THE INTERNATIONAL REC STANDARD

Country Assessment Report

Country/Region name: Japan

Japan is one of the largest economies in the world (3rd in size) and continues to have a high Gross Domestic Product (GDP) per capita of around 40000 USD/capita) since the 1990s. Japan's population is 126 million, but this number has been decreasing since 2018 due to the country's low birth-rate. Japan has long been a major consumer and importer of energy and a recognised leader in energy technology development (IEA, 2020). After the major earthquake in 2011, and the subsequent Fukushima nuclear accident, 55 nuclear power plants shut down altogether. All of the Fukushima plants (10 reactors) will be decommissioned, and several more will be decommissioned as well. As of 2020, only a total of 9 nuclear reactors are approved for operation.

While Japan has recovered from the severe economic impact following the disaster, electricity demand has continued to decrease from the 2010-2011 peak. This is partially caused by the population decreasing, but the majority of the decrease is due to intensive efforts to improve energy efficiency after the electricity shortages following the nuclear accident. Japan's former Nationally Determined Contribution (NDC) was to decrease GHG emissions by 26% by 2030 compared to 2013 levels, followed by updates to increase the ambition to 46% in 2021. As of FY2021, Japan has achieved a 18.4% reduction of overall GHG emissions compared to the 2013 baseline. In October 2020, Prime Minister Suga has announced that Japan is committing to net-zero GHG emissions by 2050, in his general policy speech. The current Strategic Energy Plan (approved by the cabinet in 2021) aims to achieve 59% 'non-fossil' ratio of the nation's electricity generation mix (which had been 44% in previous plan).

Generation and demand: (type, MW, TWh)

<Generation>

1003 TWh of electricity was generated in FY 2020 (Comprehensive Energy Statistics, METI). While being significantly less than the US and China, it is approximately the same as Russia, nearly twice as much as Germany, and three times more than the UK.

Electricity generation capacity increased rapidly until the early 1980s, mostly dominated by hydro and thermal. Nuclear power started to be introduced in the 1970s and increased until the 1990s following the 1973 oil crisis. Following a sluggish attempt with a Renewable Portfolio Standard, renewable electricity capacity started to increase after the implementation of a Feed in Tariff (FIT) scheme for all renewable sources in 2012. (FIT for rooftop solar PV's surplus electricity started in 2009.)

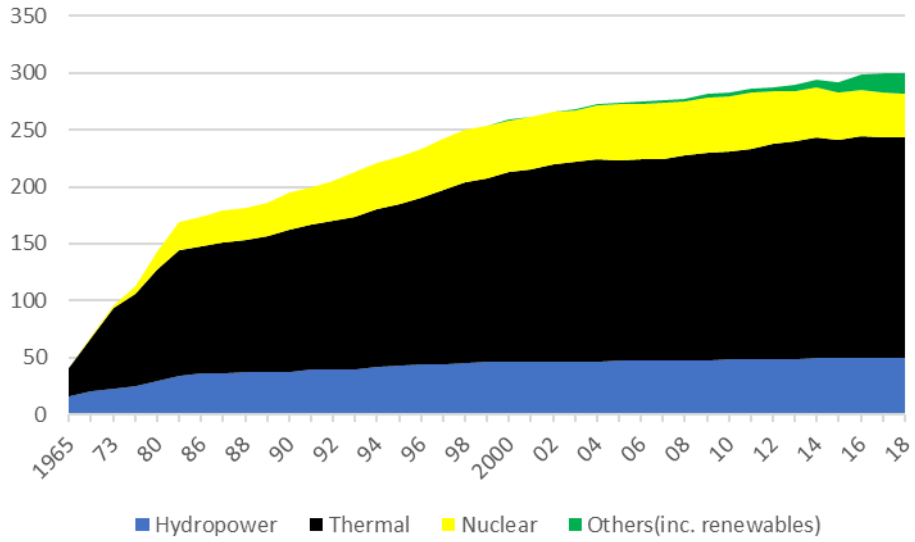


Figure 1. Electricity Generation Capacity by Electric Utilities (100 GWh)
(Note this does not include rooftop solar PV. ISEP Japan has estimated that the capacity of renewable power in 2019 has reached 69 GW.)

Japan's electricity generation structure has changed dramatically after the Fukushima accident. Nuclear power, which accounted for 25% of electricity generation in 2010, has decreased to zero in 2014, while only accounting for 6% in 2018. In 2018, renewable sources accounted for 16.9% of the total electricity generation.

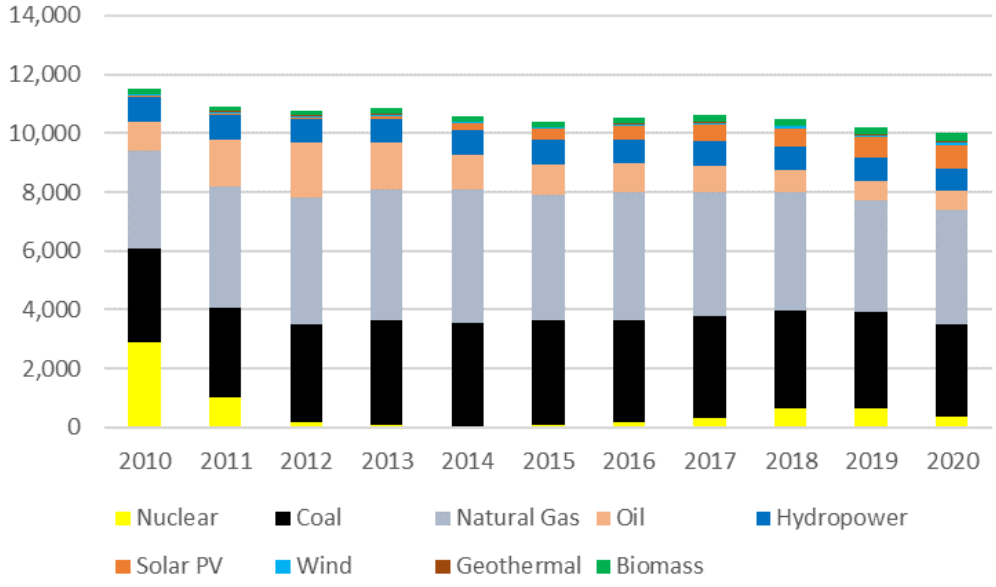


Figure 2. Electricity Generation by sources (Unit: 100GWh) (Source: METI/ANRE, Comprehensive Energy Statistics of Japan)

<Demand>

As of FY 2020, 36% of electricity is used in the industry sector, where the steel and machinery sectors are the largest in terms of electricity demand (each of the steel and machinery sector accounts for 9% of total electricity demand). The household and commercial sectors account for 29% and 30% respectively.

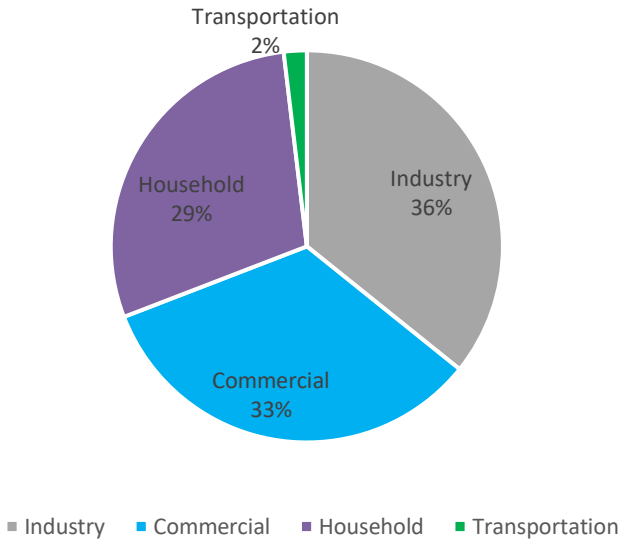


Figure 3. Electricity Demand Structure in Japan (Source: METI/ANRE, Comprehensive Energy Statistics of Japan)

Electricity accounts for 27% of the total final energy demand in FY 2020. The electrification rate has increased from 20% in 2010 to 27% in 2020 and is expected to increase until 2030, according to the current Long-term Energy Outlook (which is consistent with Strategic Energy Plan) published in 2021. In the Long-term Energy Outlook approved by the Japanese government, the electricity demand level will decrease by 2030, due to the increased deployment of energy efficiency measures across sectors, which will surpass some of the increased demand as fossil fuel furnaces covert to electricity.

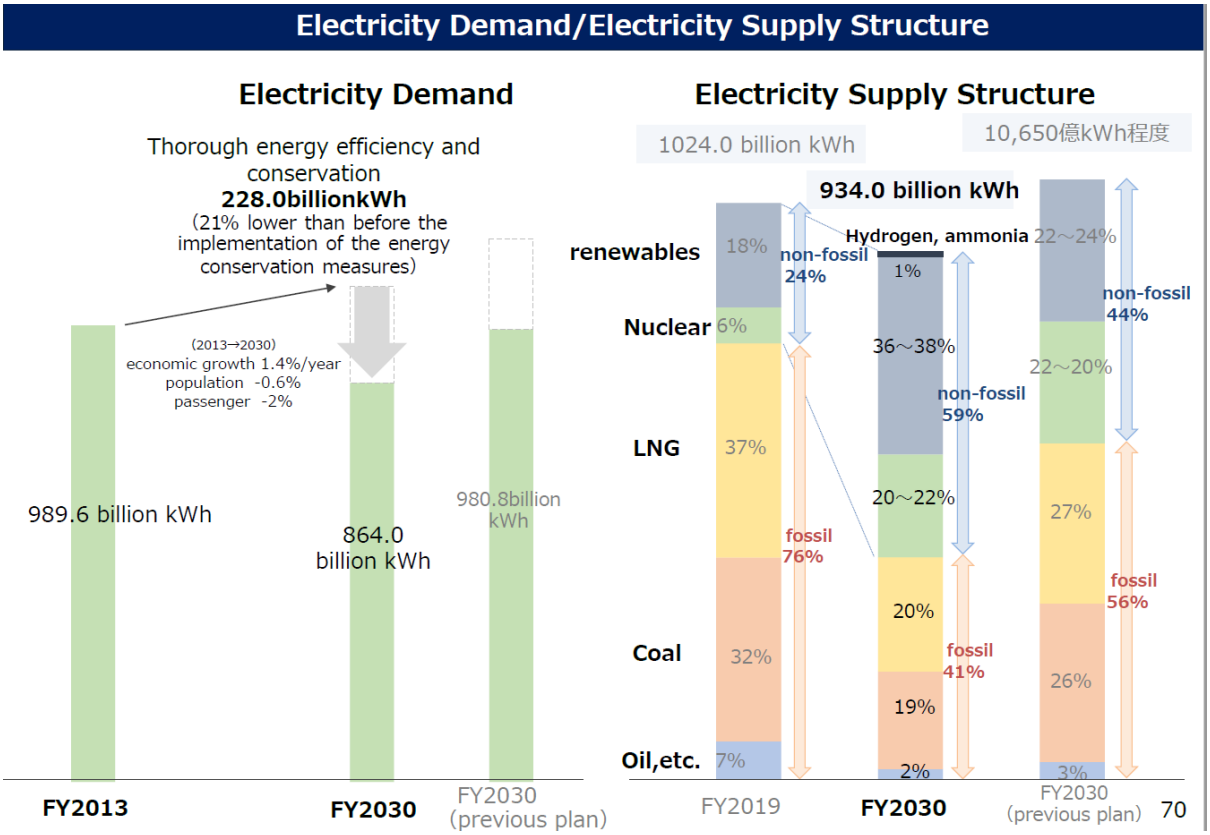


Figure 4. Electricity Demand and Supply in FY 2030 in Long-term energy outlook (METI, 2021)

According to the Outlook, Japan will need to source 59% of its electricity from non-fossil sources by 2030 to meet the NDC. This is a binding regulation on electricity retailers and should be achieved by purchasing non-fossil value certificates from the Japan power exchange in 2030. The regulation has been implemented to the retailers, to achieve a non-fossil ratio by purchasing non-fossil certificates from 2020, however, currently the penalty for non-compliance is minimal (1,000,000 yen / 7872 EUR) and only applicable to retailers with 500 GWh of annual sales[1]. The ratio was primarily set at 31.8% in 2020.

In the Outlook, renewable electricity is expected to account for 36 to 38 % of electricity generation. According to the Renewable Energy Institute of Japan, the renewable ratio has reached 23% for the 1st half of 2020 (January to June). This is partly because of the demand decrease brought about by COVID-19, but it showed that renewable electricity continued to generate electricity during the period, and Japan can pursue a higher renewable ration for 2030, 10 years from 2020.

Electrical interconnection and import/export:

Japan consists of 4 major islands and thousands of smaller islands, including Okinawa Prefecture. Japan has no interconnection with other countries.

[1] エネルギー供給事業者による非化石エネルギー源の利用及び化石エネルギー原料の有効な利用の促進に関する法律 | e-Gov 法令検索 (e-gov.go.jp)

Originally in Japan, electric utilities were operated by private companies. In 1939, the Imperial Japanese Government ordered Japanese private utilities to integrate into 1 generation and transmission company and 9 distribution companies. After WWII, it was reformed to 9 vertically integrated utilities in 1951. (Okinawa was returned to Japan in 1972 and since then 10 integrated utilities have existed in Japan.) Due to the historical development of the physical Japanese electricity market, the east operates at 50 Hertz, and the west at 60Hertz. (Electricity and Gas Market Surveillance Commission, 2018)

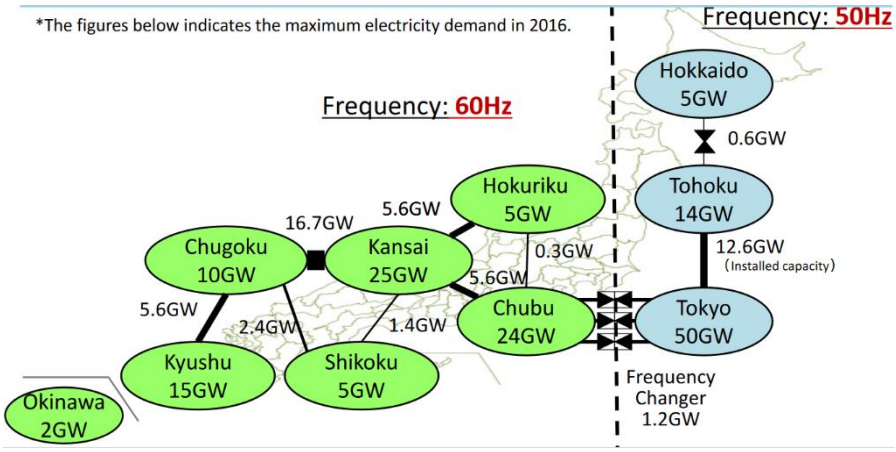


Figure 5. Outline of Electricity System in Japan (Source: Electricity and Gas Market Surveillance Commission, 2018)

Historically, each utility balanced demand and supply within its assets. Interconnection lines are supposed to be utilized in the case of an emergency. In the aftermath of the Fukushima nuclear accident, there was enough electricity generation capacity to avoid blackouts in the Kanto (Tokyo) area. However, due to the lack of flexible interconnections, there were numerous major planned blackouts for several weeks until Tokyo Electric restarted their mothballed fossil fuel generation.

Discussion of electric supply system reform started after Japan experienced the bankruptcy of many small and medium-sized enterprises (SME) due to the lack of electricity to produce their products. In 2015, in the course of electricity system reform, the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) was established to plan and manage interconnection between the 9 transmission areas. It is mandatory to join OCCTO if you operate as generators, grid operators, or retailers.

In 2020, the nine of the ten former regional utilities (excluding Okinawa) were forced by the law to separate their grid operation into legally different companies. Although legally unbundled, all 10 former regional utilities will operate under a single holding company including a generation constituent, grid operations, and retail companies.

There has been an issue for renewable electricity projects which are often refused to connect to the grid lines. METI has ordered transmission and distribution companies to calculate how much of variable renewable sources can be connected to the grid, assuming 100% operation of existing unoperated nuclear power plants, and resulted in a limited capacity to be connected to the grid. Japan is in the process of piloting and potentially implementing a new connect and manage regime for tying in new generation, which would allow for more efficient allocation of transmission resources.

Better management of the transmission and distribution line is highly necessary to unlock local renewable projects to be realized.

Historical support or development of renewables in the country/region:

The Government of Japan has a history of supporting renewable energy market development. In the 1980s, it rolled out a loan scheme with low-interest rates for households to install rooftop solar heating systems. It was very successful, with more than 2.7 million households implemented solar heating systems under this scheme. In 1992, electric utilities started their voluntary net-metering scheme for rooftop Photovoltaics (PV), and in 1994, a subsidy was introduced to top-up the initial investment. The subsidy significantly contributed to the introduction of rooftop PV in Japan but ended in 2006 after renewable portfolio standards (RPS) were implemented in 2003, requiring utilities to procure a fixed percentage of renewables. The RPS scheme set an obligatory renewable energy target for electricity retailers of 1.6% of total electricity sales in 2014.

In 2009, a FIT for rooftop solar PV was introduced. A further FIT for all types of renewable energy sources for 20 years was introduced in 2012, following the Fukushima nuclear accident in 2011. The FIT scheme, coupled with the fact that solar PV plants have a short lead time for construction, has stimulated rooftop and larger solar PV implementation.

Since 2005, the annual growth rate of the renewable energy market had been 5%, until it jumped to 29% after the introduction of the FIT in 2012. This sharp rise demonstrates the strong support that the FIT provided to further expand renewables in Japan. Renewable electricity penetration continues to increase significantly each year and the market is changing to facilitate access to renewable electricity for all consumers. However, Japan's overall 2030 renewable energy target is relatively low at 36-38% of generation.

As part of the phase out of the FIT system, an auction scheme started in 2017 for large scale solar PV expanded to most of renewable sources except for geothermal, small hydro, and biomass (large timber biomass, and all size of liquid biomass FIT price will be determined by the auction). In April 2022, a FIP (Feed-in Premium) scheme was started and is planned to replace FIT shortly. Premium will be calculated on a monthly basis reflecting the price of electricity wholesale market (Figure6).

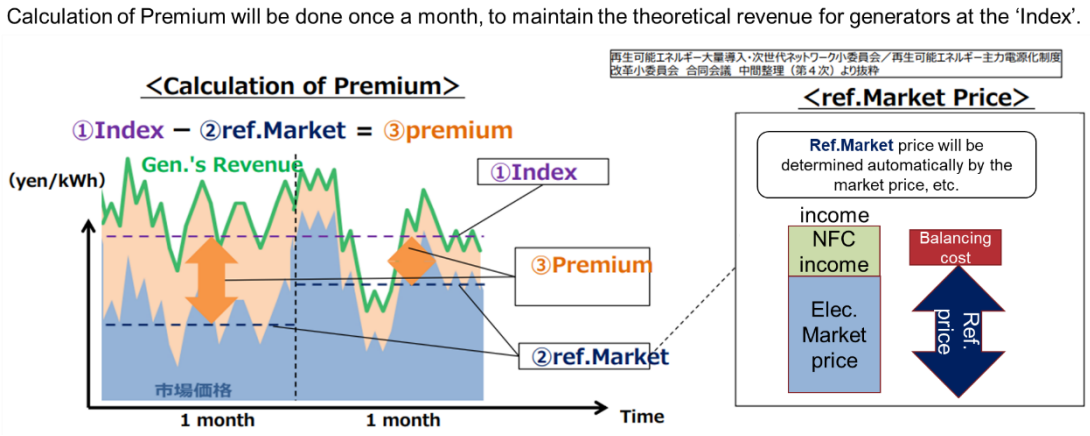


Figure 6. Calculation of FIP premium starting from April, 2022 *(Source: METI)*

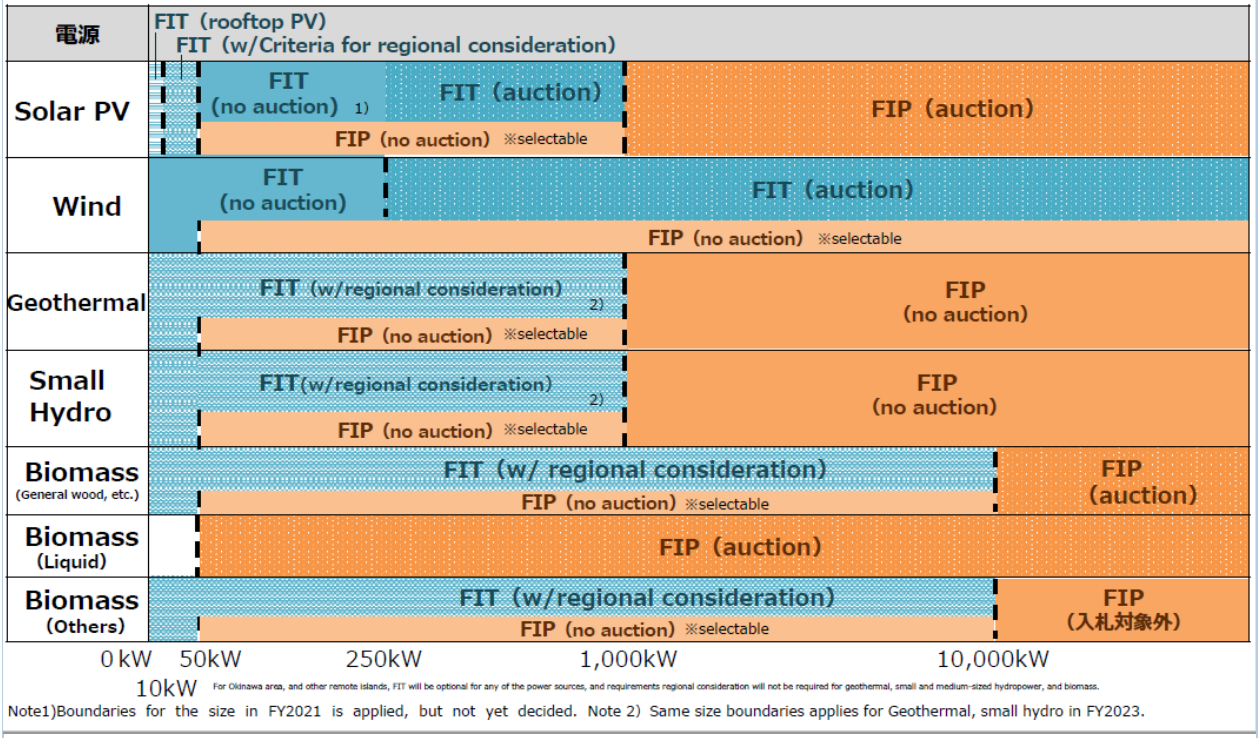


Figure 7. FIT/FIP, auction/non-auction classification for April 2022 by source(Source: METI)

Policies have been focused on the supply-side of renewables, but along with deregulation, retailers were enabled to set green tariffs and create green electricity products. The eligibility of each of the sourcing options is continually determined by the government. The introduction of the Non-Fossil Fuel Certificates (NFC) scheme has enabled the purchase of FiT supported renewable electricity. The Agency for Natural Resources and Energy (ANRE), under METI, is the supervisory authority for renewable policy.

Electricity market structure:

Electricity generation and retailing are fully deregulated after the series of regulatory updates started in 2012. Transmission and Distribution lines are operated by the former grid operating department of the 10 regional utilities. The Organization for Cross-regional Coordination of Transmission Operators, (OCCTO), was established in 2015. OOCTO plans and manages interconnection between the nine transmission areas and plans the inter-regional issues, such as building higher capacity transmission lines in areas with a large potential for wind power.

As of October 1st, 2020, there are 679 retail companies registered with the Japan Electric Power Exchange (JEPX). Each electric retailer, or group of retailers (called a balancing group), must balance their supply and demand every 30 minutes. Retail companies or balancing groups can contract with specific generation plants, but otherwise need to purchase electricity from JEPX. If retail companies fail to balance supply and demand every 30 minutes submitted an hour ahead, then retailers need to pay a penalty fee to the relevant regional grid companies. In addition to power procurement costs and labor costs, retailers need to pay wheeling costs and FIT surcharges to the grid companies.

In addition to wholesale electricity, JEPX deals with several electricity related commodities, such as indirect transmission rights trading market (started in 2019), non-fossil value trading market (started in 2018), baseload electricity market (started in 2019). The capacity market started in July 2020, where coal-fired power plants are also eligible to join. All market costs will be paid by retailers as a price for operating the grid system. The first auction of the capacity market in July saw contract prices near the upper limit, one of the highest in the world, which could have a critical impact on the business conditions of retail electricity providers.

<Deregulation process>
After Japan experienced the nuclear accident followed by an electricity shortage, and series of planned blackouts in the Kanto area, the inadequate interconnections and limited management between 9 utilities became a major issue. In 2013, an integrated plan for electricity system reform was approved by the cabinet, which plans to: 1) increase cross-regional operations, 2) complete deregulation of the retail market, 3) legal unbundling of transmission and distribution department of utilities in order to achieve grid neutrality.

1) Enhancing Cross-regional operation
OCCTO, an organization all electricity companies are obliged to join, was established in April 2015. OCCTO is committed to secure a mid-to-long-term supply/balancing capacity and to ensure efficient use of transmission/distribution facilities on a nationwide scale. Furthermore, OCCTO is working on various issues relating to balancing capacity as well as a network connection that arise in connection with the expansion of renewable energy.

2) Deregulation of the retail market
Prior to April 2016, only large size consumers could choose electric retail companies. From April 2016, the market was opened for all consumers, down to individual households.

3) Legal unbundling of transmission and distribution department of regional utilities
Since April 2020, integrated utilities are obliged to legally unbundle their transmission and distribution companies. While they must be separate entities with separate operating license, they can be owned by a single holding company, which introduces some barriers to a truly open market.

Description of renewables support mechanism:

The major support mechanism since 2012 has been the feed-in tariff. Since 2018, large scale solar PV and some biomass have shifted from the FIT to an auction based FIT. From April 2022, a Feed in Primium (FIP) was started for larger size renewables except for geothermal, small hydro, and certain types of biomass, and is planned to expand to the smaller size renewables in 2023.

Household rooftop PV continues to be supported by FIT for their surplus electricity generation. The tariff decreased to 20 yen/kWh in 2020, 19 yen/kWh in 2021, and 17 yen/kWh in 2022 This is encouraging self-consumption, including with integrated storage systems.

FIT Prices published for fiscal year 2022 and onward are shown in the table below. The types of renewable generation by size, source, and condition not included in the table below are subject to auction and FIP.

Table 1. FiT Prices(Source: METI)

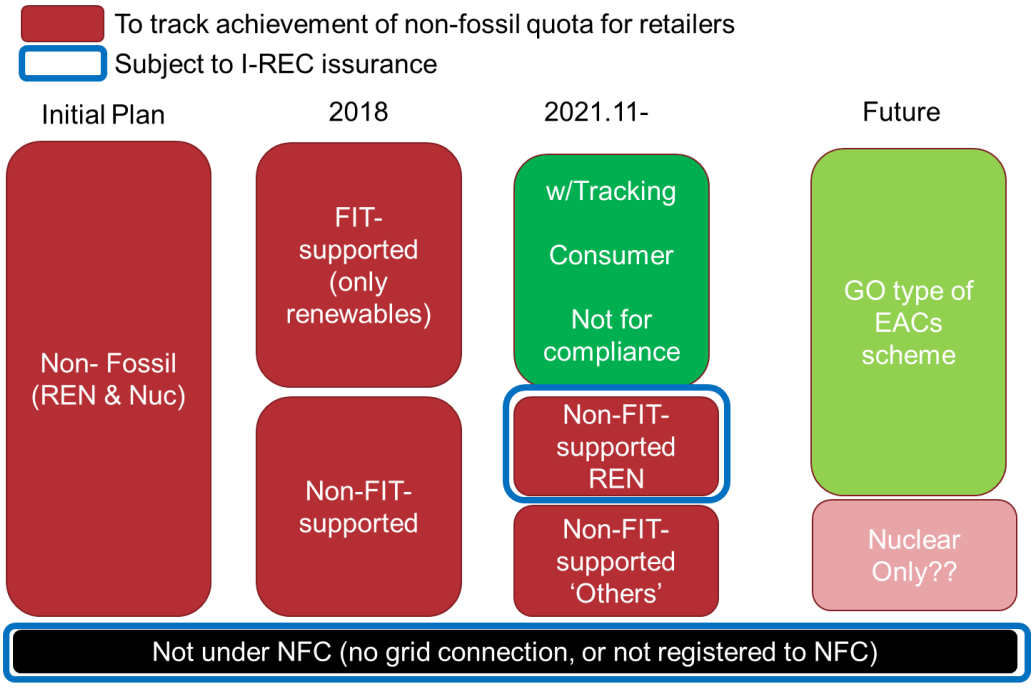
	2021	2022	2023	2024
Rooftop Solar PV	19	17	16	
Mideum size Solar PV	11-12	10-11	9.5-10	
Large solar	determined by the auction			
Onshore Wind (<50kW)	17	16	15	14
Onshore Wind	determined by the auction			
Replacing Onshore wind	15	14		
Offshore wind (implanted)	32	29	determined by the auction	
Offshore wind (floating)	36	36	36	36
Geothermal	19-40	19-40	19-40	19-40
Small Hydro	12-34	12-34	9-34	
Biomass	13-40	13-40	13-40	
Large timber biomass, liquid biomass	determined by the auction			

Yen/kWh		FY2021	FY2022	FY2023
Solar PV	less than 10kW	19	17	21
	10kW-less than 50kW	12	11	10
	Over 50kW (not subject to auction)	11	10	9.5
Wind	On Shore (less than 50kW)	17	16	15
	On shore (replacemet)	15	14	
	Offshore (implanted) *not applicable to the special law	32	29	auction
	Offshore (floating) *not applicable to the special law	36	36	36
Geothermal	Tariff differs from the type and the size	12-40	12-40	12-40
Small hydro	Tariff differs from the type and the size	12-34	12-34	12-34
Biomass	Less than 15,000kW			40
	Less than 15,000kW, total replacement			30

For the FIT supported commercial renewable generation plants, there is a tax reduction scheme to reduce property tax base for 3 years. Also, in addition to ordinary depreciation, special depreciation of up to an amount equivalent to 14% of the base acquisition price.

FIT supported electricity will be automatically issued Non-fossil value certificates, with a label of 'FIT supported renewable sources'. However, FIP supported electricity will automatically be issued 'non-FIT' NFC, and generators can choose if they want to specify renewable non-FIT NFC, or general non-FIT NFC. In 2018, METi started a pilot tracking scheme on top of FIT supported renewable NFCs. Initially, it was not possible for the consumer companies to purchase NFCs directly, but since November 2021 METI has opend FIT-NFC to consumer companies and made it mandatory to attach attribute information. Non-FIT NFCs are not open to the consumer yet, and detailed attribute information has not yet be attached. It is becoming increasingly complicated, but METI has announced that the NFC scheme is aiming to become similar to the European Guarantee of Origin scheme in the near future.

I-RECs will be only issued to attach detailed information to non-FIT NFCs, which are not yet attached attributes, and renewables outside of NFC scheme (which means not connected to the grid or not registered to NFC for various reasons). See Figure 8 for past NFC schemes, current NFC schemes, ad future plans, and where I-RECs will be issued. METI is providing tracking information to FIT-supported NFCs, but for non-FIT supported NFCs no attributes information are attached to NFCs and I-REC can provide these information to anonymous non-FIT NFCs. There is renewable electricity not subject to NFC issurance, that is, 1) non-FIT supported renewables for self-wheeling purpose, 2) own use of renewable generation, 3) small generation plants which can be registered to NFCs, but not registered for various reasons. *Figure 8. NFC features and the part subject to I-REC issurance*



Responsible government department: (include key contacts)

Electricity policy and the market are overseen by the Agency of Natural Resources and Energy (ANRE), within the Ministry of Economy, Trade and Industry (METI). Renewable energy policy including the FIT scheme and other support schemes are governed by the Energy Conservation and Renewable Energy Department under ANRE/METI.

There is a voluntary GHG credit system, called J-credits, which is cooperatively managed by the Ministry of Environment, the METI and the Ministry of Agriculture, Forestry and Fisheries. Additionally, there is a legacy energy attribute certificate system, called Green Energy Certificates. This is a private initiative but overseen by the METI.

The Government of Japan reinitiated the electricity market reforms via amending the regulations in the Electricity Business Act (1964) in three phases in April 2015, April 2016 and in April 2020 respectively. The reforms include the establishment of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) (in April 2015); the establishment of the Electricity Market Surveillance Commission (in September 2015), which was renamed to the Electricity and Gas Market Surveillance Commission (EGC) in April 2016; and the implementation of full liberalization of electricity retail sales (in April 2016). The legal unbundling of power generation, transmission and retail was implemented in April 2020.

The role of the Electricity and Gas Market Surveillance Commission (EGC) is to strengthen and monitor the energy market reform and the role of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) is to facilitate better use and planning of cross-regional electricity transmission operations. OCCTO is a membership organization for electricity generation, transmission and distribution, as well as retail companies.

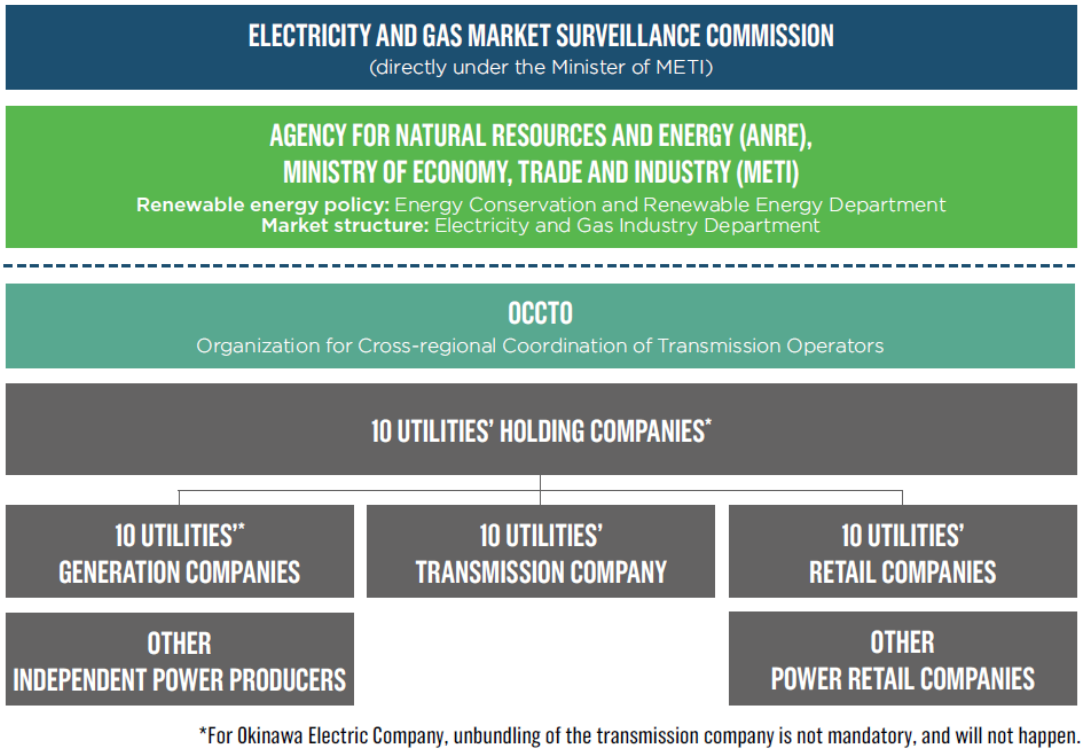


Figure 9. Overview of Japanese electric market stakeholders
Source: Takase, K. Ishida, M., Telang, S., " RE100 Japan Market Briefing Report" (2020.1)

Existing/Planned energy legislation:

The Electricity Business Act is governing legislation for the electricity market. It was initially promulgated in 1964 and has been revised several times. In 1995, it was revised to enable new entrants into the generation business. In 2000, the retail market for very high voltage customers was deregulated, and retail companies other than 10 regional monopolies were allowed to enter the market.

In 2003, the remainder of the high voltage retail market was deregulated, and JEPX (Japan Electric Power eXchange) was established. Following the energy crisis in California in the early 2000's, and domestic discussions regarding the potentially drawbacks of deregulating the energy market, further opening of the market was paused for most of the remainder of the decade.

After the Fukushima nuclear accident, the discussion to proceed with deregulation restarted, and the Cabinet approved the Reform Policy for the Electricity System on April 2, 2013, with the objectives of ensuring a stable supply, maximizing the containment of electricity prices, and expanding choices for consumers and business opportunities for businesses. The overall reform consisted of three stages: (1) expansion of wide-area grid operations, (2) full liberalization of retail and power generation, and (3) further ensuring the neutrality of the transmission and distribution sector through legal separation. The specific regulations were laid out in the 185th Extraordinary Diet Session (2013), 186th Ordinary Diet Session (2014), and 189th Ordinary Diet Session (2015), respectively, which provided for the measures necessary to implement the first, second and third stages.

Energy Basic Act on Energy Policy was set in 2002, to identify basic principles of energy policy, including supply stability, environmental eligibility, and utilization of market mechanisms. It also mandates the development of a Strategic Energy Plan periodically. The latest Strategic Energy Plan was set in 2018 in accordance with Japan's NDC (Nationally Determined Contribution) toward 2030, to reduce GHG emissions 26% by 2030, in comparison to 2013. The Strategic Energy Plan is to be revised in 2021.

In 2009, 'The Act on the Promotion of Use of Non-Fossil Energy Sources and Effective Use of Fossil Energy Materials by Energy Suppliers' has passed the Diet. This law requires energy suppliers, such as electricity, gas and oil companies, to take the necessary measures to promote the use of renewable and non-fossil energy sources and the effective use of fossil energy sources. The mandated non-fossil (including Nuclear) energy ratio for Electric Retailers to achieve as laid out in the Strategic Energy Plan is 44%. Retailers can meet this goal by purchasing or attaining non-fossil value certificates. This law is the basis of non-fossil fuel certificates (NFC), started in 2018. The compliance target is set for 2030, but interim targets will also be levied on electricity retailers.

The FIT law has passed in August, 2011, right after the earthquake and nuclear accident earlier the same year. The passage of the law was passed with strong public support as more renewables in Japan was seen as an important development. It went into force in July, 2012, setting a very high tariff, especially for the solar Photovoltaics (PV). A revision to the law that goes into effect in 2022 was recently enacted. This revision defines the shift toward feed-in premium (FIP), instead of feed-in tariff (fixed total tariff).

The FIP will have some similarities to the FIT, but will be based on a premium to the market price for power, rather than a fixed tariff as explained in previous section. FIP supported renewables will be issued non-FiT supported NFCs without any tracking information other than 1)It is FIP supported renewables, 2)It is generated in which quarter, year. METI has announced that they will shift the whole NFC scheme into an attribute tracking scheme that is similar to the Guarantee of Origin in the future, but the timeline is not yet decided. METI has proposed that JEPX will be responsible for implementing GO type tracking scheme. However, given the past experience of excel spreadsheet tracking scheme provided by METI, I-REC can play a role to demonstrate how credible tracking scheme works. It would be ideal for either JEPX or any responsible entity to take over a position as an issuer of Japan after the pilot of I-REC in Japan has been implemented, or establish a governance scheme to oversee I-REC to cover whole tracking scheme within Japan.

Environmental legislation for RE:

It is mandated to have environmental impact assessments for power plants, including renewable power plants. Solar power plants above 40 MW and wind power plants above 10MW are subject to the mandatory assessment.

Previously, there were constraints on the use of abandoned farmland for renewable power generation, but it was eased by the Taskforce for Renewable Power Deployment in 2021 and the regulation to maintain 80% of farming yield was repealed to aquire special permission to convert zoning for agricultural land to allow power plant development for a certain period of time. At the same time, the permission period was extended from 3 years to 10 years, which made it easier to plan for building solar power.

Existing/Planned energy certificate systems: (purpose, extent)

There are 3 attribute certificate systems in Japan, Green Energy Certificates (GECs), J-credits (renewables), and Non-Fossil Value Certificates (NFCs) NFCs are devided into 3 categories: FIT-NFC, non-FIT NFC (renewables), and non-FIT NFC (unspecified).
Figure 10 below shows comparison between GEC, J-Credit, and FIT-NFC. FIT-NFC is mentioned to be cancelled on annual basis, however, there are no operation of cancellation. They will automatically be cancelled when the equivalent fiscal year is over.
Figure 11 shows 3 categories of NFCs. FIT-NFC cannot be used to meet RPS for non-fossil ratio of retailers, but can be purchased by consumers directly. There is no process of cancellation to any of NFCs. Consumers or retailers purchase cannot be for re-sale, thereby ensuring no double counting is possible within the scheme.

Once the generation plant is registered to any of the schemes, it cannot be registered elsewhere. However, there is an exception of registering only the own use part of the generation. In that case, credible meters are required to claim for the issurance of any certificates.

■Certificates for Corporate Energy Users

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

Figure 10. Overview certificate schemes in Japan(Source: Renewable Energy Institute of Japan)

■Overview of Non-fossil Certificates (NFCs)

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

Figure 11. Overview of 3 categories of NFC in Japan(Source: Renewable Energy Institute of Japan)

The first-ever attribute certificate system was established by a private company, Japan Natural Energy, which is a subsidiary company of Tokyo Electric Company in 2000. They are called 'Green Energy Certificates' (GEC), and are still being issued for renewable electricity and heat in 2020. GEC initially dealt with grid-connected power sources, as well as self-consumption from renewable power sources. After the FIT law was implemented, most of the grid connected renewable electricity was purchased by under the FIT system electric utilities, and use of GEC stopped growing. Today, GECs are mainly issuing certificates for the own use of renewable power plants. Since 2011, there has been almost no growth in GECs, and the system to issue and manage GECs is paper based, making it difficult to expand.

The J-Credit system is a voluntary domestic carbon credit scheme started in 2000s' to induce carbon emissions reductions and reforestation. There are 3 types of J-credits, which are, 1) energy efficiency improvements, 2) renewable energy, 3) reforestation. It is run by METI (Ministry of Economy, Trade, and Industry) and MOE (Ministry of Environment), government of Japan. In order to simulate the market of J-credits, METI has proposed to put kWh information on J-credits from renewable electricity sources, so that it can meet the criteria of market-based measure. It was validated by CDP, WRI, and concluded that it meets scope 2 criteria. Most J-credits from renewable electricity sources are issued for the own use of rooftop-solar generated electricity at households, so the prospect to expand supply is limited.

Non-fossil certificates (NFC) were first implemented in 2018, to prepare for use in the compliance market for electricity retailers to meet the legally mandated non-fossil energy supply by 2030. The interim ratio was levied additionally to the electric retailers since 2020. National target for non-fossil based generation was raised from 44% to 59% since the NDC's ambition was increased in 2021. The first NFCs were issued for the FIT supported renewables, and auctioned at the JEPX. The auction scheme was a multi-price auction for FIT renewables, and are held quarterly basis. The trading for post-FIT renewables started in November 2019, which are mainly for the rooftop solar PV after 10 years of FIT support period. (FIT for surplus electricity from rooftop solar PV started in 2009.) Other NFC, including non-FIT renewables, nuclear, large scale hydro started for the electricity generated during April-June, 2020. It will be auctioned quarterly at JEPX, but it is also possible to tie to the direct (bilateral) contract with generators, so that NFCs don't have to go through JEPX auction. In that case NFCs from contracted power plants will be excluded from auction, but will be automatically put into corresponding retailer's account. Although FIT-NFC can be purchased by consumers sinde November 2021, non-FIT NFCs can only be purchased by retailers, and cannot be directly transferred to the end consumer of electricity, inhibiting their ability to be used for end to end renewable energy tracking.

For the FIT-renewable NFCs, METI started a short-term pilot scheme to add tracking attribute information on top of NFCs in 2018. Since November 2021, after the discussion at the Taskforce for Renewable Deployment, METI changed the scheme so that 1)Consumers can purchase directly, and 2) accompany detailed tracking information for all FIT-renewables. For the renewable electricity consumers such as RE100 member companies, FIT-NFCs are not very attractive because the payment will be used to decrease the surcharge and therefore cannot be considered 'additional'. As it was mentione before, it does not have explicit cancellation process, which makes it difficult to consider the process credible even though government claims that there is no double counting.

The NFC scheme is primarily designed as a tool for the compliance market in Japan, with the other major goal of shifting the current socialized FIT support levy from all rate payers to specific retailers. The income generated from NFCs goes to the grid operator to help pay for the FIT tariff premiums and reduce the surcharges for the next fiscal year.

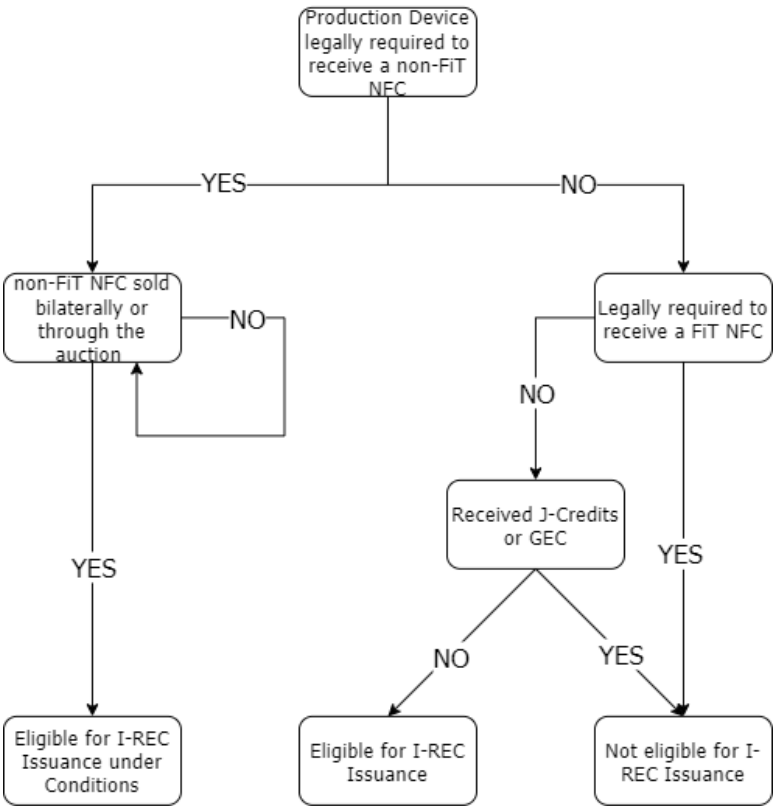
The income from non-FIT-NFC will not be used to lower the surcharge. However, having 'single price auction' for non-FIT NFC, or any types of renewable attributes certificates grouped into the same category, will receive same price quarterly. Generation plants receiving FIP will be registered into the non-FIT renewable NFC which can be used by retailers to meet the mandate on the non-fossil ration. It is critisized by RE100 members that a non-flexible attribute tracking scheme for new renewable power plants are not amplifying the purchasing power of RE100 members and should be amended to enable VPPA in Japan.

<Fitting in I-RECs>

All registrants must prove to the I-REC issuer that

1. The production device is:
    a. Legally required to receive the issuance of a non-FiT NFCs, or,
    b. not legally required to receive any NFC mechanisms whatsoever nor actively receiving another tracking instrument such as an J-Credit or GEC for the same MWh.

Please see the figure below for what production devices will be eligible for I-REC issuance. As can be seen below, I-REC issuance will at first instance only be possible for production devices that have sold a non-FiT NFC and for production devices that are not receiving FiT NFCs, J-Credits, and GECs.



Not eligible for I-REC Issuance

This means that this production device can currently not request the issuance of I-RECs. This possibility might open up in the future following further discussions with local stakeholders.

Eligible for I-REC Issuance

These production devices can request I-REC issuance when providing sufficient proof to Local Good, the I-REC issuer in Japan, that no FiT NFCs, no J-Credits, and no GECs were received or will be requested in the future. Local Good is to lead in what proof must be provided in addition to the regular issuance requirements.

Eligible for I-REC Issuance under Conditions

In addition to the regular issuance requirements under the I-REC Standard, the following additional conditions must be met by I-REC registrants to request I-REC issuance in Japan. The conditions are split between I-REC registrants who are a certified electricity retailer in Japan and those who are not:

Registrants who are a certified electricity retailer in Japan must contractually state that for every requested I-REC

1. Where it is legally required to retain an NFC, the electricity retailer must own sufficient volumes of non-FiT NFC, comparable to the amount of issuance being requested. The determination of legal requirement is determined by the I-REC Standard in collaboration with the local issuer.
2. When NFCs are required, in adherence with the requirements seen above, the instruments must be segregated from the other volumes owned by the electricity retailer, either through online or company IT infrastructure (where possible) or at a minimum through contractual means and some kind of identifying mechanism.
3. The separated NFCs, linked to the I-REC issuance, cannot at any time but used, redeemed, retired, cancelled, or in any way used for a beneficiary.

Registrants who are not a certified electricity retailer must sign a contract with a Japanese electricity retailer that is able to procure NFCs and agree to the requirements listed above.

For the purposes of the I-REC Standard - and until there is further clarification from the national authorities - it is irrelevant which electricity retailer holds, retains, procures or purchases the NFCs for the associated registrant making the issuance request. The registrant must be able to contractually prove the necessary NFC volumes are available via a Japanese electricity retailer. The NFC, for all intents and purposes, is considered a commodity and not an individual product. As such no differentiation is made between various NFCs. In other words, it does not matter what non-FiT NFCs are reserved as long as the volume matches with the number of I-RECs requested.

Why is this way forward chosen and what will I-REC add to the market

The NFC is a legislative mechanism that numerous stakeholders have suggested is not functioning fully for the purposes it was proposed for. However, the I-REC Standard Foundation should work within the regulatory framework created by the Japanese authorities to prove the supply of renewables. Some important characteristics of the non-FiT NFCs are as follow:

1. Non-FIT NFCs are required by law to prove the supply of non-fossil (including renewable) electricity to electricity retailers in Japan
2. Non-FIT NFCs can be purchased 1)bilaterally 2) through an auction (JEPX)
3. Non-FIT NFCs can only be purchased by certified retailers to prove the supply of renewables. End-users **cannot** purchase or be listed as a beneficiary of NFCs.
4. Non-FIT NFCs do not contain tracking information. This means that the following information, among others, is not enlisted on an NFC: 1) location of production device 2) capacity of the device 3) energy technology used to generate the electricity (e.g. solar, wind, hydro). 4) etc.

Because of characteristic '1' above, it is challenging at this moment in time to have an EAC tracking scheme, adherent to the I-REC Standard, without mandating a link of some form between the I-REC and the non-FIT NFC.

Because of characteristic '3' and '4' listed above, among others, the mechanism is not suitable for end-user claims in the manner expected by most end-users. An I-REC is tradable and redeemable for all entities and an I-REC contains sufficient information to be used for scope 2 reporting to CDP, RE100. The infrastructure on which I-RECs are issued, traded, and redeemed is clear and transparent and used by many stakeholders around the world.

Interaction with other Japanese mechanisms

Double issuance among the multiple Japanese certificate systems is already avoided. Production devices can only receive GECs, J-credits, OR NFCs (non-FiT or FiT supported). Because the issuance of I-RECs will only be possible for production devices that are eligible for non-FiT NFCs, there will be no double counting with other certificate schemes in Japan.

Future Developments

It is the goal of the I-REC Standard to further collaborate with Japanese authorities on the development of a mechanism that will make it easier for companies with electricity consumption in Japan to claim renewable attributes. Also, expanding I-RECs to FiT supported devices is an aspect that is being looked into but will require closer collaboration with national authorities to prevent issues such as double issuance and determination related to how the requirement to have auction sold NFCs (for FIT devices) would interact with the I-REC issuance process.

By entering the Japanese market with the additional issuance conditions, the I-REC Standard can set up an EAC scheme that is in adherence with international best practices while providing some tangible results that will be helpful in the ongoing improvement of the EAC scheme in Japan.

The extent of engagement with government:

In response to the appeal from METI, CDP and WRI have examined the eligibility of renewable sourced J-credits in 2016. Afterward, ANRE (Energy Agency under METI) has contacted CDP and TCG around the eligibility of NFCs to GHG Protocol and RE100. After discussion with RE100 member companies, RE100 has concluded that NFCs don't meet RE100 member's preferences since they only show the sources and the period of generation (in a quarterly manner), lacking specificity RE100 would prefer.

ANRE actively considered criteria from RE100 members and built a pilot project to add tracking information on top of NFCs. Initially, ANRE did not believe the needs from companies for the tracking system, but given the result of pilot tracking project, they now consider it can increase the attractiveness of NFCs. Unfortunately, the future status of the pilot project is not yet clear.

After NFC started in 2018, I-REC held a seminar in Japan to discuss the importance of a tracking scheme in August. I-REC held a seminar with all stakeholders including METI (Energy Agency, and the department responsible for J-credits), MOE (Ministry of Environment, co-organizing J-credits with METI), GEC issuer (JQA, Japan Quality Assuarance), electricity companies, RE100 companies, CDP responder companies. The study group around tracking scheme was established in Japan, hosted by Mizuho Research Institute and CDP Japan, and discussed how Japan can establish reliable tracking scheme for several times. One of the tracking schemes discussed were I-RECs.

Along with the study group, Energy Agency under METI had asked for advice to CDP if NFCs are eligible for RE100 achievement, and RE100 initiative concluded that, if the government recognized tracking information is added on top of NFCs, it is eligible or achieving RE100. Energy Agency has started a pilot tracking scheme to add information on top of NFCs, which is run by Unysis Japan since 2019. Energy Agency started to issue NFCs for non-FIT renewables from November 2019, and the discussion for non-FIT NFCs started. For non-FIT NFCs, there are many PPA type of contracts but with generators and retailers, which can specify which electricity bundled with NFCs are supplied. For the bilateral contract, RE100 TWG members advised that it can be considered as tracking until national integrated tracking scheme to be established.

Response from Government in relation to attribute tracking systems: Government

ANRE currently understands the importance of tracking information for the companies reporting to CDP, committing RE100, or setting SBTs. ANRE is positive about expanding the pilot scheme to non-FIT NFCs in the near future. In the conversation with ANRE, we have suggested that it is important to make the process transparent, and also enable consumers to directly purchase NFCs (currently, only registered electric retailers can purchase NFCs and sell electricity products). There is an on-going conversation with ANRE, but current NFCs are run by private company for profit (Unisys Japan), and has no third-party board oversite. We have continuously communicated the importance of transparency, governance mechanism to be considered reliable tracking scheme, but given that current tracking scheme is a pilot, there is a way for the government to consider transparency and better governance scheme in the future.

While establishing current pilot tracking scheme for FIT-supported renewables, I-REC has supported which information should be included, and provided all necessary information. I-REC had a meeting

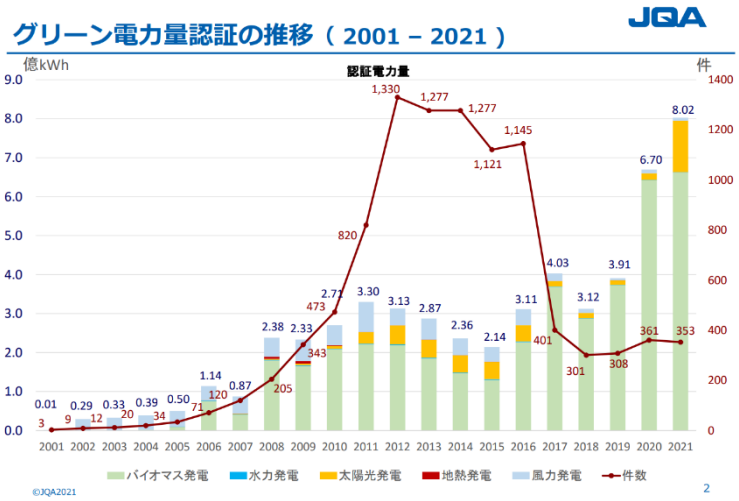
with ANRE and Unysis for many times to support establishment of pilot tracking scheme. I-REC has consulted ANRE if there will be any issues to start I-REC on top of non-FIT NFCs.

Current pilot scheme is funded by ANRE, and commissioned by Unysis, which is commercial entity. The scheme is not user-friendly, and process is manually arranged. It is not easy for non-Japanese speakers to understand the whole process. It has no third party surveillance yet, but is too complicated to ensure credibility without third party surveillance. It is worth starting I-REC in Japan to show the balance between credibility and the cost, which current I-REC should have after implementation in many countries. I-REC will be reporting ANRE about its experience of running I-REC in Japan, therefore Japan can move forward utilizing global experience and unique condition in Japan.

Demand-side market potential or strategic nature of market development:

In Japan, as of May 6th, 2022, there are over 69 RE100 companies, more than 900 CDP responders (including supply chain requested) and 192 companies with approved SBTs who seek to procure renewable electricity on voluntary basis. In 2020, approximately 100TWh of renewable electricity was fed into the grid under FIT scheme and issued NFCs, although buyout bidding for FIT NFCs were very limited to 0.35TWh. For non-FIT renewable NFCs, there were only 3.5 TWh available, however, more than 6.6 TWh were demanded by buyout bidding (Source: JEPX).
In 2021, 800TWh of renewable electricity was certified under Green Energy Certificates. More than 80% of the certified electricity originated from biomass, and the remainer was mainly from photovoltaics.

Figure 10. Certified electricity under Green Electricity Certificates



Source: JQA

For renewable sourced J-credits, there are over 1 TWh certified as of November 2020, with the majority from household PV projects and the projects listed below. The detailed statistics are not disclosed in kWh since the scheme was originally designed to create carbon credits.

Table 2. projects under J-Credits

	Prefecture	Project overview	MWh
1	Nigata	Biogas in sewage treatment plants	1593
2	Miyazaki	PV at University of Miyazaki #1	215
3	Miyazaki	PV at University of Miyazaki #2	298

4	Yamanashi	Hydropower at public facility #1	280
5	Yamanashi	Hydropower at public facility #2	191
6	Hokkaido	biomass solid fuel and solar power generation facilities in public facilities #1	9
7	Hokkaido	biomass solid fuel and solar power generation facilities in public facilities #2	46
8	Okayama	Biogas in sewage treatment plants	331
9	Fukuoka	PV at water treatment plants	594
10	Chiba	PV at Condominiums	547
11	Shizuoka	biomass solid fuels (woody biomass) at paper mills #1	54142
12	Shizuoka	biomass solid fuels (woody biomass) at paper mills #2	69855
13	Hyogo	biomass solid fuels (woody biomass) in industrial complexes	9352
14	Okinawa	PV at University	376
15	Nigata	PV at Hotel #1	13
16	Nigata	PV at Hotel #2	15
17	Hokkaido	PV at public facilities	57
18	Hiroshima	PV at logistic center	938
19	Iwate	Biomass power for own use #1	308
20	Iwate	Biomass power for own use #2	19
21	Toyama	PV, biomass at sewage treatment plant	2238

Analysis of political disruptions or market risks:

Japanese prime minister has committed to net zero by 2050, and discussion to enable renewable purchasing at reasonable prices has started in October 2020, by the new ministers of the cabinet. This has included discussions of the use of I-RECs in Japan.

As Japan continues its shift to decarbonization, there will be increasing needs for renewable energy. Most current government programs are built around socializing the cost of renewables across the entire rate base. Unless Japan updates its regulations on land use, grid access and permitting, and considering the large number of Japanese industrial companies committed to RE100 and SBT, there is a risk that renewable energy demand will outstrip supply in the coming years.

There are a number of ancillary electricity market that are in the process of being deployed, including the Capacity and Baseload markets, with a balancing market in development. Unfortunately, while one of the these for the implementation of these markets has been to increase competition and decrease costs, in some cases, the opposite has occurred.

At the first auction of the Capacity market in 2020 has shown 14000 yen/kW (112.75 EUR/kW as of Nov 27, 2020) of capacity, and it is to be levied to the electricity retailers. This makes Japan the second most expensive capacity market in the world. This the design of the Japanese capacity market favors fossil fuel generators, there are concerns this could work as a reverse carbon tax.

Analysis of regulatory risks including linkages with carbon markets and support systems:

Cap and trade scheme exist in Metropolitan Tokyo, and Saitama prefecture, but not as national scheme. However, after the prime minister addressed net zero commitment toward 2050, there appeared a possibility for material national level carbon pricing scheme to be realized.

Under cap and trade scheme of Tokyo, Green Energy Certificate can be used to reduce emissions from facilities under the cap. For the Green Energy Certificate scheme, ANRE's decision to cover all grid injected non-fossil energy under non-fossil value scheme restrict the potential of issuance, only to the own use of electricity. However, there is ambiguity on whether all grid injected non-fossil energy must be bundled with NFCs or whether it would be possible to separate the environmental attributes from these non-fossil grid connected electricity with other programs, such as GEC or potentially I-RECs.

Current environmental reporting in energy:

Based on the amended Act on Promotion of Global Warming Countermeasures (the "Global Warming Countermeasures Act"), as of April 1, 2006, those who emit large amounts of greenhouse gases (specified emitters) are required to calculate and report their own greenhouse gas emissions to the government. The government is also required to compile the reported information and make it public.

Mechanisms in place to support the reliable verification and issuance of I-RECs:

<Grid electricity>

All FIT approved facilities should pass governmental verification process to be approved. In order to receive FIT support per kWh injected into the grid, all injected kWh is measured by certified meters, and reported to GIO, which is appointed organization to manage income (charge to the electricity tariff) and payment (additional cost to the electricity market price) by FIT scheme. The information around amount of electricity reported to GIO is not disclosed, therefore acquiring consent from generation plants before tracking is necessary for the pilot tracking scheme, and making the process more complex. No mechanism is needed for the issuance of I-RECs for these devices as FiT supported plants will not be eligible for issuance under the I-REC Standard.

For non-FIT renewables, along with the start of non-FIT non-fossil value certificates started to have auctions in 2020, the government started to certify non-FIT non-fossil power sources and the amount of electricity generated from non-FIT non-fossil power sources. Nihon Unisys has been commissioned by the government to certify the amount of electricity generated from non-FIT, non-fossil power sources. Verified facility can either sell their electricity through bilateral contracts with NFCs attached, or to unbundle NFCs and join the auction. As same as FIT facilities, the information will not be disclosed, and kept within Unysis, ANRE and JEPX. I-RECs will be issued under certain conditions which are stated under the paragraph 'Fitting in I-RECs', p. 14.

<Green Electricity Certificates >

In order to ensure the fairness, neutrality and transparency of green energy certification operations, the Green Energy Certification Advisory Committee was established as a monitoring system with external experts.
In addition, the Green Energy Certification Technical Review Committee, consisting of experts with relevant knowledge, has been established for the purpose of obtaining advice from technical knowledge

to facilitate the smooth execution of certification operations. In addition, we have established a meeting for applicants to hear their requests and opinions about our green energy certification services.
When utilizing certificates under the Act on the Promotion of Global Warming Prevention, it is necessary to obtain certification under a certification system operated by the Agency for Natural Resources and Energy and the Ministry of the Environment, which is separate from the Green Energy Certificate System.

In addition, power producers, etc. that have abandoned their environmental values are required to report the amount of CO2 reduction on-count (added to the amount of emissions) when reporting their emissions under the Act on Promotion of Global Warming Countermeasures. This is because it is necessary to prevent double counting in the calculation of adjusted emissions when a credit purchaser uses the amount of CO2 reduction in the calculation of adjusted emissions under the Law Concerning the Promotion of Global Warming-Up of Emissions.

<J-Credits>
In order to issue credits from renewable electricity project, project owners need to register the project, and verified by the committee, run by the government. After the project is verified, project owner need to measure the amount of electricity production minus the electricity dispatched to the grid. It should be verified as well to issue credits. For the small size generation facilities, it is allowed to use sampling method, so that the similar facilities such as rooftop solar power will need less cost to measure the amount.

Local organizations of importance and their opinion on local I-REC market development:

A number of new regional electric power companies are currently working together with local governments to launch renewable energy projects to revitalize communities and achieve local production for local consumption. On the other hand, there are some renewable energy projects that do not involve the local community in their work and are sloppily constructed and have become a nuisance facility. It is expected that if the local new electric power companies that spend a lot of time and effort to work with the community can issue renewable energy certificates in a way that is distinct from these sloppy and cheap projects, consumers will support them and a virtuous cycle will be created.

Also, there is a great needs from global companies operating in Japan to procure credible renewable electricity to achieve decarbonization. There are 50 RE100 Japanese members, and around 107 Japanese companies have their approved SBTs.
There are requests from international companies to be able to source renewable electricity in Japan in a manner that is reliable and aligned with international best practices. NFCs cannot be used to achieve RE100 without very scarce pilot tracked certificates, and consumers need to ask retailers in advance to join the pilot project, which cost many processes.
There are great needs for transparent, easy-to-purchase, and a standardised cost-effective tracking scheme.

Any other relevant information: Local issuer

The proposed local issuer will be Local Good. Local Good is a non-profit membership organization. Members include local electricity retailers, including municipal power companies, power generators, municipal governments, large corporations, local businesses, and many other organizations that participate in the operation as observers. Based on the idea that renewable energy scattered throughout the countryside is one of the keys to reviving the local economy, Local Good provides support for local people to set up their own new local power company and manage supply and

demand. By becoming an I-REC tracking issuer, Local Good hopes to realize a world where electricity is differentiated by the value of each renewable energy project, especially the value of revitalizing local communities and supporting the happiness of the people who live there.

Report Prepared by	- Kae Takase, Senior Manager, CDP Japan - Ian Burkheimer, Business Development Director, World Kinect Energy Services
Contributors	- Kenji Inagaki, Executive Director, General Incorporated Association Local Good
Advisor	- Mr. Ishida, Renewable Energy Institute
Preparation Date	11/13/2020
Revised	5/6/2022