CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No.158/MP/2013

Coram:
Shri Gireesh B. Pradhan, Chairperson
Shri A.K.Singhal, Member
Shri A.S.Bakshi, Member
Dr. M. K. Iyer, Member

Date of Hearing: 15.3.2016
Date of order: 4.4.2016

In the matter of:

Petition under Regulations 63 and 64 of Central Electricity Regulatory Commission (Power Market) Regulations, 2010 for removal of difficulty arising due to present method of Transmission Corridor Allocation to Power Exchanges for Collective Transactions.

And

In the matter of:

Power Exchange India Limited
5th Floor, Tower 3,
Equinox Business Park, LBS Marg,
Kurla (W) Mumbai 400070 **….Petitioner**

VS

1. Power Operation System Corporation Limited (POSOCO)
B-9, Ist Floor, Qutub Institutional Area, Katwaria Sarai,
New Delhi- 110 016.

2. Indian Energy Exchange Limited
Fourth Floor, TDI Centre, Plot No. 7,
Jasola, New Delhi-110 025 **….Respondents**

The following were present:

Shri S.K. Soonee, POSOCO
Shri Kapil Dev, PXIL,
Shri Akhilesh Awasthy, IEX
Ms Shruti Bhatia, IEX
Shri S.C. Saxena, NLDC, POSOCO
Ms. Abilia Zaidi, POSOCO

ORDER

This petition was filed by Power Exchange India Limited (hereinafter referred to as "PXIL") under Regulations 63 and 64 of the Central Electricity Regulatory Commission (Power Market) Regulations, 2010 (hereinafter referred to as "Power Market Regulations") seeking changes in the present system of transmission corridor allocation for collective transactions made through the Power Exchanges.

2. The petitioner has submitted that for trading in electricity in Day Ahead Market on the Exchange platform, National Load Despatch Centre (NLDC) coordinates the power flow allocation among the two Power Exchanges. The Power Exchanges run an unconstrained process of trade matching where they consider all the buy-sell orders on their platform and assume infinite flows on their inter-regional transmission corridors. The orders derived in this process are used to derive net flows of each region and flows required on each inter-regional transmission corridor. Thereafter, NLDC compares the power flow request sent by both the Power Exchanges with the actual flow feasible on the corridor and allocates the corridor to both exchanges proportionate to the flows

requested by the exchanges. The petitioner has submitted that the present methodology of pro-rate allocation of corridor between two Power Exchanges has many operational issues and is detrimental for sustenance of smaller Power Exchanges. The petitioner has submitted that imbalance in terms of market design against smaller power exchange can be taken care of by allocating a fixed amount of corridor between the operating exchanges alongwith a caveat that if a particular Power Exchange is not able to use the allocated corridor, then the other exchange will have the right to use the residual corridor.

3. The Commission extensively heard both power exchanges, National Load Despatch Centre and Professor S.A. Soman of Indian Institute of Technology, Kanpur. After deliberating different aspects of transmission corridor allocation in the context of the transactions on both power exchanges, the Commission vide order dated 30.4.2015 decided that the issue needs to be examined by an Expert Group for finding out an acceptable solution which will also achieve social welfare maximization. The terms of reference and scope of work of the Expert Group were delineated in para 15 of the said order as under:

> "15. The terms of reference and scope of work of the Expert Group are as under:
>
> (a) Review the present transmission corridor allocation methodology between power exchanges in the light of its implementation since 2009, its co-relation with the behavior of market participants in the exchanges and its impact on the viable operations of the exchanges and merits and demerits of continuation of the existing system of corridor allocation;
>
> (b) Examine and deliberate on the merits and demerits of the methodology suggested by PXIL, the methodology suggested by IEX, the methodology

suggested by NLDC vide its letter dated 18.9.2008 and the Min–Max fairness theory with proportionate regret as suggested by Prof. Soman in the light of the experience gained during the past five years and the best international practices suitable to Indian conditions as the Expert Group considers appropriate;

(c) Suggest viable methodologies for allocation of transmission corridor that ensures social welfare maximization along with optimal corridor utilization, with deliberations on the practical aspects of implementation of the suggested methodologies."

4. The composition of the Expert Group is as under:-

Ser No.	Member of the Expert Group	Remarks
1	Shri S. K. Soonee, CEO, POSOCO	Chairperson
2	Shri Ajay Kumar Saxena, Chief (Engg), CERC	Power System Expert
3	Shri Ravinder, Ex-Member(PS) and Acting Chairperson, CEA	Special Invitee
4	Shri Ravinder Gupta, Director (SP&PA), CEA	Representative of CEA
5	Dr Puneet Chitkara, Consultant, KPMG	Power Market Expert
6	Shri Kapil Dev, AVP(Business Development), PXIL	Representative of PXIL
7	Shri Akhilesh Awasthy Director (Operations) IEX	
8	Prof Dr Abhijit R. Abhyankar, IIT Delhi	Co-opted Member
9	Dr S K Chatterjee, Joint Chief (RA) CERC	Member Secretary

5. The Expert Group held extensive discussions and deliberation on the subject including consultations with academics and foreign experts of eminence. The Expert Group has submitted its report to the Commission. We have gone through the report of the Expert Group. In para 6 of the report, the Expert Group has come to the following conclusions:

"6. Conclusions:

Based on the extensive literature survey, deliberations in various meetings, presentations by both the Power Exchanges, presentation by Dr. Nicholas Ryan, Report on Simulation of Alternatives Proposed for Allocation of Transmission Corridor between Power Exchanges and CERC (Power Market) Regulations, 2010, the Expert Group conclusions drawn in relation to specific terms of reference and scope of work of the Expert Group are summarized below:-

i. Co-relation between change in cleared volumes on the power exchanges and the .present transmission corridor allocation methodology is indirect in nature and therefore, could neither be ruled out nor established.

ii.The present transmission corridor allocation methodology impacts the ability to clear and schedule trades. But the impact on viability of the operation of power exchanges could not be firmly established.

iii. With reference to the current pro-rata methodology, it was agreed that it is a sub-optimal solution. Nonetheless, it was an informed decision like introduction of multiple power exchanges in a single day ahead physical delivery market.

iv. The various allocation methods like pro-rata allocation, priority based rules, explicit auctions were discussed and found to be sub-optimal in comparison to the solution obtained by merging of bids. The merits and demerits of these methods as per the technical literature and Hon'ble Commission Order dated 30th April, 2015 were discussed.

v. With reference to the solution suggested by PXIL in the Petition before CERC, i.e. allocation of corridor on equal basis (50:50), it was agreed that the methodology suggested was ad-hoc, sub-optimal and would amount to a pro-rata solution only. Further, this would lead to an iterative process if residual margins after the first round are to be utilized.

vi. A study on "Simulation of Alternatives Proposed for allocation of Transmission Corridor between Power Exchanges" was carried out. The present models were tested on a 14 bus system with normal bids and considering only congestion on one corridor. The study tries to show how merging of bids of both power exchanges would be the first best solution in comparison to various other allocation methods. The proposed four mathematical model provide a good solution and also satisfy the constraint of maintaining the Power Exchange identities separate. The methodology adopted in this study uses a 'test 14 bus system' and more in-depth study is

required to capture full complexity such as loop flows, counter flows, etc. is required.

vii. Merging of the bids from the Power Exchanges, apart from being not acceptable to the present Power Exchanges, would require changes in the market design and amendment in the CERC Power Market Regulations in addition to resolution of the various practical considerations such as confidentiality, running of merging solution, logistic, settlement among multiple exchanges, etc. In case the same is implemented, the power exchanges would compete on services they offer rather than the price discovered by them in Day Ahead Market (DAM)."

6. Para 7 of the report contains the recommendations of the Expert Group which is extracted as under:

"Recommendations of the Expert Group

The recommendations of the Expert Group Are as follows:

7.1 The solution obtained by merging the bids/market coupling of the two power exchanges would give the optimum solution with social welfare maximization, in this segment, irrespective of congestion. This would require changes in the market design and amendment in the CERC Power Market Regulations in addition to resolution of the various other practical considerations such as confidentiality, running of merging solutions, logistics, settlement among multiple exchanges etc.

7.2 All other methods excluding those based on merging of bids lead to a solution which may be optimal in a given set of conditions only.

7.3 The present method has been implemented with the direction of the Hon'ble Commission and agreed between NLDC, IEX and PXIL in October, 2008. Hence, for the present, the existing method of allocation of transmission corridor based on pro-rata allocation may be continued with the modification as suggested in para 7.4 below.

7.4 A priority allocation of corridor upto 15% on constrained corridors to the smaller Power Exchange may be made when only two Power Exchanges are functioning (if there are only two Power Exchanges functioning, then the Power Exchange with a market share less than 20% is considered the smaller Power Exchange. To start with, requisition upto 10% by the smaller Power Exchange on a constrained corridor would be allocated corridor on priority and the balance would be shared as per the existing pro-rata methodology. On the un-

congested transmission corridors, no priority allocation is necessary to the smaller Power Exchange and it would continue as per the existing methodology based on pro-rata.

7.5 The methodology suggested in para 7.4 above may be tried on a pilot basis for a period of 6 months and both Power Exchanges and NLDC shall submit a report covering various aspects such as trade volumes, prices, impact of priority allocation of corridor to the smaller Power Exchange on market participation, etc. Based on the experience gained, the priority allocation for sharing of transmission corridors may be reviewed by the Commission.

7.6 The Export Group would like to place on record a word of caution regarding allocation of transmission corridor in case of congestion. The core underlying issue is pertaining to "competition for the market" and "competition in the market". From a Regulatory perspective, equity and fairness needs to ensure competition in the market as the current methodology is inclined towards competition for the market.

7.7 The optimal solution for allocation of transmission corridor to power exchanges in case of congestion could be obtained by merging of bids/market coupling method. A separate committee for long term solution may look into the market design issues in a holistic manner including the transmission access methodology besides requirement of infrastructure, logistics, settlements etc. for implementation of merging of bids for optimal solution of transmission corridor allocation amongst multiple exchanges."

7. The report has been signed by all members of the Expert Group. It is noticed that the representative of IEX has signed the report with the remarks "with a side note". A copy of the letter dated 9.2.2016 submitted by IEX on certain points in the report of the Expert Group on Transmission corridor allocation methodology has been made an annexure to the report. In the said letter, IEX has pleaded that the proposed solution of merging of bids for social welfare maximization would not yield any significant improvement, as currently in the day ahead market share of IEX is more than 99% and therefore social welfare maximization is already taking place. IEX has submitted that as and when the market share of smaller exchange picks up and reaches a level of 20-

25%, and significant transmission congestion remains, a separate committee for the long term solution may look into the market design issues in a holistic manner including the transmission access methodology besides the requirement of infrastructure, logistics, settlement etc. for optimal solution of transmission corridor allocation among multiple exchanges.

8. The matter was heard on 15.3.2016. During the course of hearing, Chief Executive Officer of POSOCO submitted that as per the recommendations of the Expert Group, 10% of the constrained corridor should be allocated to the smaller Power Exchange on a pilot basis for a period of six months and thereafter NLDC and both Power Exchanges would submit a report to the Commission and based on the experienced gained, the Commission could review the sharing of priority allocation of corridor between the Exchanges. The representatives of IEX and PXIL during the hearing agreed to the recommendations of the Expert Group with regard to allocation of upto 10% of the constrained corridor to the smaller Power Exchange with the provision for review of the methodology after six months.

9. We have considered the report of the Expert Group, submissions of Chief Executive Officer, POSOCO and representatives of the petitioner and IEX. The Expert Group was given three terms of references. Let us first examine the terms of reference and the findings/recommendations of the Expert Group thereon. First term of reference is as under:

"Review the present transmission corridor allocation methodology between power exchanges in the light of its implementation since 2009, its co-relation with the behavior of market participants in the exchanges and its impact on the viable operations of the exchanges and merits and demerits of continuation of the existing system of corridor allocation;"

10. The Expert Group advised both power exchanges to make detailed presentation. IEX made a presentation on the Average Clearing Volume and average Clearing Price of the two exchanges for three different time phases i.e. phase I (June 2008 to December 2009), Phase II (January 2010 to March 2012) and Phase III(April 2012 onwards). PXIL made a presentation covering the growth in annual traded volume of PXIL, IEX and trend of curtailment based on UMCV, MCV, UMCP, congestion, bid volume and bid price of PXIL clients in Western Region, Northern Region and Southern Region. From the presentations of IEX and PXIL, Expert Group has observed as under:

(a) The prices were converging in both the power exchanges when the market share of both the exchanges was significant during the first two phases.

(b) Congestion was observed mainly on one corridor i.e. Southern Region Vs Rest of India.

(c) During some period in the second phase, the volumes in PXIL towards SR were significant and touched about 1/3rd of that of IEX.

(d) Even during the period when there was nil corridor availability for power transfer towards Southern Region, the volumes cleared in both the exchanges were following a similar trend.

(e) The market clearing volume and prices discovered in both power exchanges started diverging towards the end of second phase.

(f) The current methodology of allocation of transmission corridor has no co-relation with the volume cleared and the prices discovered. Moreover, any co-relation between the bidding pattern and impact on viability of power exchanges due to present methodology of allocation of transmission corridors to power exchanges could not be finally and directly established.

Considering the above, the Expert Group has come to the conclusion that the co-relation between the change in cleared volume between power exchanges and the present transmission corridor allocation methodology is indirect in nature and could neither be ruled out nor be established. The Expert Group has further concluded that the present transmission corridor allocation methodology impacts the ability to clear and schedule trades but the impact on viability of the operation of power exchange cannot be firmly established. The Expert group has further concluded that the current methodology is a sub-optimal solution but it was an informed decision like introduction of multiple power exchanges in a single day ahead physical delivery market.

11. From the above discussion, it emerges that the impact of present pro-rata corridor allocation either on the change in the cleared volume on the power exchanges or on the viability of the operation of the power exchanges could not be firmly established. Though it a sub-optimal solution, it is nevertheless an informed decision by the Commission. Further, the Expert Group has recommended for continuation of the existing method of transmission corridor with certain modifications.

12. The second term of reference is as under:-

> "(b) Examine and deliberate on the merits and demerits of the methodology suggested by PXIL, the methodology suggested by IEX, the methodology suggested by NLDC vide its letter dated 18.9.2008 and the Min–Max fairness theory with proportionate regret as suggested by Prof. Soman in the light of the experience gained during the past five years and the best international practices suitable to Indian conditions as the Expert Group considers appropriate;"

13. The Expert Group has noted in para 6.v that the solution suggested by PXIL for allocation of corridor on equal basis was ad hoc, sub-optimal and would lead to an iterative process if residual margins upto first round are to be utilized. The Expert Group also considered the various options suggested by POSOCO in its letter dated 18.09.2008 such as 50:50 allocation between two exchanges before the bidding period, explicit auctioning of transmission corridor and did not find them suitable for implementation. However, there is no discussion about the Min–Max fairness theory with proportionate regret as suggested by Prof. Soman.

14. The third term of reference is as under:

> "(c) Suggest viable methodologies for allocation of transmission corridor that ensures social welfare maximization along with optimal corridor utilization, with deliberations on the practical aspects of implementation of the suggested methodologies."

15. The Expert Group considered the study carried out by Dr. Puneet Chitkara and Dr. Abhyankar on "Simulation of Alternatives Proposed allocation of Transmission Corridors between the Power Exchanges". The present models were tested on a 14 bus system with normal bids and congestion in one corridor. As per the study, merging of the bids of the power exchanges would be the first best solution in comparison to

various other allocation methods. However, the Expert Group agreed that more in depth study was required to capture the full complexity such as loop flows and counter flows etc. The Expert Group has acknowledged that the solution of merging of bids was not acceptable to the power exchanges for various reasons including the apprehension that devoid of price discovery engine, exchange would be reduced to a glorified trader. Moreover, the Expert Group has recommended that merging of bids would require changes in the market design and amendment with the Power Market Regulations in addition to resolution of various other practical considerations such as confidentiality, running of merging solution, logistics, settlement among multiple exchanges, etc. The Expert Group has concluded that in case merging of bids is implemented, the power exchanges would compete o services they offer rather than the price discovered in by them in Day Ahead Market.

16. As the Expert Group has itself suggested that resolution of various practical issues are required before considering the proposal for introduction of merging of bids /market coupling method. Moreover, the Expert Group has recommended for constitution of a separate committee for long term solution which may look into the market design issues in a holistic manner including the transmission access methodology besides requirement of infrastructure, logistics, settlement etc. for implementation of merging of bids for optimal solution of transmission corridor allocation amongst multiple exchanges. Both the power exchanges have expressed serious reservation about the solution of merging of bids. The Commission is of the view that the concept of merging of bids is pre-mature at this stage and is not relevant in the

context of the present petition. During the hearing of the petition, CEO, POSOCO clarified that congestion on the transmission corridor is not that acute as it was prevailing four years back which was also endorsed by the representatives of both the power exchanges. Therefore, the Commission has not considered this recommendation of the Expert Group for merging of bids of the power exchanges.

17. The Expert Group has further recommended that a priority allocation of corridor upto 15% on constrained corridors to the smaller power exchange may be made when only two power exchanges are functioning. The Expert Group has further recommended that requisition upto 10% by the smaller power exchange on a constrained corridor could be allocated on priority and balance would be shared as per the pro rata methodology. However, on the uncongested transmission corridor no priority allocation is necessary to the smaller power exchange and it will continue as per the existing methodology based on pro rata allocation. The Expert Group has further recommended that this methodology may be tried on a pilot basis for a period of six months and both power exchanges and NDLC would submit a report covering various aspects such as trade volume, prices, impact of priority allocation of corridor to smaller power exchanges on market participation etc. and based on experience gained priority allocation for sharing of transmission corridor may be reviewed by the Commission. During the hearing, the representatives of both Power Exchanges agreed to the arrangement.

18. We have considered the issue of priority allocation of corridor to PXIL. The market shares of both the exchanges since the operation of PXIL in the year 2008-09 are as under:-

Market Share (Day Ahead Market & Term Ahead Market) of IEX and PXIL		
Year	IEX	PXIL
2008-09	95%	5%
2009-10	87%	13%
2010-11	82%	18%
2011-12	93%	7%
2012-13	97%	3%
2013-14	95%	5%
2014-15	96%	4%
2015-16 (Upto Dec 2015)	98%	2%

19. It may be seen from the above table that even though the present methodology of allocation of transmission corridor on pro rata basis is in force since the year 2008, the share of PXIL increased in the initial years and reached 18% during 2010-11 and in the subsequent years it has ranged from 2% to 7%. Therefore, it is difficult to accept that the present methodology of pro rata allocation of corridor has adversely impacted the viability of PXIL. The Commission has been advocating multiple power exchanges from the very beginning and therefore, it is essential that both the power exchanges thrive as viable market institution. Even though priority allocation of transmission corridor in favour of one exchange is against the principle of competition and market philosophy, the Commission feels that PXIL needs some hand holding to enable it to increase its market share. Accordingly, as agreed by IEX, PXIL and POSOCO during the hearing, priority allocation of 10% in the constrained corridor shall be made in favour of PXIL for the next six months beginning from 1.4.2016. It is, however, clarified that

beyond 10%, allocation of corridor will be on pro rata basis as per the existing methodology. In the first week of November, 2016, POSOCO (NLDC) after consultation with the power exchanges shall submit a report covering the trade volumes of both the exchanges during the period, the prices discovered in both the exchanges and the impact of priority allocation of corridor to PXIL on the market participation. The Commission will take a view on continuation of priority allocation based on the report submitted by POSOCO.

20. The matter regarding compliance of the net worth requirement of PXIL is presently under consideration of the Commission. It is clarified that compliance with net worth requirement as per the Power Market Regulations by PXIL is independent of the priority allocation of corridor in favour of PXIL made through this order and PXIL shall be required to achieve the necessary net worth as directed by the Commission through separate orders.

21. Petition No. 158/MP/2013 is disposed of in terms of the above.

sd/-	sd/-	sd/-	sd/-
(Dr. M. K. Iyer)	**(A.S. Bakshi)**	**(A.K. Singhal)**	**(Gireesh B. Pradhan)**
Member	**Member**	**Member**	**Chairperson**