Attachment

Overview of Virtual Power Plant (VPP) Construction Demonstration Project

[Primary demonstrations to be conducted during FY2020]

<AC system improvements>

In light of the results of demonstrations conducted during FY2019 of the aggregation coordinator (AC) system that we developed in the same year, we have improved frequency (on the order of seconds) control function and other functions aimed at further improving control accuracy.

<Developing resources>

During this fiscal year a new resource aggregator (RA) has joined the project, and RA that have participated in the project since last fiscal year have continued to proactively develop resources.

<Technical demonstrations>

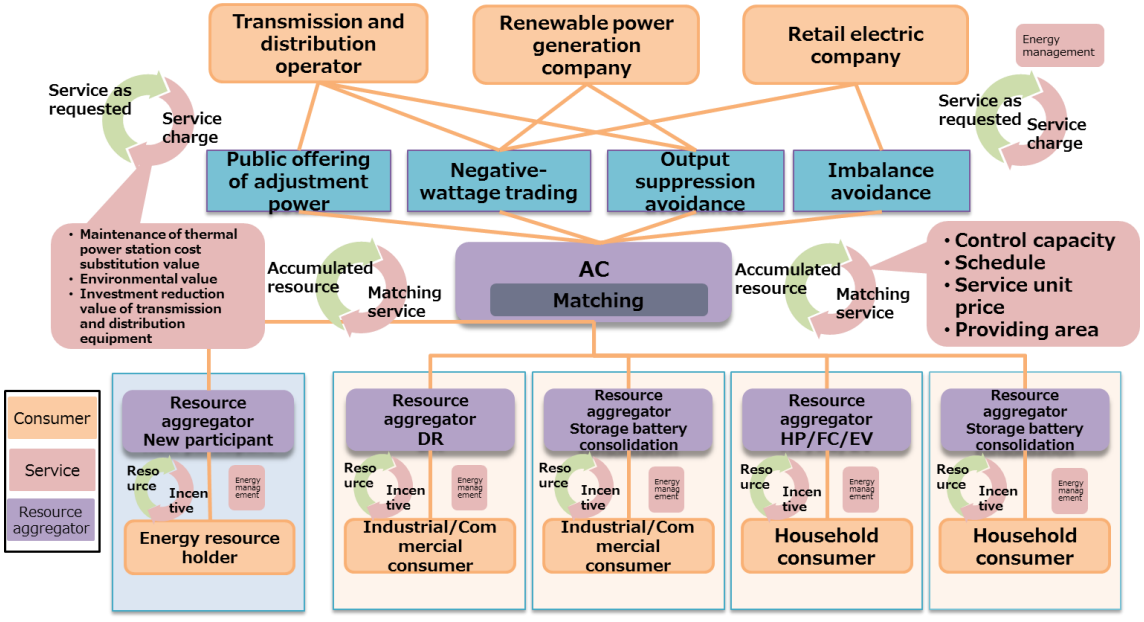
Common demonstrations shall be performed in light of the requirements of the supply/demand adjustment market.

https://sii.or.jp/vpp02/uploads/R2VPP_kyoutujishousiyou.pdf (only in Japanese)

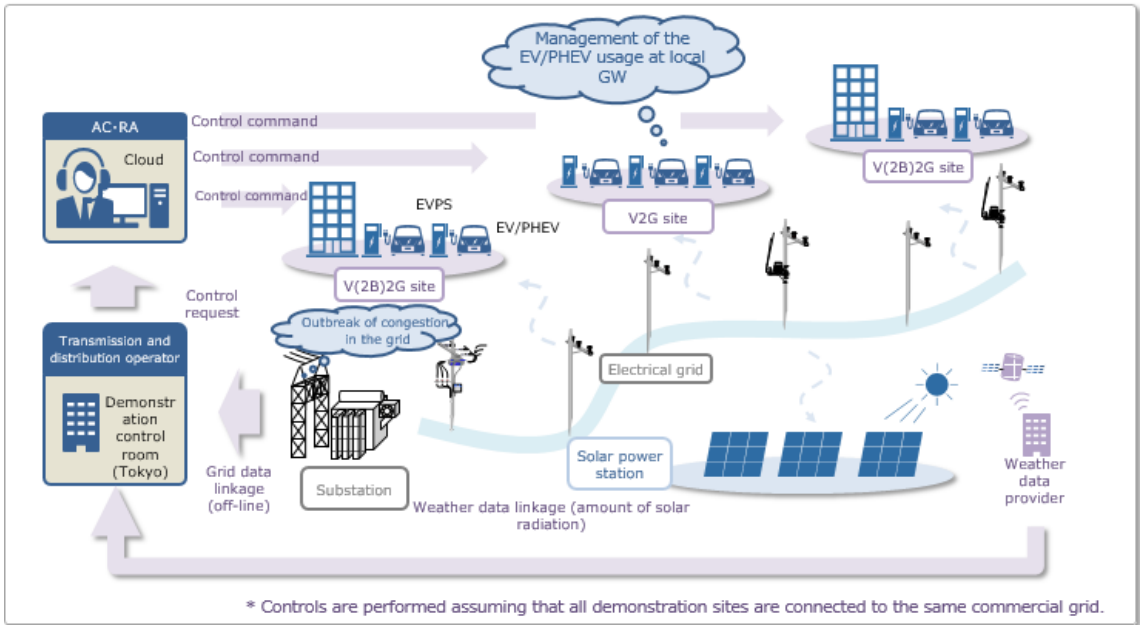
<V2G business model deliberations>

Along with continuing deliberations on a V2G business model, we shall also deliberate how to advance V2G control in accordance with this V2G business model such as by deliberating methods for backing up sudden mobility needs (inter-site flexibility).

[Resource aggregation]



[V2G (concept diagram)]



<Reference>

Past Achievements of the Virtual Power Plant Construction Demonstration Project

1. FY2016 Primary Demonstrations and Results

<AC system development>

Requirements for an AC system were defined, and an AC system prototype was developed.

<Resource preparation>

Lithium ion batteries were newly introduced for household and industrial/commercial consumers (approx. 3.4 MWh). Furthermore, control units were installed for existing industrial/commercial consumer NAS batteries and a demonstration of demand response (DR) was conducted at 10 minutes, one hour, and four hours prior to use. As a result, we were able to verify high DR success rate at all times.

2. FY2017 Primary Demonstrations and Results

<AC system improvements>

Improvements were made to the prototype developed in FY2016 and an AC system that enables adjustment within 15 minutes and within five minutes of the command was constructed.

<Resource development>

In FY2017, three more RA joined the project, and RA that had been part of the project since FY2016 continue to proactively develop resources. Over 12.4 MW of resources were secured on a control capacity basis.

<Technical demonstrations>

In regards to technical demonstrations, we are able to control output on a megawatt level by accommodating approximately 7 MW of control commands, and our best control volume average deviation was 2%.

<Business model deliberations>

The feasibility of aggregation as a business (break-even point analysis) was examined, and under certain conditions we showed that several tens of megawatts of resources need to be leveraged in order to exceed the break-even point for any single fiscal year.

3. FY2018 Primary Demonstrations and Results

<AC system improvements>

The AC system developed in FY2017 was improved by adding control volume adjustment functions and market price-linked control functions.

<Resource development>

Eight new RA joined the program in FY2018, and RA that have been participating in the program since FY2017 continued to proactively develop resources.

<Technical demonstrations>

During technical demonstrations our best stay rate assessment (assessed by examining the percentage of time that actual control volume stayed within ±10% of control command values) for approximately 400kW of control command exceeded 75%.

Furthermore, we were able to develop a method for responding to control volume changes by combining resources that leverage the attributes of high-response storage batteries, and highly sustainable private power generators.

<Distribution grid stabilization>

The impact that the increased introduction of dispersed renewable energies has on distribution grids was assessed. And, we quantitatively ascertained the effect that control of consumer resources by RAs has on distribution grids.

<V2G technical demonstrations>

We constructed a demonstration environment for enabling bidirectional power connection between EV/PHEV and power grids, and confirmed its effectiveness for contributing to power grid stabilization.

4. FY2019 Primary Demonstrations and Results

<AC system improvements>

In light of FY2019 technical demonstrations, the AC system developed in FY2018 was additionally equipped with the ability to respond to one-minute command value changes, and baseline calculation method changes.

<Resource development>

Nine new RA joined the program in FY2019, and RA that have been participating in the program since FY2018 continued to proactively develop resources

<Technical demonstrations>

During technical demonstrations, our best achievement rate for approximately 7 MW of control command from tertiary adjustment ability② in the supply/demand adjustment market was 100% (6/6 periods).

<Distribution grid stabilization>

Technical issues and business models were deliberated upon compiling issues to

address in order to stabilize grids and avoid the need for additional equipment by having RA control consumer resources.

<Advancing V2G control>

We created one of the Japan's largest demonstration environment through the addition of approximately 40 EV/PHEV (total number of vehicles: 59). Furthermore, in light of EV/PHEV mobility needs, we enabled EV/PHEV parked at the demonstration site to be controlled simultaneously via online systems.