



ESIG
2021 Meteorology &
Market Design for Grid
Services Workshop

Session 6:
Tail Events Concerns from
Around the World

17th June, 2021

Market related tail event in Japan



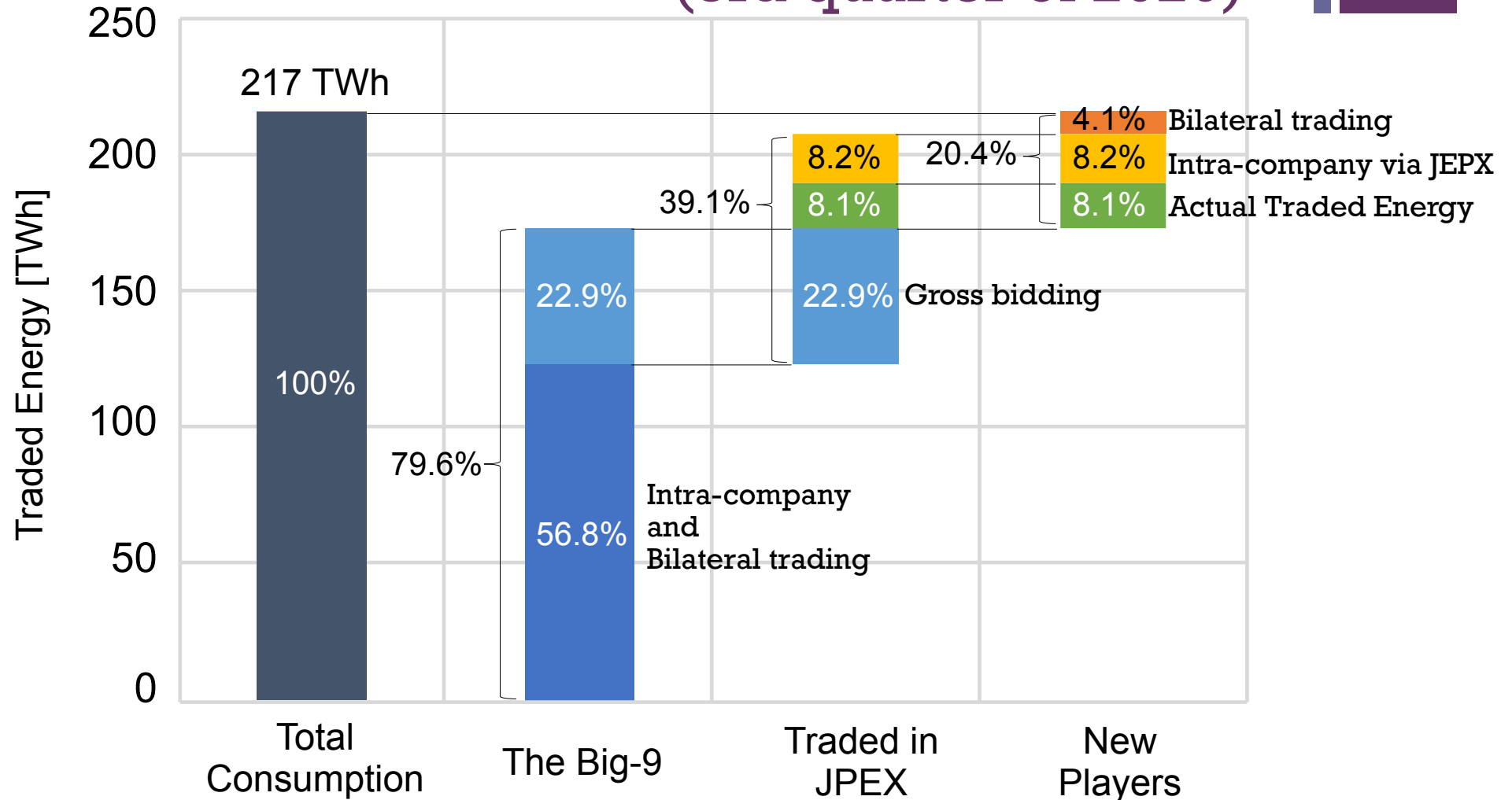
Yoh YASUDA

Graduate School of Economics, Kyoto University

+ Market Structure in Japan



(3rd quarter of 2020)

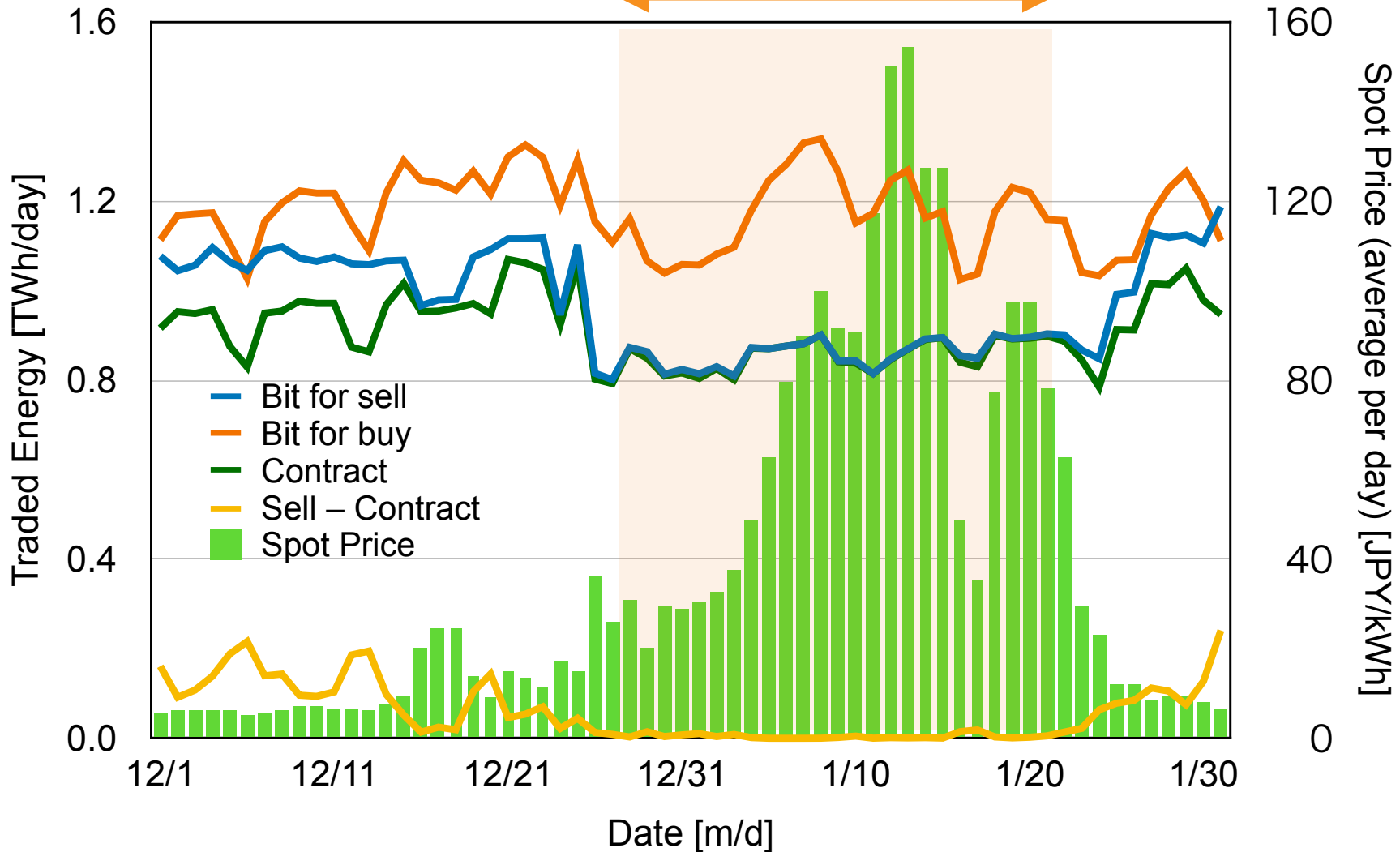


+ Facts: Market results



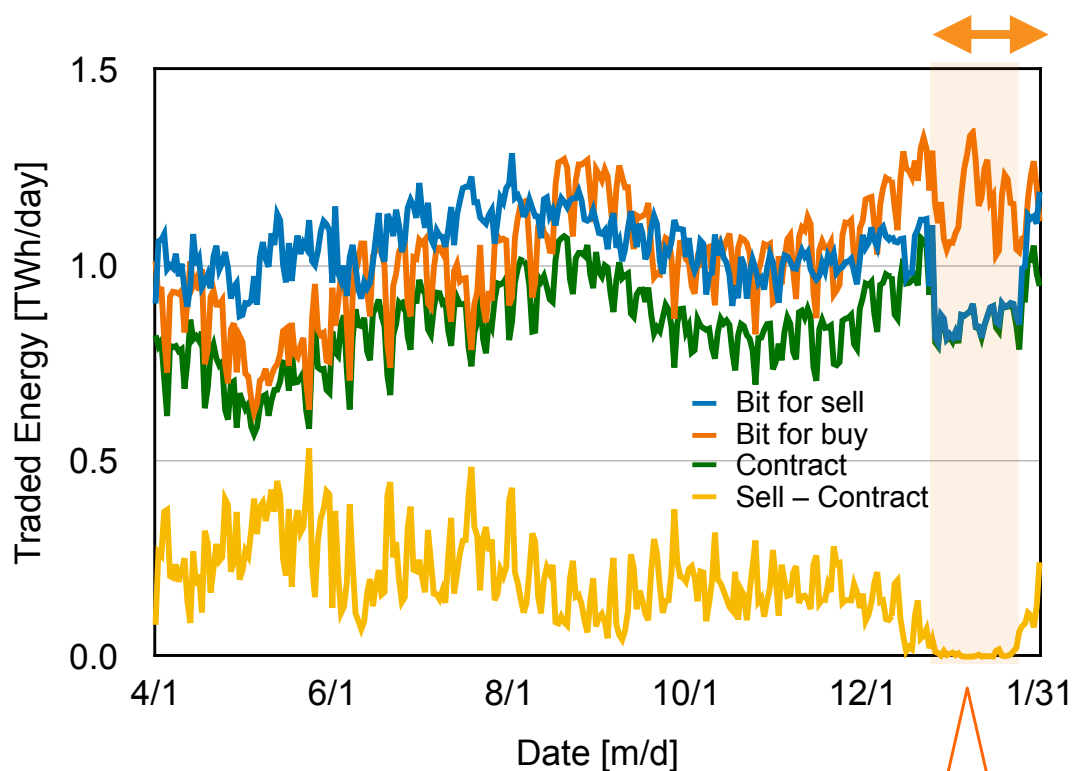
28th Dec to 20th Jan: all bits for sell sold out

Prices for BUY rather than sell made spot price

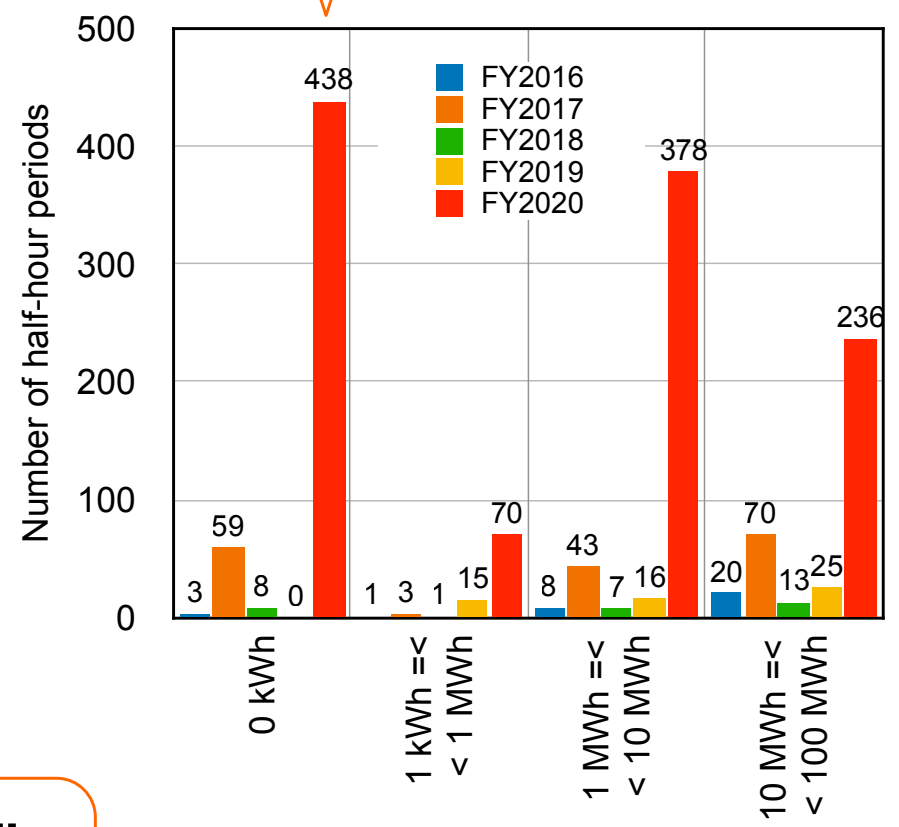


+ “Sold-out” continued over three weeks

Frequency of “sold-out”



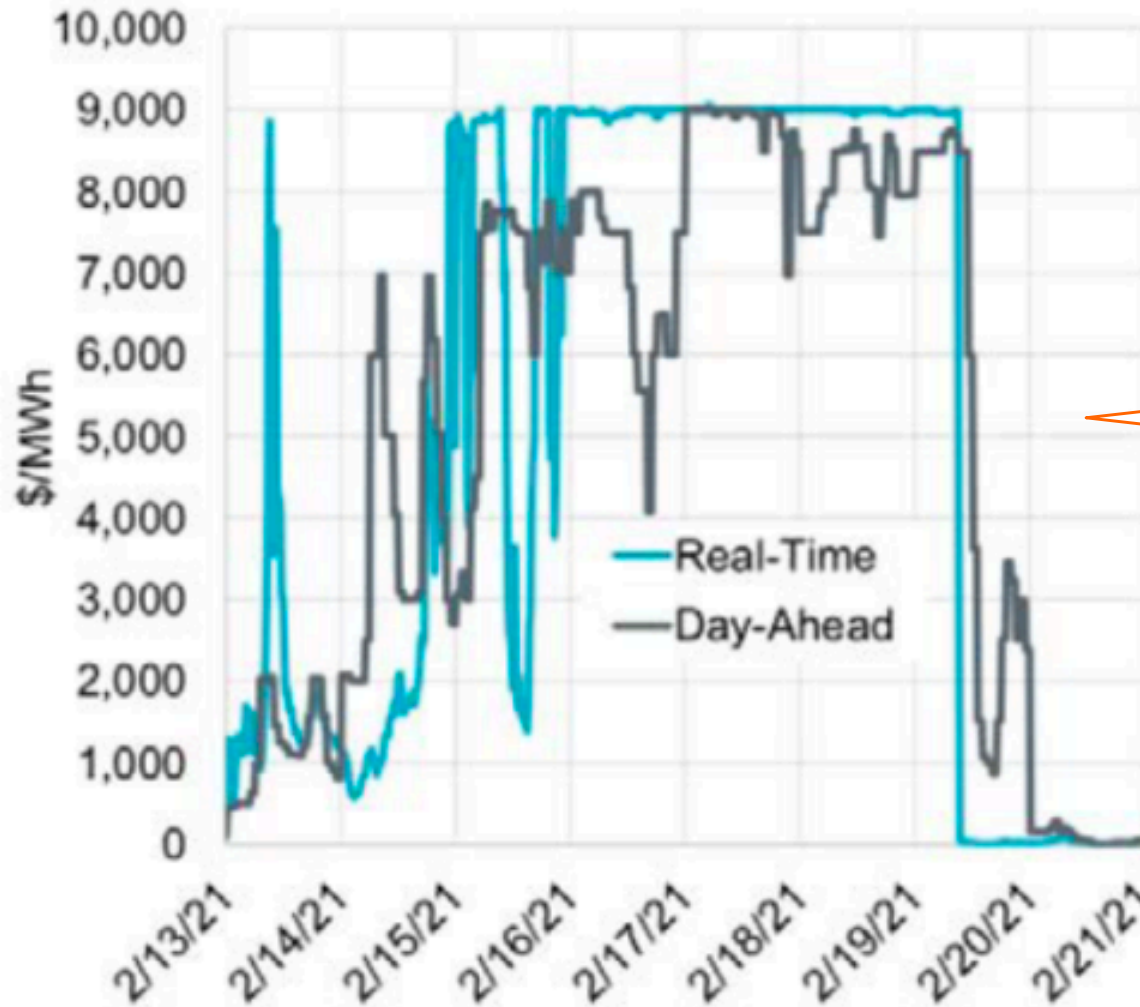
“Sold-out”



Sell - Contract



Event in Texas on Feb. 2021



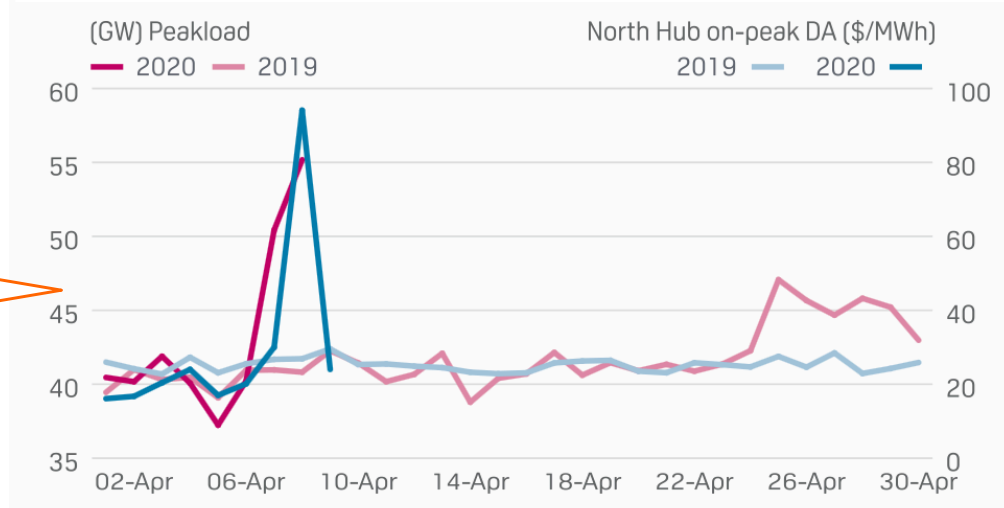
High spikes
but
converged
within 7 days

(source) <https://lawandcrime.com/high-profile/unfathomable-biggest-power-cooperative-in-texas-hit-with-2-1-billion-post-outages-bill-files-for-chapter-11-bankruptcy/>

+ Event in Texas on Aug. 2019

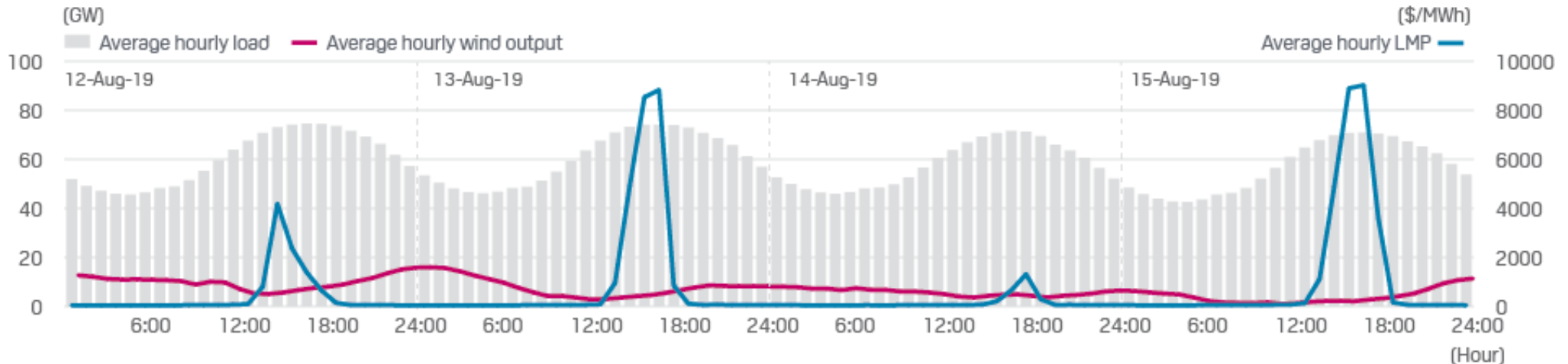


ERCOT APRIL PEAKLOAD, PRICE COMPARISON



Spikes converged within 4 days

ERCOT SYSTEMWIDE AVERAGE HOURLY LOAD, WIND OUTPUT, LMPS

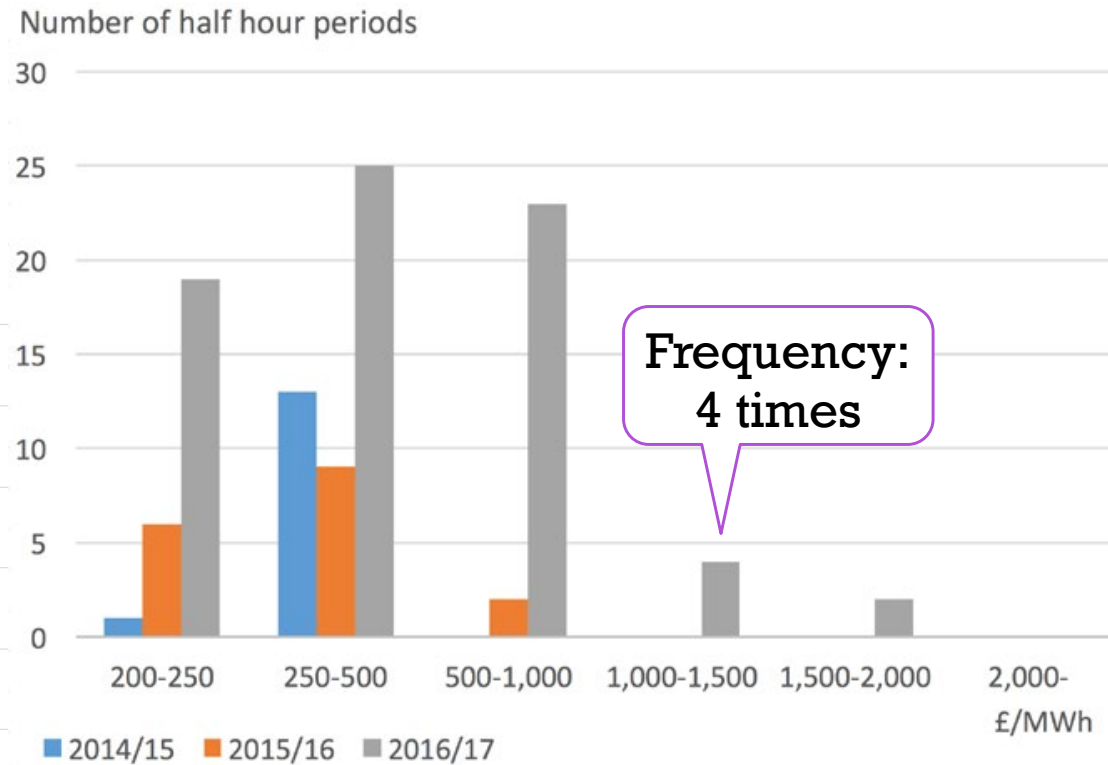
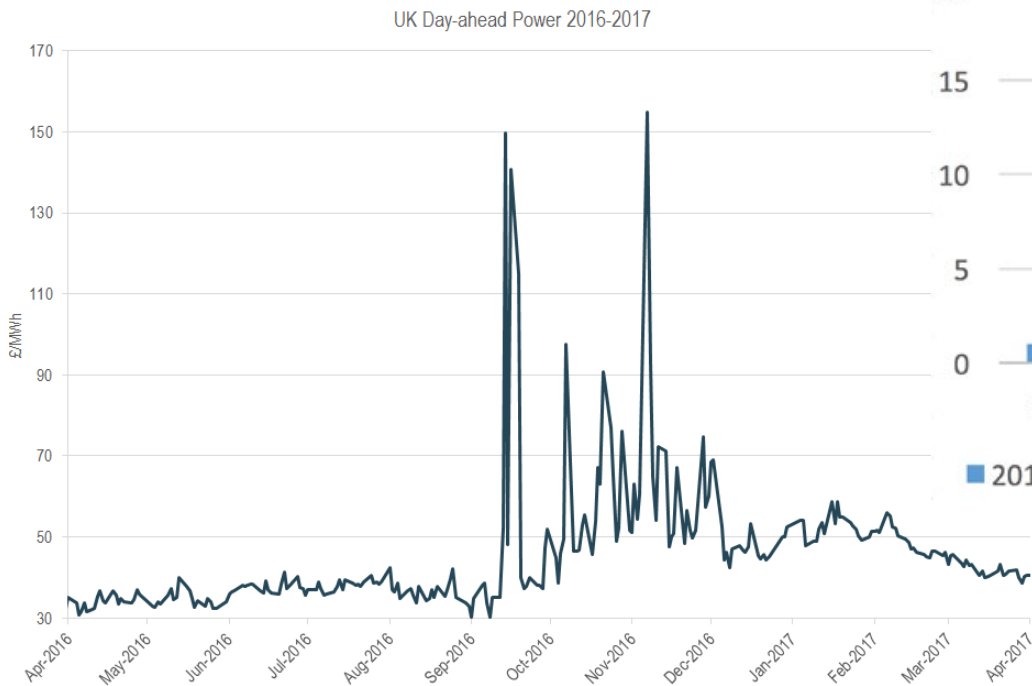


Source: ERCOT

(Source) <https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/040920-ercot-sets-april-peak-demand-record-real-time-prices-spike-into-300smwh-at-same-time>
<https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/081619-analysis-ercots-price-surge-may-have-hurt-some-retail-electricity-providers-experts>



Event in US on 2016/17 (Due to Nuclear outage in France)



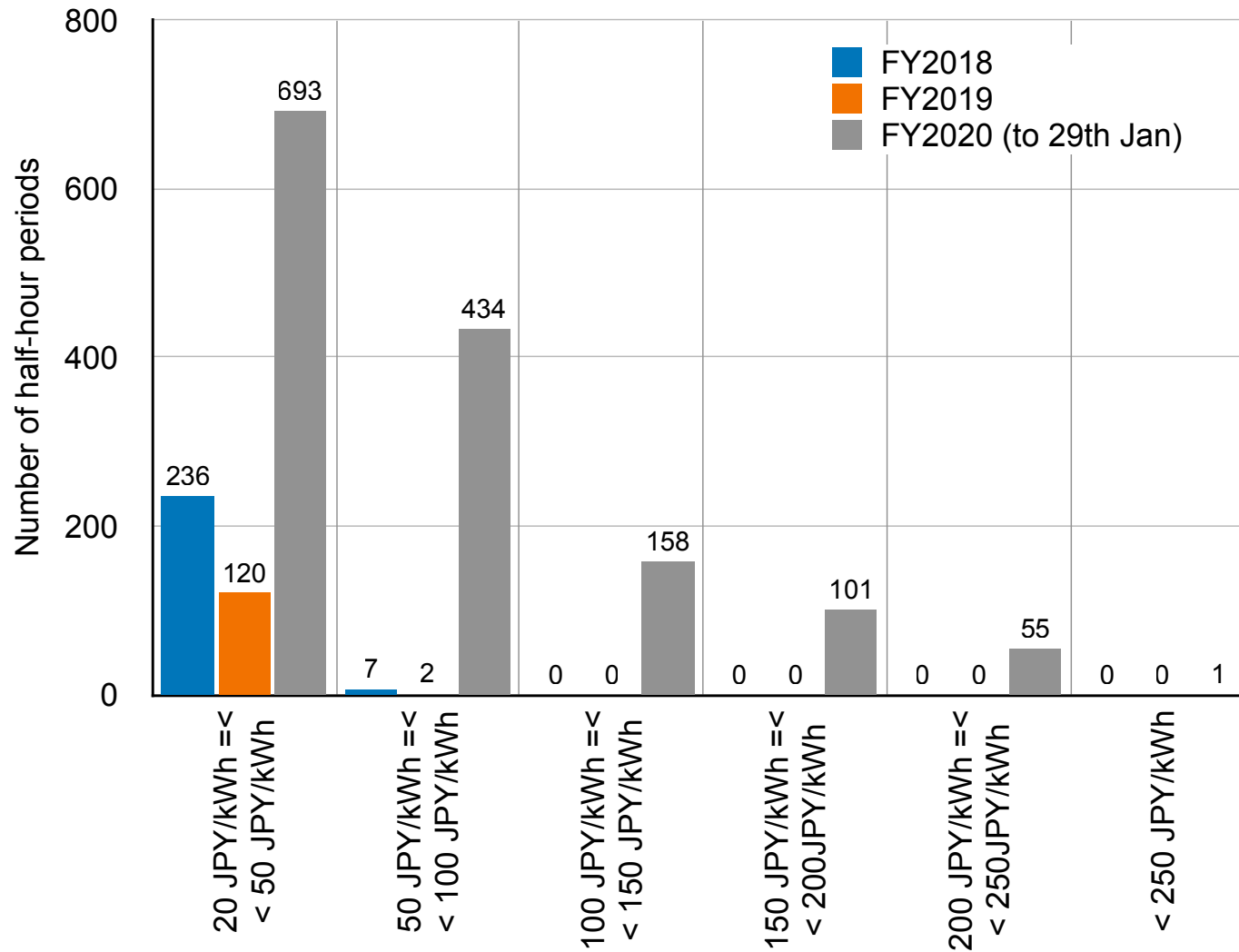
(Source) J. Ellison: Challenging Winter Ahead for Triad Season (2017)

<https://www.eic.co.uk/tag/energy-market/>

OFFGEM: State of Energy Market 2017 Report (2018)

https://www.ofgem.gov.uk/system/files/docs/2017/10/state_of_the_market_report_2017_web_1.pdf

+ Frequency of high prices in JEPX



+ Causes of the event: breakdown

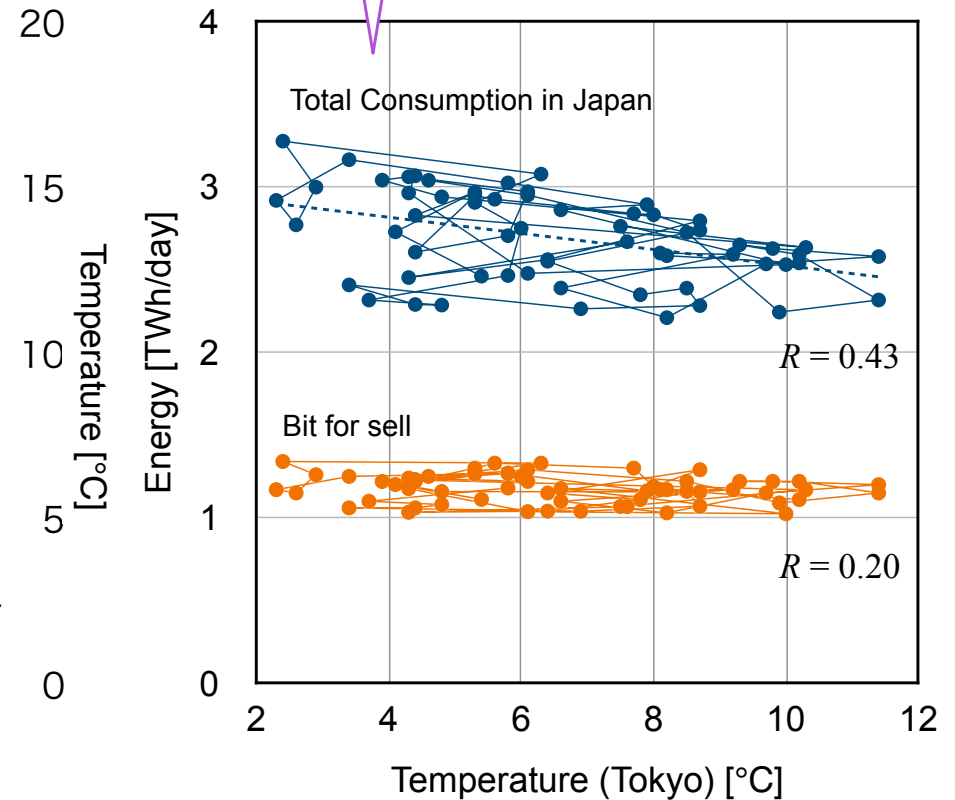
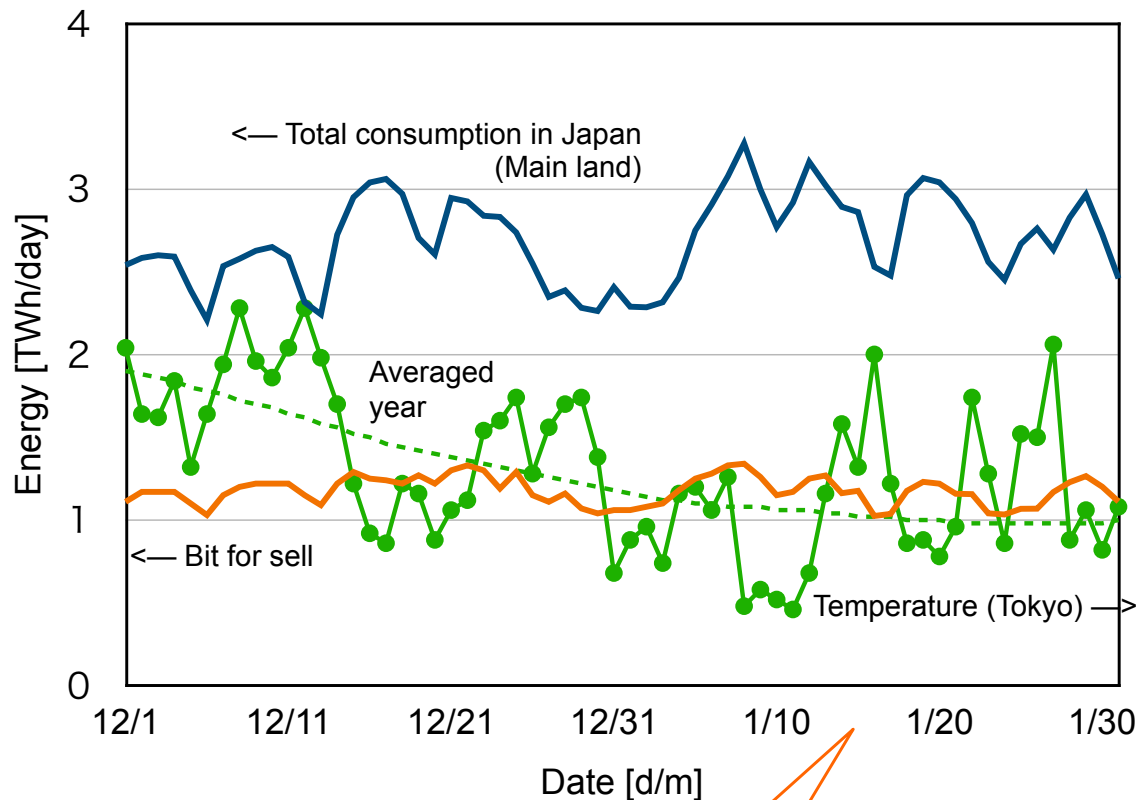


- **Primary cause:** generators
 - Sudden reduction of bids for sell in market
 - “Sold out” over three weeks
 - Extraordinary situation in market
- **Secondary cause:** market operators/
regulators
 - Immature monitoring on market power
 - Immature imbalance prices
- **Tertiary cause:** retailers
 - Prisoner’s dilemma
 - Lack of Demand Response

+ Due to Cold Weather?



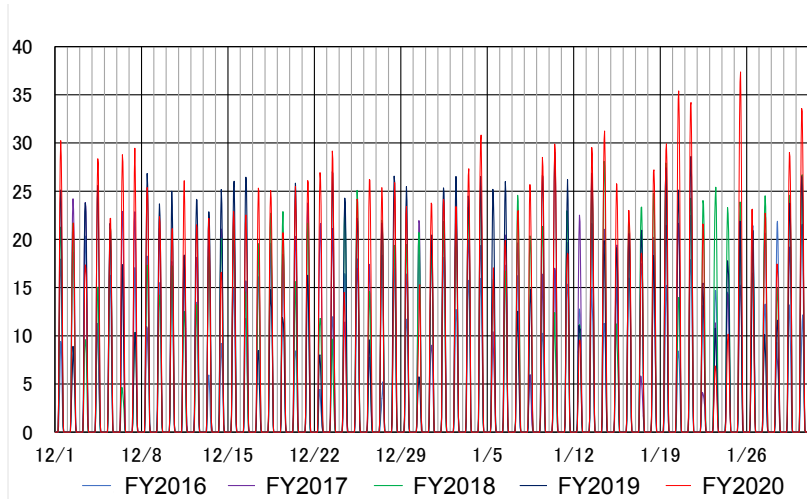
No correlation between temperature and bit for sell



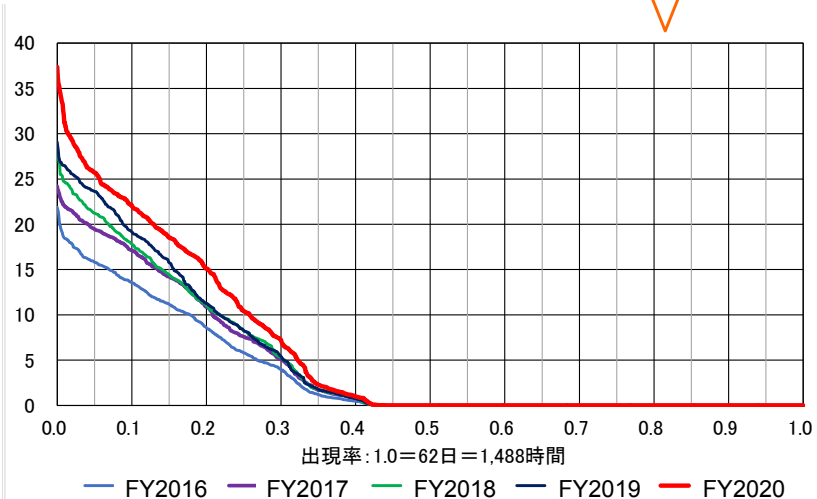
Not so extreme wether during the event

+ Due to PVs?

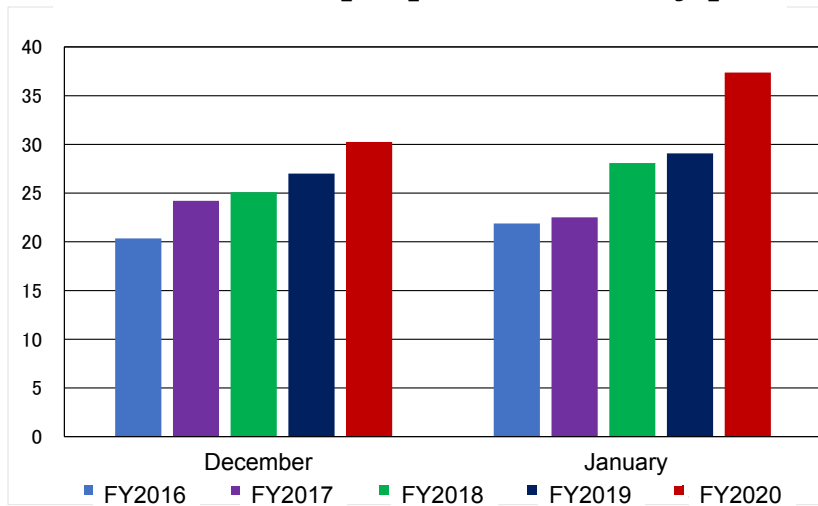
Some articles argued the event was caused by “unstable” PVs...



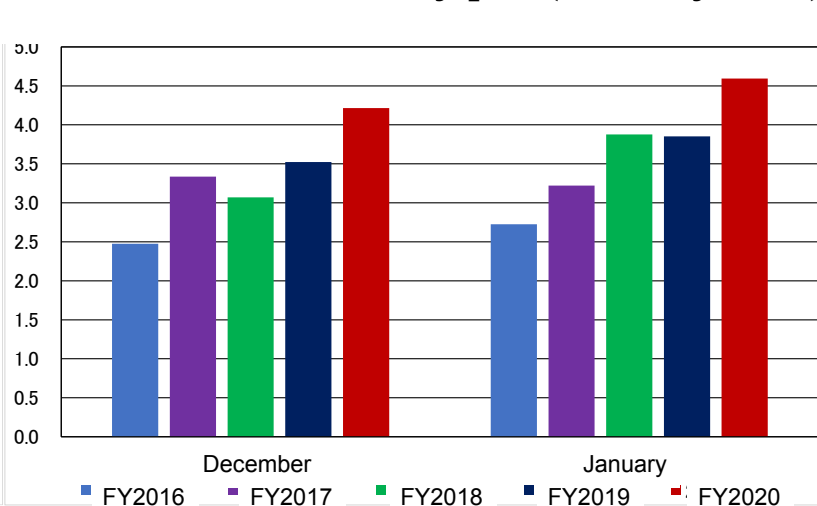
Time-series output power of PV in Japan



Duration curve of PV in Japan (Dec.20-Jan. 21)



Maximum output power of PV in Japan



Generated Energy by PV in Japan

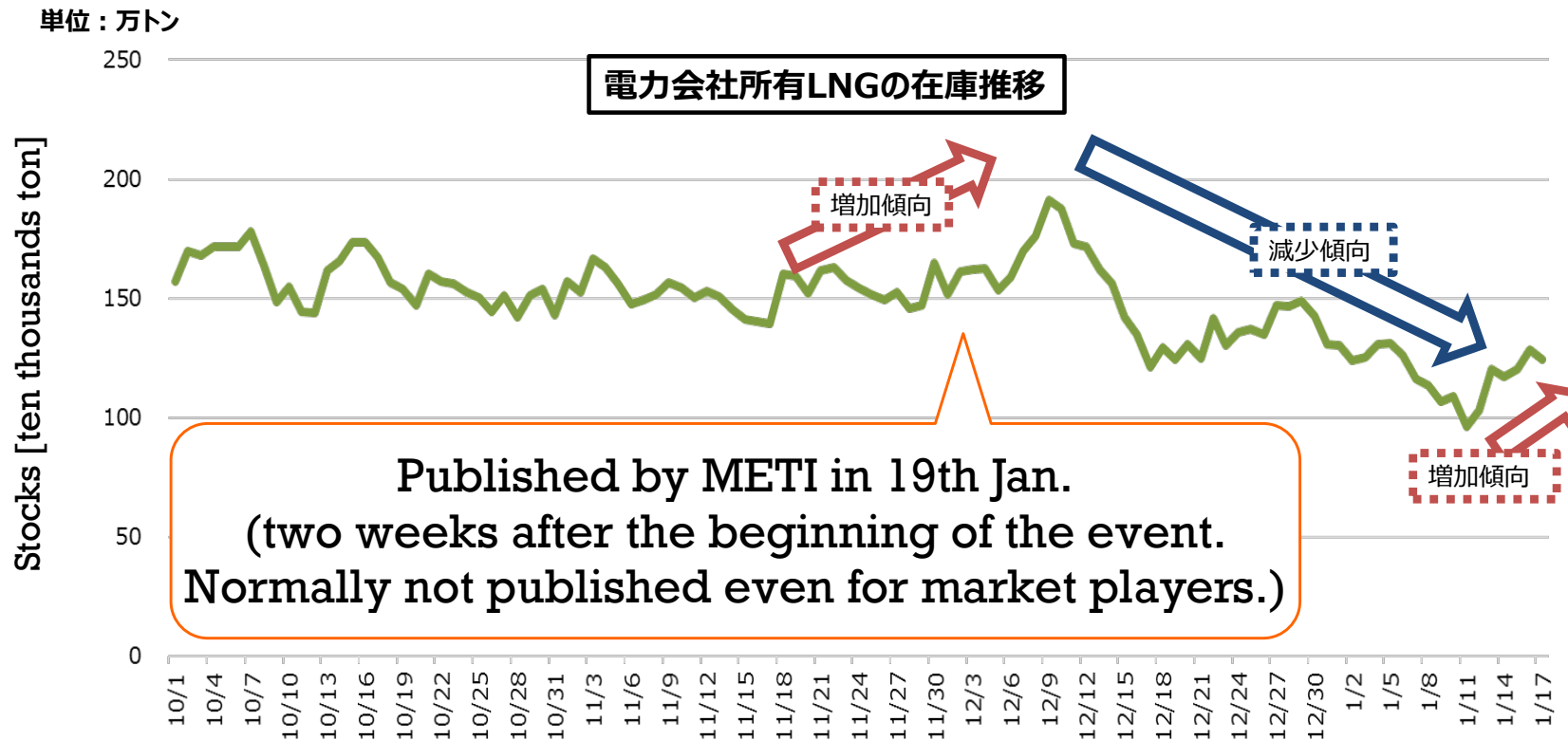
... but it has been denied.

+ Due to lack of LNG stocks ...?



LNGの在庫の推移

- 12月上旬までは冬季の需要増に備え、LNG在庫量は全国的に増加傾向であったが、**電力需要が例年に比べて大幅に増えたこと等により、12月中旬以降大幅に下落。**
- **1/10頃が在庫下振れのピーク**であり、12月上旬の水準までは戻っていないものの、**在庫量は回復傾向。**



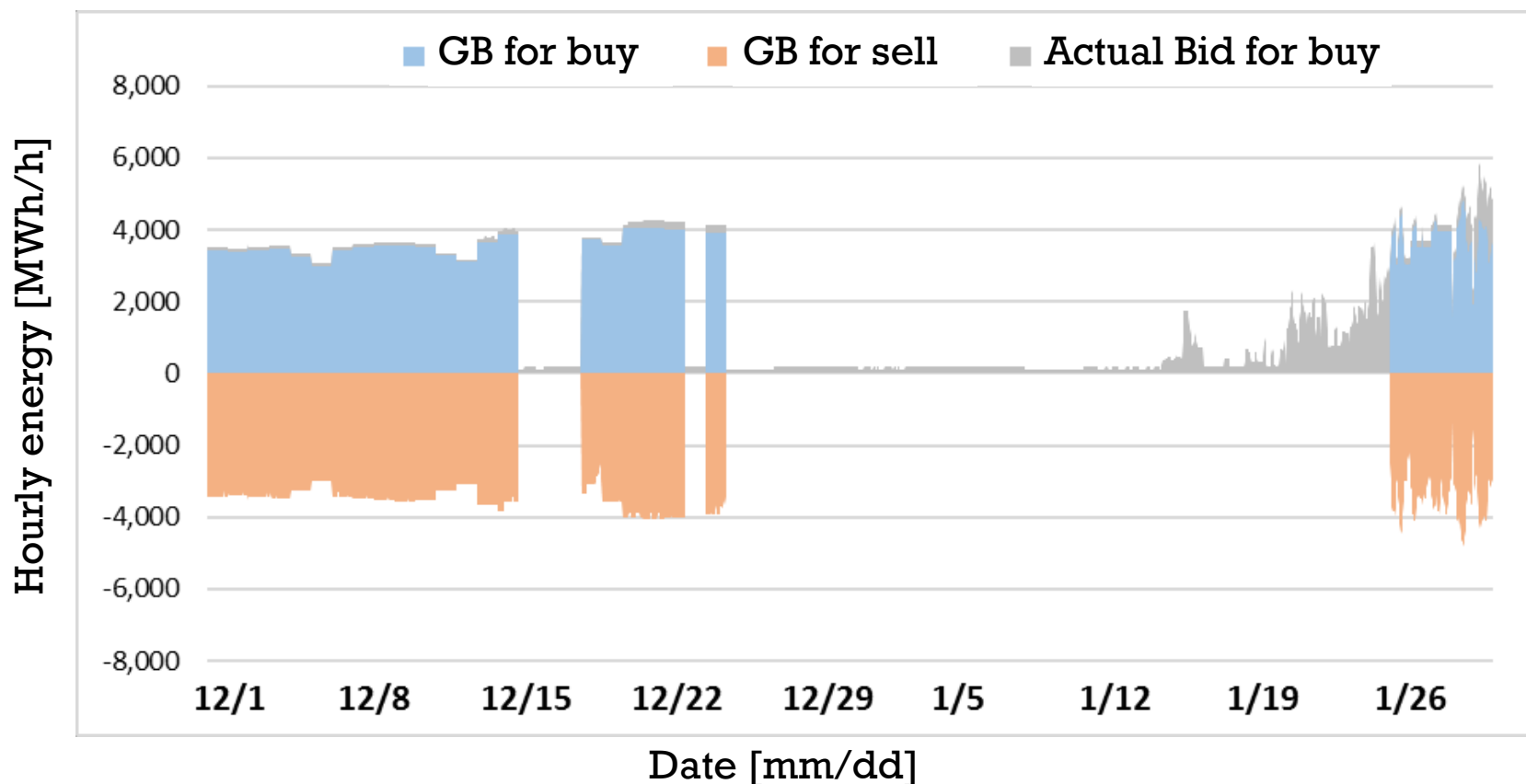
※旧一般電気事業者へのヒアリングを元に資源エネルギー庁作成



Extraordinary behavior by one of the Big-9



Gross-bidding trading in JEPX by Kansai EPCO





Planned outage of nuclear reactors in Kansai EPCO



Annual plan as of Apr. 2020	2020									2021		
	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Takahama 3	- 4th Apr.					2nd Aug. - 22nd Dec.						
Takahama 4							7th Oct. - 10th Feb.					
Ohi 3		8th May - 15th July										
Ohi 4							26th Oct - 9th Jan.					

Actual in Dec. 2020	2020									2021		
	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Takahama 3	schedule delay due to a trouble in steam generator											
Takahama 4							7th Oct. - 10th Feb.					
Ohi 3				schedule delay due to a pipe trouble								
Ohi 4							3rd Nov. - 9th Jan.					

No nuclear reactors restarted

+ Causes of the event: breakdown



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+ Opinion by EMSC (as of Mar. 2020)

16



- Risk of the current gross bidding scheme
 - possibility of **intentional market operation**
- Recommendations:
 - **Non-discriminate behaviors** between market-base and intra-company tradings
 - **Isolation of information** btw generation and retail sections
 - **Transparency**
 - **Unbundling** of generation and retail sections

+ Opinion by FTC and METI

(as of Oct. 2020)



- In case a power generator which used to be a General (Monopoly) Power Utility in the area **does not supply, or restricts the quantity of electricity supplied electricity**, to a wholesale power exchange unreasonably and thereby prevents other retailers from procuring electricity from the wholesale power exchange, which may make it difficult for them to conduct their business activities, etc., such **a case may be illegal** (private monopoly, refusal to deal, etc.) **under the Antimonopoly Act.**

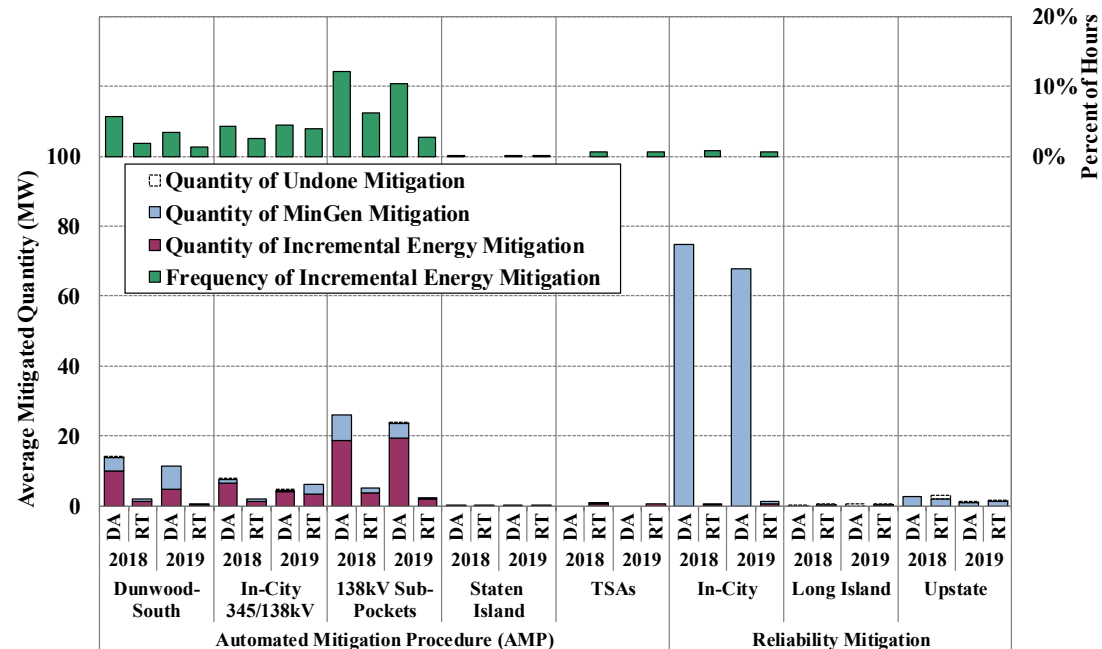
Tentative Translation by Y. Yasuda

+ Monitoring on market power



- So far in Japan, there are no automatic mortaring system such as ATP (Automatic Mitigation Procedure) in NYISO.
- Only manual and *ex post fact* monitoring schemes are under discussion.

Figure 6: Summary of Day-Ahead and Real-Time Mitigation
2018 - 2019





Q&A on Insider Information

(as of Oct. 2020)



- Q2-1
What is an **insider information** in electricity business?
- A2-1
It is the fact that on planned and unplanned outage in a generator unit over 100 MW in approval output, **output reduction over 100 MW** and so on.
- Q6-5
Is an **output reduction due to fuel restriction** an object of publication?
- A6-5
In case the output reduction over 100 MW is reasonably estimated to **continue more than 24 hours** from fuel stocks, it is an object of publication.

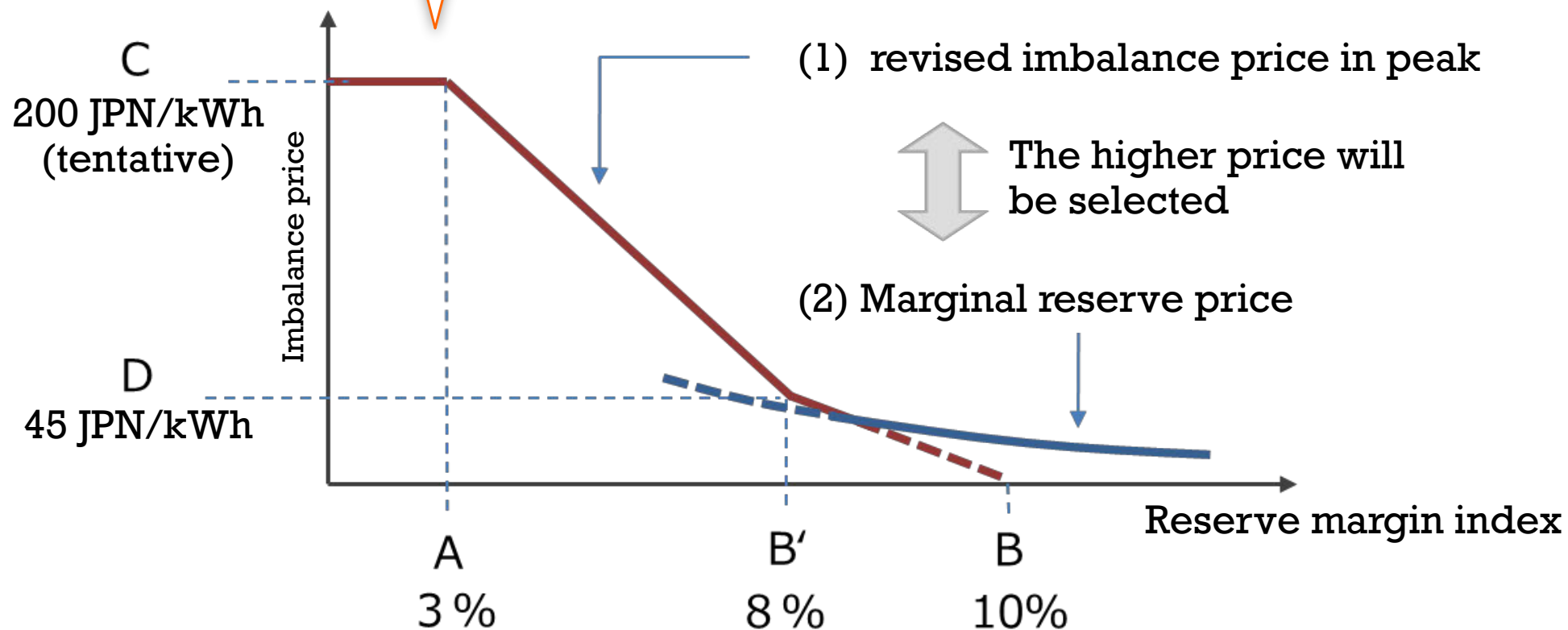
Tentative Translation by Y. Yasuda

(source) <https://www.emsc.meti.go.jp/info/business/insider/pdf/20201007001.pdf>

+ Imbalance price



Discussion on improvement of imbalance price has been done in EMSC.
However, its enforcement is planned in 2022.



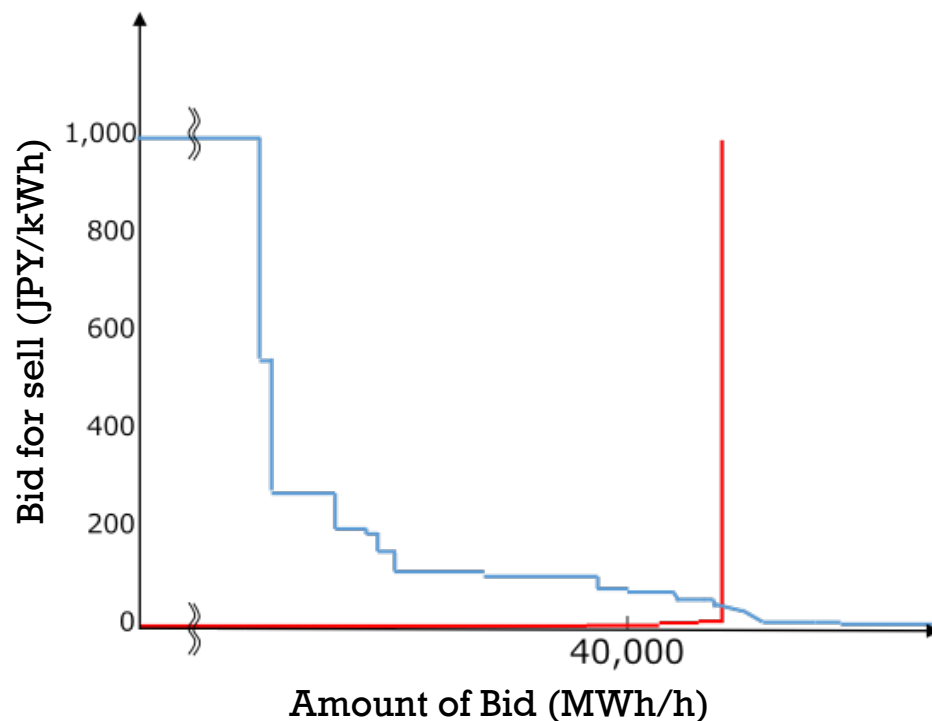
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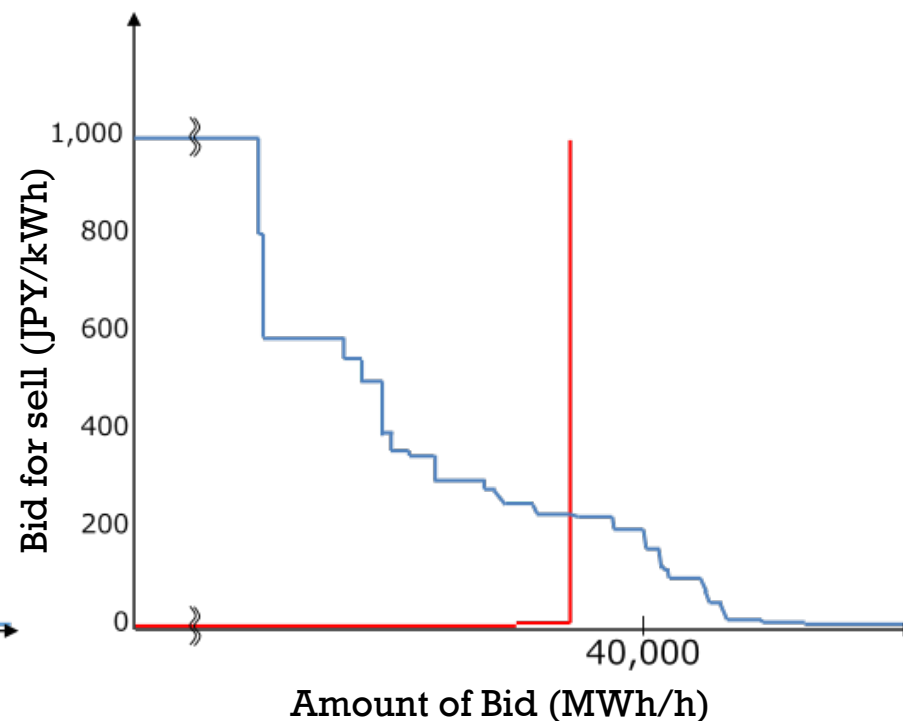


Samples of supply and demand curve in the event

Case 1: under 50 JPY/kWh



Case2: over 200 JPY/kWh



※ 入札量および価格の粒度については調整を実施。

※ 999円部分の買入札には、既存契約の自動入札分（ベースロード市場、先渡市場）、買いブロック約定分、グロスビディング高値買戻し分等が含まれる。

0.01円部分の売入札には、既存契約の自動入札分（ベースロード市場、先渡市場）、売りブロック約定分、再エネ、グロスビディング売り分等が含まれる。

+ Conclusions



- The event where high spot prices **continued for three weeks...**
 - was not due to extreme weather.
 - was no due to “unstable” PVs.
 - was argued to be caused by shortage of **LNG** stocks.
 - was originally caused by troubles in **nuclear reactors**.
- There are **few fail-safe schemes** in market so far in Japan.
 - non-discriminately and transparency: **poor**
 - automatic monitoring on market power: **non**
 - publication of insider information: **loophole**
 - imbalance price: **before improvement**
- Market design and regulation should be improved for fair and transparent trade of electricity.



Market related tail event in Japan

Thank you for your kind attention!
yasuda@mem.iee.or.jp

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