block chain technology

Thank you







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