RE 100 | THE CLIMATE GROUP

CDP
DISCLOSURE INSIGHT ACTION

JANUARY 2020

RENEWABLE ENERGY MARKET BRIEFING JAPAN

Authors:

Kae Takase, Senior Manager, CDP-Japan

Masaya Ishida, Senior Manager, Renewable Energy Institute (REI), Japan

Shailesh Telang, Technical Manager, Renewable Energy, CDP

CONTENTS

01 ELECTRICITY SECTOR LANDSCAPE

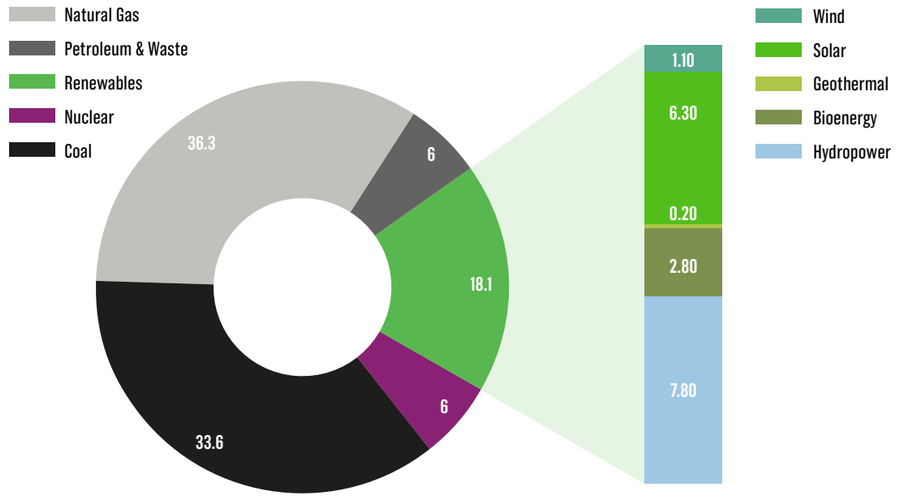
Japan's electricity journey started in 1887 when Tokyo Electric Lighting, Japan's first electric power company, started supplying electricity to the public. Japan is now the fifth largest consumer of electricity with a consumption per capita of 7,819 kWh (2014, World Bank).

Japan has experienced substantial growth in electricity consumption over the last five decades.. After the implementation of a feed-in tariff (FiT) scheme for renewables in 2012, there has been a significant increase in installed renewable energy capacity. The FiT scheme accelerated capital investment in renewables, with installed capacity growing by 41,480 MW[1] from the launch of the scheme until the end of March 2018.

Japan generated **18%** of its electricity from renewable energy sources, including 8% hydropower, mainly from large hydropower (>100 MW). However, coal and natural gas still contribute heavily to the overall electricity mix, with a 34% and 36% share respectively. After the Fukushima nuclear accident in March 2011, Japanese nuclear power plants stopped their operations until new safety regulations were adopted. As of April 4th, 2019, nine nuclear power plants with 9.1GW[2] of capacity are under operation compared to 55 nuclear power plants prior to the accident.

In order to reduce power sector greenhouse gas (GHG) emissions and achieve energy security for the country, Japan adopted a new Strategic Energy Plan[3] in 2010. The plan sets the country's energy policy until 2030 with objectives to double

FIGURE 1: % ELECTRICITY GENERATION BY SOURCES IN JAPAN (FY2018)



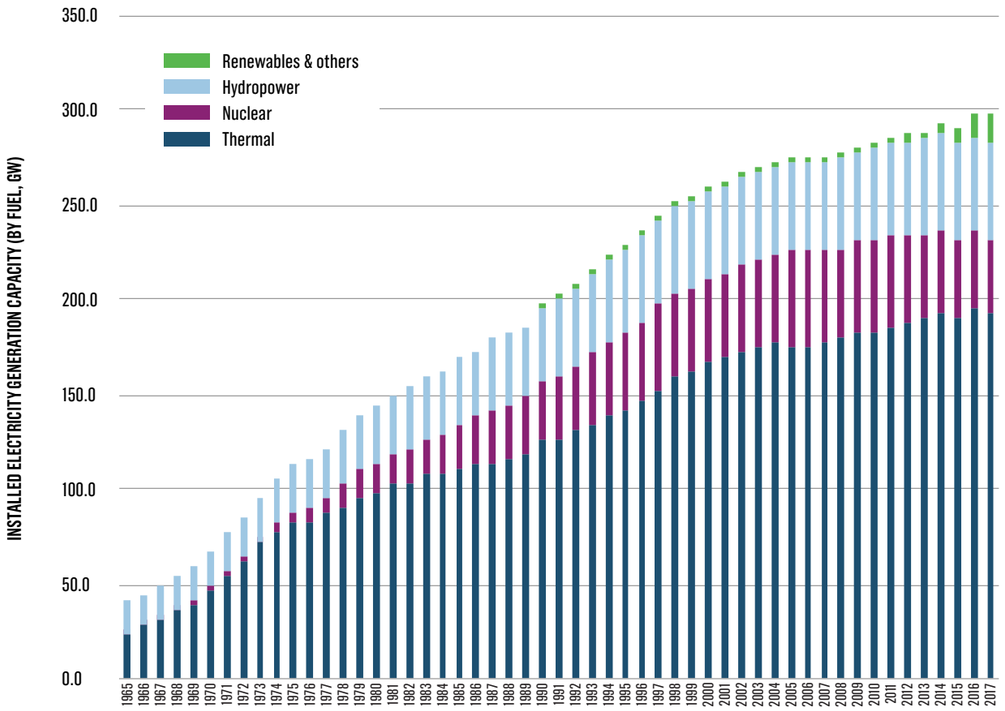
[Renewable Energy Institute, Japan]

[1] https://www.jepic.or.jp/pub/pdf/epiiJepic2019.pdf

[2] Japan Nuclear Safety Institute

[3] In October 2003, the Government formulated the First Energy Plan, and it publicized the Second Plan in March 2007 and the Third Plan in June 2010.

FIGURE 2: INSTALLED ELECTRICITY GENERATION CAPACITY (BY FUEL, GW)

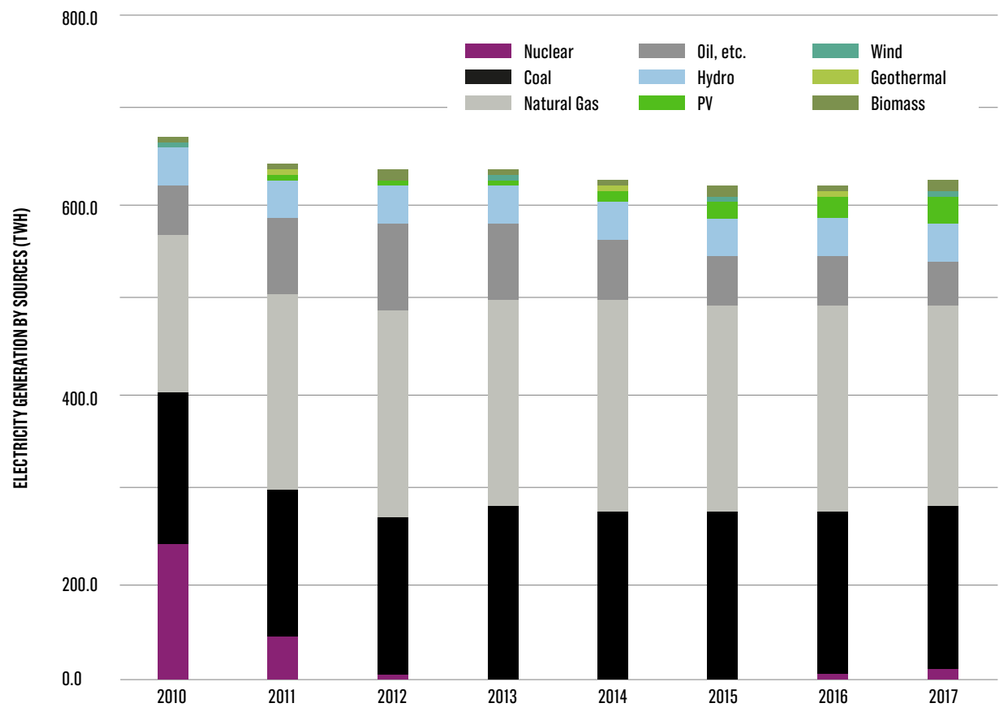


[EDMC/The Institute of Energy Economics, Japan, 2019]
Includes generation capacity from general utilities, IPPs, and self-generation, but excludes plants under 1000 kW.

energy self-sufficiency, reduce CO2 emissions, and improve energy productivity in the industrial sector. In response to the Fukushima nuclear accident in March 2011, the Government of Japan established the 4th 'Strategic Energy Plan' for 2030 in April 2014. The plan outlined the policies for reducing dependency on nuclear power and fossil resources and for expanding renewable energy in the grid mix.

Fossil fuels still dominate the electricity market but there has been a significant growth in non-fossil fuel-based electricity generation, particularly from solar energy sources, over the past five years. A FiT scheme was launched in 2009 to support solar PV installations for 10 years. Subsequently, a FiT scheme with high tariffs was launched in 2012 with support for 20 years covering other renewable energy sources such as wind energy.

FIGURE 3: ELECTRICITY GENERATION BY SOURCES (TWH/YEAR, INCLUDING NON-UTILITY GENERATION)



[Agency for Natural Resources and Energy, Ministry of Economy, Trade, and Industry, Government of Japan]

1.1 INSTITUTIONAL STRUCTURE OF THE ELECTRICITY MARKET

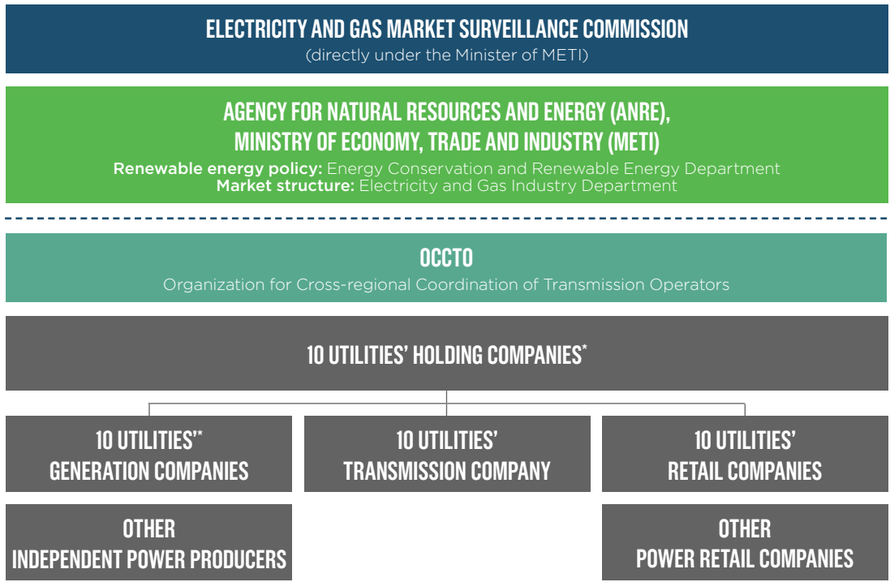
The Japanese electricity market was a monopoly of 10 regional utilities, until a gradual liberalization process started in 2000 which ceased in 2005[4]. The Government of Japan reinitiated the electricity market reforms via amending the regulations in the Electricity Business Act (1964) in three phases 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 separation of power generation and transmission verticals is also set to be implemented in April 2020.

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

[4] The deregulation process started in 2000, first by enabling extra-high voltage consumers to choose electric suppliers, followed by deregulating high-voltage customers to choose suppliers in 2004 and 2005. Until 2016, low-voltage customers were regulated so had to purchase electricity from one of the 10 regional utilities depending on where you live.

FIGURE 4: OVERVIEW OF JAPANESE ELECTRICITY MARKET STAKEHOLDERS



*For Okinawa Electric Company, unbundling of the transmission company is not mandatory, and will not happen.

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.

1.2 MARKET LIBERALIZATION STATUS

The liberalization of the retail sector was completed in April 2016 and since then, all electricity consumers including household customers can choose their power retail company for the delivery of electricity. Following the open procurement of balancing power in April 2017, a number of new market entrants obtained retail licenses for the power business. From 2020 onwards, unbundling of transmission and distribution from generation and retail is expected to be legalized and some of the dominant, vertically integrated electric utilities[5] are expected to be broken up.

The regulated retail tariff was planned to be abolished in 2020. The purpose of regulating prices is to protect consumers in less competitive areas from unreasonably high prices compared with those in competitive areas. However, due to the status of competition in the electricity market, it is likely to be postponed[6].

Currently, the power system has three sectors: generation, transmission and distribution (regional monopoly under license/concession) and retail.

According to METI, deregulation of the electricity market has the three key aims of: 1) securing stable energy supply; 2) cutting electricity prices; and 3) expanding business opportunities for operators and the range of choices for consumers. The liberalization of the market will allow increased competition from many new market entrants.

[5] Tokyo Electric Company has already unbundled its generation department, transmission & distribution department, and retail department in 2016.

[6] http://www.emsc.meti.go.jp/english/info/public/pdf/180122.pdf

FIGURE 5: HISTORY AND PLAN FOR DEREGULATION OF THE JAPANESE ELECTRICITY MARKET

1.3 POWER GRID AVAILABILITY AND NETWORK

Japan's power grids have no international connections. There are 10 general electric utilities which build, operate and manage their transmission lines independently. Interchange of electricity between nine transmission areas (the Okinawa islands are excluded) occurs only for limited purposes and situations.

OCCTO has been working to manage existing interconnection lines between utilities.

However, these interconnection lines have limited capacity, even after the application of a better power grid management process. In addition, the local power grids in areas where renewable resources are abundant are likely to have limited transmission capacity available.

FIGURE 6: JAPAN ELECTRIC POWER EXCHANGE (JEPX)

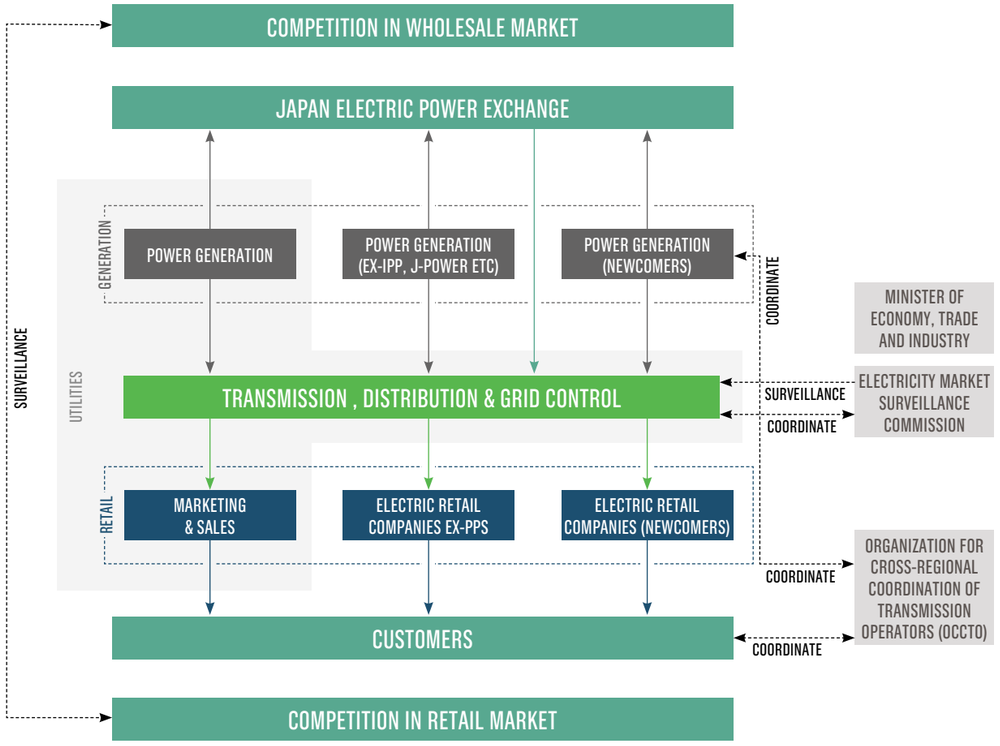
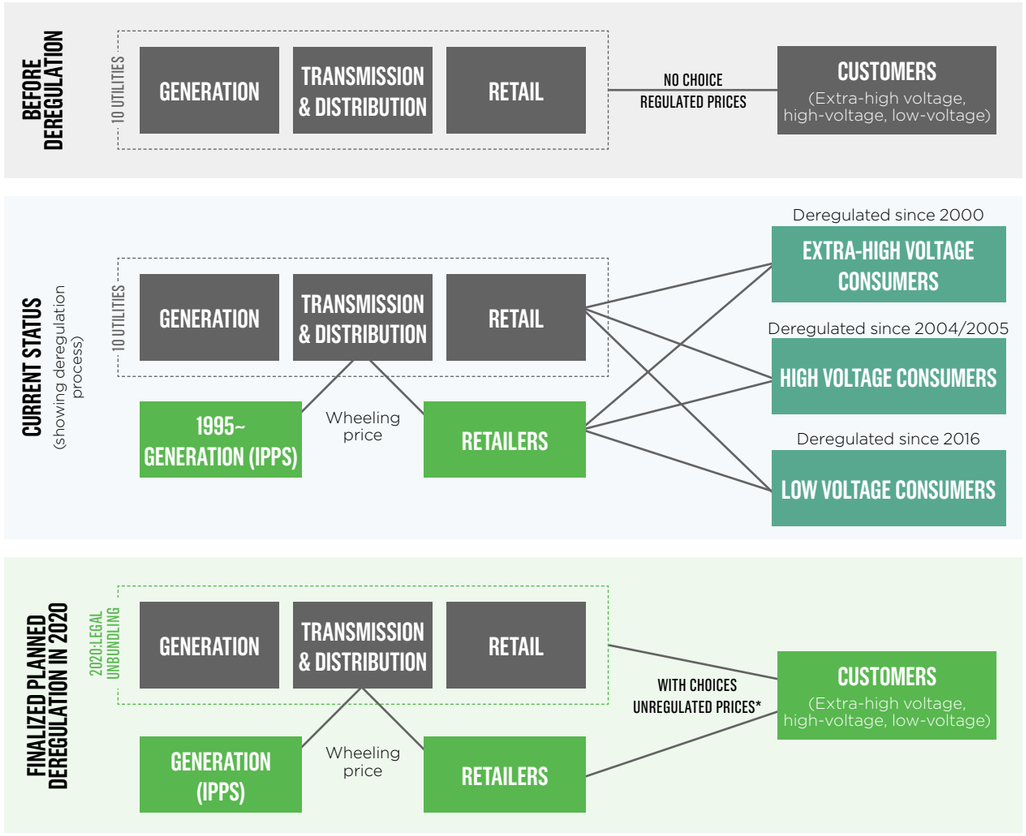


FIGURE 7: JAPAN'S ELECTRICITY MARKET DEREGULATION PROCESS



*** Regulated prices should remain until surveillance authority considers enough competition exists, for regulation not to be needed. Regulated prices were due to be abolished by 2020, but the authority is likely to extend this until the end of the year.**

As per the *Electricity Business Act*, existing power plants e.g. nuclear and coal-fired power plants are given priority in Japan ("first-come basis"). The grid connectivity rule limits opportunities for renewable energy producers. The key issue faced by renewable energy producers in Japan is inadequate transmission infrastructure to accommodate the growing renewable energy capacity and the high cost associated with grid connectivity. METI sets the "connectable amount" for each of the utilities, which further translates into generation limits on renewable energy producers leading to curtailment. In October 2018, the first curtailment of solar power plants took place in Japan[7].

METI is seeking to implement a more flexible grid operation policy (called "connect-and-manage") to utilize existing transmission lines better and increase grid capacity to connect renewables. TEPCO has started a pilot project for the connect-and-manage in Chiba, but most of other 10 utilities are reluctant to implement connect-and-manage operations.

[7] https://www.renewable-ei.org/en/activities/column/REupdate/20190409.php

02 RENEWABLE ELECTRICITY MARKET LANDSCAPE

Japan has set long-term targets for 2030 for self-sufficiency, electricity prices and greenhouse gas emissions. The Government plans to leverage renewable energy sources such as solar, wind, hydropower, geothermal, and biomass to reduce its reliance on nuclear power. Electricity retailers are required to have 44% or more of their sales from non-fossil fuel sources by 2030.

The Government of Japan supports 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 implementing solar heating systems under this scheme[8]. In 1992, electric utilities started their voluntary net-metering scheme for rooftop 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[9]. The RPS scheme set an obligatory renewable energy target for electricity retailers of 1.6% of total electricity sales in 2014[10].

A FiT for rooftop solar PV was introduced in 2009. A further FiT for all types of renewable energy sources for 20 years was introduced in 2012, right after the Fukushima nuclear accident in 2011. The FiT scheme, coupled with the fact that rooftop solar PV plants have a short lead time for construction, has stimulated rooftop solar PV implementation[11].

Since 2005, the annual growth rate of the renewable energy market has been 5%, until it jumped to 29%[12] after the introduction of the FiT in 2012. This sharp rise demonstrates the strong support that the FiT provided in further expanding renewables in Japan. Renewable electricity penetration is increasing 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 22-24% of generation.

An auction scheme started in 2017 for large scale solar PV and in 2018 for biomass (liquid and timber woods, separately). The auction for solar PV started with a minimum size of over 2MW for plants but expanded to include plants over 500kW in 2019. The latest auction resulted in a minimum price of 10.5 yen/kWh, which is much less than the FiT price for the same scale solar

[8] (Source: METI, History and Future of Renewable Energy, 2018.2.01, https://www.enecho.meti.go.jp/about/special/tokushu/saiene/saienerekishi.html)

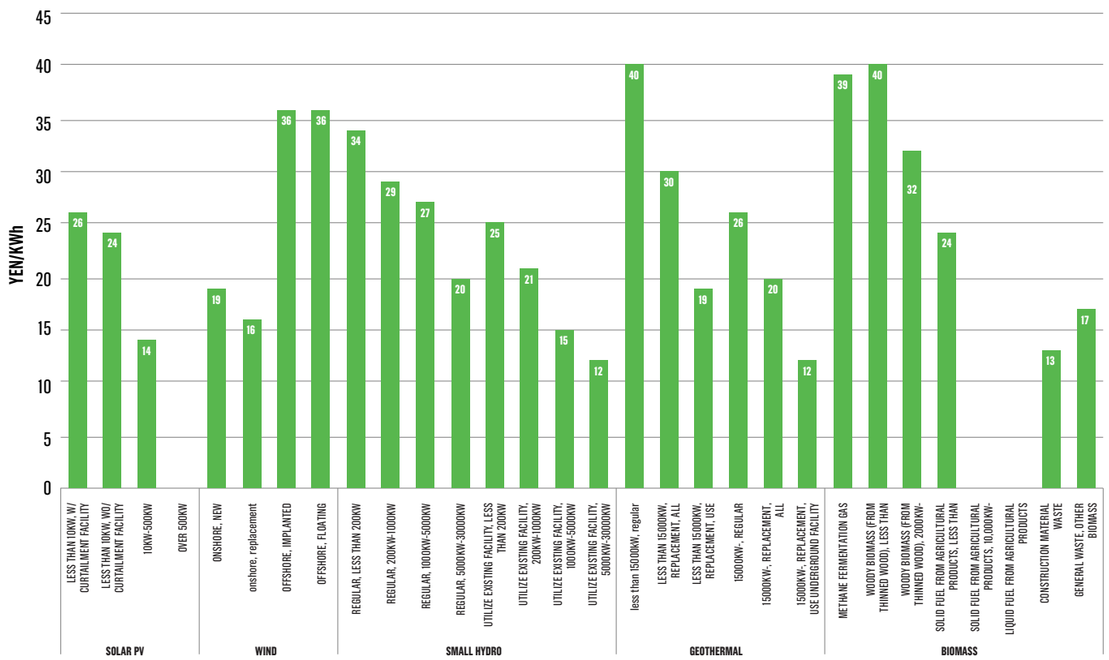
[9] (Source: Japan For Sustainability, History of Solar PV in Japan, 2008.7.01, https://www.japanfs.org/ja/news/archives/news_id027197.html)

[10] (Source: METI, RPS Website, https://www.rps.go.jp/)

[11] https://www.enecho.meti.go.jp/about/special/tokushu/saiene/saienerekishi.html

[12] http://www.emsc.meti.go.jp/english/info/public/pdf/180122.pdf

FIGURE 8: TARIFF LEVEL IN 2019



PV, which was 14 yen/kWh. For the biomass power auction, the minimum price bid was 23.9 yen/kWh for liquid biomass and 19.6 yen/kWh for timber wood biomass. However, since the minimum price set by the Government (which was not disclosed before the auction) was 20.6, no liquid biomass met the minimum price criteria. There is a plan to expand the target to large scale biomass and fixed foundation offshore wind power from 2020.[13]

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 are 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.

TABLE 1: RESULT OF THE AUCTION SCHEME FOR RENEWABLE ELECTRICITY

	2017.11	2018.9	2018.12	2019.9	2018.12	2018.12
SOURCES	Solar PV	Solar PV	Solar PV	Solar PV	Biomass	Biomass
SCALE/CONDITION	>2MW	>2MW	>2MW	>500kW	Liquid	Timber and woods
CAPACITY OPENED FOR AUCTION (MW)	500	250	197	300	30	180
MAXIMUM PRICE SET (YEN/KWH)	21	15.5	15.5	14	20.6	20.6
MINIMUM PRICE OFFERED (YEN/KWH)	17.2	16.47	14.25	10.5	23.9	19.6

Source: GIO, 'Result of FIT Auction' (https://nyusatsu.teitanso.or.jp/)

[13] (Source: METI, History and Future of Renewable Energy https://www.enecho.meti.go.jp/about/special/tokushu/saiene/saienerekishi.html

03 RENEWABLE ELECTRICITY SOURCING OPTIONS

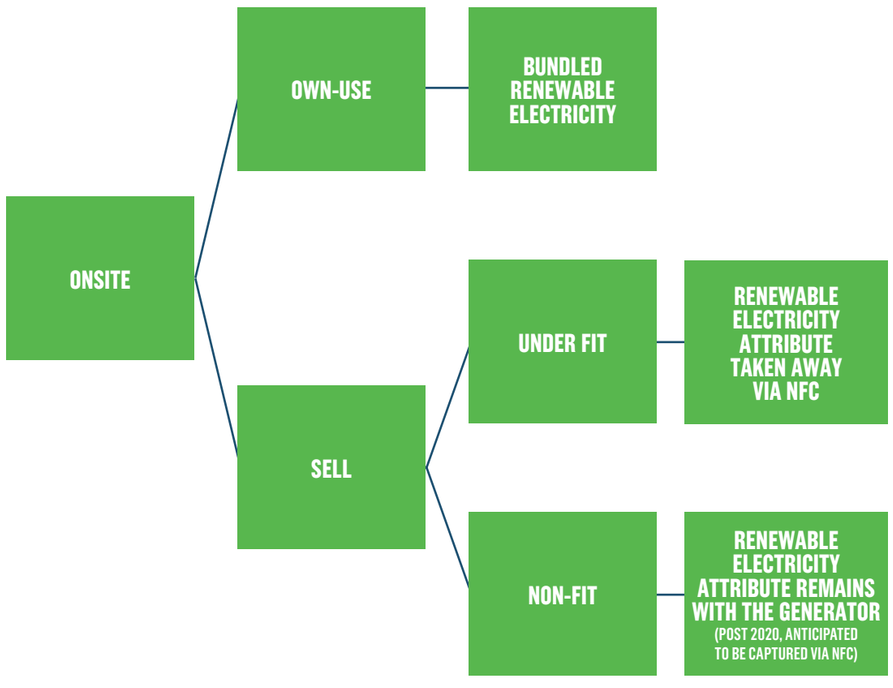
The demand for renewable electricity is growing among corporate consumers (Industrial and commercial), as they have started recognizing the benefits of renewable electricity consumption from an environmental and economic standpoint.

Corporates in Japan are proactive in adopting renewables, as shown by the growing number of Japanese companies joining the RE100 initiative and committing to source 100% renewable electricity for their global operations. All these member companies are actively exploring renewable electricity sourcing options in Japan.

Companies in Japan have the following options to source renewable electricity:

1. Onsite generation;
2. Green electricity products (which can include contracts similar to PPAs);
3. Energy Attribute Certificates.

FIGURE 9: RENEWABLE ENERGY ATTRIBUTES FOR ONSITE RENEWABLE ENERGY GENERATION IN JAPAN



3.1 ONSITE GENERATION

Consumers in Japan can invest in captive renewable energy assets and source electricity directly. Renewable electricity from an onsite renewable energy developer can be purchased directly, because it is beyond the boundary of Electricity Business law. However, METI advises developers to align their services with the Electricity Retailers' Guidelines, which licensed retailers are obliged to abide by, for consumer protection. The entirety of the electricity generated from onsite power plants, or just the surplus not used by the consumer company, can be sold to the grid. In the case of self-consumption, the attributes remain with the generator. They can be unbundled as Green Energy Certificates (GEC) or J-credits, and the buyer of the certificates and/or credits can claim the renewable energy use by using the attribute.

If the generated electricity is sold to the grid under the FiT scheme, the attribute is taken away, and the retailers need to buy the NFCs back on behalf of the consumers at the NFC auction. If the electricity is sold to the utility outside of the FiT scheme, or if there is a bilateral electricity contract with the third-party consumer, it is important to include environmental attributes with the electricity purchase contract. Currently, it is possible to unbundle environmental attributes and issue GEC or J-credits for the sold electricity outside of the FiT scheme. However, it is anticipated that all grid connected renewable energy power projects will be, in principle, issuing NFCs post 2020 for renewable electricity generation.

CASE STUDY 1: INGKA GROUP

The IKEA store in Nagakute, Aichi Prefecture installed a 1.3 MW rooftop solar PV plant in 2017 to help power its operations. Ingka Group has a policy to invest in projects that have a payback period of less than 10 years, and a solar PV system best meets this requirement. The electricity generated amounts to 25% of the store's total electricity consumption and the store retains the environmental attributes from the generated electricity.

CASE STUDY 2: AEON

In 2019, Japanese retailer AEON signed its first on-site PPA contract with a third party company. The company installed 1 MW of solar PV on an AEON store in K nan and sells the generated electricity to AEON for consumption by the store. AEON did not pay for installation and it does not pay operation and maintenance costs – all charges are included in the electricity bill AEON pays to the 3rd party company. AEON is planning to expand this model to other stores.

Off-grid onsite projects are becoming popular as the costs of renewable facilities and FiT prices decrease. Self-consumers don't need energy attribute certificates to make use claims, however, it is possible to issue GEC or J-credits for self-consumption. If GEC or J-credits are issued for energy that is self-consumed, a company can only claim credit for renewable energy

Currently, many industrial rooftop solar energy producers sell their electricity to the utility because the FiT is attractive. However, when they do so, the environmental attributes associated with the renewable electricity are taken away and the retailers need to buy NFCs back from the Japan Electric Power Exchange (JEPX) auction.

Between 2018 and 2019, the FiT for solar PV over 10kW decreased significantly from 18 yen/kWh to 14 yen/kWh, settling lower than high-voltage electricity prices (16.7 yen/kWh in April 2019). This price drop triggered an increase in self-consumption.

FIGURE 10: LIST OF EMISSIONS FACTORS BY ELECTRIC POWER COMPANY IN FY2017, FOR THE REPORTING IN 2019[14]

REGISTRATION #	NAME OF RETAIL COMPANIES	EMISSION FACTORS (BEFORE EACS ADJUSTED) (T-CO2/KWH)	EMISSION FACTORS (AFTER EACS ADJUSTED) (T-CO2/KWH)	
A0062	Ricoh Japan	0.00052	Menu A Menu B Menu C (residual) retailer's average	0.000000 0.000370 0.000499 0.000494
A0170	Daiwa House	0.000583	Menu A Menu B Menu C (residual) retailer's average	0.000000 0.000268 0.000571 0.000571
A0136	Panasonic	0.000458	Menu A retailer's average	0.000000 0.000708
A0226	Next Energy & Resources	0.00051		0.000000

Note: This is only available online in Japanese.

3.2 GREEN ELECTRICITY PRODUCTS

Electricity retailers in Japan can offer green electricity products. Since the 2016 electricity market reforms, Japan has seen a surge of new companies becoming certified power retailers. A good example of a green electricity product is Aqua Premium, an electricity rate plan offered by TEPCO. Electricity is generated by TEPCO's hydro power plants and is then attributed to Aqua Premium customers through accounting. The hydro power plants under this scheme are not covered under the FiT scheme.

Only licensed electricity retailers can sell electricity, but it is possible to constitute a contract by placing a licensed retailer as a 'middleman' between the renewable energy generators and consumers. Green electricity products also include onsite renewable facilities owned by third parties on the condition that the consumer pays for the electricity through an electricity tariff. It is also possible to categorize the fee as a leasing fee if the facility is within the consumer's premises and does not use the grid.

A company operating and consuming electricity in Japan wishing to procure renewable electricity can do it through the following steps:

STEP 1
FIND RETAILERS WITH GREEN ELECTRICITY PRODUCTS

The Government of Japan annually publishes the list of emission factors for electricity power companies, and this information can be used to trace the retailers who offer 'zero carbon' electricity.

STEP 2
SEARCH FOR THE WEBSITE OR CONTACT THE RETAILER

By searching online or contacting the retailer directly, consumers can explore which type of renewable energy source has been used to supply electricity for green electricity products.

Type 1: Electricity products with non-FiT renewables using a bilateral contract

When a bilateral contract is signed between an electricity generator and a retailer, the

[14] source: Ministry of Environment, https://ghg-santeikohyo.env.go.jp/files/calc/h31_coefficient_rev.pdf

TABLE 2: SUMMARY OF TYPES OF GREEN ELECTRICITY PRODUCTS

	ARRANGEMENT	RENEWABLE ATTRIBUTE STATUS	INSTRUMENT TO USE	OPTIONS UNDER RE100 TECHNICAL CRITERIA FOR CLAIMING
TYPE 1: PRODUCT WITH NON-FIT RENEWABLES WITH BILATERAL CONTRACT	Bilateral, nonFIT	Renewable electricity attribute is bundled with electricity	Until 2020: GECs, J-credits (renewables) After 2020: In principle, EACs of all grid electricity will be under NFC scheme	Contract with supplier can be used to claim renewable electricity uses.
TYPE 2: PRODUCTS WITH FIT RENEWABLES WITH BILATERAL CONTRACT	Bilateral, FIT	Renewable electricity attribute is bundled with electricity	NFCs	Contract with supplier can be used to claim renewable electricity uses.
TYPE 3: PRODUCTS WITH ANONYMOUS ELECTRICITY WITH UNBUNDLED CERTIFICATES	JEPX (anonymous)	No renewable electricity attribute	NFCs, GEC, J-credits (renewable)	Contract with supplier can be used to claim renewable electricity uses.

Note: Consumers can make credible renewable energy use claims using NFCs with the robust tracking system.

CASE STUDY 3: SEKISUI HOUSE

Sekisui House has helped to create "zero-emission" houses by installing solar PV panels on rooftops. Before Japan's FiT scheme for household rooftop solar began expiring in November 2019, other electricity retailers could purchase excess electricity from the generators at a low rate of 7-9 yen/kWh. Now, Sekisui House is offering 11 yen/kWh to homeowners for excess electricity via bundled bilateral contract (physical electricity plus renewable energy attributes). Homeowners are able to change contracts if they can get a better price from other retailers.

retailer retains the renewable attributes equivalent to the physical electricity delivered. The retailer has the possibility to sell its attributes but must then claim the products that emit equivalent emissions as anonymous electricity. Currently, non-FiT renewable generation facilities can unbundle environmental attributes and issue GECs or J-credits (renewables), but METI intends to capture all attributes injected into the grid to be as NFCs from April 2020.

Example: Aqua Premium by TEPCO is an electricity product provided by TEPCO to the large-scale customers with contracts above 500kW. RE100 member Sony is procuring renewable electricity using this product. TEPCO had third-party verification of this products in 2018, to align with RE100 criteria. Electricity and attributes are exclusively allocated from the large hydro power plants owned by TEPCO under contract with the customers[15].

CASE STUDY 4: MARUI GROUP

Marui Group has started to procure electricity from 2 MW wind energy generators located in Aomori Prefecture. The electricity will power Marui Group's operations in Shinjuku, Tokyo. The wind generator used to sell electricity to the utility through a FiT, but the contract expired in September 2018. Now, the electricity retailer is providing a blockchain-enabled renewable energy tracking system to enable Marui Group to make claims about its use of renewable electricity.

CASE STUDY 5: SONY CORPORATION

Sony is currently installing 1.7 MW of solar PV on the rooftop of its warehouse in Shizuoka. The surplus electricity will be transferred to Sony's production factory in Shizuoka using the grid transmission network operated by TEPCO. Sony will pay TEPCO for the electricity wheeling charges. Elsewhere, Sony has entered into a renewable electricity supply contract with TEPCO under its Aqua Premium plan started in March 2017. In 2018, Sony reported to CDP that it had consumed 2.1GWh of Aqua Premium electricity.

Type 2: Electricity products with FiT renewables using a bilateral contract

When contracts are made between power generators and retailers under the FiT scheme, consumers of that electricity cannot claim for the attributes unless retailers buy NFCs and cancel it on behalf of the consumer. In this case, attributes of the electricity under contract should be covered by NFCs to claim for renewable consumption. Consumers should obtain a contract with the retailer using the equivalent tariff option. A third-party verification of the green product scheme is recommended to secure renewable energy uses claims.

Type 3: Electricity products with anonymous electricity using unbundled certificates (NFCs, GECs, J-credits (renewable)

It is not possible to identify the sources of electricity purchased through the grid, but it is possible to match certificates (NFCs, GECs, J-credits (renewable) and claim the electricity as renewable. In that case, according to RE100's technical criteria, third-party verification of the transaction is recommended.

3.3 ENERGY ATTRIBUTE CERTIFICATES

An Energy Attribute Certificate (EAC) is a certificate that provides information about the environmental attributes of electricity generated from renewable energy sources. Each EAC provides proof that a certain amount of renewable electricity (usually in 1 MWh, but 1kWh in all of Japanese EAC schemes) has been produced and either injected to the grid or consumed by the generation entity (own use). Most of the EAC schemes globally comply with the Greenhouse Gas Protocol Scope 2 Guidance and are recognized electricity market instruments to document electricity consumption from renewable energy sources and to report reduced greenhouse gas emissions (scope 2 emissions).

In Japan, there are three EAC schemes in principle, but the Government is planning to integrate all EACs for grid injected renewables into NFCs starting in April 2020. There is no

CASE STUDY 6: NEXT ENERGY & RESOURCES (RE100 PLAN)

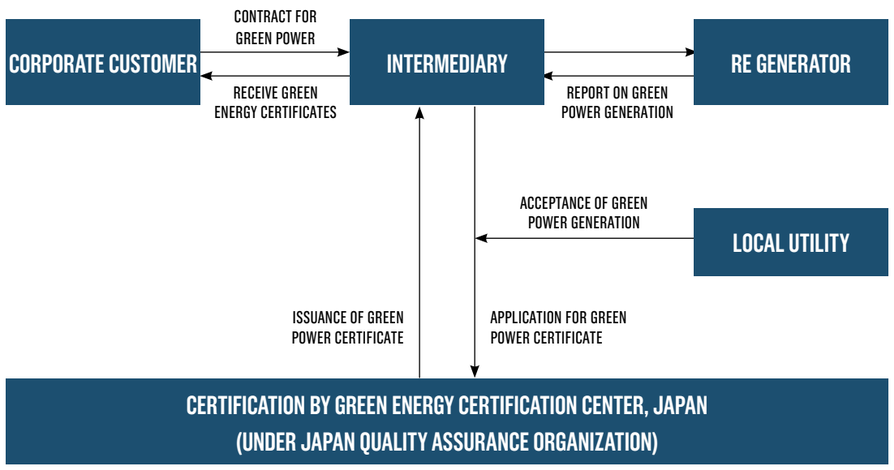
Electricity retail company Next Energy & Resources has started to offer a green electricity product which they call the "RE100 plan". This product includes GECs attached to energy sourced mainly from FiT-backed renewables. The generation from the FiT backed renewables has previously been stripped of its renewable attributes when the NFCs were turned over to the government in exchange for FiT support but by attaching GECs from other renewable generation Next Energy & Resources offers a green electricity product.

CASE STUDY 7: KANSAI ELECTRIC (RENEWABLE ECO PLAN)

Kansai Electric (KEPCO) offers the 'Renewable ECO plan' which is electricity generated mainly from KEPCO owned facilities. The physical electricity is matched with NFCs at 2 yen/kWh for low voltage customers and at a bilaterally negotiated rate for high voltage customers.

[15] http://www.tepco.co.jp/ep/eco/plan/corporate/index-j.html

FIGURE 11: CERTIFICATION PROCESS FOR GREEN ENERGY CERTIFICATES



CASE STUDY 8: TEPCO (ELECTRICITY MENU WITH ENVIRONMENTAL ATTRIBUTES)

TEPCO Energy Partners, a retail company, offers an electricity menu where they add Green Electricity Certificates to electricity generated from facilities mainly owned by TEPCO. The contract is for large scale customers over 500kW, and the price is determined bilaterally.

clear plan for the two other EAC schemes, namely Green Energy Certificates and J-credits (renewable sources), but it is likely that these two EAC schemes will cover self-consumed (not grid injected) electricity's attributes or work as green electricity certification/label schemes.

3.3.1 GREEN ENERGY CERTIFICATES (GEC)

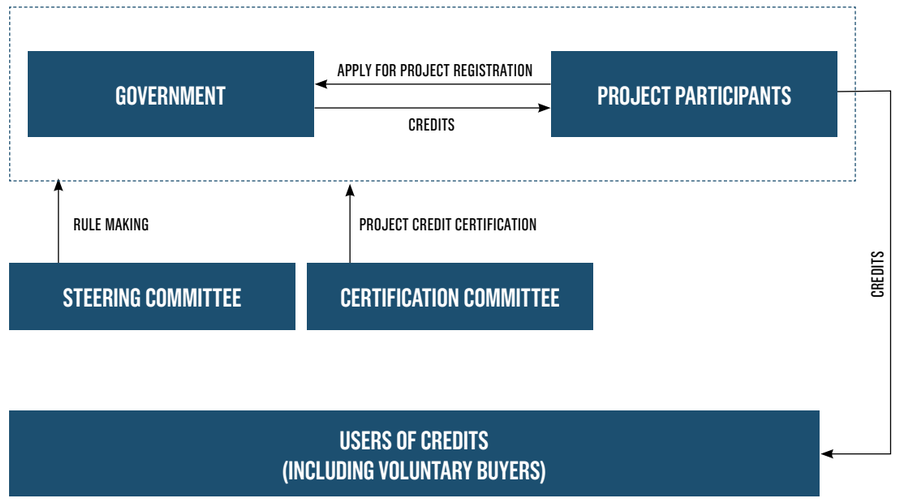
The Green Power Certificate scheme was introduced in 2000 by the Japan Natural Energy Company Ltd and was the first energy attribute certification scheme in Japan. In 2008, the Green Electricity Certificates Guidelines were designed at the committee set by METI. At the same time, the Green Energy Certification Center was established as an individual and neutral body in charge of certifying green electricity generated in power plants as meeting the renewable energy criteria.

Electricity customers in Japan can purchase renewable electricity by paying a premium price in exchange for Green Energy Certificates. The mechanism of Green Energy Certifications divides generated renewable energy into two components: the physical electricity and a Green Energy Certificate, representing the environmental attribute. The electricity is either sold to the distribution utility at an agreed cost or used by the generation entity, while the Green Energy Certificate can be cancelled on behalf of the consuming entity. The trading of GECs is not allowed, they need to be retained or cancelled by entity that consumes the electricity.

If companies wish to buy certificates, they can contact issuers, such as Japan Natural Energy Company Limited. In 2018, 328 facilities were registered under the GEC scheme: their total capacity was 350 MW, and they issued 256 GWh of certificates[16].

[16] https://www.jqa.jp/service_list/environment/service/greenenergy/file/list_cert/power_chart201906.pdf

FIGURE 12: J-CREDIT SCHEME



CASE STUDY 4: UNILEVER

Unilever purchases Green Energy Certificates sourced from biomass, wind, hydro, and solar PV to cover all electricity consumed within Japan. Unilever products have a logo to certify that the production process is all powered by renewable electricity.

The Green Electricity Certificate is a private scheme, but it was established with the purpose of supporting renewable energy deployment. Additionality criteria[17] is defined in their standards, to ensure they contribute to the building of new facilities or sustain a facility. The GECs are fairly transparent, although all the information available is in Japanese. They contain facility-level information, and the organization that purchased GECs are fully disclosed. As the GECs are verified manually, the amount of issuance is small, and the cost is high.

3.3.2 J-CREDITS (RENEWABLE SOURCE)

In April 2017, the METI transformed its offset-credit scheme, the 'J-credit system', in a way that can provide businesses with offsetting credits or RECs (Renewable Energy Certificates). The J-Credits issued for renewable energy generation convey information about direct energy generation emissions occurring during the production.

Consumers of renewable energy-based J-Credits can choose whether to retire them as an offsetting credit or as an Energy Attribute Certificate. J-Credits are tracked from their production to their retirement within 'J-Credit Scheme Registry', an electronic registry for the management and recording of the J-Credits. This system avoids double-counting attributes.

Companies can buy J-credits by contacting the J-credits providers listed on the website[18], contacting the owners of the credits listed on the website, or joining the auctions[19] for METI-owned certificates.

[17] https://www.jqa.jp/service_list/environment/service/greenenergy/file/flow/power_standard.pdf
[18] https://japancredit.go.jp/market/offset/
[19] https://japancredit.go.jp/tender/

FIGURE 13: RESULT OF A SEARCH FOR THE RENEWABLE PROJECTS FOR THE BILATERAL PURCHASE

SCHEME	PROJECT#	PROJECT OWNER	PLACE	SECTOR	OVERVIEW	TYPE	IN MWH	IN GJ	ENERGY SAVED	POSSIBLE TO USE FOR LOW CARBON SOCIETY ACTION PLAN?	MINIMUM UNIT OF SALE	MAXIMUM UNIT OF SALE	CONTACT INFORMATION OF CREDIT OWNER
J-credit	P11	Oita prefecture	Oita prefecture	House-hold	PV installation on rooftops	Emissions reduction by renewables	2,968	-	-	YES	10	371	Oita prefecture
J-credit	P29	Utsunomiya city	Tochigi prefecture	House-hold	PV installation on rooftops	Emissions reduction by renewables	475	-	-	YES	1	4	Utsunomiya city
J-credit	P41	Yamagata prefecture	Yamagata prefecture	House-hold	PV installation on rooftops	Emissions reduction by renewables	4029	-	-	YES	50	2,095	Yamagata prefecture Department of Environment

Note: This table is only available online in Japanese. If there is a MWh figure, it means that the project is producing renewable sourced J-credits.

The J-credits scheme is run by the Government and has strict standards for verification. Verifiers check to ensure the facility is not registered in another EAC scheme to avoid double-counting. METI owns the renewable energy attributes in exchange for initial support money being provided by METI to the households to install the solar panels. Since the cost of the secretariat is being covered under the national budget, the price of J-credits is generally lower than GECs.

3.3.3 NON-FOSSIL FUEL CERTIFICATES

Non-fossil fuel certificates (NFCs) were introduced to monitor electricity retailers' achievements of their non-fossil electricity ratio which is set to be 44% or more by 2030. Currently, electricity retailers are obliged to purchase or acquire NFCs only and from 2020, the METI is planning to set a mandatory non-fossil ratio for retailers. This ratio will gradually increase to match the 2030 target ambition.

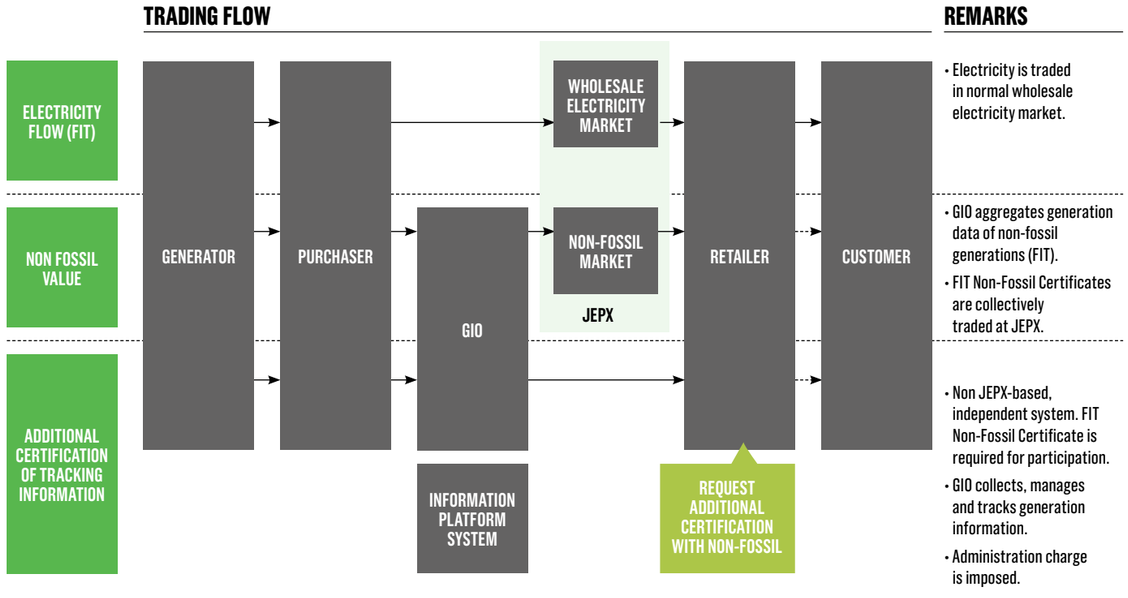
The NFCs are currently being issued for the renewable electricity generated from power plants connected to the grid and selling power to utilities at feed-in-tariff (NFC FiT)[20]. The Green Investment Promotion Organization (GIO) is appointed as a clearing organization, which adjusts costs between regions so that the unit price of renewable energy charges is uniform throughout the country, in addition to issuing of NFCs.

Consumers can buy renewable electricity from Load-Serving Entities (LSE) (i.e. electricity retailers) who purchase NFCs at the Japan Electric Power Exchange (JEPX) and can claim renewable energy use. Consumers do not get NFCs directly, rather, the LSE retires the NFCs on the consumer's behalf and conveys them to the consumer. The LSE trades NFCs through the accounts at JEPX. The Government's policy allows the LSEs to notify their adjusted emission factors with NFCs to final users. If some NFCs are left unsold after the last auction of the year, they lose their validity, which means the NFCs cannot be carried over to the next year.

The Government is also designing two types of NFCs for non-FiT: the Renewable non-FiT NFC and the General non-FiT NFC. The

[20] FiT supported generation facility is strictly managed and overseen by Green Investment Promotion Organization (GIO), which is appointed by Government to manage tariff revenue and payment and avoid double issuance.

FIGURE 14: NON-FOSSIL FUEL CERTIFICATE (NFC) SCHEME OF JAPAN FOR FIT BASED RENEWABLE ELECTRICITY[21]



Renewable non-FiT NFC will cover existing large hydro, rooftop PV after 10 years of FiT support for surplus electricity generated, and newly built renewables which were developed without FiT support. General non-FiT NFC would mainly be covering nuclear power. The METI plans to not set a lower price for non-FiT NFCs, and the revenue can go directly to the renewable generation plants. It is still possible for the retailers to sign contracts with specific generation facilities and electricity consumers. This is very similar to a power purchase agreement (PPA), but with the retailers as a facilitator.

Although the NFCs in general only contain information about the energy source and whether the electricity is FiT-supported or not, consumers now have the choice to buy green electricity using NFC with specified source. Recently, the Government has introduced a tracking scheme for NFCs as a pilot project.

The Government decided to integrate all EACs of grid electricity into the NFC scheme by April 2020. There will be three types of NFCs, which are summarized in table 3.

Renewable Energy Attribute Tracking System for NFCs

In February 2019, a demonstration experiment was conducted to track renewable energy attributes in the form of NFCs using an electronic tracking system developed by Nihon Unisys Limited. Retailers will be able to track renewable energy attributes from the generator to the consumer using this new system.

The tracking system will be able to track the following information: equipment ID, power generation equipment category, name of installer, power generation output (kW), certification date, start of operation or scheduled date, location and purchase amount (kWh).

3.4 COMPARISON OF RENEWABLE ELECTRICITY SOURCING OPTIONS

Japan has fragmented renewable energy attribute certificates schemes. In addition, direct bilateral purchases of renewable electricity (PPAs) between the consumers and generators are only possible if retailers are positioned in

[21] Source: METI, "Direction for Increasing Value of Non-Fossil Value Trading Market", Working Group on System Study, Electricity and Gas Industry Subcommittee, Electricity and Gas Industry committee, 25th Advisory Committee for Natural Resources and Energy; October 22, 2018), English Translation by the Renewable Energy Institute

TABLE 3: CHARACTERISTICS OF THREE TYPES OF NFC

	NFC (RENEWABLES)		NFC (ANONYMOUS)
SOURCES OF ELECTRICITY	FIT supported renewables (ex. Solar, Wind, small medium hydro, biomass, geothermal)	Not FIT supported renewables (ex. Large hydro, others)	Non-FIT supported (ex. Large hydro, others, nuclear)
SELLING ENTITY OF THE CERTIFICATES	GIO	Generation company	Generation company
BUYING ENTITY OF THE CERTIFICATES	Electric Retailers	Electric Retailers	Electric Retailers
MINIMUM PRICE	1.3 JPY/kWh	None	None
MAXIMUM PRICE	4.0 JPY/kWh	4.0 JPY/kWh	4.0 JPY/kWh
METHODS OF PURCHASE	Via JEPX market (multi-price auction)	Via JEPX (single price), or bilateral contract	Via JEPX (single price), or bilateral contract

Source: METI [22]

between, or if the generator itself has a retailer license[23].

Under the current regulatory scenario, the tri-party contract between the renewable energy generator, retailer and consumer can be categorized as a green electricity product, which leaves only three options for companies to source renewables in Japan – onsite self-generation, green electricity products (renewable electricity menu from retailers, which include PPA types of contracts) and unbundled energy attribute certificates (EACs).

The existing renewable electricity certificate schemes are compared in the table below.

3.5 RENEWABLE ELECTRICITY USES CLAIMS

RE100 provides a set of criteria regarding renewable electricity sources and purchasing mechanisms which must be met in order to make credible renewable electricity usage and delivery claims. Making claims around the use of renewable electricity requires the defining of renewable "attributes" of generation, which gives data on the condition of production. Attributes include anything that identifies the generation source and all non-power outputs, including the fuel type, location, greenhouse gas (GHG) emissions and the other environmental and social impacts and benefits resulting from the electricity generation.

RE100 believes that the ability to demonstrate and claim use or delivery of renewable electricity on a shared electricity distribution network (grid) requires the support of contractual and/or tracking instruments that meet specific criteria to be credible. The requirements are the following:

3.5.1 COMPLIANCE WITH RE100 CRITERIA

Green Energy Certificate (GEC): This scheme has been in operation since 2001, when Japan Natural Energy Company Ltd. started to issue GECs. The Green Energy Certification Center was established in 2008 to set the criteria for GEC certification and manage the

[22] https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/seido_kento/pdf/032_04_03.pdf

[23] If the generation company obtains a retail license and operate as a retailer, it needs to match the demand and supply for each 30 minute period or pay additional fees.

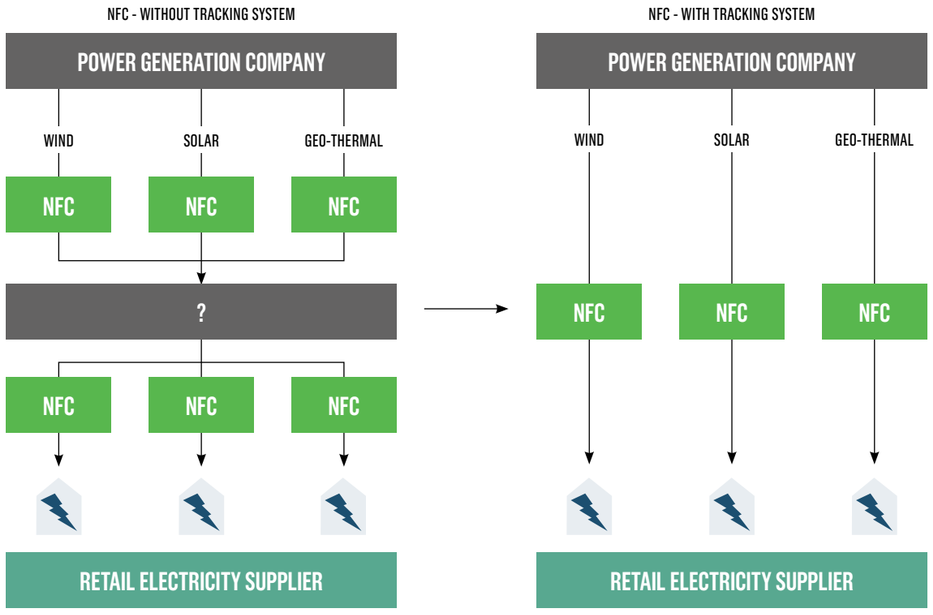
TABLE 4: COMPARISON OF EXISTING RENEWABLE ELECTRICITY CERTIFICATE SCHEMES

DETAILS	GREEN ENERGY CERTIFICATE (GEC)	J-CREDIT (RENEWABLE SOURCE)	NFC-FIT	NFC-NON-FIT RENEWABLE (FROM FY2019 ONWARDS)
TYPE/ELIGIBILITY	Generation facility accredited by Japan Quality Assurance Organization (JQA)	Generation facility accredited by J-Credit Scheme Certification Committee	Generation facility certified as FiT facility by the Government	Generation facility accredited by the Government
TECHNOLOGY	Solar, Wind Hydro, Geo-thermal, Bioenergy	Solar, Wind Hydro, Geo-thermal, Bioenergy	Solar, Wind Hydro, Geo-thermal, Bioenergy	Solar, Wind Hydro, Geo-thermal, Bioenergy
OWN USE/GRID ELECTRICITY	Mainly Own use[24]	Mainly Own use[25]	Grid connected	Grid connected
PURCHASING METHOD	Purchase from issuing body	1) Bilateral transaction 2) Tender by J-Credit Secretariat	Via auction	Via auction or bilateral contract
CANCELLATION	Anytime (No vintage)	Anytime (No vintage)	Only during the fiscal year as the year of generation (Jan-Dec)	Only during the fiscal year as the year of generation (Jan-Dec)
PRICES DISCOVERY	Depends on the price band determined by issuing body	Vary by bilateral negotiation or via tender	Vary by tender, multi-price (lowest price set at 1.3 yen/kWh, highest price set at 4.0 yen/kWh for the time being)	Vary by tender, single price/contract (Highest price set at 4.0 yen/kWh)
BUYERS	Corporates, local governments, etc.	Corporates, local governments, etc.	Retailers (Retailers can buy NFCs on behalf of the corporate customers)	Retailers (Retailers can buy NFCs on behalf of the corporate customers)

[24] GEC is the oldest EACs scheme in Japan and predates the regulation for renewable energy ratios. In 2003, when the Renewable Portfolio Standard (RPS) was introduced, most of renewable electricity was purchased at higher price for the achievement of RPS, therefore most of GECs was issued only for the own use of electricity at the generation sites.

[25] Most J-credits (renewable source) are issued from own use of rooftop PV. Since it receives subsidies from the Government for the upfront cost, EACs for the supported PV (for own use) is owned by the Government.

FIGURE 15: RENEWABLE ENERGY TRACKING SYSTEM FOR NFCS



certification scheme of GECs as a third-party organization. The criteria are provided below:

1. The quantity of renewable electricity generated from certified facilities is verified according to the descriptions of the certification rules.
2. Renewable electricity is certified by independent and neutral organizations.
3. Public understanding and awareness of green power is enhanced

Green Energy Certificates meet the RE100 criteria.

J-Credit: The J-Credit scheme is administrated by the Japanese government which gives credibility to the system. Technically, J-Credit follows ISO14064-2 as a guidance and only ISO 14065 accredited entities can become examining authorities for J-Credit verification. J-credits are tradable through auctions or negotiated transactions. The J-credit tracking system helps restrict double-counting of attributes. J-Credits act as an offset as well as Energy Attribute Certificates, and the buyer can choose whether to retire them as an offsetting credit or as an Energy Attribute Certificate. The J-Credit scheme meets RE100 criteria.

NFC: NFCs cannot be used as unbundled attribute certificates, as voluntary buyers cannot purchase certificates directly from JEPX. Indeed, only electricity retailers can buy certificates and retire them. The customers get electricity as well as NFCs if they purchase a green electricity product using NFCs from the retailers. However, consumers can make credible renewable energy use claims using NFCs with the robust tracking system, which is currently being tested as a pilot project by METI. The NFC scheme meets RE100 criteria.

TABLE 4: COMPARISON OF EXISTING RENEWABLE ELECTRICITY CERTIFICATE SCHEMES

CRITERIA	EXPLANATION
CREDIBLE GENERATION DATA	Static data (e.g. fuel type, location, date of first operation, etc.) should be third-party verified. Dynamic data (quantity of generation) is best when metered using a “revenue-grade meter” and independently used as the basis for determining the quantity of attributes and certificate issuance.
ATTRIBUTE AGGREGATION	Making a credible renewable electricity usage claim requires ownership of all environmental and social attributes associated with the generation that can be owned, and that none of these attributes have been sold off, transferred, or claimed elsewhere.
EXCLUSIVE OWNERSHIP (NO DOUBLE COUNTING) OF ATTRIBUTES	Exclusive ownership of renewable electricity generation attributes consists of legal enforceability, tracking (exclusive issuance, trading, and retirement), and exclusive sales and delivery. Claims must be substantiated by attributes that have been reliably tracked from a generator to a consumer.
EXCLUSIVE CLAIMS (NO DOUBLE CLAIMING) ON ATTRIBUTES	This requires that all renewable electricity instruments or instruments representing individual generation attributes have been retired by or on behalf of the same entity and that there are no other usage claims being made on the generation or attributes, for example, by the electricity supplier to meet a renewable electricity delivery target or in marketing that renewable electricity is being delivered to customers.
GEOGRAPHIC MARKET LIMITATIONS OF CLAIMS	Attributes (and certificates) must be sourced and purchased from within the same defined geographic region that constitutes a “market” for the purpose of transacting and claiming attributes.
VINTAGE LIMITATIONS	Certificate shall be able to communicate vintage related information (date of generation). To make a credible renewable electricity claim, the vintage of the attributes (and certificates) – that is, when the generation occurred – must be reasonably close to the reporting year of the electricity consumption to which it is applied.

04 RENEWABLE ELECTRICITY SOURCING BARRIERS

There are numerous barriers when it comes to sourcing renewable electricity in Japan including technology, resources, institution, policy, economy and society. The key issue is a less ambitious national renewable energy target (22-24% RE by 2030). Thanks to the Feed-in-Tariff (FiT) scheme, the share of renewable electricity has increased from 10% in 2012 to 18% in 2018.

According to the Renewable Energy Institute (REI), a Tokyo-based thinktank focusing on renewable energy and climate change, the percentage of renewable electricity in Japan´s electricity mix could increase to more than 40% by 2030 if major existing barriers were resolved by the Government and regional utilities. For now, the low national target does not incentivize the regional utilities to integrate renewable electricity into the grid network, which explains their lack of pace. At the same time, the traditional industries such as the steel sector are not active in the energy transition from fossil fuels to renewables. Setting a higher national target can send a strong signal which could further help remove the existing barriers faced by various stakeholders including utilities, industries, local governments and communities.

TECHNOLOGY AND RESOURCE BARRIERS

One of the major reasons for the high cost of generating renewables in Japan is the inefficiency of the building process of the power plants due to a lack of expertise in the renewable energy sector. In turn, the length and cost of the building process affect the generation costs of solar and other renewable energies. According to REI, the average capital expenditure of a utility-scale solar power plant is JPY200,000/kW (approx. USD1,800/kW) in 2018-19 including 63,000/kW for construction and 60,000/kW for solar panels. It is expected to decrease to one third, JPY68,000 including 26,000 for construction and 15,000 for solar panels in 2030.

A technological barrier is the lack of information technologies available for grid operations. As observed in leading countries in terms of renewable energy integration to the grid, such as Spain, precise prediction of output from variable renewables is key to integrating renewable electricity to the grid. Analyzing previous output and demand combined with weather information enables grid operator to precisely predict output of variable renewables in each region. It reduces unnecessary curtailment of solar and wind. So far, the Japanese grid operators (regional utilities) have not established such advanced prediction systems using information technologies.

Some regulatory barriers restrict the use of existing resources and prevent the development of solar, wind and geothermal power plants. Japan has abundant resources of solar, and wind exists on abandoned agricultural land, but the Agricultural Land Law strictly prohibits using the land for purposes other than crop production. Only "Solar Sharing" [26] is allowed, which consists of installing solar panels above the ground with elongated poles, allowing for the ability to cultivate crops underneath. As for geothermal energy, Japan owns the third vastest geothermal resource in the world after the US and Indonesia, but cannot use it all, as the majority is located under the ground of national parks, protected by the Natural Park Acts which strictly regulate new economic development in the parks.

INSTITUTIONAL BARRIERS

Many renewable energy development projects are on hold, waiting for permission to connect to the regional grid operated by the utility. There is enough capacity physically in the grid for new power plants, but the current operation rule allocates the capacity to the existing power plants, which includes all the nuclear sites, either in operation or halted. The Government is currently introducing a new operation rule called "Connect and Manage" to allocate empty capacity to new power plants, but the regional utilities have so far been slow to apply the new rule.

Another institutional barrier is the lack of standard certification and tracking systems of renewable electricity, like the Guarantees of Origin in Europe, Renewable Energy Certificates in North America and International RECs in other countries and regions. Currently there are three kinds of certificates for renewable electricity in Japan, but the criteria and tracking mechanisms are different, and only the J-Credit scheme provides an online tracking system. The Government has started a pilot project to implement a national tracking system for Non-Fossil Certificates by collecting information of renewable electricity supplied through the grid network. It will cover electricity from FiT power plants, and whether government will continue the system for non-FiT has not yet been decided.

POLICY BARRIERS

The Government is still embracing coal and nuclear power, as shown by the national 2030 targets of 26% production from coal and 20-22% from nuclear. A typical policy barrier is the dispatching rule of electricity to the power grid. The highest priority goes to "baseload" power supply powered by coal, nuclear and large hydro power plants. The purpose of prioritizing the baseload is to supply low-cost electricity consistently, but the marginal cost is actually higher than renewables.

By April 2020, 9 regional utilities (except for Okinawa, which covers several southern islands of Okinawa) are required to unbundle transmission and distribution business units from generation and retail accordingly as per the revised Electricity Business Act. 'Legal Unbundling' must be executed to separate transmission and distribution business units as an independent company. However, the ownership remains within the holding company and the grid operation functions will not be independent. Furthermore, seven of the nine regional utilities, except for Tokyo and Chubu Electric Power, will maintain their generation and retail businesses directly within the same holding company that supervises their transmission and distribution subsidiaries. Tokyo and Chubu will have pure holding companies on top of all separated generation, transmission, retail companies. Maintaining generation and retail business units in the same company creates a competition issue, as the regional utilities are still dominating the market.

A significant benefit of an electricity system based on renewable energy is its flexibility and resilience with several distributed facilities in each region. Unbundling distribution network operation from transmission, as in many countries in Europe, is desirable for locally managing electricity demand and supply, independent from the transmission network. For now, the unbundling of transmission and distribution is not planned by the Government, and the unbundling of generation and retail businesses for fair competition is not considered either.

ECONOMIC BARRIERS

So far, renewable electricity is mostly limited to large hydro power plants operated by regional utilities and FiT-certified renewables. In the very near future, PPAs through retailers will become cost-competitive, as the generation costs of solar and wind are expected to decline

[26] https://www.mdpi.com/2076-3298/6/6/65/htm

with lower FiT prices. The FiT system for large-scale solar and wind will be replaced by auctions with a Feed-In-Premium mechanism, to be introduced in 2021. Utilities sell hydro-based renewable electricity at a premium price, usually adding around JPY4/kWh on top of regular tariffs, which are typically at JPY14 for industrial use (as of October 2019, the JPY is almost equivalent to US cent). Large corporate customers can receive a volume discount including hydro-based products, whereas medium- and small-sized companies are often required to pay the premium.

For FiT-certified renewable electricity, retailers purchase Non-Fossil Certificates (NFCs) to sell carbon-free electricity. Currently, NFCs from FiT-certified electricity are sold at JPY1.3/kWh as a minimum. Retailers usually sell electricity with NFCs at a higher-than-average price. The other certificates are available for retailers and corporate users for around JPY1.0/kWh for J-Credits and around JPY3.0-4.0/kWh for Green Electricity Certificates. The amount of J-Credits and Green Electricity Certificates are limited and will not be enough for many corporate users to reach the 100% goal.

From November 2019 onwards, retailers will sell electricity from household solar with NFCs. It may be sold at a regular price without premium, as retailers can buy the solar electricity from household at a lower price than the wholesale market. From April 2020 onwards, NFCs will also be available for large hydro and other Non-FiT renewables, collectively 'Non-FiT NFCs'. Non-FiT NFCs can be traded by auction or direct transaction between generators and retailers. The prices are expected to be lower than JPY1/kWh. The question remains as to whether regional utilities will supply NFCs from large hydro power plants or continue selling hydro-based products at a premium price; and also, how fast non-FIT renewables will increase due to the new FiT rule which will be introduced in 2021.

SOCIAL BARRIERS

Recently, several local governments have introduced new rules restricting large-scale solar power plants for environmental and scenery reasons. Obtaining consensus and permission from the local communities will also be an issue, due to historic opposition to onshore wind projects when the turbines are close to residential areas. The fishery industry may also oppose offshore wind farms, and hot spring owners may oppose geothermal power plants.

The current national energy policy neither incentivizes nor highlights the need to increase renewable energy to transition towards a low-carbon society. The situation will gradually change as many corporations and several local governments including Tokyo Metropolitan have set ambitious emission reduction targets and have highlighted the importance of improving energy efficiency and increasing renewable energy use to reach this target. Non-state actors have an important role to mobilize society in Japan.

05 OPPORTUNITIES AND RECOMMENDATIONS

Japan has untapped potential in various renewable energy sources; solar, onshore and offshore wind, hydro, geothermal, biomass and biogas, and ocean resources including wave and tide.

However, the Japanese government has so far set a modest national target of 22-24% for renewables by 2030, while the share of renewable electricity generation already reached 18% in 2018. When considering projects under development, the total capacity of renewable energy has surpassed the 2030 target. If the barriers such as grid connection were resolved, Japan could achieve the target of non-fossil share of 44% in 2030 without relying on nuclear power generation (unrealistic 20-22% target from 6% in 2018).

In the meantime, generation costs of solar and wind will decline, following the same trend as seen in many other countries where the market is expanding and the competition drives cost reduction. Bloomberg NEF estimates solar will be cheaper than coal, which is currently the lowest-cost power supply in Japan, in the middle of 2020s, with wind energy following suit to be cheaper than gas in the early 2020s. Corporate energy users will be able to procure low-cost renewable electricity before 2030, as suppliers will provide renewable electricity products at competitive prices. With more renewable energy and a higher energy efficiency, Japan can reduce GHG emissions dramatically towards zero by 2050.

RECOMMENDATIONS

1. A nationwide renewable electricity tracking system should be adopted in Japan for all renewable electricity being generated and consumed. RE100 Technical criteria recommends that renewable electricity use claims must be substantiated by attributes that have been reliably tracked from a generator to a consumer. Attribute tracking systems provide exclusive issuance, trading, and retirement of attributes to markets for renewable electricity to support credible claims. The most sophisticated mechanism for tracking energy attribute certificates is an electronic attribute "tracking system".
2. Access to electricity grid transmission and distribution network should be non-discriminatory for energy generators from different sources to allow for further development of the renewable electricity market in Japan. This process should be managed transparently and fairly to ensure efficient use of the grid. Corporate electricity users can collaborate to aggregate renewable electricity demand and demonstrate the requirement for clean energy to regulator and utilities to help advocate for this change.
3. The cost-competitiveness of onsite generation by solar and wind has been greatly improved. Tri-party (generator-retailer- consumer) contracts are becoming economically realistic as the generation cost of solar and wind gets closer to the price of fossil energy. There is a need to spread awareness about such arrangements so that more customers can take advantage and help drive down the cost of renewable electricity.
4. Corporate consumers have a strong interest in buying renewable electricity, which leads to the creation and support of new renewable energy capacity. Renewable electricity products should be developed with "additionality" in mind. New renewable electricity capacity, when developed in concert with local governments and stakeholders can provide additional social benefits.
5. Currently, a few sectors of consumers can enter into a bilateral contract with a generator through retailers. However, the high-wheeling cost makes such contracts unviable. It is recommended to explore opportunities to reduce the wheeling costs and create a pilot project by the regulator creating awareness about this provision.
6. The floor price of the Energy Attribute Certificate (NFCs) need to be lower than the present level. There is also a suggestion to use the revenue associated with the NFCs for the purpose of improving local economy.

RE 100

Led by The Climate Group in partnership with CDP, RE100 is a collaborative initiative bringing together the world's most influential businesses committed to 100% renewable power. Renewables are a smart business decision, providing greater control over energy costs while helping companies to deliver on emission reduction goals. RE100 members, including Global Fortune 500 companies, have a total revenue of over US$5.4 trillion and operate in a diverse range of sectors – from information technology to automobile manufacturing. Together, they send a powerful signal to policymakers and investors to accelerate the transition to a clean economy.

Visit **RE100.org** and follow **#RE100** on Twitter.

THE CLIMATE GROUP

The Climate Group's mission is to accelerate climate action to achieve a world of no more than 1.5°C of global warming and greater prosperity for all. We do this by bringing together powerful networks of business and governments that shift global markets and policies. We focus on the greatest global opportunities for change, take innovation and solutions to scale, and build ambition and pace. We are an international non-profit organization, founded in 2004, with offices in London, New Delhi and New York. We are proud to be part of the We Mean Business coalition.

Visit **www.theclimategroup.org** and follow **@ClimateGroup**

CDP
DISCLOSURE INSIGHT ACTION

CDP is an international non-profit that drives companies and governments to reduce their greenhouse gas emissions, safeguard water resources and protect forests. Voted number one climate research provider by investors and working with institutional investors with assets of US$96 trillion, we leverage investor and buyer power to motivate companies to disclose and manage their environmental impacts. Over 8,400 companies with over 50% of global market capitalization disclosed environmental data through CDP in 2019. This is in addition to the over 920 cities, states and regions who disclosed, making CDP's platform one of the richest sources of information globally on how companies and governments are driving environmental change. CDP, formerly Carbon Disclosure Project, is a founding member of the We Mean Business Coalition. Visit cdp.net or follow us @CDP to find out more.

Visit **cdp.net** follow us **@CDP** to find out more.

自然エネルギー財団
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 Corp., with his own resources. REI launched the Renewable Energy Users Network (RE-Users) in April 2018 to support corporate energy users for procuring renewable energy in Japan. Participants attend meetings and conferences focusing on renewable energy procurement for learning and networking in the corporate community. Collaboration with the Renewable Energy Buyers Alliance in the US, the RE-Source Platform in Europe, CDP Worldwide-Japan and WWF Japan expands the network globally and locally.

Visit **www.renewable-ei.org/en**

JCLP

This report was produced in association with JCLP, Regional Delivery Partner for RE100 in Japan.

Japan Climate Leaders' Partnership (JCLP) is a coalition of companies in Japan (127 as of November 2019) that aims to create a zero-carbon society, built on the idea that decarbonization is essential to economic development. It was set up in 2009 to encourage the business sector to develop a sense of urgency on climate action. Recognizing the key challenge climate change poses to society, its members are committed to integrating decarbonization measures into their core business models. Members share this common goal and proactively communicate with policy makers, other businesses and civil society. The coalition has a unique focus on policy engagement to accelerate decarbonization in the country. Since April 2017, JCLP has been the regional delivery partner for The Climate Group's RE100, EP100 and EV100 initiatives in Japan.

Visit **www.japan-clp.jp/en**