STUDY ON RENEWABLE ELECTRICITY PROCUREMENT IN JAPAN

September, 2022

The Institute of Energy Economics, Japan

TABLE OF CONTENTS

Sichao KAN, Senior Researcher, New Energy System Group, Electric Power Industry & New and Renewable Energy Unit

Hiroko NAKAMURA, Senior Researcher, New Energy System Group, Electric Power Industry & New and Renewable Energy Unit

Akiko SASAKAWA, Senior Researcher, Renewable Energy Group, Electric Power Industry & New and Renewable Energy Unit

Yoshiaki SHIBATA, Assistant Director, Electric Power Industry & New and Renewable Energy Unit

The Institute of Energy Economics, Japan (IEEJ)

Yu NAGATOMI, Former Senior Researcher, The Institute of Energy Economics, Japan (IEEJ)

EXECUTIVE SUMMARY

Renewable energy is expected to play an important role in Japan's carbon neutrality strategy. According to the Sixth Strategic Energy Plan (6th SEP), approved in October 2021, renewable electricity is expected to account for 36%~38% of the total power generation mix by 2030, which is much more ambitious compared to the target share of renewable electricity (22%~24%) set out in the previous SEP. At the same time, an increasing number of Japanese companies have been seeking direct renewable electricity procurement in recent years. For example, the number of Japanese companies joining RE100, a global renewable energy initiative for companies committed to 100% renewable electricity consumption, reached 69 in April 2022 from only three companies five years ago (2017).

Renewable energy deployment in Japan has seen rapid growth since the implementation of the Feed in Tariff (FIT) scheme in 2012. However, renewable power generation costs are still high compared to those of other countries and the high cost is passed on to electricity consumers in the form of FIT surcharges. Corporate purchases of renewable electricity can provide an option for supporting renewable energy deployment that imposes no additional burden on the general public. Yet, according to a RE100 report[1], Japan is one of the most challenging places in the world for companies to switch to 100% renewable electricity. High costs and limited supply are cited as the two largest problems.

Given this background, the Institute of Energy Economics (IEEJ) team conducted a study to reveal the main challenges of corporate renewable energy procurement in Japan and what policies and/or regulations are needed to address the issues pertaining to making Japan's renewable electricity market more friendly to corporate buyers. We interviewed various stakeholders, including renewable energy developers, electricity retailers, consumer companies, industry associations, as well as experts, to gain firsthand insight into the issues often raised.

Land constraints and grid integration were mentioned to be the two biggest concerns regarding future cost reductions of renewable power generation and the further expansion of renewable capacity. A mountainous country, Japan is not home to as wide an area of flat land compared to other countries and most of the low-cost flat land suitable for renewable power generation plants has already been developed. Geographic constraint is not the only reason behind the land use issue. The acquisition of land suitable for renewable projects can be time-consuming because of complex land use approval procedures, and more so when property rights are unclear. Moreover, there are growing concerns regarding the safety and environmental impact of renewable projects.

---

[1] Andrew Glumac, Shailesh Telang, Claire Lambert (2020) *Growing renewable power: Companies seizing leadership opportunities,* https://www.there100.org/growing-renewable-power-companies-seizing-leadership-opportunities

Furthermore, current grid connection and grid operation rules are not favorable for new renewable projects. In Japan, the current grid connection rule for new projects follows the “first come first serve” principle. Free grid capacity for new projects is becoming increasingly limited. If a new power generation project requires grid expansion, the construction cost is partly borne by the project owners. The short-term solution to the grid connection constraints issue is the “non-firm” connection rule[2], which is currently applied to all high-voltage transmission connections. While “non-firm” connection can help more new renewable projects connect to the grid, there are concerns that the risk of unpredictable curtailment faced by the “non-firm” connected projects may harm the project’s bankability. Further grid capacity expansion and improvement of grid utilization rules are needed to accommodate more renewable capacity.

Many RE100 companies rely on Environmental Attribute Certificates (EACs) for sourcing renewable electricity. In Japan, the largest EAC market, the Non-fossil Fuel Certificates market, is currently under reform. Consumers and brokers are allowed to participate in the FIT NFC market from the November 2021 auctions.

And the NFC tracking[3] is now managed by JEPX. The tracking system covers both FIT NFC and non-FIT NFC. NFC with tracking information can be used for RE100 reporting. The tracking system is expected to be further improved in the future.

In Japan, corporate PPA (Power Purchase Agreement)[4] markets are still at a preliminary stage and there is still room for improvement. A virtual PPA (VPPA) scheme (virtual corporate PPA without the involvement of electricity retailer), which is a popular corporate PPA scheme overseas, would require direct transactions of non-FIT NFCs. According to the latest rule revision of the NFC market, consumer companies with a VPPA contract can have direct transaction of non-FIT NFCs with renewable power generators when the renewable projects meet certain criteria. There are issues other than institutional barriers that need to be addressed to facilitate corporate PPA/VPPA[5] in Japan. For example, evaluating a consumer company’s (off-taker) credibility to guarantee a long-term electricity purchase agreement is essential to the bankability of a renewable project. This has been expressed by developers as a primary concern regarding corporate PPAs/VPPAs. The lack of retailers with enough know-how on demand and supply balancing was also cited as a barrier to corporate PPAs/VPPAs.

---

[2] Under the “non-firm” connection rule, even if there is no free grid capacity, the new power plant can still be connected to the grid but its generation will be first to be curtailed, without compensation, when there is grid congestion.

[3] Tracking system is typically an electronic database that registers basic information of each MWh of renewable generation such as, technology, location, operation year, etc.

[4] A corporate PPA is Power Purchase Agreement signed between a consumer company and a renewable power generator. Details of corporate PPA in Japan are stated in Chapter 2

[5] “PPA/VPPA” means physical PPA and virtual PPA

Given the circumstances stated above, we propose the following measures to further expand the supply of low-cost renewable electricity and improve the current situation of renewable electricity procurement for corporations such as corporate PPAs, in Japan:

[Measures for expanding renewable supply]

(1) Accelerate the implementation of local decarbonization initiatives and collect information on land ownership and required conditions for land acquirement approval during the wide area zoning process: Land constraints are one of the most significant problems pertaining to renewable energy development in Japan. The limited availability of optimal sites affects not only renewable power generation costs but also the future potential of renewable power development. While cross-ministerial efforts at the central government level are required to address this issue, the involvement of local governments is also indispensable. In the revision of the Act on Promotion of Global Warming Countermeasures, the Ministry of the Environment (MOE) reinforced the promotion of local government decarbonization initiatives. The local decarbonization initiative comprises two important elements: 1) the local renewable development target; and 2) the local decarbonization zone. Measures for local decarbonization zone include wide area zoning[6]. And according to the manual for wide area zoning developed by the MOE, not only environmental regulations at the country and prefecture levels but also local issues at the municipality level should be considered. Implementing local decarbonization zoning can accelerate the development of renewable energy and help lower power generation costs. Japanese EIA (Environmental Impact Assessment) procedures require the participation of the general public and approval from the prefectural government at various stages. This time-consuming requirement can be streamlined in the case of wide area zoning, where the local government and local communities have already participated in the zone selection process. On the other side, during the wide area zoning process, information collection regarding land ownership and providing the information that can be disclosed to renewable developers can help addressing the land acquirement difficulties in the renewable project development process.

(2) Improve grid integration conditions for renewable projects: Grid connection and grid utilization need to be more predicable to encourage investment in renewable projects. Uncertainties pertaining to grid connection, grid operation (associated with curtailment), and the electricity market price can undermine the predictability of a renewable project's revenue and thus have negative impact on renewable energy investment. To address such

[6] "Wide Area Zoning" is the process of designating area in a municipal for renewable development after consideration of national and prefectural environmental regulations as well as social concerns in the specific municipal, and negotiation with all stakeholders.

issues, data regarding power generation plants as well as the grid operation status need to be properly disclosed to electricity market participants. In the longer term, in addition to predictability issues, the increased accommodation of renewable electricity in the power grid will require accelerated procedures for grid utilization rules reflecting the environmental benefit of renewable energy.

[Measures for improving environment for corporate renewable procurement]

(3) Develop a user-friendly NFC market and improve the renewable tracking system: Direct consumer access to renewable NFCs and tracking renewable electricity are key elements of encouraging corporate renewable electricity procurement in Japan. Several factors should be considered while accelerating the rulemaking associated with NFC market reform and developing a tracking system that covers all renewable energy: It is important to develop a **user-friendly** scheme with new rules. For example, the tracking system can meet consumer companies' needs such as providing enough information for verification of additionality ("Additionality" means contribution to new renewable investment). And under current NFC market rules, the effective period of NFCs terminates at the end of June, regardless of the timing of NFC acquirement. Given the reporting timeframe for RE100 companies, for example, revising the current NFC effective period to one year after the generation period of the NFC, would allow more flexibility for reporting by consumer companies. It is also important that the renewable NFCs managed under the tracking scheme to be developed will be **compatible with the latest international standards,** including RE100 criteria**.** Further, to make the renewable certificate management and trading system be as developed as REC (Renewable Energy Certificate) in the United States or the GO (Guarantee of Origin) system in Europe, data from not only the renewable developers but also other stakeholders such as grid operators and retailers will be necessary. Therefore, further improvement of the renewable tracking system and NFC market is not only about renewable energy system. The relevant rules regarding the renewable tracking system and NFC market need to comply with the rules for data disclosure and management of the whole electricity system.

(4) Scale up the corporate PPA/VPPA market. Rapidly disclose relevant market regulation revision information companies and develop government guidance for corporate PPA/VPPAs. In response to the needs of consumer companies, the latest rule revision of the NFC market enables consumer companies with a VPPA contract to have direct transaction of non-FIT NFCs with renewable power generators when the renewable projects meet certain criteria. Detailed information about such market rule revision should be disclosed and reached to the companies rapidly. Given the complex market structure and regulation environment, accessible government guidelines can help relevant stakeholders to gain a better understanding of how corporate PPA/VPPA schemes work in

Japan, as well as what roles and responsibilities are expected of them by different stakeholders.

(5) Introduce consumer relief measures to reduce FIT surcharge burden: The increasing burden of the FIT surcharge shouldered by end users is a critical issue in Japan's renewable energy development. Given that the FIT purchase period is 10 to 20 years (depending on the type of technology), the current FIT surcharge is rooted in existing highly priced FIT projects that were approved in the initial years of the FIT scheme. In the longer term, to reduce FIT surcharge further bring down renewable power generation cost is necessary. And to promote the cost reduction, Japan has introduced auctions and has moved from FIT to market mechanism based FIP mechanism. However, even under the FIP mechanism, the premium paid to renewable developers is passed on to consumers, and thus there are still surcharge to consumers (surcharge caused by FIP).

Corporate PPAs for non-subsidized (non-FIT/FIP) renewable projects (corporate PPA with non-FIT/FIP renewable projects) can help encourage renewable energy development without increasing the FIT surcharge. However, newly contracted corporate PPAs cannot contribute to the reduction of the FIT surcharge caused by projects already approved. Consumer relief measures are needed to reduce the FIT surcharge shouldered by electricity consumers. When considering such measures one of the examples is Germany's case. For example, Germany has abolished consumer's renewable energy surcharge as of July 1, 2022, and has instead set up a climate fund (financed by revenues from **carbon pricing** and the **government budget**) to support renewable energy.

GLOSSARY

ANRE: Agency for Natural Resources and Energy
CDP: Carbon Disclosure Project
CfD: Contract for Difference
EAC: Environmental Attribute Certificate
EIA: Environmental Impact Assessment
FIP: Feed-in-Premium
FIT: Feed-in-Tariff
FY: Fiscal Year
GHG: Greenhouse gas
GO: Guarantee of Origin
JQA: Japan Association for Quarity
MAFF: Ministry of Agriculture, Forestry and Fisheries
METI: Ministry of Economy, Trade and Industry
MLIT: Ministry of Land, Infrastructure, Transport and Tourism
MOE: Ministry of the Environment
NFC: Non-fossil Fuel Certificates
OCCTO: Organization for Cross-regional Coordination of Transmission Operators, Japan
PKS: palm kernel shell
PPA: Power Purchase Agreement
REC: Renewable Energy Certificate
SBT: Science Based Targets
SEP: Strategic Energy Plan
TEPCO: Tokyo Electric Power Company Holdings
VPPA: Virtual Power Purchase Agreement

CHAPTER 1. BACKGROUND AND OBJECTIVES OF STUDY

Japan is committed to reducing its greenhouse gas (GHG) emissions by least 46% by FY 2030 relative to FY 2013 levels and to achieving carbon neutrality by 2050. The 6th Strategic Energy Plan (SEP) approved by the Cabinet in October 2021, right after the start of the Kishida administration, sets a roadmap toward achieving those targets. According to the 6th SEP, renewable electricity is expected to account for 36%~38% of the total power generation mix by 2030. This is much more ambitious compared to the target share of renewable electricity (22%~24%) set out in the previous SEP. To achieve the 36%~38% target, Japan needs to double its renewable power generation capacity from the current level (84GW in 2021) by FY 2030 (147~161GW).

At the same time, carbon neutrality goals have gained recognition beyond government policy and more companies are pursuing such goals under their corporate business strategies; and therefore, the corporate appetite for renewable electricity is growing. The number of Japanese companies joining RE100, a global renewable energy initiative for companies committed to 100% renewable electricity consumption, reached 69 by April 2022 from only three companies five years ago (2017). RE Action, an initiative for smaller companies and organizations with lower levels of electricity consumption[7] committed to converting to 100% renewable electricity by 2050 was established in 2019. As of May 2021, 258 entities have joined RE Action.

Renewable energy deployment in Japan has seen rapid growth since the implementation of the Feed in Tariff (FIT) scheme in 2012. And as mentioned above, renewable energy is expected to play an even more important role in Japan's future electricity supply.

Renewable power generation costs remain high in Japan compared to the global average level. Under the FIT scheme, renewable power generation is purchased at a pre-determined price that is higher than the average wholesale electricity price for a given period (10 to 20 years, depending on the renewable power generation technology). The additional cost is passed on to electricity consumers as a FIT surcharge included in their electricity bills. Given that almost all of the new renewable power generation capacity installed over the past 10 years is covered by the FIT mechanism, the rapid growth of renewable power installation has resulted in increasing financial burden on electricity consumers. Reducing the FIT surcharge is one of the most critical issues that need to be addressed for the further development of renewable energy in Japan.

The FIT mechanism has been the main driver of renewable development in many countries. However, because of the cost reductions achieved in renewable power generation, especially solar PV and wind, and the increasing burden of FIT surcharges shouldered by electricity end-users,

[7] Less than 50GWh/year

most countries are moving away from the FIT scheme, searching for new ways of supporting renewable energy development.

Corporate buyers have become an important driver of renewable development in recent years. Corporate purchases of renewable electricity provide an option for supporting renewable energy while imposing no additional burden in the form of FIT surcharges. It is reported that private companies bought 31.1GW of clean power in 2021[8], equivalent to about 37%[9] of total renewable capacity installation in Japan. Corporate renewable electricity purchases are expected to continue to positively contribute to renewable energy development in Japan. However, Japan is one of the most challenging places in the world for companies to switch to 100% renewable electricity according to a RE100 survey report[10]. High costs and limited supply are cited as the two largest problems.

Japan's electric power system reform has yet to be completed, and thus many market rules and regulations are still under development. Given this background, the IEEJ team conducted this study to reveal the main challenges in corporate renewable electricity procurement in Japan and what policies and/or regulations are needed to make Japan's renewable electricity market more friendly to corporate buyers. The IEEJ team interviewed various stakeholders, including renewable energy developers, electricity retailers, consumer companies, industry associations, as well as experts, to gain firsthand insight into the issues often raised.

[8] BloombergNEF, (January 31, 2022) "Corporate Clean Energy Buying Tops 30GW Mark in Record Year", https://about.bnef.com/blog/corporate-clean-energy-buying-tops-30gw-mark-in-record-year/)

[9] capacity as of September 2021: 84GW

[10] RE100, (2020) "Growing renewable power: companies seizing leadership opportunities (RE100 Annual Progress and Insights Report 2020)", https://www.there100.org/growing-renewable-power-companies-seizing-leadership-opportunities

CHAPTER 2. CORPORATE RENEWABLE ELECTRICITY PROCUREMENT IN JAPAN

As mentioned above, Japan is one of the most challenging countries in the world for companies converting to renewable electricity. High cost and limited options are the two biggest barriers to renewable electricity procurement in Japan, according to RE100 companies.

2.1. ISSUES WITH HIGH COST AND AVAILABILITY OF RENEWABLE ELECTRICITY

2.1.1 HIGH COST

Data from the International Renewable Energy Agency (IRENA) reveals that the total installed cost of Japan's utility-scale solar PV is relatively higher than that of other countries (**Figure 1**).[11] In particular, Japan's installation costs, including inspection, electrical installation, and mechanical installation, occupy large portions of the total cost. Since Japan is prone to natural disasters such as earthquakes and typhoons, solar PV panels and equipment need to be disaster-resistant. Furthermore, solar power generation systems ten to be installed on the slope of mountainous areas due to limitations in suitable land. These factors add to the development costs.

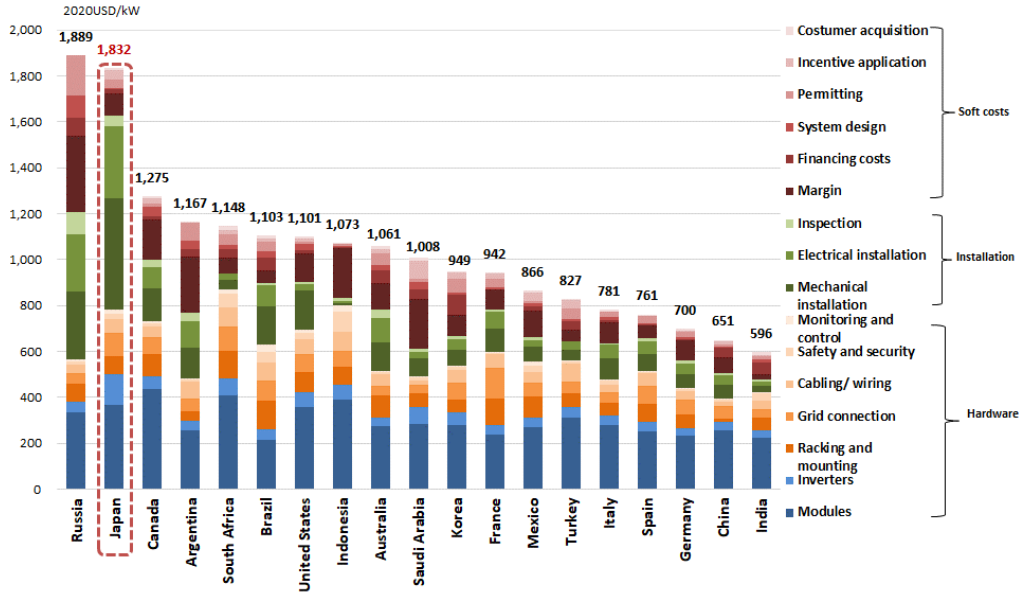


FIGURE 1. UTILITY-SCALE SOLAR PV TOTAL INSTALLED COSTS IN 2020

Source: compiled by authors based on IRENA (2021)

[11] IRENA, (2021) *Renewable Power Generation Costs in 2020*. International Renewable Energy Agency: Abu Dhabi.

Figure 2 presents weighted-average total installed costs for onshore wind in major countries. While other countries have experienced gradual cost reductions, Japan has struggled in following the front-runners and the cost difference between Japan and other countries became even larger in 2020. This situation is mainly explained by the lack of competition and economy of scale in Japan's wind industry.

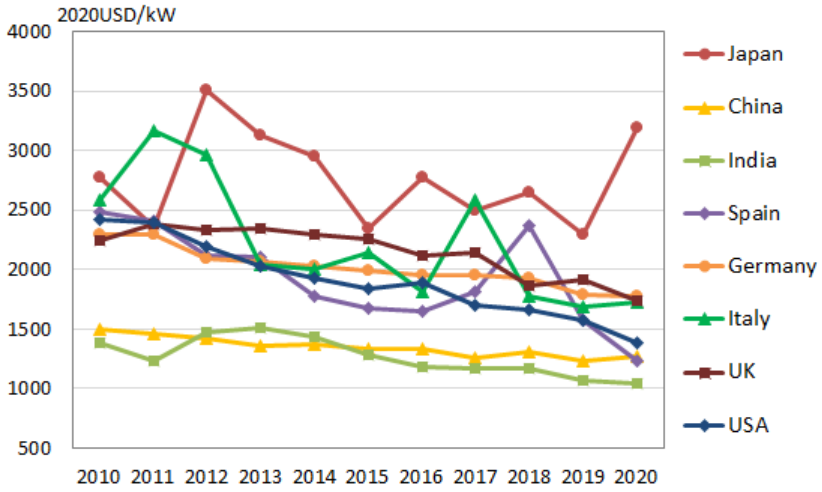


FIGURE 2. WEIGHTED-AVERAGE TOTAL INSTALLED COSTS FOR ONSHORE WIND [12]

Source: compiled by authors based on IRENA (2021)

The developers interview referred to land use as one of the major reasons behind high renewable power generation costs. According to the cost breakdown compiled by the Calculation Committee for Procurement Prices, the "land formation" cost included in the CAPEX for solar PV projects (larger than 10kW) has not decreased, but has rather increased over past years.

[12] The average cost is substantially affected by a high-cost project in a market like Japan where the number of wind power projects is much smaller than those of the solar PV, which may have caused some spikes seen in the cost trend.

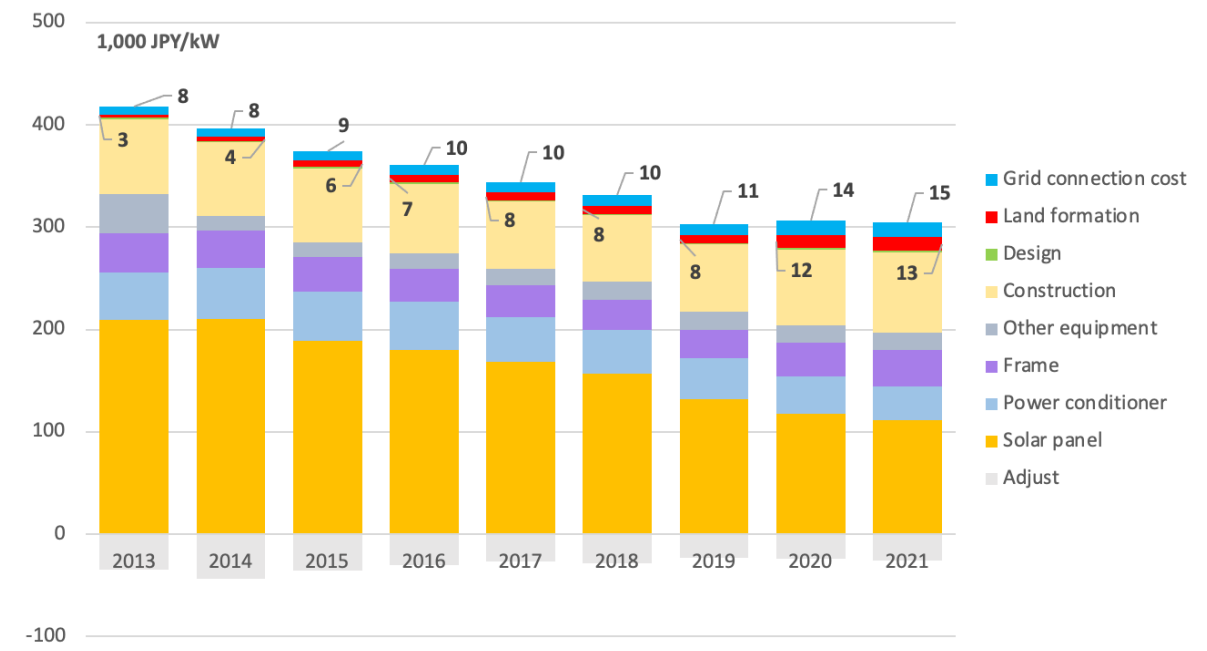


FIGURE 3. TRENDS IN CAPEX BREAKDOWN FOR SOLAR PV PROJECTS LARGER THAN 10KW

Source: Calculation Committee for Procurement Prices[13]

Flat land is not available in abundance in Japan compared to other countries. Existing projects have already occupied most of the flat land that can be acquired at a low cost and used for renewable power plant development. Geographic constraint is not the only reason behind the land use issue. The acquisition of land suitable for renewable projects can be time-consuming because of complex land use approval procedures, and more so when property rights are unclear. Moreover, there are growing concerns regarding the safety and environmental impact of renewable projects. As a result, the number of municipalities that have implemented regulations on renewable energy development has increased from 26 in FY 2016 to 134 in FY 2020 Some municipalities even limit or prohibit the installation of renewable power generation facilities in given areas. Lack of trust and cooperation from local communities can make the land acquisition process more difficult and costly.

Sometimes, acquirable land, including land that has been unused for more than two years and some industrial parks, cannot be utilized due to a lack of free grid connection capacity for new projects.

[13] Calculation Committee for Procurement Prices material, (2021) “Solar PV related issues” (73rd committee meeting on December 22, 2021), https://www.meti.go.jp/shingikai/santeii/pdf/073_01_00.pdf (Japanese only)

According to **FIGURE 3**, the grid connection cost has increased for new solar PV projects over recent years. Similar to the land constraint issue, most sites close to grid connection points are already occupied by existing power generation plants.

In Japan, although grid operators take on the construction work for grid connection, the construction cost from power generation site to substation is assumed by the power generator. If additional construction is necessary to accommodate the new generation in the local grid system, the cost will be paid by the generator or local electricity end-users depending on who will benefit from the new construction. When additional construction work is required in the high voltage transmission system (backbone transmission system), the cost will be passed on to end-users. The cap for grid construction costs that can be passed on to end-users is 41,000 JPY/kW. Costs that exceed the upper limit will be assumed by the generator (**FIGURE 4**).

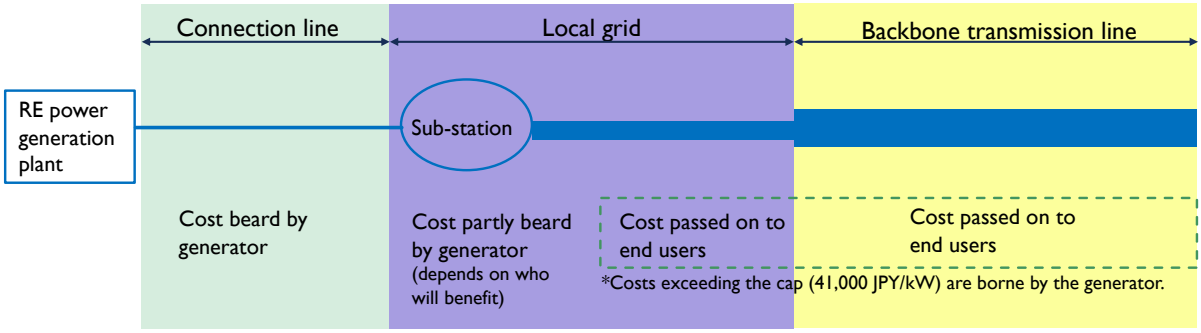


FIGURE 4 GRID CONNECTION COST ALLOCATION IN JAPAN

Source: compiled by authors based on METI[14]

Land and grid connection constraints can have indirect impact on renewable power generation cost. Because of land and grid constraints, and sometimes logistic constraints for onshore wind, it is difficult to develop large-scale renewable projects, especially solar PV and onshore wind projects, in Japan. As a result, the benefit of economic of scale is limited in Japan.

The developers interviewed also mentioned the following reasons for the high CAPEX of renewable projects high: time-consuming inspection and Environmental Impact Assessment (EIA) processes (especially for onshore wind projects), local community acceptance, etc. In terms of OPEX, the requirements regarding Chief Electrical Engineers hinder renewable energy development. Currently, power generation facilities exceeding capacities of 5MW and 50kV are required to appoint high-level Chief Electrical Engineers. However, there is a serious shortage of

[14] METI website (Grid Connection), https://www.enecho.meti.go.jp/category/saving_and_new/saiene/grid/01_setsuzoku.html#setsuzoku01 (Japanese only)

eligible Chief Electrical Engineers. Furthermore, their payroll tends to be 2~3 times that of Class III Chief Electrical Engineers. Rule revisions[15] to solve this issue are ongoing.

High renewable power generation costs are passed on to electricity end users. Under the FIT scheme, the expansion of renewable power generation results in an increase of the total cost of purchasing power sourced from renewables. In other words, the burden on consumers who are obliged to pay the FIT surcharge increases in tandem with the promotion of the FIT scheme. The government estimates that in FY 2022, the total cost of purchasing renewable electricity will amount to JPY 4.2 trillion (USD 33 billion[16]), of which the total amount of surcharge will be JPY 2.7 trillion (USD 21 billion) (**FIGURE 5**). The surcharge has continuously increased from 0.22 JPY/kWh in 2012 to 3.45 JPY/kWh in 2022. Accordingly, the monthly surcharge per household has risen from 57 JPY/household in 2012 to 897 JPY/household in 2022[17]. On average, the share of surcharge against the total electricity tariff was 12% for household users and 16% for industrial and commercial users in 2020.

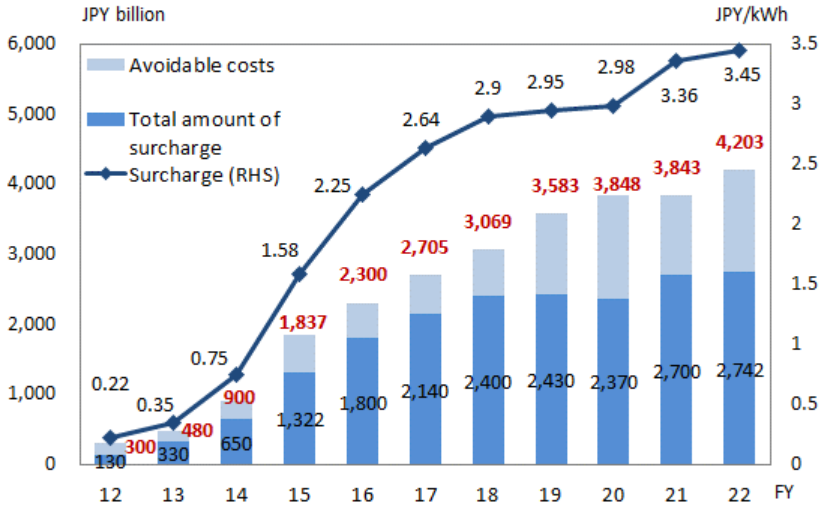


FIGURE 5 TOTAL FIT PURCHASING COST

Source: compiled by authors based on METI [18]

[15] METI, (2022) "Rule Revision Regarding Chief Electrical Engineers "(The 10th Meeting of Working Group on Electricity Safety System on April 15, 2022), https://www.meti.go.jp/shingikai/sankoshin/hoan_shohi/denryoku_anzen/hoan_seido/pdf/010_04_00.pdf (Japanese only)

[16] 1 JPY = USD 0.0078

[17] Average electricity consumption per household is assumed at 260kWh per month.

[18] METI, (2022) "Prospective Renewable Energy Policy" (40th Mass Renewable Energy Introduction and Next-Generation Power Network Subcommittee on April 7, 2022), https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/pdf/040_01_00.pdf (Japanese only)

2.1.2 GRID CONSTRAINTS

Grid constraints are not only a reason for the high cost of renewable power generation but are also a major concern for the further deployment of renewable energy, especially variable renewable technologies, such as solar PV and wind.

Japan's grid network is regionally divided with limited capacity for interconnection between regions. The different frequency between eastern and western Japan exacerbates the problem. That is, the power grid runs on 50 Hz in the east, and 60 Hz in the west. Yet there are only four frequency converter stations capable of transferring a total of 2.1 GW. Furthermore, many regions endowed with renewable energy sources, such as Kyushu and Hokkaido, and some offshore wind sites are found in distant locations from the electricity demand center, such as the Tokyo and Osaka areas.

The current rule for intraregional grid balancing allows renewable power generation output to be curtailed after the output reduction of thermal power plants, the utilization of pumped hydro, and inter-regional adjustment. The curtailment of variable renewable electricity had been limited as it was previously observed only in the Kyushu region. However, in April 2022, renewable power generation was curtailed for the first time in the Shikoku and Tohoku regions, and in May in Hokkaido. The curtailment of variable renewable electricity is likely to occur in more regions.

Now that more regions are challenged with grid capacity constraints, it will be even more challenging to further connect and accommodate new renewable projects. In Japan, renewable power plants are not granted priority for grid connection. As shown in **FIGURE 6**, if there is free grid capacity, new power generation plants will be connected by the "first come first serve" rule.

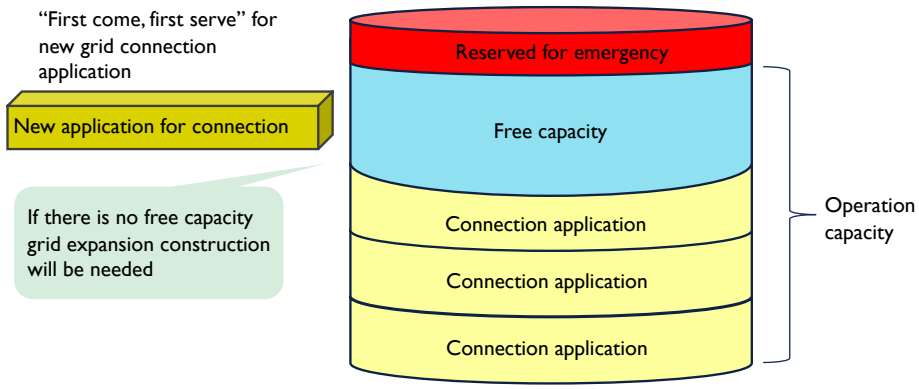


FIGURE 6. RULES FOR GRID LINE UTILIZATION

Source: depicted by authors based on METI[19]

[19] METI website (Grid Connection), https://www.enecho.meti.go.jp/category/saving_and_new/saiene/grid/01_setsuzoku.html#setsuzoku01 (Japanese only)

Grid connection constraints are a substantial issue in the further deployment of renewable energy in Japan. Therefore, a new grid expansion master plan is under development. However, grid expansion, especially backbone transmission line construction, may take more than ten years. Hence, utilizing the existing grid system is of significant importance in achieving the 2030 renewable energy target. One such measure is the “non-firm” connection rule. Under the “non-firm” connection rule, a new power generation plant can be connected to the grid even if there is no free grid capacity, on condition that its output will be first in line to be curtailed without compensation in the event of grid congestion. The “non-firm” connection mechanism was applied in January 2021 high voltage transmission lines across Japan with no free capacity. However, since April 2022, the “non-firm” connection rule is applied to all high-voltage transmission lines nationwide regardless of the availability of free capacity for new connections. As of 2021, applications for “non-firm” connection have reached a total of 3GW.[20]

Currently, the “non-firm” connection rule applies only to high-voltage transmission lines. The application of this rule to the local grid systems with lower voltage is also under consideration. TEPCO (Tokyo Electric Power Company Holdings) Power Grid is piloting the implementation of the “non-firm” connection rule to the local grid i in its service area. ”Non-firm” connection is an effective transitional solution for connecting more new renewable projects to the grid in the short-term. Yet, renewable generators share the concern that it is difficult to predict how much uncompensated curtailment will occur, and thus the impact it will have on the project cash flow.

In the long-term, the transmission capacity, especially the interconnection capacity between different regions, needs to be expanded so that a higher share of renewables can be integrated into the power grid. Taking into consideration the potential of renewable energy resources across Japan, the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) is currently formulating a cross-regional network development plan for grid enhancement.

2.2. OPTIONS FOR RENEWABLE ELECTRICITY PROCUREMENT

Almost all types of renewable electricity procurement options are possible in Japan in theory. However, some options, such as, Environmental Attribute Certificates (EAC), physical corporate PPAs, virtual corporate PPAs, still face challenges in practice.

2.2.1 ENVIRONMENTAL ATTRIBUTE CERTIFICATES (EAC) AND TRACKING RENEWABLE ELECTRICITY

(i) Current Status

[20] *Ibid.*

Japan currently has three different types of EACs: Green Electricity Certificates (bundled EAC), J-Credit (renewable electricity), and non-fossil fuel certificates (NFCs). They have been developed in different contexts, and thus bear different characteristics, as provided in **TABLETable** 1.

TABLE 1. COMPARISON OF EACS IN JAPAN

	J-Credit (from renewables)	Green Electricity Certificates	FIT NFCs	Non-FIT NFCs (renewable)
Year started	2001	2013	2018	2020
Target facilities	Power generated at renewable power facilities for self-consumption	Power generated at renewable power facilities for self-consumption	Surplus grid power generated at FIT power generation facilities	Surplus grid power generated at non-FIT power generation facilities
Renewable energy sources	Solar PV, wind, hydro, geothermal, biomass	Solar PV, wind, hydro, geothermal, biomass	Solar PV, wind, small and medium-sized hydro, geothermal, biomass	Solar PV, wind, hydro, geothermal, biomass
Issuer	METI, MOE, MAFF	Green Electricity Certificate issuer	Power generator	
Certifier	METI, MOE, MAFF	Japan Quality Assurance Organization (JQA)	METI	
Seller	Auctions held by J-Credit Scheme Secretariat; J-Credit holders or brokers (direct transactions)	Green Electricity Certificate issuer	Green Investment Promotion Organization (GIO)	Power generators
Buyer	Consumers	Consumers	Retailers, consumers	Retailers
Tracking information	Credit certification number, project number, project implementer (corporate number), location (area) of project, outline of project, type of project, target period, certified amount, amount of renewable electricity	Name of holder, serial number, amount generated, power type, generation period, certifier, issuer, date of issuance,	Facility ID, type of power generation facility, name of facility, name of owner, generation capacity, date of certification, date of commission, location of facility, allocated amount	
Amounts issued	1.07 million t-CO_2 (amount certified in 2021)	246 million kWh	around 90 billion kWh*1	around 90 billion kWh*1 (including direct transactions)
Price level (2021)	1.38 JPY/kWh	2-7 JPY/kWh	0.3 JPY/kWh	0.6 JPY/kWh

Notes:

*1 Based on FY2020 results (METI[21])

Source: Compiled by authors based on various government material

[21] METI, (2021) “Tracking FIT non-fossil fuel certificates” (Document 1 from the 33rd meeting of the Subcommittee on Mass Introduction of Renewable Energies and Next-Generation Electricity Networks, June 3, 2021), https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/pdf/033_01_00.pdf (Japanese only)

(a) Green Power Certificates

The Green Power Certificate scheme was launched in FY2001 by Japan Natural Energy Company as a voluntary initiative by private enterprises for the mass deployment of renewable energy. The Japan Quality Assurance Organization (JQA) certifies renewable power facilities and the power generated. Certificates are available for green power and green heat generated for self-consumption. Certified Green Electricity Certificates are sold by certificate issuer organizations.[22] Prices vary from 2-7 JPY/kWh, depending on the certificate issuer.[23]

FIGURE 7 shows the annual volume of Green Power Certificates issued by type of renewable energy. Biomass accounts for the majority of certificates. An increase in solar PV certificates was seen in 2020 with the addition of post-FIT residential solar power.

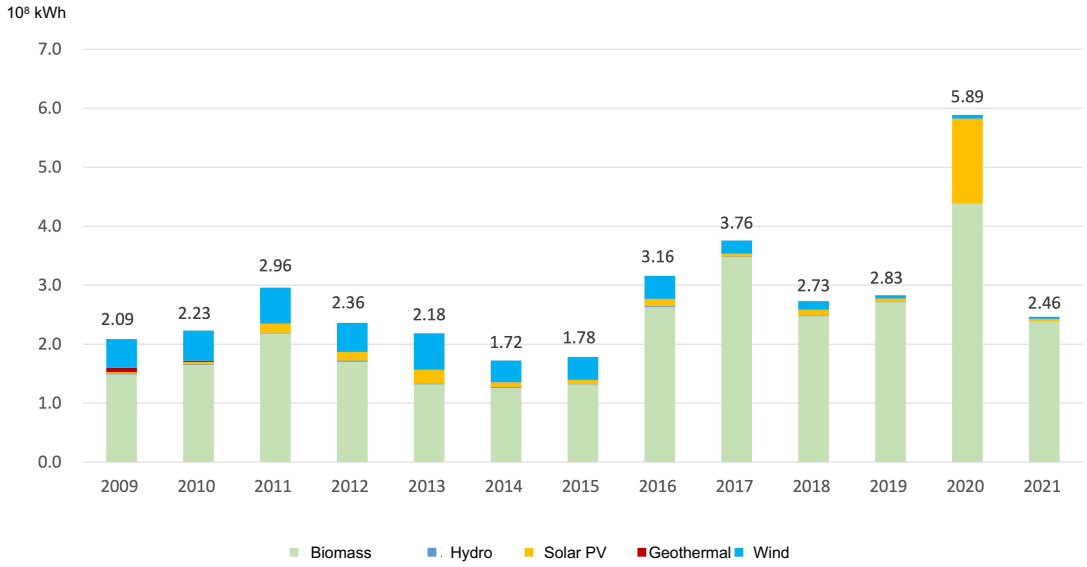


FIGURE 7. ANNUAL VOLUMES OF GREEN POWER CERTIFICATES ISSUED (2009-2021)

Source: JQA website

(b) J-Credits

The J-Credit scheme certifies the amount of carbon dioxide emissions reduced or absorbed through the self-consumption of renewable electricity, the introduction of energy efficient equipment, or forest management. The J-Credits issued for renewable electricity can be used as clean energy credits.

[22] There are 37 issuers as of April 1, 2022.

[23] MOE, (2020) "What public organizations can do in the climate era: the challenge of achieving 100% renewables: Renewable energy procurement guidebook for public organizations", https://www.env.go.jp/earth/earth/re100_1/RE100guidebook.pdf (Japanese only)

The domestic credit system and the J-VER system were integrated in 2013 into the current J-Credit scheme, which is jointly operated by the Ministry of Economy, Trade and Industry (METI), the Ministry of the Environment (MoE), and the Ministry of Agriculture, Forestry and Fisheries (MAFF). J-Credits can be purchased 1) through intermediaries such as offset providers;2) by purchasing credits listed for sale; or 3) through auctions conducted by the J-Credit Scheme Secretariat. As shown in **FIGURE 8**, the average winning bid price of J-Credits has risen over the recent years, due to an increase in demand.

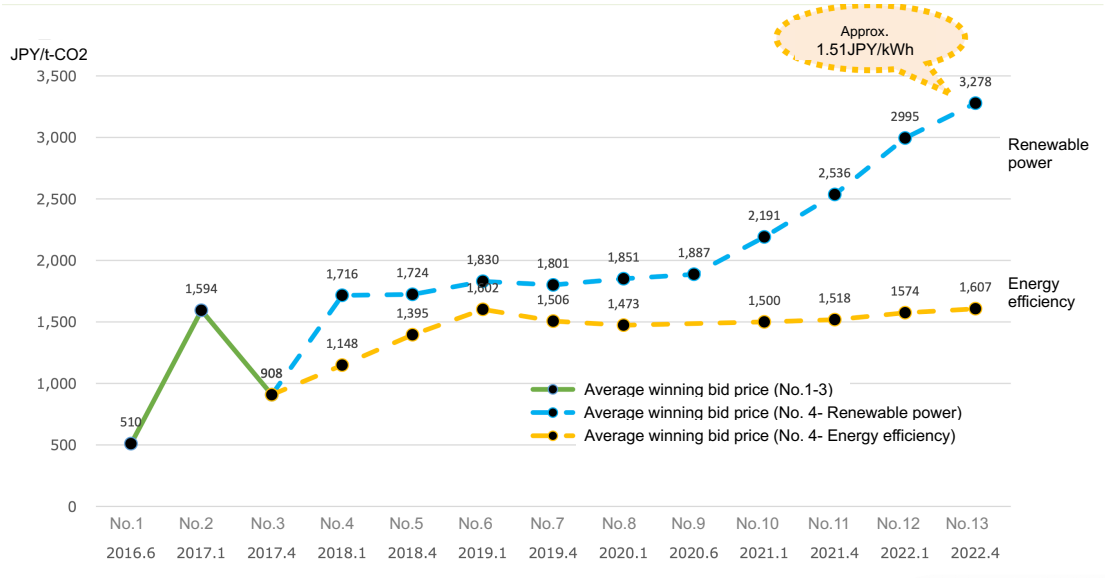


FIGURE 8. AVERAGE WINNING BID PRICE OF J-CREDITS

Source: J-Credit Scheme website[24]

(c) Non-fossil Fuel Certificates

Non-fossil Fuel Certificates (NFC) account for the majority of EACs currently issued in Japan[25].

This scheme was originally launched in 2018 for FIT electricity with two aims. First, having the "environmental value" of FIT electricity purchased by retail electricity suppliers seeking to sell products bearing that value was expected to reduce the costs shouldered by the general public (consumers) in the form of FIT surcharges. Second, NFCs could be used as a means for electricity retailers to comply with the 2030 target of procuring at least 44% of their supply from non-fossil fuel electricity including renewable energy under the Act on Sophisticated Methods of Energy Supply Structures (hereafter “Sophisticated Act”; enacted in 2009).

[24] https://japancredit.go.jp

[25] It should be noted that as indicated in Table 1, only an estimate is available for direct transactions; and therefore, a precise percentage of NFC in total traded clean energy credits cannot be given.

In 2020, the scheme was expanded to include non-FIT non-fossil fuel sources, including nuclear power, thus dividing NFCs into FIT NFCs, non-FIT NFCs (with renewable attributes[26]) and non-FIT NFCs (with no renewable attributes[27]). In August 2021, further reform divided the NFC market into the Renewable Value Trading Market covering FIT NFCs and the Sophisticated Act Compliance Market for non-FIT NFCs, thus excluding FIT NFCs from means of complying with the Sophisticated Act.

As of the November 2021 auctions, consumers and brokers are allowed to participate in the FIT NFC market. This, along with the increased amount of trackable NFCs available, has led to a significant increase in the amount of credits contracted. Direct transactions between power generators and consumers have been permitted for non-FIT NFCs (for certain projects[28]), on condition that they will conclude a corporate PPA. Transaction costs, including the fees required for membership in the Japan Electric Power Exchange (JEPX)[29], can be a challenge.

The minimum price of NFCs was brought down by 1 JPY/kWh to 0.3 JPY/kWh with the launch of the Renewable Value Trading Market in November 2021 with an aim to make the price of renewable power procurement closer to international levels. Yet, there remains an oversupply of credits in both markets (**TABLE 2**). It should also be noted that the May 2022 auctions ended with a 98.8% decrease in transactions for non-FIT NFCs, perhaps due to the impact of soaring wholesale electricity prices recently experienced by retailers, as well as an increase in direct transactions.[30]

TABLE 2. RECENT AUCTION RESULTS FOR NFCS

	FIT NFCs					Non-FIT NFCs (renewables)					
Fiscal year	FY2020		FY2021			FY2020		FY2021			
Contract date	2/12	5/14	11/26	2/10	5/13	2/10	5/13	8/27	11/25	2/9	5/12
Price (JPY/kWh)	1.30	1.30	0.33	0.3	0.3	1.2	0.9	0.6	0.6	0.6	0.6
Contract amount	446	350	1,929	1,341	2,139	10,570	2,276	1,744	1,846	2,825	35
Supply (Mil. kWh)	-	-	55,954	83,551	108,175	11,273	3,518	3,771	11,480	15,408	16,604
Bids	-	-	1,929	1,341	2,139	15,890	6,666	3,935	1,846	2,825	35

[26] Electricity from non-FIT renewable

[27] Electricity from nuclear and other non-renewable non-fossil fuel electricity

[28] According to an interim report on discussions on the NFC market at government committee meetings, direct transactions for eligible non-FIT NFCs can be made between renewable generators and consumers. Eligible non-FIT NFCs include:

-Non-FIT renewable projects with COD after April 2022

-Post FIT renewable projects

FIP renewables are to be eligible.

[29] Exemptions apply to members only participating in the NFC market.

[30] For renewable non-FIT NFCs, direct transactions accounted for around fourfold of those purchased in the market in FY2021.

(Mil. kWh)											
Tracking (Mil. kWh)	226	271	1,837	1,341	2,139	-	-	890	990	-	-

Source: Compiled by authors based on METI[31]

(d) Tracking renewable energy attributes

For Green Power Certificates and J-Credits, relevant attribute information can be found on the relative websites. In response to calls for a system to track renewable attributes that can be used to claim the use of renewable energy under international initiatives, including RE100, CDP and SBT, the Agency Natural Resources and Energy (ANRE) launched a pilot tracking scheme in 2019. As of November 2021, following a pilot period, all FIT NFCs auctioned require tracking information.

For non-FIT NFCs, a pilot tracking scheme was launched in August 2021 (**FIGURE 9**). As a result, in the August and November auctions, 0.89 billion kWh and 0.99 billion kWh, respectively, out of the 1.74 billion kWh and 1.85 billion kWh contracted had tracking information.

Later in 2022, JEPX takes over the tracking scheme, which ~~will~~ covers all types of NFCs. NFCs with renewable tracking information can be used for RE100 reporting. The tracking system is expected to be further improved and though the system is free of charge at the moment in the future fees are supposed to be charged for system usage.

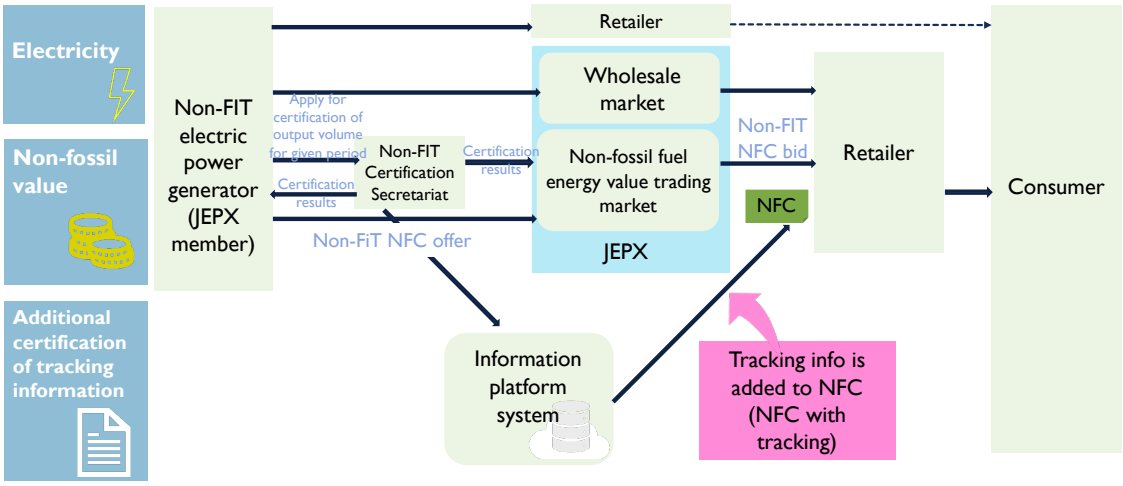


FIGURE 9. PILOT TRACKING SCHEME FOR NON-FIT NFCS

Source: Compiled by authors based on METI

[31] ANRE, (2022) “NFC trading” (Document 6, 62nd meeting of the Working Group on System Design (Electricity and Gas Basic Policy Subcommittee, February 17, 2022), https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/seido_kento/pdf/062_05_00.pdf (Japanese only); ANRE (2021) “Pilot tracking scheme” (Document 3-2, 60th meeting of the Working Group on System Design, Electricity and Gas Basic Policy Subcommittee, December 22, 2022), https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/seido_kento/pdf/060_03_02.pdf (Japanese only)

(ii) Challenges to be overcome

While recent reforms have responded to the needs of many corporate renewable power procurers, many challenges remain.

The market mechanism has not worked as effectively as expected in the current NFC markets, as seen in the oversupply of credits. This implies that unresolved issues including not only the trackability of credits as aforementioned, but also the complexity of the market has undermined its attractiveness. For example, post-FIT power generation facility owners can choose among the Green Electricity Scheme, J-Credit Scheme or NFC scheme to acquire certification. In the longer term these different markets should be integrated at some point to create a user-friendly market for which rules for consumer participation are made clearer.

Given the approval of the 6th SEP and thus higher prospects of deployment of electricity from non-fossil fuels (including renewable energy), targets under the Sophistication Act may also be revised. A higher mandatory target share of renewables may lead to increased demand for NFCs in the future.

It should be noted that interviews with stakeholders revealed that despite dominant calls for lower credit prices, some stakeholders, including those from the real estate and manufacturing industries, as well as experts, felt that current prices did not fairly reflect the high procurement cost of renewable energy in Japan. And the tracking system that covers all NFCs is still not as sophisticated and user-friendly as that of REC in the United or GO in Europe. Therefore, some businesses that are willing to pay a premium that reasonably reflected the current situation in Japan were reluctant to purchase NFCs and felt more comfortable physically procuring renewable electricity. Given that NFCs are the most traded EACs in Japan, it is important to improve the quality of NFCs and pricing NFCs so that they fully reflect the environmental value of renewable electricity in Japan. Such improvements will make NFCs an attractive choice for both the renewable power generators seeking guaranteed revenue and for corporations seeking renewable electricity to convert to 100% renewable electricity consumption.

2.2.2 CORPORATE PPAS[32] /VPPAS

Although there are various options for corporations to procure renewable electricity, different methods have different impacts on renewable energy development. The “additionality” of new renewable power facilities has become a critical quality criterion for renewable electricity procurement around the world. Corporate PPAs can offer “additionality”. Although EACs continue to be the dominant method for renewable electricity procurement among many RE100 companies, corporate PPAs are becoming increasingly important (**FIGURE 10**).

[32] This report focuses on offsite corporate PPAs.

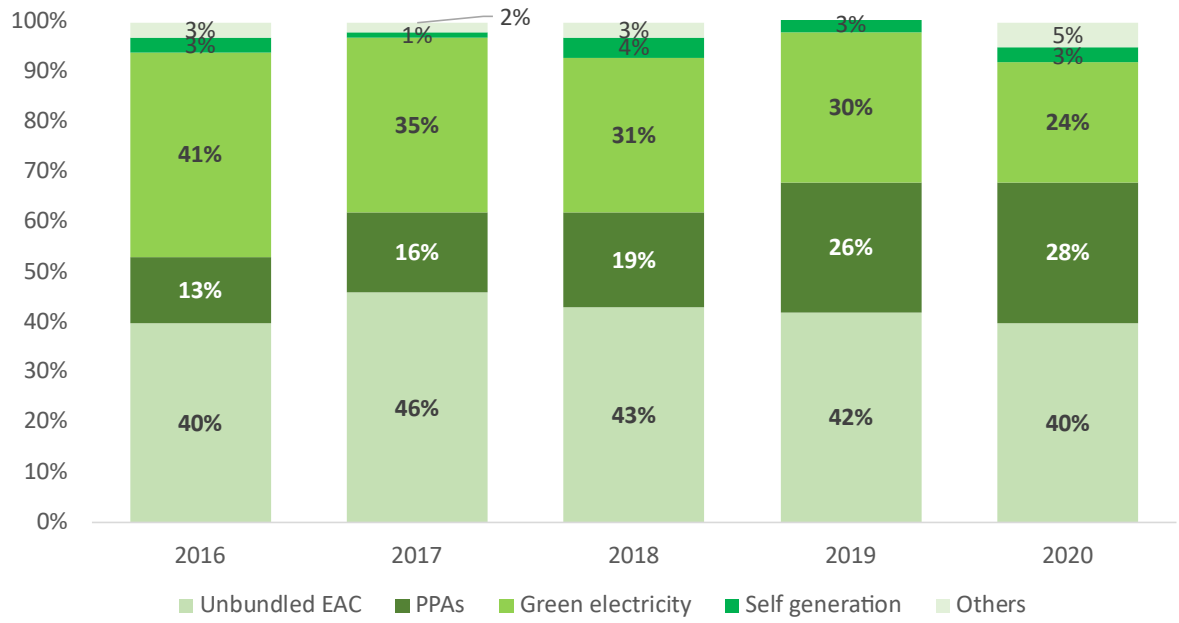


FIGURE 10 BREAKDOWN OF RE100 COMPANIES' RENEWABLE SOURCING OPTIONS

Source: RE100[33]

In a corporate PPA, a consumer company can conclude an electricity purchase agreement directly with a renewable power generator. Depending on the location of the renewable power generation site, corporate PPAs can be grouped into onsite PPAs and offsite PPAs. Globally most corporate PPAs are offsite PPAs, which can be broken down into two types: physical corporate PPAs and virtual corporate PPAs (VPPA).

In Japan, the electricity business rules were revised in 2021 so that consumer companies can conclude offsite PPAs directly with any non-FIT/FIP renewable power generator (direct offsite corporate PPA) under the self-wheeling rule. Before the rule revision, the consumer company and renewable generator had to have close business relations (for example, belonging to the same corporate group) to be able to conclude a direct offsite corporate PPA. If not, they had to sign the contract through an electricity retailer (indirect offsite corporate PPA) (**FIGURE 11**).

In Japan, non-FIT and non-FIP projects are eligible for direct offsite corporate PPAs. Consumer companies who are parties to such agreements using the self-wheeling program are exempted from FIT surcharges. Given the increasing financial burden of the FIT surcharge imposed upon commercial electricity consumers, direct offsite corporate PPAs can help consumer companies reduce their electricity bill. In a direct offsite corporate PPA that does not involve an electricity retailer, the consumer company and power generator are challenged with the burden of

[33] RE100, (2022) "RE100 annual disclosure report: Stepping up: RE100 gathers speed in challenging markets", https://www.there100.org/sites/re100/files/2022-01/RE100%202021%20Annual%20Disclosure%20Report.pdf

signing a wheeling contract, as well as the responsibility for supply-demand balancing and the imbalance penalty falls upon. However, consumer companies and power generators often do not have enough expertise on such matters. Therefore, this type of offsite corporate PPA is still not the major means of renewable electricity procurement for corporate renewable buyers at present. On the other hand, in an indirect offsite corporate PPA, consumer companies are required to pay the FIT surcharge and a premium to the retailer, but can avoid the complex grid operation-related responsibilities and contract procedures.

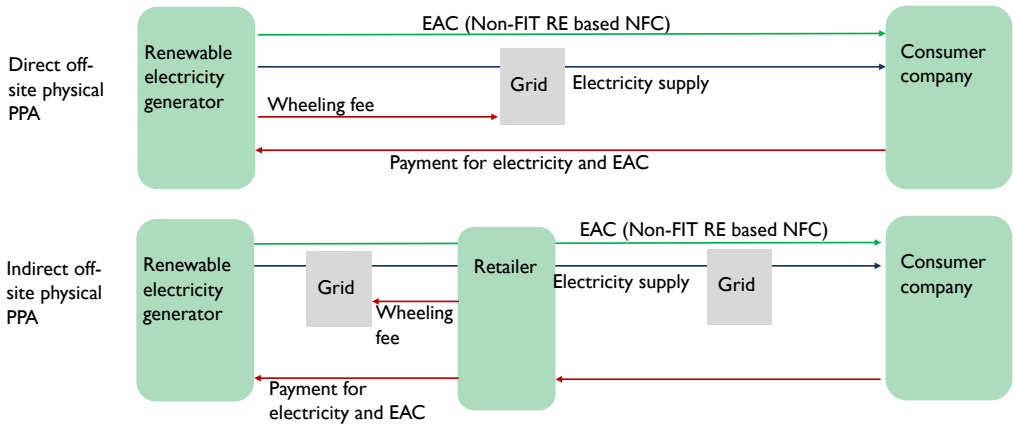


FIGURE 11 TYPES OF PHYSICAL OFF-SITE PPA IN JAPAN

Source: Depicted by authors based on MOE[34]

Virtual PPAs (VPPA) are also becoming increasingly popular. VPPAs are rapidly growing especially in the United States. The mechanism of VPPAs is shown in **FIGURE 12**. In a VPPA, the renewable power generator sells its electricity to the wholesale power market, whereas the consumer company has an electricity purchase contract with the retailer. Although the electricity is not physically delivered, the consumer company is able to purchase the total amount of renewable electricity and a corresponding amount of EACs (e.g. NFCs in the case of Japan) for a pre-negotiated price. The settlement follows the CfD (Contract for Difference) principle. When the market price is lower than the pre-negotiated VPPA price, the consumer company will pay the difference to the generator. In turn, when market price is higher, the generator is required to pay the difference to the consumer company. In a VPPA contract the EACs for the renewable electricity (NFCs in Japan) are transferred from the generator to the consumer company. Because the physical delivery of renewable electricity from the generator to the consumer company is not required in a VPPA, consumer companies can avoid wheeling charges due to the grid operator and the responsibility of supply-demand balancing. Therefore, this type of corporate PPA is much easier for consumer companies to engage in.

[34] MOE and Mizuho Research & Technologies, (2021) “Off-site Corporate PPA” (revised in March 2022), https://www.env.go.jp/earth/off-site%20corporate.pdf (Japanese only)

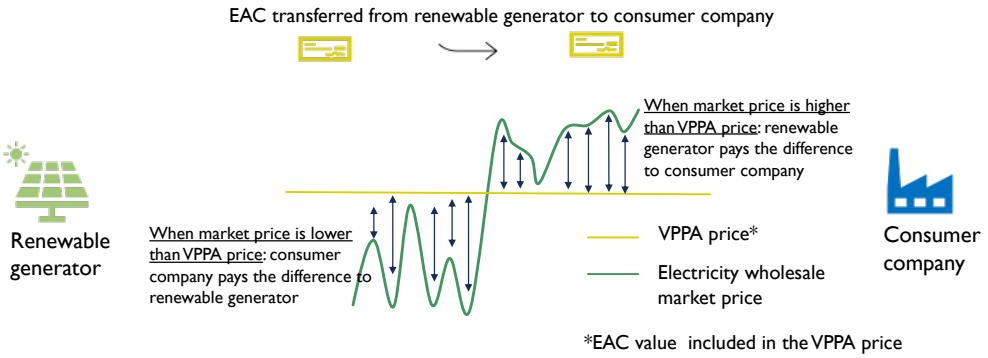


FIGURE 12. MECHANISM OF VIRTUAL PPA

Source: Depicted by authors based on MOE[35]

As with physical PPAs, there are direct and indirect VPPAs in Japan. To make the direct VPPA scheme work, the consumer company needs to be able to directly conclude a contract with the renewable electricity generator for electricity purchase and the transfer of the EACs for the renewable electricity. Electricity purchase agreements can be directly concluded between a consumer company and renewable generator in Japan by using the self-wheeling program (applicable to non-FIT renewable projects).

Although direct VPPAs are more common overseas, indirect VPPAs through an electricity retailer are also workable in Japan (**FIGURE 13**). Currently, the only type of credits that can serve as EACs for non-FIT renewable projects is the non-FIT NFC. For consumer companies concluded a VPPA contract the latest rule revision of the NFC market allows their direct non-FIT NFC transactions with renewable power generators for certain renewable projects[36].

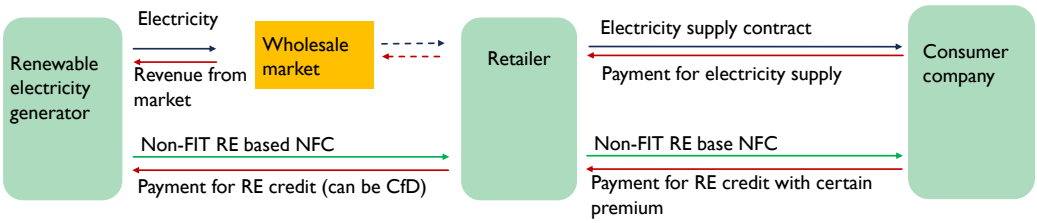


FIGURE 13. VPPA STRUCTURE IN JAPAN WITH INVOLVEMENT OF A RETAILER

Source: depicted by authors based on MOE[37] and Renewable Energy Institute[38]

[35] *Ibid.*

[36] Eligible power plants include non-FIT renewable projects starting operation after April 2022 and post-FIT renewable power projects. FIP renewable project is also expected to be eligible.

[37] *Ibid.*

[38] Renewable Energy Institute, “RE Procurement Guidebook 5th Edition (2022 Edition)”, https://www.renewable-ei.org/activities/reports/20220112.php

TABLE 3. OFFSITE CORPORATE PPA IN JAPAN

Types of Corporate PPA s		Overview
Physical PPA	Direct	• Consumer company and renewable power generator conclude direct electricity purchase contracts (non-FIT renewable power project) • Workable in Japan under the self-wheeling program
	Indirect	• Consumer company purchase renewable electricity from certain renewable power generator through an electricity retailer • Workable in Japan
VPPA	Direct	• Consumer company and renewable power generator sign virtual electricity purchase contract directly (non-FIT renewable project) • NFCs (non-FIT NFCs) from the purchased renewable electricity are directly transferred from renewable power generator to consumer company • The latest rule revision of the NFC market enables consumer companies with a VPPA contract to have direct transaction of non-FIT NFCs with renewable power generators when the renewable projects meeting certain criteria
	Indirect	• Consumer company signs virtual electricity contract with renewable power generator through an electricity retailer • NFCs (non-FIT NFCs) from the purchased renewable electricity are directly transferred from renewable power generator to consumer company through an electricity retailer • Workable in Japan

Source: Compiled by authors based on METI[39]

Under the FIT scheme, the purchase price and period of renewable electricity is predetermined by the government and this can guarantee a stable revenue for the renewable power generator. However, in a corporate PPA or VPPA, the purchase price and period are negotiated by the renewable power generator and buyer (off-taker). Therefore, whether a renewable power generator can expect a stable revenue from the project is dependent on the buyer's credibility and capacity to guarantee a long-term electricity purchase agreement. This has significant impact on the bankability of the renewable project. Many interviewees referred to buyers' credibility to be their biggest concern regarding corporate PPA/VPPA in IEEJ's interviews.

It should be noted that in Japan the renewable power generation is still subsidized under a FIT or FIP scheme. Therefore, for corporate PPAs or VPPAs to be an attractive choice fro renewable power generators, they need to promise a revenue level equivalent to that of FIT and FIP projects. Current government measures such as determining the FIT/FIP price through bidding,

[39] METI, (2022) "Regarding Trading of Non-fossil fuel Credits" (62th Working Group on Policy Revision Electricity and Gas Basic Policy Subcommittee under the Electricity and Gas Industry Committee of the Advisory Committee),
https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/seido_kento/pdf/062_05_00.pdf (Japanese only);
METI, (2021) "Regarding Demonstration of Renewable Tracking" (60th Working Group on Policy Revision Electricity and Gas Basic Policy Subcommittee under the Electricity and Gas Industry Committee of the Advisory Committee),
https://www.meti.go.jp/shingikai/enecho/denryoku_gas/denryoku_gas/seido_kento/pdf/060_03_02.pdf (Japanese only)

which aim to encourage renewable projects to be independent from government subsidy, can contribute to the further growth of corporate PPA/VPPA.

Retailers are expected to play an important role in both physical and virtual corporate PPAs in Japan. Although consumer companies can directly conclude a corporate PPA with renewable power retailers, the involvement of electricity retailers in corporates PPA can help facilitate contracts, given the complexity of wheeling contracts and supply-demand balancing. However, concerns have been raised that only a limited number of retailers possess the expertise and know-how (for example, on supply-demand balancing) needed for concluding a corporate PPA/VPPA contract.

CHAPTER 3. POLICY RECOMMENDATIONS

(1) Accelerate the implementation of local decarbonization initiatives and collect information on land ownership and required conditions for land acquirement approval during the wide area zoning process.

Land constraints are one of the most significant problems pertaining to Japan's renewable energy development. The limited availability of optimal sites affects not only renewable power generation costs but also the future potential of renewable power development. The government is well aware of this issue and several government ministries have already taken measures to address it. In a national land planning committee meeting[40], The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) is leading discussions on new national land planning towards achieving carbon neutrality. Securing enough land to facilitate renewable project development is one of the most important discussion points of the committee meeting. Outcomes will be reflected in the National Land Use Plan. This MLIT-led ongoing discussion on land use planning is also linked to the local decarbonization promotion initiative led by the Ministry of the Environment (MOE).

In the amended Act on Promotion of Global Warming Countermeasures, MOE reinforced the promotion of local government decarbonization initiatives. The local decarbonization initiative comprises two important elements: 1) the local renewable development target; and 2) the local decarbonization zone. MOE also established a committee[41] to promote the implementation of the local decarbonization initiative. The summary report[42] compiled by the committee outlined several important issues to be considered when setting up local decarbonization zones and acquiring permission for decarbonization projects (mostly renewable projects) in a decarbonization zone.

The committee's suggestions clarify different responsibilities expected for different stakeholders: central government, prefectural governments, municipalities, local communities, and private project developers (**FIGURE 14**). Furthermore, one of measures in local decarbonization zone is wide area zoning. According to the MOE's manual for wide area zoning, in the zoning process for renewable energy development, not only environmental regulations at the national and prefecture levels will be considered, environmental and social concerns at the municipal level also need to be taken into account. Therefore, the wide area zoning can be expected to help streamline

[40] MILT, (2022) 6th Planning Committee meeting under the National Land Development Council, https://www.mlit.go.jp/policy/shingikai/kokudoseisaku01_sg_000275.html

[41] Council for Implementing the Amended Act on Promoting Global Warming Countermeasures toward Local Decarbonization

[42] MOE, (2021) "Summary Report of the Council for Implementing the Amended Act on Promoting Global Warming Countermeasures toward Local Decarbonization", https://www.env.go.jp/policy/council/51ontai-sekou/ref_1-1-1.pdf (Japanese only)

the permission procedures such as the Environmental Impact Assessment (EIA) for renewable project development.

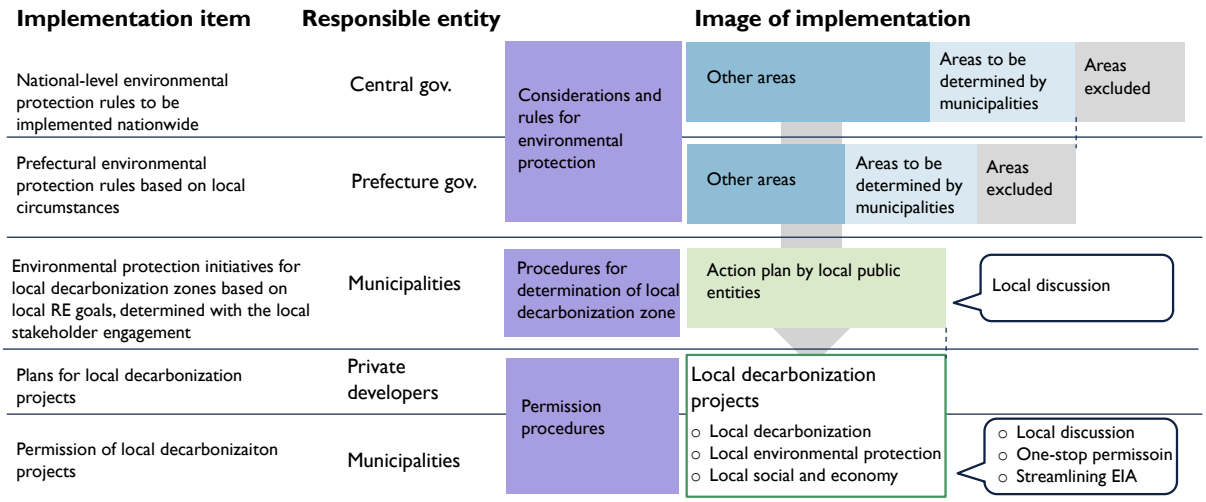


FIGURE 14. PROCEDURES FOR LOCAL DECARBONIZATION ZONE

Source: compiled by authors based on MOE[43]

The long duration of the EIA process is often referred to as one of the factors leading to high generation costs, especially for wind power. A shortened EIA process can not only contribute to lowering renewable development costs but also accelerating renewable power development. Japanese EIA procedures require the participation of the general public and approval from the prefectural government at various stages. (**FIGURE 15**). This time-consuming requirement can be streamlined in the case of wide area zoning, where the local government and local communities have already participated in the zone selection process.

[43] *Ibid.*

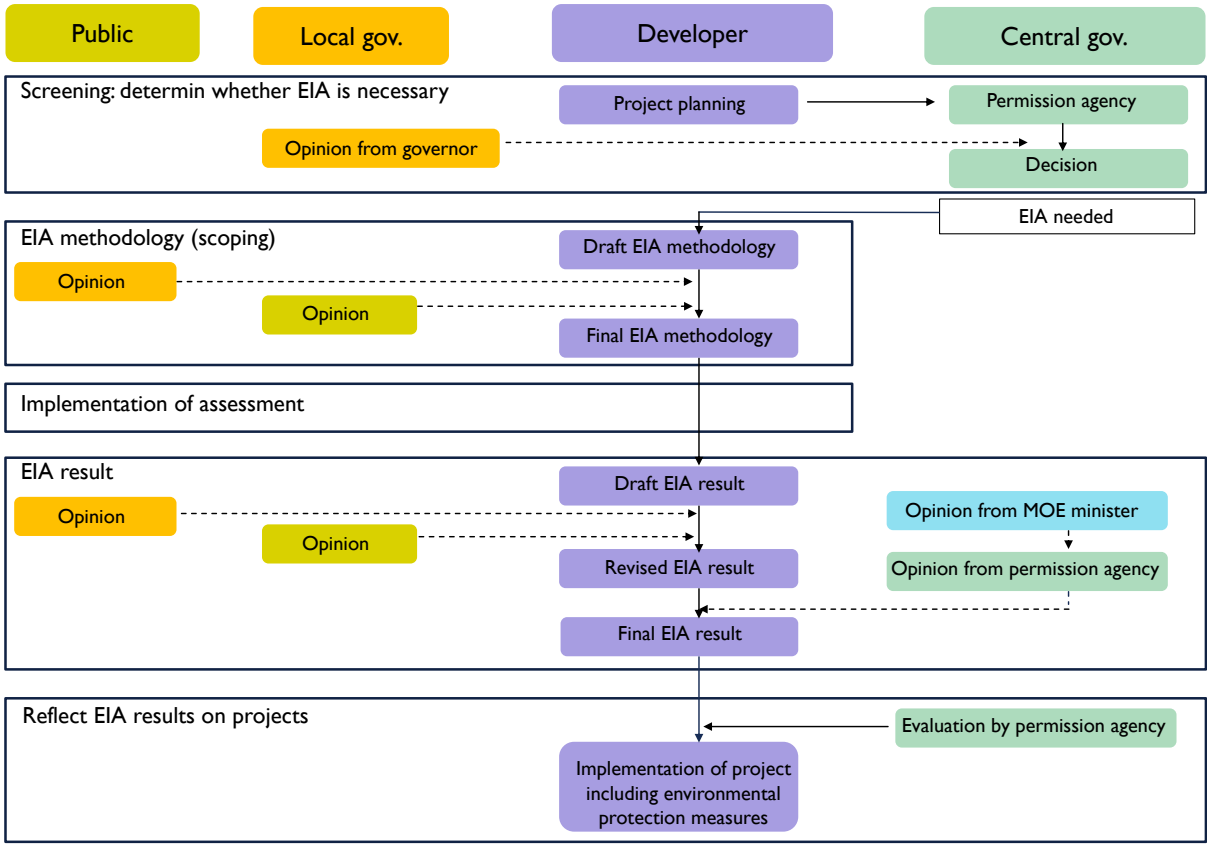


FIGURE 15. ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURES IN JAPAN

Source: https://www.cas.go.jp/jp/seisaku/jouhouwg/hyoka/dai1/sankou6.pdf

The implementation of wide area zoning can help speed-up the development process of renewable energy projects. However, even though in the zoning process the environmental and social matters will be considered, there is little mention of land utilization issues in the zoning manual. Unclear land ownership and complicated and time-consuming land use approval process are sited to be one of the major issues hindering renewable development and resulting in high renewable development cost. Therefore, during the wide area zoning process, information collection regarding land ownership and providing the information that can be disclosed to renewable developers can help addressing the land acquirement difficulties in the renewable project development process.

(2) Improve grid integration condition for renewable projects

Grid connection and grid utilization need to be more predicable to encourage investment in renewable projects. Measures for accommodating more renewable electricity in the grid, such as grid expansion, and consumer-side renewable electricity solutions will also be needed in the future.

Accelerate improvement of data disclosure and data management rules to enhance "predictability": "Predictability" was the main concern among interviewees in terms of grid and electricity market issues. For example, new renewable power plants connected to the grid under the "non-firm" connection rule are subject to curtailment without compensation when grid congestion occurs. Interviewees were concerned that unpredictable curtailment may affect a renewable project's bankability.

From April 2022, most newly approved renewable projects will be covered by the FIP program, under which the renewable electricity purchasing price is linked to the electricity wholesale market price. Therefore, renewable power developers will face risks associated with market price volatility. Furthermore, more energy storage facilities such as batteries will be needed to accommodate more variable renewable power capacities. Market participants interviewed pointed out that the predictability of the market price, especially the price difference between different hours of the day, is key to the economic viability of energy storage facilities.

To improve the predictability of grid operations and the market price, data regarding power generation plants and the grid operation status need to be properly disclosed to electricity market participants. It is important for the government to accelerate the process of establishing data disclosure and data management rules for the electric power system. Data disclosure and management are also key to the digitalization of the electric power system. A proper database design can also simplify energy-related processes. For example, in Germany, all electricity and gas market participants (plant operators, network operators, and traders) are required to register with the Market Master Data Register (MaStR). Plant information, including the name, address, location, technology, performance value, is registered with MaStR and made available to the public.[44] With such information, one can assess the total capacity of power connected to the grid in a certain area and make a rough evaluation of grid congestion conditions.

Formulate inter-regional grid expansion and new grid utilization rules: In the longer term, the increased accommodation of renewable energy in the grid will indispensably require inter-regional transmission line expansion. An inter-regional grid expansion plan (Master Plan) is currently being developed under the leadership of OCCTO. At the same time, new grid utilization rules that incorporate the environment benefits of renewable electricity are also necessary. Several formulations of grid utilization and grid congestion management rules are currently under consideration (**FIGURE 16**). To make sure that grid constraints do not delay future renewable energy development, it is desirable to speed-up the future grid utilization rule making process.

[44] There is also some other registered information that is confidential

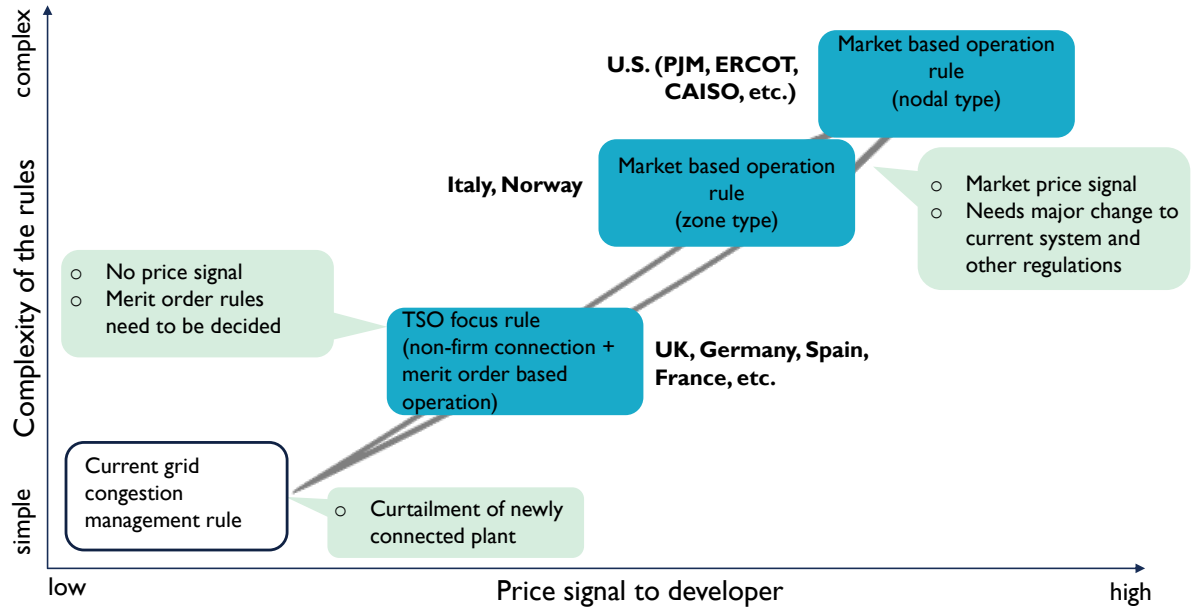


FIGURE 16 RULES UNDER CONSIDERATION FOR FUTURE GRID CONGESTION MANAGEMENT

Source: OCCTO[45]

(3) Develop a user-friendly NFC market and improve the renewable tracking system

Direct consumer access to renewable NFCs and tracking renewable electricity are key elements of encouraging corporate renewable electricity procurement in Japan. In response to strong calls for revision from consumer companies, the government is working on reforming NFC market rules and further improving a renewable tracking scheme applicable to all renewable projects. There are several factors that need to be carefully considered in the process:

User friendliness: One of the drivers of NFC market rule revision is increasing consumer companies' needs for procuring renewable electricity. Hence, it is important to design rules that are user-friendly for consumer companies. Under current NFC market rules, the effective period of NFCs terminates at the end of June, regardless of the timing of NFC acquirement. Given the reporting timeframe for RE100 companies, for example, revising the current NFC effective period to one year after the generation period of the NFC[46], would allow more flexibility for reporting by consumer companies. Furthermore, companies have different requirements for renewable electricity sourcing. Some companies emphasize "additionality" in their renewable electricity procurement, while others have special requirements for the location of renewable electricity

[45] OCCTO, (2022) "Master Plan (Long-term Policy for Cross-regional Grid) Main Points" (17th Meeting of Council of Cross-regional Grid Master Plan and Grid Utilization Rules), https://www.occto.or.jp/iinkai/masutapuran/2022/files/masuta_17_01_01.pdf (Japanese only)

[46] The effective period rule for Guarantee of Origin in Germany

production. The renewable tracking system should be designed to provide renewable electricity buyers with clear and sufficient information to check whether the electricity or NFC they purchase will meet their corporate standards.

Compatibility with the latest international standards: It is important that the renewable NFCs managed by the tracking scheme for renewable power meet RE100 criteria. It should be noted that RE100 criteria are evolving and the latest international trends should be taken into account when improving the domestic renewable tracking system.

Compatibility with other regulations: in the future to make the renewable certificate management and trading system be as developed as REC (Renewable Energy Certificate) in the United States or the GO (Guarantee of Origin) system in Europe, data from not only the renewable developers but also other stakeholders such as grid operators and retailers will be necessary. Therefore, further improvement of the renewable tracking system and NFC market is not only about renewable energy system. The relevant rules regarding the renewable tracking system and NFC market need to comply with the rules for data disclosure and management of the whole electricity system.

(4) Scale up the corporate PPA/VPPA market. Rapidly disclose relevant market regulation revision information companies and develop government guidance for corporate PPA/VPPAs.

Japan's corporate PPA and VPPA market is still at the nascent stage. To scale up the market, information on regulation and rule revisions need to be rapidly disclosed to companies. For example, as stated in Chapter 2, to be able to execute a direct VPPA, the consumer will need to have direct access to non-FIT NFCs. In response to the needs of consumer companies, the latest rule revision of the NFC market enables consumer companies with a VPPA contract to have direct transaction of non-FIT NFCs with renewable power generators when the renewable projects meeting certain criteria. Detailed information of such market rule revision should be disclosed and reached to the companies rapidly.

Meanwhile, challenges pertaining to corporate procurement of renewable electricity can also be attributed in part to the complexity and uncertainty of market rules. As aforementioned, the Japanese renewable electricity market is undergoing change in many dimensions: revisions are being considered for NFC market rules, a renewable tracking scheme is being developed, the renewable support mechanism is shifting from a FIT scheme to a FIP scheme, and new electricity grid operation rules are under discussion. The current market situation can be overwhelming for many stakeholders, including developers, retailers, consumer companies, financial institutions, and local governments, involved in corporate renewable electricity procurement,

In addition to the uncertainties of the market and regulations, the corporate PPA/VPPA business model is still new to many stakeholders. Therefore, although corporate PPA/VPPA schemes can be utilized in theory, the lack of proven successful cases and the confusion around market regulations make it difficult for companies to make business decisions to harness corporate PPA/VPPA schemes. At the early stages of market development, access to government guidance can help stakeholders to gain a better understanding of how corporate PPA/VPPA schemes work in Japan, as well as what roles and responsibilities are expected of them. Some effective measures include identifying the relevant authorities from whom to seek guidance and providing clear public guidance on the legal requirements that a VPPA needs to satisfy in order not to be treated as a derivative.

Not only general guidance but also guidance on specific issues can also be useful. For example, many interviewees mentioned that guaranteeing long-term electricity purchases as a major obstacle in developing corporate PPA/VPPAs. Under the FIT scheme, a long-term electricity purchase price is guaranteed by the government; and therefore, banks can be more confident in financing the renewable project. In contrast, in a corporate PPA/VPPA, the off-taker is a private company, whose credibility is an important factor in assessing the bankability of the renewable project. The lack of expertise in evaluating emerging schemes can also make banks hesitant in financing corporate PPAs/VPPAs for renewable electricity. Therefore, government guidance on evaluating the bankability of corporate PPAs/VPPAs can facilitate the financing of such renewable projects.

(5) Introduce consumer relief measures to reduce FIT surcharge burden.

As mentioned in Chapter 2, high renewable power generation costs are passed on to electricity consumers in the form of the FIT surcharge. The increasing burden of the FIT surcharge shouldered by end users is a critical issue in Japan's renewable energy development. Given that the FIT purchase period is 10 to 20 years (depending on the type of technology), the current FIT surcharge is rooted in existing highly priced FIT projects that were approved in the initial years of the FIT scheme. In the longer term, to reduce FIT surcharge further bringing down renewable power generation cost is necessary. And to promote the cost reduction, Japan has introduced auctions and has moved from FIT to market mechanism based FIP mechanism. However, even under the FIP mechanism, the premium paid to renewable developers is passed on to consumers, and thus there are still surcharge to consumers (surcharge caused by FIP).

Corporate PPAs for non-subsidized (non-FIT/FIP) renewable projects (corporate PPA with non-FIT/FIP renewable projects) can help encourage renewable energy development without increasing the FIT surcharge. However, newly contracted corporate PPAs cannot contribute to the reduction of the FIT surcharge caused by projects already approved.

Other countries are also faced with the challenge of increasing burden of FIT/FIP surcharges for consumers. One example of addressing the issue is to make the FIT/FIP surcharge be shouldered not only by electricity consumers but by all the energy consumers. In other words, consumers from other sectors also shoulder the cost of supporting renewable electricity development. Germany reduced its FIT surcharge (renewable energy levy) by 43%, from 6.5 eurocent/kWh to 3.72 eurocent/kWh as of January 2022. Alternately, the cost of supporting renewable energy will be partly financed using revenue from the carbon price on heating and transport fuels. The German government has also abolished consumer's FIT surcharge as of July 1, 2022 and has instead set up a climate fund to support renewable energy. The fund will be financed by revenue from **carbon pricing** and the **government budget**. The consumer relief measures in Germany offer a good example for Japan to consider when addressing its growing FIT surcharge issue.

APPENDIX RENEWABLE ENERGY DEVELOPMENT IN JAPAN

The current 6th SEP ensures the utilization of renewable energy as the major power source; and therefore, renewable energy will be adopted to the maximum possible level.[47] The SEP seeks to reduce the financial burden shouldered by consumers and to facilitate the social acceptance of renewable energy by local communities in the long term.

The 6th SEP sets an ambitious target for renewable energy with a share of 36-38% in power generation mix by 2030 (**TABLE A1**). The 2030 renewable energy target consists of solar at 14-16%, wind at 5%, geothermal at 1%, hydropower at 11%, and biomass at 5%. Among others, the solar power is planned to increase the share by more than double compared to the previous SEP. In terms of the capacity, the 6th SEP requires 147-161GW of renewables' capacity to achieve the target.

TABLE A1. THE 2030 RENEWABLE ENERGY TARGET IN POWER GENERATION

	The 5th SEP	The 6th SEP	
		Share	Capacity
Renewables in power generation mix	22-24% (237TWh – 251TWh)	36-38% (336TWh – 353TWh)	147-161GW
Solar	7.0%	14 – 16%	104 – 118GW
Wind	1.7%	5%	Onshore 17.9GW Offshore 5.7GW
Hydro	8.8 – 9.2%	11%	50.7GW
Geothermal	1.0 – 1.1%	1%	1.5GW
Biomass	3.7 – 4.6%	5%	8.0GW

Source: compiled by authors based on METI (2022)[48]

A.1 CURRENT STATUS AND ISSUES OF RENEWABLE ENERGY DEVELOPMENT IN JAPAN

(i) Current Status

One of the features of renewable energy development in Japan is that the solar PV has increased significantly compared to wind power. Japan's renewable power generation capacity reached 134 GW in 2021 (**FIGURE A1**). Solar PV generation capacity accounts for 56%, followed

[47] METI, (2021) "Outline of Strategic Energy Plan"
https://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/6th_outline.pdf (Japanese only)

[48] METI, (2022) "Prospective Renewable Energy Policy" (40th Mass Renewable Energy Introduction and Next-Generation Power Network Subcommittee on April 7, 2022),
https://www.meti.go.jp/shingikai/enecho/denryoku_gas/saisei_kano/pdf/040_01_00.pdf (Japanese only)

by hydro with a share of 37%. The feed-in tariff (FIT) scheme implemented in 2012 especially contributed to boosting solar power, which increased about elevenfold from 6.6GW in 2012 to 74.2 GW in 2021. The generation capacity of wind and biomass has expanded steadily, although each account for a share of merely about 3% of the total renewable power generation capacity. Hydro and geothermal power have not shown notable growth partly because they require a long time and high costs to realize a project.

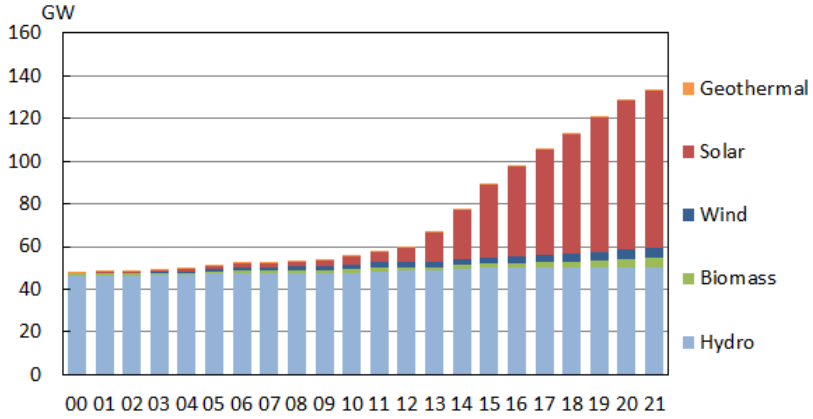


FIGURE A1 RENEWABLE POWER GENERATION CAPACITY IN JAPAN

Source: compiled by authors based on IRENA (2022)[49]

FIGURE A2 shows the current renewable power generation capacity and the 2030 target specified in the 6th SEP. The current capacity includes facilities in operation before and after the FIT scheme, and the non-operating facilities approved under the FIT scheme as of September 2021. The overall achievement rate of 55% indicates that Japan needs to ramp up the renewable energy development towards the 2030 target. In specific, an additional operating capacity of 40-54GW for solar and 13GW for onshore wind will be necessary to achieve the target.

[49] International Renewable Energy Agency (IRENA) (2022). *Renewable Capacity Statistics 2022*. International Renewable Energy Agency: Abu Dhabi.

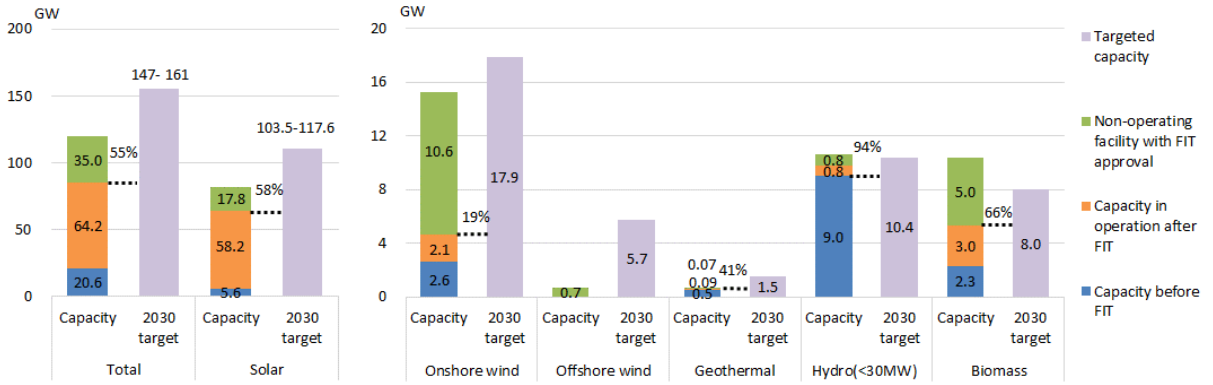


FIGURE A2. CURRENT RENEWABLE POWER GENERATION CAPACITY AND 2030 TARGET

Source: compiled by authors based on METI[50]

(ii) Issues by renewable energy source

Nevertheless, these renewable energy developments will be challenging for Japan due to several obstacles. The foremost serious issue is lack of adequate or flat land, which is found in common among the renewables. Given the fact that forestry covers 67% of Japan's total land area, the appropriate areas to be developed are getting limited as the renewable energy development is pursued further. For instance, the number of large-scale solar power projects with no less than 2MW capacity have reduced significantly in recent years. As to onshore wind power, almost half of the projects are planned in mountainous areas, which entails additional costs for extra land development and specific technology or equipment required.

An equally important subject for renewable energy development is the environmental aspect. Conflicts with local communities are often seen in the solar and onshore wind power projects. There are concerns about negative impacts on the environment and wildlife caused by the projects. It is fundamentally important to take appropriate measures to protect the environment or prevent incidents such as land sliding to help the local communities to understand and support the projects.

In addition, geothermal and biomass energy development projects need to deal with other issues, respectively. For the geothermal development, it is crucial to coordinate related regulations in place such as the Hot Springs Act and the Natural Parks Act which have restricted the progress in this field so far. The geothermal development also necessitates substantial expenses even in the initial phase to carry out geological survey and drilling tests, which imply high development risks.

In Japan, a substantial part of biomass fuel for power generation is imported wood pellets/chips and palm kernel shell (PKS). Prior to FIT approval, the sustainability of imported

[50] METI, https://www.fit-portal.go.jp/PublicInfoSummary

biomass fuels is evaluated based on a third-party certification scheme that certifies fulfillment of sustainability requirements.[51] However, some companies have their own criteria to define the sustainability of electricity from biomass. Therefore, some corporate renewable electricity buyer will choose not to purchase biomass power, even if it meets FIT sustainability requirements.

On the other hand, domestic wood biomass can be a source of sustainable biomass that can be further explored. Utilizing forest thinnings in biomass power generation can contribute to encouraging sustainable forest management and developing local employment, as well as the utilization of local resources. A system to ensure that the wood biomass supply is from sustainable forestry practices will be indispensable.

A.2 MAJOR SUPPORTING POLICIES

A major policy to support the renewable energy development is the feed-in tariff (FIT) scheme adopted in 2012. **TABLE A2** presents the tariff rates under the FIT scheme in Japan and they are acknowledged relatively higher at global level as illustrated in **FIGURE A3**. For instance, the tariff rates of commercial solar PV and onshore wind are set at JPY 11/kWh and JPY 16/kWh in 2022, respectively. The tariff rates for solar and onshore wind projects have gradually declined while those of geothermal, hydro, and biomass projects remained almost the same since the FIT scheme started.

The FIT Act was revised in 2017 to tackle issues such as the accumulation of non-operating facilities with FIT approval and increasing surcharge. Under the revised FIT Act, the auction system was introduced as a measure to reduce costs, which was expected to consequently relieve financial burden on consumers. In FY 2022, large-scale solar PV (250kW or above and less than 1,000kW), biomass (general wood with capacity of 10MW or above and liquid biomass), and onshore wind (50kW or above) are subject to the auction system. Organization for Cross-regional Coordination of Transmission Operators, Japan (OCCTO) is designated to oversee the auction.

[51] In Japan, the Renewable on Sustainable Palm Oil (RSPO) for palm oil, and the Roundtable on Sustainable Biomaterials (RSB), the Green Gold Label (GGL), and the ISCC Japan Fit for PKS and palm trunk are recognized as the certification scheme as of FY 2022.

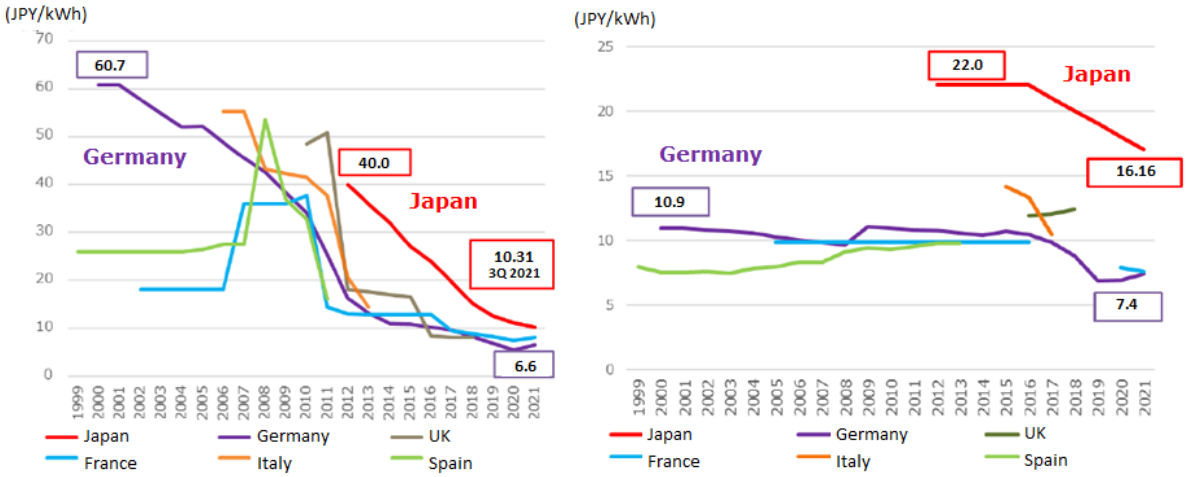
TABLE A2. FIT RATES

<table>
<tr><td colspan="2" rowspan="2">Fiscal Year</td><td colspan="5">Tariff rates (JPY/kWh)</td><td rowspan="2">Duration</td></tr>
<tr><td>2020</td><td>2021</td><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td rowspan="2">Commercial solar PV</td><td rowspan="2">10 kW or above</td><td colspan="2">auction
(250kW or above)</td><td colspan="2">auction
(250-1,000kW)</td><td rowspan="2"></td><td rowspan="2">20 years</td></tr>
<tr><td>13(10-50kW)
12(50-250kW)</td><td>12(10-50kW)
11(50-250kW)</td><td>11(10-50kW)
10(50-250kW)</td><td>10(10-50kW)
9.5(50-250kW)</td></tr>
<tr><td>Residential solar PV</td><td>Less than 10 kW</td><td>21</td><td>19</td><td>17</td><td>16</td><td></td><td>10 years</td></tr>
<tr><td rowspan="3">Wind</td><td rowspan="2">Onshore</td><td rowspan="2">18</td><td>17
(<50 kW)</td><td>16
(<50 kW)</td><td>15
(<50 kW)</td><td>14
(<50 kW)</td><td rowspan="3">20 years</td></tr>
<tr><td colspan="3">auction
(50kW or above)</td><td colspan="2"></td></tr>
<tr><td>Offshore (fixed-bottom)</td><td>auction</td><td>32</td><td>29</td><td>auction</td><td></td></tr>
<tr><td>Geothermal</td><td>Offshore (floating)</td><td colspan="5">36</td><td>15 years</td></tr>
<tr><td rowspan="2">Geothermal</td><td>15,000 kW or above</td><td colspan="5">26</td><td rowspan="2">15 years</td></tr>
<tr><td>Less than 15,000 kW</td><td colspan="5">40</td></tr>
<tr><td rowspan="4">Hydro</td><td>5,000-30,000 kW</td><td colspan="3">20 (5-30MW)</td><td>16
(5-30MW)</td><td rowspan="3"></td><td rowspan="4">20 years</td></tr>
<tr><td>1,000-5,000 kW</td><td colspan="4">27 (1,000-5,000 kW)</td></tr>
<tr><td>200-1,000 kW</td><td colspan="5">29 (200-1,000 kW)</td></tr>
<tr><td>< 200 kW</td><td colspan="5">34 (< 200 kW)</td></tr>
<tr><td rowspan="6">Biomass</td><td>Biogas</td><td colspan="3">39</td><td>35</td><td rowspan="6"></td><td rowspan="6">20 years</td></tr>
<tr><td rowspan="2">Unutilized wood</td><td colspan="4">40 (< 2MW)</td></tr>
<tr><td colspan="4">32 (2MW or above)</td></tr>
<tr><td rowspan="2">General wood
(e.g., imported pellets, sawmill residues, PKS)</td><td colspan="4">auction (10MW or above)</td></tr>
<tr><td colspan="4">24 (< 10MW)</td></tr>
<tr><td>Liquid Biomass
(palm oil)</td><td colspan="4">auction</td></tr>
<tr><td>Construction wood waste</td><td colspan="4">13</td></tr>
<tr><td>Waste materials</td><td colspan="4">17</td></tr>
</table>

Note: The tariff rates for geothermal and hydro are those of new projects.

Source: compiled by authors based on METI[52]

[52] METI, https://www.enecho.meti.go.jp/category/saving_and_new/saiene/kaitori/fit_kakaku.html



Solar (2MW) Onshore wind (20MW)

FIGURE A3. PURCHASING TARIFF RATES

Note: 1€=JPY120, 1 £ =JPY150

Source: compiled by authors based on METI[53]

As a part of the Act for Establishing Energy Supply Resilience which took effect in April 2022, the FIT scheme was reviewed and redesigned to make the renewable energy the major power source. A new scheme, the feed-in premium (FIP), is applied to the renewable energy that is likely to become competitive and for which a market-based support system is considered rather appropriate. Commercial solar PV, hydro, and geothermal with capacity of 1MW or above, biomass (general wood) with capacity of 10MW or above and liquid biomass with capacity of 50kW or above will comply with the FIP scheme from FY2022. The feed-in premium (FIP) scheme started in April 2022 along with the FIT scheme.

Under the FIP scheme, renewable power generators sell electricity directly at the market or over-the-counter transactions and receive a premium in addition to the market price. The premium is calculated as a difference between “the designated FIP price” and “the reference price.”

Premium (JPY/kWh) = the designated FIP price – the reference price

The designated FIP price for FY 2022 will be set through the auction for commercial solar with capacity of 1MW or above, biomass with capacity of 10MW or above and liquid biomass with capacity of 50kW or above, and at the equivalent level of the FIT rates for other renewables. The reference price is determined monthly based on the average wholesale price of the previous year

[53] METI, (2022) “Opinions on Renewable Energy Purchase Prices from FY2022 Onward” (The Procurement Price Calculation Committee (February 4, 2022)),
https://www.meti.go.jp/shingikai/santeii/pdf/20220204_1.pdf (Japanese only)

with monthly adjustments. The non-fossil values and the balancing costs are also factored into the equation

On the other hand, the basic framework of the FIT scheme is to be maintained for the other renewable energy sources if they are utilized locally and expected to improve disaster resilience of the area. The locally utilized power sources need to meet the certain requirements to benefit from the FIT scheme. The requirements to be eligible for the FIT approval have been applied to commercial solar PV since FY 2020 and geothermal, hydro, and biomass since FY 2022 **(**TABLE A3). Furthermore, onshore wind with less than 50kW capacity will be included and the targeted capacity of biomass power will be changed to that of less than 2MW from FY 2023. The commercial solar PV is obliged to satisfy both conditions while the other renewables need to meet one of the requirements.

TABLE A3. REQUIREMENTS FOR LOCAL UTILIZATION

Renewable energy	Requirements to be eligible for the FIT approval	
Commercial solar PV (10-50kw)	✓ Self-consumption at least 30% ✓ Black start capability and power outlet function for emergency use	
Geothermal (<1MW) Hydro (<1MW) Biomass (<10MW)* Onshore wind (<50kW)**	[Self-consumption type] ✓ Self-consumption at least 30% ✓ Power supply at least 50% of its retail electricity provided by a retailer or transmission and distribution operator to a local community where a power generation facility is located. ✓ Self-consumption of power at least 10% and heat for CHP	[Community-based type] ✓ Agreement on utilization of generated power/heat with a municipality ✓ Operated or financed by a municipality ✓ Power supply to a retailer operated or financed by a municipality

Note: * The targeted capacity of biomass power will be changed to that of less than 2MW from FY 2023.

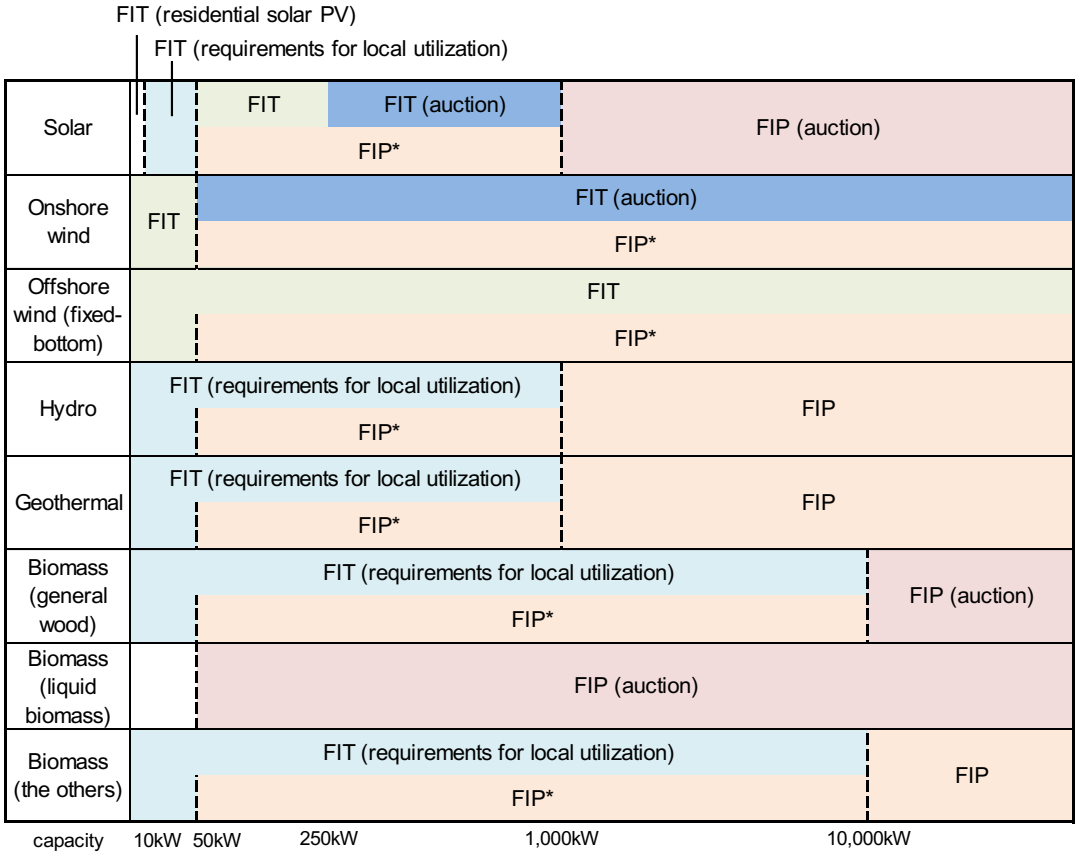
** Onshore wind with capacity less than 50kW will be covered from FY 2023.

Source: compiled by authors based on METI[54]

From FY 2022, the renewable energy projects are supported by either FIT or FIP, depending on the energy source and capacity (**FIGURE A4**). New projects and FIT approved projects with no less than 50kW capacity are allowed to apply for the FIP scheme if it is preferred over the FIT scheme. The classification will be adjusted to reflect the renewable energy market and development situations.[55]

[54] METI, (2022) “Renewable Energy FIT/FIP Scheme Guidebook”, https://www.enecho.meti.go.jp/category/saving_and_new/saiene/data/kaitori/2022_fit_fip_guidebook.pdf (Japanese only)

[55] The commercial solar PV registered under the FIP scheme will be expand to projects with capacity of 500kW or above from FY2023 and those of 250kW or above from FY 2024. Similarly, the targeted biomass (general



Note: * New projects and FIT approved projects no less than 50kW are allowed to apply for the FIP scheme if it is preferred over the FIT scheme.

FIGURE A4. RENEWABLE ENERGY SUPPORT SCHEME (FY 2022)

Source: compiled by authors based on METI[56]

wood and the others) capacity will cover those of no less than 2MW from FY 2023. Fixed-bottom offshore wind projects to which Marine Renewable Energy Act of 2019 do not apply are not subject to the auction in FY 2022 but they will be required to participate in the auction from FY 2023.

[56] METI (March25, 2022) “Renewable Energy Purchase Prices, Surcharge Rate, and Other Details related to FIT and FIP Schemes from FY2022 Onward to Be Determined”, https://www.meti.go.jp/english/press/2022/0325_004.html (Japanese only)

Contact: report@tky.ieej.or.jp