

A QUESTIONNAIRE SURVEY OF MARKET PARTICIPANTS' VIEWS ON THE VITALIZATION OF THE JAPAN ELECTRIC POWER EXCHANGE

Toru Hattori*

Kenta Ofuji**

Misao Endo*

Ken Furusawa*

* Socio-economic Research Center, Central Research Institute of Electric Power Industry

** Department of Computer Science and Engineering, The University of Aizu

ABSTRACT

It has been argued that vitalizing the wholesale power market is one of the most important issues in the restructuring of the electricity industry in Japan. The trading volume in the spot market has been quite small relative to the total demand for electricity, thereby generating causes for concern about market liquidity. In this paper, we examined the potential for vitalizing the power exchange by administering questionnaire surveys to obtain market participants' views on the same. While there is an indication that the market still lacks liquidity, some market participants considered that the current level of trading volume in the spot market is adequate. One of the major problems concerning the institutional factors, which are indicated by our survey, is to be addressed by a planned establishment of the balancing market. The participants consider the limited interconnection capacity between the regions and the similarity of generating fuel mix to be less relevant. The trading rules and the operation of the JEPX are considered to be less relevant except for the potential of uneconomical scheduling in the spot market. The individual circumstances of the market participants are also relevant, including capacity constraints and the inability of managing price risk.

1. INTRODUCTION

Following the global trend of liberalized electricity trading, Japan established its first power exchange market called the Japan Electric Power eXchange (JEPX) in April 2005. Market participants are now able to sell and buy wholesale power at the exchange. JEPX

operates in the day-ahead spot market and the standardized forward market. It was expected that the exchange would generate competitive prices for wholesale power to facilitate competition. Although the trading volume has increased since the commencement of JEPX, the percentage share of trading volume in the spot (day-ahead) market based on the total demand for electricity has only been 0.3–0.4%, as illustrated in Table 1. In order to make a fair comparison at the international level, it is important to consider the differences in the network topology and the trading environment among countries; nevertheless, Japan’s percentage share of trading volume is deemed to be relatively low. The trading activity in the forward market thus far remains even more marginal. Thus, vitalizing the wholesale market becomes one of the most important issues in the restructuring of the electricity industry in Japan. In fact, the advisory committee of the electric utility industry at the Agency of Natural Resources and Energy revised its recommendations in the Fourth Electricity Policy Reform proposed in 2007, stressing that further “vitalization” of JEPX is needed to facilitate more liberalized trading. Yet, there has been no detailed analysis on the factors that generate a low level of trading activity.

Table 1
Comparison of Traded Volume in the Physical Spot Market
as Ratios to the National Total Demand of Electricity

	(A) Traded volume, physical spot market (TWh, 2007)	(B) National consumption (TWh, 2007)	Ratio (A/B) (%)
EEX (Germany)	117.3	556	21.1%
APX NL (Netherlands)	20.7	117	17.7%
Powernext (France)	44.2	480	9.2%
Belpex (Belgium)	7.6	90	8.4%
EXAA (Austria)	2.3	67	3.4%
APX UK (UK)	11.0	327	3.3%
Towarowa (Poland)	2.5	142	1.7%
JEPX (Japan)	2.3	882	0.3%

Sources: Web sites of Various Power Exchanges

The purpose of this paper is to analyze the issues related to vitalizing the wholesale electric power exchange in Japan and identify the factors that would increase the trading volume at JEPX. We focus on the trading activity in the spot market because the liquidity of the spot market is critical for the forward market to be active. We examined the extent to which the trading volume could be increased by administering a questionnaire survey to market participants so as to gauge their views on the vitalization of the JEPX. This survey was prepared based on a preliminary study involving phone and in-person interviews with market participants. Although similar surveys are available (for example, [1]), to our

knowledge, this is the first independent survey conducted for the Japanese wholesale electricity market. The paper is organized as follows: After a brief description of deregulation in the Japanese electricity industry in section 2, we explain the design of the questionnaire survey in section 3. We then discuss our findings in section 4 and the prospects for increasing trading volume in the market in section 5. The final section concludes our analysis.

2. DEREGULATION AND THE MARKET ENVIRONMENT IN JAPAN

2.1 Overview of Deregulation and JEPX

Up till 1995, the Japanese electricity industry was long dominated by nine privately-owned, vertically-integrated electric utilities¹. They were regulated as regional monopolies in the retail market. In the generation sector, there have been two large wholesale generators as well as small generators owned by municipalities. Large industrial customers typically own self-supply generators and account for about 15% of the total electricity generated in Japan.

Deregulation of the Japanese electricity industry started in 1995 that introduced competitive bidding for new generating capacity so as to allow for the new entry of the Independent Power Producers (IPPs). In 2000, the retail market was partially liberalized and those who wanted to supply electricity to large-scale customers (connected to an extra-high voltage system of 20 kV and above with a contract demand of 2,000 kW and above) could do so as Power Producers and Suppliers (PPSs). Deregulation in Japan has not accompanied organizational unbundling, and hence, the transmission function has been retained within each incumbent utility as Transmission Divisions. The PPSs therefore use transmission (wheeling) services provided by the electric utilities. The eligible customer base has been subsequently expanded to customers connected to high voltage system of 500kW and above and later 50kW and above.

In April 2005, the wholesale electricity exchange JEPX opened to facilitate the trading of short-term surplus power among various market participants and to supplement the bilateral contracts that remain the most common type of electricity transaction². By April 2009, the number of participating companies in JEPX rose to 44, which was 27 at the exchange's opening, although the overall trade volume remains less than about half a percent of the country's total electricity demand. Nevertheless, the market is expected to grow to

¹ The 10th electric utility, which serves Okinawa Island, is not interconnected with other electric utilities on the main islands of Japan.

² Before JEPX started its operations, PPSs were allowed to participate in the so-called economic inter-utility trading (i.e., power interchanges for the sake of economical operations) by modifying the rules of its operations in April 2001. This trading was carried out to exchange solely marginal supply capabilities to reduce cost. Trading arrangements were made twice a day, during a 30-minute trading period (with a minimum one-hour requirement).

become the country's central power exchange.

2.2 The Current Profile of JEPX

JEPX opened with two markets, the day-ahead spot and the standardized forward markets, and it also has the bulletin board platform for forward bilateral contract. In June 2006, in the standardized forward market, JEPX introduced weekly block commodities in addition to monthly block commodities. Since November 2008, it has launched an experimental green certificate market where green electricity certificates and Kyoto emission reduction credits can be traded. In 2009, it further plans to introduce an hour-ahead market, where balancing energy of up to four hours ahead of delivery can be traded. Figure 1 summarizes the history of JEPX's market variety. At the moment, trading membership is limited to those who deal with physical electricity. In this paper, we focus on the spot market, since it plays a central role in the power exchange.

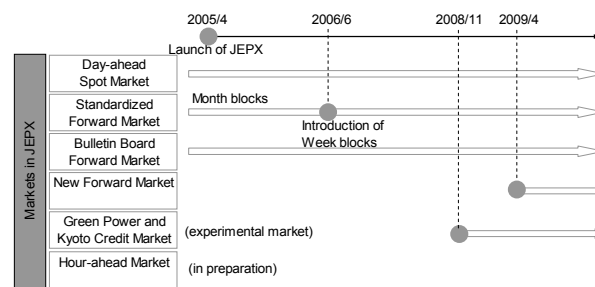
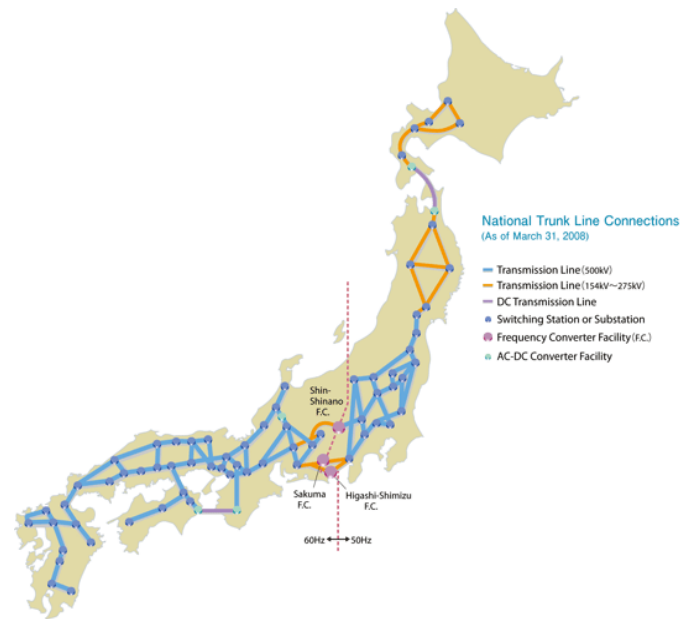


Figure 1
Historical Development of Markets in JEPX

The spot market deals with forty-eight, 30-minute strips per day of next-day electricity. Due to the country's two different frequency zones, the gross buying and selling bids will be split into multiple regions in case of transmission congestions at the interconnections. The Hokkaido and East-Japan grids operate at 50Hz and West-Japan grids operate at 60Hz, as shown in Figure 2. There are frequency converter facilities at the connection points between the 50 and 60Hz regions, where transmission congestions occur most frequently³.

³ At three interconnecting points between the country's 50 and 60Hz zones, there are frequency conversion stations (FCs). Power semiconductor devices installed in these FCs allow electricity to flow into either frequency zones. Despite this, the two zones are asynchronously operated. For example, if power sold in the 50 Hz zone is bought in the 60Hz zone at JEPX, it flows through one of these FCs. As of July 2009, the three FCs' gross operable capacity is limited to 1,000MW. In addition, not all of this capacity can be used for JEPX transactions because some of the capacity must be reserved for pre-existing inter-utility contracts and the emergency margin. When JEPX receives a large amount of bid and offer volumes that would result in the inter-zonal power flow exceeding this FC capacity limit, it treats the 50 and 60Hz zones as two different markets ("market splitting"), until the inter-zonal flow reduces to less than the FCs' capacity limit. It is sometimes argued that due to this FC capacity limit, trading may be



Source: Federation of Electric Power Companies

Figure 2
Transmission Lines in Japan

The historical record of prices and traded volumes, as well as buying and selling bid volumes, are posted on the JEPX website. Figure 3 shows the daily index prices DA-24 and DA-PT in solid lines⁴ from April 2005 to March 2009. As can be observed from the figure, the prices have clear seasonal and weekly cyclic variations as those of other exchanges in the world, and these prices occasionally have spiky peaks correlating with high electricity demand such as in September 2007.

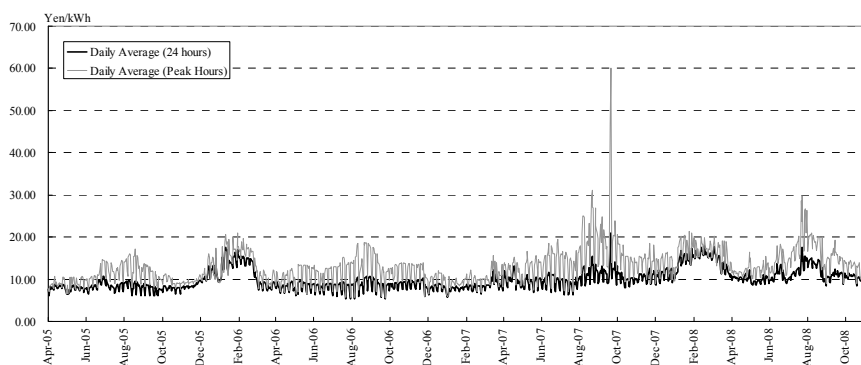


Figure 3
Development of daily system price indices (24 hours and peak hours) of the spot market of JEPX (2005 – 2008 FY)

discouraged at JEPX.

⁴ The index DA-24 is the gross average of system prices throughout the 24 hours of each day. DA-PT is the “peak price,” or the three-hour average from 13:00 to 16:00 each day.

Figure 4 shows the monthly traded volumes in bars of the spot market in the same period. The dotted line in the figure shows the targeted volumes declared when the exchange was launched. Clearly, the traded volumes appear to have a growing trend over time, almost leveling with the targeted volumes (shown in the dotted line) that were declared at the exchange’s launch. Part of this growth may be attributed to the increasing number of players, which are 44 as of April 2009.

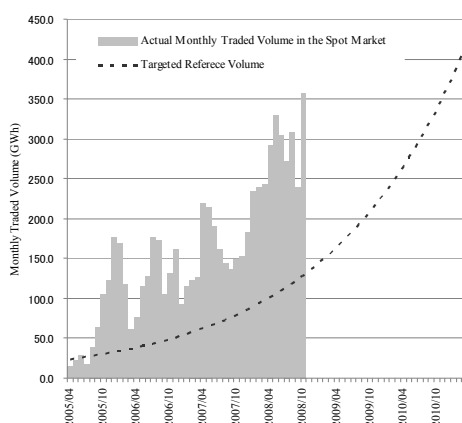


Figure 4
Development of Monthly Traded Volumes (in bars) against the Targeted Reference Volumes (in dotted line) of the JEPX Spot Market

However, the market is still reputed to be suffering from sluggish volumes, particularly evident when compared with exchanges in other countries (Table 1). There is a debate as to what percentage of the national consumption will duly be expected for trading, but the ratio of traded electricity divided by the national consumption of 0.3% of JEPX appears to be lower than the counterparts in other countries. It is difficult to make any judgments as to the market liquidity solely based on the trading volume⁵. Yet, it is worthwhile investigating the causes preventing more active trading, and this will be the key issue behind our survey in the remainder of this paper.

3. DESCRIPTION OF SURVEY

We have administered a survey in order to understand the views and perceptions of the market participants with respect to the vitalization of the market. As part of the survey, we first conducted interviews with 12 market participants (including two telephone interviews), taking a cross sample of the incumbent electric utilities, Power Producers and Suppliers,

⁵ See Newbery, et al. (2003) for a more detailed discussion on market liquidity in the electricity wholesale market.

self-supply generators, and financial intermediaries. A questionnaire of six pages with mostly multiple-choice questions was prepared based on the information obtained by the interviews. The survey was conducted by sending the questionnaires to all the 40 registered market participants of JEPX (as of August 2008) by mail in November 2008. We asked that the survey be completed by the employees who actually engaged in power trading and not by the management. Hence, the views expressed within the survey do not necessarily reflect the official views of the individual participating company. Twenty nine participants, out of 40 companies on the participant list, returned the questionnaires by the end of December 2008. This number corresponds to a return rate of 72.5%. All the responses were utilized for the data analysis.

Prior to inquiring into the possible reasons for the low level trading activity in the JEPX spot market, the respondents were asked to state whether they were actually participating in the power trading in the spot market of JEPX. As shown in Figure 5(a), most of the respondents have actually traded in the spot market⁶. The respondents were then asked to state their views on the trading volume in the spot market. As shown in Figure 5(b), about 60% of the respondents thought that the trading volume was either “small” or “very small.” Yet, 30% of the respondents thought that it was either “appropriate” or “very large,” perhaps reflecting the fact that the trading volume has increased over the last four years and is expected to reach a target of 4 billion kWh in FY 2010, which was declared at the opening of the exchange⁷.

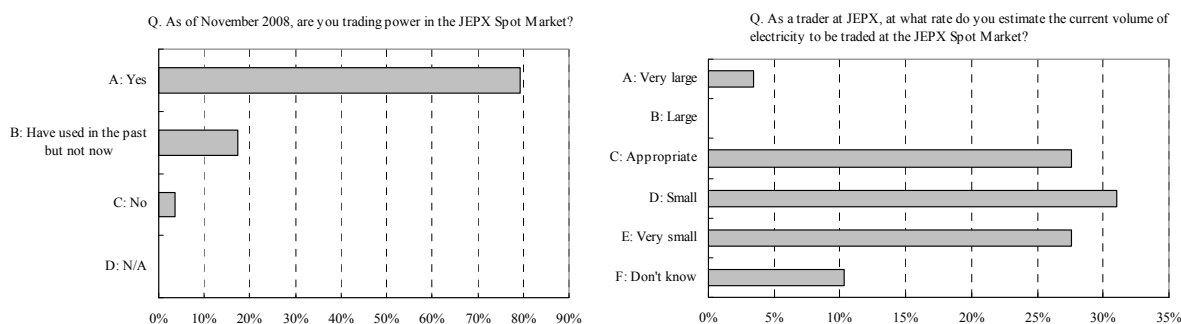


Figure 5

(a) Participation in the JEPX Spot Market (Left) and (b) Respondents' Views on the Traded Volume in the JEPX Spot Market (Right)

We also asked whether the respondents have ever felt a significant price change in response to a substantial change in the amount of their own bid or offer, i.e., a market impact.

⁶ We asked the same question with respect to the standardized forward market and found that 40% of the respondents have never traded in the forward market.

⁷ We also asked the same question with respect to the standardized forward market and found that most respondents have indicated that the trading volume is either “small” or “very small.”

As indicated in Figure 6, about 40% of the respondents have actually experienced such an event, with “sometimes” implying inadequate depth of the market and lack of liquidity.

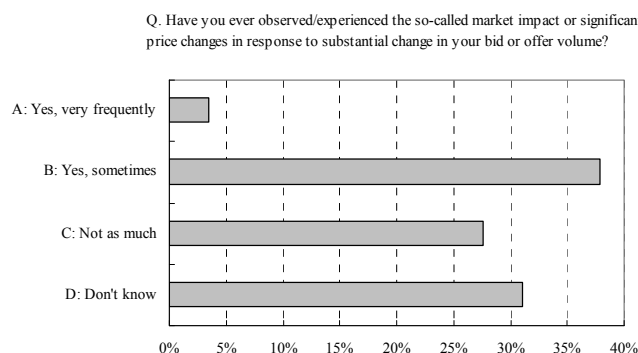


Figure 6
Experience of Market Impact in the JEPX Spot Market

4. MAJOR FINDINGS

On the basis of the interviews previously conducted, we selected 22 factors that resulted in the possible low level trading activity thus far. We asked the respondents to rate the relevance of each possible factor as a reason for preventing the vitalization of the spot market of the JEPX. We scored each response in the following manner:

1. Not at all relevant (-2 points)
2. Somewhat irrelevant (-1 point)
3. Neither relevant nor irrelevant (0 point)
4. Somewhat relevant (1 point)
5. Very relevant (2 points)

The total points are calculated based on all the responses for each of the 22 possible factors. Figure 7 lists the responses in the order of the total points. Below we discuss in detail the factors considered relevant and irrelevant by the market participants in the JEPX.

4.1 Relevant Factors Hindering the Vitalization of the JEPX

The respondents considered the following, “possibility of intermittent operation as the auction was conducted for every half hour,” as being most relevant in hindering the vitalization of the JEPX. According to the current trading rules, the participants must bid in each time period (every half hour) and should not impose constraints to secure continuous operation for some multiple periods. Although this is regarded as being the most relevant

according to our scale, relatively few respondents indicated “Very relevant”; instead, many respondents (52%) indicated that it is “somewhat relevant.” In addition, some respondents indicated that it is possible to avoid such an intermittent operation by bidding at slightly lower prices. Thus, many participants do not seem to consider this as quite problematic.

Q: Given that the causes for the JEPX Spot Market have not been vital thus far, as a trader, to what extent do you consider the following potential causes to be relevant?

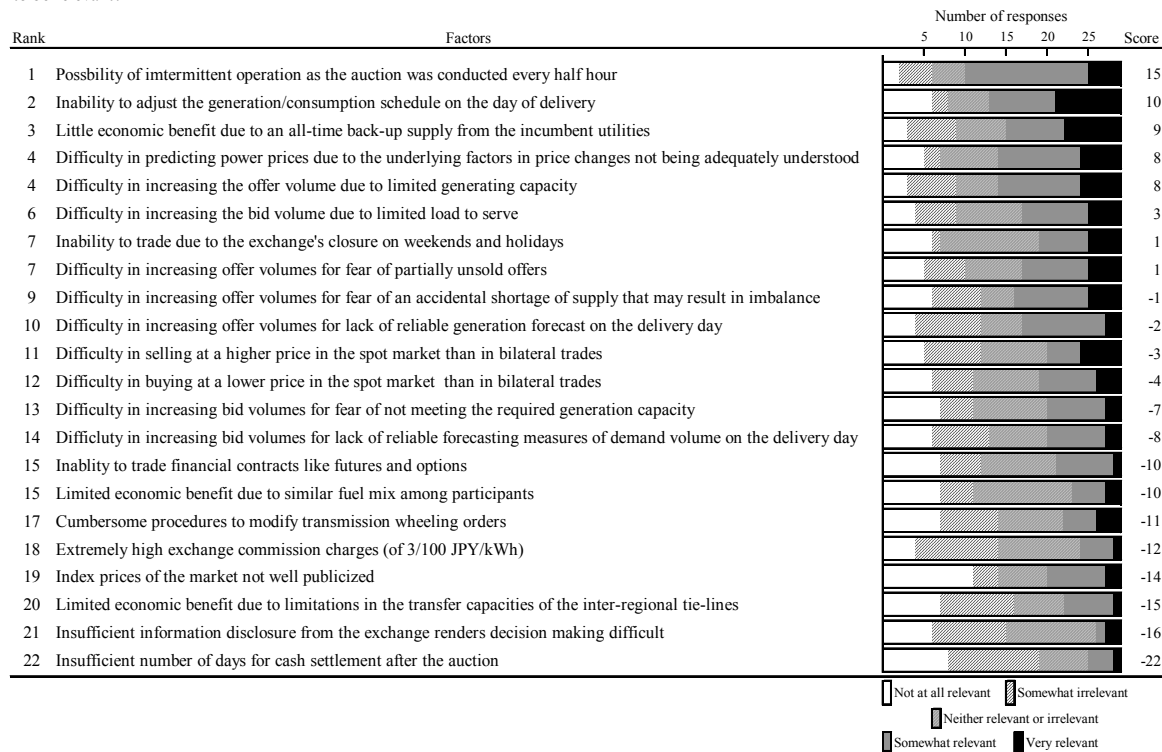


Figure 7

Factors Responsible for the Low Level of Trading Activities in the JEPX Spot Market

The next relevant reason is the “inability to adjust the generation/consumption schedule on the day of delivery,” due in part to the lack of a balancing or intra-day market at the time of our survey. To avoid the generation/consumption adjustment, precise forecasting is required for both generation and consumption. Demand forecasting, however, (much more so than generation forecasting) is essentially a difficult task. It is common knowledge that to forecast the power demand even one hour ahead requires seasoned expertise. Yet, as the balancing market, or the new hour-ahead market, is planned to be established within FY 2009, this might be less relevant in the future. Note that this is one of the institutional factors that affect the trading activity in the spot market. Another highly relevant reason is related to “little economic benefit due to the existence of an all-time back-up supply⁸ from the

⁸ The “all-time backup supply” is a service introduced in 2000 at the time when the retail electricity market was being partially liberalized. The incumbent utilities provide PPS with “back-up supply” at a predetermined supply rate agreed between the incumbents and the PPSs. This service was implemented to support new entrants, especially in their early stage of growth so as to facilitate competition.

incumbent electric utilities.” Note that this is another institutional factor outside the wholesale market operation, suggesting that the institutional framework of the electricity market as a whole is quite important for vitalizing the wholesale market. The respondents also considered the following to be relevant: Difficulty in predicting power prices as an underlying factor of price changes is not being adequately understood. Although insufficient predictability may be explained by the lack of market liquidity, it is well known that the behavior of the power price is quite different from that of other commodities. This result suggests that the market participants are not accustomed to managing risk that is specific to power price.

The following relevant factors “difficulty in increasing the offer due to limited generation capacity” and “difficulty in increasing the bid due to limited load to serve” imply that many respondents already trade their maximum possible volume and there is inadequate scope to increase the trading volume. Such a capacity constraint will be resolved in the future; however, this change may be slow due to the construction lead time.

According to some respondents, trading would be more vitalized if the JEPX were to allow trading on weekends and holidays. The JEPX day-ahead market participants are required to conduct a demand forecast one day in advance every weekday and two-or-more days in advance before every weekend. Understandably, the risk associated with the forecast error is impassable for the delivery on Monday. At the moment, however, the trading volume on Monday, for example, is not as small as those of other weekdays (only 3%). Thus, the effect of opening the JEPX on weekends and holidays would be marginal.

The respondents fear that a fraction of their offer would remain unsold due to the lack of depth in the market. In fact, in the three-year average from FY 2005 to FY 2007, the amount of offer has frequently been greater than the amount of bids. Some respondents consider the risk associated with the imbalance charge to be relevant. The structure of the imbalance charge was modified recently so as to ease the burden of new entrants, and their risk of imbalance is currently assumed to be smaller.

4.2 Irrelevant Factors Hindering the Vitalization of the JEPX

Factors that are related to the operation of the JEPX are considered as rather irrelevant for preventing vitalization, such as the short period of time till settlement (ranked at 22), insufficient amount of information disclosed to the participants (ranked at 21), and high transaction fee (ranked at 18). It is interesting to note here the role of information disclosure. It is generally believed that more information disclosure would help increase market liquidity, but our result suggests that the current participants are quite satisfied with the level of information disclosure from JEPX.

Factors that are related to the physical aspects of the assets are not considered as very

relevant, such as limited available transmission capacity of interconnections and similarity of generating fuel mix. It is especially important for policy makers to ensure that the capacity expansion of frequency converters—which is sometimes argued as necessary for vitalizing the wholesale market—should not be considered as a necessarily urgent issue among the market participants.

Although there presently is a lack of opportunity to trade financial contracts such as futures and options in the JEPX, this is also considered rather irrelevant for vitalizing the spot market. It is generally said that availability of financial contracts facilitates active trading; however, the market participants do not really think that financial instruments are crucial for active trading.

4.3 Some Remarks on Differences in Opinion among the Respondents

In order to examine the differences in opinion among the respondents, we will examine the responses of a subgroup who are relatively less satisfied than the entire group. The subgroup, or the conditional respondents (CR), comprises those respondents who were trading at the JEPX (A. or B. in the Figure 5(a) question) and who considered the traded volume to be either “small” or “very small” (C. or D. in the Figure 5(b) question). The CRs may be strongly dissatisfied by some of the factors as compared to the overall respondents. It may be worthwhile to focus on such factors that the CRs consider necessary for further vitalization.

Figure 8 lists the factors in the order identical to those in Figure 7. The CRs’ responses are indicated by “*,” while the overall responses are marked as shaded cells. It is clear that the CRs consider some factors to be differentially relevant. For example, the factor on the seventh rank, “Difficulty in increasing offer volumes for fear of partially unsold offers” and “Difficulty in increasing offer volumes for fear of an accidental shortage of supply that may result in imbalance” show that the CRs are particularly concerned about the potential of unsold offers and imbalance charges. “Difficulty in buying at a lower price in the spot market than in bilateral trades” means that the CRs find it easier to use bilateral contracts than the JEPX for low prices. “Cumbersome procedures to modify transmission wheeling orders” and “Insufficient information disclosure from the exchange renders decision making difficult” also show that the CRs are less satisfied than the overall respondents with the transmission divisions and the JEPX for each reason, but the rankings of these factors remain relatively low. The CRs regard the abovementioned factors as more relevant for vitalizing the JEPX volume.

We will now examine the factors of low relevance rated by the CRs. The factor on the third rank, “Little economic benefit due to the existence of an all-time back-up supply from the incumbent utilities,” is regarded as less relevant by the CRs. Other factors thought less

relevant by the CRs are “Difficulty in increasing bid volumes for lack of reliable forecasting measures of demand on the delivery day,” and “Inability to trade financial contracts like futures and options.” These show that the CRs consider that the financial instruments will not make substantial contributions.

Rank	Factors	Orders of the Contidional Respondents																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	Possibility of intermittent operation as the auction was conducted every half hour		*																				
2	Inability to adjust the generation/consumption schedule on the day of delivery	*																					
3	Little economic benefit due to an all-time back-up supply from the incumbent utilities									*													
4	Difficulty in predicting power prices due to the underlying factors in price changes not being adequately understood		*																				
4	Difficulty in increasing the offer volume due to limited generating capacity							*															
6	Difficulty in increasing the bid volume due to limited load to serve							*															
7	Inability to trade due to the exchange's closure on weekends and holidays				*																		
7	Difficulty in increasing offer volumes for fear of partially unsold offers		*																				
9	Difficulty in increasing offer volumes for fear of an accidental shortage of supply that may result in imbalance			*																			
10	Difficulty in increasing offer volumes for lack of reliable generation forecast on the delivery day												*										
11	Difficulty in selling at a higher price in the spot market than in bilateral trades												*										
12	Difficulty in buying at a lower price in the spot market than in bilateral trades					*																	
13	Difficulty in increasing bid volumes for fear of not meeting the required generation capacity												*										
14	Difficulty in increasing bid volumes for lack of reliable forecasting measures of demand volume on the delivery day																					*	
15	Inability to trade financial contracts like futures and options																						*
15	Limited economic benefit due to similar fuel mix among participants																*						
17	Cumbersome procedures to modify transmission wheeling orders									*													
18	Extremely high exchange commission charges (of 3/100 JPY/kWh)																			*			
19	Index prices of the market not well publicized																*						
20	Limited economic benefit due to limitations in the transfer capacities of the inter-regional tie-lines															*							
21	Insufficient information disclosure from the exchange renders decision making difficult										*												
22	Insufficient number of days for cash settlement after the auction																						*

Figure 8

Cross Table Citing the Reasons for the Low Level of Trading Activities in the JEPX Spot Market by Actual Participation and Evaluation

4.4 On the Number of Market Participants

Although the number of participants has increased over the past few years since the opening of the JEPX, trading at the exchange would be vitalized if there were more participants. Although the respondents of the survey are the current participants at the JEPX (whether they are actively trading or not), we inquired about the possible reasons behind the limited number of participants.

Many respondents suggested that the restricted eligibility to those who engage in physical electricity trading and the cumbersome procedures of transmission wheeling orders are the key factors that have hindered increases in the participant number (Figure 9). The latter reason is particularly relevant when the market participants aggregate the supply contracts of excess power generated from multiple self-supply generators. However, it was suggested that those interested in electricity trading are already trading members and there is no scope for the number of market participants to increase.

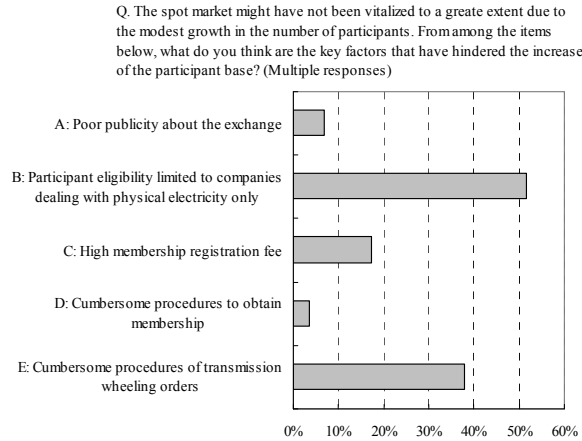


Figure 9
Reasons for the Small Number of Participants

4.5 Expectations about the Impact of the Hour-ahead Market

The original purpose of the planned hour-ahead (balancing) market is to create trading opportunities on the day of delivery. Yet, it could also lead to a more vitalized spot market, as discussed in section 4.2. To examine this possibility, we examined the respondents' expectations on the positive effect of the hour-ahead market. As shown in Figure 10, approximately 60% of the respondents believed that the establishment of the hour-ahead market would "more or less vitalize the spot market." This is consistent with the result discussed earlier that many participants suggested that the inability to adjust the generation/consumption schedules on the day of delivery is relevant as the potential reason for preventing vitalization. Yet, no respondent believed that it would "very much vitalize" the spot market, and 20% of the respondents thought that it would "not vitalize" the market.

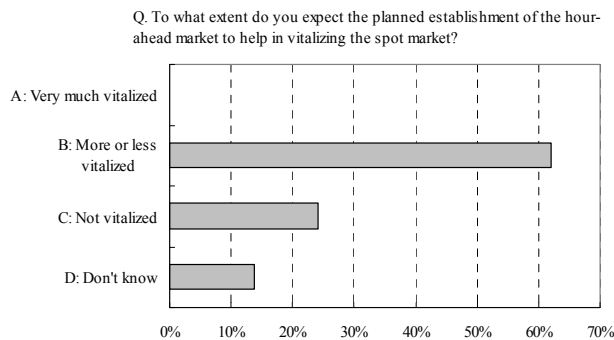


Figure 10
Expectation about the Impact of the Hour-ahead Market on the Vitalization of the Spot Market

5. DISCUSSION

On the basis of the abovementioned results, we can draw several implications for increasing the trading volume and enriching the participant base in the JEPX spot market.

First, the institutional factors are considered to be important among the market participants to facilitate trading in the JEPX. We must recognize that market design facilitating retail competition (by easing new entry) may not necessarily support wholesale market trading such as an all-time back up supply. It is encouraging, however, that at least one of them (inability to adjust the generation/consumption schedule on the day of delivery) has already been addressed by policymakers by establishing the hour-ahead market. This suggests that the trading volume in the spot market may increase in the near future. For example, some ambiguities remain in terms of the effectiveness of the planned hour-ahead market since the imbalance charge was recently revised to be lowered on average, diminishing the need for the hour-ahead market. Nonetheless, it is better than nothing, and we presently need to wait for a future evaluation of the impact of the hour-ahead market on the trading volume in the spot market.

Second, the capacity constraints of the interconnections, particularly at the frequency converters, are not necessarily considered to reduce trading activity in the wholesale market. As already mentioned, this suggests that the capacity expansion of the frequency converters can be given a low priority, even though it is sometimes considered necessary solely for vitalizing the wholesale market. Since such a project is very costly, its benefit must be very large to justify the cost-effectiveness. On the basis of our results, however, we do not expect a significant increase in trading volume as a result of increased transmission capacity.

Third, our results suggest that improving the trading rules and operations of the JEPX may be of limited effectiveness for facilitating trading. In other words, the JEPX could continue its current operation without hindering the potential for more active trading. It is generally believed that low commission charges, sufficient information disclosure, and a long time period for cash settlements facilitate active trading, but they are not given top priority. Although the possibility of intermittent operation due to the current market rule was considered to be a highly relevant reason for a low level of trading activity, this is not necessarily a serious problem as mentioned earlier. It can be remedied by adding constraints when determining the market clearing prices, but the cost effectiveness of such an additional procedure should carefully be examined. The closure of the JEPX on weekends and holidays is also considered as relevant, and opening the market on those days may help increase the trading volume but the impact could only be marginal.

Lastly, some of the individual circumstances of the market participants could affect the trading volume, especially in terms of their own capacity constraints and limited ability to

forecast price or manage price risks. This suggests that the trading volume may not be increased substantially even if the issues in the institutional factors are well addressed, as problems such as capacity constraints and price risk would not be eliminated even in a well-designed market. On the other hand, it also suggests that the trading volume might increase without any major institutional changes as the market participants increasingly become accustomed to power trading, become confident in managing risks, and plan a new capacity operation in the future so as to ease their capacity constraints. In fact, the trend of increasing the trading volume thus far might have reflected these aspects.

6. CONCLUSION

Our questionnaire survey revealed several aspects of the issues associated with the lack of trading volume in the JEPX. We found that while there are some indications that the market still lacks liquidity, some market participants consider that the current level of trading volume is adequate. Since the trading volume and the number of participants have been increasing, it is important to carefully observe the subsequent developments of the market. Some of the major problems in the institutional factors as indicated by our survey are to be addressed by the planned establishment of the balancing market. The participants consider the limited transmission capacity between the regions and the similarity of generating fuel mix to be less relevant. The trading rules and operation of the JEPX are considered to be less relevant except for the potential of uneconomical scheduling in the spot market. In contrast, the individual circumstances of the market participants are relevant, including their own capacity constraints and limited ability to manage price risk. Future research needs to evaluate the impact of the planned hour-ahead market on trading in the spot market and the learning effect as well as the increased capacity of market participants.

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