

自然エネルギー財団
RENEWABLE ENERGY INSTITUTE

Renewable Electricity Procurement Guidebook

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Contents

Renewable Energy Institute publishes “Renewable Electricity Procurement Guidebook” for corporate energy users in Japan since January 2018 and revises it with the latest information every year.

The 2022 edition details major procurement methods of renewable electricity from Onsite Generation to Green Products, Renewable Energy Certificates and Corporate PPAs with the latest examples and information on cost and availability. Key topics such as Non-fossil Certificates are also discussed.

This English edition focuses on electricity procurement methods (Chapter 3 of the Japanese edition) for global corporations operating business in Japan.

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Disclaimer

Although the information contained in this guidebook is based on information available at the time of its writing, Renewable Energy Institute cannot be held liable for its accuracy or correctness.

About Renewable Energy Institute

Renewable Energy Institute is a non-profit think tank which aims to build a sustainable, rich society based on renewable energy. It was established in August 2011, in the aftermath of the Fukushima Daiichi Nuclear Power Plant accident, by its founder Mr. Masayoshi Son, Chairman & CEO of SoftBank Group Corp., with his own resources.

Table of Contents

Renewable Electricity Procurement Methods	1
1. Onsite Generation	3
Self-consumption of Solar Power	3
Declining Cost of Renewable Energy.....	5
2. Green Products	9
Electricity applied to FIT (FIT electricity)	10
Electricity not applied to FIT (Non-FIT electricity)	13
Electricity generated from Hydro.....	15
Electricity through Regional Cooperation	18
Notes on Non-fossil Certificates (NFCs)	19
3. Renewable Energy Certificates	21
Green Electricity Certificates.....	22
J-Credits	24
4. Corporate PPA (Power Purchase Agreement)	27
Onsite PPA and Offsite PPA.....	27
Cost Reductions for Offsite PPA.....	29
Virtual PPA for Environmental Values.....	30
5. Key Considerations in Procurement	33
Calculating CO ₂ Emissions from Certificates	33
Prioritizing Generation Method or CO ₂ emission	34
Requirements for Renewable Electricity.....	35

Renewable Electricity Procurement Methods

There are four main ways to procure electricity generated from renewable energy sources; Onsite Generation, Green Product, Certificate and Corporate PPA. For corporate energy users that consume large amounts of electricity, it is difficult to procure the required amount of electricity by only one procurement method. It is necessary to combine multiple methods based on budget and selection criteria.

■ Procurement Methods of Renewable Electricity

Method	Feature	Advantages and Disadvantages
Onsite Generation	Construct generation facilities and consume generated electricity.	<ul style="list-style-type: none"> ● Initial investment required, low-cost operation. ● Environmental impact identified accurately. ● Responsible for construction and operation.
Green Product	Purchase renewable electricity from retailers.	<ul style="list-style-type: none"> ● Short-term procurement based on the budget. ● Generation sites not usually identified. ● Higher prices compared with regular tariffs.
Certificate	Purchase environmental values by certificates.	<ul style="list-style-type: none"> ● Increase renewable electricity independently. ● Generation sites usually identified. ● Additional cost for electricity procurement.
Corporate PPA	Purchase renewable electricity by long-term contract.	<ul style="list-style-type: none"> ● Fix electricity cost for a long time. ● Environmental impact identified accurately. ● Risks of long-term contract with developers.

The cost of solar and wind power generation has approached that of thermal power generation, making it possible to procure electricity from renewables at lower costs than before. The benefits of self-generation and self-consumption have increased, and the cost of electricity from renewables supplied by retailers has also declined.

In addition, the Feed-in Tariff (FIT) system will be revised in FY2022 (starting in April), and solar power generation with an output of 1,000 kW or higher will move to a Feed-in Premium (FIP) linked to the market price on the wholesale electricity exchange. The expansion of FIP will make it easier for corporate energy users to make corporate PPAs and purchase renewable electricity on a long-term basis.

Among the methods of procuring electricity from renewables, it is advisable to choose either onsite generation or corporate PPA, where new generation facilities are constructed, in terms of additionality that can be effective in mitigating climate change. These two methods also have the advantage of fixing the cost of procuring electricity from renewables for a long period of time.

As the cost of solar power generation has declined, corporate energy users have been able to reduce both CO2 emissions and electricity procurement costs by generating and consuming their own power. In addition, an increasing number of power producers and retailers can offer Corporate PPAs, which are long-term fixed-price contracts for electricity from renewable energy sources.

However, the amount of electricity that can be supplied by onsite generation is limited. corporate PPAs need to find projects that meet their conditions including contract prices, and they cannot always supply the amount of electricity as planned.

The basic approach will be for corporate energy users to increase the amount of electricity procured from renewables by maximizing onsite Generation and corporate PPAs, while purchasing the shortfall from retailers. If this is still not enough, they will purchase additional certificates to make up for the shortfall.

Based on the above ideas, it is appropriate to increase the amount of electricity from renewable energy sources by balancing additionality, procurement volume, and cost.

1. Onsite Generation

One of the most efficient ways to procure electricity from renewable energy sources is to build and operate your own power generation facilities and consume the generated electricity on your own. Construction costs can be kept low by using land and buildings that you own. They do not have to use the transmission and distribution network of the power company, and do not have to pay for the use of the network (wheeling charges) or the renewable energy surcharges.

However, it requires expertise in the construction and operation of power generation facilities. This entails the risk of not being able to generate the expected amount of electricity in the event of a breakdown or accident. For avoiding such risks, an increasing number of companies are adopting a new contract method (Onsite PPA) in which the construction and operation of the power generation facility is outsourced to a contractor.

Self-consumption of Solar Power

In Japan, solar power is by far the most common method of self-generation and self-consumption. The reason for this is that it is easier to construct and operate power generation facilities than other sources of renewable energy. In the past, the cost of solar power was higher than that of regular electricity, but the price of solar panels has been falling steadily.

A typical example of self-generation and self-consumption of solar power is IKEA Japan, a major furniture retailer. IKEA Japan is implementing solar power generation on the rooftops of its large-scale stores across the country, including the IKEA Nagakute store that opened in Aichi Prefecture in October 2017.

IKEA Nagakute, which has the largest scale of solar power generation for IKEA Japan, can supply a maximum of 1,300 kW of electricity. The amount of electricity generated per year is equivalent to the power consumption of 360 standard households. The electricity generated by the solar power system is used for lighting in the store and supplied to the electric forklifts that transport products. In addition, battery chargers are installed on the rooftop parking lot to provide free solar-generated electricity to the electric vehicles of customers visiting the store.

■ Roof-top solar at IKEA Nagakute



Source: IKEA Japan

The manufacturing industry is also taking steps to generate and consume its own electricity using solar power. Tokyo Steel, a major steel manufacturer that makes steel products from steel scraps, has been installing solar power generation facilities on the rooftops of its four plants nationwide. In February 2021, the company started solar power generation at three of its plants, bringing the total power generation scale to about 9,200 kW, which can supply about 9.3 GWh of electricity per year.

The largest scale of solar power generation facilities is at the Tahara Plant in Aichi Prefecture. More than 20,000 solar panels have been installed on the roof of the product warehouse building in the plant. With an output of approximately 6,200 kW, it is one of the largest solar power generation facilities for private consumption in Japan. The steel making process using electric furnaces consumes a large amount of electricity. Although the percentage that can be supplied by solar power is small, the advantage of reducing CO₂ emissions while keeping the cost of purchasing electricity down is significant.

■ Roof-top solar at Tokyo Steel Tahara Plant



Source: Sumitomo Mitsui Finance and Leasing et al.

Declining Cost of Renewable Energy

According to a report by the Agency for Natural Resources and Energy, based on data from BloombergNEF, the average cost of generating electricity from commercial solar power has fallen to about JPY13/kWh in 2019, but the cost rose to nearly JPY14/kWh between 2020 and 2021 due to the COVID-19. However, given the ongoing decline in power generation costs on a global scale, there is significant room for further cost reductions in Japan. The cost of onshore wind power generation is also continuing to decline.

The costs for power generation facilities certified under the FIT system in 2020, there were approximately 2,000 commercial solar projects nationwide with power generation costs of JPY10/kWh or lower. The cost of equipment, including solar panels, is declining. The FIT price for FY2022 is also set at JPY10/kWh for solar power with an output of 50 kW or higher.

The national average for electricity purchased by corporate energy users is about JPY17/kWh for high voltage (50kW-2,000kW) and about JPY13/kWh for special high voltage (2,000kW-) including the renewable energy surcharges. We are now in a situation where it is possible to reduce costs by consuming solar power onsite rather than purchasing regular electricity. In case the rooftop of a building can be used for solar power generation, the generation cost can be kept low because the cost of purchasing or renting land and the cost of land development are no longer necessary.

Renewable Energy Institute analyzed the cost of solar power based on a survey of domestic power producers and concluded the cost is expected to drop to the JPY5/kWh range by 2030. If that happens, it will certainly be cheaper than buying electricity.

Onsite PPAs (power purchase agreements) are gaining attention as a new way to consume solar power in house. This is a method in which a corporate energy user provides the rooftop of a building or part of its site to a power generation company to install solar power facilities.

The power generation company undertakes everything from construction of the facilities to operation and maintenance, and supplies the generated electricity to the buildings on the site. Corporate energy users will no longer need to make initial investments and will only need to purchase electricity. Since there are no charges for using the transmission and distribution network and no renewable energy surcharges, electricity is available at a lower price than conventional electricity rates in most cases.

Moreover, it is common to sign a contract to take back the power generation facilities free of charge at the end of the contract period. After that, the electricity can be used only at the cost of operation and maintenance, which further reduces costs. Many corporate energy users are adopting onsite PPA because it requires less efforts and risks than onsite generation by their own.

Aeon, one of the largest electricity users in Japan, is moving ahead with plans to deploy onsite PPAs by solar at its stores across the country. The company has installed solar power generation equipment at a total of eight locations through onsite PPAs by December 2021. About 10% of the electricity used annually by each store can be procured through onsite PPAs. In addition, a solar power generation system with an output of 3,360 kW will be installed at a distribution facility to be opened in Chiba Prefecture in 2023 using onsite PPA.

Onsite PPAs are a type of corporate PPA in which corporate energy users purchase electricity from renewable energy sources under long-term contracts and have been adopted by major retail and manufacturing companies since 2021. If you own a building with a large rooftop, such as a shopping mall, factory, or distribution center, this can be a cost effective way to procure electricity from renewable energy sources.

When generating and consuming solar power on its own, there are cases where all the power generated during the day is not consumed and is left over. Sony Group, which is mainly engaged in the electronics business, has installed solar power generation facilities on the rooftops of its factories and warehouses to increase the amount of electricity it consumes on its own, while at the same time using a system called "self-wheeling" to flexibly distribute surplus electricity to neighboring business sites.

Since February 2020, Sony Group has been using self-wheeled power transmission between a warehouse and a factory of its group companies in Shizuoka Prefecture, making full use of the renewable electricity generated by its own solar power facilities. Although additional fees for the transmission and distribution network (around JPY4/kWh in the case of high voltage) and the cost of supply and demand adjustment will be required, there is the advantage of not having to pay the renewable energy surcharges (JPY3.36/kWh in FY2021).

In case a corporate energy user owns a building or land, it can use electricity from solar power by implementing onsite power generation or onsite PPA without increasing its cost compared to the electricity it has been purchasing. It is possible to procure electricity with additionality, which also has the effect of mitigating climate change.

Efforts to generate and consume power on their own have begun to spread to wind power. Toyota Motor is building a large-scale wind power plant on the site of its Tahara plant in the coastal industrial zone of Aichi Prefecture. The plant will generate 25,800 kilowatts of electricity, which will be consumed by the plant itself, and is scheduled to start operation in 2022.

For factories that require large amounts of electricity, wind power can generate more electricity than solar power. There are many coastal industrial zones along the coast of Japan, and there are places all over the country where strong winds blow from the sea. If large-scale wind power generation facilities are installed on vacant land, the cost can be reduced to a level close to that of solar power generation. It is also possible to implement onsite PPA by providing the factory site to the power generation company.

■ Coastal Industrial Zone in Aichi Prefecture including Toyota Motor Tahara Plant

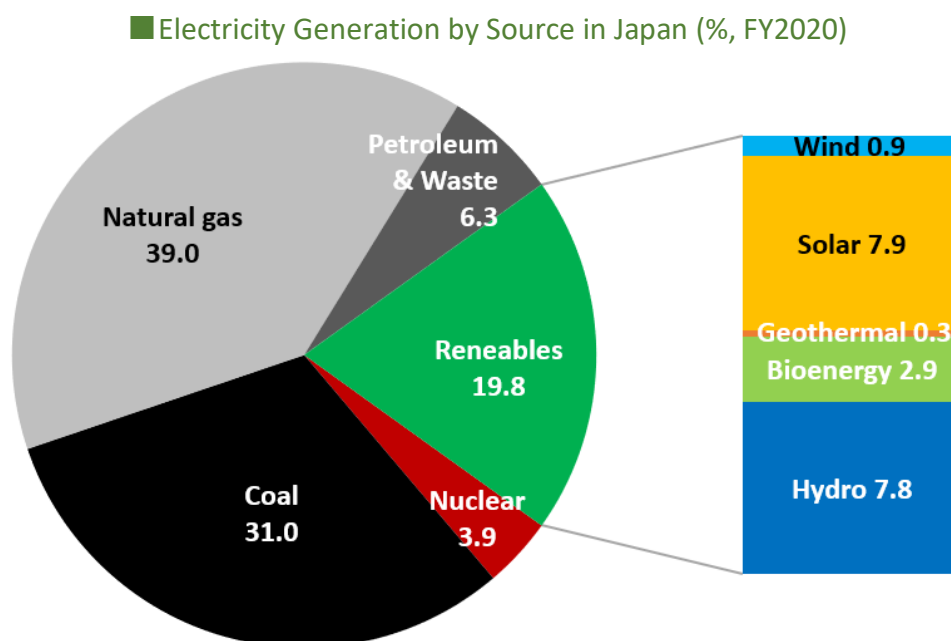


Source: Ministry of Land, Infrastructure, Transport and Tourism

2. Green Products

As a large number of corporate energy users seek renewable electricity, there has been an increase of 100% renewable electricity plans sold by retailers. While this is the easiest way to procure electricity from renewable energy sources, there are advantages and disadvantages depending on the type of electricity offered in the plan.

Of the total amount of electricity generated by the country in FY2020 (1,130 TWh), renewables account for 19.8%. Looking at the breakdown, solar power reached 7.9% and surpassed hydro for the first time, followed by hydro (7.8%), bio energy (2.9%), wind (0.9%), and geothermal (0.3%).



Source: Renewable Energy Institute
(Based on the statistics by Ministry of Economy, Trade and Industry)

The majority of hydro comes from large power plants that have been in operation for a long time. Nearly 90% of the electricity generated by solar and wind is under the Feed-in Tariff (FIT) system, and only a little over 10% is not under FIT.

Given this situation, 100% renewable electricity plans sold by retailers can be divided into three types. Each type differs in terms of additionality and environmental impact.

1. Electricity applied to FIT (FIT electricity)
2. Electricity not applied to FIT (Non-FIT electricity)
3. Electricity mainly from hydro

Electricity applied to FIT (FIT electricity)

The amount of electricity applied to FIT reached 103.6 TWh in FY2020, accounting for 10% of the total electricity generated in Japan. Electricity purchased under FIT (FIT electricity) does not emit CO₂ when it is generated, but its CO₂ emissions are not considered to be zero. It is counted as average electricity for the country as a whole because the majority of the purchase cost under FIT is borne by electricity purchasers through renewable energy surcharges.

Since the electricity subject to the surcharges includes thermal and nuclear power, the rule is that the CO₂ emissions of electricity purchased under FIT are calculated based on the average of the entire country in the previous year, including thermal and nuclear power. In addition to the domestic "Law Concerning the Promotion of Measures to Cope with Global Warming", international projects such as CDP and RE100 do not recognize FIT electricity as renewable electricity with zero CO₂ emissions.

FIT electricity does not actually emit CO₂ and the government retains the environmental values of FIT electricity and trades it in the market as "FIT Non-fossil Certificates (FIT NFCs)". The combination of FIT electricity and FIT NFCs can be used as renewable electricity with zero CO₂ emissions.

A number of retailers are selling 100% renewable electricity plans that combine FIT electricity and FIT NFCs. The minimum price for FIT NFCs has been reduced from JPY1.3/kWh to 0.3/kWh starting with the November 2021 auction. The plan by FIT electricity and FIT NFCs is expected to continue to expand in sales volume and decrease in price.

FIT NFCs have been traded in the Non-fossil Value Trading Market of the Japan Electric Power eXchange (JEPX) since FY2017 and will be traded in the newly established Renewable Energy Value Trading Market of JEPX after November 2021 through four rounds of auctions every year. With the transition to the new market, FIT NFCs can now be purchased by corporate energy users and brokers in addition to retailers.

In the November 2021 auction, over 1.9 TWh of FIT NFCs were traded. This is more than the annual volume traded in FY2020 (approximately 1.5 TWh). Lowering the minimum price has made it easier for corporate energy users to procure renewable electricity with FIT NFCs. Still, the trading volume is only about 3% of the total amount of certificates issued (about 56 TWh). There are enough certificates issued to meet demand, and for the time being they can be purchased at the minimum price of JPY0.3/kWh.

The amount of FIT NFCs issued is plentiful. FIT NFCs that can be applied to electricity in FY2021 (FIT electricity generated between January and December 2020) expanded to 99.7 TWh. This entire amount will be sold on the market in three separate auctions from November 2021 to May 2022 (certificates for FY2022 will be sold in four auctions from August 2022 to May 2023).

In addition, trading of "Non-FIT NFCs" for electricity from renewable energy sources that are not applied to FIT started in FY2020. The certificates cover large-scale hydro power generation with an output of 30,000 kW or higher and "Post-FIT" residential solar power generation that has reached the end of its FIT purchase period. There are also Non-FIT NFCs for nuclear power generation that does not emit CO₂.

Non-FIT NFCs can be divided into "renewable" and "non-renewable". Only NFCs designated as renewable provide the environmental values of renewable energy. Most of the non-renewable NFCs are from nuclear power, and some from the electricity generated by heat of waste plastic incineration.

■ Overview of Non-fossil Certificates (NFCs)

Type	FIT NFC	Non-FIT NFC (renewable)	Non-FIT NFC (non-renewable)
Facility	Applied to FIT	Not applied to FIT	
Energy Source	Solar, Wind, Small Hydro, Geothermal, Biomass	Large Hydro, Post-FIT Solar, Other Renewables	Nuclear, Waste Plastic
Issuer	Government	Generator	
Purchaser	Retailer, Consumer, Broker	Retailer	
Purchasing Method	Auction by trading market	Auction by trading market, Bilateral trading	
Floor Price	JPY 0.3/kWh	JPY 0.6/kWh	
Ceiling Price	JPY 4.0/kWh	JPY 1.3/kWh	
Trading Price by Auction	Multi-priced	Single-priced	
Issuance Amount	approx. 100TWh (FY2020)	approx. 90TWh (FY2020)	approx. 30TWh (FY2020)

FIT electricity, which is the source of FIT NFCs, is supplied by renewable energy generation facilities that have been certified by the government. There are five types of renewable energy sources that can be certified: solar, wind, small and medium-sized hydro, geothermal and bio energy (biomass). As for bio energy, the type of fuel is specified, but a wide range of fuels from biological origins are allowed. From the perspective of environmental impact, there is a possibility that they are using unacceptable types of fuels for corporate energy users.

Related to this point, there is still a problem with FIT NFCs. You cannot choose FIT NFCs by energy source such as solar or wind. The location of the power generation facility is also unknown. For corporate energy users concerning about environmental impact, it is difficult to use FIT NFCs that do not specify the power generation facilities.

In case the generating facility to be covered by the certificate cannot be identified, it may not be considered as renewable electricity internationally. RE100, an international initiative to promote the use of 100% renewable electricity by businesses, does not recognize NFCs that do not identify the generating facility as a means of using renewable electricity.

In order to improve this situation, the government started a demonstration experiment to add attribute information for identifying (tracking) power generation facilities to some FIT NFCs from the February 2019 auction. The scope of the experiment has been expanded so that attribute information can be added to all FIT NFCs from the November 2021 auction. FIT NFCs with attribute information will be recognized by RE100 as a means of procuring electricity from renewable energy sources.

However, in the experiment, attribute information is added to the FIT NFCs purchased by retailers and corporate energy users after the auction. Retailers and corporate energy users need to apply for the conditions of the power generation facilities they wish to use, and the secretariat of the experiment adds the attribute information of the power generation facilities that meet the conditions. It is not always possible to add attribute information as desired.

Essentially, all NFCs should be traded with attribute information added to them, same as certificates used in other countries around the world. This way, retailers and corporate energy users will be able to purchase certificates based on the attribute information. They will also be able to check the environmental impact before purchasing.

There is a desirable way to use FIT NFCs. Retailers can make a contract to receive electricity from a power generation facility that is applied to FIT, and then purchase FIT NFCs with tracking that contains attribute information about the power generation facility to sell it as a set. East Japan Railway Company (JR East) and other companies have adopted this method to procure renewable electricity from specific power generation facilities.

FIT NFCs with tracking contain attribute information including the generation period of the electricity from which the certificate is derived, power generation method such as solar or wind, the location and start date of operation of the power generation facility, and the maximum output. Based on this information, the environmental value of the FIT electricity can be confirmed.

Electricity not applied to FIT (Non-FIT electricity)

Many of Non-FIT power generation facilities have been in operation for a long time. If they have been in operation for more than 20 years, they are not eligible for FIT. Recently, there has been an increase in the number of Post-FIT power generation facilities that have reached the end of their FIT purchase period.

As the cost of solar and wind power declines, many newly operating power generation facilities will not be applied to FIT. Renewable electricity applied to the new Feed-in Premium (FIP) system that replaces FIT will also be included in Non-FIT.

Since the beginning of 2021, plans for supplying electricity from new solar power plants that do not apply to the FIT have begun to increase. In April 2021, TEPCO Energy Partner announced "Sunlight Premium" which provides 100% of electricity from newly constructed solar power plants. Corporate energy users with contracted power of 1,000 kW or higher are eligible to switch part of their power purchases to Sunlight Premium.

The plan will be marketed to corporate energy users that want electricity from renewable energy sources with additionality. The price has not been announced, but an optional fee will be added on top of regular electricity charges. Game console maker Sega Sammy Holdings became the first user of the new plan and began using the electricity at its headquarters in Tokyo in December 2021.

Similar plans will be offered by Tokyo Gas and Osaka Gas in partnership with power generation companies. Each electricity retailer is adopting a method of constructing many small-scale solar power facilities.

TEPCO Energy Partner plans to expand the number of new solar power generation facilities covered by the plan to 300,000 kW or higher in five years. Osaka Gas will procure electricity from several tens of thousands of kW of solar power facilities per year. As the need for electricity from renewable energy sources with additionality increases, the plan with newly developed Non-FIT electricity is expected to increase further.

Under the Post-FIT electricity plan, the surplus after self-consumption by residential PV power generation can be used as electricity from renewable energy sources. The subsidies for residential solar power began in November 2009, before the FIT began; solar power facilities that have completed their 10-year purchase period have become Post-FIT after November 2019; by being removed from the FIT, they can sell the surplus after self-consumption as electricity from renewable energy sources.

From November 2019 to the end of 2023, a total of 6.7 GW of residential PV installations will become Post-FITs; if the 6.7 GW of PV installations continue to operate, the surplus electricity purchased by retailers is expected to reach around 7 TWh per year.

In many cases, when retailers purchase electricity from Post-FIT, they set a unit price close to the wholesale electricity market trading price (about JPY8/kWh on average). It will probably be possible to sell the electricity at a price not much different from that of normal electricity. Solar power for residential use has a small environmental impact. Since the power generation facilities of the Post-FIT have been in operation for more than 10 years, it is not suitable for companies that value the additional benefits of new power generation facilities.

Saitama Prefecture is consolidating the surplus electricity from residential solar power generation that have become Post-FIT in the prefecture and selling "Saitama Prefecture-produced CO2 offset electricity" exclusively to companies in the prefecture from October 2020. Saitama Prefecture ranks second in Japan in terms of the number of residential solar power generation facilities installed and has a large number of Post-FIT power generation facilities. Under this plan, surplus electricity purchased by TEPCO Energy Partner out of the Post-FIT electricity are sold to companies.

In addition, FIT electricity generated by large-scale solar power plants operated by the Sewerage Bureau of Saitama Prefecture and other facilities was also aggregated and added to the plan. FIT electricity is combined with NFCs with tracking to be supplied as renewable electricity without CO2 emissions. Two types of plans, Post-FIT and FIT electricity with FIT NFCs, are available for consumers. Both types of electricity from renewable energy sources can be locally produced and consumed, making them suitable for purchase by corporate energy users that value local benefits.

A similar plan was launched in Yokohama City in November 2021. The plan combines electricity from biomass power generation at a waste incineration plant operated by the City of Yokohama and electricity from residential solar power generation by Post-FIT in the city. TEPCO Energy Partner is selling the electricity to businesses in the city as "Hamakko Electricity". It is available to those with a contract of 500 kW or higher. The unit price for the environmental value of renewable electricity is added to the regular electricity rate.

Electricity supplied by Non-FIT and Post-FIT power generation facilities became eligible for Non-FIT NFCs from FY2020 (from November 2019 for Post-FIT residential solar). Generators can no longer transfer the environmental value of electricity from renewables to retailers without registering for Non-FIT NFCs. Retailers cannot sell the electricity as renewable electricity without attaching Non-FIT NFCs.

In addition to buying and selling Non-FIT NFCs in the market, there is another way to trade Non-FIT NFCs by making a bilateral contract between a power generation company and a retailer. Non-FIT NFCs bought and sold in the market do not come with tracking information to identify the generating facility. It is not possible to distinguish whether it is residential solar, large hydro, or another type of renewable energy. The Agency for Natural Resources and Energy has started a demonstration experiment to add tracking information to some Non-FIT NFCs from FY2021.

Non-FIT NFCs obtained by a retailer from a power generation company through bilateral trading can identify the power generation facility based on the information in the contract. For this reason, RE100 recognizes Non-FIT NFCs as a means to procure electricity from renewable energy sources. Post-FIT residential solar is also covered by the RE100 criteria because it is limited to bilateral trading. However, it would be desirable to be able to track all Non-FIT NFCs.

RE100 recommends that the Japanese government make it possible to track all FIT NFCs and Non-FIT NFCs. Using a country-wide tracking system to manage the environmental value of electricity from renewables is something that many foreign countries have done. The government should add attribute information to all NFCs and manage them with a tracking system so that corporate energy users can use internationally recognized renewable electricity.

Electricity generated from Hydro

Major power companies are selling 100% renewable electricity plans, mainly based on hydro. TEPCO Energy Partner was the first to start selling “Aqua Premium”, a 100% hydro plan for corporate energy users, in April 2017. Sony and Mitsubishi Estate became the first users of Aqua Premium.

There are more than 100 hydro power plants for Aqua Premium, with a generating capacity of larger than 2 GW in total. Of the Aqua Premium power sold in FY2020, the two-thirds was supplied from large hydro power plants with an output of 30,000 kW or higher and one-third from small and medium hydro power plants with an output of less than 30,000 kW. The ratio of large hydro is increasing compared to FY2019.

The hydro power plants covered by the plan do not include pumped storage facilities that operate in combination with thermal power or other power sources, or hydro power plants that are applied to FIT, so Aqua-Premium's power is not considered to emit CO₂. However, given the fact that there are many large hydro power plants that have been in operation for a long time, it is difficult for corporate energy users that place importance on environmental impact and additionality.

Aqua Premium is sold only to large users with a contract power of 500 kW or higher. When 20% of the electricity purchased by consumers is switched to Aqua Premium, the unit price is typically JPY 4-5/kWh higher than usual. This is a significant increase in cost compared to the average unit price of high-voltage electricity (about JPY 17/kWh for 50-2,000 kW usage including the renewable energy surcharges), but there are some cases where the unit price remains the same as the conventional electricity rate depending on the amount purchased and other factors.

Following TEPCO, Kansai Electric Power started selling a 100% hydro plan "Hydro ECO Plan" to corporate energy users in April 2018 (revised to "Renewable Energy ECO Plan Premium" in July 2020). Of the hydro power plants operated by KEPCO, pumped storage hydropower and small and medium-sized hydro power plants that are applied to FIT are excluded and sold as electricity with zero CO₂ emissions. The environmental value of zero CO₂ emissions is charged to the unit price of electricity.

Kyushu Electric Power started selling its "Renewable Energy ECO Plan," which combines hydro and geothermal power generation, to corporate energy users in September 2018. 135 hydro power plants (with a total output of 1.28 GW) and six geothermal power plants (with a total output of 210,000 kW) can supply approximately 5 TWh of electricity per year. This is equivalent to 5% of Kyushu Electric Power's power generation. In FY2020, about a quarter of the electricity was supplied by geothermal. As with the 100% hydropower plan of other electric power companies, environmental value is charged to the unit price of the tariff.

This plan was changed to "Renewable Energy ECO Extreme" in November 2021, and the type of power source can be selected from small hydro and geothermal. This plan is designed to meet the needs of corporate energy users that are reluctant to use large-scale hydro, which has a large environmental impact.

Chubu Electric Power began offering a "CO2-free plan" in July 2019, based on large hydro power plants. The company has announced optional charges for corporate energy users in JPY4.4/kWh (including sales tax).

Tohoku Electric Power is supplying 100% renewable electricity to certain companies through a combination of hydro and geothermal power generation. The program covers electricity from 222 hydro power plants and five geothermal power plants. Tokyu Corporation, which operates a railroad business in the Tokyo metropolitan area, has adopted this plan for powering its streetcars in Tokyo.

Electricity supplied by large hydro power plants became eligible for Non-FIT NFCs from FY2020. Power producers need to issue the environmental value as Non-FIT NFCs. Then, the power producer supplies the electricity to the retail electricity provider bilaterally or in a market transaction. A plan by hydro power generation is provided including Non-FIT NFCs from FY2020.

Non-FIT NFCs have been changed to a system where they are traded in the newly established "Obligation Fulfillment Market of the Law on Sophisticated Methods of Energy Supply Structures" from August 2021. Along with the change in the system, the minimum price for market trading was set at JPY0.6/kWh and the maximum price was set at JPY1.3/kWh (excluding sales tax). In the first auction, the trading price for Non-FIT NFCs (renewable energy), including large hydro, was JPY0.6/kWh, the same as the minimum price. Considering the fact that the highest price in the market is JPY1.3/kWh, it is reasonable to say that the optional fee for a plan that mainly includes hydro power by the major electric power companies should be below JPY1.5/kWh including sales tax.

In response to the mandatory registration of Non-FIT NFCs for electricity from hydro power generation, local governments operating hydro power plants, in cooperation with electric power companies, have started selling a plan of 100% locally produced hydro electricity. Electricity from local hydro power plants is supplied corporate energy users limited to within each prefecture.

A typical example is "Aqua de Power Kanagawa," which Kanagawa Prefecture launched in April 2020 with TEPCO Energy Partners. It is a plan that supplies electricity from 11 prefectural hydro power plants to businesses in the prefecture. The electricity will be sold at regular rates with an optional charge for environmental value added. A portion of the profits will be used for Kanagawa Prefecture's environmental initiatives.

Kanagawa Prefecture does not disclose optional charges in its plans, but some plans in other prefectures do. The lowest optional charge is JPY1/kWh (including sales tax) for Okayama Prefecture's "Okayama CO2 Free Electricity" sold through Chugoku Electric Power. This is followed by Gunma and Yamanashi prefectures' plans at JPY1.02/kWh, Iwate, Akita, Yamagata, and Toyama prefectures' plans at JPY2.2/kWh, and Nagano Prefecture's "Shinshu Green Denki" at JPY4.4/kWh.

Adopting a plan of 100% locally produced hydro power is spreading to major corporations. Seiko Epson, which manufactures and sells printers and watches, began using Shinshu Green Denki at three of its sites in Nagano Prefecture in April 2020. TDK, a manufacturer of electronic components, started using "Akita E-ne! 100% Optional Hydro" provided by Akita Prefecture and Tohoku Electric Power.

Electricity from a municipally operated hydro power plant has the advantage of contributing to the local community. If a company purchases the plan, a portion of the revenue will be returned to the municipal. The effect of returning the cost of purchasing electricity to the local community can be expected. However, same as the major electric power company's plan of hydro power generation, many of the large hydro power plants have been in operation for a long time. When purchasing electricity, it is necessary to check each hydro power plant to evaluate its additionality and environmental impact.

Electricity through Regional Cooperation

Some of the 100% renewable electricity provided by retailers is supplied between regions in cooperation with local governments. Electricity generated in areas with abundant renewable energy is sold to users in large cities. The aim is to make effective use of local renewable energy without being concerned about local consumption.

The City of Yokohama in Kanagawa Prefecture has signed a partnership agreement with 13 municipality in Tohoku region to procure electricity from renewable energy sources. The purpose of the agreement is to supply 100% renewable electricity generated in Tohoku, a region rich in solar and wind resources, to the citizens, businesses, and public facilities of Yokohama City.

The first project was a wind power plant in Aomori Prefecture, which was adopted by the Yokohama Shinkin Bank, a regional financial institution, and 5 other companies. Among them is Okawa Printing, which was founded in Yokohama City in 1881 and has about 40 employees. Okawa Printing operates its printing business using 100% of its electricity from renewable energy sources, including its own solar power generation.

In addition, a wind power plant operating in Aizu-Wakamatsu, Fukushima Prefecture, began supplying electricity to seven businesses in the City of Yokohama in August 2021. The annual electricity supply is expected to amount to 7 GWh. A portion of the electricity charges will be paid to Aizu-Wakamatsu City as a fund for regional revitalization, amounting to about JPY 1 million per year.

Similar inter-regional cooperation is also being carried out by the Setagaya Ward in Tokyo and Kawaba Village in Gunma Prefecture under an agreement. The electricity from a woody biomass power plant built with investment from Kawaba Village is provided to the residents of Setagaya Ward through a retailer. In this biomass power plant, the heat generated by the power generation is also used for cultivating agricultural crops. This is an example of how electricity from renewable energy can be used to promote local development.

Renewable electricity supplied between regions may be applied to FIT. When combined with NFCs, it can be used as electricity from renewables with zero CO2 emissions. Retailers can also claim the local value of electricity by procuring renewable electricity through bilateral trading from specific power generation facilities in the region.

Notes on Non-fossil Certificates (NFCs)

Corporate energy users should be careful when purchasing 100% renewable electricity and CO2 free electricity. The government's Electricity and Gas Market Surveillance Commission has formulated "Guidelines for Electricity Retail Business" to regulate the business activities of retailers. In response to the start of trading of Non-FIT NFCs in FY2020, the method of labeling and promotion of electricity has also been revised.

With regard to electricity from renewable energy, retailers need to change their labeling and promotion methods depending on the type of NFC and the type of electricity combined. Only when NFCs designated as renewable energy (both FIT and Non-FIT) are combined with electricity from renewable sources can be labeled and sold as "Renewable Energy".

When non-renewable electricity and NFCs designated as renewable energy are combined, they must be labeled as "Substantially Renewable". Corporate energy users that wish to purchase both electricity and certificates from renewable energy must select electricity labeled as "Renewable Energy".

There is one more thing to be aware of when it comes to NFCs, and that is when you choose a "CO2 Zero Emission" electricity plan. Among the NFCs, there are Non-FIT NFCs (non-renewable) which is mainly based on nuclear power. Electricity combined with this certificate will have zero CO2 emissions, but it cannot be used as renewable electricity.

If a corporate energy user purchases electricity labeled as "CO2 Zero Emission," there is a large possibility that the environmental value of nuclear power is used for reducing CO2 emissions to zero. Nuclear power does not emit CO2, but it does emit radioactive waste. We need to be aware of this point before purchasing CO2 zero emission electricity.

3. Renewable Energy Certificates

One way for corporate energy users to procure electricity from renewable energy sources is to purchase certificates for the environmental values derived from renewable energy. By purchasing a certificate separately from the electricity contract, the electricity can be recognized to be procured from renewable energy sources.

In Japan, there are three types of certificates for electricity from renewable energy sources. There are two types of certificates that corporate energy users can purchase: Green Electricity Certificates and J-Credits (by renewable energy generation). In addition, FIT NFCs can be purchased by corporate energy users from November 2021. The advantage of these certificates is that you do not have to change your existing electricity contract, as you can purchase only the environmental value derived from renewable energy separately from electricity.

However, in terms of additionality, it is inferior to onsite generation and corporate PPAs. There is a growing trend among leading companies in the US and Europe to consider the procurement method of purchasing only certificates as undesirable. There is a great possibility that this trend will spread to many companies in the future.

■ Certificates for Corporate Energy Users

Brand	Green Electricity Certificate	J-Credit (Renewable Energy)	FIT NFC
Issuer	Registered Issuer	Government	Government
Fuel	Solar, Wind, Hydro, Geothermal, Bio	Solar, Wind, Hydro, Geothermal, Bio	Solar, Wind, Hydro, Geothermal, Bio
Facility	Certified by Japan Quality Assurance	Certified by the Government Committee on J-Credit	Certified as a Feed-in Tariff (FIT) project by the Government
Purchasing Method	From issuer	Auction by the government or from J-Credit owner/broker	Auction by trading market
Issuance Amount	585GWh (FY2020)	980GWh (FY2020)	99.7TWh (Jan-Dec, 2020)
Price	JPY 2-4/kWh for volume purchase	ave. JPY 1.17/ kWh (Apr 2021 auction)	JPY 0.3-4.0/kWh
Cancellation	Anytime	Anytime	Same fiscal year

Green Electricity Certificates

The "Green Electricity Certificate" system was launched in 2000 as a certificate derived from renewable energy. Many companies are using this system as a means of procuring electricity from renewable energy sources. There are five types of power generation facilities that are eligible: solar, wind, hydro, geothermal and bio energy.

As of the end of September 2021, there were about 52MW of power generation facilities certified for Green Electricity Certificates. Bio, solar and wind power make up the majority of the renewable energy sources. The system allows users to purchase certificates by specifying the power generation facility, making it easier to evaluate the environmental impact. As of November 2021, 40 organizations have been registered that can issue and sell Green Electricity Certificates.

In FY2020, 585GWh of Green Electricity Certificates were issued. This is more than double compared to 283GWh issued in FY2019. One of the reasons for the increase is the inclusion of self-consumption of residential solar power generation, which has become Post-FIT after the end of the FIT purchase period. More than 70% of the Green Electricity Certificates issued in FY2020 was for bio energy, and most of the rest was for solar power. Fewer certificates were issued for wind power.

Power generation facilities that are covered by FIT are not eligible for Green Electricity Certificates. The same rule applies to Non-FIT power generation facilities in case the electricity is transmitted via the grid. In case a power generation company has issued Green Electricity Certificates before the current rule is applied, it is likely to be allowed to continue issuing them as Green Electricity Certificates for the environmental value from renewable electricity transmitted via the grid.

The price of Green Electricity Certificates varies depending on the organization that sells them. Some companies disclose the price, while others determine the price based on estimates. In the case of quotations, the more certificates are purchased, the lower the price will be. The standard price for a large purchaser is JPY2-4/kWh. As the minimum price for FIT NFCs was lowered to JPY0.3/kWh in November 2021, the price of Green Electricity Certificates is expected to decrease.

By purchasing Green Electricity Certificates, corporate energy users can enjoy the same benefits as they purchase electricity from renewable energy sources. Depending on the volume of certificates purchased, it will be possible to reduce the amount of CO2 emissions reported to the government and other organizations. The national average of CO2 emissions from electricity sold by retailers in the previous year can be subtracted for the volume of purchased certificates.

Green Electricity Certificates can be used to reduce CO2 emissions reported under the “Law Concerning the Promotion of the Measures to Cope with Global Warming” after certified under the "Green Energy CO2 Reduction Equivalent Certification System" operated by the government. “Green Heat Certificates,” which are issued for heat from renewable energy sources, can also be applied to reporting under the Law.

Power generation facilities that are eligible for Green Electricity Certificates will be certified by the Japan Quality Assurance Organization (JQA), a third-party organization, based on the guidelines of the Agency for Natural Resources and Energy. Mixed-firing power generation, which combines bio energy and fossil fuels, and the use of mixed fuels of waste cooking oil and kerosene, are also eligible. In the case of mixed-fuel power generation, the ratio of bio energy is evaluated, and if the ratio is low, the project may not be certified.

All types of power generation facilities are required to submit documents and information proving the evaluation of their impact on the surrounding environment. In the case of hydro power generation, it is limited to the case where the power generation facility is newly constructed in a river or where the power generation facility is added to existing facilities (ex. water supply facilities from dam, water supply and sewage facilities, agricultural and industrial waterways). In the case of adding power generation facilities to dams and weirs, the approval or disapproval will be determined based on the environmental impact assessment of the dam or weir and the status of agreement with the local community.

Many of the power generation facilities certified for Green Electricity Certificates have been in operation for many years. Some of them, especially those using bio energy, have been in operation for more than 20 years.

The Green Electricity Certificate requires additionality, which promotes investment in renewable energy, as a certification requirement. The additionality is not limited to the new construction of power generation facilities, but is also recognized for contributions to continuous operation and maintenance (such as procurement of bio fuel). Therefore, power generation facilities that have been in operation for more than 20 years can be certified. Corporate energy users that wish to strictly determine additionality need to confirm the start of operation of the power generation facilities that are eligible for the certificate.

J-Credits

J-Credits are divided into two types according to the method of reducing CO2 emissions: J-Credits (renewable energy) from renewable electricity generation and J-Credits (saving energy) from energy conservation and other measures. In many cases, J-Credits (renewable energy) are issued from residential solar power facilities aggregated by municipalities or third-party organizations. Residential solar power facilities have an advantage of low environmental impact.

Five types of renewable energy generation methods are covered: solar, wind, hydro, geothermal and bio energy. In many cases, J-Credits (renewable energy) are issued by local governments or third-party organizations to aggregate the environmental value of solar power generated by local residences for their own consumption.

With J-Credits (renewable energy), the amount of electricity generated and the amount of electricity provided to others are measured, and the difference is used to calculate the amount of self-consumption and convert it into CO2 reductions. Depending on the volume of J-Credits (renewable energy) purchased, corporate energy users can be considered to have procured electricity from renewable energy sources, which can be used to reduce CO2 emissions. When converting to electricity, the amount will be calculated using the average CO2 emission factor of electricity for the entire country in the year in which the power generator consumes it on its own.

When using J-Credits (renewable energy) to reduce CO2 emissions, it is necessary to apply to the secretariat of the J-Credit system for invalidation (write-off). Once the invalidation procedure is completed, a "Notification of Renewable Energy Calculation" will be issued.

This notification can be used for reporting under the Law Concerning the Promotion of Measures to Cope with Global Warming, as well as for CDP and RE100 reporting. However, the Tokyo Metropolitan Government's "Cap and Trade Scheme" for large businesses does not allow the use of J-Credits to reduce CO2 emissions.

Residential solar power generation that has completed its FIT purchase period and become Post-FIT are eligible for J-Credits (renewable energy) if additional capital investment is made, such as installing batteries (limited to cases where additional equipment is installed after May 27, 2018). The portion of electricity for Post-FIT that is consumed onsite can be issued as J-Credits (renewable energy).

The environmental values of self-consumption of solar power for residential use that has become Post-FIT is also eligible for Green Electricity Certificates. To avoid issuing duplicate J-Credits (renewable energy) for the environmental values of the same electricity, the secretariat of the J-Credit system will check for duplication based on the list issued for Green Electricity Certificates.

There are three ways to purchase J-Credits: through brokers called "J-Credit providers", directly from the party holding the J-Credits, or through auctions conducted by the J-Credit system secretariat. The J-Credit providers include companies such as Itoki as of October 2021. The auction by the secretariat is usually conducted twice a year.

The amount of J-Credits (renewable energy) certified for FY2020 has reached about 1TWh. This is about twice as large as the amount of Green Electricity Certificates in FY2020. In the auction held in April 2021, the average transaction price was JPY2,536/ton. In terms of electricity, this is JPY1.17/kWh.

Since J-Credits (renewable energy) can be purchased at a lower price than the standard price of Green Electricity Certificates (JPY2-4/kWh), the transaction price continues to rise. However, considering the minimum price for FIT NFCs has been reduced to JPY0.3/kWh from November 2021, there is a large possibility that the transaction price of J-Credits (renewable energy) will decrease.

For J-Credits, projects must have been implemented after April 1, 2013 to be registered. The maximum period for which credits can be issued is eight years. Another eight years can be extended by submitting a "Notification of Project Plan Amendment". In principle, the payback period of the power generation equipment must be at least three years in terms of additionality.

To apply for a project, the location of the power generation facility, the name and model number of the manufacturer of the equipment to be used, the power output, and the start of operation date must be submitted in a plan. After the plan has been reviewed and approved by the certification committee, the project can be registered.

Each registered project is required to conduct monitoring and submit a report on an average cycle of one to two years. After reporting on the amount of CO2 reduction from self-consumption of electricity from renewable energy sources and receiving the approval from the certification committee, J-Credits can be issued.

The Ministry of Environment, an operator of the J-Credit system, plans to digitize all procedures from registration application to certification and issuance by FY2022 for increasing the volume of J-Credit certification and trading. In addition, it will operate a trading market using blockchain, so that J-Credits can be bought and sold in real time. The trading market is scheduled to start in FY2023.

4. Corporate PPA (Power Purchase Agreement)

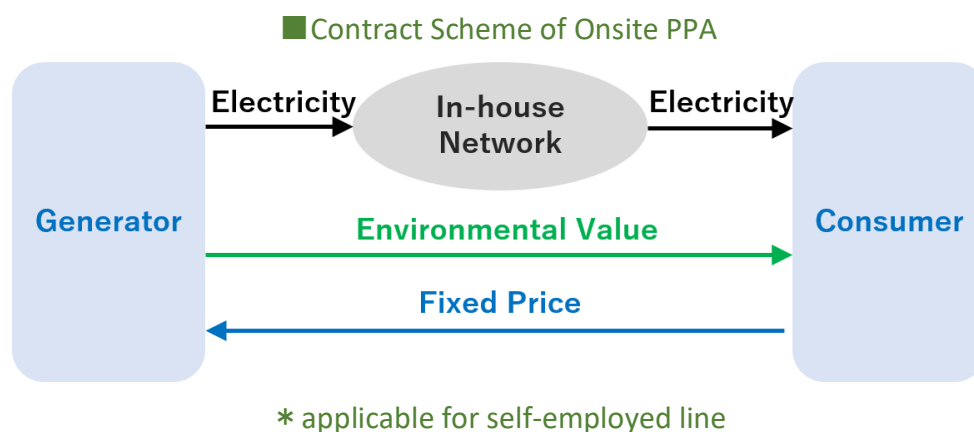
As the cost of generating electricity from renewable energy sources, especially solar power, has declined, more and more companies are adopting corporate PPAs (Power Purchase Agreements) to procure renewable electricity from specific power generation facilities under long-term contracts.

In a corporate PPA, electricity from renewable electricity generation facilities built by the power generation company is supplied to the corporate energy user at a fixed price. For power generation companies, this provides a new source of revenue in place of the Feed-in Tariff (FIT) system, and for corporate energy users, it has the advantage of securing renewable electricity with additionality at a fixed cost for a long period of time.

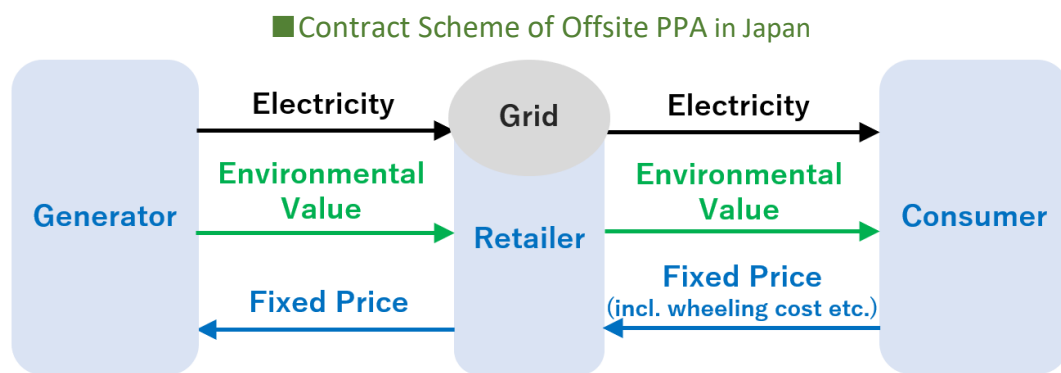
If the transition to Feed-in-Premium (FIP) replaces FIT from FY2022, power producers will be able to use FIP to reduce the cost of corporate PPAs. In turn, corporate energy users will be able to reduce the unit price of electricity contracted under corporate PPAs. With the lowering of power generation costs and the introduction of FIP, corporate PPAs are expected to spread to many companies from FY2022.

Onsite PPA and Offsite PPA

Corporate PPAs are expanding worldwide, especially in the United States, as a means of procuring electricity from renewable sources with additionality. It is common for consumers to make direct contracts with power producers. In Japan, however, consumers can only make a corporate PPA directly with a power generation company in the case of "Onsite PPA," in which a power generation facility is constructed on or near the site of the business location where electricity is used.



Usually, the power generation facilities are constructed far away from the site of electricity use. In such a case, it becomes an "Offsite PPA" and a retailer must be involved between the consumer and the power generation company. For supplying electricity from a remote location, a power transmission and distribution network (grid) must be used. Under the current Electricity Business Act, only retailers registered with the government are allowed to sell electricity to consumers via the grid.



In Japan's offsite PPA, retailers can be entrusted with the tasks required by the offsite PPA, such as adjusting the supply and demand of electricity. In many cases of offsite PPAs overseas, consumers outsource similar tasks to external providers. In Japan, involving a retailer is beneficial in terms of operational efficiency. The fees are usually not very large.

The number of companies concluding offsite PPAs has increased since the beginning of 2021. Seven & i Group, a major commodity retailer, has concluded an offsite PPA with NTT Group to procure electricity for use in its Seven-Eleven convenience stores and other facilities on a long-term basis.

In this contract, NTT Group builds two solar power plants in Chiba Prefecture exclusively for Seven & i Group and supplies the electricity generated along with environmental values. In addition, NTT Group supplies electricity with FIT NFCs. In two ways, the electricity used in Seven-Eleven convenience stores will be 100% renewable energy.

The unit price of electricity purchased by Seven & i Group through the offsite PPA is slightly higher than the electricity rates contracted until then. The electricity used by the stores is high-voltage (50-2,000 kW), and as of 2021, the standard level for purchasing high-voltage electricity through offsite PPA is JPY16-17/kWh. On the other hand, the unit price of normal electricity is about JPY14/kWh on average nationwide (total of basic charges and electricity volume charges, not including the renewable energy surcharges).

In many cases, offsite PPAs increase the cost of procuring electricity at this moment. In return, corporate energy users can purchase electricity from renewable energy sources with additionality at a fixed price for a long period of time. For preparing for future increases in electricity prices, the immediate cost increase may be considered as a necessary investment. By increasing the amount of renewable electricity and reducing CO2 emissions as soon as possible, the benefits of contributing to mitigating climate change are significant.

Cost Reductions for Offsite PPA

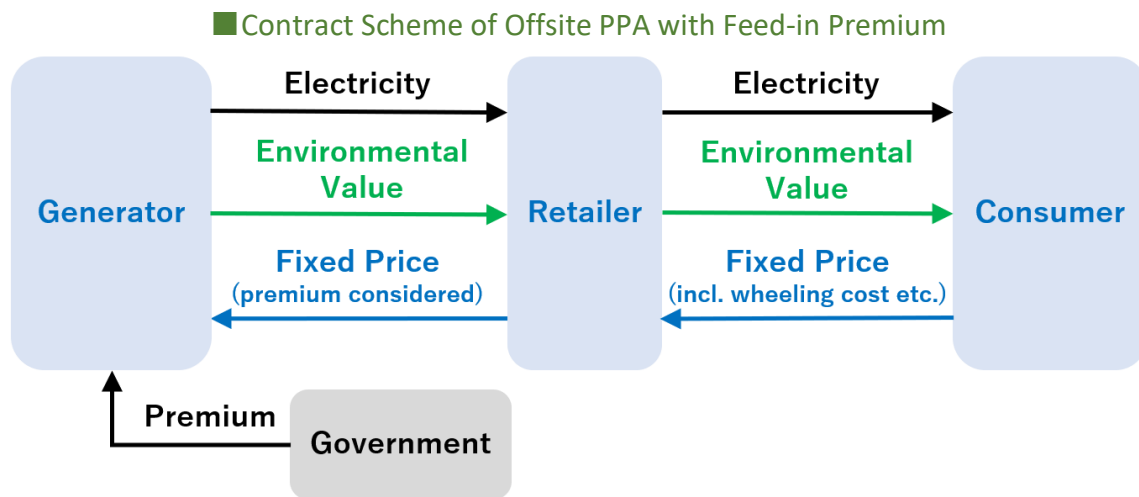
As for the cost of offsite PPAs, there are solutions: one is the government subsidies. MOE has provided subsidies for offsite PPAs in FY2021. Kao, Dai-ichi Life Insurance and several other corporate energy users have signed offsite PPAs with subsidized solar power projects. Subsidies can compress the cost difference compared to regular electricity rates; in FY2022, METI will provide subsidies for offsite PPAs.

Another solution is to utilize "Self-wheeling". Consumers can transfer surplus electricity from their own power generation to other business locations via the grid by self-wheeling. In November 2021, the self-wheeling system was amended to allow companies without capital ties to utilize. It can be applied to offsite PPAs on the condition that consumers purchase electricity from newly constructed renewable energy generation facilities on a long-term basis. This does not apply to power generation facilities certified under FIT or FIP.

If self-wheeling can be applied to offsite PPAs, consumers can directly conclude contracts with power generation companies. Moreover, the purchased electricity will not be subject to the renewable energy surcharges (JPY3.36/kWh, FY2021). For high-voltage and low-voltage power contracts, there is a large possibility of being able to purchase electricity from renewable energy sources at a cost lower than normal electricity rates. It is necessary to adjust the supply and demand of electricity due to self-wheeling. This task can be outsourced to an energy service company, even including the cost, it is expected to be less than or equal to normal electricity rates due to the renewable energy surcharges exempted.

The cost of offsite PPA can be reduced by utilizing FIP, which will start in FY2022. Under the conventional FIT system, the government purchases the electricity generated and covers most of the purchase cost through renewable energy surcharges that is added to electricity rates. Therefore, the system allows the government to retain the environmental values associated with renewable electricity and sell it to retailers and consumers as FIT NFCs.

The FIP, on the other hand, will change the way in which the government pays a premium to the power producers based on the difference between the FIP certified fixed price and the wholesale market price. The power producers will need to be responsible for their own revenue, but in return they will be able to retain environmental values. It will be possible to offer both electricity and environmental values to consumers through retailers, and to conclude offsite PPAs. In addition, the unit price of off-site PPA contracts can be reduced by taking into account the revenue from premiums.

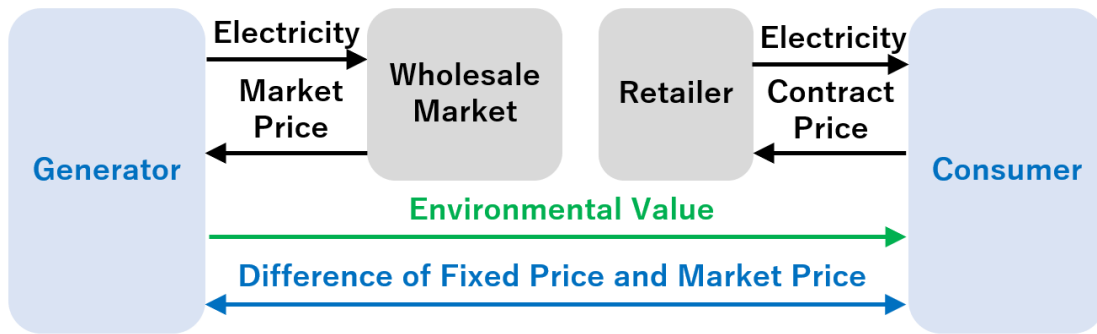


Virtual PPA for Environmental Values

There are two types of offsite PPAs. The first is "Physical PPA," in which electricity and environmental values are contracted as a set. Currently, physical PPAs are the most common offsite PPAs concluded by companies in Japan. In contrast, a contract in which electricity and environmental values are separated and the consumer obtains only the environmental values is called "Virtual PPA. In the U.S., virtual PPAs have become the mainstream.

The virtual PPA allows consumers to purchase environmental values from power producers while maintaining their existing electricity contracts, which is the major advantage for corporate energy users. The power producers sell the electricity subject to the virtual PPA in the wholesale market. As the market price fluctuates, the contract is generally settled between the consumer and the power producer such that the consumer bears the risk of price fluctuations.

■ Contract Scheme of Virtual PPA in US

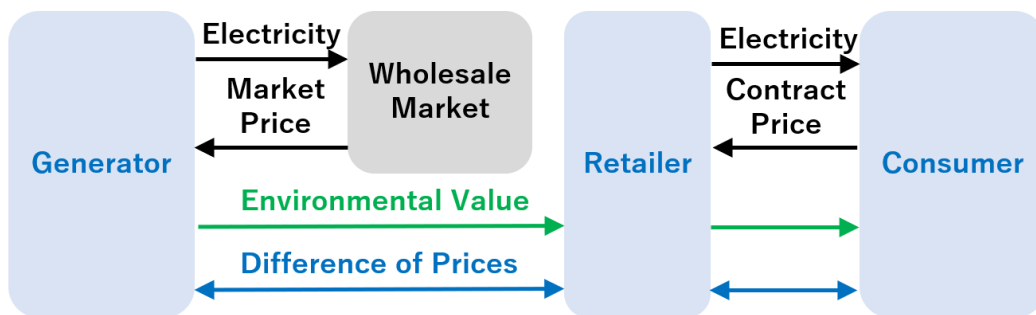


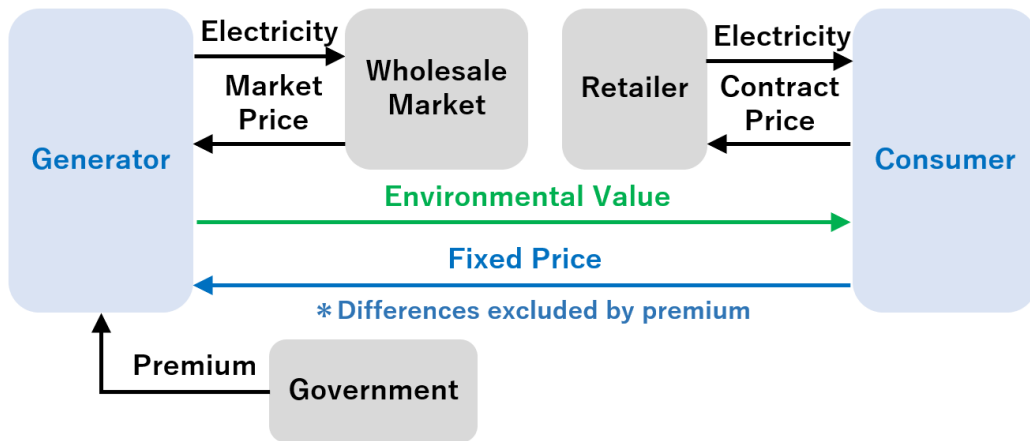
In Japan, even for virtual PPAs, the current regulation requires the involvement of a retailer. Since it does not affect the electricity contract, it is not subject to the provisions of the Electricity Business Act but necessary to supply environmental values in the form of Non-FIT NFCs. The current rule does not allow power producers to provide Non-FIT NFCs directly to consumers. If this rule is changed, it will be possible for consumers and power producers to form virtual PPAs directly.

The Agency for Natural Resources and Energy is considering allowing corporate energy users to purchase Non-FIT NFCs from power producers and is expected to change in early 2022. If direct trading of Non-FIT NFCs becomes possible, virtual PPAs without involving retailers can be made. In addition, the combination of FIPs will provide significant benefits to consumers in terms of cost.

■ Contract Scheme of Virtual PPA in Japan

Under the existing rule of NFCs (below), After changing the rule with FIP (next page)





5. Key Considerations in Procurement

Calculating CO₂ Emissions from Certificates

There are two methods of calculating CO₂ emissions associated with the use of electricity when reporting to the national and local governments. One is to calculate based on the CO₂ emission factor of the electricity (CO₂ emissions per kWh of electricity) sold by the retailer in each fiscal year, and the other is to apply a plan-specific CO₂ emission factor.

Plan-based CO₂ emission factors can be applied to electricity combined with NFCs. Retailers shall calculate the plan-specific CO₂ emission factor by subtracting the average CO₂ emission factor for the entire country in the previous year (0.432 gram/kWh, FY2020) from the CO₂ emission factor of the electricity sold (the emission factor cannot be negative).

With this calculation method, the CO₂ emission factor for a plan combining FIT electricity (the national average CO₂ emission factor is applied) and FIT NFCs will be zero. The same calculation method can be applied to the use of Green Electricity Certificates and J-Credits (renewable energy).

There is a point to be noted here. In the case of NFCs, the year in which the electricity to be covered by the certificate was generated (January to December) and the year in which the electricity was supplied (April to March of the following year) must match. This applies not only to FIT NFCs but also to Non-FIT NFCs.

With Green Electricity Certificates and J-Credits, which can be purchased by corporate energy users, you can choose the year in which you want to use them to report your CO₂ emissions. Green Electricity Certificates and J-Credits are more flexible than NFCs when it comes to reporting CO₂ emissions. However, it is important to avoid using certificates that have been issued for a long time. It is recommended to use them within two years from the issuance.

There is a concern common to using certificates. It is in case of using electricity generated mainly by thermal or nuclear power and combining certificates from renewable energy sources. From the perspective of climate change, the use of certificates in combination with electricity generated mainly from coal-fired power, which emits a large amount of CO₂ is concerned.

CDP, which evaluates companies' climate change efforts, recognizes electricity combined with NFCs as renewable energy. However, it asks companies to use electricity with low CO₂ emissions by the following three recommended conditions. For meeting these recommended conditions, electricity with a high CO₂ emission factor, mainly from coal-fired power plants, should not be selected.

1. Procure renewable electricity as much as possible (e.g., FIT electricity).
2. Procure electricity with a low CO₂ emission factor in case renewable electricity cannot be purchased.
3. Procure electricity with a CO₂ emission factor at least equal to or lower than the national average.

Prioritizing Generation Method or CO₂ emission

There are two ways for corporate energy users to think about increasing renewable electricity: one is to procure electricity from renewable energy sources that have a low environmental impact based on how they are generated. Regardless of whether the FIT system is applied (FIT electricity) or not, choose electricity from renewable energy sources that do not actually emit CO₂.

The other approach is to target the procurement of electricity from renewable energy sources that can be used to reduce CO₂ emissions. Companies that are obligated to report their CO₂ emissions to the government and other entities must report their CO₂ emissions based on the calculation method determined by each system. In this regard, FIT electricity must be procured with a combination of certificates.

Should we choose electricity from renewable energy sources that do not actually emit CO₂, or electricity that can be used to reduce CO₂ emissions through institutional means? Which to focus on is left to the policy of individual corporate energy users. This will change the value of using FIT electricity and certificates.

Patagonia, an outdoor goods manufacturer, has a clear policy regarding CO₂ emissions associated with the use of electricity. Patagonia, which operates stores in the U.S. and other countries around the world, has been promoting environmentally friendly business practices. As they work to reduce CO₂ emissions to mitigate climate change, they purchase FIT electricity in Japan; increasing the amount of electricity from new power generation facilities that qualify for FIT will help us reduce the amount of electricity generated from thermal power, which emits CO₂. Patagonia is not concerned about CO₂ emissions for reporting.

Patagonia gives priority to purchasing electricity from solar-sharing systems, which combine solar power with crop production. For solar-sharing projects on abandoned agriculture lands in Japan, crop production is mandatory. By restarting crop production, CO2 can be absorbed and the benefits of reducing CO2 emissions are larger.

From April 2020, new rules are applied to electricity sold by retailers: if they sell CO2 free electricity, it must come with NFCs. Even if electricity is generated from renewable energy sources, it cannot be claimed to have environmental value. The same rules apply to Non-FIT and Post-FIT electricity.

In line with the new rules, the Electricity and Gas Market Surveillance Commission, a government agency, has revised its "Guidelines for Retail Business of Electricity". It requires retailers to disclose the power source composition of the electricity and the use of NFCs on their websites. It also requires the same disclosure for 100% renewable energy plans and CO2 zero emission plans.

However, both disclosures are only positioned as "desirable actions" and are not mandatory. It is the responsibility of retailers to provide concrete and easy-to-understand information on the characteristics of the electricity sold to consumers. Corporate energy users should avoid purchasing electricity from retailers that do not disclose their power source composition and the use of NFCs.

When purchasing a 100% renewable energy plan or a 100% CO2 zero emission plan, it is advisable to confirm the details of the power source and the type of NFCs with the retailer. The label "NFCs (Renewable Energy)" does not indicate whether it is FIT or Non-FIT, or whether the source of the environmental value is solar, hydro, or bio energy. With trackable NFCs, consumers can identify the power plant, the environmental impact and additionality.

Requirements for Renewable Electricity

Currently, there is no unified standard for certifying renewable electricity in Japan. Green Electricity Certificates, J-Credits and NFCs each have different certification requirements for power generation facilities. For corporate energy users to procure renewable electricity efficiently, it is necessary to establish a unified standard of renewable energy certificate.

As for internationally accepted requirements for renewable electricity, recommendations by the leading NGOs can be used as a reference. Typical examples are RE100, an international initiative, and Green-e, which is the standard used in North America. A possible way to organize the requirements for renewable electricity and certificates is to classify them into three levels.

■ Requirements for Renewable Electricity
(Class 1 is most desirable)

Class	Requirement		Examples in Japan
3	Technology	Generated by renewable sources	<ul style="list-style-type: none"> ● Electricity by Feed-in Tariff (FIT)
	Zero Emission	Considered to be zero CO2 emissions by global and national rules	<ul style="list-style-type: none"> ● Non-fossil Certificate (renewable) + Electricity with a CO2 emission factor lower than the national average ● Hydro 100% electricity
2	Tracking	Trackable of generation facility to identify environmental impact	<ul style="list-style-type: none"> ● Electricity by FIT + Non-fossil Certificate with tracking ● Electricity by Non-FIT + Non-fossil Certificate with tracking
	Certified	Environmental values certified by third-party	<ul style="list-style-type: none"> ● Green Electricity Certificate ● J-Credit (renewable generation) ● Non-fossil Certificate (renewable)
1	Additionality	Increasing new renewable electricity	<ul style="list-style-type: none"> ● Green Electricity Certificate (within 15 years) ● J-Credit (ditto) ● Non-fossil Certificate (ditto)
	CO2 Reduction	Decreasing CO2 emissions	<ul style="list-style-type: none"> ● Onsite Generation ● Corporate PPA by new generation facility

◇CDP Recommendations: Class 3 (Technology + Zero Emission)

◇RE100 Requirements: Class 2 (Tracking + Certified) + Class 3

◇Green-e Requirements: Class 1 (Additionality) + Class 2 + Class 3

The first and most basic requirement is that the electricity must be generated from renewable energy sources. In addition to that, what is important for major corporate energy users is to report zero CO2 emissions according to national and international systems and guidelines.

The second requirement is that the power generation facility must be identified for confirming the generation method. In addition, it is desirable to have certification from the government or NGOs that the electricity is generated using methods with low environmental impact.

The third requirement is additionality, which leads to increase renewable electricity. The addition of new renewable energy generation facilities can replace fossil fuel-based electricity and reduce CO₂ emissions. However, the criteria for judging additionality are not standardized both in Japan and globally. In addition to the method of judging based on the number of years of operation of the power generation facility, there is also the concept of recognizing additionality based on the use of revenue from the sale of electricity and certificates.

There are three main criteria for determining additionality. The basic one is #1 below, but it is not excluded to support a wide range of renewable energy generation facilities through an expanded interpretation such as #2 or #3.

1. Select projects that construct new renewable energy generation facilities and purchase the electricity generated (including onsite generation).
2. Purchase electricity and certificates for renewable electricity generation facilities that have been in operation for a short period of time to support the return on investment and promote the development of the next construction project.
3. Purchase electricity and certificates from renewable electricity generation facilities that require financial support to continue the operation.

In terms of reducing CO₂ emissions, the #1 above is the most effective. In addition to onsite generation, corporate PPA (Power Purchase Agreement) for new power generation facilities is applicable to #1.

The next case is #2 where CO₂ reduction effect can be expected. Based on the standard payback period for power generation facilities (15 years), the criteria of power generation facilities that have been in operation for 15 years or less as a condition for additionality has been established in the United States. This is the criteria for additionality adopted by Green-e, which certifies electricity and certificates of renewable energy with low environmental impact.

The case #3 does not have the effect of reducing CO₂ emissions, but rather aims to prevent emissions from increasing. In the case of a renewable electricity generation facility that has already paid back its investment, if the profitability of the facility becomes low due to increased operation and maintenance costs, there is a possibility that the operator will cease operation. To prevent this from happening, funds will be provided through the purchase of electricity and certificates. Green Electricity Certificates allow this kind of additionality.

At present in Japan, even if only case #1, the basic additionality, is sought, the number of eligible power generation facilities is limited. It is realistic to comprehensively select renewable electricity with other selection criteria (environmental impact, sustainability of energy source and local benefit).

In terms of local benefit, Starbucks Coffee Japan places emphasis on it, along with environmental impact, when selecting electricity for use in its stores across the country. Starbucks selects electricity on the condition that it is used for activities that create local jobs and solve local problems. The company has switched its approximately 350 directly managed stores to using renewable electricity that meets the conditions for regional contribution.

Mitsui Sumitomo Insurance has adopted electricity from a wind power plant in Aizu-Wakamatsu City, Fukushima Prefecture and a biomass power plant in Sakata City, Yamagata Prefecture for switching to 100% renewable energy for the electricity used in a high-rise building it owns in central Tokyo. For the sake of additionality, power plants that have been in operation for less than 15 years were selected. The plants started operation in 2015 and 2018, respectively. Furthermore, an agreement has been made with the city of Aizu-Wakamatsu to return a portion of the operator's profits to the city as a fund for regional revitalization.

■ Features by Procurement Method

Method	Environmental Impact	Sustainable energy source	Additionality	Local Benefit
Onsite Generation	○ Low impact generation technology selectable	○ Sustainable source selectable	◎	△ Electricity supply to local community in case of disaster
Green Product	△ Depending on generation facility	△ Depending on generation facility	△ Depending on generation facility	△ Depending on profit sharing
Certificate	○ Low impact generation facility selectable	○ Sustainable source selectable	○ New generation facility selectable	○ Locally beneficial generation facility selectable
Corporate PPA	○ Low impact development project selectable	○ Sustainable source selectable	◎	○ Locally beneficial project selectable

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