

KYOS Webinar
27 January 2021
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A wide-angle photograph of the Tokyo skyline at dusk or dawn. In the background, Mount Fuji is visible, its snow-capped peak glowing with a warm orange light from the setting or rising sun. The foreground is filled with various skyscrapers and buildings of the city, some of which are also illuminated with warm lights. The sky is a mix of blue and orange hues.

Webinar: Trading in the Japanese market ウェビナー：日本の電力市場でのトレーディング

Cyriel de Jong & Ewout Eijkelenboom, Hiroshi Ishiguro
KYOS Energy Analytics

Agenda

Japanese translation available by Hiroshi Ishiguro

8:30 (16:30 Japan) Market Overview – Ewout Eijkelenboom

- Key facts
- Price dynamics
- Recent events

8:50 (16:50 Japan) Risk Management Tools – Cyriel de Jong

- Japanese market data
- ETRM system

9:05 (17:05 Japan) – Q&A and discussion

9:15 (17:15 Japan) – End of the webinar



KYOS Energy Analytics

- Since 2016 active in the Japanese Market
- Products and services to support both Japanese companies and international companies interested in Japanese market

KYOS Product Suit for Japan

Together with MRI

ETRM system

Price forward curves (MPX)

Fundamental power model with Japanese data set

Power plant valuation optimization software

Price forward curve builder (30min)

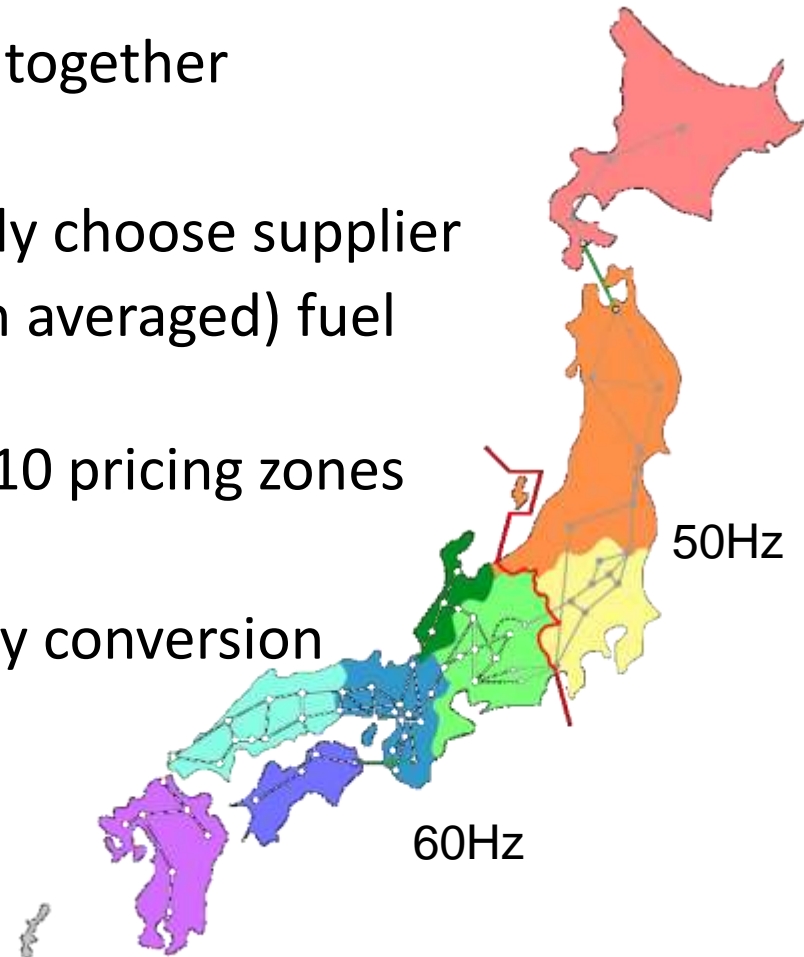
Renewable generation software (PPA valuation)

Risk management service: training and consulting



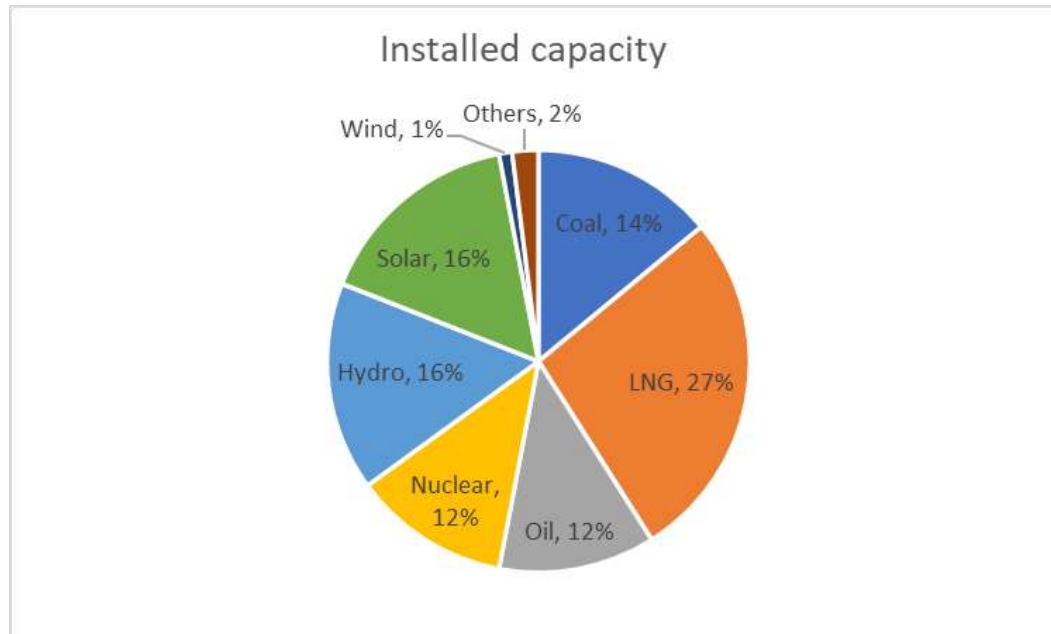
Japanese power market – key facts (1/2)

- Size: approx. 950 TWh/year
 - 5th largest market in the world.
 - Comparable to France + Germany together
- Liberalization market: 2000
 - Since 2012 all consumers can freely choose supplier
 - Retail tariff linked to (three-month averaged) fuel price
- Two frequency (50Hz & 60Hz) areas, 10 pricing zones
 - Limited interconnection capacity
 - Only 1200 MW between frequency conversion



Japanese power market – key facts (2/2)

- Generation mix
 - Total installed capacity 305 GW
 - 82 GW LNG fired power plants
 - Now: 4 GW onshore wind, 62 GW solar
 - Aim: 10 GW offshore wind in 2030



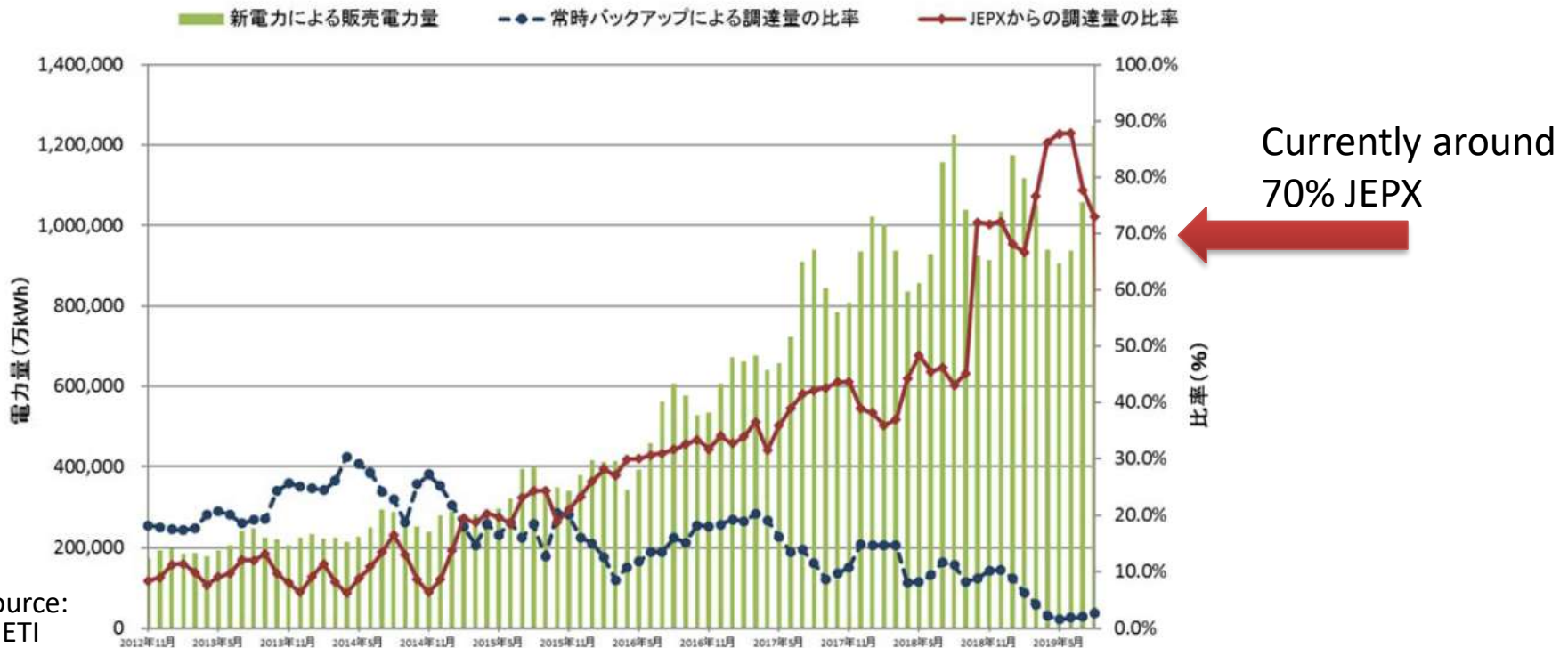
Japanese power market – trading

Different trading places:

- Spot market: JEPX – physical delivery
- Bilateral market (OTC/brokers)
- Futures markets (financially settled):
 - TOCOM (since Sep 2019)
 - EEX (since May 2020)
 - CME (as of Feb 2021)

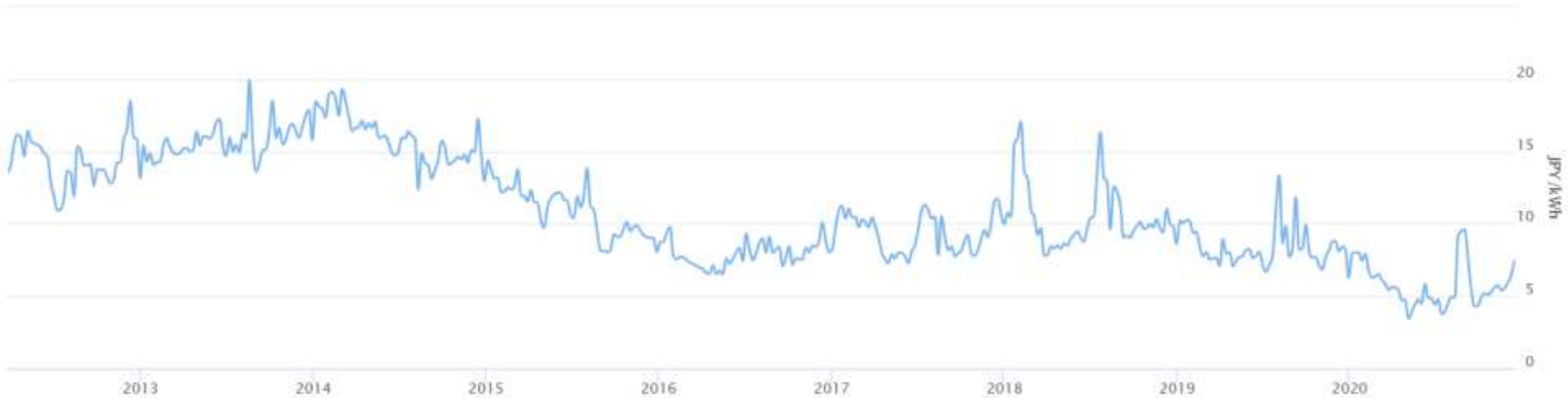


Companies are increasingly buying on JEPX



- Japan has seen various retail companies (PPS) make large losses and default, withdraw from the market or restructure
- PPS companies increasingly use JEPX to source electricity and lack proper risk management

JEPX spot prices (system) – up to 2020



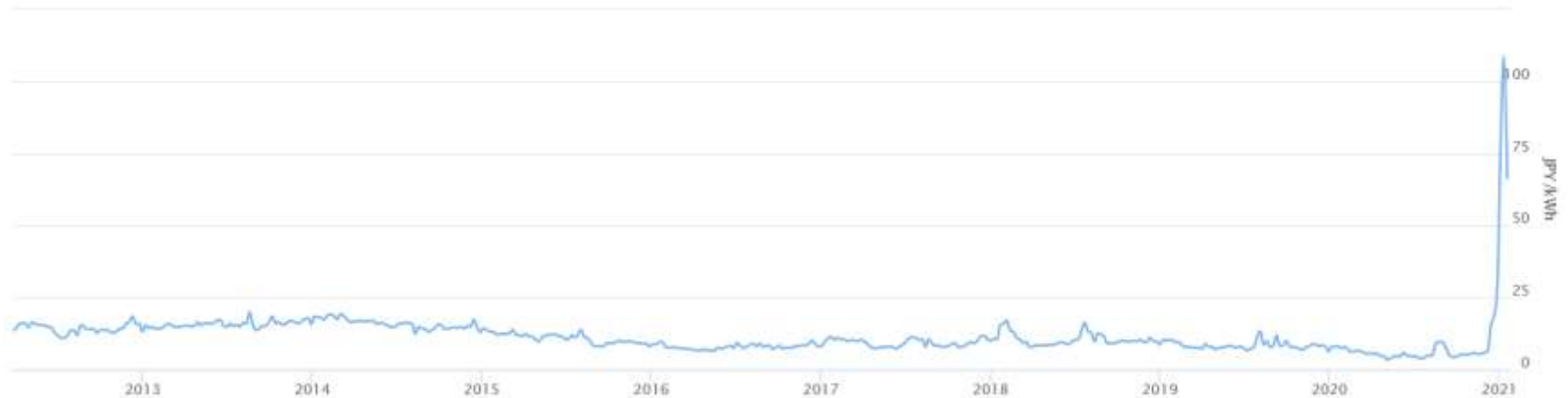
Year	Price (¥/kWh)		
	Average	Minimum	Maximum
2012	14.32	6.79	39.70
2013	15.72	5.93	55.00
2014	15.95	5.79	44.61
2015	10.96	3.82	44.92
2016	7.91	3.84	40.00
2017	9.29	4.51	30.00
2018	10.52	4.66	75.00
2019	8.42	0.18	60.00
2020	6.50	0.01	80.00

Prices on the **JEPX** are **volatile**:

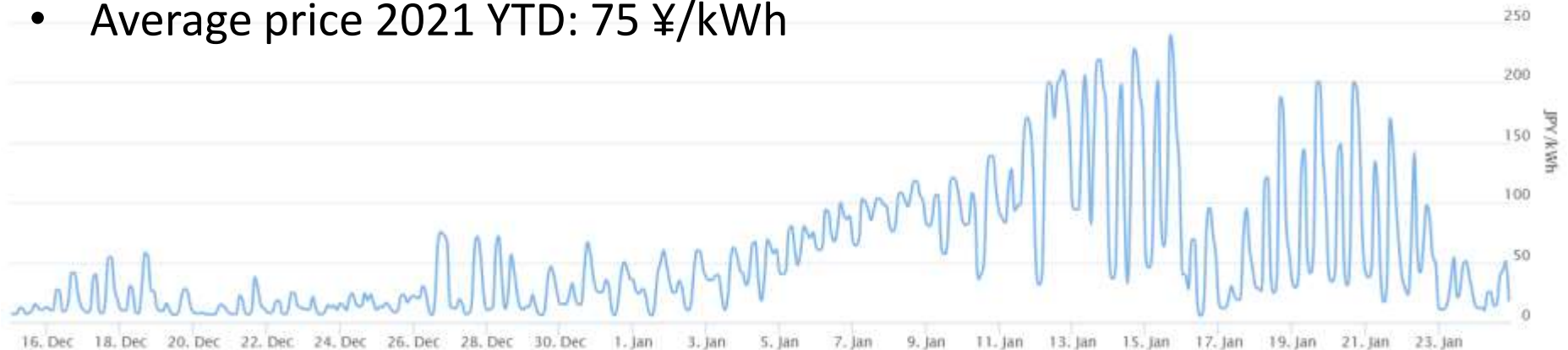
- Long term:
 - economic situation
 - fuel prices
 - investments
- Short term:
 - weather
 - power plant outages
 - demand changes

January 2021 event

- JEPX prices increased from mid-December 2020



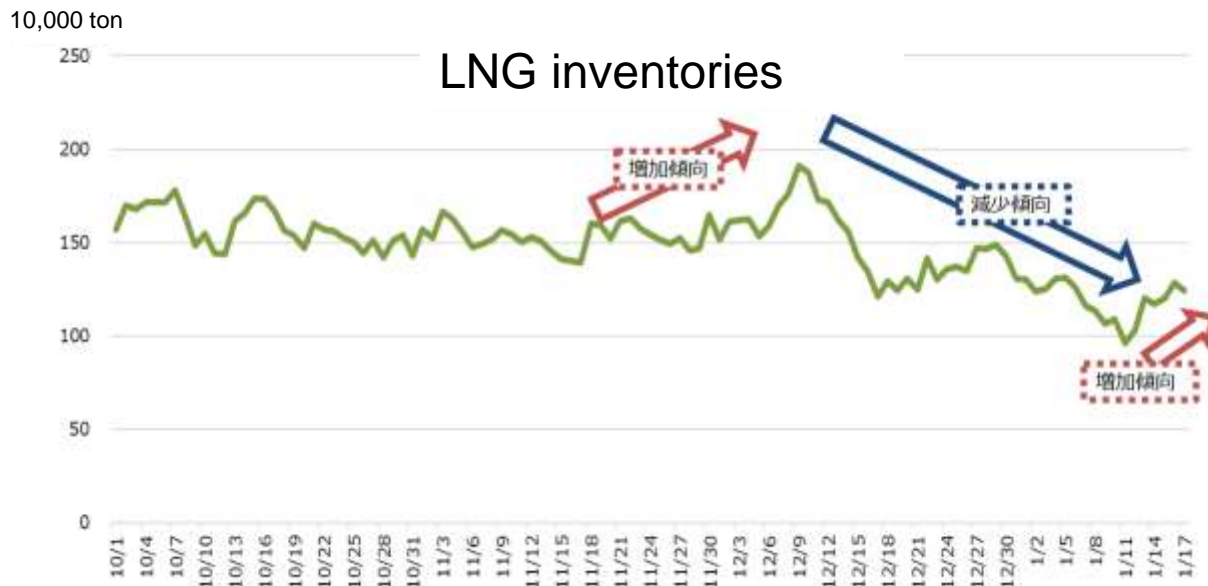
- Levels never seen before.
- System price of 251 ¥/kWh! Highest price before this event: 75 ¥/kWh
- Average price 2021 YTD: 75 ¥/kWh



January 2021 event

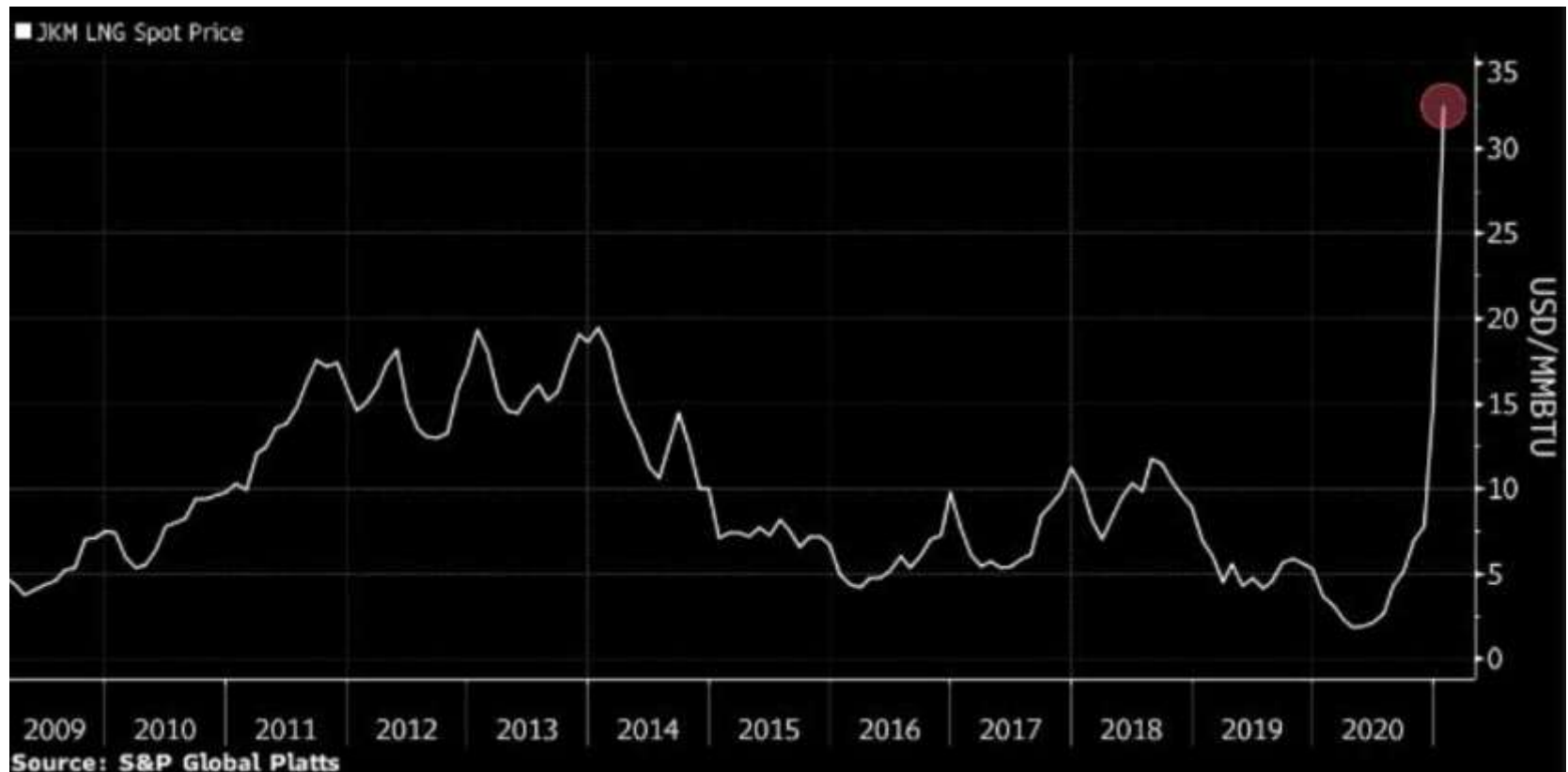
Possible reasons:

- Below average temperature
- Heavy snowfall reducing solar productions
- Low LNG inventories
- Reduced availability of thermal and nuclear power plants



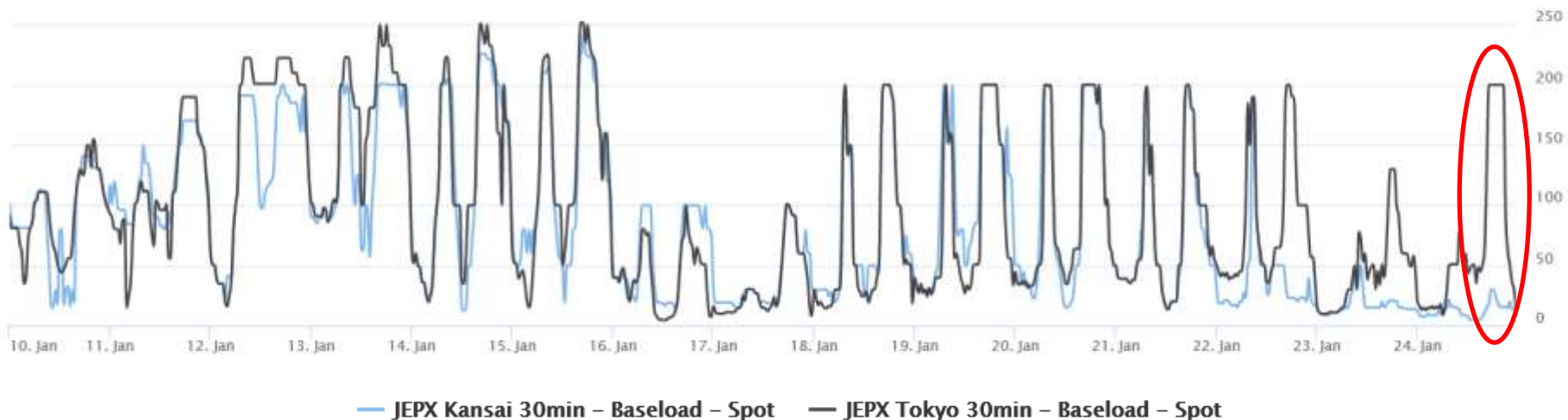
January 2021 event

- Timing together with tightening of Northeast Asian LNG prices
- Strong winter across the region led to record high LNG prices of over 32 \$/MMBtu (or 90 €/MWh!)



January 2021 event

- Restricted interconnection capacities:
 - Strong price differences between regions
 - 25 January: over 150 ¥/kWh difference between Tokyo and Kansai



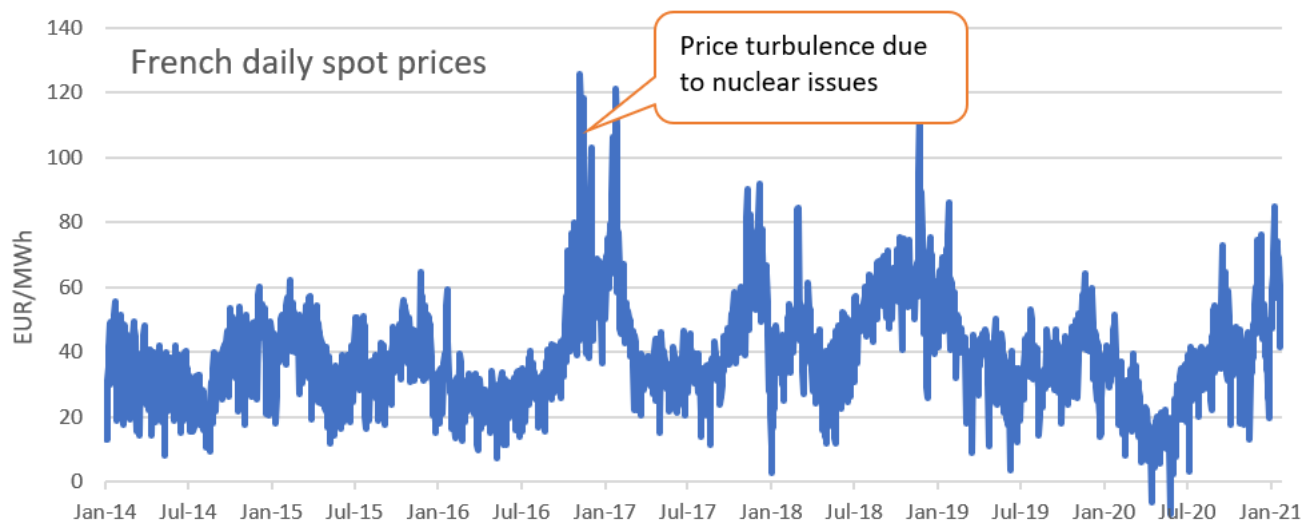
January 2021 event

Reactions

- METI
 - Temporary maximum of 200 ¥/kWh on balancing price
 - Installed committee to investigate causes of price spike
- PPS (retail suppliers)
 - Request for more data transparency
 - Request for compensation
- Futures trading on EEX
 - In January 2021 more volume than whole of 2020!

Comparison to France end of 2016

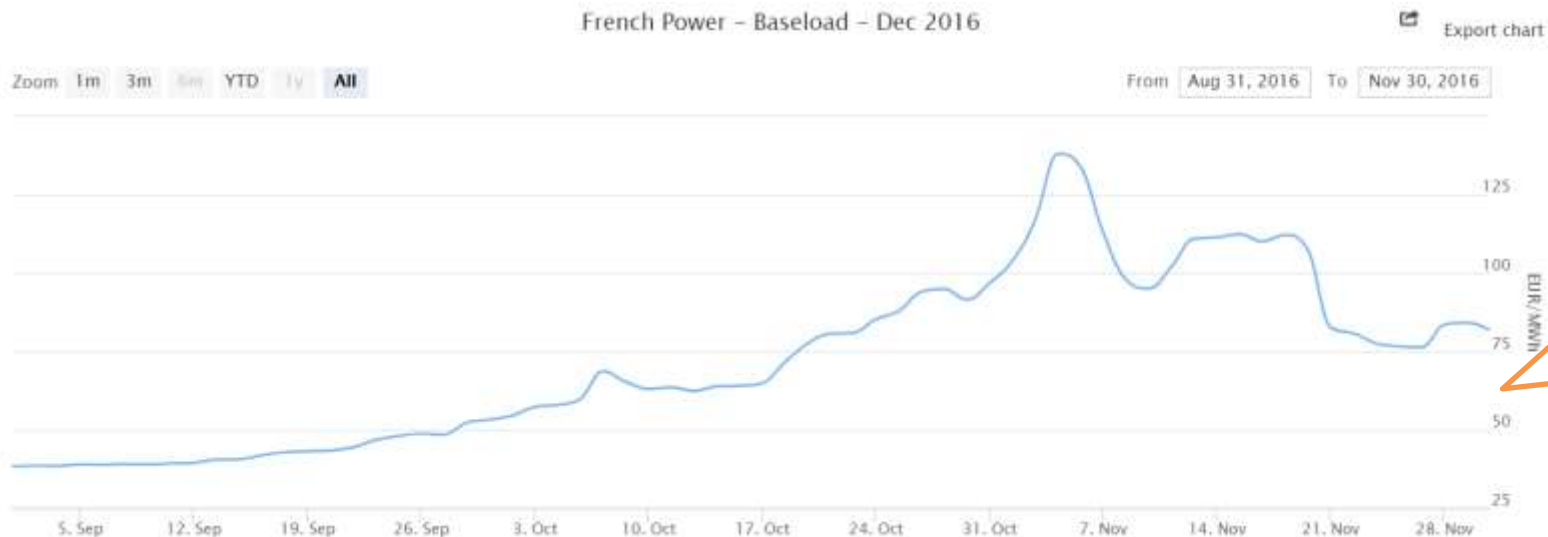
- No other spot power market has ever seen such a prolonged period of extremely high prices
- Price spikes in other markets last for a few days only
- What is different in Japan?
 - Limited data transparency
 - Very low trading volumes in forward/futures market
 - Risk management practices to be developed



The role of forward trading and risk management

How can forward trading and risk management help to avoid a market breakdown?

- Price discovery: forward market traders actively search for information to form a price view and trade on that
- Forward prices rise before the actual problems arise
- All market participants take action: increase availability of plants, reduce demand and remove network issues



Dec 2016
average
spot price:
56 €/MWh



Market data and risk management



Attractiveness of Japanese market

Japanese companies

- Fully liberalized
- Active spot market
- Growing futures market provides risk management tools
- Move away from renewable feed-in tariffs

Overseas companies

- Fully liberalized
- Large market, quickly developing
- Futures market in its infancy, but growing
- Largest LNG importer
- Strongly growing renewable capacities (investments!)

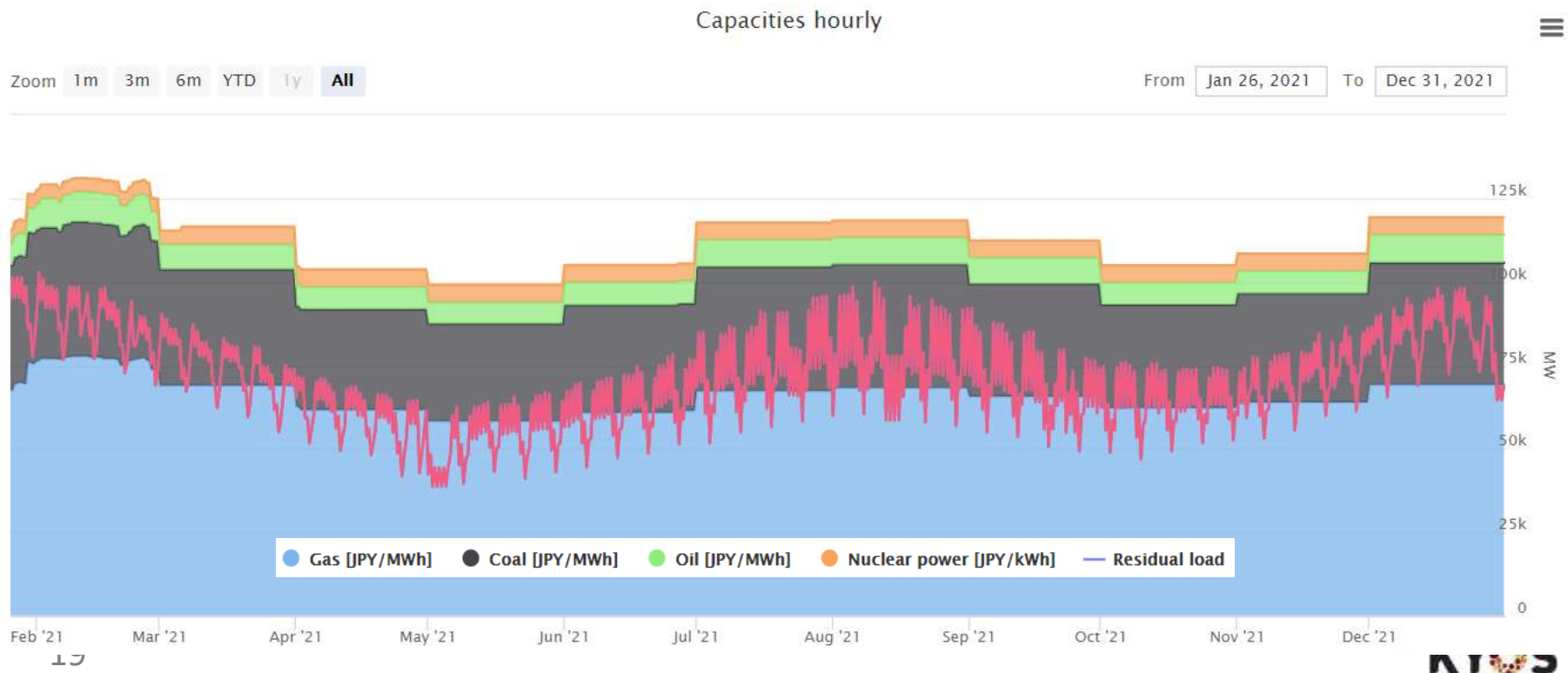
Japanese power market – way forward

- More transparency
 - Power plant capacities and availabilities
 - Supply / demand, including renewables
- More futures trading
 - Japanese firms participate more actively
 - Overseas traders providing liquidity
- Risk management
 - Hedge the forward exposures, reduce spot
 - Implement ETRM systems and practices
- More flexibility
 - Generation to be made more flexible
 - More fuel storage, batteries
 - More demand side flexibility

NOT: protective measures, hampering the well-functioning of the market (such as the capacity market auction)

Data transparency

- KYOS partnership with Mitsubishi Research Institute (MRI) since 2016
- MRI is part of the Mitsubishi Group and stock listed (TYO 3636)
- Analyst team closely follows the fundamentals of the market
- For example, detailed power plant dataset, including maintenance periods



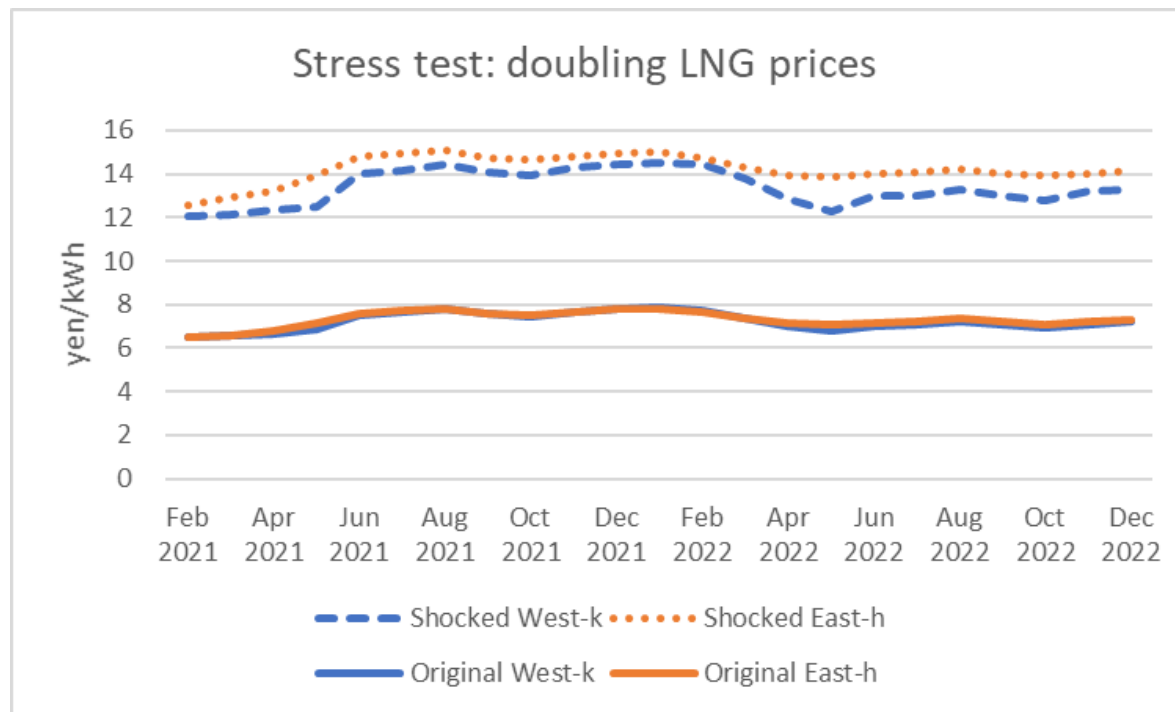
Fundamental power market model

- KYOS has over a decade experience in power market modeling (see e.g. power.kyos.com for European coverage)
- KYOS analytical software used by MRI to generate fundamental power price forward curves over the next couple of years
- Per hour, per market area
- Combining:
 - merit order
 - spot market bidding
 - transmission flows
 - balancing




Software + data license

- We offer access to the KYOS fundamental market modeling software, including MRI dataset and base case scenarios
 - Ability to perform your own analysis and evaluate alternative scenarios, such as higher LNG prices



Risk management

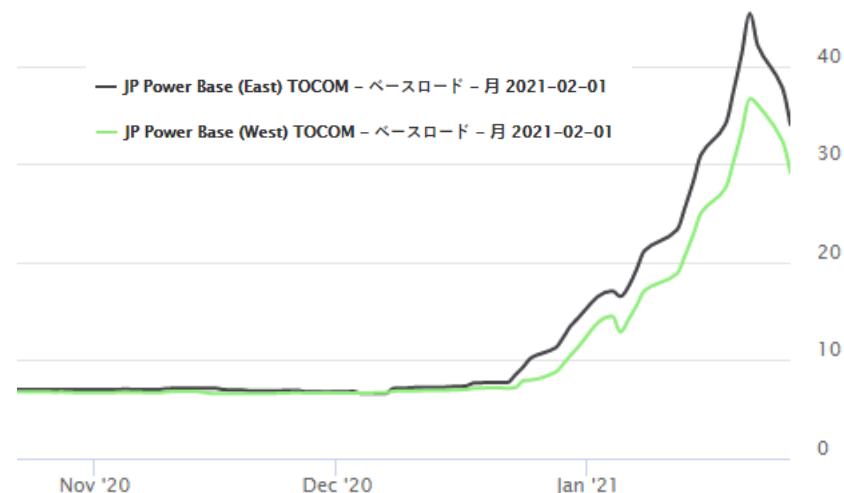
- We support companies with the implementation of risk management principles
- Training and software, in Japanese or English
- Cloud based ETRM system is easy to implement and use, unlike some US systems
- Range of price data services, integrated in KYOS ETRM system



JP Power Base (West) TOCOM

2021-01-08

取引日	基差期間	Price (JPY/Wh)	単位	買値/売値
2021-01-08	2021-01-05	29.56	Wh	29.56
2021-01-08	2021-01-04	11.33	Wh	11.33
2021-01-08	2021-01-03	8.38	Wh	8.38
2021-01-08	2021-01-02	6.51	Wh	6.51
2021-01-08	2021-01-01	6.75	Wh	6.75
2021-01-08	2021-01-01	7.77	Wh	7.77
2021-01-08	2021-01-01	7.86	Wh	7.86
2021-01-08	2021-01-01	8.34	Wh	8.34
2021-01-08	2021-01-01	8.41	Wh	8.41
2021-01-08	2021-01-01	6.73	Wh	6.73
2021-01-08	2021-01-01	7.84	Wh	7.84

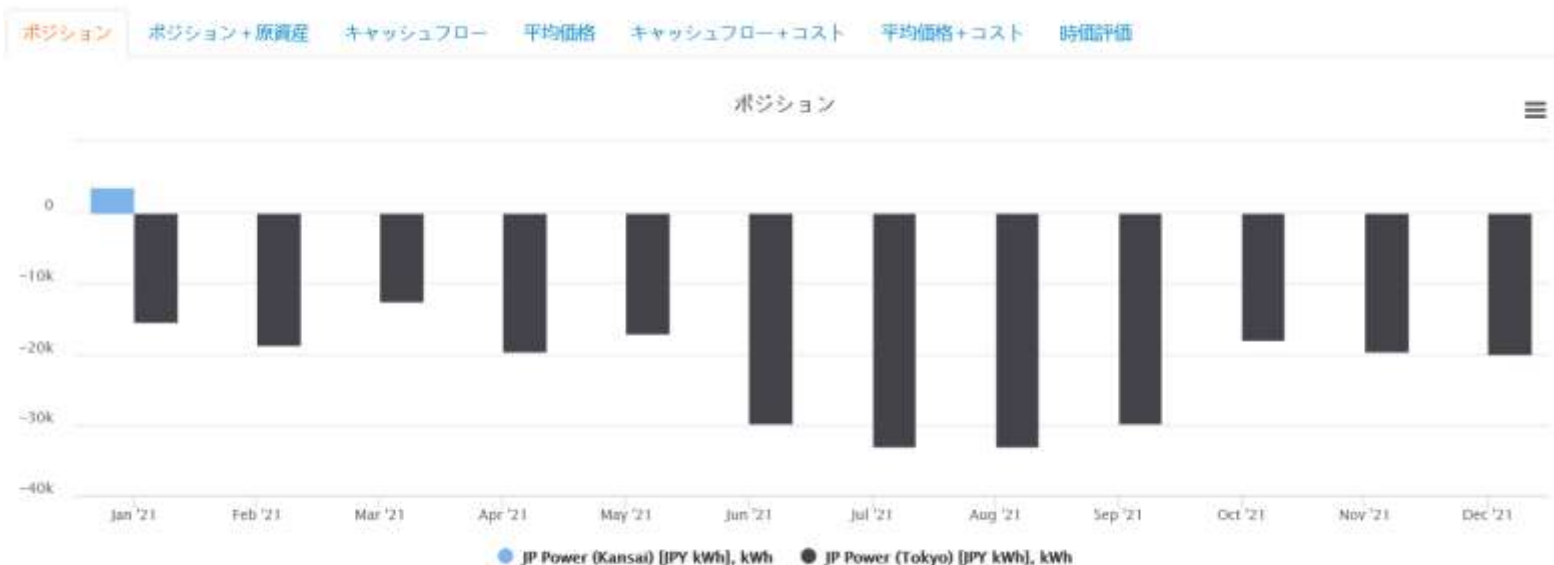


ETRM system – deal capture

Dedicated system for risk management

Easy deal entry of all sorts of contracts:

- Spot trades
- Forward/futures/swap trades
- Sales contracts
- Expected generation, expected consumption



ETRM system – flexible reporting engine

Positions, P&L, Cash-flows, Mark-to-Market, etc.

Optional: risk metrics such as Value-at-Risk or Profit-at-Risk



Questions and answers

More information or a software demo

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