Renewable Electricity Procurement Guidebook

2024 Edition

自然エネルギー財団
RENEWABLE ENERGY INSTITUTE

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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 2024 edition details major procurement methods of renewable electricity from On-site Generation to Corporate PPAs, Renewable Energy Certificates and Green Products 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.

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About Renewable Energy Institute

Renewable Energy Institute (REI) 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.

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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 on-site, corporate PPAs (Power Purchase Agreements) are being adopted to purchase electricity from new renewable energy sites under long-term contracts. Many corporate energy users have also adopted the method of purchasing certificates for the environmental value of renewable energy (e.g., no CO_2 emissions) or purchasing green products with 100% renewable electricity sold by retailers.

■Procurement Methods of Renewble Electricity

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.
Certificate	Purchase environmental attributes by certificates.	●Increase renewable electricity as necessary. ●Generation sites usually identified. ●Additional cost for electricity procurement.
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.

For corporates consuming substantial 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 generation and corporate PPAs have increased, and the cost of renewable electricity supplied by retailers has also declined.

With the revision of the feed-in tariff (FIT) in FY2022, the transition from FIT to feed-in premium (FIP) is underway. One of the differences between FIT and FIP is that FIP allows power producers to retain the environmental value of renewable energy and supply it to retailers or consumers. The expansion of FIP will also make it easier to enter corporate PPAs for purchasing renewable electricity under long-term contracts.

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 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 able to both reduce CO_2 emissions and costs through on-site power generation and consumption. In addition, an increasing number of developers and retailers can 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, On-site PPA

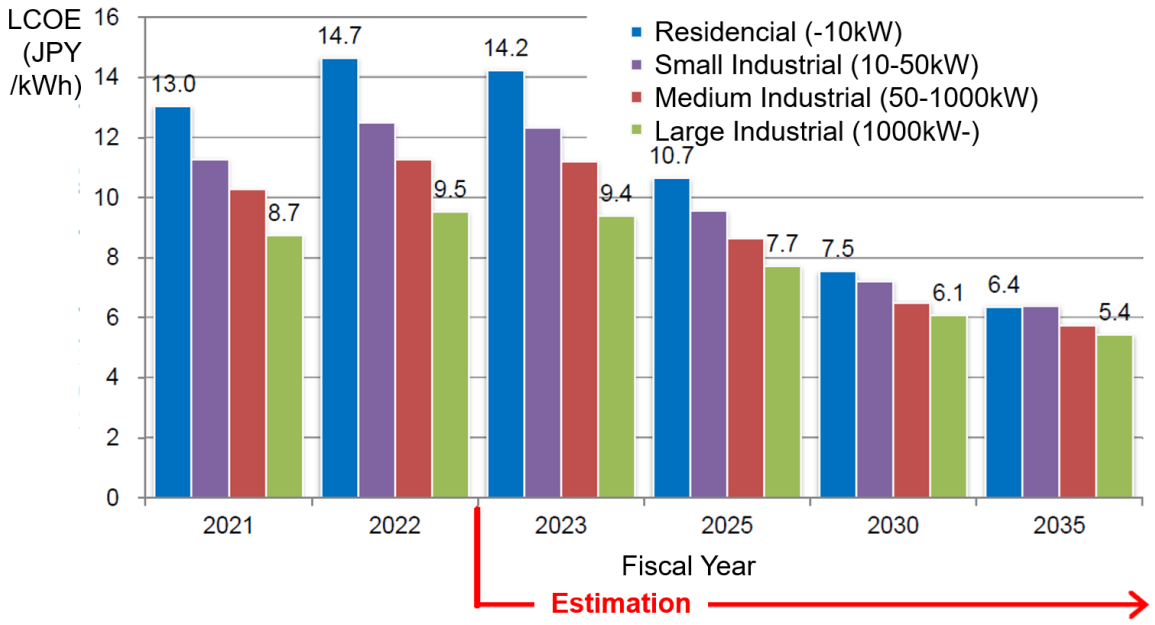
One efficient way to procure renewable electricity is to build and operate your own generation facilities and consume the generated power on your own sites. Using land and buildings you own can keep construction costs low. The grid network is not used, and there are no wheeling fees (network tariffs)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

● Solar Power Generation Cost Declining

According to RTS Corporation, a leading research institute on solar power generation, the cost of large-scale solar (capacity of 1MW or higher) fell to JPY8.7/kWh in FY2021. The cost for medium and small-scale solar was also around JPY10-11/kWh. In FY2022, the solar power generation cost temporarily increased due to the COVID-19 and the depreciation of the yen, which led to higher prices for equipment such as solar panels and installation costs. In FY2023 downward trend began again. The cost is expected to fall to around JPY6-7/kWh in FY2030.

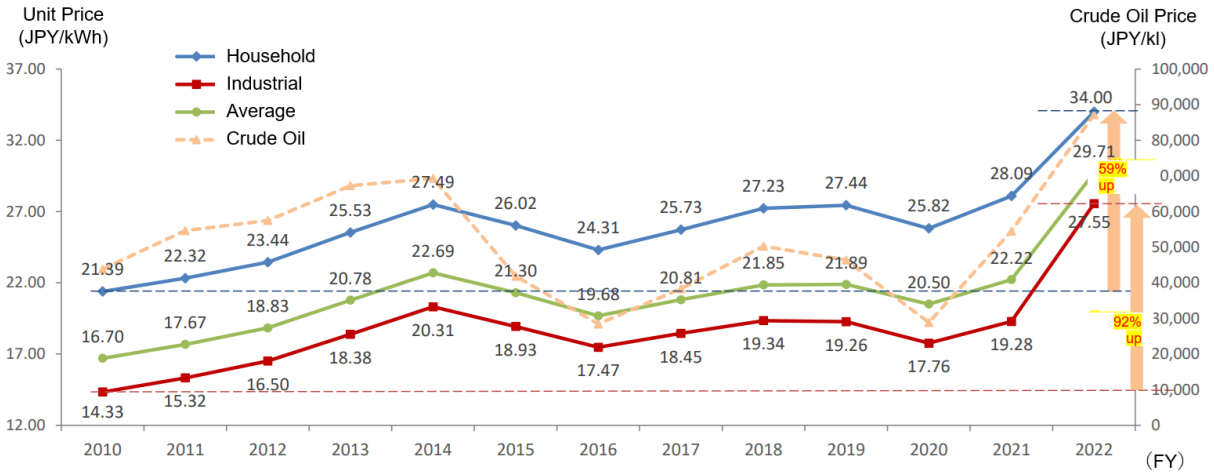
■Trends of Solar Power Generation Cost (in Japan)



LCOE: Levelized Cost of Electricity
Source: RTS Corporation (English by REI)

In contrast, electricity tariffs for corporates through retailers have been significantly higher due to the impact of soaring fossil fuel prices since early 2022. Electricity tariffs (including basic rates, volume charges, fuel cost adjustment, renewable energy surcharges and tax) for industry rose to a national average of JPY27.55/kWh in FY2022 and remained at high levels in FY2023. The tariffs will continue to be affected by fossil fuel import prices.

Trends of Electricity Tariffs (national average)



including Renewable Energy Surcharges and tax
Source: Ministry of Economy, Trade and Industry (English by REI)

Procuring solar power is more cost-effective than purchasing electricity generated primarily by fossil fuels. Installing solar power generation equipment on the rooftops of buildings and inside the business sites eliminates the need to purchase or rent land, which in turn lowers costs.

● 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. In addition, the cost of solar power generation has been declining to be lower than regular electricity tariffs.

One of the large-scale projects of self-generation and self-consumption is that 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. The on-site generation facilities at Tahara Plant are the largest scale with more than 20,000 solar panels to generate 6.4 MW of electricity.

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.

■ Roof-top Solar at Tokyo Steel Tahara Plant (Aichi Prefecture)

Source: Sumitomo Mitsui Finance and Leasing et al.

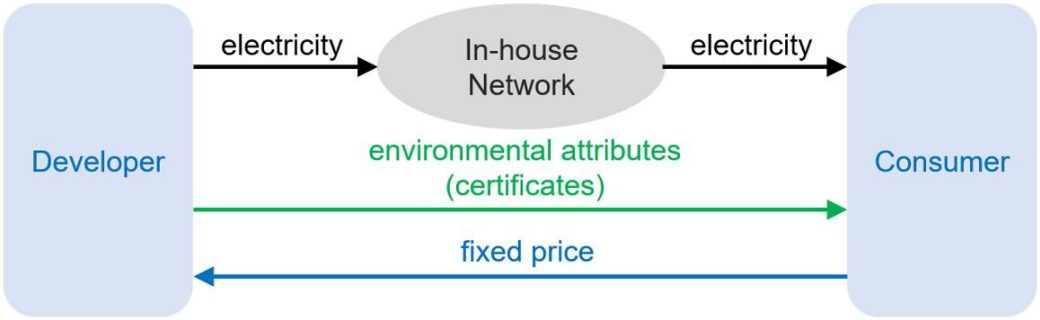
● From Self-generation to On-site PPA

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 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 regular electricity tariffs.

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 with 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.

■Contract Scheme of On-site PPA



The contract price of on-site PPAs varies depending on the size of the capacity, the length of the contract, and the region. In 2021-2022, the contract price averaged around JPY11 kWh (tax included). However, due to higher prices for solar panels and other equipment due to the COVID-19, as well as increased demand for on-site PPAs, the average price increased to JPY14-15/kWh in 2023. In some cases, the price will be around JPY20/kWh for smaller scale facilities, but it is still cheaper than regular electricity tariffs. In the future, the contract price of on-site PPAs is expected to be lower as the price of solar panels and other equipment declines. Contract terms are generally 15 to 20 years.

Aeon Group, one of Japan's major consumer product retailers and the largest electricity buyer, is moving forward with deploying on-site PPAs at its stores nationwide. Aeon previously installed its own solar power generation facilities and switched to on-site PPAs since 2020.

■On-site PPA at Aeon Town Konan (Shiga Prefecture)

Source: Aeon

On-site PPA is adopted by many distribution and manufacturing companies. 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 electricity 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.

Another method is to make an “Off-site PPA” with a retailer so that surplus electricity from the on-site PPA can be supplied to other sites. Mitsubishi Heavy Industries, one of the leading industrial equipment manufacturers, supplies electricity from a solar power generation facilities installed at a plant in Hiroshima Prefecture by on-site PPA and then transfer surplus electricity to other plants by off-site PPA through the grid network.

In addition, batteries can be utilized for surplus electricity from on-site PPAs within the same location. This method does not incur the wheeling fees while continuing electricity supply even in the event of a power outage. However, the current high installation cost of batteries is an issue to solve. The total cost of procuring electricity is higher than with other methods.

2. Off-site PPA (Corporate PPA)

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 corporate PPAs, consumers purchase the generated electricity and environmental attributes from developers at a fixed price. For developers, this is a new source of revenue to replace the feed-in tariff (FIT), and for corporates, it has 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 PPAs. With lower generation costs and the expansion of FIP, more corporates are expected to enter corporate PPAs.

There are two types of corporate PPAs: on-site PPA and off-site PPA. 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 like on-site generation and consumption but differs in that it outsources the entire process from installation to operation and maintenance of the generation facility to the developer.

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

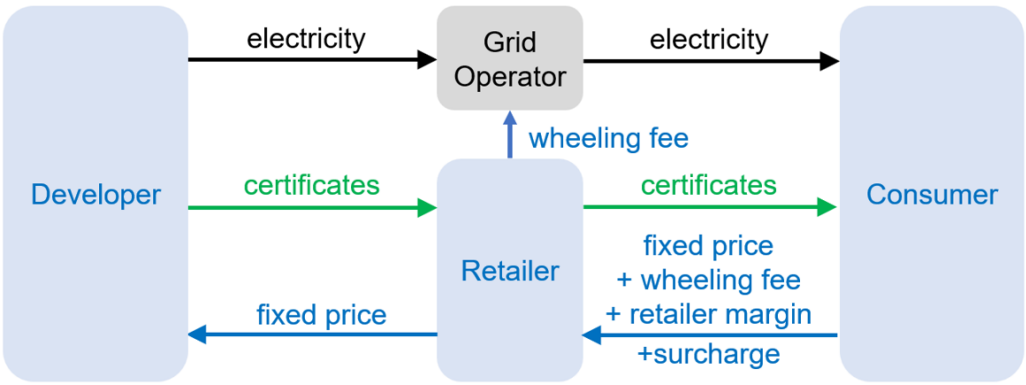
In addition, there are two types of off-site PPAs: one is called "Physical PPA," in which the consumer purchases both electricity and environmental attributes as a set. The other is "Virtual PPA," in which the consumer purchases only environmental attributes. In the U.S., where corporate PPAs are popular,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

● 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 the registered 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.

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

■Contract Scheme of Physical PPA in Japan



Comparing with regular electricity tariffs, the contract price of physical PPAs 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 tariffs provided mainly by thermal power generation. The national average electricity tariffs for industry in fiscal year 2022 was JPY27.55/kWh (including basic rates, volume charges, fuel cost adjustment, renewable energy surcharges and tax). Compared to one year ago, the tariffs increased more than JPY8/kWh.

In 2023, the prices of fossil fuels declined, and electricity tariffs dropped slightly, but have not returned to the 2021 levels. As decarbonization efforts spread further around the world, there will be a shift from coal, a low-cost fossil fuel with high CO_2 emissions, to natural gas, a high-cost fossil fuel with low CO_2 emissions. It is unlikely that fuel costs for thermal power generation will decline significantly.

In the meantime, the contract price of physical PPAs from solar power generation was averagely at JPY13-16/kWh (only for generation without tax) in 2023. Due to the impact of the weak yen and increased demand for physical PPAs, the contract price was JPY3-4/kWh higher than in 2021, when physical PPAs started in Japan. The total cost for consumers (including wheeling fees, retailer fees, renewable energy surcharges and tax) is usually JPY25-28/kWh for high voltage and JPY21-24/kWh for special high voltage. Even so, in many cases, it is still lower or equal to the regular electricity tariffs.

To sign up for physical PPAs, the existing contract must be changed. Since it is difficult to meet electricity demand with physical PPAs, the shortfall is compensated for in the form of a "partial supply" from a retailer. However, the tariffs may be higher than before. In such a case, switching to another retailer with a lower price should be considered.

In a situation where fossil fuel prices are unpredictable, if the long-term cost of electricity can be fixed through physical PPAs, it will help stabilize costs for corporate consumers. In addition to reducing CO_2 emissions by using electricity from renewable energy sources, the benefits of physical PPAs are increasing in terms of economic efficiency. An increasing number of corporates are adopting physical PPAs because of its ability to expand new low-cost renewable energy facilities.

Seven & i Group, a leading consumer product retailer, has been active in physical PPAs to increase procuring 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, one of the major developers, built two solar power plants exclusively for Seven & i in Chiba Prefecture and supply the generated electricity along with its environmental attributes. The total capacity of the solar power plants is 3.1 MW. In addition, NTT Group supplies renewable electricity with “FIT Non-Fossil Certificates” for supplementing any shortfall in demand from the physical PPA.

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) 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 twelve suppliers to procure renewable electricity in its supply chain on a long-term basis. For individual 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 PPAs, consumers can utilize the "self-wheeling" program. Consumers can transfer surplus electricity generated on-site 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 requirement 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 PPAs, even if it is outsourced to an energy service provider. However, forming an association with a developer is not easy from a practical standpoint.

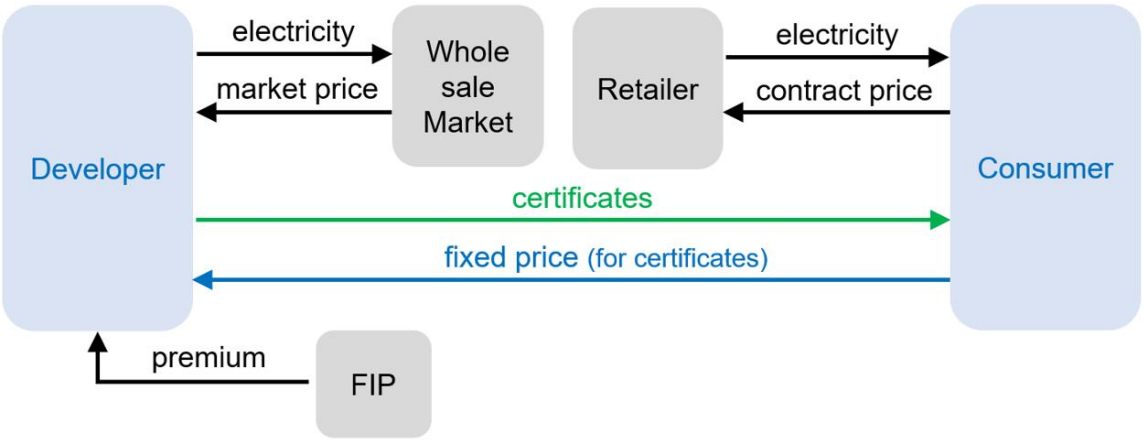
In some cases, customers lease renewable energy facilities from developers to apply self-wheeling. The customer can supply the electricity from the leased facilities to its own or its group company's business site by self-wheeling. However, Agency for Natural Resources and Energy has announced a policy of tightening the requirements from January 2024 with mentioning that the leasing scheme is against the purpose of self-wheeling. The Agency will revise the "Guideline for Self-wheeling" to strictly stipulate the requirements for ownership of generation facilities and consumers of electricity. Self-wheeling by renting power generation facilities for physical PPAs will no longer be applicable.

Other than self-wheeling, the cost of physical PPAs can be reduced by utilizing the FIP, which began in FY2022. Under the conventional FIT, the government purchases the electricity at fixed prices from developers 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 and sells it to retailers or consumers as “FIT Non-Fossil Certificates (FIT NFCs)”.

Under FIP, on the other hand, developers are responsible for selling generated electricity. The income of the developers is not guaranteed, but in return, they can retain the environmental attributes and sell them to retailers or consumers. By applying the FIP, developers can make physical PPAs or virtual PPAs with corporate consumers.

In addition, under the FIP, the government grants a premium to developers based on the difference between the base price approved by the government for each generating facility and the wholesale market price. If the base price is higher than the market price, the developer can get a premium as additional revenue although the calculation of premium is more complicated than price differences. When making physical PPAs, premium by FIP may be considered to reduce the contract price.

Contract Scheme of Physical PPA with Feed-in Premium



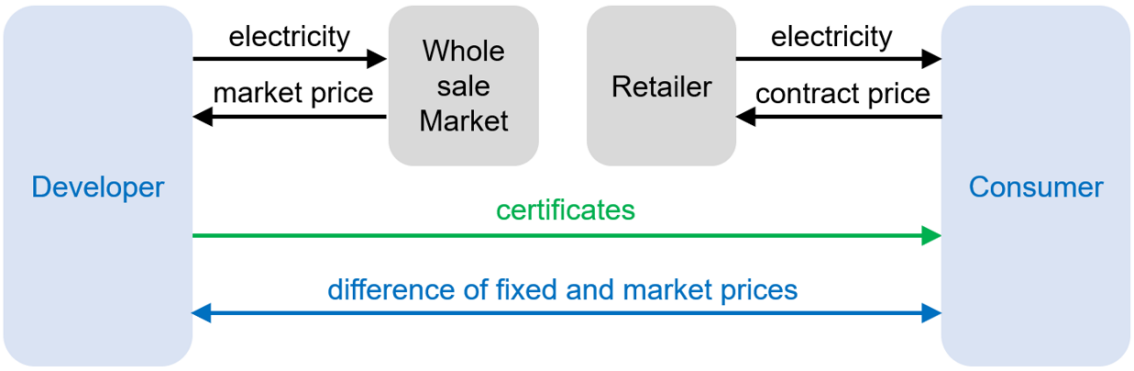
Currently, the majority of physical PPAs in Japan are for low-cost solar, and since the FIP base price for solar is below JPY10/kWh, no premium can be expected since the average market price is usually above JPY10/kWh. However, if the base price of FIP is higher, such as for wind, there is a possibility to set the contract price of physical PPAs lower by considering the increased revenue of the developers with the premium.

● Virtual PPA only for Certificates

Another type of off-site PPAs, virtual PPAs, unbundle the electricity and environmental attributes, and the consumer purchases only the environmental attributes by certificates. With continuing the existing electricity contract with retailers, consumers purchase the environmental attributes from developers on a long-term basis to use as renewable electricity. The major advantage is that the electricity contract does not need to be changed.

The developer earns income by selling the generated electricity to the wholesale market. Since the market price fluctuates by every 30 minutes, the revenue of developers is not consistent. For the developers to receive a fixed revenue, virtual PPAs, like physical PPAs, are contracted at a fixed price. The difference between the fixed price and the market price is settled between the consumer and the developer in virtual PPAs. The purpose is to let the developer recover its investment, but the consumer bears the risk of price fluctuations. Virtual PPAs have advantages and risks that physical PPAs do not.

Contract Scheme of Virtual PPA



The contract price for virtual PPAs is usually at the same level as for physical PPAs. In the case of solar, the contract price in 2023 was 13-16 yen/kWh (excluding tax). If the market price is lower than the fixed contract price, the cost to the consumer will increase. Conversely, when market prices are higher, the cost will decrease. If a virtual PPA is made at a high price, the risk of cost increase for consumers may be greater. To reduce this risk, it is desirable for developers to make power generation facilities certified under FIP so that developers can receive a premium when the market price is low and decrease the consumer cost.

In the past, virtual PPAs required the involvement of retailer as in physical PPAs in Japan, but the rule has changed since FY2022, allowing consumers and developers to make virtual PPAs directly. The new rule is applicable to power 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 consumer and the developer without adjusting the differences of prices. Premium by FIP is calculated by the base price for each generation facility and the average wholesale market price. The premium increases when the market price is lower and vice versa. It makes up the difference between the fixed contract price and the market price in the virtual PPA, which has the effect of stabilizing the income of developers.

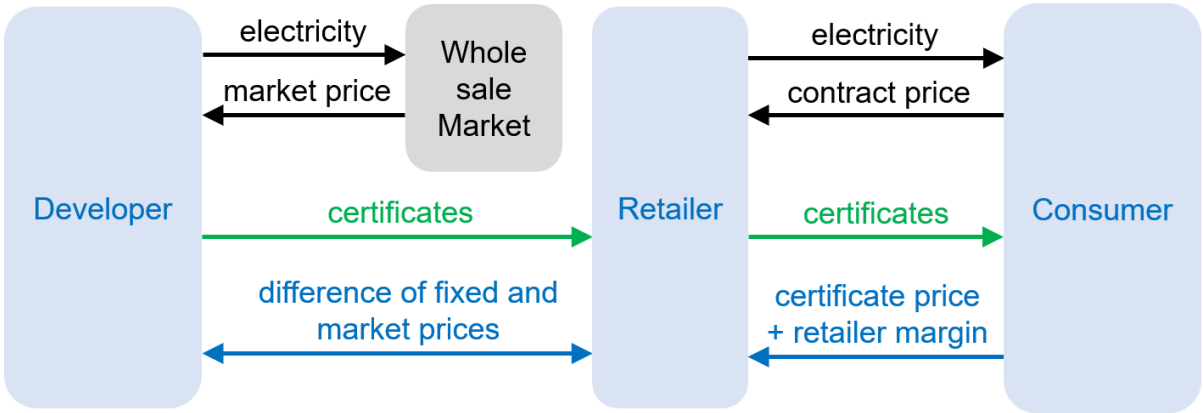
By combining the premium with electricity sales revenue from the wholesale market, developers can absorb much of the fluctuation in the market prices. However, the premium fluctuates monthly and does not fully compensate for the fluctuations. If the virtual PPA is contracted at a fixed price, the developer bears the risk of fluctuating revenues, but the addition of the premium reduces the risk.

Sony Group aims to procure 100% of its electricity from renewable energy sources by 2030 and signed the Japan's first virtual PPA with FIP. The virtual PPA provides environmental attributes by Non-FIT NFCs 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 capacity 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 at a fixed price set in the virtual PPA, regardless of fluctuations in the wholesale market price or the premium of FIP. From a consumer perspective, the total cost will be close to the fixed contract price including the premium.

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

■Contract Scheme of Virtual PPA with Retailer



Some of the electricity contracts with retailers set tariffs that fluctuate by 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 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.

One of the challenges of virtual PPAs with differential adjustments is the issue of accounting treatment. The International Financial Reporting Standards (IFRS), which have been adopted by major Japanese companies, require mark-to-market accounting for virtual PPAs. It is necessary to evaluate profit and loss each time when accounting is performed, based on forecasts of future wholesale market prices.

In the U.S., where virtual PPAs are active, normal accounting is accepted. In Japan, there are no guidelines for accounting for virtual PPAs, and the Japanese Institute of Certified Public Accountants published a research report in June 2023 to study the issue. If normal accounting is accepted as in the U.S., it will make it easier to make virtual PPAs in Japan. However, companies applying IFRS will be required mark-to-market accounting even for virtual PPAs in Japan.

3. 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, corporates can claim using renewable electricity.

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. It should be adopted as the next best option.

There are three kinds of certificates for renewable electricity available in Japan. Corporates can select "FIT NFCs (Non-Fossil Certificates)", "Green Electricity Certificates" and "J-Credits (Renewable Energy)".

■ Certificates for Corporate Energy Users

Brand	FIT NFC	Green Electricity Certificate	J-Credit (renewable generation)
Issuer	Government	Registered Issuer	Government
Fuel	Solar, Wind, Hydro, Geothermal, Bio	Solar, Wind, Hydro, Geothermal, Bio	Solar, Wind, Hydro, Geothermal, Bio
Facility	Certified as a Feed-in Tariff (FIT) project by the Government	Certified by Japan Quality Assurance	Certified by the Government Committee on J-Credit
Purchasing Method	Auction by trading market	From issuer	Auction, or from J-Credit owner/broker
Issuance Amount	121TWh (FY2022)	0.43TWh (FY2022)	1.19TWh* (FY2022)
Price	JPY 0.4-4.0/kWh (FY2023)	JPY 2-4/kWh for volume purchase	JPY 1.4/ kWh (Ave., May 2023 auction)
Cancellation	Same fiscal year	Anytime	Anytime

* The issuance amount is not disclosed. J-Credits are issued when available for sale after the certification.

● FIT NFCs for Consumers to Purchase

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, corporate consumers and brokers, in addition to retailers, are able to purchase FIT NFCs.

Consumers can claim using renewable electricity equivalent to the amount of FIT NFCs. CO_2 emissions can also be reduced in proportion to the number of certificates purchased.

The minimum price for FIT NFCs was set at JPY0.3/kWh until FY2022 and raised to JPY0.4 /kWh in FY2023. Nevertheless, the transactions are increasing due to the low cost for procuring renewable electricity.

In the FY2023 auctions, the volume of transactions exceeded 8GWh in both the first (August) and second (November) auctions, setting a record. It was only about 16% of the sales volume (54GWh) in the second auction. The sales volume will increase significantly after the third auction, adding to the unsold certificates from the previous auctions. The FIT NFCs for FY2023 can be used for electricity consumed in FY2023 (April 2023-March 2024).

FIT NFCs are issued for renewable power generation facilities certified by the government. There are five types of renewable energy eligible for the certification: solar, wind, small and medium-sized hydropower, geothermal, and bio energy (biomass).

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

● Non-FIT NFCs for Retailers to Purchase

There is 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 a capacity of 30MW or larger, "graduated-FIT" by residential solar power plants that have completed the FIT purchase period are eligible for Non-FIT NFCs. Furthermore, nuclear power is also eligible for Non-FIT NFCs.

Only retailers can purchase Non-FIT NFCs. The exception is when corporate consumers make virtual PPAs, which allows the consumers to purchase Non-FIT NFCs directly from the developers.

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	Developer	
Purchaser	Retailer, Consumer, Broker	Retailer, Consumer (only for virtual PPAs)	Retailer
Purchasing Method	Auction by trading market	Auction by trading market, Bilateral trading	
Floor Price	JPY 0.4/kWh (from 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	121TWh (FY2022)	approx. 100TWh (est., FY2022)	approx. 50TWh (est., FY2022)

*Electricity generated between January and December of each year is eligible for issuance of NFCs to be used for electricity consumption for each fiscal year (April to March).

In addition to auctions in the market, Non-FIT NFCs can be traded by developers and retailers through bilateral contracts. In virtual PPAs, developers and consumers can trade Non-FIT NFCs (renewable). Many of Non-FIT NFCs (renewable) are traded bilaterally, and the volume of market trading is declining.

● Tracking for NFCs

A big problem remains with NFCs. When retailers and consumers purchase NFCs, they cannot choose the energy type, such as solar or wind, and cannot confirm the location and the operation start date of the generation facilities.

If the generation facilities cannot be identified, the electricity will not be considered as 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 in the February 2019 auction to add attribute information for identifying (tracking) power generation facilities of FIT NFCs. From the November 2021 auction, attribute information can be added to all the FIT NFCs. RE100 accepts NFCs with attribute information.

If Non-FIT NFCs are traded bilaterally, the generation facilities can be identified based on the information in the contract. RE100 recognizes Non-FIT NFCs traded bilaterally as a means of procuring renewable electricity. Graduated-FIT residential solar is also eligible for RE100 because the trade is made bilaterally with retailers.

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.

There are two ways for retailers and consumers to apply for tracking for the NFCs they plan to purchase. One is the "regular allocation". In addition to the prefecture where the power generation facility is located, it is possible to specify the energy type, such as solar or wind, and from FY2023 to allocate the facility in operation for less than 15 years. Another method is the "facility-specific," which allows adding the attribution information of specific power generation facilities only when agreed with the developer.

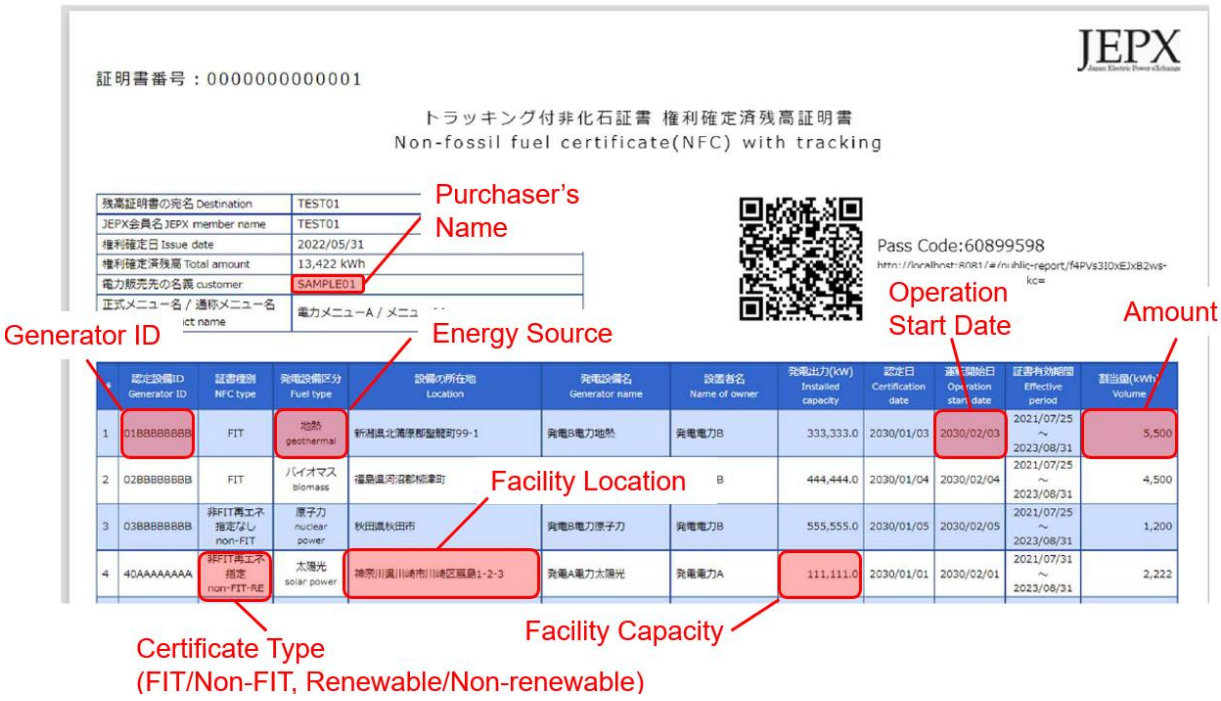
From January 2024, RE100 member companies are required to procure renewable electricity within 15 years from the start of operation of the generation facilities. With the new allocation system, NFCs meeting the RE100 requirement can be purchased in the auctions.

There are nine items of attribute information that can be added to NFCs. In addition to the energy type, the location and the operation start date of the power generation facilities are identified for retailers and consumers to confirm environmental impact and additionality. Information on NFCs purchased by retailers and consumers can be confirmed in the account management system by JEPX.

The process of cancellation is essential for consumers to prove that they have used renewable electricity with certificates. Once the certificate is cancelled, the same certificate cannot be used twice, thus preventing double use and counting. Not only NFCs but also certificates used in many countries around the world require the cancellation as a rule.

By completing the cancellation process for NFCs, consumers can receive a proof report that they have used renewable electricity. The report includes attribute information of NFCs, as well as the certificate amount.

■Non-Fossil Certificates with Attribute Information



Source: Japan Electric Power Exchange (English by REI)

The NFCs system has gradually improved, but the essential problems have not been solved. Attribute 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 desired attributes.

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

The NFCs system should be changed to be traded in the same way as overseas certificates, including attribute information at the time of issuance. It is desirable that retailers and consumers can purchase certificates with desired attributes. METI is considering changing the system to include attribute information at the time of issuance of NFCs in FY2024.

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 NFCs after confirming the environmental impact and sustainability of the fuel in advance.

● Green Electricity Certificates mainly by Bio Energy

"Green Electricity Certificates (GECs)" started in 2000. Many corporates are using GECs as a means of procuring renewable electricity. There are five types of power generation facilities eligible for GECs: solar, wind, hydro, geothermal and bio energy.

As of the end of September 2023, there were 337 power generation facilities certified for GECs, with a total capacity of approximately 910MW. By energy type, solar is the most, followed by bio energy, wind, hydro and geothermal. Since GECs can be purchased by specifying the power generation facilities, it is easy to confirm the environmental impact. Thirty-seven suppliers were registered selling GECs as of September 1, 2023.

The volume of GECs issued in FY2022 was 434GWh. Bio energy accounted about 80%. Most of the remainder was by solar, including graduated-FIT residential solar. The issuance decreased in FY2022 from 489GWh in FY2021. The decrease of certificates by bio energy was particularly significant.

There are two types of renewable electricity eligible for GECs: electricity generated and consumed on-site, and electricity sold from power generation facilities through the grid network. For 3 years from FY2020 to FY2022, new certification for grid electricity was suspended to avoid duplication with Non-FIT NFCs. In April 2023, new certification for grid electricity was resumed.

When applying for GECs for grid electricity, developers are required to submit information to the secretariat, including the information on the power generation facilities (point identification number), the amount of electricity to be certified, and the period of power generation. Based on the information, the secretariat confirms that there is no overlap with Non-FIT NFCs before the certification and issuance.

The price of GECs varies by supplier. Some suppliers officially announce the price, while others determine the price by quotation. In the case of quotations, the larger amount purchased, the lower the price generally becomes. For large purchasers, typical price range is JPY2-4/kWh.

By purchasing GECs, corporates can claim using renewable electricity. Depending on the volume 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 fiscal year can be deducted for the number of certificates purchased.

GECs can be used to reduce CO_2 emissions reported under the Law Concerning the Promotion of the Measures to Cope with Global Warming after certified by 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 include co-firing of bio energy and fossil fuels, or mixed fuels of waste cooking oil and kerosene are eligible. In the case of co-firing, the ratio of bio energy 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 for assessing 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. Facilities using bio energy may have been in operation for more than 20 years. Corporates need to confirm the operation start date of the facilities for each GEC if they want to judge the additionality by the operation time.

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.

● J-Credits mainly by Residential Solar

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

Five types of renewable electricity generation are eligible: solar, wind, hydro, geothermal, and bio energy. In many cases, local governments and third-party organizations issue J-Credits (renewable) 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.

The volume of J-credits (renewable) certified in FY2022 was 1,185GWh, down from 1,327 GWh in FY2021. This is because some of large projects were certified in a lump sum in FY2021, including past generation. Compared to 980GWh in FY2020, the certified volume in FY2022 increased by about 20%.

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

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 secretariat. As of September 2023, 7 suppliers were registered as J-Credit Providers.

In the same way as NFCs and GECs, the start date of operation of power generation facilities is disclosed for J-Credits (renewable). In the case of a project with multiple facilities, the earliest start of operation is applied. Based on the information, J-credits (renewable) meeting the technical requirements of RE100 (limited to 15 years from the start of operation) can be purchased. However, in the auctions, power generation facilities or projects cannot be specified.

In the May 2023 auction by the secretariat, the average transaction price of J-Credits (renewable) was JPY3,246/ton, equivalent to about JPY1.4/kWh. The price is lower than the typical price of GECs (around JPY2-4/kWh). The average transaction price of J-Credits (renewable) rose from 2021 to 2022 by demand increase, but slightly declined in 2023. The price per ton remains almost the same, but the price per kWh is lower due to the lower average CO_2 emission factor for electricity in the country.

It is higher than the floor price for FIT NFCs (JPY 0.4/kWh). For purchasing NFCs, corporates must become a member of the JEPX, which requires an admission fee and annual membership fee. J-Credits (renewable) may be cheaper when purchasing lesser amounts.

The auction systems of J-Credits changed in FY2023. In October 2023, the Tokyo Stock Exchange (TSE) established a "Carbon Credit Market" where J-Credits can be traded online throughout the year. In addition to the TSE, other private entities started online trading of J-Credits.

The Carbon Credit Market by TSE deals J-Credits (renewable). Trading is conducted in units of one ton as in the conventional auctions by the J-Credits secretariat. From October to December 2023, the trading price of J-Credits (renewable) are around JPY3,000/ton. J-Credits (renewable) purchased in the market can be converted into electricity based on the CO_2 emission coefficient (the national average for the year in which the electricity was generated). Same as the auctions by the secretariat, power generation facilities or projects cannot be specified.

J-Credits require projects started on or after April 1, 2013, to be registered. The maximum period for which credits can be issued is 8 years. The period can be extended for another 8 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 to report 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.

J-Credits (renewable), as well as NFCs and GECs, can be used for the report under the Law Concerning the Promotion of the Measures to Cope with Global Warming, in addition to reporting for CDP and RE100. However, the Tokyo Metropolitan Government's "Obligation to Reduce Total Greenhouse Gas Emissions and Emissions Trading System (Cap & Trade System)" for large-scale businesses does not allow reducing CO_2 emissions by J-Credits.

Residential solar facilities after the FIT purchase period (“graduated-FIT”) are also eligible for J-Credits (renewable) if additional 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).

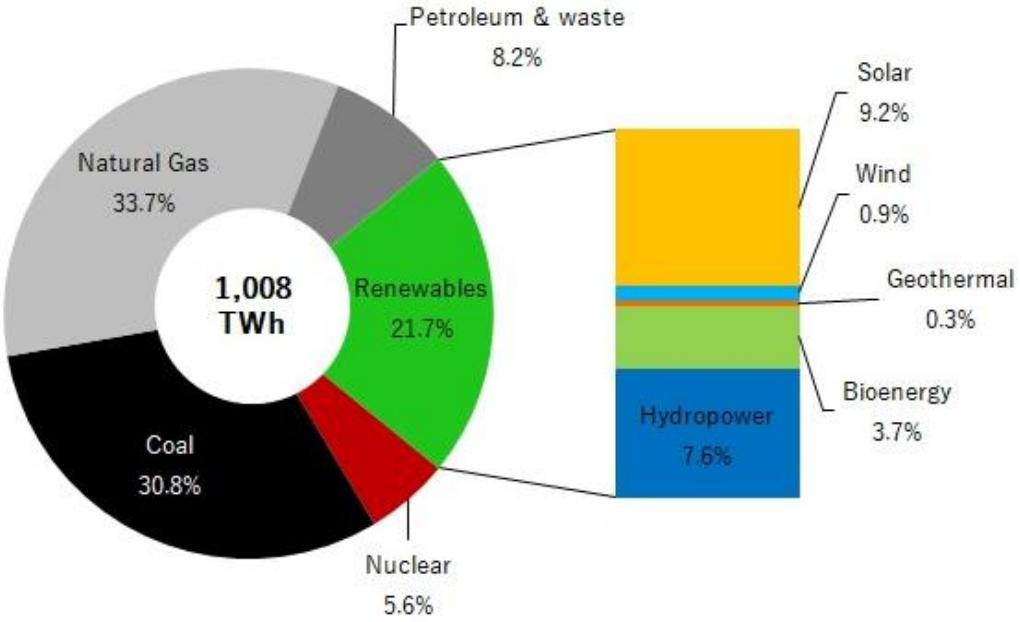
The environmental attributes of the self-consumed electricity by the graduated-FIT residential solar facilities are also eligible for GECs. To prevent duplicate issuance, the J-Credit secretariat checks for duplication based on the list of GECs and excludes them from the certification. The positioning of each certificate, including NFCs is confusing. It is desirable for the government to take the initiative in reviewing the entire system and unifying it as a single certificate system for renewable energy electricity.

4. Green Products

As more corporate energy users 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 FY2022, renewables accounted for 21.7% of the total electricity generation (1,008TWh) in Japan. Looking at the breakdown, solar power accounted for the largest share at 9.2%, followed by hydropower at 7.6%, bioenergy at 3.7%, wind at 0.9%, and geothermal at 0.3%.

■Electricity Generation by Energy Source in Japan (FY2022)



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 continuing the operation for a long time.

Utilizing renewable electricity available in the country, green products sold by retailers can be divided into three types. Each type differs in terms of additionality (CO_2 reductions by new generation facilities) and environmental impact.

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

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

Although fuel costs are not required for electricity generated from renewable energy (except bio energy), the fuel surcharges are often added, and the surcharges fluctuate monthly depending on the import price of fossil fuels. The surcharges have increased significantly in all regions of the country since 2022. The risk of fluctuations in fossil fuel import prices will continue being affected by other countries. For stabilizing the procurement cost of renewable electricity, it is necessary to select green products that do not apply the fuel surcharges.

● Electricity applied to FIT (FIT Electricity)

The amount of electricity certified by the FIT reached 122TWh in FY2022. The electricity purchased under the FIT (“FIT Electricity”) does not emit CO_2 when generated, but CO_2 emissions are not considered zero as the average electricity for the country. It is because the purchase cost of FIT Electricity is covered by electricity consumers through the renewable energy surcharges added to electricity tariffs.

Since the electricity subject to the renewable energy surcharges includes thermal and nuclear power generation, the national rule is that CO_2 emissions from electricity purchased under the FIT are calculated based on the national average in the previous year including thermal and nuclear (the average for FY2022 is 0.438kg/kWh). FIT Electricity is not considered as renewable electricity with zero emission by "Law Concerning the Promotion of the Measures to Cope with Global Warming" in Japan, as well as international projects such as CDP and RE100.

Retailers cannot sell FIT Electricity as renewable with zero emissions by the national guidelines. As FIT Electricity does not actually emit CO_2, the government retains the environmental attributes and trades it on the market as "FIT Non-Fossil Certificates (NFCs)".

When FIT Electricity is combined with FIT NFCs, it can be used as renewable electricity with zero emissions. Many retailers are offering green products by the combination of FIT Electricity and FIT NFCs. The amount of FIT Electricity and FIT NFCs will continue to increase.

The floor price for FIT NFCs was set at JPY1.3/kWh at the start of the program in FY2017 and lowered to JPY0.3/kWh from the November 2021 auction. In FY2023, the floor price was raised to JPY0.4/kWh, but still a small percentage for electricity tariffs. The price of green products with FIT NFCs is currently not much different from the regular electricity tariffs.

● 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 need to apply for FIT. The new system “Feed-in Premium (FIP)” replacing FIT started in April 2022 and certifies non-FIT renewable power generation facilities. Several types of “Non-FIT Electricity” including new and old facilities are increasing.

There are green products supplying electricity from newly constructed solar power generation facilities not applied to FIT. A typical example is "Sunlight Premium” by TEPCO Energy Partner, the regional utility in Tokyo area. Corporates with electricity contracts of 1MW or larger are eligible to switch a portion of the electricity to Sunlight Premium. It is marketed to corporate 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 tariffs. Sega Sammy Holdings, major game console manufacturer, is the first customer of Sunlight Premium and began using it at the headquarters in Tokyo in December 2021. TEPCO Energy Partner plans to expand electricity from new solar power facilities to more than 300MW in 5 years.

Equivalent products are also sold by Tokyo Gas and Osaka Gas. Each company is expanding its supply by building many small-scale solar power generation facilities.

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.

Retailers started purchasing electricity from graduated-FIT facilities at about JPY8-10/kWh. Recently in some cases, the purchase price has increased to JPY14/kWh or higher due to the growing demand for renewable electricity. Although it takes time and effort for retailers to purchase electricity from residences, it is possible to sell it at the same price or lower than regular electricity. Residential solar power has a small environmental impact. Since it has been in operation for more than 10 years, it is not suitable for corporates to procure renewable electricity with additionality provided by newer facilities.

Saitama Prefecture locally aggregates surplus electricity from graduated-FIT residential solar power and sells "Saitama CO_2 Offset Electricity" 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 Partner purchases the surplus electricity and sells it to businesses.

In addition, FIT Electricity generated by large scale solar power plants operated by Saitama Prefecture's Bureau of Sewerage are added to the CO_2 Offset Electricity by combining with FIT NFCs. Graduated-FIT and FIT electricity are available for consumers to choose from. Both are suitable for purchase by corporates focusing on regional benefits, as the electricity is locally produced and consumed 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 with electricity from graduated-FIT residential solar power generation. TEPCO Energy Partner sells the electricity to businesses in the city as "Hamakko Denki”. Corporates with electricity contracted of 500 kW or larger can purchase it. The additional cost for the environmental value is charged with the regular electricity tariffs.

Electricity supplied by non-FIT and graduated-FIT power generation facilities became eligible for Non-FIT NFCs from FY2020 (graduated-FIT residential solar power from November 2019). Developers can sell the environmental attributes of electricity to retailers with issuing Non-FIT NFCs. Retailers can sell Non-FIT Electricity with Non-FIT NFCs as zero carbon emissions products.

● Electricity generated mainly from Hydro

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

There are more than one hundred hydro power plants for Aqua Premium, with the total capacity of more than 2GW. About half of the electricity of Aqua Premium came from large hydro power plants with a capacity of 30MW or larger, and the remaining half was supplied from small and medium-sized hydro power plants with a capacity lower than 30MW.

Hydro power plants under the FIT are not included, and CO_2 emission of the electricity provided by Aqua Premium is zero. Since it includes electricity from many large hydro power plants in operation for a long time, corporates concerned about environmental impact and additionality should check the details of the facilities.

Some of the green products sold by regional utilities combine electricity from hydro and geothermal power plants. "Renewable Energy Eco Kiwami" by Kyushu Electric Power selling since November 2021, allows consumers to choose either small hydro or geothermal. This product is designed for corporates to procure renewable electricity excluding large hydro.

The number of green products by hydro power generation is declining. Among the regional utilities, only TEPCO Energy Partner’s "Aqua Premium" and Kansai Electric Power’s "Renewable Energy ECO Plan Premium" are marketed as 100% hydro power products on the websites.

There are green products from hydro power plants operated by local governments and sold through regional utilities as 100% locally produced and consumed renewable electricity. Tohoku Electric Power sells green products by hydro power plants in Iwate, Akita and Yamagata prefectures. JPY1.1/kWh (including tax) for environmental value is added to regular electricity tariffs. By purchasing electricity from hydro power plants operated by local governments, corporates can contribute to the local community.

● Electricity through Regional Cooperation

Some of the green 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 renewable energy nationwide.

Yokohama City in Kanagawa Prefecture, the second largest city in Japan, signed a partnership agreement with fifteen local governments in Tohoku region to procure renewable electricity. The purpose of the agreement is to supply 100% renewable electricity generated in Tohoku, a region rich in solar and wind power, 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 five other corporates. Among them is Okawa Printing, which was founded in Yokohama City in 1881 and has about forty employees. Okawa Printing operates its printing business using 100% renewable electricity including the on-site solar power generation.

Renewable electricity supplied between regions may be applied to FIT. Combined with FIT NFCs, it can be used as renewable electricity with zero emissions.

5. Key Considerations in Procurement

● Calculating CO_2 Emissions

When reporting CO_2 emissions from electricity consumption to the national and local governments, calculations are based on the CO_2 emission coefficient (CO_2 emissions per kWh) of the electricity sold by the retailer. The government compiles and publishes CO_2 emission coefficients for each supplier on a yearly basis. Recently, an increasing number of companies started to publish CO_2 emission coefficient by product, and there are many products with zero CO_2 emission coefficient.

When consumers purchase certificates and combine with electricity, CO_2 emissions can be reduced according to the amount of the certificates. For each kWh of certificates, the national average emissions in the previous year (0.438kg/kWh in FY2022) can be deducted. The CO_2 emissions become zero when certificates are used with FIT Electricity (the national average CO_2 emission coefficient is applied for FIT Electricity).

It should be noted that if the CO_2 emission coefficient of the contracted electricity exceeds the national average, the emissions will not be reduced to zero even if the same volume of certificates are purchased. Conversely, if the CO_2 emission coefficient of the electricity is lower than the national average, it is possible to reduce the number of certificates for reaching zero emissions. The calculation formula is as follows. However, only the volume of certificates can be considered as the consumption of renewable electricity.

CO_2 emission (kg) by consumption of electricity
= Electricity consumption (kWh) x CO_2 emission coefficient of electricity (kg/kWh)
− Volume of certificates (kWh) x National average of CO_2 emissions (kg/kWh)

There are differences between Japanese and international methods of calculating CO_2 emissions. In the GHG Protocol, used worldwide as an international standard, CO_2 emissions from renewable electricity are uniformly counted as zero. When certificates are combined with electricity, emissions are zero.

Countries where the GHG Protocol applied for calculating CO_2 emissions from electricity publish "Residual Mix," which is the CO_2 emission coefficient for the rest of the country's electricity, excluding electricity with zero emissions. By applying the Residual Mix to the CO_2 emission coefficient for regular electricity, it is designed to be consistent with the CO_2 emissions of the country.

International initiatives such as CDP, which evaluates corporate actions for climate change, require CO_2 emissions to be calculated based on the GHG Protocol. When corporates use a combination of electricity and certificates in Japan, it is required to report zero emissions.

The Japanese government developed its own calculation methods as described above, including the reporting under the Law Concerning the Promotion of the Measures to Cope with Global Warming. Japanese companies must calculate CO_2 emissions separately for domestic and overseas consumption of electricity. When exporting products overseas, tax based on the CO_2 emissions will be required. The Japanese government should adopt the GHG Protocol for calculating CO_2 emissions so that the Japanese companies can apply the same approach domestically and internationally.

There is a common concern for certificates. It is in case of using electricity generated mainly by thermal or nuclear power with 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 plants which emits a large amount of CO_2 is concerned.

CDP requests corporates to use electricity with low CO_2 emissions by the following recommendations. For meeting the recommendations, electricity with a high CO_2 emissions coefficient, mainly from coal-fired power plants, should not be selected.

1. Procure electricity from renewable energy sources (e.g., FIT Electricity).
2. Procure electricity with the lowest CO_2 emissions coefficient in case renewable electricity cannot be purchased.
3. Procure electricity with a CO_2 emission coefficient at least equal to or lower than the national average.

There are two ways for corporate energy users to increase renewable electricity for consumption: one is to procure electricity from renewable energy sources with a low environmental impact based on how it is 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 for accounting. Large corporations in Japan are obligated to report CO_2 emissions to the government based on the calculation method stipulated by the government. In this regard, FIT Electricity need to be procured with certificates for zero emissions.

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 in the reporting, 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 been promoting environmentally friendly business practices and has a clear policy regarding CO_2 emissions associated with the consumption of renewable electricity. The company. 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 generation 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.

● Notes on Non-fossil Certificates (NFCs)

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.

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 supplied with electricity. The same disclosure is required for 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 detailed 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 energy source such as solar and bio energy. With trackable NFCs with attribute information, consumers can identify the specific power plant, the environmental impact and additionality.

Retailers need to change the labeling of the products depending on the type of NFCs and the type of electricity combined. Only when NFCs (renewable) are combined with electricity from renewable sources can be labeled and sold as "Renewable Energy”.

When non-renewable electricity and NFCs (renewable) are combined, they must be labeled as "Substantially Renewable Energy”. For purchasing both electricity and certificates from renewable energy, consumers must select electricity labeled as "Renewable Energy”.

There is one more thing to be aware of when you choose a "Zero CO_2 Emission" products. Among the NFCs, there are Non-FIT NFCs (non-renewable) mainly by nuclear power. Electricity combined with the certificates cannot be used as renewable electricity.

If a corporate energy user purchases electricity labeled as Zero CO_2 Emission, there is a possibility that 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 issue before purchasing Zero CO_2 Emission electricity.

Several retailers are selling green products by appealing "Raw Green". It is a type of "Renewable Energy" providing electricity generated from renewable energy sources along with environmental value, and it is unique in that it provides electricity according to the generation time. The environmental value is provided by Non-FIT NFCs (renewable)

Raw Green is effective for corporates to increase the proportion of renewable energy at various times of the day. Normally, including the international initiative RE100, the ratio of renewable energy is counted based on the annual electricity consumption and procurement. The usage by time is not relevant. Even if the ratio of renewables is 100%, there are many time periods when electricity is supplied mainly from thermal power generation.

In the future, it will be important to increase the share of electricity from renewable energy sources on an hourly basis. Raw green is more appropriately called "Time-based renewable". On-site generation, on-site PPAs and off-site physical PPAs are also time-based renewable electricity.

In combining NFCs with electricity, another key point should be noted. In the case of NFCs, the certificates are issued based on the generation from January to December of each year. The electricity to be combined with NFCs must be consumed from April to next March on the fiscal year basis. There is a 3-month time lag. This rule applies to both FIT NFCs and Non-FIT NFCs.

With GECs and J-Credits, corporate energy users can choose the year to use them for reporting CO_2 emissions. GECs and J-Credits are more flexible than NFCs in 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.

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 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, many corporates are emphasizing additionality. The construction of new (additional) power generation facilities with renewable energy sources has the effect of replacing electricity by fossil fuels for reducing CO_2 emissions.

There are three kinds of criteria for evaluating additionality. The basic criteria are #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 and/or certificates from newly constructed generation facilities (including on-site generation and consumption).

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

3. Purchasing electricity and/or 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, corporate PPAs for new facilities are 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 applied in the US.

RE100 specifically stated additionality (impact on CO_2 reduction) in its Technical Criteria revised in October 2022. On-site generation and corporate PPAs (#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, if only the additionality #1 is requested, the volume 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 renewable power generation facilities. If the profitability of the facilities become low due to increased operation and maintenance costs particularly for bio energy, 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, 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.

By evaluating renewable electricity 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 rating renewable electricity. The selection of the evaluating points for each energy source 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
	Other benefits	+1	ex. agricultural production under solar panels on abandoned land

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