Renewable Electricity Procurement Guidebook

English Edition

自然エネルギー財団
RENEWABLE ENERGY INSTITUTE

January 2023

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 2023 edition details major procurement methods of renewable electricity from On-site Generation to Corporate PPAs, Green Products and Renewable Energy Certificates 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.

Acknowledgements

We would like to express our sincere gratitude to everyone who cooperated in compiling this guidebook.

Author

Masaya Ishida, Senior Manager, Renewable Energy Institute

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 Content

Renewable Electricity Procurement Methods

There are four major methods to procure renewable electricity. In addition to installing their own facilities to generate and consume electricity, consumers can purchase renewable electricity sold by retailers, or certificates for the environmental value (e.g., no CO_2 emissions) of renewable electricity. In recent years, more and more corporates are adopting corporate PPAs (Power Purchase Agreements), in which they purchase renewable electricity from new generation facilities under long-term contracts.

Method	Feature	Advantages and Disadvantages
On-site Generation	Construct generation facilities and consume generated electricity.	●Initial investment required, low-cost operation. ●Environmental impact identified accurately. ●Responsible for construction and operation.
Corporate PPA	Purchase renewable electricity by long-term contract.	●Fix electricity cost for a long time. ●Environmental impact identified accurately. ●Risks of long-term contract with developers.
Green Product	Purchase renewable electricity from retailers.	●Short-term procurement based on the budget. ●Generation sites not usually identified. ●Higher prices compared with regular tariffs.
Certificate	Purchase environmental values by certificates.	●Increase renewable electricity independently. ●Generation sites usually identified. ●Additional cost for electricity procurement.

■Procurement Methods of Renewble Electricity

For corporates consuming large amounts of electricity, it is difficult to procure the necessary amount by only one method. While combining multiple methods, it is necessary to select renewable electricity based on key selection criteria (e.g., environmental impact).

The cost of solar and wind power generation has declined, making it possible to procure renewable electricity at lower costs than before. The benefits of on-site power generation and consumption have increased, and the cost of renewable electricity supplied by retailers has also declined.

The feed-in tariff (FIT) program has been revised since FY2022 to shift to a feed-in premium (FIP), which is linked to the wholesale market price. As FIP expands, it will also become easier for corporates to enter into corporate PPAs to purchase renewable electricity at lower prices on a long-term basis.

In terms of additionality, which is effective in reducing CO_2 emissions by adding new facilities replacing fossil fuel power plants, it is preferable to select either on-site generation and consumption, or corporate PPAs. These two methods also have the advantage of fixing the cost of procuring renewable electricity over the long term.

As the cost of solar power generation has decreased, corporates are now in a position to both reduce CO_2 emissions and costs through on-site power generation and consumption. In addition, an increasing number of developers and retailers are able to offer corporate PPAs for long-term fixed-price contracts for renewable electricity. However, the amount of electricity that can be supplied by on-site generation is limited, and corporate PPAs require finding new projects that meet their procurement conditions.

Corporates can increase the amount of renewable electricity by maximizing on-site generation and corporate PPAs, while purchasing the shortfall from retailers. If that is still not enough, additional certificates would be purchased to make up for the shortfall.

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

Making Renewable Electricity Procurement Plan

Step 1. Prioritize options increasing new renewables		
Onsite Generation	Options	Corporate PPA
Execute at available locations quickly. Capacity is limited though.	Strategies	Realize the maximum scale of agreements toward the target.
1. Self operation 2. Onsite PPA	Executions	1. Long-term agreements with retailers 2. Investments to developers

Step 2. Purchase the rest from suppliers		
Green Products	Options	Certificates (unbundled)
Select products by criteria on environmental impact and additionality.	Strategies	Purchase the insufficient amount each year (the last option to meet the target).
1. FIT Electricity + NFCs 2. Non-Fit Electricity (new) 3. Non-FIT Electricity (old)	Executions	1. NFCs (renewable) 2. GECs 3. J-Credits (renewable)

1. On-site Generation

One efficient way to procure renewable electricity is to build and operate your own generation facilities and consume the generated power on your own sites. Using land and buildings you own can keep construction costs low. The grid network of the electric power company is not used, and there are no wheeling fees (network tariffs) or renewable surcharges.

However, it requires expertise in the construction and operation of power generation facilities. There is a risk of failure or accident, which could result in generating less amount of electricity than expected. To avoid such risks, an increasing number of corporates are adopting a new contract method (on-site PPA) in which the construction and operation of the power generation facilities are outsourced to developers.

● Self-consumption of Solar Power

Solar power generation is the most common method of on-site power generation and consumption in Japan. This is because it is easier to construct and operate power generation facilities than other renewable energy sources. Until recently, the cost of solar power has been higher than the cost of regular electricity tariffs, but the cost of solar panels has been declining significantly.

One of the best examples of self-generation and self-consumption is the projects by IKEA Japan, a major furniture retailer. IKEA Japan has been generating solar power on the rooftops of its large stores across Japan, including IKEA Nagakute, which opened in Aichi Prefecture in October 2017.

IKEA Nagakute, the largest solar-powered IKEA store in Japan, can supply up to 1,300 kW of electricity. The amount of electricity generated annually is equivalent to the electricity consumption of 360 standard households.

In addition to using solar-generated electricity for lighting in the store, it will also be supplied to electric forklifts used to transport merchandise. IKEA has installed battery chargers on the rooftop parking lot to provide free solar-generated electricity to consumers' electric vehicles.

■Roof-top Solar at IKEA Nagakute

Source: IKEA Japan

The manufacturing industries are also becoming active in on-site solar power generation and consumption. Tokyo Steel, a major electric furnace steel manufacturer has installed solar power generation equipment on the roofs of four of its plants in Japan in 2021 to consume the generated electricity.

■Roof-top Solar at Tokyo Steel Tahara Plant

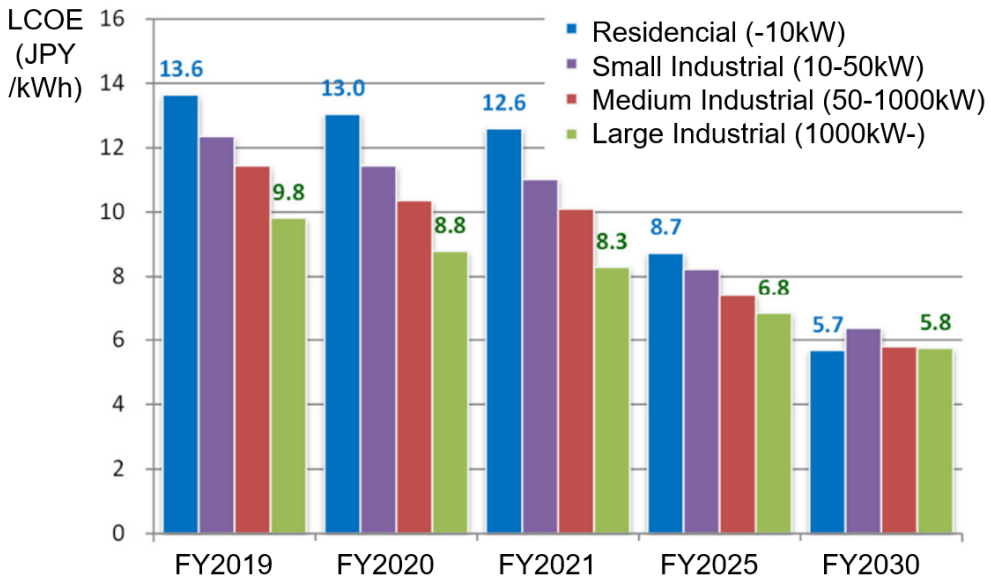
Source: Sumitomo Mitsui Finance and Leasing et al.

Of the four locations, the Tahara Plant in Aichi Prefecture has the largest scale of solar power generation. More than 20,000 solar panels have been installed on the roof of a building in the plant. With an output of 6.4 MW, it is one of the largest solar power generation facilities for on-site consumption in Japan. Steelmaking using electric furnaces consumes a large amount of electricity. Although the percentage of electricity supplied by solar power generation is small, the benefits of reducing electricity procurement costs and CO_2 emissions over the long term are significant.

● Solar Generation Cost Declining

According to RTS Corporation, a leading research institute on solar power generation, the cost of large-scale solar (output of 1MW or higher) fell to JPY8.3/kWh in FY2021. The cost for medium and small-scale solar is also around JPY10-11/kWh. Furthermore, the cost is expected to fall to around JPY6/kWh in FY2030, regardless of the size of the project.

■Trends of Solar Power Generation Cost (in Japan)



LCOE: Levelized Cost of Electricity
Source: RTS Corporation

In contrast, electricity tariffs for corporates through retailers have been significantly higher due to the impact of soaring fossil fuel prices since early 2022. According to data compiled by the Agency for Natural Resources and Energy, as of August 2022, electricity rates (including fuel surcharges and renewable energy surcharges) for industrial users rose to about JPY23.5 /kWh on average nationwide. Since then, electricity rates have continued to rise as fuel costs have increased. They will continue to be affected by fossil fuel price fluctuations.

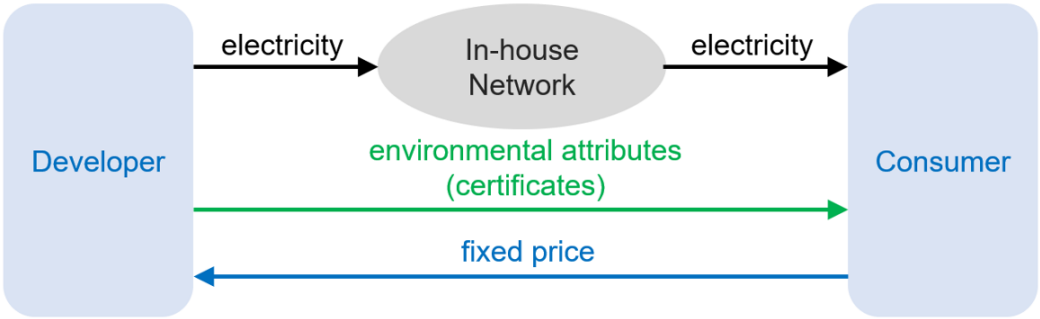
Self-consumption of solar-generated electricity is a sure way to reduce costs rather than purchasing regular electricity. In case the rooftop of a building can be used for solar power generation, the cost can be kept low because there is no need to purchase or lease land or to develop the land.

● From Self-generation to On-site PPA

On-site PPAs (Power Purchase Agreements) are gaining attention as a new way to consume solar-generated electricity on site. Corporates provide rooftops of their buildings or a portion of their property to developers for installing solar power generation equipment.

Developers undertake the installation, operation, and maintenance of the equipment, and supplies the generated electricity to the buildings on the site. Corporates do not need to make an initial investment and only need to purchase the electricity. Corporate consumers will acquire environmental attributes along with the electricity. The price is fixed throughout the contract period. Since there are no transmission and distribution network tariffs or renewable energy surcharges, electricity is available at a lower price than conventional electricity rates.

■Contract Scheme of On-site PPA



＊applicable also for self-employed line

Furthermore, it is common to contract to take back the power generation equipment free of charge at the end of the contract period. After that point, the electricity can be used only for operation and maintenance costs, further reducing costs.

Many corporates are adopting on-site PPAs because they are less time-consuming and less risky than on-site power generation and consumption. Aeon Group, one of Japan's major consumer product retailers, is moving forward with deploying on-site PPAs at its stores throughout Japan. Aeon previously used to install its own solar power generation equipment on store rooftops and is switching to on-site PPAs since 2020.

■On-site PPA at Aeon Town Konan

Source: Aeon

On-site PPA is a type of corporate PPA in which consumers purchase renewable electricity under long-term contracts and has been adopted by many corporates. If you own a building with a large rooftop, such as a shopping mall, factory, or distribution center, this is a cost-effective way to procure renewable electricity.

● Utilizing Surplus Electricity by Self-wheeling or Off-site PPA

For on-site solar power generation and consumption, there are cases all the power generated during the day cannot be consumed, leaving a surplus. Sony Group, a giant electronics and entertainment company, has installed solar power generation equipment on the rooftops of its factories and warehouses, and is also working to flexibly distribute surplus power to neighboring business sites through a system called "self-wheeling".

Sony is supplying electricity generated by solar power on the roof of a warehouse in Shizuoka Prefecture to a factory in the same prefecture by self-wheeling using the grid network. This allows the use of renewable electricity generated in-house without any excess. Although additional costs are required for the use of the grid network (around JPY4/kWh for high voltage) and for supply and demand adjustment, there is the advantage of exempting renewable energy surcharges (JPY3.45/kWh in FY2022).

2. Corporate PPA (Power Purchase Agreement)

As the cost of generating renewable electricity, especially solar, has declined, more corporates are adopting corporate PPAs (Power Purchase Agreements), in which electricity from newly constructed power generation facilities is purchased under long-term contracts.

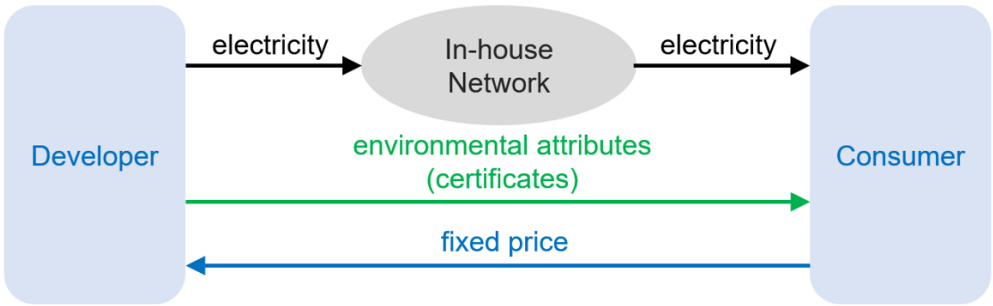
Under a corporate PPA, consumers purchase the generated electricity and environmental attributes from developers at a fixed price. For developers, this will be a new source of revenue to replace the feed-in tariff (FIT), and for corporates, it will have the advantage of securing renewable electricity with additionality over the long term.

The transition to Feed-in-Premium (FIP) began in FY2022, replacing FIT. Developers can use FIP to reduce the cost of corporate PPA. With lower generation costs and the expansion of FIP, more and more corporates are expected to enter into corporate PPAs.

● On-site PPA and Off-site PPA

There are two types of corporate PPAs: on-Site PPAs and off-Site PPAs. On-site PPA can be applied if the generation facility can be built on or adjacent to the consumer's premises. On-site PPA is a procurement method similar to on-site power generation and consumption but differs in that it outsources the entire process from installation to operation and maintenance of the power generation facility to the developer.

■Contract Scheme of On-site PPA



＊applicable for self-employed line

The consumer only needs to provide a site (such as the roof of a building or a vacant lot) on which to build the power generation facility, and no investments are required. Although it depends on the size of the power generation facility and the length of the contract, the average unit price for on-site PPAs for solar power generation is around JPY10/kWh in 2022. This is significantly lower than regular electricity rates. The standard contract term of on-site PPA is 15 to 20 years.

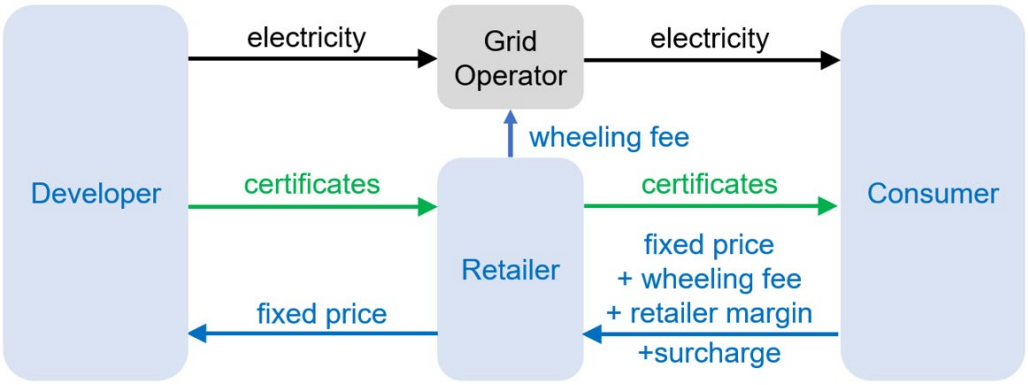
Off-site PPA is for the construction of generation facilities in locations far from where electricity is used. The contract is more complicated than on-site PPA because the generated electricity must be supplied to the consumer through the grid network.

In addition, there are two types of off-site PPAs: one is called "Physical PPA," in which the consumer purchases both electricity and environmental attributes as a set. The other is "Virtual PPA," in which the consumer purchases only environmental attributes. In the U.S., where corporate PPAs are popular, virtual PPAs are the most common type of PPA, but in Japan, physical PPAs are currently the most common.

● Physical PPA for Electricity and Certificates

In many countries, consumers and developers can directly make physical PPAs, but in Japan, under the Electricity Business Act, only retailers are allowed to sell electricity to consumers via the grid network. Therefore, in principle, retailers must be involved in physical PPAs. Normally, the contract is made between developer, retailer, and consumer.

■Contract Scheme of Physical PPA in Japan



In physical PPAs, as in on-site PPAs, the consumer pays a fixed price for the electricity and its environmental attributes by certificates. In addition, grid network tariffs, retailer fees and renewable energy surcharges are added. The cost for the consumer is higher than on-site PPA.

Comparing with regular electricity rates, the unit price of physical PPA is now at the same or lower level. The price of fossil fuels has soared since the fall of 2021, resulting in a significant increase in the regular electricity rates mainly by thermal power generation. The national average electricity rate for industry in August 2022 was about JPY23.5/kWh (including fuel surcharges and renewable energy surcharges). Compared to one year ago, the rate was about JPY7/kWh higher. Since then, electricity rates have continued to rise due to increased fuel costs.

In contrast, the unit price of physical PPA from solar power generation is at the standard level of about JPY18-20/kWh (including wheeling tariffs and renewable energy surcharges). Although it depends on the future price of fossil fuels, physical PPAs are more economical in addition to reducing CO_2 emissions, considering the benefits of fixing the procurement cost of electricity under a long-term contract.

However, it is difficult to predict what level regular electricity rates will remain at in the future. In determining the economics of a long-term contract with an physical PPA, a comparison can be made based on the range of price fluctuations in recent electricity rates.

Since the spring of 2021, electricity rates have continued to rise due to the roaring prices of fossil fuels. They are already quite high and may peak in the first half of 2023. Given the recent low level of electricity prices in 2020, it can be assumed that future electricity rates will be within the 3-4 year range of fluctuation after 2020.

Check the unit prices of the electricity rates currently contracted (including fuel surcharges) for the most recent 3-4 years and assume that the midpoint between the highest and lowest prices is the average unit price over the long term. Comparing that average unit price with the price of physical PPA, it can be judged that the cost can be controlled in the long term if the price of the physical PPA is less than or equal to the average unit price of the most recent electricity bill. Even if the price of physical PPA is higher, the benefits of long-term reduction of CO_2 emissions are significant.

Seven & i Group, a leading consumer product retailer, has been active in physical PPAs to increase the amount of renewable electricity with additionality. The company signed its first physical PPA in 2021 with NTT Group for a 20-year contract to procure electricity used in the Group's stores, including 7-Eleven.

NTT Group built two solar power plants exclusively for Seven & i in Chiba Prefecture and supply the generated electricity along with its environmental attributes. The total scale of power generation amounts to 3.1 MW. In addition, the contract is to supply 100% renewable electricity by supplementing any shortfall in demand from the physical PPA with electricity that has been granted FIT Non-Fossil Certificates with tracking.

Seven & i Group has also made a solar-powered physical PPA in the Hokuriku region with the Hokuriku Electric Power Group. The Hokuriku Electric Power Group built a 6.2 MW solar power plant in the coastal industrial area of Fukui Prefecture to supply solar-generated electricity to approximately 300 stores of 7-Eleven in three prefectures in the Hokuriku region.

In the past few years, the use of renewable electricity has been expanding throughout the supply chain (from procurement of raw materials and parts to production, consumption, and disposal of products), mainly in the manufacturing industries. Apple is a good example and similar efforts are also underway in the Japanese manufacturing industries. Physical PPAs can be effectively used to promote renewable electricity in the supply chain.

Tokai Rika Corporation, a manufacturer of automotive security systems and other products, has made a physical PPA with 12 suppliers of parts to procure renewable electricity in its supply chain on a long-term basis. For individual parts suppliers, this is more efficient and cost effective than procuring renewable electricity on their own.

● Cost Reductions for Physical PPA

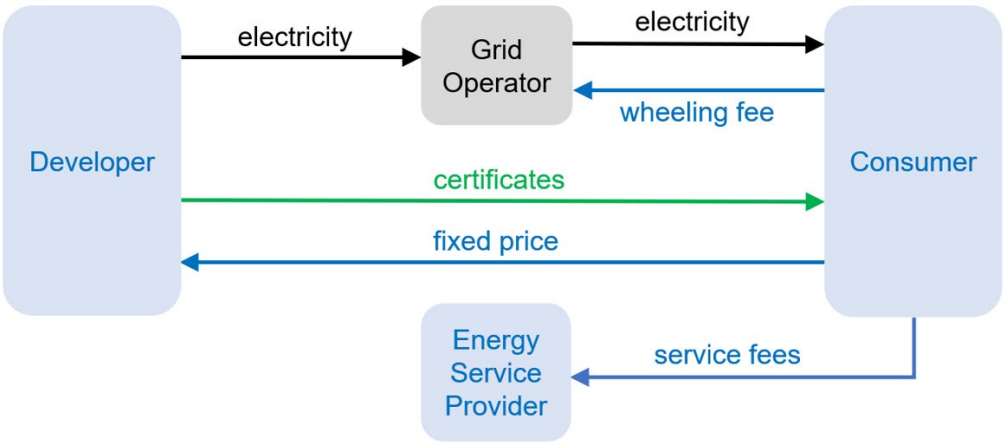
For reducing the cost of physical PPA, consumers can utilize the "self-wheeling" program. Consumers are able to transfer surplus power generated in-house to other business locations via the grid network by self-wheeling. The program can be used within the company or among group companies.

In November 2021, the self-wheeling program was revised so that consumers can use the program with developers. The premise is that consumers and developers form an association and establish a close relationship, and then consumers purchase renewable electricity from developers by newly constructed generation facilities on a long-term basis. It can be applied to physical PPAs, but generation facilities certified under FIT or FIP are not eligible.

By self-wheeling, consumers can make contracts directly with developers without involving retailers. Moreover, the purchased electricity is not subject to renewable energy surcharges. Although the supply-demand adjustment of electricity associated with self-wheeling is required, the cost will be lower than regular physical PPA, even if it is outsourced to a specialized service provider.

In order to apply self-wheeling, consumers can also lease generation facilities from developers to supply electricity from the leased generation facilities to their own or group companies' business locations. Strictly speaking, this is not a physical PPA, but it has the same benefits.

■Contract Scheme of Physical PPA with Self-wheeling



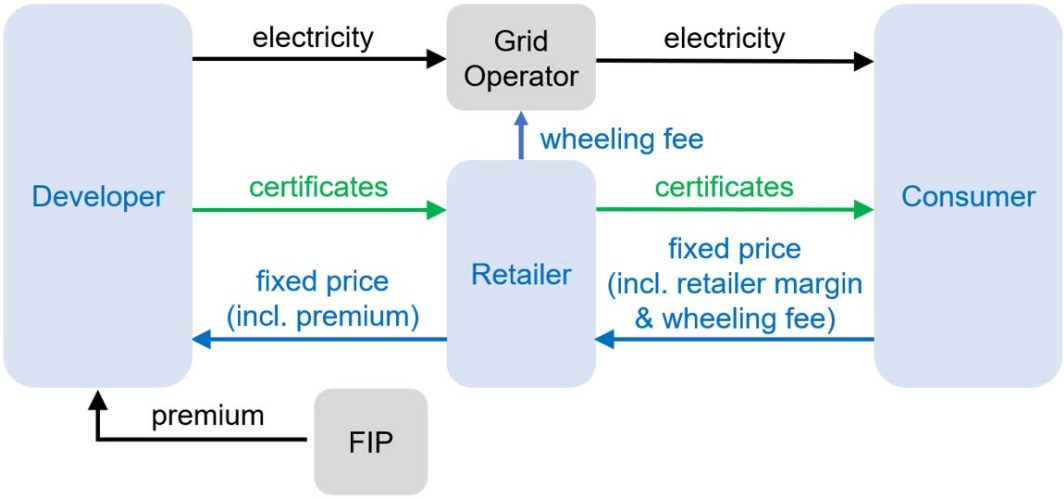
Aeon Mall, an Aeon Group company that operates large-scale commercial facilities, procures electricity for its stores through leased solar generation facilities. The company began supplying electricity by self-wheeling to 31 stores nationwide in September 2022 from 740 small-scale solar power generation facilities built by developers in various location. All of them are low-voltage solar power generation facilities with an output of less than 50 kW, totaling approximately 65 MW.

Other than self-wheeling, the cost of physical PPA can be reduced by utilizing the FIP, which began in FY2022. Under the conventional FIT, the government purchases the electricity generated and recovers most of the purchase cost through renewable energy surcharges added to the electricity tariffs for every consumer. In exchange for a long-term guarantee of the purchase price, the government retains the environmental attributes associated with the renewable electricity and sells it to retailers and consumers as FIT Non-Fossil Certificates.

Under FIP, on the other hand, developers are responsible for selling the power. The government then grants a premium to the developers based on the difference between the price certified under the FIP and the average wholesale market price. The income of the developers fluctuates, but in return, they can retain the environmental attributes and sell them to retailers and consumers.

By applying the FIP, developers can offer both electricity and environmental attributes to consumers through physical PPAs. In addition, the price of physical PPA can be reduced to consider the revenue from the premium by FIP. Currently, physical PPAs in Japan are limited to solar power at low generation costs, but if FIP is applied to other renewable energy sources, such as wind power, it could also drive physical PPAs.

■Contract Scheme of Physical PPA with Feed-in Premium

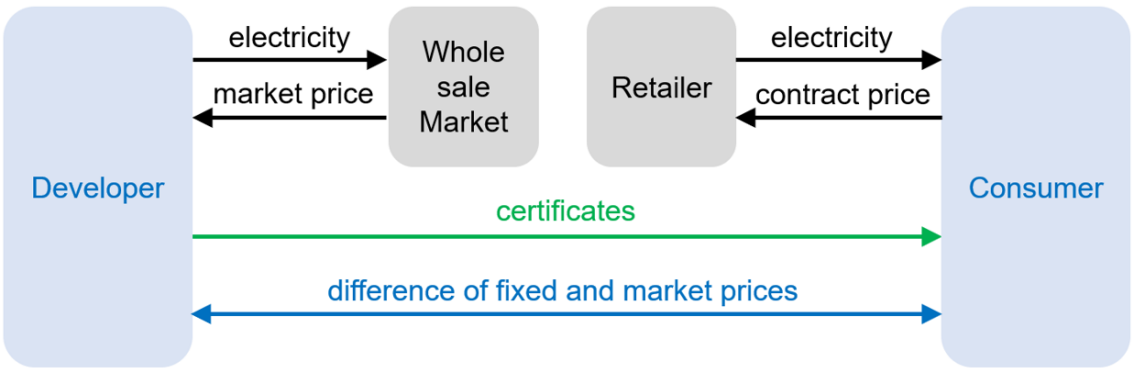


● Virtual PPA only for Certificates

Of the two types of off-site PPAs, virtual PPA separates the electricity and environmental attributes, and the consumer purchases only the environmental attributes by certificates. With continuing the existing electricity contract with retailers, the environmental attributes can be purchased from developers on a long-term basis and to use as renewable electricity. The major advantage is that the electricity contract does not need to be changed.

On the other hand, the developer earns income by selling the generated electricity to the wholesale market. Since the transaction price of electricity fluctuates in the market, a contract in which the consumer and the developer settle the amount of the fluctuation is common in virtual PPAs. The objective is to ensure the recovery of the initial investment by allowing the developer to secure a certain level of income, but the consumer bears the risk of price fluctuations.

■Contract Scheme of Virtual PPA

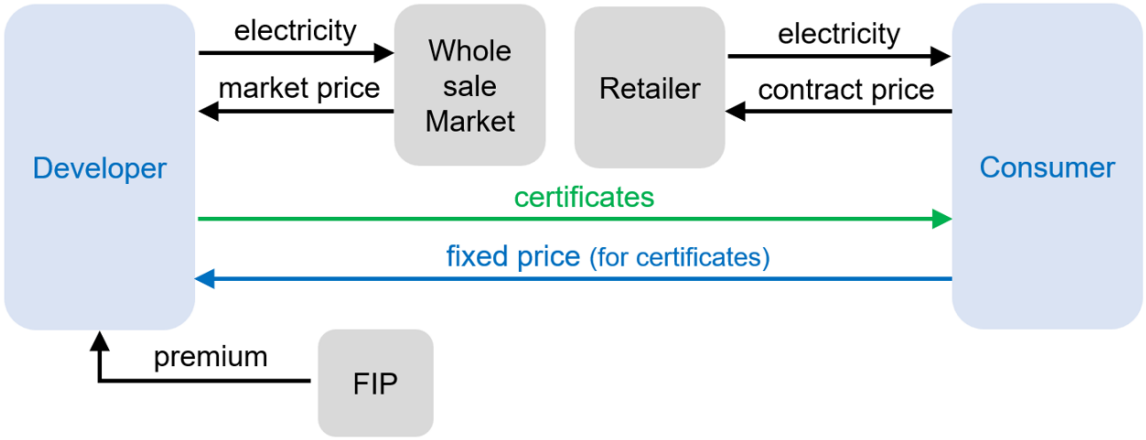


In the past, virtual PPAs also required the involvement of retailer in Japan, but the rule has changed since FY2022, allowing consumers and developers to make virtual PPAs directly. The new rule is applicable to generation facilities that started operation after April 2022 and have not been certified under FIT. In addition, generation facilities completing the FIT program are also eligible for direct virtual PPAs.

The combination of virtual PPA and FIP also allows for a fixed price contract between the customer and the developer without differential adjustment. Premium by FIP is calculated by the fixed price applied to each generation facility and the average price in the wholesale market. The premium increases when the market price is lower and vice versa. It makes up the difference between the fixed price and the market price in the virtual PPA, which has the effect of stabilizing the income of developers.

By combining the premium with electricity sales revenue from the wholesale market, developers can absorb much of the fluctuation in market prices. However, the premium fluctuates on a monthly basis and does not fully compensate for the fluctuations. If the virtual PPA is contracted without a difference adjustment, the developer bears the risk of fluctuating revenues, but the addition of the premium reduces the risk to a small amount.

Contract Scheme of Physical PPA with Feed-in Premium



Sony Group aims to procure 100% of its electricity from renewable energy sources by 2030 and signed the Japan's first virtual PPA combining FIP. The virtual PPA provides environmental attributes (Non-FIT Non-Fossil Certificates) from the developer under a long-term contract starting in November 2022. The developer operates a solar power generation facility certified under the FIP and sells the generated electricity to the wholesale market. The size of the facility is approximately 2MW, and the contract term is approximately 20 years.

In this virtual PPA, Sony Group adopted a method to adjust the trading price of the environmental attributes including the premium of FIP. The developer earns income based on the amount of electricity generated based on the fixed price set in the virtual PPA, regardless of fluctuations in the trading price in the wholesale market or the premium of FIP.

There is another way for consumers to enter virtual PPAs at a fixed price without using FIP. This is a virtual PPA contracted by Sumitomo Mitsui Banking Corporation (SMBC) with retailer TEPCO Energy Partners. TEPCO provides SMBC with the environmental attributes of the newly built solar power plant in combination with regular electricity. From the perspective of the consumer, SMBC, this is a virtual PPA in which the environmental attributes of a dedicated solar power plant is provided under a long-term contract. The environmental attributes can be purchased at a fixed price while the existing electricity contract with TEPCO continues.

On the other hand, the developer can supply electricity and environmental attributes to TEPCO at a fixed price and receive a stable income over the long term. The contract between the developer and TEPCO is a physical PPA. The consumer and the developer can make a long-term contract without the risk of price fluctuation by involving the retailer.

The key issue for both consumers and developers in virtual PPAs is how to deal with fluctuations in the transaction price in the wholesale market. Several options are possible, including incorporating differential adjustment, which is standard in virtual PPAs, or applying FIP and contracting at a fixed price, or purchasing environmental attributes at a fixed price by involving a retailer.

Some of the electricity contracts with retailers set unit prices that fluctuate in line with the wholesale market price. In this case, the difference adjustment in virtual PPAs can absorb the market price fluctuation. Consumers will be able to purchase electricity and environmental attributes at a fixed cost in total. The combination of a market priced electricity contract and a virtual PPA with differential adjustment is an effective way to stabilize costs for consumers.

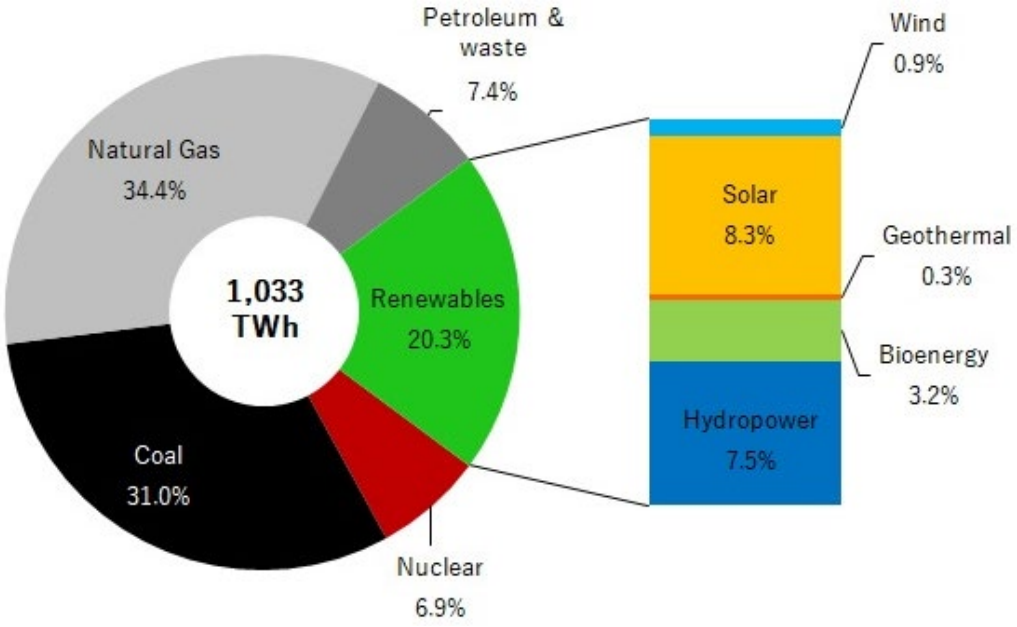
As virtual PPAs increase, various forms of contracts will emerge. There is also a growing possibility that retailers and financial institutions will offer services to consumers to hedge the risk of price fluctuations in virtual PPAs. Such services have already begun in the United States.

3. Green Products

As more corporates seek renewable electricity, the number of green electricity products sold by retailers has increased. While this is a convenient way to procure renewable electricity, there are pros and cons depending on the type of electricity offered in each product.

In FY2021, renewables accounted for 20.3% of the nation's total electricity generation (1,033 TWh). Looking at the breakdown, solar power accounted for the largest share at 8.3%. This was followed by hydropower at 7.5%, bioenergy at 3.2%, wind at 0.9%, and geothermal at 0.3%.

Electricity Generation by Source in Japan (%, FY2021)



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

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. The majority of hydro comes from large power plants that have been in operation for a long time.

Given this situation, renewable electricity products sold by retailers can be divided into three types. Each type differs in terms of additionality (CO_2 reductions due to new generation facilities) and environmental impact.

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

There are some points to note in the renewable electricity products sold by retailers. Check whether the fuel surcharges are added to the electricity rates. The fuel surcharges are calculated monthly based on the import price of fossil fuels (coal, oil, natural gas) used for thermal power generation by regional utilities and can be added to electricity rates. Many retailers other than the regional utilities also incorporate the fuel surcharges into their electricity rates.

Although fuel costs are not originally required for electricity generated from renewable energy sources (with the exception of bioenergy), the fuel surcharges are often added, and the rates fluctuate monthly depending on the import price of fossil fuels. The risk of fluctuations in fossil fuel import prices will continue being affected by other countries around the world. For stabilizing the procurement cost of electricity, it is necessary to select green products that do not include the fuel surcharges.

● Electricity applied to FIT (FIT electricity)

The amount of electricity covered by the FIT in FY2021 reached 114 TWh. The electricity purchased under the FIT (FIT electricity) does not emit CO_2 when generated, but CO_2 emissions are not considered zero. The electricity subject to the FIT is positioned as the average electricity for the country as a whole.

Since the electricity subject to the renewable surcharges includes thermal and nuclear power generation, the rule is that CO_2 emissions from electricity purchased under the FIT are calculated based on the previous year's average for the entire country, including thermal and nuclear (the average for FY2021 is 0.435kg/kWh). In addition to the domestic "Law Concerning the Promotion of the Measures to Cope with Global Warming," international projects such as CDP and RE100 do not recognize FIT electricity as renewable electricity with zero CO_2 emissions.

Since FIT electricity does not actually emit CO_2, there is a system under which the government retains the environmental attributes and trades it on the market as "FIT Non-Fossil Certificates (NFCs)". When electricity is combined with FIT NFCs, it can be used as renewable electricity with zero CO_2 emissions.

A number of retailers are offering 100% renewable electricity products that combine FIT electricity and NFCs. The minimum price for FIT NFCs has been reduced from JPY1.3/kWh to 0.3/kWh since the November 2021 auction. The total price including FIT NFCs is currently close to the regular electricity rates.

FIT NFCs were traded on the "Non-Fossil Value Trading Market" of the Japan Electric Power Exchange (JEPX) since FY2017 four times a year. After November 2021, they are traded on the newly established "Renewable Energy Value Trading Market" on JEPX. With the transition to the new market, in addition to retailers, corporate consumers and brokers are able to purchase FIT NFCs.

With the reduction of the minimum price, FIT NFCs have become more accessible as a means of procuring electricity from renewable energy sources. In the two consecutive auctions in FY2022 (August and November), a record high of approximately 3.3 TWh was traded. Even so, this is only about 6% of the amount of certificates issued (about 57.7 TWh in the November auction), so there is sufficient supply to meet demand. In FY2022, the certificates can be purchased at the lowest price of JPY0.3/kWh. However, the minimum price is scheduled to be raised to JPY0.4/kWh in FY2023.

The amount of FIT NFCs issued (FIT electricity generated between January and December 2021) that consumers can apply to their electricity in FY2021 has increased to 112TWh. All of this amount was sold in four auctions from August 2021 to May 2022 (FIT NFCs for FY2022 are sold in four auctions from August 2022 to May 2023).

FIT electricity, which is the source of the FIT NFCs, is supplied by renewable energy generation facilities that have been certified by the government. There are five types of renewable energy that are eligible for the certification: solar, wind, small and medium-sized hydropower, geothermal, and bioenergy (biomass).

For bioenergy, the type of fuel is specified, but a wide range of fuels from biological origins are currently allowed. It is advisable to check each fuel, since there is a possibility of using a type of fuel that is unacceptable from the sustainability perspectives.

There are another type of NFCs "Non-FIT NFCs" derived from non-fossil energy sources that are not subject to FIT, and the trading began in FY2020. In addition to large hydro power plants with an output of 30MW or more, "graduated-FIT" by residential solar power plants that have completed their FIT purchase period are also eligible for Non-FIT NFCs. Furthermore, nuclear power generation are eligible for Non-FIT NFCs.

Non-FIT NFCs are divided into two categories: "renewable” and "non-renewable”. Non-FIT NFCs (non-renewable) cannot be used for procuring renewable electricity. Most of the Non-FIT NFCs (non-renewable) are from nuclear power, and the rest are from the heat of incineration of waste plastic.

■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, Consumer (only for virtual PPA)	Retailer
Purchasing Method	Auction by trading market	Auction by trading market, Bilateral trading	
Floor Price	JPY 0.3/kWh (plan to raise to JPY 0.4/kWh in FY2023)	JPY 0.6/kWh	
Ceiling Price	JPY 4.0/kWh	JPY 1.3/kWh	
Trading Price by Auction	Multi-priced	Single-priced	
Issuance Amount	112TWh (FY2021)	approx. 95TWh (FY2021)	approx. 65TWh (FY2021)

A big problem remains with NFCs, regardless of energy type. When retailers and consumers purchase NFCs, they cannot choose the method of electricity generation, such as solar or wind. They do not know the location and the operation start date of the generating facilities.

If the generating facilities cannot be identified, the electricity will not be considered renewable internationally. RE100, an international initiative to promote the use of 100% renewable electricity by corporates, does not recognize NFCs without environmental attributes as a means of procuring renewable electricity.

To solve this problem, Ministry of Economy, Trade and Industry (METI) started a demonstration experiment to add attribute information to identify (track) power generation facilities for FIT NFCs, in the February 2019 auction. From the November 2021 auction, the scope was expanded so that attribute information can be added to all FIT NFCs.

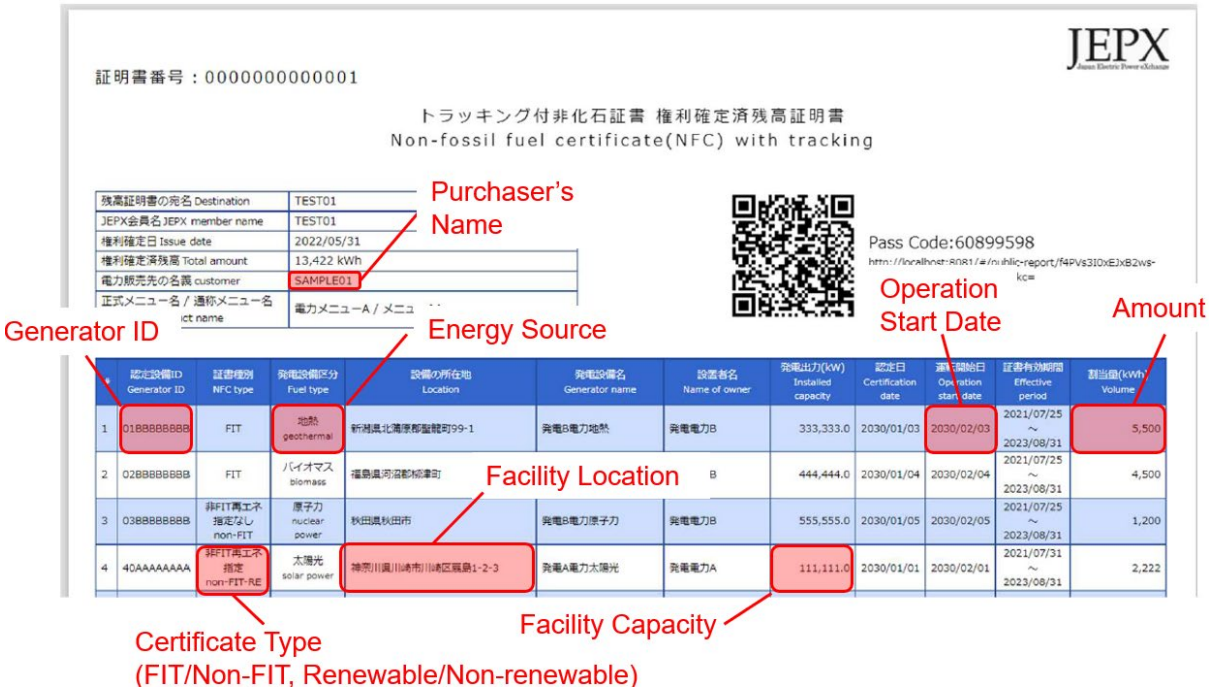
● FIT Non-Fossil Certificates with Tracking

The tracking function of NFCs was transferred to JEPX in FY2022, and the system was changed to conduct both bidding and tracking. Along with the transfer of operations, the management system for NFCs was restructured so that bidding and tracking can be executed in the same system from the August 2022 auction.

Two functions have been added to the new system: the first allows businesses and consumers to view all NFCs they hold in the account of the management system.

The second new function is the procedure for cancelling NFCs. Once cancelled in the system, NFCs can be used as certificates for electricity from renewable energy sources. The certificate can be provided with the name of the consumer exercising the rights to the NFCs, including tracking information of key environmental attributes.

■Non-Fossil Certificates with Tracking



Source: Ministry of Economy, Trade and Industry
English notes (red) added by Renewable Energy Institute

There are nine items of tracking information that can be added to NFCs. In addition to the energy source, the location and the operation start date of the power generation facilities are included to verify environmental impact and additionality.

Nevertheless, there is significant room for improvement in the current tracking of NFCs. Tracking information is not included at the time retailers or consumers purchase them but needs to be added after the purchase. It is not always possible for consumers to purchase NFCs with tracking information that meets their desired conditions.

Renewable energy certificates used in Europe, North America, and other major countries around the world include tracking information when they are issued. Consumers can purchase certificates based on the tracking information. While NFCs are traded at the same price regardless of the energy source and other attributes, overseas certificates are priced higher for the sources with lower environmental impact and newer operation start date.

The system should be changed so that NFCs can be traded in the same way as overseas certificates, including tracking information at the time of issuance. It is desirable that retailers and consumers can purchase certificates that meet their requirements based on tracking information. METI is considering changing the system to include tracking information at the time of issuance of NFCs.

When developers register the generation facilities for NFCs, they are required to provide details of the facilities. If such information is included in the NFCs, consumers will be able to purchase the certificate after confirming the environmental impact and sustainability of the fuel in advance.

● Electricity not applied to FIT (Non-FIT electricity)

There are many renewable power generation facilities operating for a long time. If they have been in operation for more than 20 years, they are not eligible for FIT. Recently, the number of “graduated-FIT” facilities completing the FIT purchase period is increasing.

As the cost of solar and wind power generation declines, more facilities will not require the FIT program. Feed-in-Premium (FIP), the new system replacing FIT started in April 2022 and certifies new non-FIT renewable power generation facilities. The number of different types of non-FIT electricity will increase, including new and old facilities.

One of the green products is supplying electricity from newly constructed solar power generation facilities that are not subject to FIT. A typical example is TEPCO Energy Partner's "Sunlight Premium”. Corporates with electricity contracts of 1MW or larger are eligible to switch a portion of their electricity to Sunlight Premium. It is marketed to consumers who seek renewable electricity with additionality.

The price of Sunlight Premium is not disclosed but considered to add an optional fee to regular electricity rates. Sega Sammy Holdings, major game console manufacturer, is the first user of Sunlight Premium and began using it at the headquarters in Tokyo in December 2021. TEPCO Energy Partners plans to bring the number of new solar power facilities to more than 300MW in five years. Similar products are also sold by Tokyo Gas and Osaka Gas.

Surplus electricity after self-consumption from graduated-FIT residential solar power facilities can be supplied as renewable electricity. The residential solar power purchase program began in November 2009, before the FIT was launched. It was then transitioned to FIT, and solar power generation facilities that completed the 10-year purchase period became graduated-FIT after November 2019. Once they are no longer subject to FIT, they can be sold as renewable electricity with environmental attributes.

A cumulative total of 8.6GW of residential solar power generation facilities will be graduated-FIT from November 2019 to the end of 2025. If the 8.6GW of solar facilities continue to operate, the surplus electricity purchased by retailers is expected to amount to about 9TWh per year. This is equivalent to about 1% of the nation's electricity sales.

In many cases, retailers purchase electricity from graduated-FIT facilities at about JPY 8 to 10 per kWh. Although it takes time and effort to purchase electricity from residences, it is possible to sell it at the same price or lower than regular electricity, even including that cost. Residential solar power has a small environmental impact. However, since it has been in operation for more than 10 years, it is not suitable for corporates that value the additionality provided by new power generation facilities.

Saitama Prefecture aggregates surplus electricity from residential solar power generation facilities that have graduated to FIT in the prefecture and sells "Saitama CO_2 Offset Power" to corporates in the prefecture. Saitama Prefecture ranks second in Japan in the number of residential solar power generation facilities installed and has many graduated-FIT facilities. TEPCO Energy Partners purchases the surplus power and sells it to businesses.

In addition, FIT electricity generated by large scale solar power plants operated by Saitama Prefecture's Bureau of Sewerage and other facilities are added to the Saitama Prefecture CO_2 Offset Power, combining FIT electricity with tracked NFCs to supply electricity from renewable energy source. Graduated-FIT and FIT electricity are available for consumers to choose from. Both are suitable for purchase by corporates that place importance on regional characteristics, as they can locally produce and consume electricity from renewable energy sources.

A similar product was launched in Yokohama City in November 2021. This product combines electricity from biomass power generation at a waste incineration plant operated by the City of Yokohama with electricity from graduated-FIT residential solar power generation in the city.

Electricity supplied by non-FIT and graduated-FIT power generation facilities became eligible for Non-FIT NFCs from the electricity generated in FY2020 (graduated-FIT residential solar power from November 2019). Generators can no longer transfer the environmental attributes of electricity from renewables to retailers without issuing Non-FIT NFCs. Retailers are also not allowed to sell electricity from renewable energy sources without Non-FIT NFCs.

Non-FIT NFCs can be traded on the market or traded between developers and retailers bilaterally. Non-FIT NFCs traded in the market do not come with tracking information to identify the generating facility. Like FIT NFCs, it is possible to add tracking information after trading in the market.

If Non-FIT NFCs are traded bilaterally, the generating facilities can be identified based on the information in the contract. For this reason, the international initiative RE100 recognizes Non-FIT NFCs traded bilaterally as a means of procuring renewable electricity. Graduated-FIT residential solar is also eligible for RE100 because it is limited to bilateral trade between residentials and retailers.

RE100 is calling on the Japanese government to improve the system so that all FIT and Non-FIT NFCs can be tracked. The environmental attributes of renewable electricity are managed through a country-wide tracking system in many foreign countries. All the NFCs should be given attribute information and managed by a tracking system so that corporates can use renewable electricity and certificates complied with international standards.

● Electricity generated from Hydro

The regional utilities are selling 100% renewable electricity products mainly from hydro power generation. TEPCO Energy Partners was the first to sell “Aqua Premium”, a 100% hydroelectric power product for corporates in April 2017.

There are more than 100 hydro power plants for Aqua Premium, with a generating capacity of more than 2GW. In FY2021, 50% of the electricity sold came from large hydro power plants with an output of 30MW or higher, and the remaining 50% was supplied from small and medium-sized hydro power plants with an output of lower than 30MW.

Eligible hydro power plants do not include generation facilities under the FIT. The CO_2 emission of the electricity provided by Aqua Premium is zero. However, since it includes electricity from many large hydro power plants in operation for a long time, it is difficult for corporates that value environmental impact and additionality to use this product.

Some of the products sold by regional utilities combine electricity from hydro and geothermal power plants. Kyushu Electric Power's "Renewable Eco Kiwami," selling since November 2021, allows consumers to choose either small hydro or geothermal. This product is designed to meet the needs of corporates that shy away from large hydro with a large environmental impact.

The number of products by hydro power generation is on the decline. Entering 2022, Tohoku Electric Power, Hokuriku Electric Power and Shikoku Electric Power are switching to new products with 100% renewable electricity mixing various renewables.

There are products from hydro power plants operated by local governments. The products are sold through regional utilities as 100% locally produced and consumed renewable electricity.

A typical example is "Aqua de Power Kanagawa," which Kanagawa Prefecture launched in April 2020 with TEPCO Energy Partners. Electricity from 11 hydro power plants operated by the local government is supplied to businesses in the prefecture. By selling electricity at regular electricity rates plus an optional fee for environmental attributes, a portion of the revenue are used for environmental measures in the prefecture.

The optional fee for the product by Kanagawa Prefecture is not disclosed while hydro products by other prefectures set fixed fees. The lowest is JPY1.0/kWh and the highest is JPY4.4/kWh for Nagano Prefecture's "Shinshu Green Denki".

Purchasing electricity from hydro power plants operated by local governments has the benefit of contributing to the local community. A portion of the fees is provided to the local government. Even if the optional fee is high, it is expected to have the effect of returning the cost of purchasing electricity to the local community. From an environmental impact perspective, local hydro products include many small and medium-sized plants with an output of lower than 30,000 kW.

● Electricity through Regional Cooperation

Some of the 100% renewable electricity products are supplied through regional cooperations between local governments. Electricity generated in areas with abundant renewable energy sources is sold to consumers in large cities for utilizing local renewable energy nationwide.

The City of Yokohama in Kanagawa Prefecture, the second largest city in Japan, signed a partnership agreement with 13 local governments 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 corporates. 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 on-site solar power generation.

In addition, a wind power plant operating in Aizu-Wakamatsu City, 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 revenue 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 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 CO_2 emissions.

● Notes on Non-fossil Certificates (NFCs)

Corporate energy users should be careful when purchasing 100% renewable electricity and CO_2 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 NFCs 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 "Zero CO_2 Emission" electricity products. 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 CO_2 emissions, but it cannot be used as renewable electricity.

If a corporate energy user purchases electricity labeled as "Zero CO_2 Emission," there is a possibility that the environmental attributes of nuclear power is used for reducing CO_2 emissions to zero. Nuclear power does not emit CO_2, but it does emit radioactive waste. We need to be aware of this point before purchasing zero CO_2 emission electricity.

4. Renewable Energy Certificates

One option for corporates to procure renewable electricity is purchasing certificates for the environmental attributes derived from renewable energy. By purchasing certificates separately from electricity contracts, corporates can claim using electricity from renewable energy sources.

There are three types of certificates for renewable electricity in Japan. There are "Green Electricity Certificates" and "J-Credits (Renewable Energy)" that corporates can purchase. In addition, FIT NFCs have been available for corporates since November 2021.

The advantage of this option is that there is no need to change the existing electricity contract. However, in terms of additionality mitigating climate change, it has less impact than self-generation and corporate PPAs.

■Certificates for Corporate Energy Users

Brand	Green Electricity Certificate	J-Credit (renewable generation)	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	436GWh (FY2021)	1.3TWh (FY2021)	112TWh (FY2021)
Price	JPY 2-4/kWh for volume purchase	ave. JPY 1.5/ kWh (Apr 2022 auction)	JPY 0.3-4.0/kWh (Floor price to JPY 0.4/kWh in FY2023)
Cancellation	Anytime	Anytime	Same fiscal year

● Green Electricity Certificates mainly by Biomass

"Green Electricity Certificate (GEC)" was launched in 2000. Many corporates are using GECs 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 2022, there were 319 power generation facilities certified for GECs, with a total output of approximately 530 MW. By type of renewable energy, bioenergy, solar and wind power account for the majority. Since certificates can be purchased by specifying the power generation facilities, it is easy to confirm the environmental impact. As of October 11, 2022, 37 suppliers were registered selling GECs.

The amount of certificates issued in FY2021 was 436 GWh, a significant decrease from 609 GWh in FY2020. The decrease in solar certificates was particularly significant. Bioenergy certificates accounted for about 90% of GECs issued in FY2021. Most of the remainder was solar power, with few certificates for wind power.

In principle, power generation facilities eligible for GECs are limited to on-site generation facilities including the graduated-FIT facilities. Facilities subject to FIT are not eligible. It is considered that off-site generation facilities that have issued GECs before FY2020, when the Non-FIT NFCs started, are allowed to continue issuing GECs.

The price of GECs varies by supplier. Some suppliers publicly announce the price, while others determine the price by quotation. In the case of quotations, the larger the amount of certificates purchased, the lower the price generally becomes. For large purchasers, JPY 2-4 per kWh is standard.

By purchasing GECs, corporates can claim using renewable electricity. Depending on the amount of certificates purchased, the amount of CO_2 emissions reported to the government and other authorities can be reduced. The national average of CO_2 emissions of electricity sold by retailers in the previous year can be deducted for the amount of Certificates purchased.

If the certificates are to be used to reduce CO_2 emissions reported under the Law (the Law Concerning the Promotion of the Measures to Cope with Global Warming), they must be certified under the "Green Energy CO_2 Reduction Equivalent Certification System" operated by the government. “Green Heat Certificates”, which can be issued for heat generated from renewable energy, can be applied in the same way for reporting under the Law.

Facilities eligible for GECs are certified by the Japan Quality Assurance Organization (JQA), a third-party certification organization, based on guidelines by Ministry of Economy, Trade and Industry. Power generation methods include co-firing of bioenergy and fossil fuels, and mixed fuels of waste cooking oil and kerosene. In the case of co-firing, the ratio of bioenergy to fossil fuel is evaluated, and in case the ratio is low, the project will not be certified.

All types of generation facilities are required to submit documents and verifiable information that assess the impact of the facilities on the surrounding environment. Hydro power generation is limited to cases where power generation facilities are newly constructed on rivers or added to existing facilities. In the case of adding power generation facilities to dams and weirs, the environmental impact assessment of the dam or weir and the status of local consensus are required for the approval.

Many of the power generation facilities certified for GECs have been in operation for a long term. In particular, facilities using bioenergy may have been in operation for more than 20 years.

Additionality of promoting investment in renewable energy is one of the requirements. For issuing GECs, additionality is recognized not only when the power generation facilities are constructed, but also when it contributes to continuing the operation of the existing facilities (e.g., procurement of biofuel). Therefore, power generation facilities in operation for more than 20 years can still be certified. Corporates need to confirm the operation start date of the facilities for each GEC if they want to judge the additionality strictly by the operation time.

● J-Credits mainly by Residential Solar

“J-Credits" issued by the government also allows trading of the environmental attributes of renewable electricity. generation facilities. There are two types of J-Credits depending on the method used to reduce CO_2 emissions: J-Credits (renewable generation) and J-Credits (energy conservation and others). Only J-Credits (renewable generation) can be used by corporates to procure renewable electricity.

Five types of renewable electricity generation methods are covered: solar, wind, hydro, geothermal, and bioenergy. In many cases, local governments and third-party organizations issue J-Credits (renewable energy) by consolidating the environmental attributes of self-consumed electricity from residential solar facilities in each region. Residential solar power generation has the benefit of small environmental impact.

In J-Credits (renewable generation), the amount of self-consumed electricity is calculated by the generation amount and the dispatched amount to the grid, then converted to CO_2 reductions. Corporates can be considered to have procured renewable electricity in proportion to the amount of purchased J-Credits (renewable generation), which can be used to reduce CO_2 emissions. When converting to the amount of electricity, the calculation is based on the average CO_2 emission factor of the country's total electricity for the year in which the electricity is generated.

When using J-Credits (renewable generation) to reduce CO_2 emissions, it is necessary to apply to the J-Credit system secretariat for cancelling the credits. Upon completion of the cancellation procedure, "Renewable Energy Calculation Notice" will be issued. In addition to reporting under the Law Concerning the Promotion of the Measures to Cope with Global Warming, it can also be used for CDP and RE100 reporting.

However, the Tokyo Metropolitan Government's "Obligation to Reduce Total Greenhouse Gas Emissions and Emissions Trading System (Cap & Trade System)" for large-scale business operators does not allow reductions in CO_2 emissions through J-Credits.

Residential solar facilities after the feed-in tariff purchase period (“graduated-FIT”) are also eligible for J-Credits (renewable generation) if additional capital investment is made, such as the installation of batteries (limited to cases where additional equipment is installed after May 27, 2018). The portion of the electricity consumed on-site from the graduated-FIT solar facilities can be issued as J-Credits (renewable generation).

The environmental attributes of the self-consumed residential solar electricity by the graduated-FIT facilities are also eligible for GECs. To prevent duplicate issuance of the environmental attributes of the same electricity, the J-Credit system secretariat checks for duplication based on the list of issued GECs and excludes them from the certification. Including this point, it is difficult to position GECs and J-Credits. The government needs to take the lead in reconstructing the system.

There are three ways to purchase J-Credits: through brokers called "J-Credit Providers" (offset providers), directly from J-Credit holders, or through auctions conducted by the J-Credit system secretariat. As of November 2022, six suppliers had registered as J-Credit Providers. The auctions by the secretariat are usually conducted twice a year.

The amount of J-Credits (renewable generation) certified in FY2021 expanded to 1.3TWh, a significant increase from 1.0TWh in FY2020. The increase in graduated-FIT residential solar power facilities is thought to be the main factor. In the April 2022 auction, the average transaction price was JPY3,278/ton, equivalent to JPY 1.5 per kWh.

The price of J-Credits (renewable generation) is lower than the standard price of GECs (around JPY2-4/kWh). The average transaction price continues to rise from 2021 to 2022. It is higher than the minimum price for FIT NFCs (JPY 0.3/kWh). For purchasing NFCs, corporates must become a member of the Japan Electricity Power Exchange, which requires an admission fee and annual membership fee. J-Credits (renewable generation) may be cheaper when purchasing small amounts.

J-Credits require projects implemented on or after April 1, 2013 to be registered. The maximum period for which credits can be issued is eight years. The period can be extended for another eight years by submitting a "Notification of Changes to Project Plan".

When applying for a project, it is necessary to submit a written plan including the location of the power generation facility, the name and model number of the manufacturer of the equipment to be used, the capacity, and the operation start date. The plan has been reviewed and must be approved by the certification committee before the registration of the project.

After the project is registered, monitoring must be conducted, and reports submitted on an average cycle of one to two years. J-Credits can be issued if the report on CO_2 reductions from on-site consumption of renewable electricity is approved by the certification committee.

5. Key Considerations in Procurement

● Calculating CO_2 Emissions from Certificates

There are two methods of calculating CO_2 emissions associated with the use of electricity when reporting to the national and local governments. One is to calculate based on the CO_2 emissions factor of the electricity (CO_2 emissions per kWh of electricity) sold by the retailer in each fiscal year, and the other is to apply a product-specific CO_2 emissions factor.

Product-specific CO_2 emissions factors can be applied to electricity combined with NFCs. Retailers shall calculate the CO_2 emissions factor by subtracting the average CO_2 emissions factor for the entire country in the previous year (0.435kg/kWh, FY2021) from the CO_2 emissions factor of the electricity sold (the emissions factor cannot be negative). With this calculation method, the CO_2 emissions factor for products combining FIT electricity (the national average CO_2 emissions factor is applied) and FIT NFCs will be zero.

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 GECs and J-Credits, corporate energy users can choose the year to use them to report CO_2 emissions. GECs and J-Credits are more flexible than NFCs when it comes to reporting CO_2 emissions. However, it is important to avoid using certificates issued many years ago. 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 CO_2 is concerned.

CDP, which evaluates corporates' climate change efforts, recognizes electricity combined with NFCs as renewable energy. However, it asks corporates to use electricity with low CO_2 emissions by the following three recommended conditions. For meeting these recommended conditions, electricity with a high CO_2 emissions 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 CO_2 emissions factor in case renewable electricity cannot be purchased.
3. Procure electricity with a CO_2 emission factor at least equal to or lower than the national average.

● Prioritizing Generation Method or CO_2 Emissions

There are two ways for corporate energy users in 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 or not, choose electricity from renewable energy sources that do not actually emit CO_2.

The other approach is procuring renewable electricity that can be used to reduce CO_2 emissions. Corporates that are obligated to report their CO_2 emissions to the government and other entities must report CO_2 emissions based on the calculation method stipulated by each system. In this regard, FIT electricity must be procured with a combination of certificates.

Whether choosing electricity from renewable energy sources that do not actually emit CO_2 or electricity that can be used to reduce CO_2 emissions through institutional means is left to the policy of individual corporate energy users. This will differentiate the value of using FIT electricity and certificates.

Patagonia, an outdoor goods manufacturer, has a clear policy regarding CO_2 emissions associated with the use of renewable electricity. The company has been promoting environmentally friendly business practices. For reducing CO_2 emissions to mitigate climate change, they purchase FIT electricity in Japan to increase the amount of electricity from new power generation facilities replacing electricity generated from thermal power plants. Patagonia is not concerned about CO_2 emissions only 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 agricultural lands in Japan, crop production is mandatory. By restarting crop production, CO_2 can be absorbed and the benefits of reducing CO_2 emissions are larger.

From April 2020, new rules are applied to electricity sold by retailers. If they sell CO_2 free electricity, it must come with NFCs. Even if electricity is generated from renewable energy sources, it cannot be claimed to have environmental attributes without NFCs.

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 energy mix of the electricity and the types of NFCs on the websites. It also requires the same disclosure for specific products such as 100% renewable or zero CO_2 emissions.

However, both disclosures are only recommended 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 the energy mix and the types of NFCs.

When purchasing 100% renewable or zero CO_2 emissions products, it is advisable to confirm the details of the energy source and the type of NFCs with the retailer. The label "NFCs (renewable)" does not indicate whether it is FIT or Non-FIT, or the source of the environmental attributes by solar, hydro, or bio energy. With trackable NFCs, consumers can identify the specific power plant, the environmental impact and additionality.

The Electricity and Gas Market Surveillance Commission has revised its guidelines for electricity retail again in September 2022 in response to a significant increase in the fuel surcharges added to electricity rates. It recommends that retailers explain the fuel surcharges to consumers in an easy-to-understand manner.

Many electricity products sold by retailers use a calculation method for adding the fuel surcharges based on the recent fossil fuel import prices. Since 100% renewable energy products may apply the same level of fuel surcharges, consumers should confirm it before purchasing.

6. Requirements for Renewable Electricity

In procuring renewable electricity, many corporates are focusing on environmental impact, sustainability of the energy source, additionality in terms of climate change mitigation, and contribution to the local community. The objectives are not only reducing CO_2 emissions, but also increasing renewable energy socially valuable.

A typical example is the renewable electricity evaluation method introduced by office equipment manufacturer Ricoh in March 2021. When purchasing renewable electricity, Ricoh gives a score in each of nine categories, including price, additionality, environmental impact of the energy source, and contribution to the local community. Among energy sources, especially for biomass, Ricoh checks whether it is domestically produced or imported, burned exclusively or mixed with coal, and whether it has been certified by a third party.

RE100, an international initiative for corporates around the world to use 100% renewable electricity, stipulates specific requirements for renewable electricity procured by the members. It requires members to take sustainability and additionality into account.

Recently, an increasing number of corporates have been requesting suppliers (supply chain) to use renewable electricity meeting certain requirements. Failure to procure renewable electricity meeting the requirements may result in discontinuing the existing business. It has become important for corporates to confirm the requirements for renewable electricity for maintaining and expanding their business.

● Evaluation Criteria for Additionality

From the perspective of mitigating climate change, the number of corporates emphasizing additionality is expanding in Japan. The construction of new (additional) power generation facilities with renewable energy sources has the effect of replacing electricity by fossil fuels and reducing CO_2 emissions. However, the criteria for judging additionality are not standardized both in Japan and globally.

There are three main criteria for evaluating additionality. The basic criteria is #1 below, but it is not wrong to support a wide range of renewable electricity through an expanded interpretation such as #2 and #3.

1. Purchasing renewable electricity from newly constructed generation facilities (including on-site generation and consumption).

2. Purchasing electricity/certificates from renewable electricity generation facilities in operation for a short period to support developers recovering investment and promoting new projects.

3. Purchasing electricity/certificates from renewable electricity generation facilities in operation to support developers continuing the operation.

In terms of reducing CO_2 emissions, #1 above is the most effective. In addition to on-site generation and consumption, corporate PPA (Power Purchase Agreement) for new facilities is applicable. The next effective case in terms of CO_2 reductions is #2. Based on the standard payback period for power generation facilities (15 years), the requirement of "power generation facilities within 15 years of operation" is popular in the US.

RE100 specifically stated additionality in its Technical Criteria revised in October 2022. On-site generation and corporate PPA (#1 above) are recommended, and purchased electricity and certificates should be limited to power generation facilities in operation for less than 15 years (#2 above).

In Japan today, even if only the additionality #1 is sought, the number of eligible electricity is limited. It is realistic to refer to the requirements of RE100 and consider additionality, including #2, while comprehensively selecting electricity with better conditions with other selection criteria (environmental impact, sustainability, and local contribution).

On the other hand, #3 above does not have the effect of reducing CO_2 emissions. It can prevent increasing emissions by continuing the existing facilities. If the profitability of the facility becomes very low due to increased operation and maintenance costs, the supplier may stop the operation. To prevent such a situation, providing funds to the supplier through the purchase of electricity and certificates is effective.

● Rating Method of Renewable Electricity

Regarding environmental impact and sustainability of energy sources, which are important in selecting renewable electricity, it is desirable to evaluate power generation method. For solar and wind power, the location of the power generation facilities, for hydro, the impact on river water quality, and for biomass, the benefits such as forest conservation, should be considered.

Including the additionality and local contributions, the benefits of using renewable electricity will be enhanced. As for procurement methods, on-site generation and corporate PPAs (on-site and off-site PPAs) should be highly evaluated, with emphasis that consumers can proactively contribute to the expansion of renewable energy deployment.

Below is an example for evaluating renewable electricity. The selection of the evaluating points depends on the policies of individual corporates.

Example of Rating Renewable Electricity

Criteria	Source	Point	Note
Procurement Option (+4 to 0)	On-site Generation incl. On-site PPA	+4	no impact on grid capacity
	Off-site PPA	+3	long-term carbon reductions
	Green Products from RE facilities	+1	ex. Green Tariffs
	Green Products with Certificates	0	
	Unbundled Certificates	0	
Environmental Impact and Sustainablity (+2 to 0)	Solar (rooftop, industrial zone)	+2	
	Solar (flat land, pond)	+1	
	Solar (sloping land)	0	safety concerns
	On-shore wind (industrial zone)	+2	
	On-shore wind (other locations)	+1/0	due to environmental impact
	Off-shore Wind	+1	
	Small hydro (river maintenance release)	+2	low impact on water flow
	Small hydro (othre sources)	+1	
	Large hydro	0	output over 30MW
	Geothermal (binary)	+2	low impact on energy source
	Geothermal (flash)	+1	
	Biomass (local waste)	+1	carbon emissions by fuels
	Biogas (local waste)	+1	
	Biomass and Biogass (other sources)	0	
Additionality (+4 to 0)	New facilities	+4	
	Facilities within 15 years	+2	
	Facilities over 15 years (renewed within 15 years)	+1	core equipments renewed
	Facilities over 15 years	0	
Local Benefits (+3 to 0) multiple points allowed	Supplier invested by local government	+1	ex. 10% or higher share
	Income donated to local government	+1	a share of income donated
	Additional industry promotion	+1	ex. agricultural production under solar panels on abandoned land

Renewable Electricity Procurement Guidebook

English Edition

January 2023

Renewable Energy Institute

11F KDX Toranomon 1-Chome Bldg., 1-10-5 Toranomon, Minato-ku, Tokyo 105-0001　TEL：03-6866-1020

info@renewable-ei.org
www.renewable-ei.org/en