Press Release

March 14, 2022
Shizen Energy Inc.

Shizen Energy's Aggregate EMS "Shizen Connect" added with EV Smart Charging Function

Shizen Energy has announced that its Aggregate Energy Management System "Shizen Connect" is now equipped with a Smart Charging function for electric vehicles (EVs).

Shizen Energy has also completed the demonstration of this Smart Charging function in the demonstration project funded by the Ministry of Economy, Trade and Industry's "FY2021 Subsidy for next-generation technology construction demonstration project utilizing distributed energy resources such as storage batteries". This project also demonstrated Governor-Free Operation in preparation for the Frequency Containment Reserve (FCR) in the electrical power reserve market .

About EV Smart Charging Function

As the use of EVs become more wide-spread, electricity retailers face more pressure on profitability as demand for electricity increases during the time when wholesale electric prices are high. Electric utilities would also like to avoid tightness of the grid without large additional investments to transmission and distribution facilities.

Looking ahead, Shizen Energy has developed and demonstrated an EV Smart Charging function for its Aggregate Energy Management System "Shizen Connect" as part of the Ministry of Economy, Trade and Industry's "demonstration projects for further utilization of distributed energy resources".

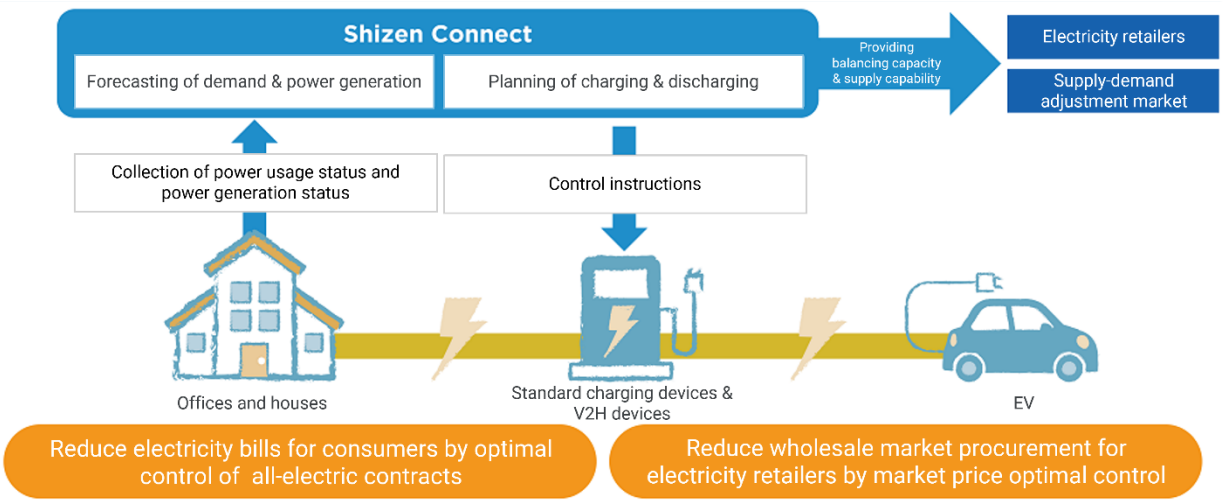

Diagram 1: Image of Smart Charging function

Shizen Connect's EV Smart Charging function can achieve the following three points by remotely controlling EV standard chargers and V2H(*1) devices:

1) reduce procurement costs of electricity retailers from the electricity market
2) reduce the load on the power grid and promote the use of renewable energy

3) lower electricity bill for EV owners

1. EV Smart Charging by standard charger

This function allows the EV to be charged when the electricity price is low, even if the EV is connected to the charger during times when the electricity market price is high, by remotely controlling the EV standard charger. This reduces the procurement costs for electricity retailers from the electricity market.

In the demonstration conducted on January 26, 2022, the procurement cost from the wholesale market was reduced by approximately 57%.

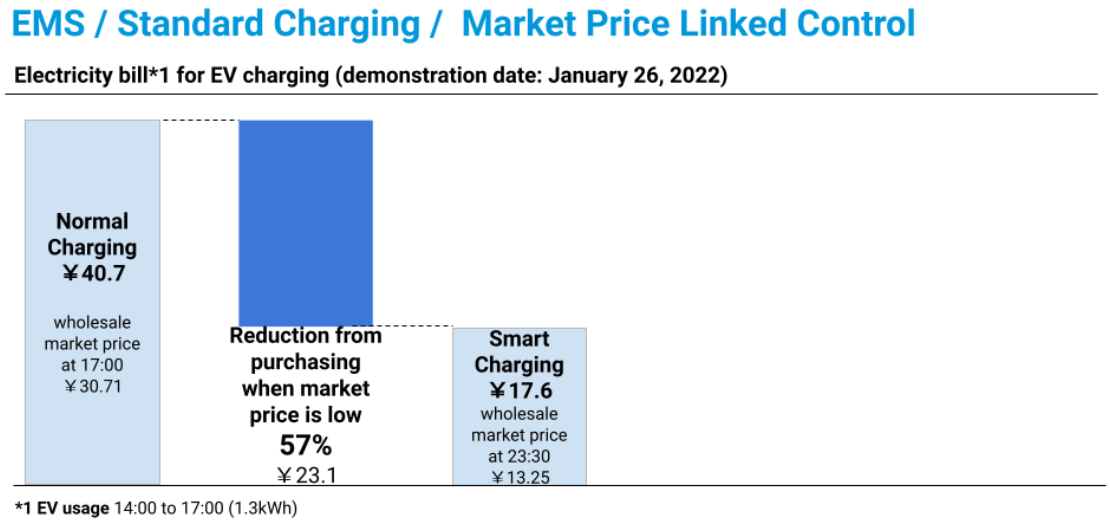

Diagram 2: Demonstration of cost reduction using EV Smart Charging function

In this demonstration, the EV user went out using the EV from 14:00 to 17:00, consumed 1.3kWh, and then connected the EV to the charger from 17:00 after returning home. Full charge would have cost 40.7 yen, but by using the Smart Charging function of Shizen Connect, the cost was reduced to 17.6 yen. (wholesale market price from 17:00 was 30.71 yen/kWh, compared to 13.25 yen /kWh from 23:30) (*2)

2. Smart Charging V2H devices

A demonstration was conducted for a remotely controlled V2H device equipped with the following three functions.

1)Charge/discharge control during best market prices

The Smart Charging controls the EV to be charged when electricity market price is low, and discharges when the electricity market price is high. Compared to just switching the timing of the standard charger, the V2H Smart Charging also controls discharge which creates even higher benefits.

In the demonstration conducted from January 26 to January 27, 2022, electricity cost for the whole household including EV charging was reduced by approximately 30%. The procurement cost from the wholesale market accounted for approximately 20% of the reduction and increase in self-consumption accounted for approximately 10% of the reduction.

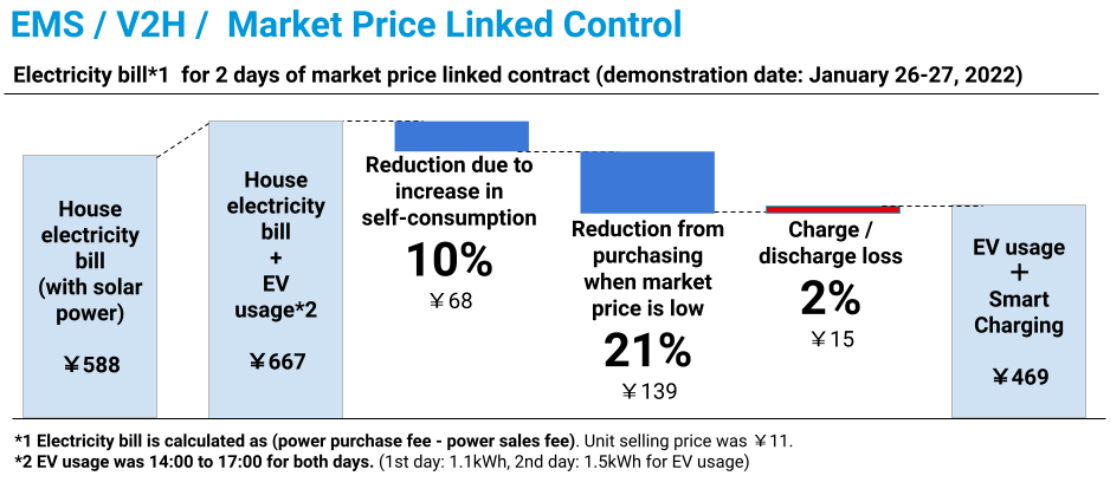

Diagram 3: Demonstration of procurement cost reduction using V2H Smart Charging function

2) Charge/discharge control optimized for seasonal/time-of-use pricing for all-electric contracts

This demonstration not only optimized the control for market prices, but also for the consumer's electricity contract.

In the demonstration conducted from January 26 to January 27, 2022, electricity cost reduction was approximately 18% compared to the normal V2H green mode(*3).

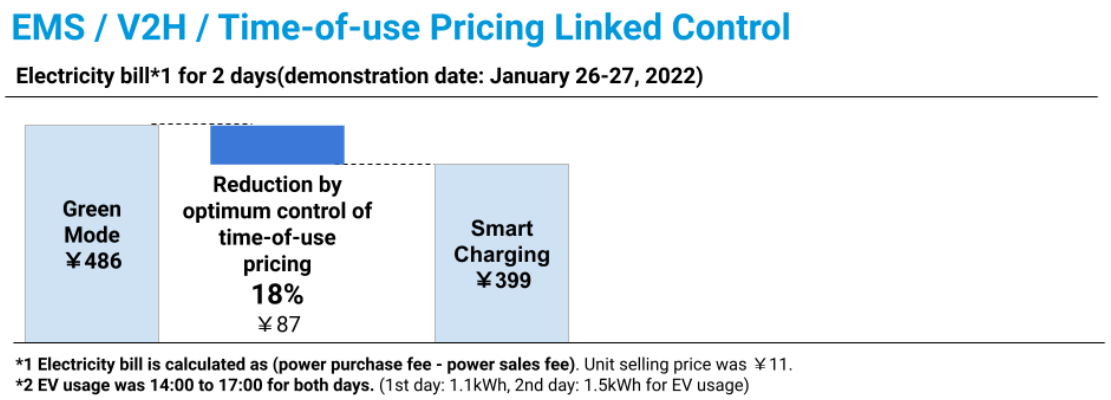

Diagram 4: Demonstration of cost reduction using V2H Smart Charging function (in the case of time-of-use pricing)

The demonstration was conducted at a household that used a seasonal/time-of-use pricing contract. On both days, the EV was used from 14:00 to 17:00 (day1: 1.1kWh, day2: 1.5kWh) and the electricity bill which would have been 486 yen using "green mode"*4 was reduced to 399 yen by Smart Charging.

Diagram 5: remote controlling of V2H device

3) Governor-free Operation in preparation for Frequency Containment Reserve (FCR)

Governor-free operation is a controlling mechanism that detects changes in frequency (rotational speed) at its own device and increases or decreases the charge/discharge output of the generator in response to load fluctuations with a cycle of several seconds. Governor-free operation is equivalent to control necessary for Frequency Containment Reserve (FCR). In this demonstration, the V2H Governor-free operation was proven to be technically feasible.

Future Plans

Shizen Connect's Smart Charging function is mainly targeted at consumers and also electricity retailers who would like to reduce their procurement costs from the electricity market. Capabilities such as imbalance(*4) avoidance and reduction of capacity payments(*5) are also planned to be added later this year to Shizen Connect.

In its aim for a world of 100% renewable energy, Shizen Energy is strengthening its EnergyTech business, such as the construction of VPP(*6) and microgrids(*7) by controlling distributed power resources using digital technologies. Shizen Energy will continue to accelerate the realization of a world of 100% renewable energy by promoting distributed power generation in communities.

***1 V2H (Vehicle to Home):** sending electricity from the EV to the home. In the event of power failure (e.g. natural disasters), home appliances can be used by supplying power from the EV.

***2** Smart Charging of the EV from a standard charger was demonstrated on January 26, 2022 and electricity cost calculations were based on the rates of that date.

***3 Green mode:** an operation mode in which the electricity generated on-site is self-consumed as much as possible.

***4 Imbalance**: the difference between planned generation and actual consumption of electricity. The charge including the penalty element that must be paid for the difference is called the "imbalance charge".

***5 Capacity Payment:** payment to the power generation company by power transmission and distribution companies and electricity retailers according to the supply capability (kW value) acquired in the capacity market auction, which is held 4 years in advance to when supply capacity is needed.

***6 VPP (Virtual Power Plant)** : a general term for digital technology that collectively controls distributed power sources (power generation equipment, storage batteries, EVs, etc.) and demand equipment as if they were one power plant.

***7 microgrid:** a small-scale power system with a power supply and demand equipment normally connected to the electrical power grid, but designed to shut off in the event of a disaster so it can stand on its own with its internal power equipment.

【Shizen Energy Inc.】

Founded in June, 2011. With the PURPOSE of “We take action for the blue planet”, Shizen Energy Group has contributed to the development of approximately 1GW of renewable energy throughout Japan (as of December, 2019). The company’s business includes development, engineering, procurement, construction (EPC), operation and maintenance (O&M), and asset management businesses for the installation and operation of large-scale renewable energy power plants. It also provides decarbonization solutions such as power purchase agreements (PPA) for medium and small-scale power plants and electricity retailing. Since 2016, the company has also been focusing on its overseas operations, expanding its development and power generation projects in areas such as Southeast Asia and Brazil.

【Shizen Connect】

Shizen Connect is an aggregation energy management system that collectively controls energy resources such as renewable energy power generation, storage batteries, EVs, and EcoCutes. Shizen Connect can control residential solar power generation with storage batteries and V2H equipment, as well as operation of microgrids connecting multiple buildings with transmission lines, and VVP construction of several thousand units of energy resources. Individual control and VVP control tended to be separate, but Shizen Connect provides a one stop service allowing energy resources to be utilized with multi-purpose which also improves economic efficiency. The system can be adapted with any equipment supplier, allowing energy resources to be chosen freely without relying on a certain manufacturer.

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