



Japan Power Procurement Options & Net Zero Law Impacts

For Commercial/Industrial Customers

Speakers



25+ Years in Energy & Environmental Markets

Industry Experience

Energy Market Design
Business development
Commodity derivatives

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30+ Years in Global Power & Gas Markets

Industry Experience

CEO, Commerce Energy
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- PennWell Top 50 Most Influential in Energy Markets
- Active in all global power markets
- Deregulation expert
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Peter Weigand
CEO, Skipping Stone

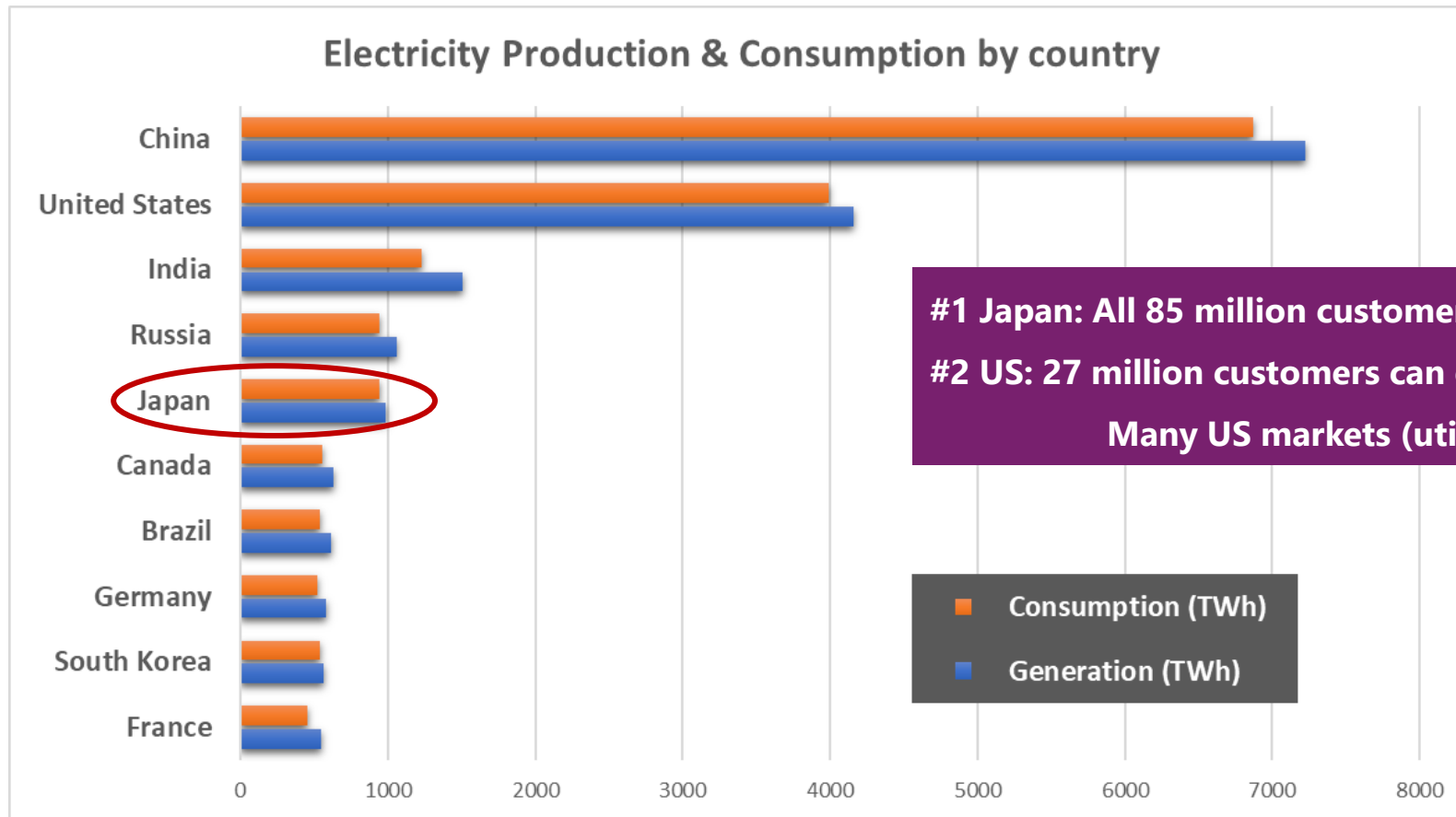
- Overview of Japan's Deregulated Power Market
- Japan's Net Zero Laws and the Impact on Commercial Industrial Customers
- New GHG and Carbon Reduction Reporting and Compliance Rules
- Overview of the Various Credits Markets
- Renewable Supply vs Demand Forecast



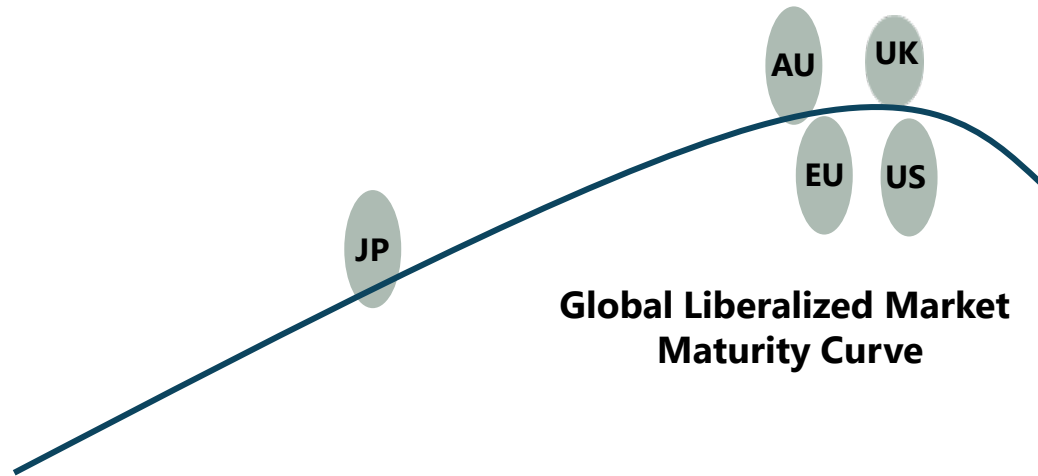
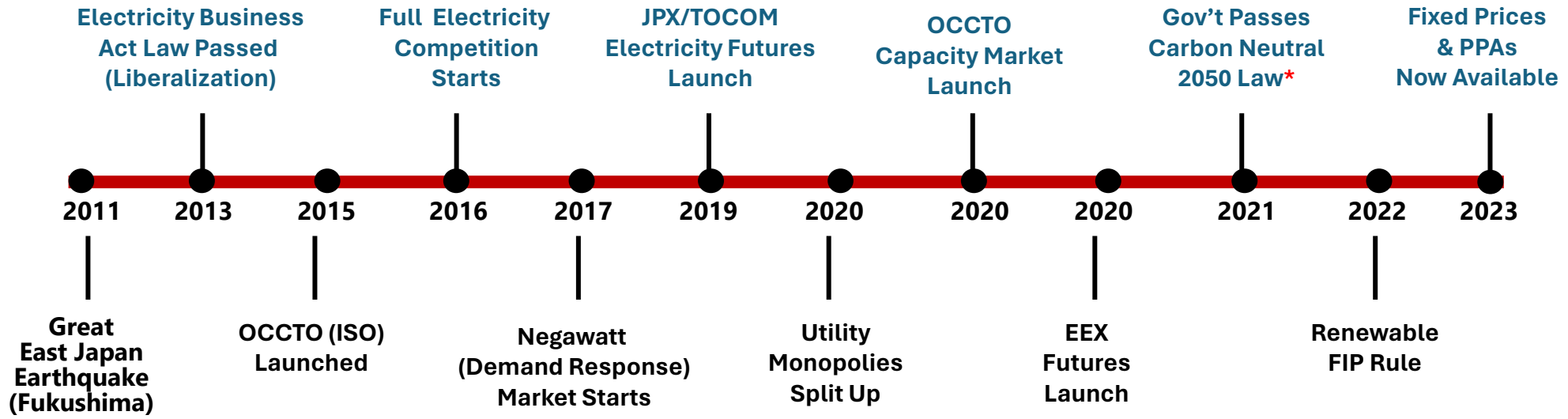
Overview of Japan's Deregulated Power Market

Japan Electricity Market Size

Japan is the largest fully liberalized electricity market and the 5th largest overall electricity market in the world



Energy Market Liberalization Events Timeline



Market share of the new Retail Suppliers*:

| | |
|--------------------|---------------------|
| Extra High Voltage | 10.3% (Industrial) |
| High Voltage | 27.0% (Commercial) |
| Low Voltage | 23.4% (Residential) |
| Total | 21.3% |

*Source: METI

Roles in the Electricity Market

Retailer

- Sell to End Users
- Collect utility charges (customer receives one bill)
- Responsible for balancing

Utility

- Three main business units:
 - T&D – delivery only, no longer supply power to customers
 - Generation – must sell power into open markets (JEPX) or bilateral
 - Retail – customers can stay with utility retailer, or switch to a different retailer

Spot Market

- JEPX (About 40% of all generation is traded on JEPX)
- Day Ahead and Real Time 30-minute markets
- Renewable credits auction

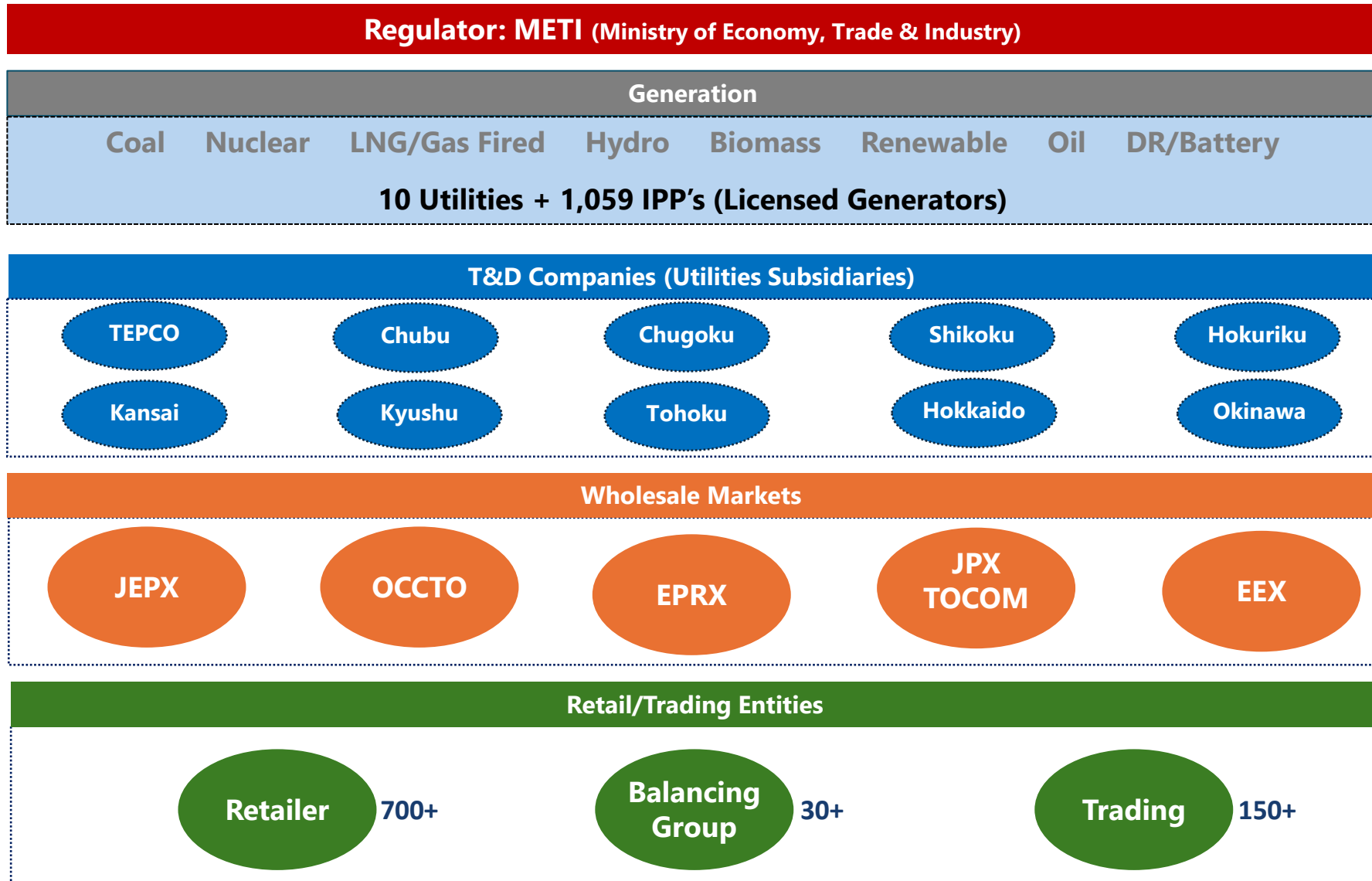
ISO

- OCCTO
- All switching and meter data exchange nationwide
- All physical scheduling
- Capacity market

Futures

- TOCOM (JPX) & EEX
- Markets split into East & West
- Volumes have grown substantially since inception

Types & Numbers of Power Market Participants



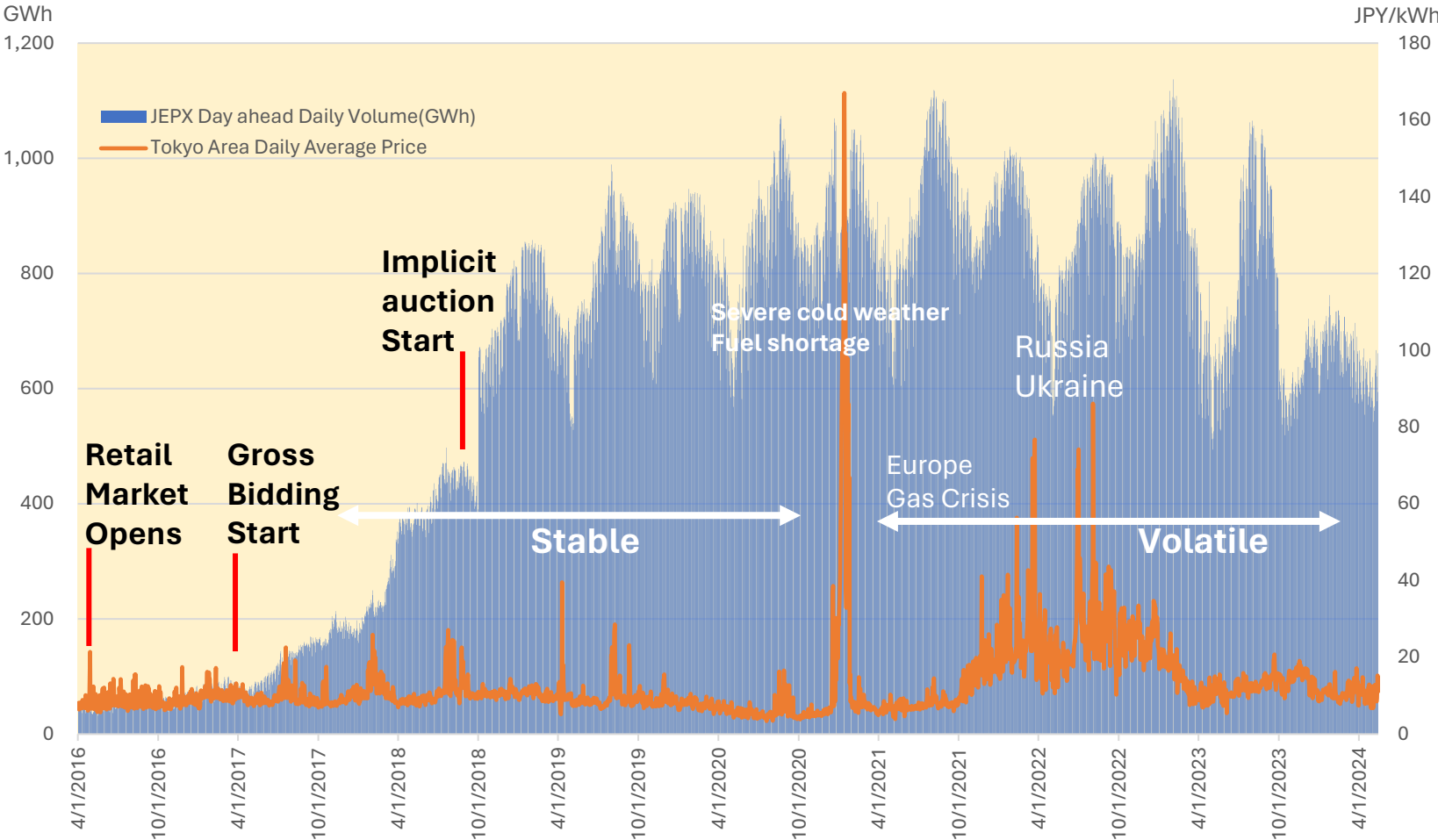
Physical Wholesale Market is Very Liquid

JEPX Spot Market

Trading Volume

Prices

JEPX Spot Market Daily Volume and Daily Average Price (Tokyo Area)





Japan's Net Zero Laws: Impact on Commercial Industrial Customers

Japan Net Zero & Related Laws Overview

- **Act on Promotion of Global Warming Countermeasures**
 - Carbon Neutral 2050 Law passed in 2020, revised in 2021
 - 46% GHG emissions reduction by 2030 (compared to 2013)
 - Zero GHG emissions by 2050
 - **GHG Emissions Accounting, Reporting & Publication System (aka SHK System)**
 - Over 13,000 industrial customers impacted
 - Must report GHG emissions for the previous year by the end of July
 - Publish emissions information for each business site.
- **Act on the Rational Use of Energy (aka Energy Savings Act) (revised 2023)**
 - 12,000 industrial customers impacted
 - Must report consumption and GHG, plus reduction plans
 - Must appoint an energy manager
 - Requires 1% minimum GHG reduction per year

Government GHG Reduction Targets

| Sector | GHG Reduction Target % | METI GHG Reduction Methodology |
|----------------|------------------------|--|
| Residential | 17.2% | Rooftop solar mandate, supplier renewable requirements |
| Commercial | 13.8% | Rooftop and offsite renewables, supplier renewable requirements |
| Transportation | 19.3% | EVs, hydrogen |
| Industrial | 36.8% | Rooftop and offsite renewables, supplier renewable requirements, carbon market participation |
| Government | 8.1% | 281 cities have pledged net zero (80% of the population) |
| Subtotal | 95.2% | |
| | | Balance of 100% is miscellaneous |

Bottom Line: The government is driving commercial/industrial customers to buy renewables

The GX League

- **Officially launched in April 2023 by METI**
 - Any company can join and collaborate with the government to draft carbon related rules
 - Over 800 members representing >50% of GHG emissions
 - **OPINION** It is very important to be a member (must have a Japan company)
- **GX League members must participate in voluntary emissions trading – for now**
 - Carbon Credit Market was launched by the Tokyo Stock Exchange (TSE, JPX) to trade only J Credits
 - GX credits, an excess reduction quota by GX League participants, will be added to the TSE Carbon Credit Market in November 2024 as part of an emissions trading scheme called GX-ETS.
 - Starting in 2026 it is anticipated that participation will be voluntary but with increased discipline– final rules are pending
- **Expected Timeline**
 - April 2023 to March 2026 – First phase: Pilot operation & voluntary
 - April 2026 to March 2033 – Second phase: Full-scale operation with enhanced discipline
 - April 2033 – Third Phase: Paid allocation of CO2 emission allowances to electricity generators



New GHG and Carbon Reduction Reporting and Compliance Rules

Reporting

- **Mandatory disclosure of GHG emissions**

- The Financial Services Agency (FSA) is contemplating mandatory disclosure of GHG emissions in an annual report for TSE Prime Market listed companies
- Make a disclosure on non-financial information consistent with international rules

- **Corporate Governance Code**

- TSE listed companies must establish a basic sustainability policy and disclosing the company's initiatives
- TSE Prime Market listed company must enhance the quality and quantity of climate change-related disclosures based on the TCFD or an equivalent international framework

- **Sustainability Standards Board**

- Japan board in the process of adopting the ISSB S1 & S2 standards
 - S1 – Requirements for sustainability related disclosures
 - S2 – Climate related disclosures
 - Japanese companies under IFRS is applying S1 and S2 standards for annual reporting starting January 2024.
 - Japanese companies not applying IFRS may apply S1 and S2 standards for annual reporting starting April 2025.

Compliance

- **Mandatory GHG emission Accounting, Reporting & Publication System (aka SHK System)**
 - Under the Ministry of Environment (MOE)
- **Key Attributes**
 - Required for GHG emitters over threshold of 1,500 kiloliter crude equivalent
 - Calculation of actual emissions – 3 Primary calculations
 1. Energy derived CO2 – use of fuels
 2. Non-energy derived CO2 – typically production/manufacturing related
 3. Six GHG (CH4, N2O, HFC, PFC, SF6, NF3) – a wide variety
 - Calculation of adjusted emissions
 - Purchase of green credits or certificate



Overview of the Various Credits Markets

Types of “Green” Certificates & Attributes

| Attribute | FIT Non Fossil Fuel Certificate (NFC) | Non FIT Non Fossil Fuel Certificate | Green Electricity Certificate | J- Credit |
|----------------------|---------------------------------------|-------------------------------------|--|-----------------------------|
| Issuer | OCCTO | Electricity Generators | Registered Issuer | Government Companies |
| Generation | Only FIT Renewable | Other Renewable, Hydro, Nuclear | 70% Biomass + Self Generated Renewable | Energy Savings or Renewable |
| Trading Model | JEPX Auction | JEPX Auction Bilateral | Bilateral Only | JPX Bilateral |
| Validity | 1 Year | 1 Year | No Deadline | No Deadline |

(FIT = Feed in Tariff)

The credits market is confusing. Further consolidation and rule changes expected.

OPINION: We expect NFC & J-Credits under the JPX & GX League to be the definitive credit needed for corporate customers to meet GHG compliance rules.



Renewable Supply vs Demand Forecast

METI Generation Mix Targets

METI is driving massive changes in Japan's generation mix

| Generation Type | Current Mix % | 2030 Target % | SS 2030 Forecast | 2050 Target % | SS 2050 Forecast |
|-----------------|---------------|---------------|------------------|---------------|------------------|
| Nuclear | 6 | 20-22 | 14 - 16 | 20-22 | 20 |
| Coal | 32 | 19 | 22 - 24 | 0 | 5-8 |
| LNG | 37 | 20 | 26 - 28 | 0 | 12-15 |
| Oil | 7 | 2 | 2 | 0 | 0 |
| Hydro | 7 | 8 | 7 | 8-10 | 8 |
| Hydrogen | 0 | 0 | 0 | 10 | 2-4 |
| Renewables | 18 | 36-38 | 23 - 31 | 60 | 40-50 |

Source: METI

The SS 2050 Forecast is based on comprehensive reliability studies done by Skipping Stone for other international markets who also have 2050 net zero goals.

- Studies show that without some level of fossil fueled generation, grid reliability cannot be achieved, no matter how much renewables and BESS are on a system
- We also don't believe Japan's transmission grid can or will support their 2050 targets

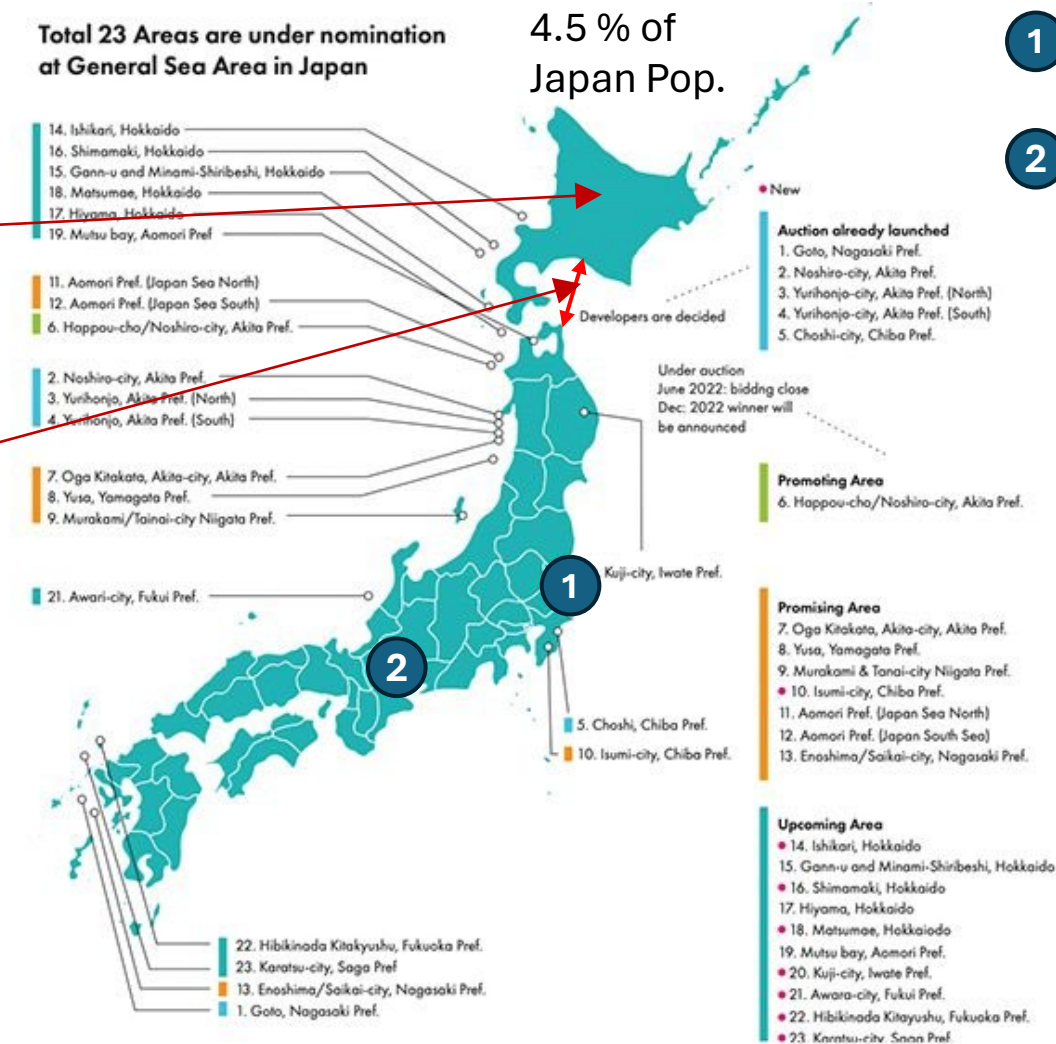
Major Changes from FIT to FIP Schemes

| | FIT (Feed in Tariff) | FIP (Feed in Premium) |
|-----------------------------|---------------------------------|--|
| Price for Generation | Fixed price set by METI | Market price + fixed premium OR Corporate PPA |
| Imbalance Risk | None | Penalty |
| Off-Taker Risk | None, utilities required to buy | Wholesale market or Corporate PPA – VPPA Utilities not required to buy |

Bottom Line: To continue to grow renewable generation supplies, Japan is pushing demand on corporate offtakers, not utilities.

Offshore Wind

- At least 2030 before first MW delivered
- Government promoting new industrial hub in Hokkaido with chip manufacturing, data centers and other large users
- **Transmission planned, not built**
- Currently low overall demand in Hokkaido
- Offshore Targets
 - 10 GW by 2030
 - 40 GW by 2040
 - 90 GW by 2050



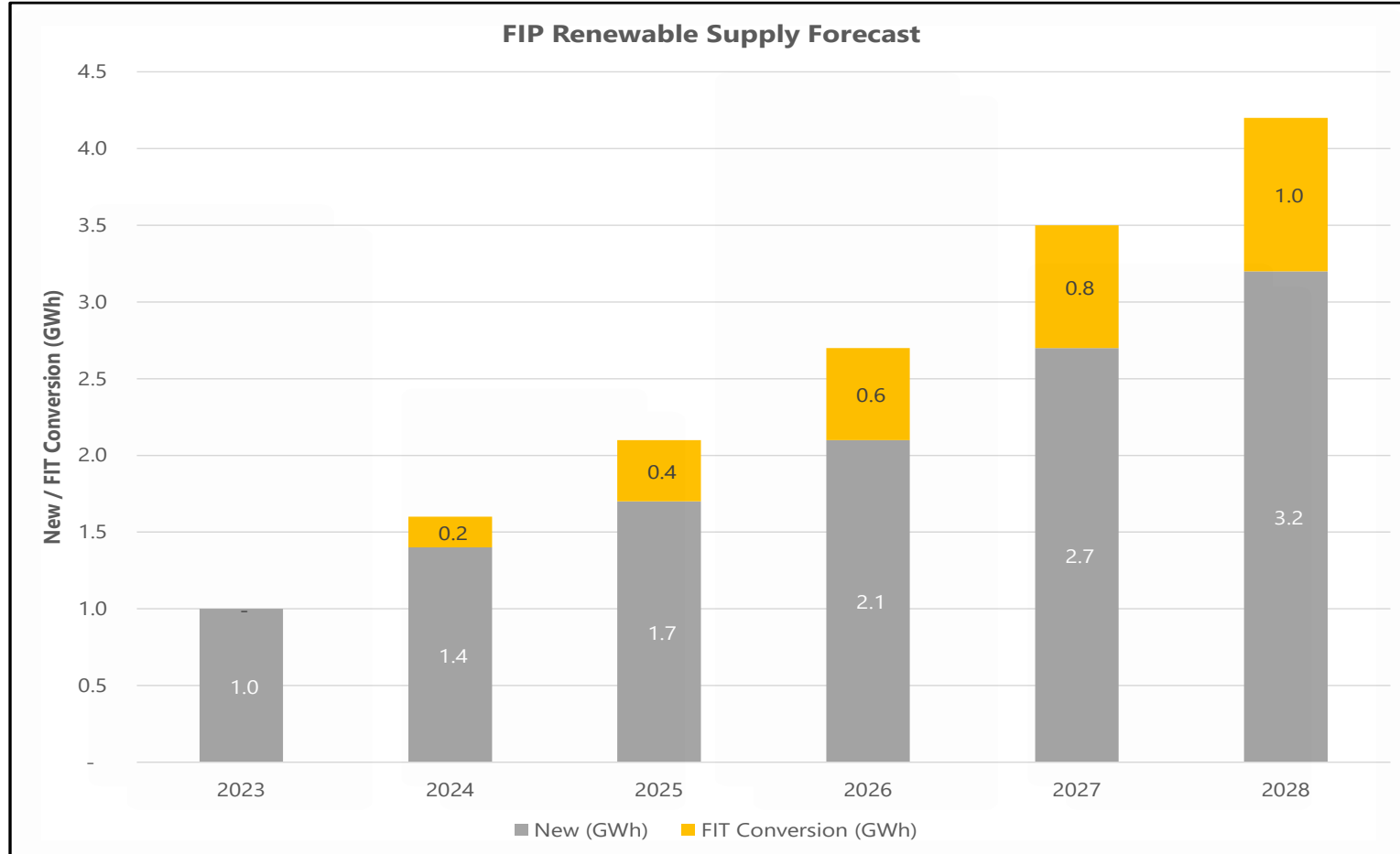
1 Tokyo } 20% of Japan Pop.
2 Osaka }

Utility Scale Renewable Supply Forecast

FIP Based Supply

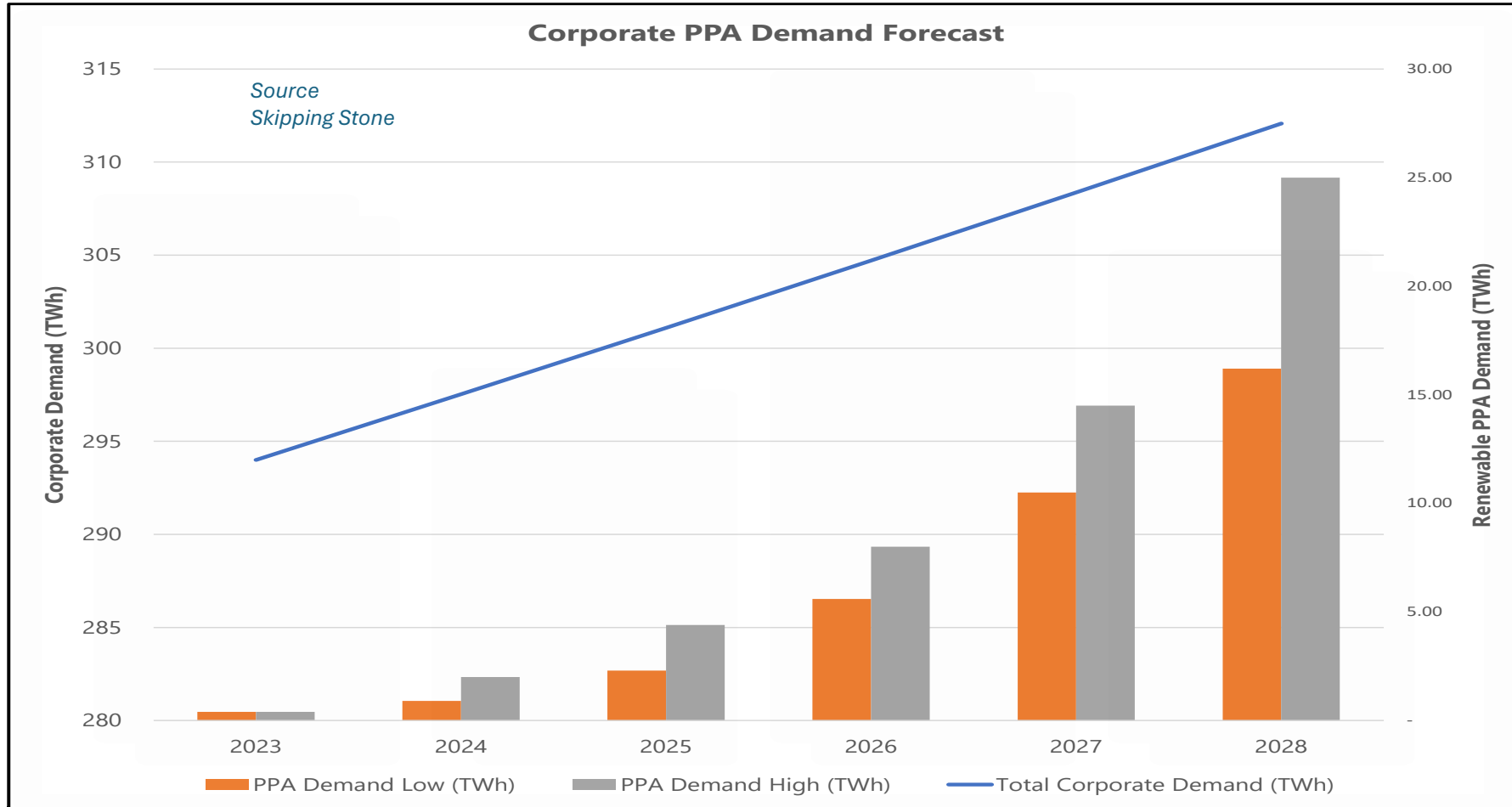
FIT to FIP Conversion

Source: Skipping Stone, LLC



The conversion of FIT to FIP will grow as Corporate PPA prices rise above the FIT price. In addition, METI is offering economic incentives to convert FIT to FIP as they are aware of the supply shortfall compared to the growing demand.

Japan Corporate PPA Demand Forecast

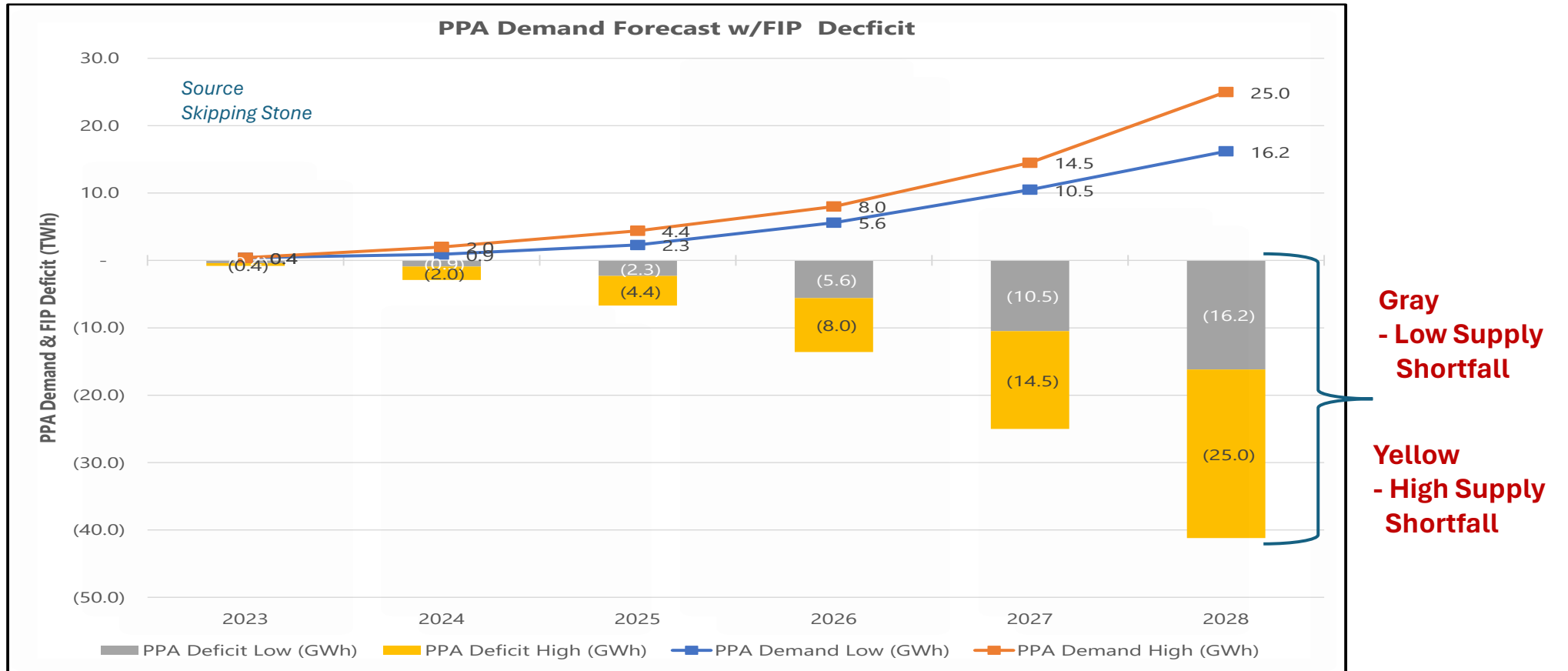


High Forecast

Low Forecast

The primary difference between high and low demand is based on the availability of renewable supplies. The overall demand is much higher than the projected supply, so if supplies are slower to market, the lower demand forecast will apply.

Corporate PPA Demand Forecast & Renewable Supply Shortfall



The chart has two scales, one for demand, the other for supply. The orange and blue lines represent the high and low demand forecast.

Key Takeaway: If a corporate wants to meet GHG reduction requirements with a PPA, get started now before the rush in 2-3 years because there may not be anything to buy.



Masahiro Yamashita
CEO, Ene Buyer

- Procurement Options for Hedging Power Prices
- Comparison of Traditional Pricing Plans vs New Hedge Pricing Plans
- Case Study Customer Example
- Japan's Power Procurement Process
- Renewable PPA and VPPA Options



Procurement Options for Hedging Power Prices

Composition of 3 Types of Electricity Prices in Japan

Fuel Cost Adjustment (FCA) linked Plan

Basic charge (JPY/kW)

- Fixed monthly charge
 - Basic wheeling charge, Capacity charge
 - **Retailer margins**
- Contract power (kW)
- Power factor discount

Electricity Usage Charge (JPY/kWh)

Varies depending on power consumption
 * **Electricity unit price (fixed)**

Fuel cost adjustment (JPY/kWh)

Varies depending on power consumption
 * **Unit price (variable, linked to fuel cost & market price)**

Renewable energy levy (JPY/kWh)

Varies depending on electricity consumption
 * Unit price is fixed

Market-linked Plan

Basic charge (JPY/kW)

- Fixed monthly charge
 - Basic wheeling charge, Capacity charge
 - **Retailer margins**
- Contract power (kW)
- Power factor discount

Electricity Usage Charge (JPY/kWh)

Varies depending on power consumption
 * **Electricity unit price (variable, linked to spot market price)**

Renewable energy levy (JPY/kWh)

Varies depending on electricity consumption
 * Unit price is fixed



Fixed Price Plan

Basic charge (JPY/kW)

- Fixed monthly charge
 - Basic wheeling charge, Capacity charge
 - **Retailer margins**
- Contract power (kW)
- Power factor discount

Electricity Usage Charge (JPY/kWh)

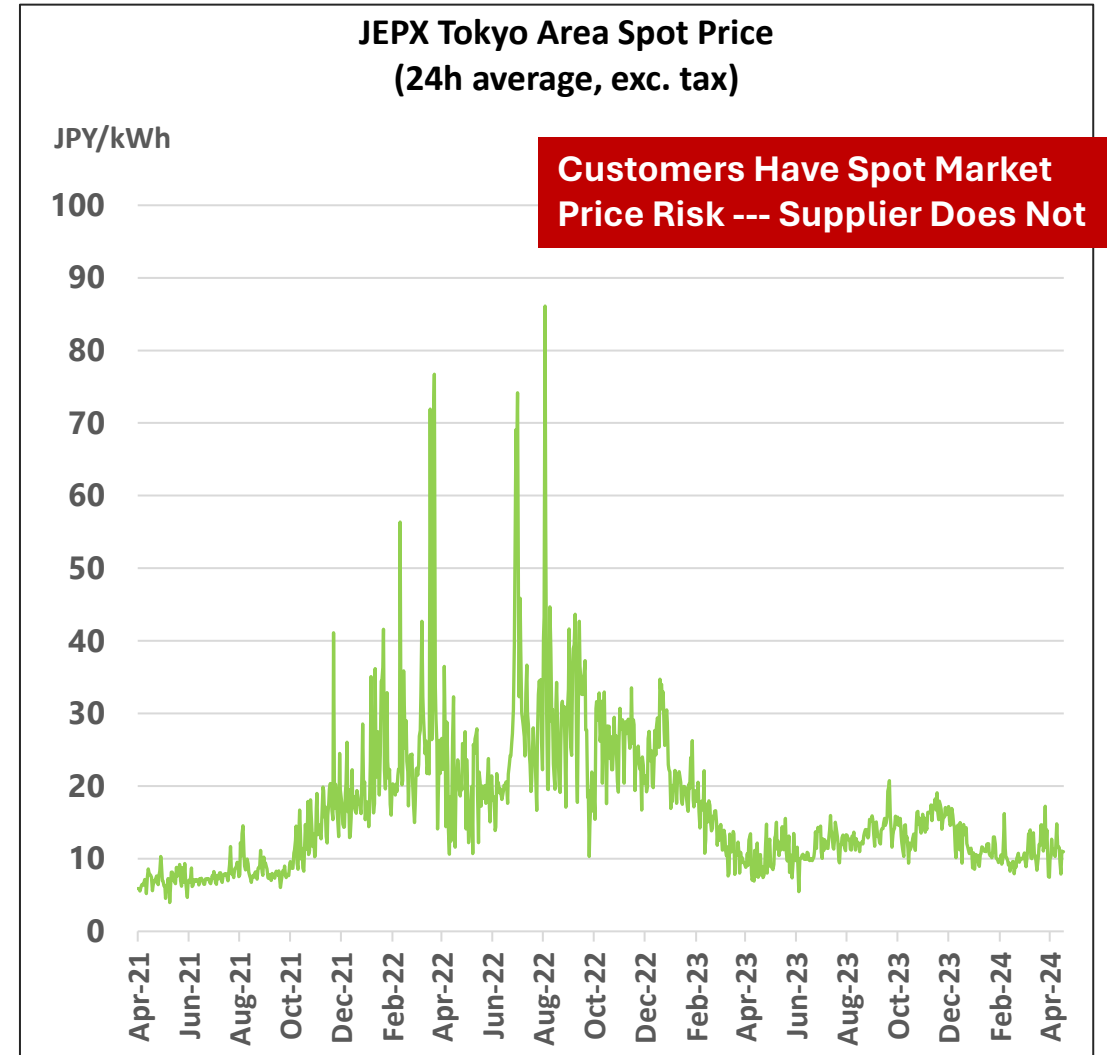
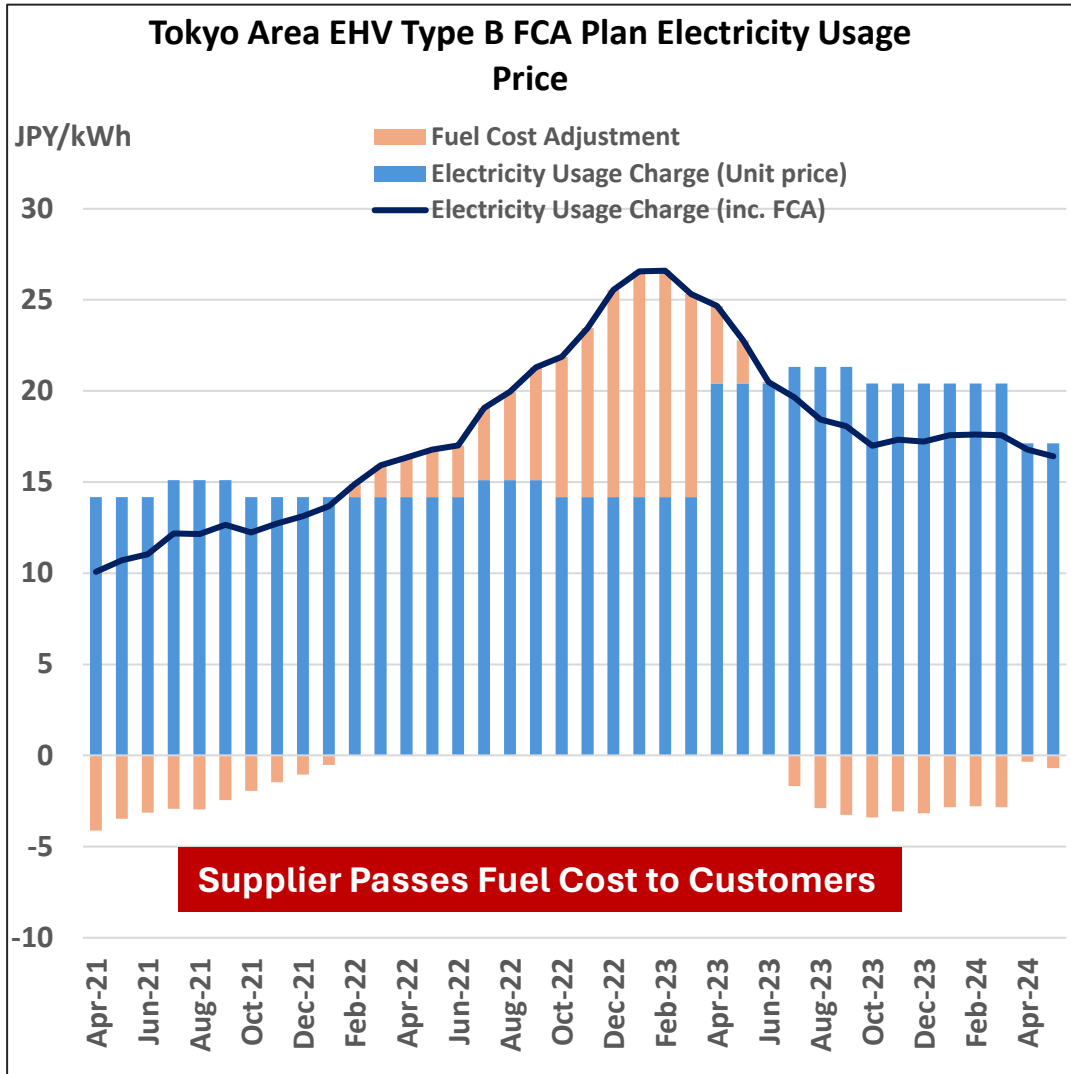
- Varies depending on power consumption
 * **Electricity unit price (fixed)**

No Fuel Cost Adjustment

Renewable energy levy (JPY/kWh)

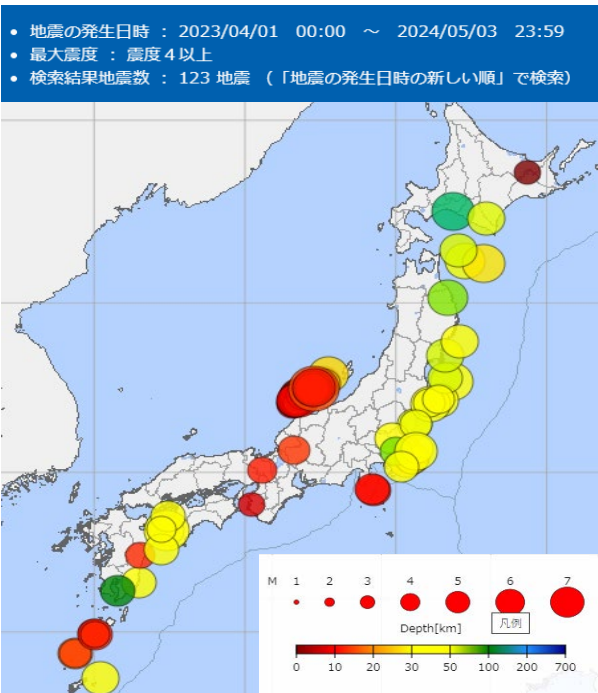
Varies depending on electricity consumption
 * Unit price is fixed

FCA Plan & Market linked price plans (Fixed plans eliminate both factors)



Future Price Risk Factors

Seismic risk



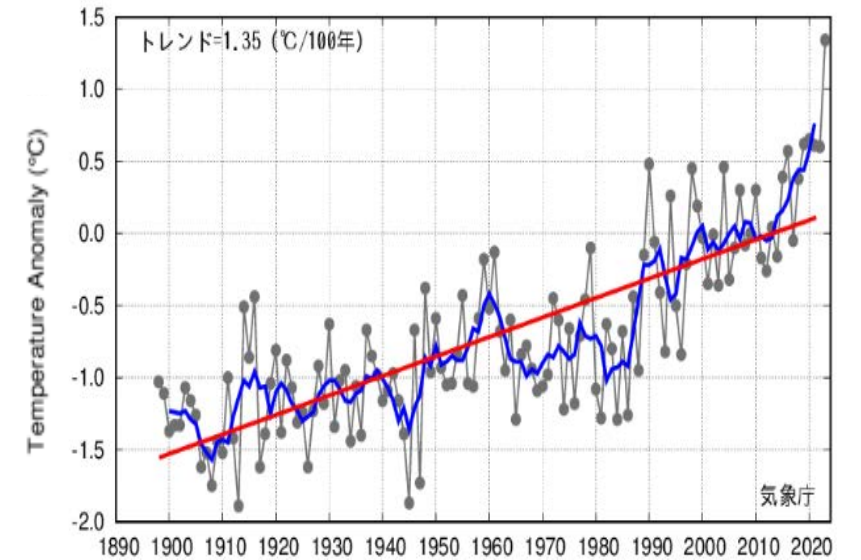
Source : Seismic intensity database search, JMA

Geo-Political Risk



Global Warming Risk

Annual Japan Average Temperature Anomalies
日本の年平均気温偏差



Source : Summary of weather conditions in 2023, JMA



Comparison of Traditional Pricing Plans vs New Hedge Pricing Plans

Traditional Pricing Plans vs New Risk Managed Pricing Plans

Traditional Pricing Plans

- ❑ Market-linked Plan
 - Available from utilities and most retailers
 - Least popular plan for customers:
 - Customer assumes all market price
 - Impossible to manage budgets
- ❑ Fuel Cost Adjustment (FCA) linked Plan
 - Available from many utilities and retailers
 - Second least popular plan for customers:
 - Inherent market risks
 - Impossible to manage budgets

Market price risk is passed through
to the customer

Utilities and most retail suppliers
offer only these two plans

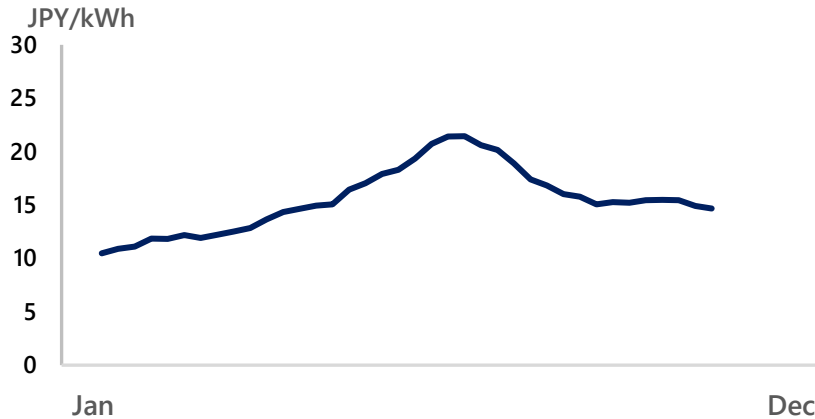
New Risk Managed Pricing Plans

- ◆ **Fixed Price (1 to 3 year terms)**
 - 100% Fixed price available
 - Locks in electricity budget for contract term
 - Only variable is electricity consumption
- ◆ **Block & Index Pricing**
 - Fixed price on set volume of electricity
 - Variable monthly price on remaining volume
 - Cap and Floor options are available
- ◆ **Structured Fixed Price**
 - Custom pricing based on customer's risk profile
 - Good for customers with onsite generation or demand response participation
- ◆ **Caps on Market Based Pricing**
 - Eliminates price spikes due to weather or global events.
- ◆ **Cap & Floor on Market Based Pricing**
 - Similar to above, but with lower premium

These pricing plans are available through
Ene Buyer's select retail supply partners

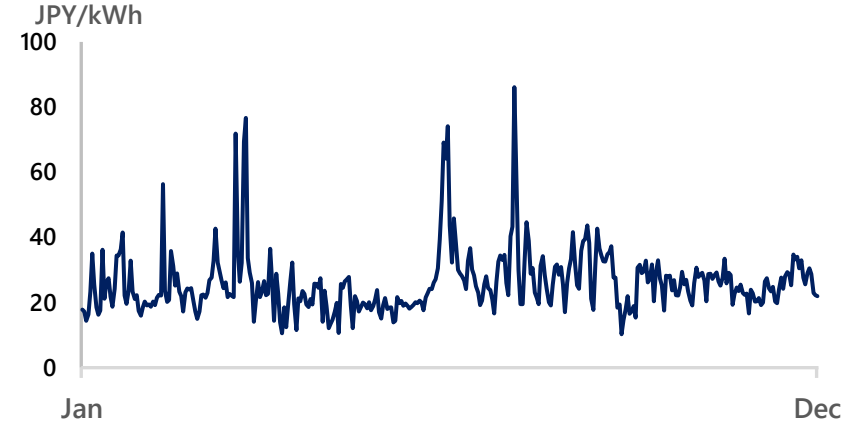
Traditional Pricing Plans

1 Fuel cost adjustment linked rate plan (Existing standard menu)



- Similar to the “standard menu” of the incumbent utility.
- Rates change monthly with in fuel costs fluctuations (FCA).
- Electricity rates are not known until after electricity is used.

2 Market price (JEPX index) linked plan



- Rates are determined according to the spot price on JEPX.
- Electricity rates change every 30 minutes.
- Electricity rates are known the day after electricity is used

Difficulty in budgeting due to inability to predict electricity rates (JPY/kWh) in advance.

No customer price risk management

New Hedge Pricing Plans : Fixed price

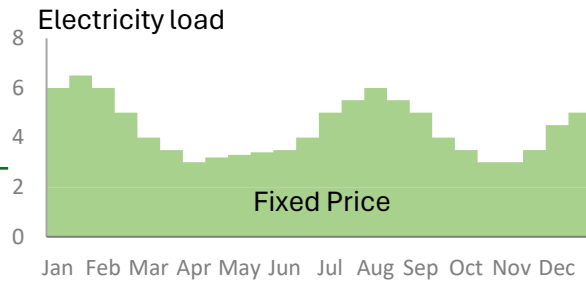
1 Fixed price (full or partial) plan



- Fixed Price Plan means a menu in which the unit price of Electricity Usage Charge (JPY/kWh) is fixed in advance. The Fuel Cost Adjustment is eliminated.
- Fixed electricity price (JPY/kWh) for 1 to 3 years.
- The amount of electricity that is fixed can be tailored to match customer's risk tolerance, such as percent of demand, by time-of-day or by seasonal periods (see next page).

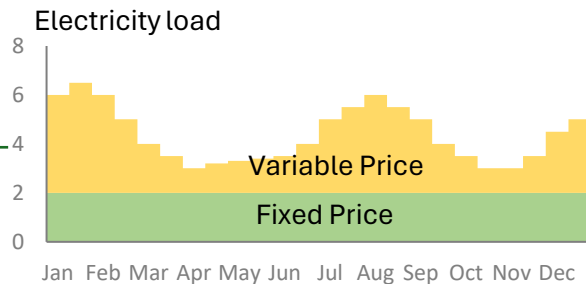
Hedge Plans are new in Japan, and work very much like similar plans in other global markets

100% Fixed Price



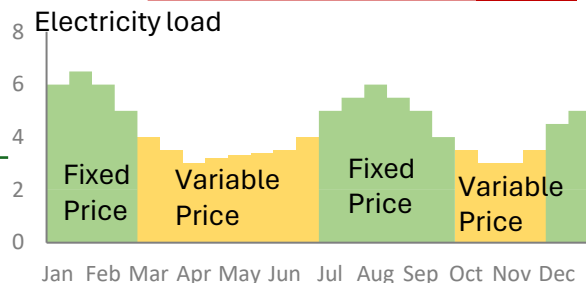
- The electricity price is the same for the all-time periods of the contract term.

Block & Index Price



- The electricity price is fixed for a baseload amount (block); which can vary by month or season.
- The electricity price for the non-baseload portion is linked to the Index (JEPX).

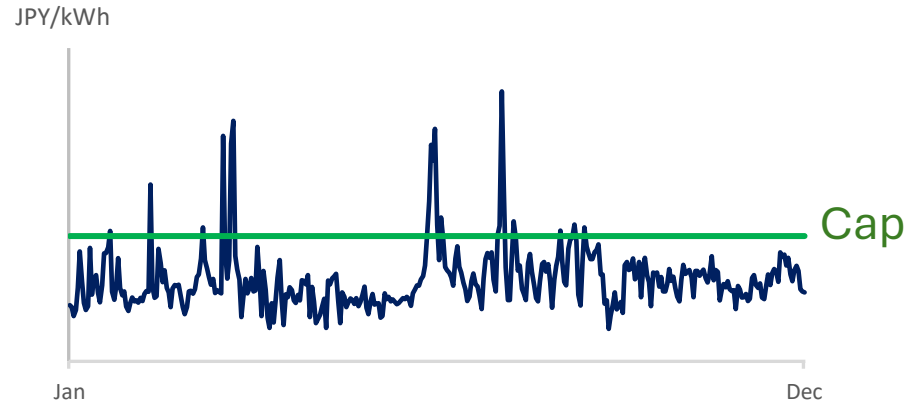
Structured Fixed Price



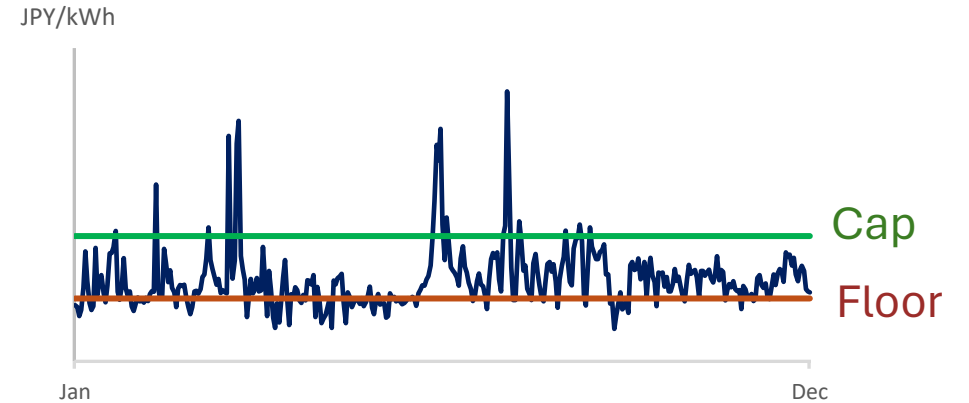
- The electricity price is fixed for specific periods (time of day or periods in the year).
- Electricity price for the remaining periods will be linked to the Index (JEPX).

New Pricing Plans: Monthly variable price with a cap on price

2 Market price linked plan + Cap/Floor



- The electricity price (JPY/kWh) is determined according to the spot price on the JEPX.
- The Cap assures prices do not go above a set level.
- The Cap have an insurance premium for risk management



- The electricity price (JPY/kWh) is determined according to the spot price on the JEPX.
- The Cap and Floor assures prices do not go above a set level nor below a set level.
- The insurance premium for the Cap and Floor is lower than the Cap only.

Yes, Customers now have Price Risk Management Options in Japan!

Price Plan Comparison Summary

| Plan | Fuel Cost Adjustment Passed Thru | Spot Market Volatility | Basic Charges | Competitive Differences | Plans Offered By |
|---------------------|----------------------------------|------------------------|---------------|---------------------------------------|---|
| FCA | Yes | No | Yes | All Competitors Offer Similar Pricing | <ul style="list-style-type: none"> - Utility retailers - Competitive retailers |
| Market Price | No | Yes | Yes | All Competitors Offer Similar Pricing | <ul style="list-style-type: none"> - Utility retailers - Some competitive retailers |
| Market w/Cap | No | Yes w/Cap | Yes | Differences in Pricing | <ul style="list-style-type: none"> - No utility retailers - A few competitive retailers |
| Fixed Price | No | No | Yes | Differences in Pricing | <ul style="list-style-type: none"> - No utility retailers - A few competitive retailers |



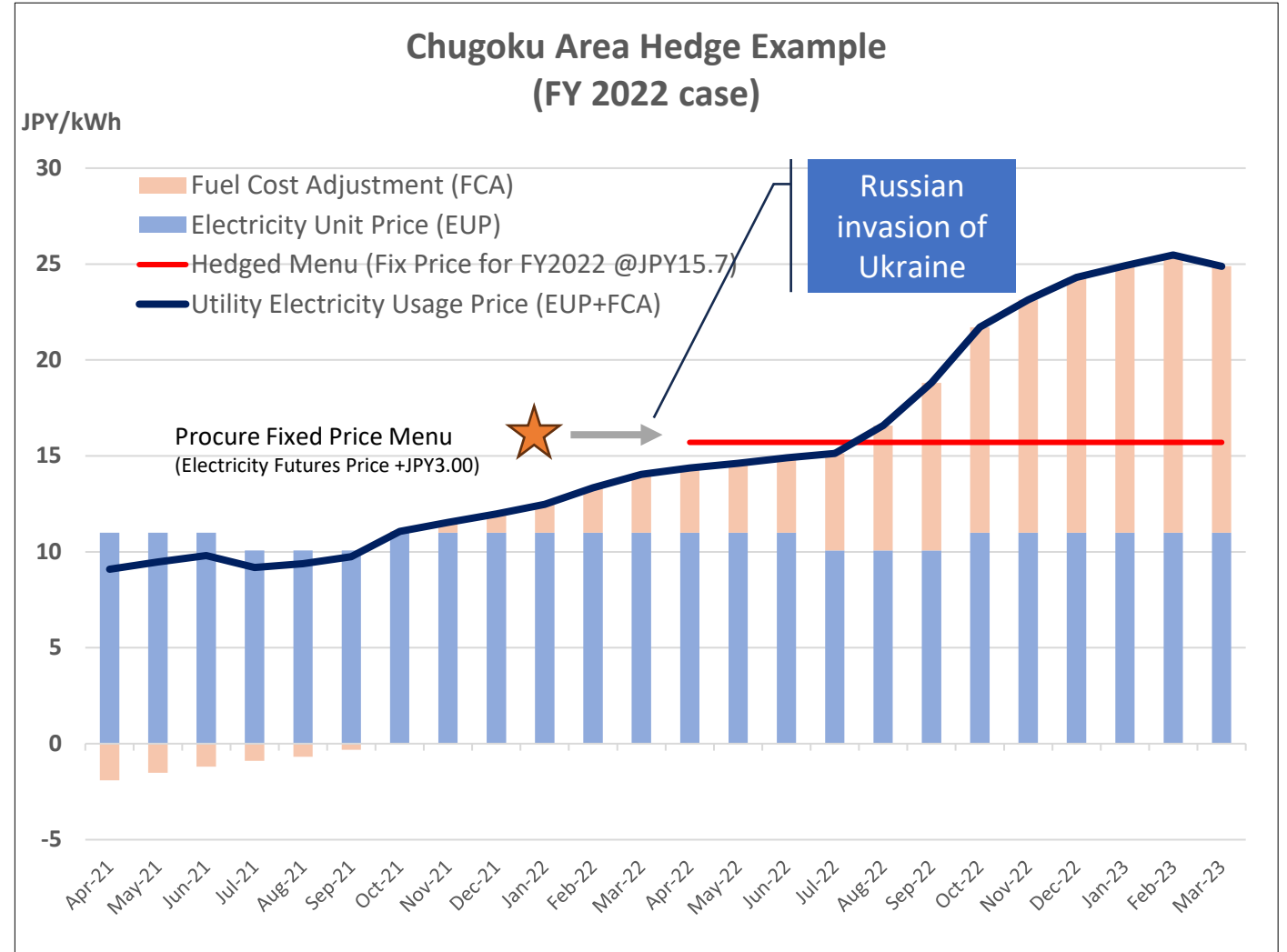
Case Study Customer Example

How Hedging Power Prices Works for C&I Customers

Case of FY2022 (April 2022 - March 2023)

- Electricity supply contract signed on January 11, 2022, under the fixed price plan at JPY15.70/kWh* per unit of electricity usage.
- Electricity futures price (FY2022 contract, @ JPY12.7/kWh) + JPY3.00/kWh
- Russia invades Ukraine on February 24, 2022. Fuel cost adjustment increases significantly as fuel rate rise to over JPY25.00/kWh.
- Average utility electricity rate in Chugoku area for FY2022 is JPY19.90/kWh
- Hedging with a fixed price menu saves JPY4.2/kWh, or JPY210 million for 50 million annual kWhs.

\$1,400,000 annual savings



Customer Example – Hedging vs Utility Pricing

- The basic charge is significantly lower for hedging plans by Retail Supplier (PPS).
- The utility electricity rate's is determined by the sum of a fixed rate and the variable FCA, while retail supplier's (PPS) price is fixed with no FCA component.
- The fixed unit price of the hedging menu varies depending on the timing of hedging and the electricity usage pattern (load factor).

| | Utility Rate (TEPCO) EP High Voltage | Fixed Pricing PPS A High Voltage | Reduction rate |
|--|--|--|----------------|
| Basic Charge(JPY/kW) | 1,840 | 960 | 48% |
| Electricity Usage Charge Unit Price (JPY/kWh) | Summer peak | 23.20 | 17% |
| | Summer daytime | 22.49 | 14% |
| | Daytime except summer | 21.06 | 19.3 |
| | Night time | 15.74 | -23% |
| FCA (JPY/kWh) | ? Varies monthly | 0 | |
| Renewable energy levy (JPY/kWh) | 3.49 | 3.49 | |

The customer in this example with 10,000kWh contract power saves an additional JPY89.8 million in basic charges
\$600,000 annual savings



Renewable PPA and VPPA Options

Net Zero approach

The best approach depends on cost, implementation schedule and additionality.

| Renewable Energy Options | Cost | Schedule | Additionality |
|---|---|---|---------------|
| Renewable Energy plans by electric retailer | Real renewable : +JPY1.0/kWh< Brown electricity + NFC : <JPY1.00/kWh | Immediate | Weak |
| Environmental Attributes <ul style="list-style-type: none"> • Non-Fossil Certificate (NFC) • J-Credit | NFC(FIT) : JPY0.4/kWh J-Credit : JPY 0.66 /kWh – 1.71/kWh | | Weak |
| On-site Generation (Rooftop solar) <ul style="list-style-type: none"> • Self operation & consumption | No wheeling charge & Renewable energy levy Initial investment, EPC+O&M cost Solar Power generation eqp costs*; Medium & Small scale : JPY10.00/kWh - JPY11.00/kWh | From 6 months to several years depending on the size of the project | Yes |
| On-site PPA (Rooftop solar) <ul style="list-style-type: none"> • Third-Party Ownership | No wheeling charge & Renewable energy levy, No initial investment Contract price : JPY14.00/kWh - JPY15.00/kWh* | | Yes |
| Off-site Physical PPA | No initial investment Wheeling charge, Renewable energy levy, Balancing cost, Contract price : JPY13.00/kWh - JPY16.00/kWh (Electricity generation cost only, exc tax)* | | Yes |
| Off-site Virtual PPA | No initial investment Contract price : JPY13.00/kWh - JPY16.00/kWh (exc tax)* | | Yes |

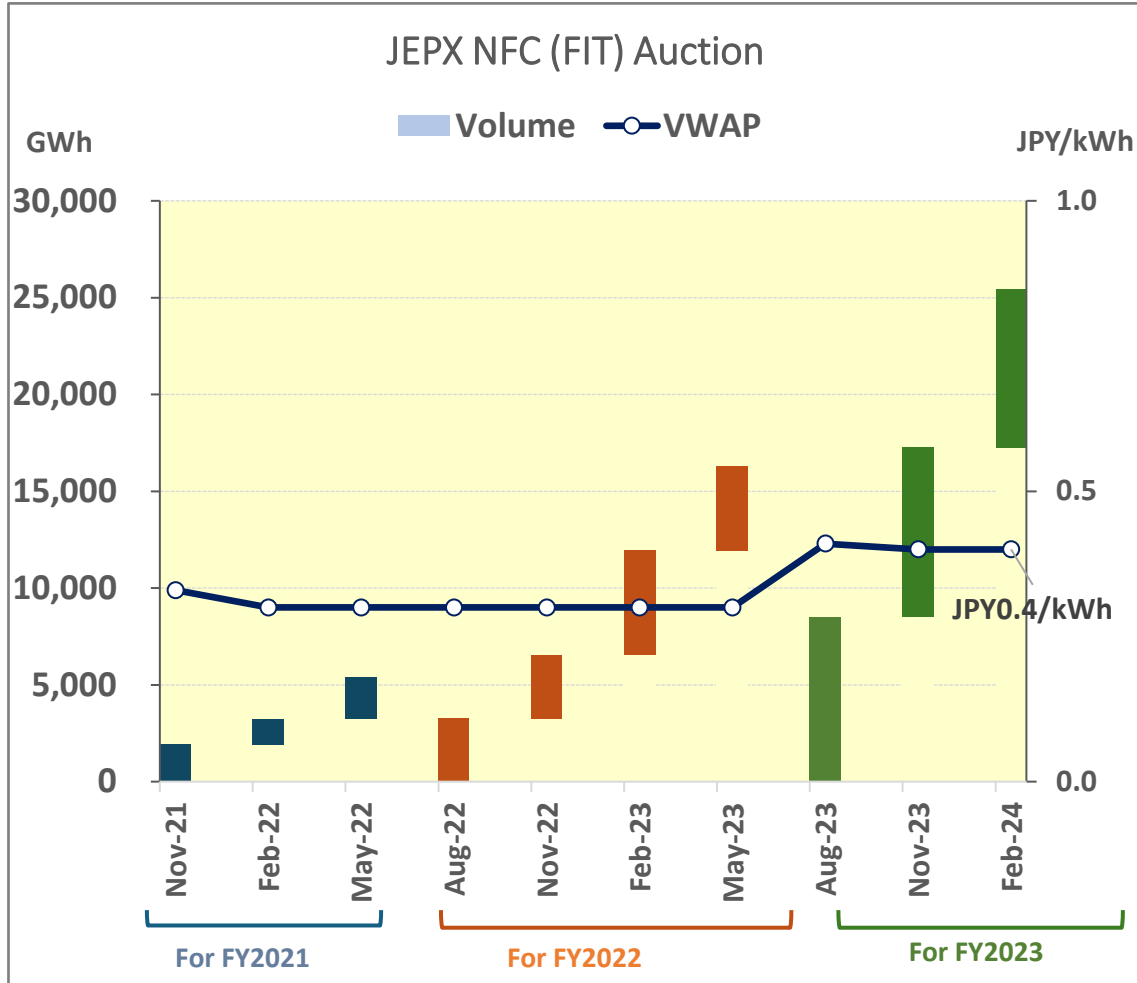
**Renewable Electricity Procurement Guidebook 2024 Edition”, Renewable Energy Institute

Adaptability of environmental attributes

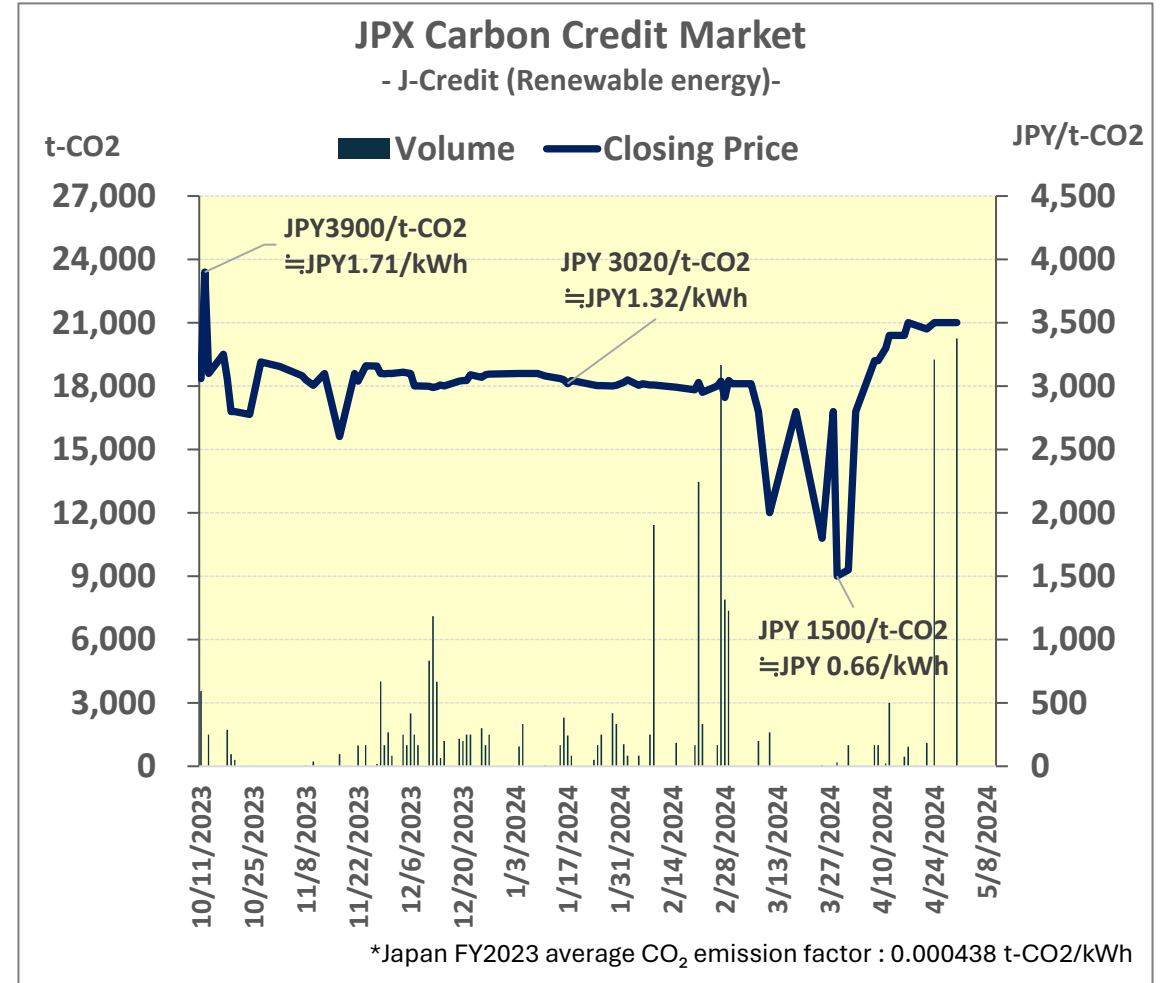
Electricity and environmental attributes combinations to be procured depends on the regulations and respective initiatives.

| Environmental Attributes | CDP | SBT | RE100 | GHG reporting |
|--|-----|-----|---|---------------|
| NFC (FIT) | Yes | Yes | Yes <ul style="list-style-type: none"> • With Tracking • Within 15 years from the start of operation | Yes |
| NFC (Non-FIT, with renewable energy designation) | Yes | Yes | Yes <ul style="list-style-type: none"> • With Tracking • Within 15 years from the start of operation | Yes |
| NFC (Non-FIT, Without renewable energy designation) | No | Yes | No | Yes |
| J-Credit (Renewable Energy) | Yes | Yes | Yes | Yes |
| J-Credit (Energy saving / Forest Sink) | No | Yes | No | Yes |
| Green Electricity Certificate | Yes | Yes | Yes | Yes |

Environmental Attributes market



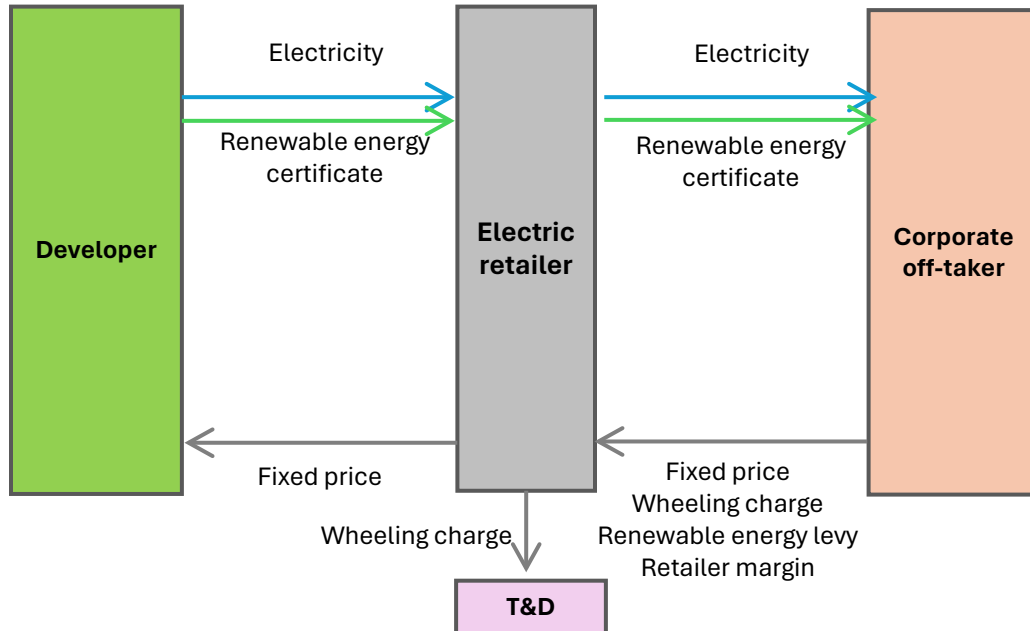
Source: JEPX



Source: JPX

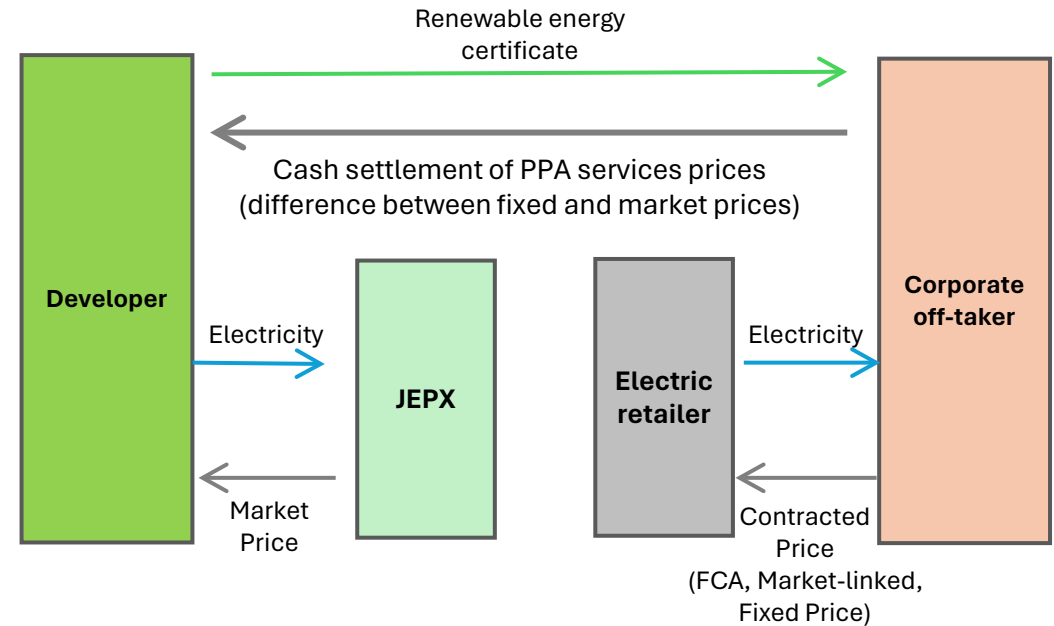
Physical PPA and Virtual PPA

Typical Physical PPA structure



- Transfer of electricity and a renewable energy certificate that represents the environmental attributes of the electricity generated by a new renewable power project to corporate off-takers.
- Electricity delivery and related services are supplied to corporate off-takers **via retail electricity suppliers**.
- Corporate procures long-term renewable energy with additionality through the physical corporate PPA.

Typical Virtual PPA structure

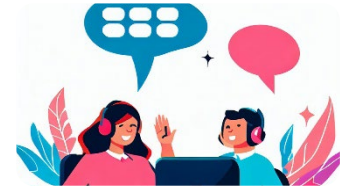


- Environmental only transaction between producers and off-takers.
- Producers sell electricity component to the wholesale market (JEPX)
- Long-term, fixed rates are achieved by setting a term price and then cash-settling the differences between the fixed price and wholesale market price.
- **Basis risk** arises when the generation and demand areas are different



Japan's New Power Procurement Process

Power & Renewable procurement : Ene Buyer model



1 Sign Up

- Conclusion of NDA & broker contract
- Provision of necessary data
 - Consumption data for the past year
 - Electricity bill for the past year
 - Financial Statements (if needed)



2 Requirements

- Target setting
- Load profile analysis
- Discuss risk tolerance
- Discuss price plan preferences w/risk analysis
- Renewable or Credits requirements and timing
- Internal decision process



3 Supplier RFP

- Screen suppliers based on criteria
- Short list suppliers
- Create and send RFP
- Confirm receipt
- Discussions as needed to receive bids



4 Supplier Determination

- Report with comparison of bids
- Customer selects one or two finalists
- Negotiations with suppliers (price, contract terms)
- Customer signs supplier contract or PPA/VPPA



5 Ongoing Services

- Verification of invoices
- Consultation when problems occur
- Market information
 - Power market
 - Fuel market
 - Carbon market
 - Regulatory

**We would like to hear about your Japan procurement process, goals, and GHG reduction plans and explore how we might assist you in the Japan market.
We offer bilingual coordination between your Japan staff and corporate HQ.**

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Thank You

**Energy
Management**

**Energy
Procurement**

**Renewable
PPA/VPPA**



Our Services



Electricity Procurement



Renewable PPA/VPPA



Net Zero Solutions



Carbon Strategy & Reporting



Invoice Verification

