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# **Japan Energy Newsletter**

**Japan Electric Power  
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## 1 Current Development and Deployment Trends for Renewable Energy Aggregation Services

Following the April 2021 launch of the Japan Electric Power Exchange (JEPX), there has been a growing movement in Japan to introduce distributed energy resource (DER) aggregation services that manage and control integrated renewable energy sources and storage batteries. Recently, Kansai Electric Power (KEPCO) and Hokkaido Electric Power (HEPCO) have started demonstrations of renewable energy aggregation services based on Virtual Power Plant (VPP) platforms, and other companies such as ENERES have also begun to provide similar services.

### 1.1 Background

In Japan, to enhance the renewable energy deployment and accelerate investments in the sector, all electricity generated by renewable energy sources is incentivized through the FIT (Feed-in-Tariff) system. Under the FIT system, utilities purchase energy at a fixed price set by the Japanese government. Since the launch of the Japan Electric Power Exchange (JEPX) in April 2021, DERs are expected to be traded in the wholesale electricity market as one of these generation resources. The Feed-in-Premium (FIP) system is scheduled to be introduced in April 2022, with the expectation that it will contribute towards making renewable energy one of the main power sources. Under the FIP scheme, when renewable electricity generated by a producer is sold at the JEPX, it will earn a premium in addition to the sales revenue from the market transaction at the trading market.<sup>1</sup> Since power producers are required to adjust their supply/demand planning and actual supply/demand on a 30-minute interval to balance out the power supply and demand based on their accurate forecasting, they will need to optimize their power trading according to fluctuating market prices to reduce their market risks. Japan must address these market risk issues to expand the use of renewable energy sources. Renewable energy aggregators can support power producers in meeting the power supply and demand and optimizing their power trading. Therefore, renewable energy aggregators in Japan have been increasingly providing aggregation services based on the VPP platform.

### 1.2 Utilities' Involvement in Renewable Energy Aggregation Demonstration Projects

KEPCO has joined a consortium led by Next Kraftwerke Toshiba (TNK)<sup>2</sup> to launch a renewable energy aggregation demonstration project funded by the Japanese Ministry of Economy, Trade, and Industry (METI). The demonstration project was slated to begin

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<sup>1</sup> The premium is calculated by subtracting the reference price (based on the market price) from the designated FIP price.

<https://enechange.jp/articles/fip#FIP>

<sup>2</sup> Next Kraftwerke Toshiba (TNK) is a joint venture which was established in November 2020 between Toshiba Energy System and Next Kraftwerke, a VPP service provider based in Germany.

[https://www.toshiba-energy.com/info/info2020\\_1104.htm](https://www.toshiba-energy.com/info/info2020_1104.htm)

operation on June 9, 2021.<sup>3</sup> The project consortium consists of seventeen renewable energy aggregators and eleven other partners. The renewable energy aggregators include electric utility companies such as Kyushu Electric Power (Kyuden), Chugoku Electric Power (Energia), Hokuriku Electric Power (Rikuden), HEPCO, and Tokyo Electric Power Energy Partner (TEPCO Energy Partner), while other partners include Idemitsu Kosan, Kanden Energy Solutions Co. (Kenes), and Tokyo Real Estate.<sup>4</sup> The project seeks to build a stable and efficient electric system through the utilization of renewable energy sources and DERs by testing resource control technologies and examining power generation forecast models for renewable energy power generation, including solar power and wind power. By leveraging the VPP knowledge and experience of Next Kraftwerke, the project will study the technical and business issues for renewable energy aggregation.<sup>5</sup>

The project will also review some of the important factors for energy aggregation businesses, including preventing power imbalances and improving profitability. It will examine technologies for power generation prediction, storage battery control, power trading, the methods that connect the power generation balancing group (BG) and the electricity providers, and the feasibility of renewable energy aggregation services. The consortium will utilize a large-scale renewable energy facility with a total capacity of 1.2 GW.

Over the past few years, KEPCO has sought to enhance its power flexibility through implementing VPP demonstration projects and promoting its VPP business via its K-VIPs platform.<sup>6</sup> Through this demonstration project, KEPCO and Kenes will evaluate the business model for power balance control by verifying the performance of K-VIPs and identifying the necessary technologies for power generation prediction and resource control. KEPCO aims to contribute to the transition to a zero-carbon society by 2050 by developing a stable and efficient electricity system utilizing DER and renewable energy.

HEPCO will use the project as an opportunity to evaluate each of its DERs, including solar power farms, electric vehicles, experimental residential houses with solar power generation installations, EcoCute, and storage batteries in the demonstration project. It will also examine the feasibility of power adjustment for biogas fuel with the support of renewable energy aggregators.<sup>7</sup>

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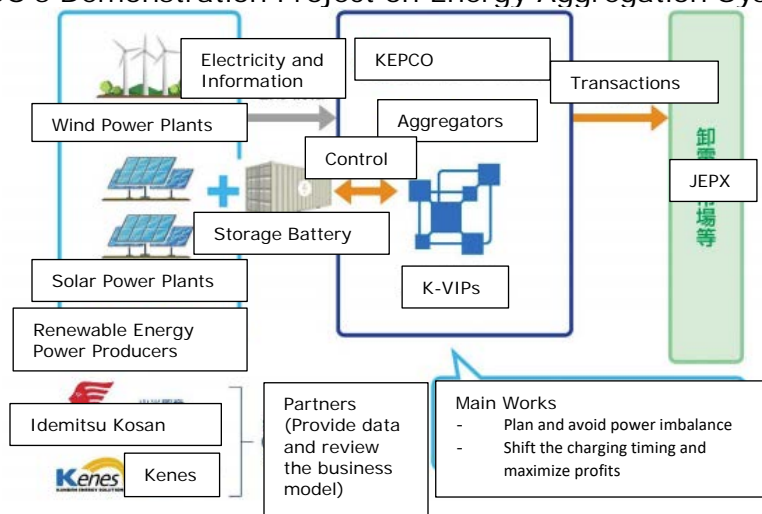
<sup>3</sup> [https://www.kepco.co.jp/corporate/pr/2021/pdf/20210609\\_1j.pdf](https://www.kepco.co.jp/corporate/pr/2021/pdf/20210609_1j.pdf)

<sup>4</sup> [https://www.toshiba-energy.com/info/info2021\\_0609.htm](https://www.toshiba-energy.com/info/info2021_0609.htm)

<sup>5</sup> [https://www.toshiba-energy.com/info/info2021\\_0609.htm](https://www.toshiba-energy.com/info/info2021_0609.htm)

<sup>6</sup> K-VIPs: the Kanden Vpp Integrated Platform System. An integrated platform that supports customers using VPP to monitor and control energy resources.

<sup>7</sup> [http://www.hepco.co.jp/info/2021/1251288\\_1895.html](http://www.hepco.co.jp/info/2021/1251288_1895.html)

KEPCO's Demonstration Project on Energy Aggregation System<sup>8</sup>

### 1.3 The Current Trends for the Development and Introduction of VPP and Renewable Energy Aggregation Services

With the recent expansion of the use of renewable energy, there has been an increasing number of development and demonstration projects for VPP and renewable energy aggregation services. On April 12, 2021, ENERES, a power trading and energy solution services provider, announced that it had completed a METI-funded VPP demonstration project that it had jointly conducted with KDDI since FY 2016. Based on the results, ENERES began offering VPP platform services on April 1, 2021, and announced that it would participate in the JEPX in the same month. ENERES has formed a consortium of 17 companies led by Energia and Toho Gas and has conducted several demonstration projects over the past five years.<sup>9</sup>

Meanwhile, NEC and Tokio Marine & Nichido Fire Insurance Co. (Tokio Marine & Nichido) announced on May 26, 2021, that they would jointly develop a first-of-its-kind service to provide resource aggregators with an insurance service for facility damages incurred from natural disasters. Since 2019, NEC has offered its Energy Resource Aggregation Cloud Service, which integrates and controls DERs. The Cloud Service was developed based on the knowledge NEC gained through past projects with METI. NEC and Tokio Marine Nichido are developing new functions that will be based on the Cloud Service, such as energy data management and a mechanism to compensate aggregators for facility damages due to natural disasters or unexpected contingencies.<sup>10</sup>

<sup>8</sup> [https://www.kepcoco.jp/corporate/pr/2021/pdf/20210609\\_1j.pdf](https://www.kepcoco.jp/corporate/pr/2021/pdf/20210609_1j.pdf)

<sup>9</sup> <https://www.eneres.co.jp/news/release/20210412.html>

<sup>10</sup> [https://jpn.nec.com/press/202105/20210526\\_01.html](https://jpn.nec.com/press/202105/20210526_01.html)

## 2 Utilities' Involvement and Investment in Smart Agriculture

On May 25, 2021, Chugoku Electric Power (Energia), ES-CON Japan, a Tokyo-based real estate company, and Spread, a Kyoto-based agriculture startup, announced that they would establish the TSUNAGU Community Farm, a venture that will build and operate indoor vertical farms that rely on clean energy. Aside from Energia, other utility companies have also recently invested in smart agriculture to support the regional agriculture sector in their own rural electric service areas.

### 2.1 Energia's Establishment of an Indoor Vertical Farm

On May 25, 2021, Energia, ES-CON Japan, and Spread announced that they had reached an investment agreement to establish TSUNAGU Community Farm, which will build and operate indoor vertical farms. Energia owns 51% of the company, while ES-CON Japan owns 48%, and Spread owns 1%.

TSUNAGU Community Farm is scheduled to start construction of the Techno Farm Fukuroi in October 2021. The smart farm will enter production from January 2024. It will be the world's largest indoor vertical farm with fully artificial light and will be able to produce 10 tons of lettuce a day. TSUNAGU Community Farm will leverage ES-CON Japan's construction capabilities and Spread's plant production technologies to produce lettuce efficiently and reliably, meeting consumer's needs and addressing the food safety issues caused by climate change. The company is dedicated to moving towards a sustainable society and achieving the SDGs by actively using clean energy and reducing CO2 emissions.<sup>11</sup>

### 2.2 Utilities' Active Investment in Smart Agriculture

Recently, some other utilities have also been actively investing in smart agriculture in their service areas. Smart agriculture refers to new agricultural processes that enable high-quality production and reduce labor requirements by utilizing technologies such as drones, artificial intelligence (AI), big data, robots and automation technologies, and other Information and Communications Technology (ICT) tools.

Since Japan is facing challenges such as an aging population and a decrease in the number of agricultural workers, smart agriculture will contribute to ensuring the country's food self-sufficiency and address labor shortages. Smart agriculture tools allow farmers to collect a wide range of data and information, which can then be analyzed and turned into actionable insights to enhance operational efficiency, energy saving, and high-quality productivity. The smart agriculture sector has increasingly attracted attention from agricultural machinery manufacturers and new players such as electric utility companies, telecommunication providers, university-launched ventures, and regional banks.

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<sup>11</sup> [https://www.chuden.co.jp/publicity/press/1206514\\_3273.html](https://www.chuden.co.jp/publicity/press/1206514_3273.html)

On February 28, 2020, K4 Ventures, the corporate venture capital arm of KEPCO, announced that it would invest in Future Food Fund No. 1 (FFF1), a venture capital fund specializing in food innovation areas, including smart agriculture, formed by Oisix Ra Daichi.<sup>12</sup> In March 2021, K4 Ventures joined with Japan Agricultural Cooperatives (JA Group) and FFF1 to invest in Terrace Mile, a company established in 2014 that provides agricultural data analysis services. Terrace Mile's RightARM is an information platform that aims to centralize various data related to agricultural technologies for educational and strategic support and utilize them in agricultural management. On the platform, a wide range of data such as weather, market conditions, sensors, and fruit selection results can be merged and viewed from a single screen. Users can use the data to build applications such as shipping forecasts and simulations.<sup>13</sup>

On September 25, 2020, Shikoku Electric Power (Yonden), together with Norinchukin Bank, announced that they would establish Aitosa, an agriculture company, with a total starting capital of 226K US Dollars. Yonden accounts for 95 percent of the investment in the company, and Norinchukin Bank accounts for the remaining 5 percent. Focusing on smart agriculture, Aitosa will build a farm that produces Shishito, a type of pepper that is a local major agricultural commodity, in Nankoku City, Kochi Prefecture.

Shikoku has an aging population with a declining birthrate, so its population is shrinking even faster than other regions in Japan, and the local agricultural industry is facing labor shortages as a result. Agriculture is a key regional industry for Shikoku, and Yonden's decision to enter the sector was motivated by the company's strong desire to contribute to the revitalization of the industry in light of the labor challenges that the region is facing. In 2018, Yonden established the Agribbon Corporation to produce strawberries in Kagawa Prefecture in Shikoku, which is now fully operational.

Smart agriculture has also been seen as a way to enhance regional production efficiency. Aitosa has been collaborating with Ginza Farm, an agricultural technology venture, to develop an AI-enabled image recognition tool for farming and robotics for pesticide spraying and harvesting. Aitosa has also been working with an IoP project<sup>14</sup>, an industry-government-academia collaboration project in Kochi Prefecture, aiming to study efficient plant cultivation methods through utilizing environmental and plant data. Based on the results and experience of the study, Aitosa will provide new tools for the agricultural management of farms and support improved regional productivity.<sup>15</sup>

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<sup>12</sup> [https://www.kepco.co.jp/corporate/pr/2020/0228\\_3j.html](https://www.kepco.co.jp/corporate/pr/2020/0228_3j.html)

<sup>13</sup> <https://prtimes.jp/main/html/rd/p/000000005.000055672.html>

<sup>14</sup> IoP (Internet of Plants) is a public-private partnership that brings together researchers, students, and companies from Japan and around the world in the field of gardening where Kochi Prefecture has an advantage. The project aims to improve farm income and strengthen marketing of local products through developing and deploying latest technologies, such as AI and IoT.

<sup>15</sup> [https://www.yonden.co.jp/press/2020/\\_icsFiles/afieldfile/2020/09/25/pr010.pdf](https://www.yonden.co.jp/press/2020/_icsFiles/afieldfile/2020/09/25/pr010.pdf)