

Japan Energy Market Update 2022

September 2022



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30+ years in Energy Industry

Industry Experience
Upstream through downstream
Power, Gas, LNG, Hydrogen, etc.
Strategy Planning
Global Alliance

Shuichi Kishida
President, Skipping Stone Japan

- Energy strategy & market entry advisory
- Energy advisory for Logistic warehouse, Semiconductor, Data Centers industry, etc.
- Global LNG experiences, including NA
- Managing Director of successful international power retail startup in Japan

Market Basics and Trends

Skishida@skippingstone.com



25+ Years in Risk Mgmt. & Trading

Industry Experience
Global Commodities
Futures Markets
Risk Management

Hiroshi Okuyama
Executive Vice President

- President of a global trading company
- Built & Managed international growth
- Risk Management expertise
- International relationships
- Years in US market leadership role

Wholesale Markets

Hokuyama@skippingstone.com



30+ Years in Global Power & Gas Markets

Industry Experience
CEO Commerce Energy
COO ACN Europe
COO TransEnergy



Peter Weigand
Chairman & CEO

- PennWell Top 50 Most Influential in Energy Markets
- Inc. 500 Fastest Growing – 3 times
- 20+ M&A transactions
- 8 Boards of Directors
- Japan Market Expert



Opportunities

Peterw@skippingstone.com



Shuichi Kishida
President, Skipping Stone Japan

Market Basics and Trends

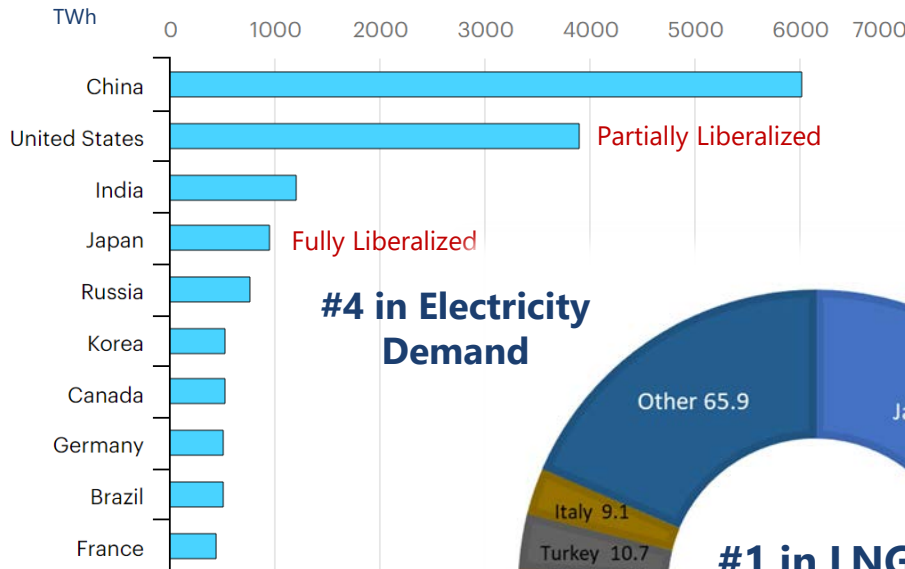


Market Structure

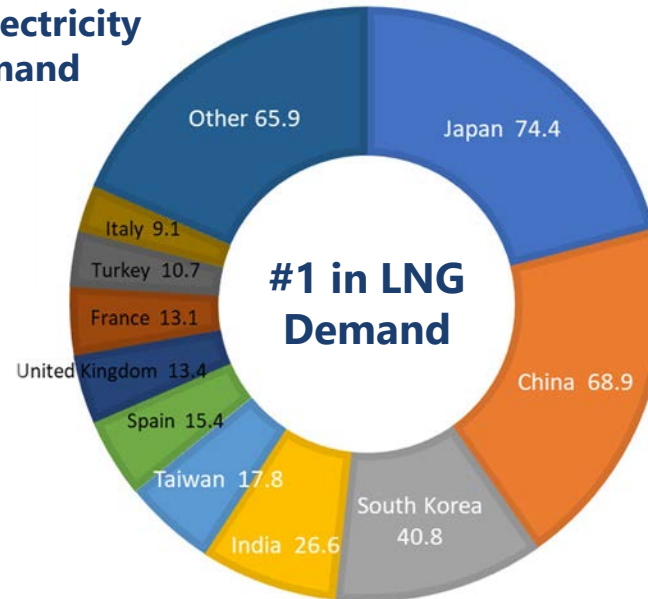
Japan Energy Landscape

Meters Available "for Electricity Competition"

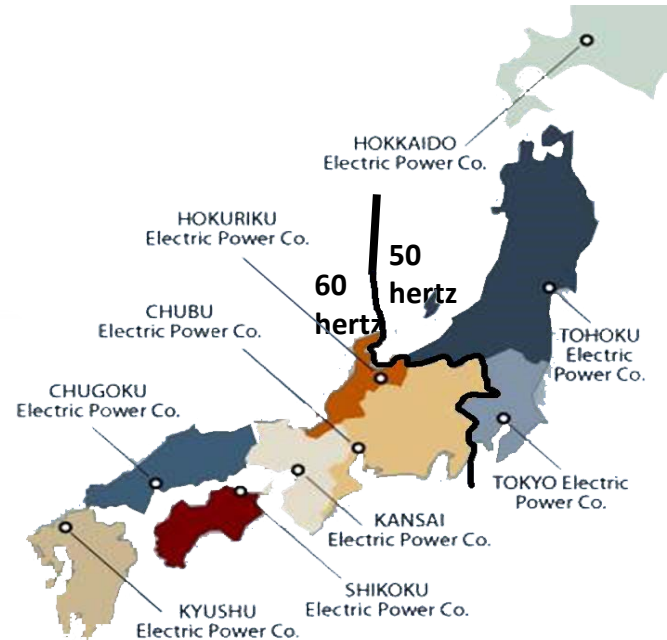
- Japan #1 – 86 Million
- USA #2 – 27 Million Meters



#4 in Electricity Demand

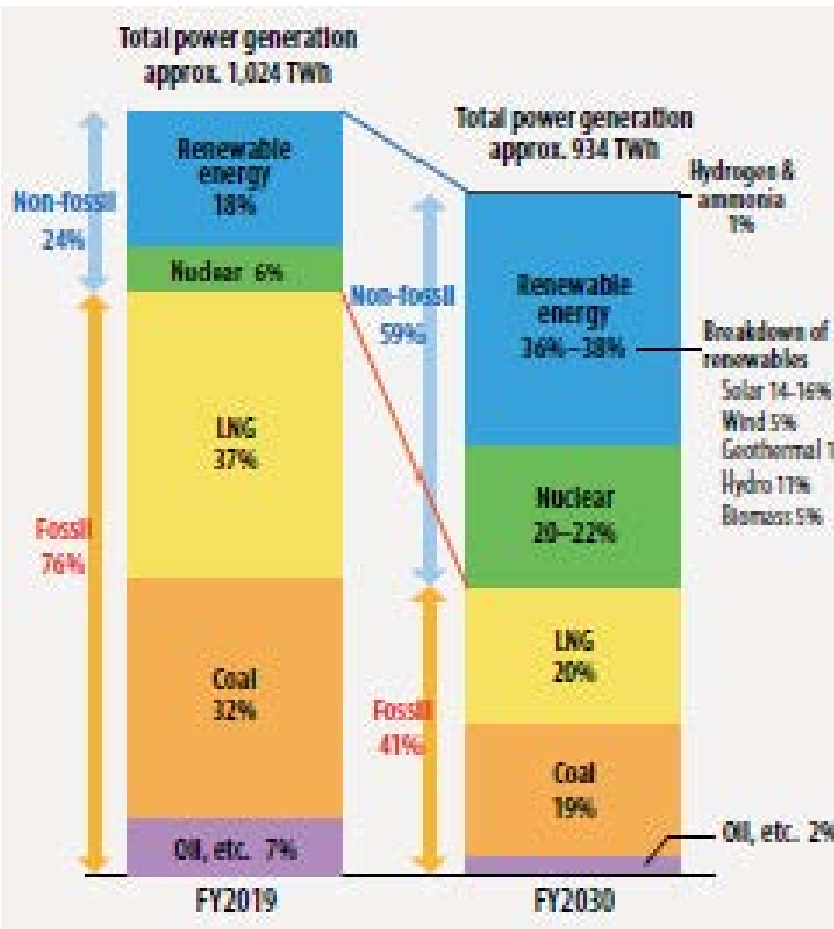


#1 in LNG Demand

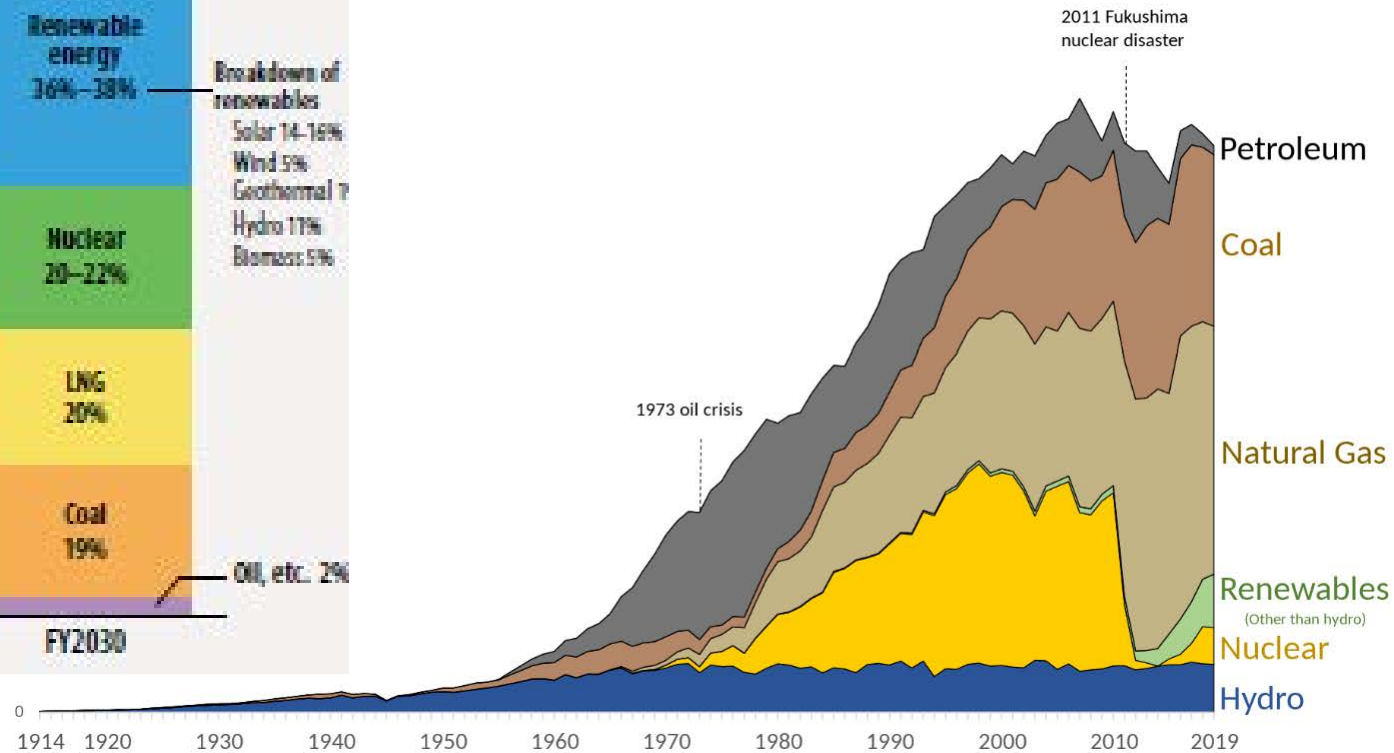


**10 Electricity Markets
200 City Gas Companies**

Energy Policy and Generation Mix



Japan electricity production



Source: METI, JEPIC, Wikipedia

Types & Numbers of Market Participants

Regulator: METI (Ministry of Economy, Trade & Industry)

Generation

Coal Nuclear LNG/Gas Fired Hydro Biomass Renewable Oil DR/Battery

10 Utilities + 1,059 IPP's (Licensed Generators)

T&D Companies (Utilities Subsidiaries)

TEPCO

Chubu

Chugoku

Shikoku

Hokuriku

Kansai

Kyushu

Tohoku

Hokkaido

Okinawa

Wholesale Markets

JEPX

OCCTO

JPX
TOCOM

EEX

Retail/Trading Entities

PPS
- Retailer -

800+

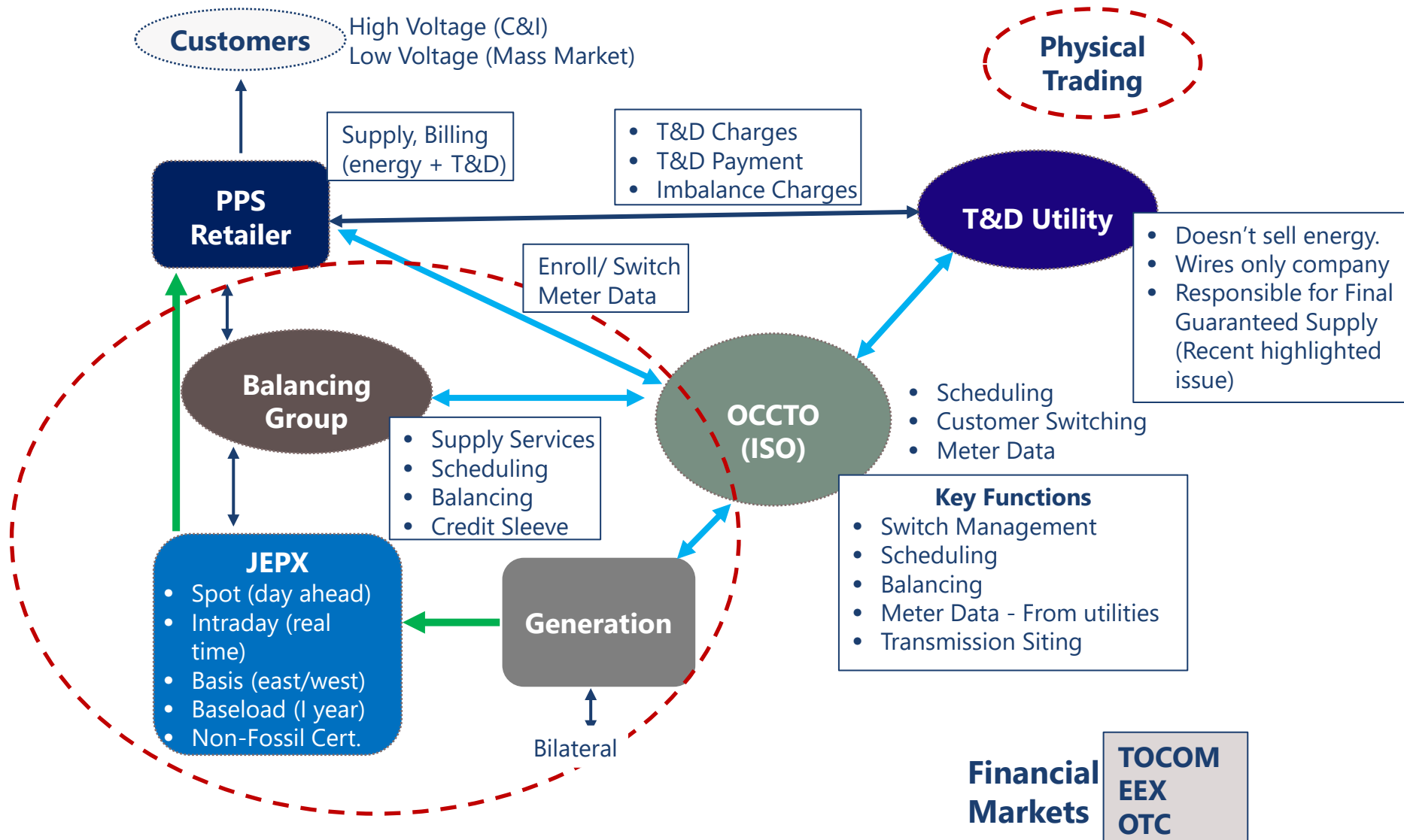
Balancing
Group

30+

Trading

140+

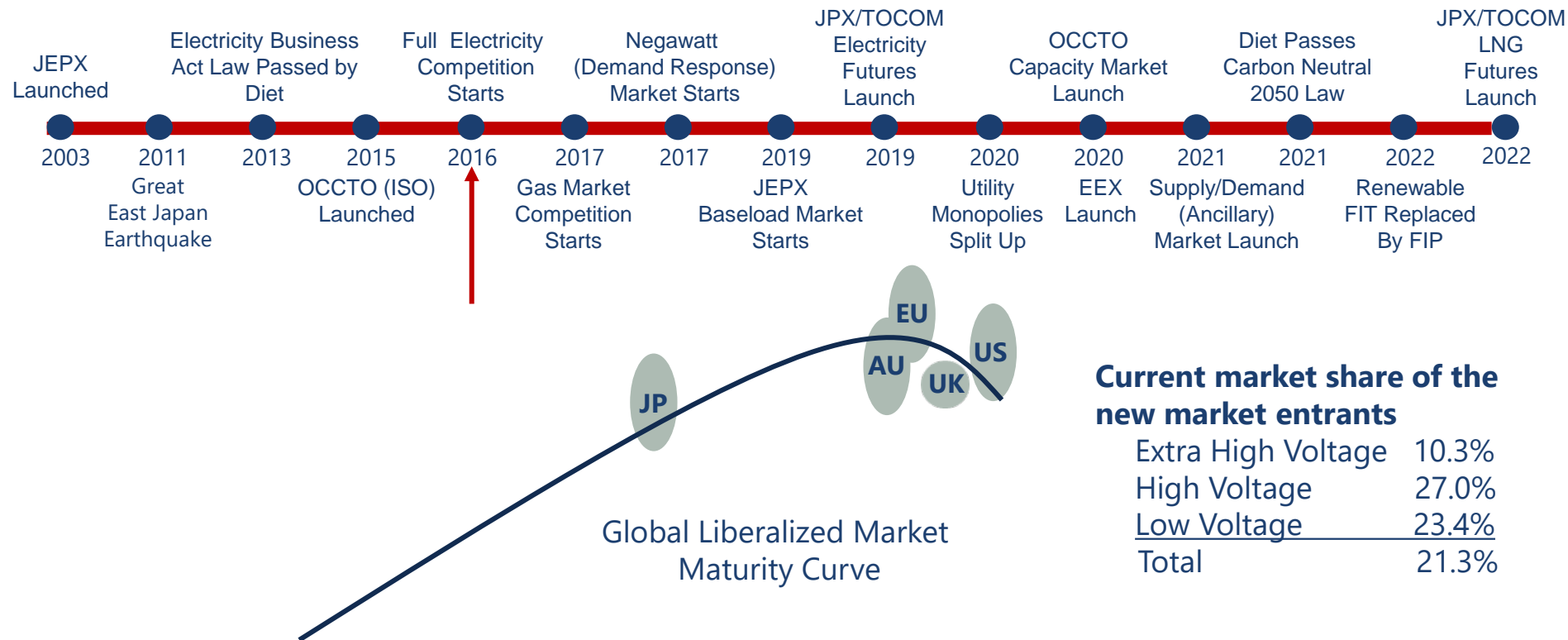
Physical Electricity Market Model





First Five Years of Liberalization

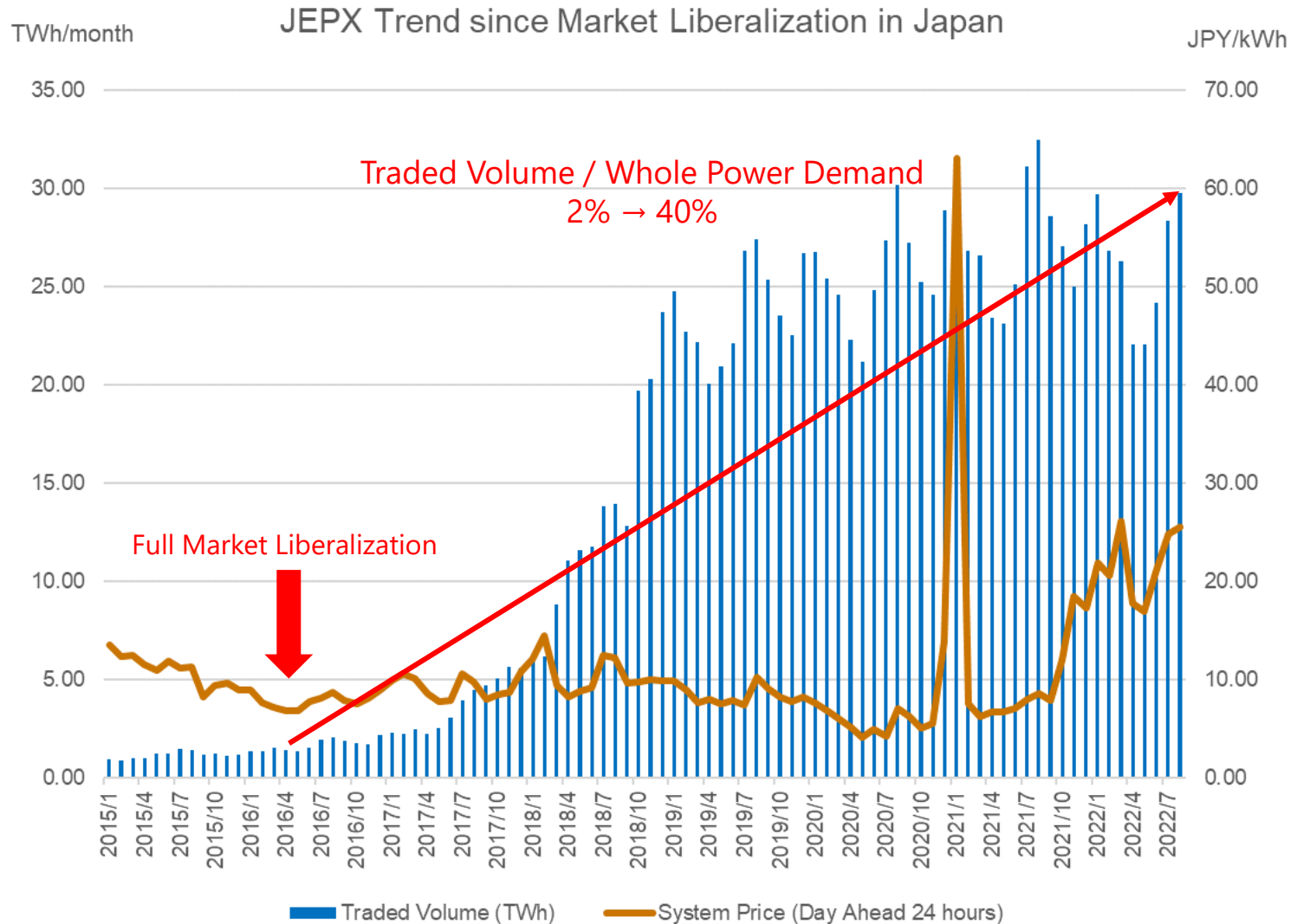
Energy Market Liberalization Events Timeline



“Japan has quickly emerged to become the most exciting liberalized energy market in the world today. Opportunities abound as the market continues to evolve.”

Peter Weigand, Chairman & CEO, Skipping Stone

Japan Wholesale Power Market (JEPX)



First 5 Years of Liberalization

- The Beginning
 - Many new retailers enter the market mimicking utility price plans: Competition squeezes margins. Tiny JEPX market
- Wholesale Markets Emerge
 - JEPX volume grows. OCCTO launches capacity market. Two futures markets start-up. Ancillary market, etc. Much confusion
- Volatility Sets In
 - Huge price swings. Retailers with mimic pricing models suffer. Traders rejoice. Retailers have started adopting risk management
- Renewable Model Shift
 - FIT to FIP. Developers need customers, PPA's, etc. Offshore gets exciting, but years off. New role for aggregators (asset manager)
- Retail Model Shifting
 - 15+% go out of business, most stop taking customers. Progressive retailers shift to a market-based pricing offer model.



2022 and Going Forward

What Happened This Year

- Russia – Ukraine War
- Astronomical price increase in Fossil Fuel Price, especially Coal and LNG
- Japan's wholesale power market jumped up
- Margin loss in power Retail business
- Utilities are experiencing significant financial loss
- Many PPSs go bankruptcy
- Stop margin loss contracts
- Not accept new enrollment
- Many industrial consumers utilize the "Final Supply Guarantee" from T&D companies
- Currently power suppliers are under preparation to introduce a "New Pricing Structure"
- Meanwhile, "New Energy Sector" development, such as Hydrogen is encouraged by the energy prices inflation
- Also, the Government has finally stepped in to support the restart of Nuclear units and the development of the next generation Nuclear system

Hot Areas in 2022

- Carbon Neutral 2050 (Net Zero)
 - This has a bigger impact than liberalizing the energy markets
- C&I Customer Confusion
 - Heavily discounted utility tariff deals evaporating. Retailers with utility-mimic plans aren't taking new customers. Now they are faced with market-based pricing and the need to sort out a carbon reduction strategy
- PPA / VPPA
 - Developers need customers to sign up – customers don't fully understand how they work / slow to jump in
- Carbon Market Coming Soon
 - More than 440 C&I customers (GX League) signed up to play come April 1, 2023
- Demand Response
 - METI pushing this as a solution to seasonal generation tightness. Uptick in volume not huge
- Nuclear Comeback
 - Prime Minister Kishida pushing hard. Now 60% of the population in favor. CN impossible without it
- Hydrogen
 - Strong support from the government with an ambition to be #1

Next 5 Years Prediction

- Near Term in the Current Power Marketplace
 - Expansion of market-based pricing
 - Derivative trading takes off
 - Further expansion of renewables
 - Increased demand and value for ancillary service
 - Retail consolidation

- Toward Carbon Neutral Goal
 - Expansion of battery and energy storage (such as hydrogen usage) demand
 - Natural gas continues to play crucial role in energy transition
 - Nuclear comes back to a certain level
 - Hydrogen & ammonia to pave the way for mainstream
 - Carbon market to play a vital role



Hiroshi Okuyama
Executive Vice President

Wholesale Markets

Japan's FY2021 Power Consumption by Area

Consumption by Regions



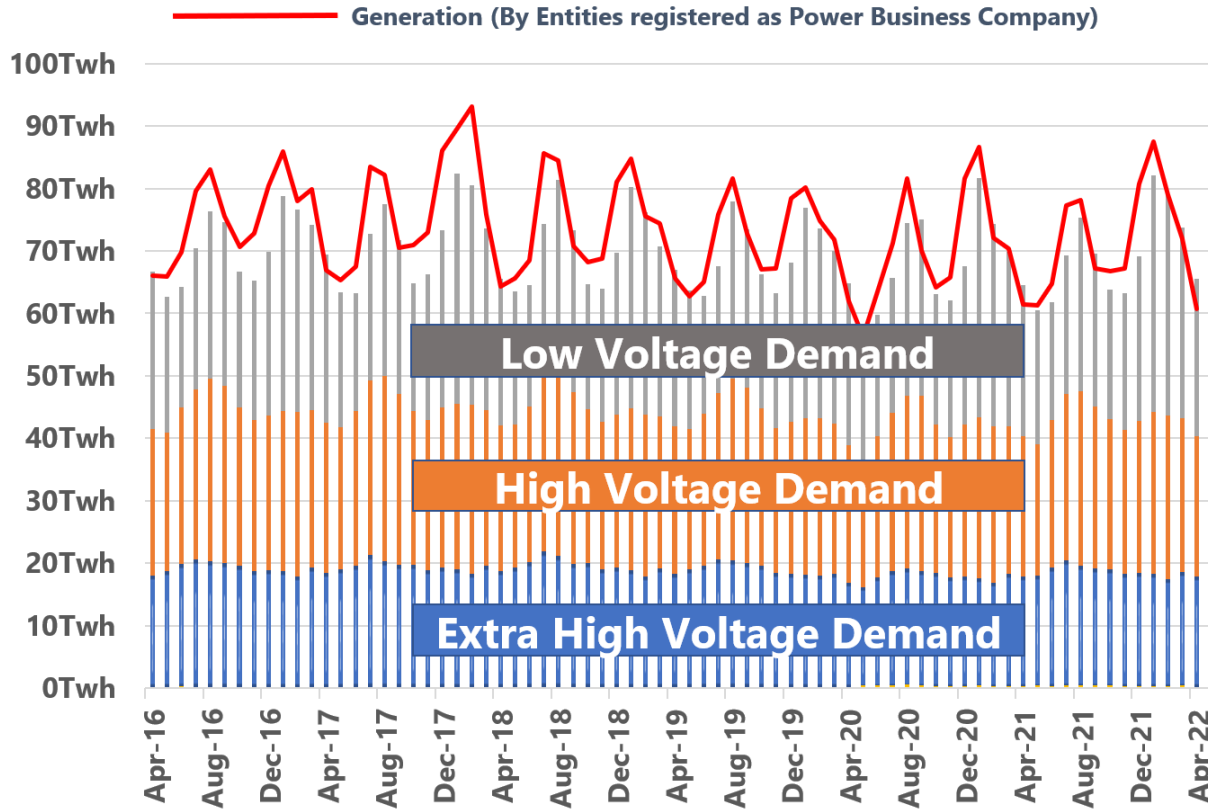
Hokkaido	29 TWh	East Total 395TWh
Tohoku	80 TWh	
Tokyo (Kanto area)	287 TWh	
Hokuriku	28 TWh	West Total 442TWh
Chubu	109 TWh	
Kansai	134 TWh	
Chugoku	56 TWh	
Shikoku	26 TWh	
Kyushu	82 TWh	
Okinawa	8 TWh	
Total	837 TWh	

Source ANRE Regional Power Demand Statistics for Fiscal 2021

*For convenience, Shizuoka grid which is split to East & West in the middle of the prefecture, is included in the West on this slide.

Monthly Demand vs Generation

Monthly Supply vs Demand
April 2016 - May 2022



Source ANRE Actual Power Demand Statistics

Japan's Supply & Demand situations remain tight.

Types of Physical Wholesale Markets

Venue	Markets	Description	
OCCTO <Cross-regional Coordination of Transmission Operators> (ISO)	Capacity Market	To secure long term supply capacity 4 years ahead (except for the first auction in 2020 for year 2023)	
JEPX <Japan Electricity Power Exchange> (Physical Wholesale Market)	Spot (Day Ahead) Market	Most active. 48 slots/day, single price auction per slot using demand/supply curves formed from bids/offers for each of the 9 regions.	
	Intraday (Same Day) Market	48 slots/day, multiple prices with continuous trading during ½ hour slot. Single market applies to all regions.	
	Baseload Market	Auctions for the whole following fiscal year (April-March). The auctions are held 4 times a year July, September, November, January.	
	Inter-region Transmission Rights	Auction for the rights to receive or pay the spot price difference between the regions	
	Forward Market	JEPX: Not active. OTC is still very small	
EPRX <Electricity Power Reserve Exchange> (9 Regional Utility TSOs - Okinawa is excluded)	Stage 3 (II) Market	Balancing 45 minutes reaction time	Started April 2021
	Stage 3 (I) Market	Balancing 15 minutes reaction time	Started April 2022
	3 ancillary markets are planned with reaction times ranging 5 minutes to 10 seconds, step by step from 2024 onward.		

OCCTO Roles

- Management of Transmission System
- Secure Short/Mid/Long Term Supply
- Manage Customer Switching/Meter Data Sharing/Wheeling
- Disaster Recovery Planning & Management

Capacity Market

- Launched in Summer 2020
- To Secure Capacity for 3 - 4 years after

Capacity Market Auction Results				
Year Held	Held For	Regions	Capacity Contract Executed	Price Per Kilowatts
Year 2020	FY2024	Whole 9 Regions (Okinawa Not Applicable)	167GW	JPY 14,137
Year 2021	FY2025	For Hokkaido and Kyushu	23GW*	JPY5,242*
		For Other Area	142GW	JPY3,495

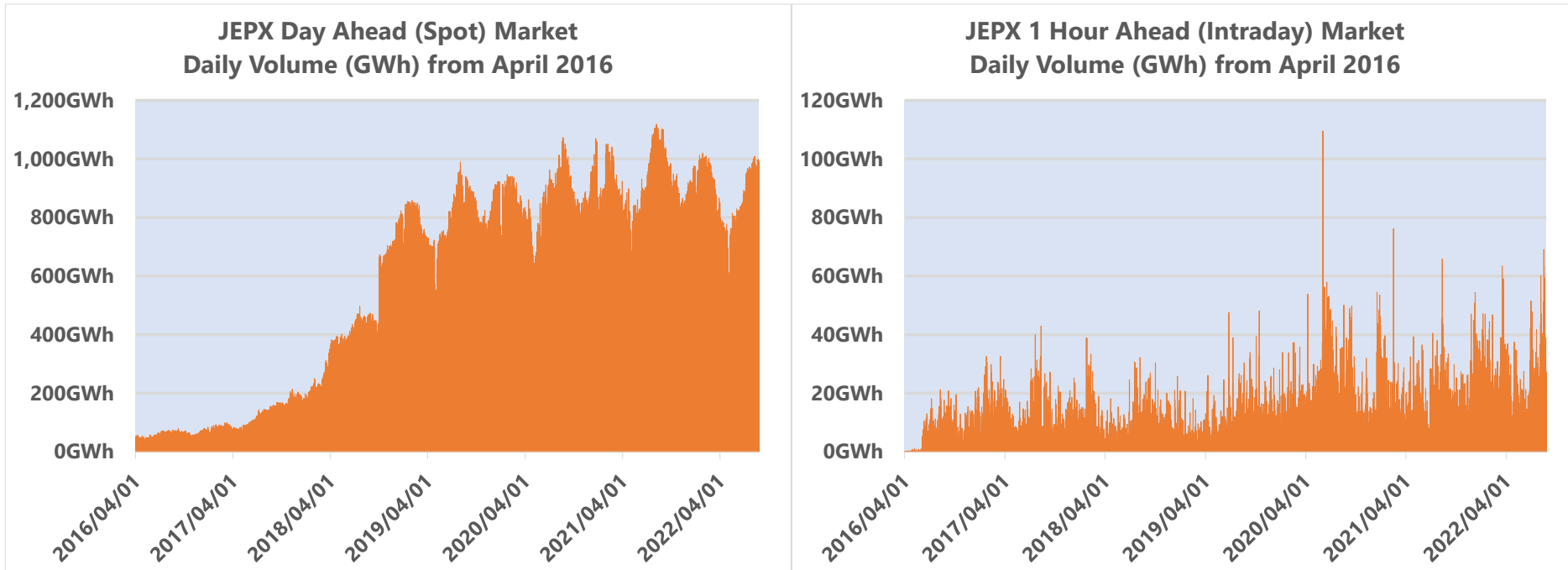
*with multiple prices transacted

JEPX Market Basics

- Each of the 10 utilities is considered a market or zone
- Spot (Day ahead) – Single price blind auction to discover price for each zone (except for Okinawa) per 30-minute slot called “Area Price.” The index price to represent the whole zone price is called “System Price.”
- Hour ahead (Same-day, Intraday) – Multiple prices are discovered in the continuous trades during each 30-minute window. One venue represents all zones; no area price.
- JEPX doesn’t carry positions over from one market to another; each is a separate trade. Day Ahead (spot) can be carried into Hour-ahead (Same-day), but any remaining balances will automatically get scheduled with imbalance charges.
- METI and OCCTO are in the process of transforming to a nodal market structure where kwh and capacity are traded at the same time; however, it is expected to take more than 6 years to happen as the grid and IT infrastructure must be upgraded to a sufficient level.

JEPX Daily Volume

Spot and Hour-ahead Markets
4/1/2016-8/31/2022



In Fiscal Year 2021 (April 2021 to March 2022), 327 TWh was transacted through JEPX Spot market which is 37% of Japan's FY2021 Annual Demand 882TWh*

Daily Average almost 1 TWh Spot vs 23GWh Hour-ahead

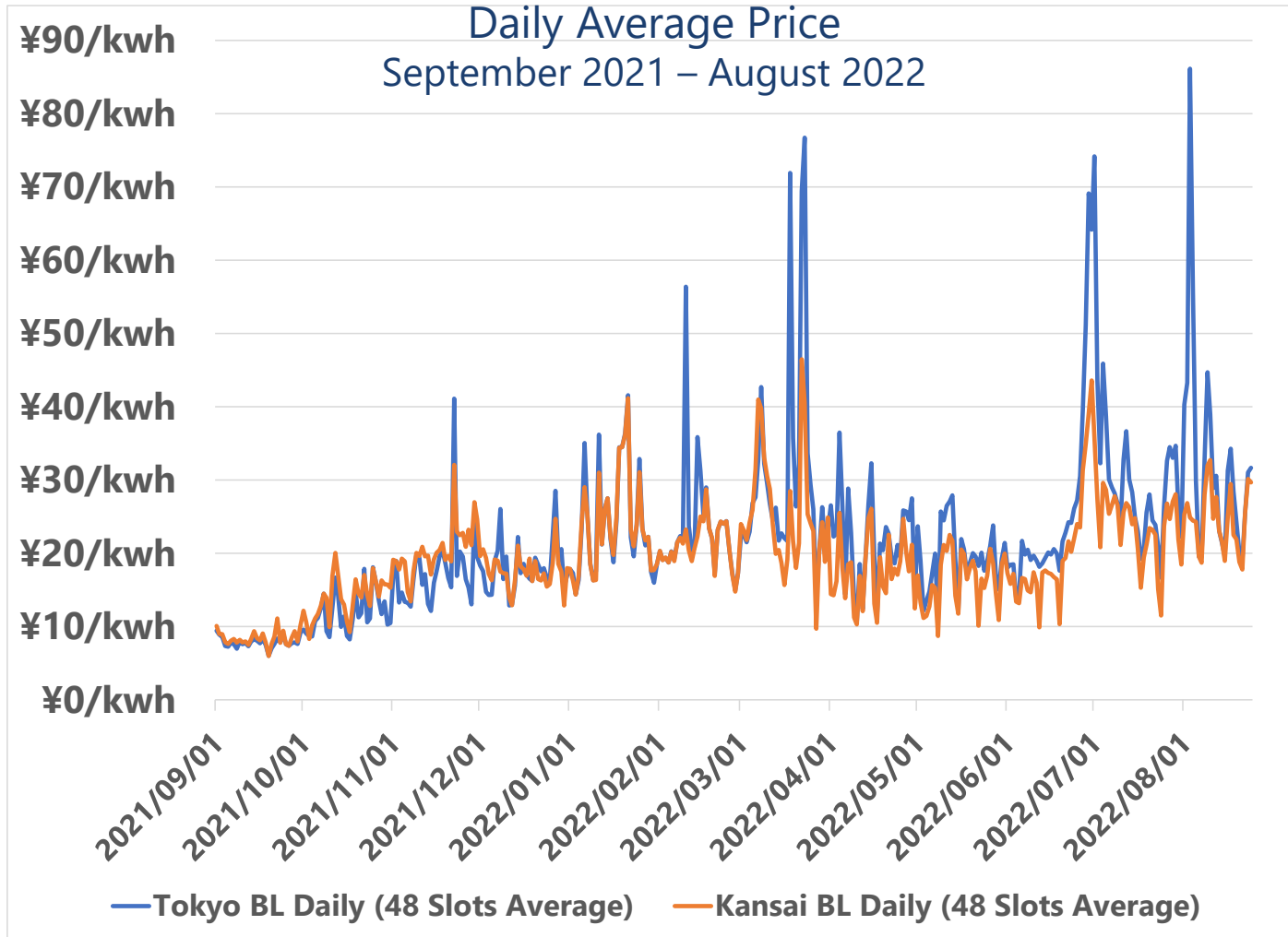
*ANRE FY2021 Power Actual Demand Statistics

Spot Market

Tokyo (East) and Kansai (West)

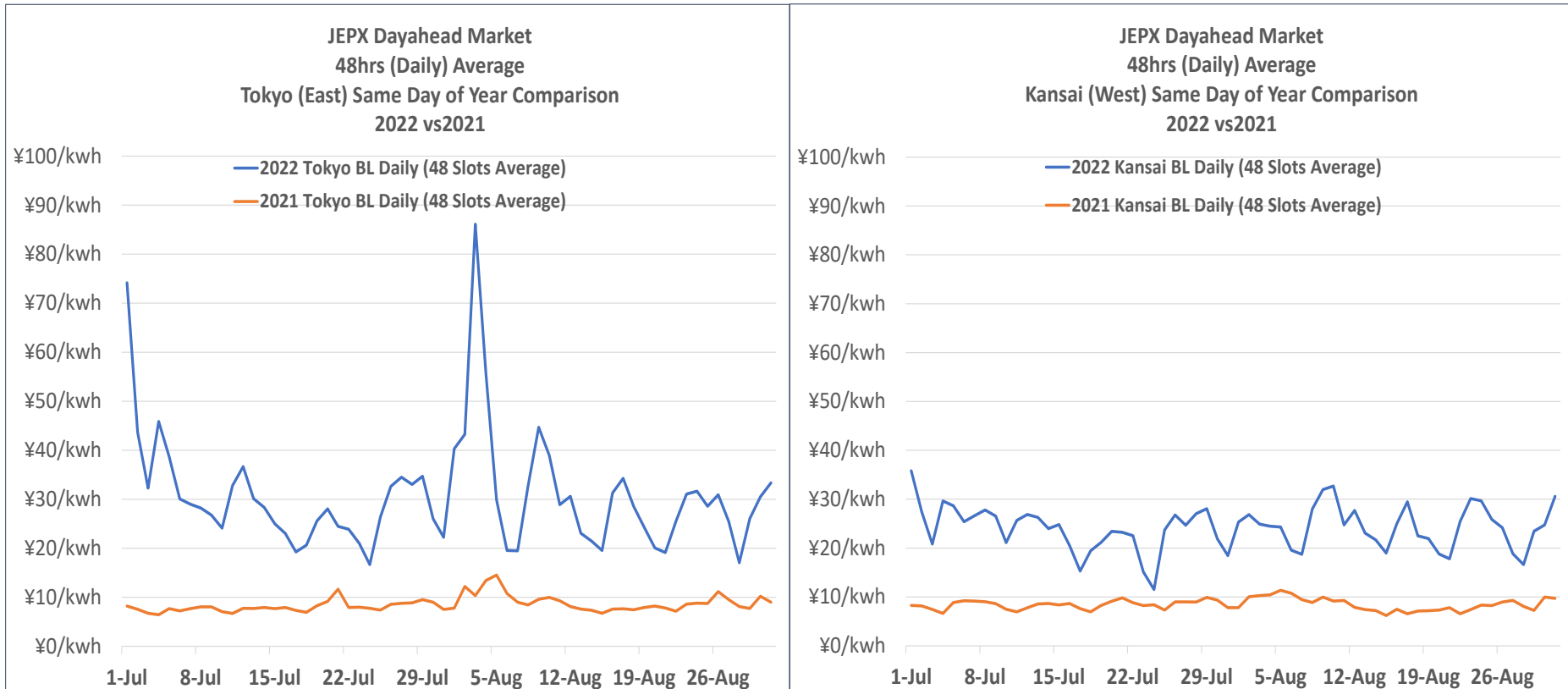
Daily Average Price

September 2021 – August 2022



JEPX Spot Price

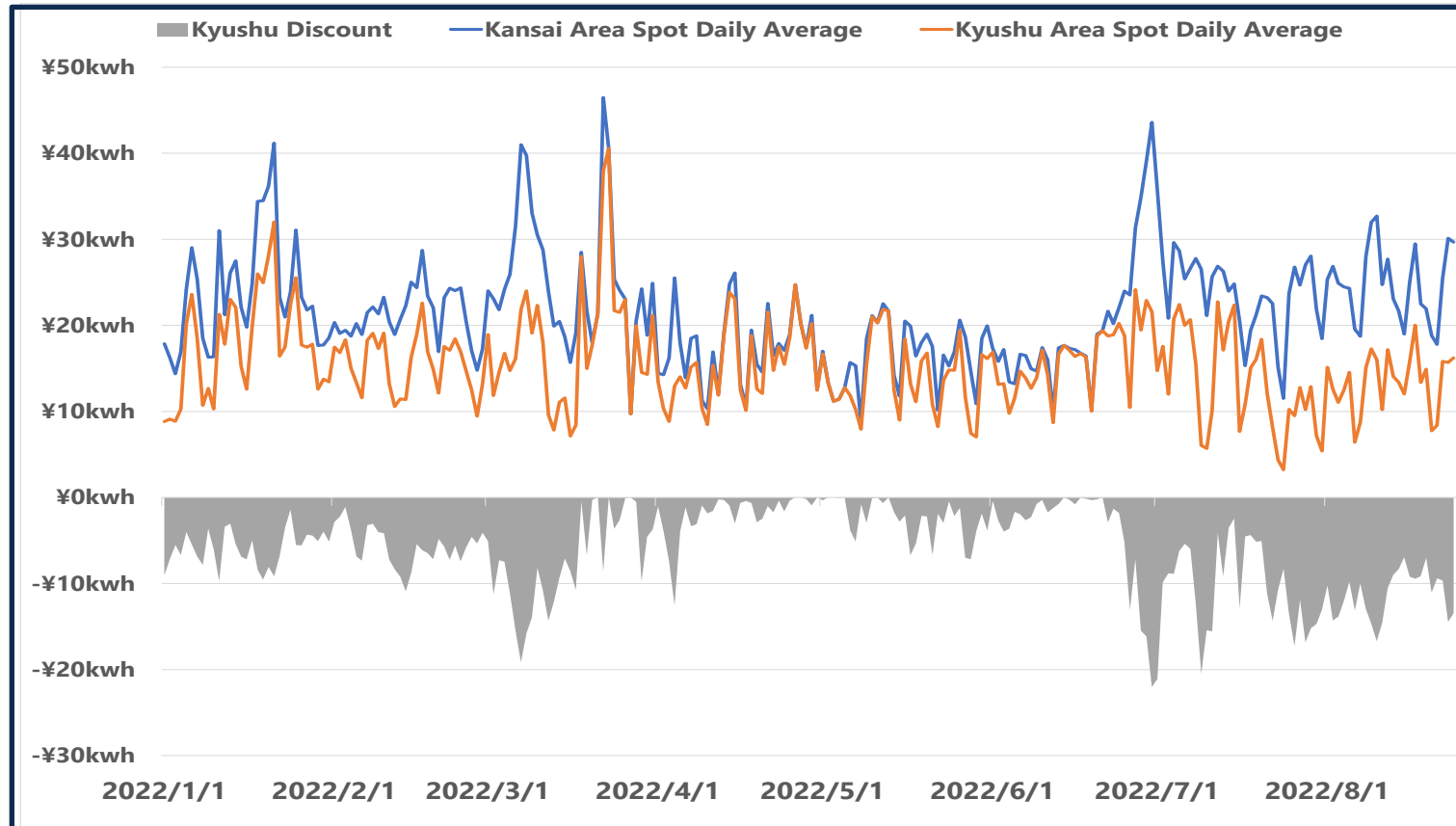
Same Season Comparison 2022 vs 2021



- In 2022, Tokyo area spot price has been traded more than double compared to 2021 during the same period of the year.
- Kansai relatively less volatile compared to Tokyo but still 2022 has been traded double or triple what it was a year ago.

Spot Kansai vs Kyushu

(Daily Average)



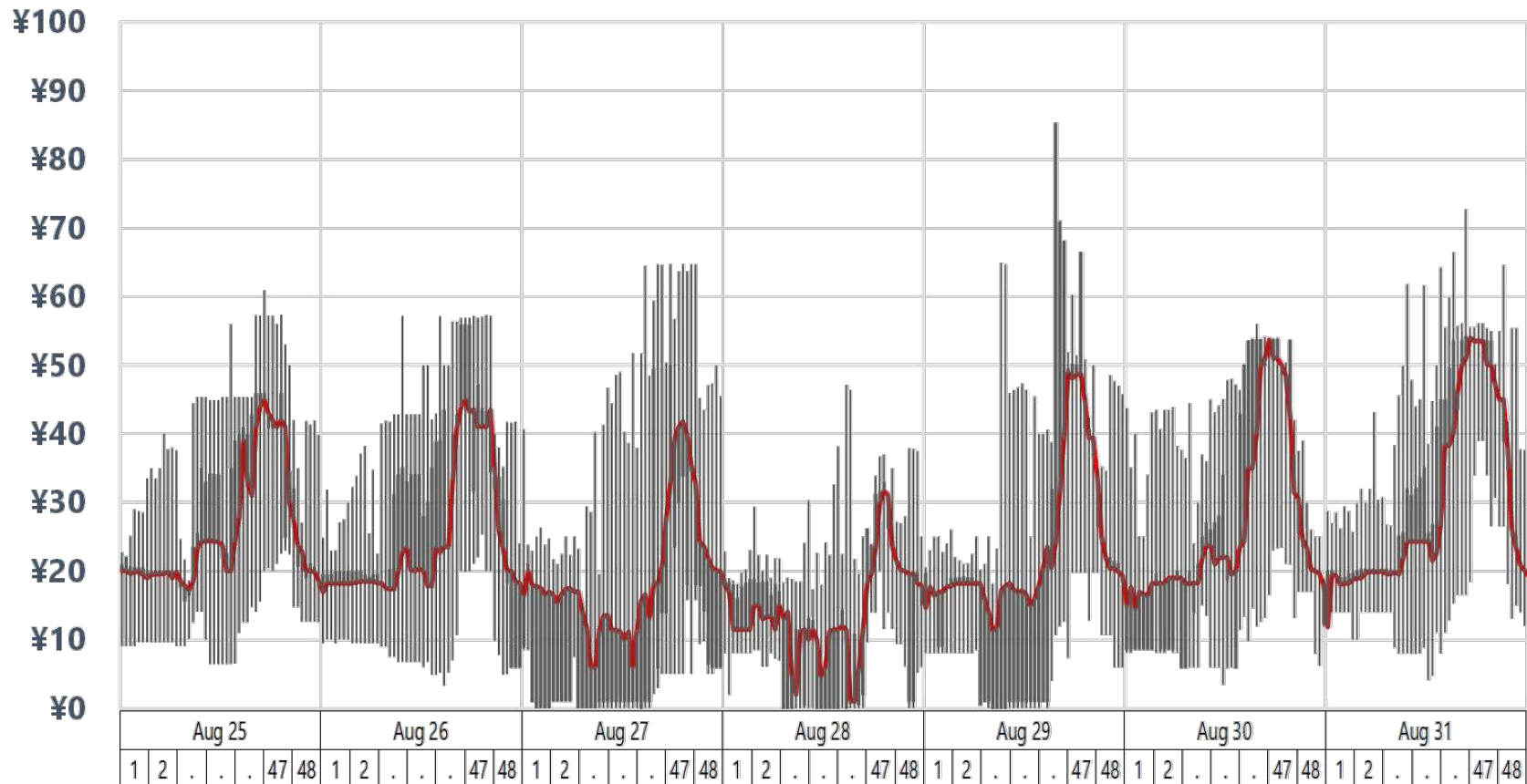
- Kansai and Kyushu are in the same West region but have different market profiles
- Kyushu has unique intraday curve than other zones as well.
- Albeit tight transmission issues, still inter-Kyushu and Kansai or Chugoku markets may provide opportunities

JEPX Day-ahead vs Hour-ahead

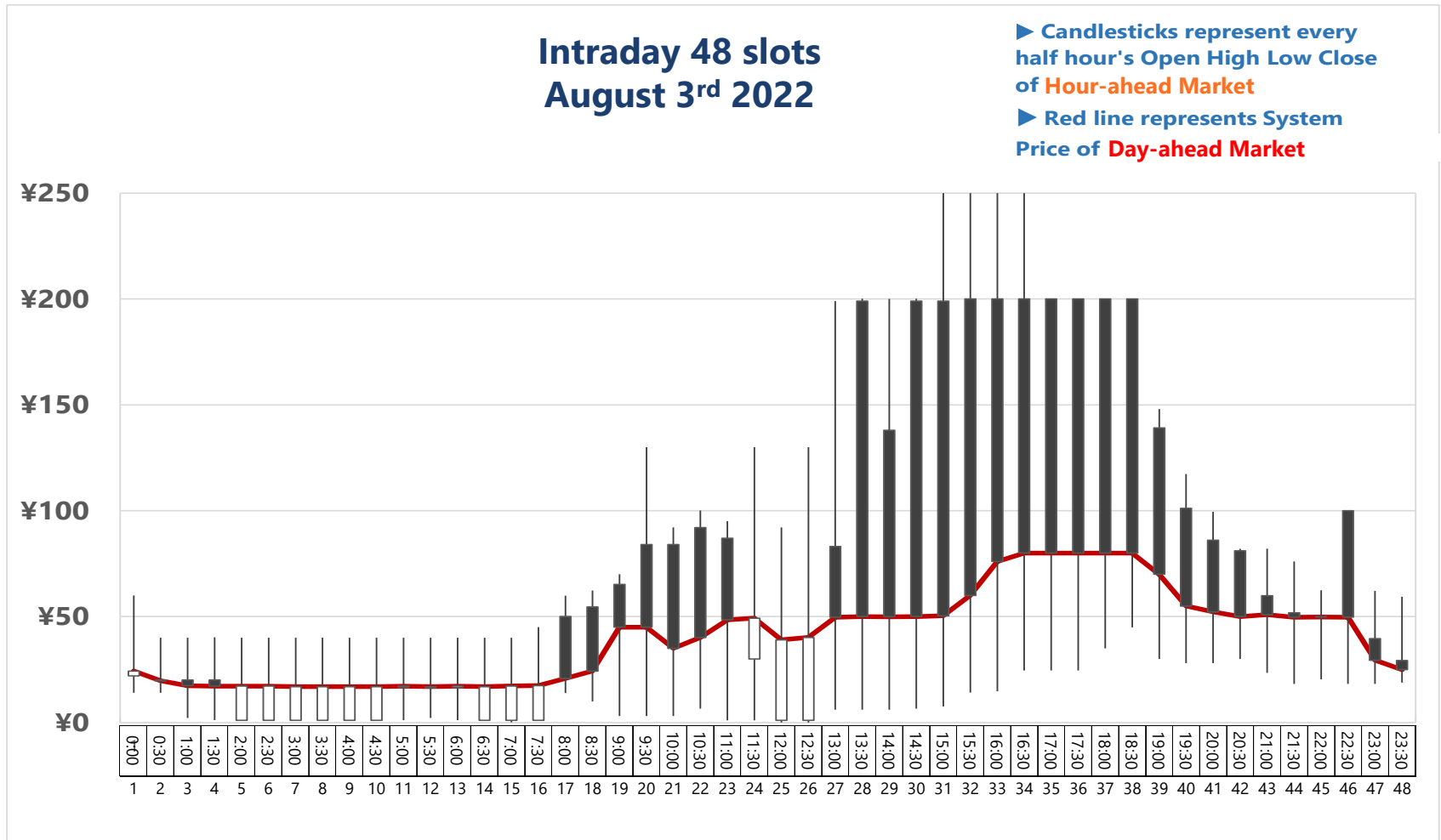
Intraday 48 slots
August 25 – 31st 2022

- ▶ Candlesticks represent every half hour's Open High Low Close of **Hour-ahead Market**
- ▶ Red line represents System Price of **Day-ahead Market**

Per kWh



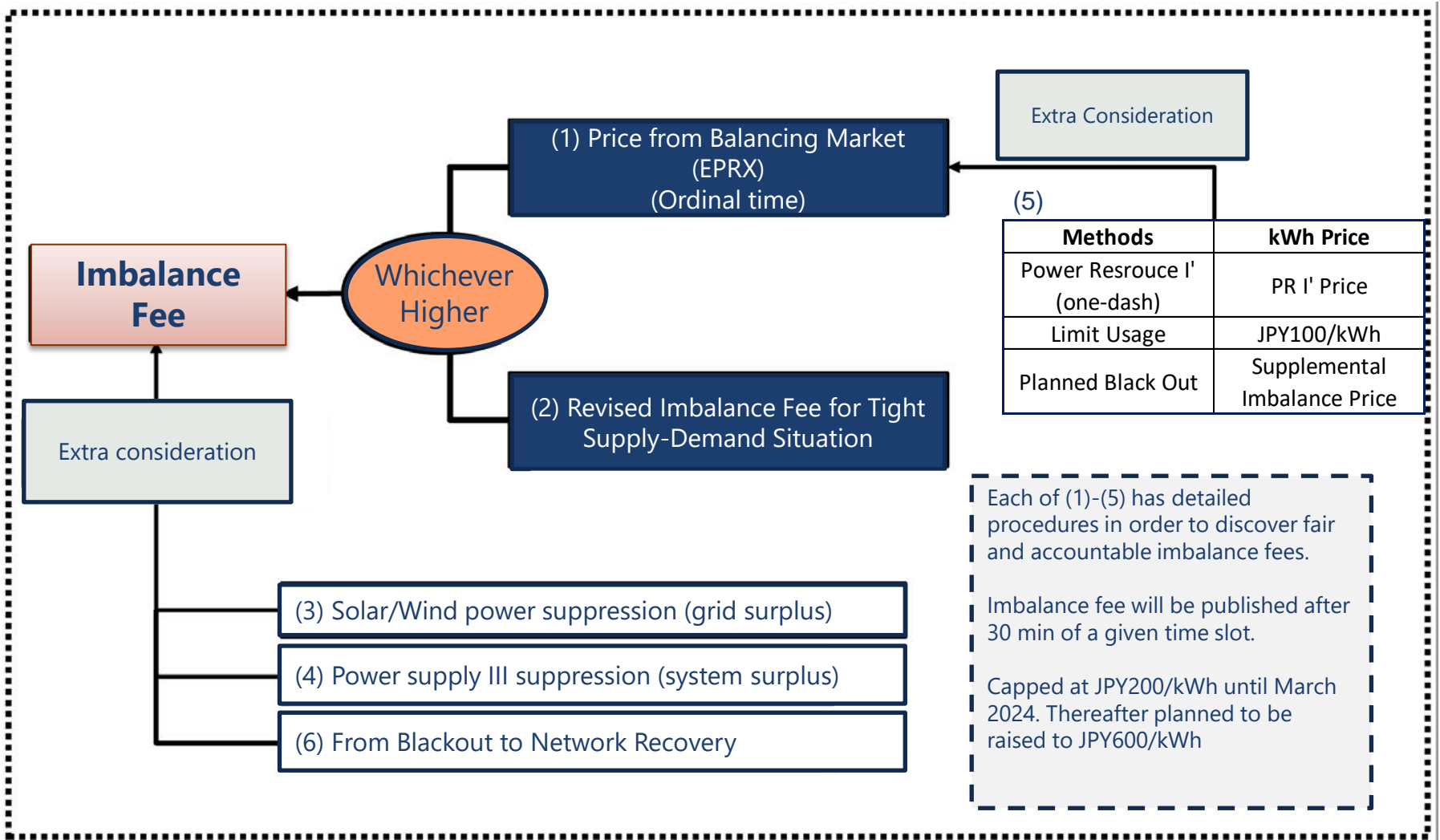
JEPX Day-ahead vs Hour-ahead



Regulators are in discussion to change rules to enable the supply of fixed but unused Reserved Stage 3(II) capacity into the same day market

Imbalance Fee Mechanism

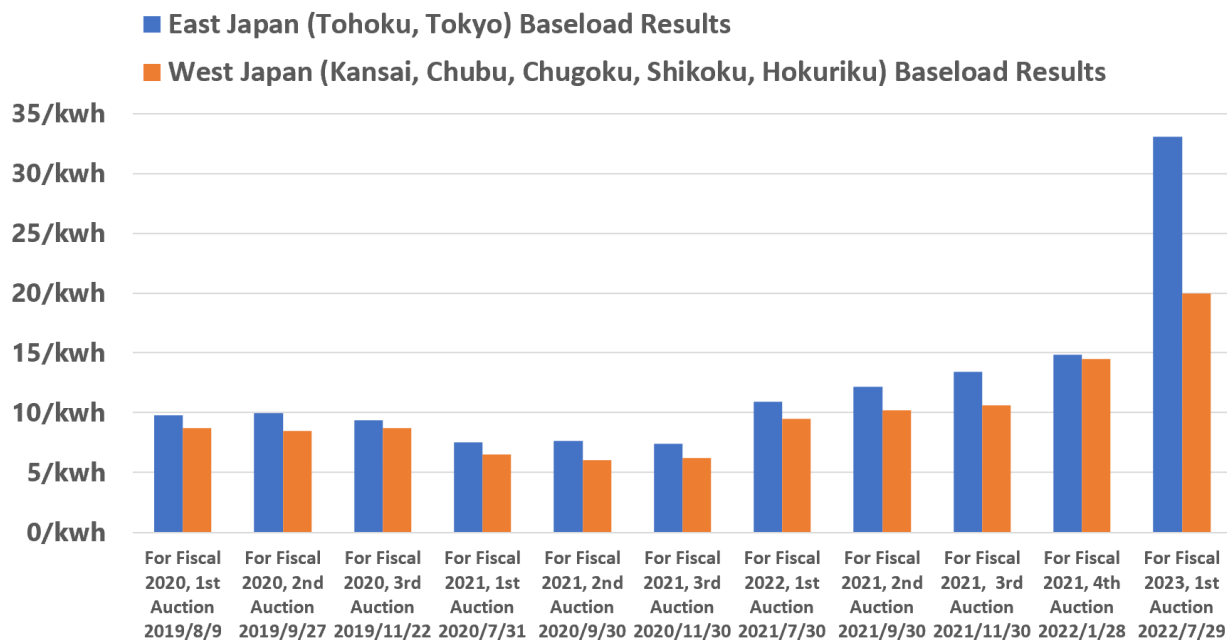
New Rule Effective April 1st, 2022



JEPX Baseload Auction History

¥/kwh	For Fiscal 2020			For Fiscal 2021			For Fiscal 2022				For Fiscal 2023
	For Fiscal 2020, 1st Auction 2019/8/9	For Fiscal 2020, 2nd Auction 2019/9/27	For Fiscal 2020, 3rd Auction 2019/11/22	For Fiscal 2021, 1st Auction 2020/7/31	For Fiscal 2021, 2nd Auction 2020/9/30	For Fiscal 2021, 3rd Auction 2020/11/30	For Fiscal 2022, 1st Auction 2021/7/30	For Fiscal 2021, 2nd Auction 2021/9/30	For Fiscal 2021, 3rd Auction 2021/11/30	For Fiscal 2021, 4th Auction 2022/1/28	For Fiscal 2023, 1st Auction 2022/7/29
East Japan (Tohoku, Tokyo) Baseload Results	¥9.77	¥9.95	¥9.40	¥7.52	¥7.65	¥7.40	¥10.92	¥12.16	¥13.42	¥14.87	¥33.06
West Japan (Kansai, Chubu, Chugoku, Shikoku, Hokuriku) Baseload Results	¥8.70	¥8.47	¥8.70	¥6.50	¥6.06	¥6.20	¥9.47	¥10.23	¥10.63	¥14.50	¥20.00

JEPX Baseload Auction Historical



Balancing/Ancillary Markets

Ancillary Markets, translated in Japan as “Power Reserve” or “Balancing Capacity (Force)” are operated in Electricity Power Reserve Exchange (EPRX) managed by T&D Grid Council comprised of 10 T&D Companies (Utilities).

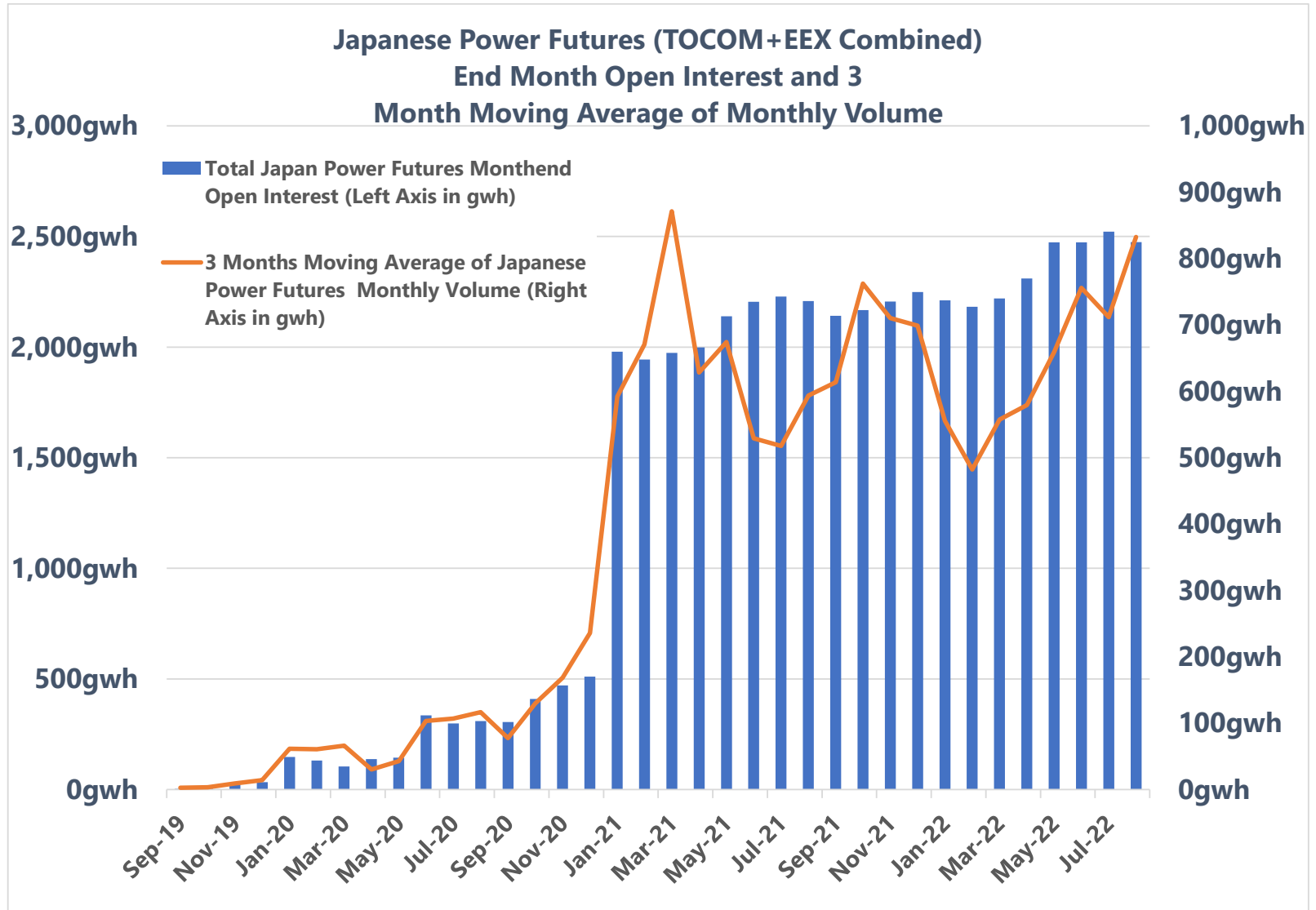
Japanese Expression	English	Required Response Time (from command)	Market Starts
Balancing Capacity III(2)	Replacement Reserve for FIT	45 min.	April 2021
Balancing Capacity III(1)	Replacement Reserve	15 min.	April 2022
Balancing Capacity II(2)	Frequency Restoration Reserve	5 min.	April 2024
Balancing Capacity II(1)	Synchronized Frequency Restoration Reserve	5 min.	
Balancing Capacity I	Frequency Containment Reserve (FCR)	10 sec.	TBD

Futures Markets

Venue	Size	Areas	Type	Contract	Settlement Availability
TOCOM	100KWh/lot	East (Tokyo) and West (Kansai)	Baseload & Peakload	Monthly Contract Only	24 consecutive months
EEX	1MWh/lot	Tokyo (East) and Kansai (West)	Baseload & Peakload	Weekly	4-5 weeks
				Monthly	6-7 consecutive months
				Quarterly	3 - 4 Quarters
				Season (Summer/Winter)	3 - 4 Seasons
				Yearly	1 -2 years

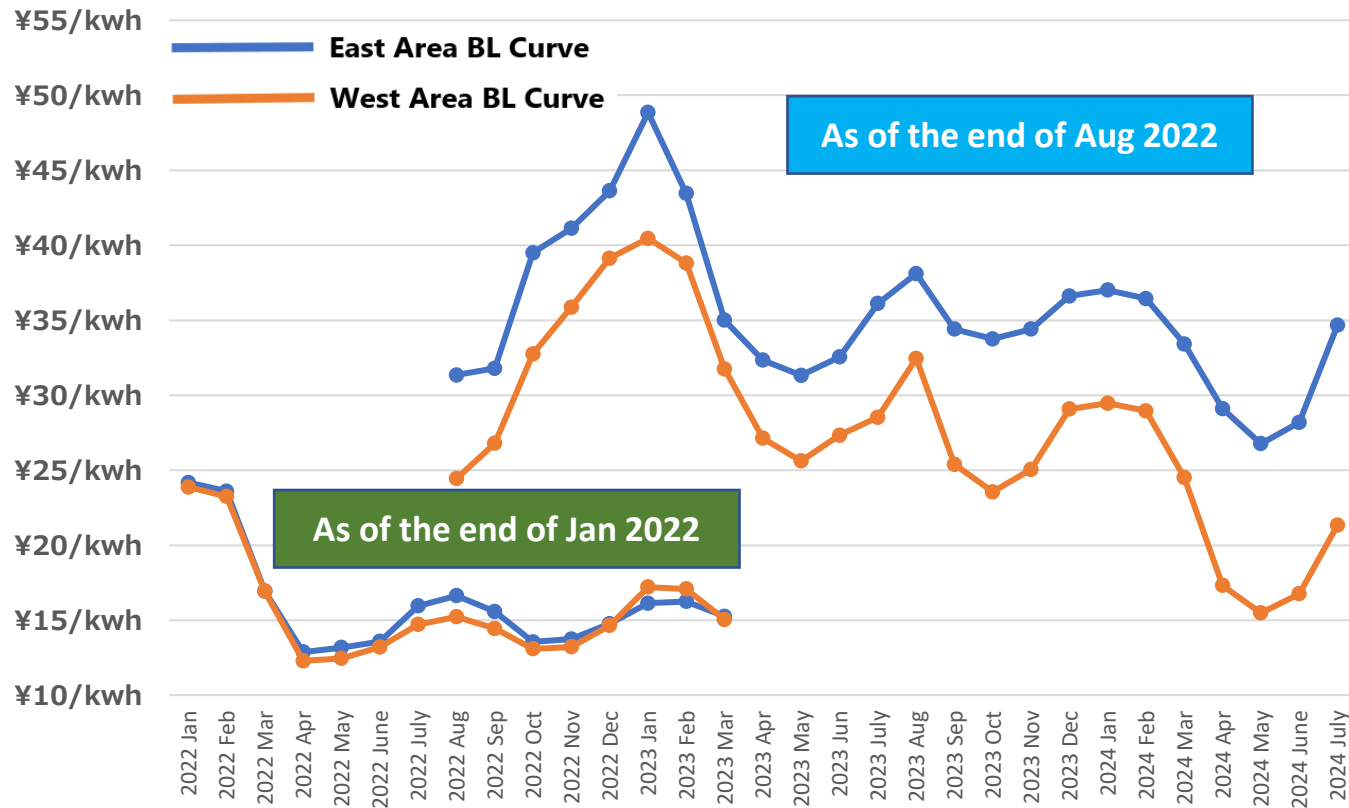
<Final Settlements> Only Cash Settlement, No physical delivery.
 Tokyo/East is based on JEPX Spot Market Tokyo Area Price.
 Kansai/West is based on JEPX Spot Market Kansai Area Price.

Futures Market – TOCOM & EEX



Hypothetical Synthetic Futures Curve Comparison

End Jan 2022 vs End Aug 2022



- Russia-Ukraine event pushed up the overall market level dramatically.
- Spreads between East and West widened as more Nuclear plants are expected to resume in the West.

***Futures curves are hypothetical.**



Peter Weigand
Chairman & CEO

Opportunities

Why the Japan Market

- The Largest LNG Market & 4th Largest Power Market in the World
- The Law Has Been Passed to Reach Carbon Zero
 - This Means Everything Will Change
 - Change = Opportunity
- The Wholesale Market is Young Compared to Every Other Market in the World
 - Young Market = Healthy Margins
 - Mature Market = Thin Margins
- The Largest Retail Market in the World – Every Customer Can Choose A Supplier
- A Single Regulator – Less Regulatory Confusion
- The Country Follows the Rule of Law

For International Entrants – The Skills, Knowledge & Business Model Honed in Your Market Can Be Adapted and Applied in the Japanese Markets!

Carbon Market Opportunities

- Starting April 1, 2023
 - Corporations will start reporting GHG status
 - Annual reductions required or buy carbon credits
- Opportunities
 - I. Carbon Credit Brokering or Trading on Behalf of Customers
 - II. Energy Efficiency
 - III. GHG – ESG Tracking & Reporting Software and Services
 - IV. Onsite Solar/Storage
 - V. Hydrogen Fuel Cells
 - VI. Renewable PPA's or VPPA's
 - VII. Corporate Energy Procurement and Sustainability Consulting

FIT to FIP Conversion Opportunities

- On April 1, 2022
 - The Feed-in Tariff (FIT) Scheme Changed to a Feed-in Premium (FIP) Scheme
 - Renewable Prices Now Tied to a JEPX Spot Formula

- Opportunities
 - I. Renewable Aggregation Services
 - New METI License
 - Provide Scheduling, Trading, Balancing and Related Services to Renewable Developers

 - II. Trading
 - JEPX Spot Formula to Term Fixed and Many Other Angles

 - III. End User PPA's & VPPA's

 - IV. Developer/Retailer/Trading Co. Partnerships

 - V. Municipal Market

Retail Opportunities

- Winter 2021 to Today Retail Market Situation
 - Due to Power Market Volatility & Significant Wholesale Price Increases
 - About 20% of Licensed Retailers (PPS) Have Exited the Market
 - No Retailer is Renewing Customer Contracts Under Old Terms
 - Most Retailers Have Stopped Accepting Any New Customers at All
 - The Few That Are Accepting New Customers or Renewing Contracts Offer a Market Price Formula
 - All Utilities are Also Increasing Tariffs and Moving to a Market Price Offering
- Impact/Opportunities
 - I. Customers Do Not Know Where to Go Now for Supply
 - II. International Retailers
 - Who Are Adept at Hedging & Offer a Variety of Customer Pricing Options
 - III. Trading Companies
 - Offering Retailers Wholesale Market Products/Services
 - IV. Corporate Energy Procurement Consultants/Brokers

Trading Opportunities

- Current Situation & Opportunities
 - JEPX Market - Substantial Volumes & Volatility
 - Single Utility Spot Price VS East or West Market Price – Arbitrage
 - Spot VS Intraday – Arbitrage
 - Baseload Auction Cleared Price VS Spot or Futures
 - Futures Markets – Growing Volumes & Volatility
 - EEX VS TOCOM – Arbitrage
 - Market Making in Out Months
 - Bilateral Market - METI Pushing Utility Generators & IPP's Into Bilateral – Volumes Will Grow
 - IPP Market Manager Services (Trade on their behalf)
 - Bilateral Term Prices VS Spot or Futures Trading
 - OTC/Derivative Market – Still In Early Stages of Development
 - Market Maker

Technology Opportunities

- This List is in No Particular Order
 - I. ETRM
 - II. Asset Management – Generation
 - III. End User Energy Management
 - IV. Retail & Wholesale Market Analytics Solutions
 - V. Next Generation Retail Billing & Operations Solutions
 - VI. GHG – ESG Tracking & Reporting Software
 - VII. Retail Brokering Platform Solution
 - VIII. Grid Edge Solutions (Distributed Gen, Storage, etc.)
 - IX. Demand Response Solutions

Keys to Succeeding in the Japan Markets

- Everyone starts off comparing how the Japan markets work with the markets they know well. This is fine to start, but Japan is different enough that it cannot be operated as if it is “like” another market.
- You **MUST** have Japanese bilingual resources on your team.
- While the Japanese value international ideas, business models, and methodologies, the sooner you adapt them to the Japanese culture the more successful you will be.
- Even if you plan to operate the Japan business outside of Japan, you will need a bilingual Japanese representative located in Japan.
- Patience. Everything takes longer in Japan.
- Attention to Detail. The Japanese strive for perfection in everything. Every filing, agreement, and even website wording is carefully studied. If a filing has a single error it will be rejected.

If You Plan to Visit Japan, Ask Us for Our Free Japanese Business Etiquette Guide

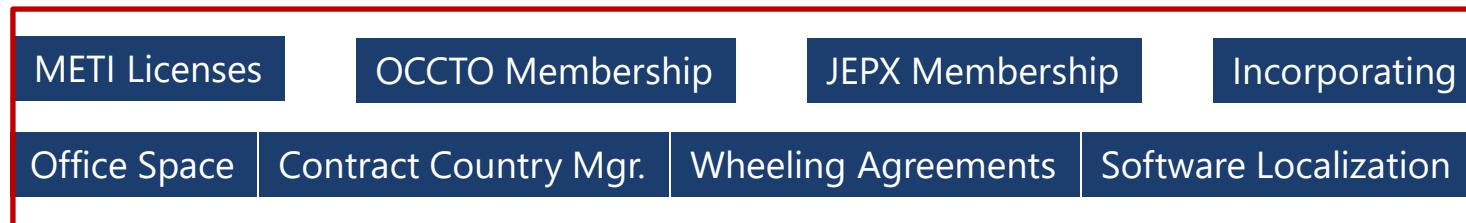
How Can We Help?

- 9 Years in the Japan Energy Marketplace
- We Have Assisted 20+ International Companies Enter the Japan Markets
 - Retail – Trading – Software – Biomass – Hydrogen – Demand Response – Renewables

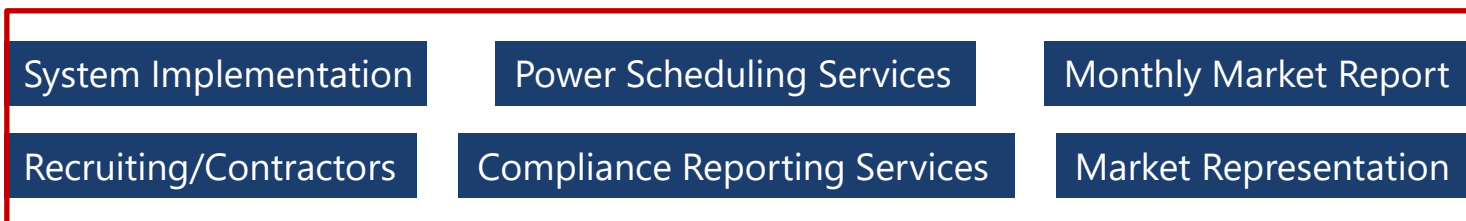
Planning/Prep



Launch Assistance



Market Services



Q & A

**We would like to hear about your Japan plans, share more of our knowledge,
and explore how we might assist you in entering the Japan market.**

Peter Weigand

Chairman & CEO

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