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

Date of Order : 30.4.2015

IN THE MATTER OF

Petition under Regulation 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. POSOCO
   B-9, Ist Floor, Qutub Institutional Area,
   KatwariaSarai, New Delhi 110 016.

2. Indian Energy Exchange Limited
   100A/1 Ground Floor,
   Capital Court, Olof Palme Marg,
   Munirka, New Dehli 110 067 **….Respondents**

For petitioner : Shri S.G. Tenpe, PXIL
Shri KapilDev, PXIL
Shri S.A. Soman
Dr. SomShekhar

For respondents : Shri S.S. Barpanda, POSOCO
Ms. Jyoti Prasad, POSOCO
Shri Akhilesh Awasthy, IEX

Ms. Shruti Bhatia, IEX
Shri Gaurav Maheshwari, IEX

ORDER

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

2. As directed by the Commission, the petitioner impleaded POSOCO and Indian Energy Exchange (hereinafter referred to as "IEX") as respondents who have filed their replies and the petitioner has filed its rejoinders.

3. 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 exchanges. The 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 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 this method of allocating the corridor for collective transactions on day ahead basis has been in use from the inception of the two power exchanges in the country.

4. The petitioner has submitted that from its experience of running the power exchange for the last five years, the petitioner has realized that present method of pro-rata allocation has many operational issues and is detrimental for sustenance of smaller exchanges for the following reasons:

(a) The smaller exchanges have an unbalanced regional portfolio because of smaller volume base and client base. The smaller exchange is dependent on the inter-regional flows for clearing of these orders. Due to scarcity of the transmission corridor, the smaller exchange is not able to clear the trades of the participants. As a result, the participants lose confidence in the smaller exchange and in turn move away from the smaller exchange platform. It becomes very difficult for the smaller exchange to increase its volume by adding new clients. The prevalent method of allocation of transmission corridor presents a significant roadblock to the development of smaller exchange and presents a serious challenge to its survival.

(b) In the 14th Central Advisory Committee held on 20.9.2010, the issue of transmission corridor allocation on pro-rata basis was discussed and it was minuted that pro-rata allocation of transmission corridor between the exchanges was not the optimum solution and there was a need to study the feasibility and appropriateness of adopting market coupling method. Therefore, there is a need to relook at the whole issue and devise a new method for allocation of transmission corridor for the power exchanges.

(c) The present scheme of corridor allocation goes against the intent of providing level playing field in terms of regulatory structure and market design. A smaller

exchange or new exchange which starts its operation today will face an uphill task against the incumbent bigger exchange due to the present method of corridor allocation. As the chances of a new exchange having a balanced regional portfolio are remote, the new exchange and its participants will depend on the vagaries of corridor allocation to get the trades cleared.

(d) As per the data collected from Market Monitoring Report of the Commission, the curtailment on PXIL is 72% whereas the curtailment on IEX is in the range of 20-27%. This curtailment does not give appropriate signal to the participants and is leading to discrimination among the participants.

(e) There is an implicit auction of transmission corridor for collective transactions on both the exchanges as pro-rata allocation creates different incentives for a market participant for bidding on the power exchange platforms. To hedge for a risk arising out of congestion, the market participants tend to bid at different prices i.e. a participant may bid conservatively on a power exchange where the risk of bidding is more and aggressively on an exchange where probability of clearance is more.

(f) Transmission corridor is a scarce resource and the allocation of it must be in line with the allocation of any scarce resource and the present corridor allocation mechanism stands apart as it ends up in discriminating against the participants of a smaller exchange.

(g) In short term bilateral transactions for advance scheduling and first-cum-first-serve basis, the allocation of corridor does not discriminate on the basis of quantum of volume transacted. Only in cases of exchange based transactions, the volume transacted is the sole criteria for allocation of corridor which influences the decisions of the participants to avoid transacting on smaller exchanges in subsequent trades.

(h) Under Regulation 35 of the Power Market Regulations, in a scenario having more than two exchanges, a power exchange having less than 20% of the market shares for consecutive two financial years of commencement of operation shall close its operations or merge with an existing power exchange. The current system of allocating transmission corridor on pro-rata basis would defeat the very purpose of having multiple power exchanges models in the sector.

5. The petitioner has submitted that the imbalance in terms of skewed market design against smaller exchange platform can be taken care of by allocating a fixed amount of corridor between the operating exchanges alongwith a caveat that if that particular exchange is not able to use the allocated corridor, then the other exchange will have the right to use the residual corridor. The petitioner has submitted that if the corridor is allocated in fixed ratio between the exchanges, then the disadvantage of the smaller exchange will be eliminated and all the exchanges will be on an even pedestal and can compete with each other on the basis of quality of the products and services provided by the exchanges and the participants will have true choice in terms of multiple

platforms with a bouquet of products and services to choose from. The petitioner has suggested the following methodology for consideration of the Commission:

> "Step-1: The available transmission capacity will be divided in (n+1) equal portion where 'n' represents number of exchanges operating in a Day Ahead Market.
>
> Step-2: All operating exchanges are allocated [1/(n+1)] transmission capacity
>
> Step-3: The unallocated portion of [1/(n+1)] transmission capacity would be allocated on pro-rata basis among all the operating exchanges.
>
> Step- 4: Any surplus available after utilization of each part of [1/(n+1)] transmission capacity would be aggregated and allocated on pro-rata basis to those exchanges whose request is not fulfilled after completion of Step-2 above."

The petitioner has submitted that with the proposed methodology, the curtailment due to congestion in transmission corridor would be eliminated in case of smaller exchange and the existing market design with multiple power exchanges can be sustained.

6. NLDC in its reply filed vide affidavit dated 9.5.2014 has submitted that the Commission vide order dated 14.10.2008 had directed NLDC to manage the cases of transmission congestion by allotting available transmission capacity on pro-rata basis to each power exchange based on their requisition. NLDC was further advised to discuss the matter with the two exchanges with a view to evolving an agreeable practical and optimal solution. Accordingly, a meeting was held by NLDC with both power exchanges on 16.10.2008 and it was agreed that pro-rata methodology was a sub-optimal solution which would not lead to overall economy and efficiency and more work was needed for an optimal solution for sharing of available margin in a multi exchange scenario. It was decided that to start with pro-rata allocation of margins based on respective requisitions by the power exchanges would be adopted as per the agreed terms i.e. (a) pro-rata

treatment would be cleared trade volumes on each area and each corridor based on the requisition by each exchange; (b) in order to avoid iterative process in case of congestion, post pro-rata treatment, the margins on all corridors and areas would be given to each of the exchanges; and (c) while checking congestion, counter flow would be accounted for and on detection of congestion, separate directional treatment would be given to each area and corridor. In response to the petitioner contention regarding uphill faced by smaller exchange against an incumbent bigger exchange, NLDC has submitted that the impact of congestion on individual exchange depends on location of buyers/sellers. Moreover, the impact of curtailment on IEX and PXIL between the period of April 2012 to March 2014 shows that the volume of electricity that could not be cleared as percentage to Unconstrained Cleared Volume has come down comparatively over the years. As regards the step-wise methodology proposed by PXIL, NLDC has submitted that the same is not practical as Area Cleared Volume may change after 1st iteration, leading to change in corridor requirement. The proposal of PXIL may lead to iterative process for utilization of balance margin which may affect the overall scheduling process at NLDC/RLDC/SLDC level. NLDC has submitted that in its letter dated 18.9.2008, NLDC had highlighted the issue of congestion management and sharing of available transmission capacity on various corridors between the multiple exchanges and had suggested certain possible criteria for sharing of available margins with merits and demerits of each for consideration of the Commission as under:

1. Priority based on pre-defined rules:

(a) Lowest MCP

(b) Highest MCV

(c) Highest MCP/MCV

(d) Maximisation of social welfare, consumer surplus, etc.

2. Pro-rata

3. Explicit Auctioning

4. Managing the bids obtained by each PX and then finding a fresh solution honouring the constraints declared.

7. IEX in its reply filed vide affidavit dated 6.5.2014 has submitted that the current methodology of pro-rata allocation of transmission corridor between the power exchanges is neither a part of Open Access Regulations nor Procedure for Collective Transactions approved by the Commission. The current methodology has been evolved by joint meetings of NLDC, IEX and PXIL held on 16.10.2008 and 9.7.2009 as per the directions of the Commission in the letter dated 14.10.2008. IEX has submitted that in those meetings, possible approaches such as priority based rules, pro-rata based allocations, explicit auctioning and merging of bids by each power exchange for finding of a constrained solution etc. were discussed and it was agreed that in case of congestion, pro-rata treatment would be on cleared volumes on each area and each corridor based on requisition by each exchange and in order to avoid iterative process in case of congestion, margins on corridors or area would be given to each of the exchanges for the time blocks during which congestion was faced. Subsequently, NLDC

proposed amendment in methodology vide its letter dated 3.8.2009 which was subsequently implemented as under:

> "In case of one of the Power Exchanges (say Px1) has requisitioned 'X' for import to a particular region and the other Power Exchange (say Px2) has requisitioned some quantity (say 'Y'), and available margin for import (say A), then
>
> 1. If the available margin 'A' is more than 'X+Y', then after allowing 'X' to Px1 and 'Y' to Px2, 'A-(X+Y)' would be distributed between both the power exchanges in the ratio of their Unconstrained Market Clearing Volume(UMCV).
> Special Case: If the available margin 'A' is more than 'X+Y' and if requisition by say Px1 is zero, then allowing 'Y' to Px2, 'A-Y' would be distributed between both the Power Exchanges in the ratio of their unconstrained market clearing volume(UMCV).
>
> 2. If the available margin 'A' is less than the total requisition by the Power Exchanges (X + Y), then sharing of the available margin would be done as per the existing practice.
>
> 3. A similar philosophy would be adopted for the requisition on the corridors."

IEX has submitted that the petitioner has not raised this point in the joint committee meetings between NLDC and two power exchanges including the meeting held on 9.4.2014. IEX has submitted that alternative remedy in the form of joint committee meeting is available in this case and without exhausting the remedy, the petitioner has approached the Commission. IEX has further submitted that the petitioner has approached the Commission by invoking the inherent power under Regulation 63 of Power Market Regulations for removal of difficulty. As inherent power can be exercised by the Commission while exercising its adjudicatory jurisdiction and not in exercise of its legislative jurisdiction as held by the Appellate Tribunal for Electricity in its judgement dated 6.5.2011 in Appeal No. 170 of 2010, the present petition which does not seek any resolution of the dispute cannot be maintained under Regulation 63 of the Power Market Regulations.

8. As regards the methodology proposed by the petitioner, IEX has submitted as under:

(a) The proposed methodology would amount to discriminatory treatment not only between the two exchanges but also to the participants of the exchanges as IEX would face higher congestion and PXIL would face lower or no congestion.

(b) The proposed methodology goes against the whole principles of market splitting which gives locational price signals and information on amount of congestion in different bid areas. As per the proposed methodology, congestion would be faced by only IEX which would give wrong information to the market participants and would lead to distorted market results.

(c) The petitioner is trying to present a wrong picture by way of showing comparison of congestion profile of two exchanges. The reason for higher congestion faced by PXIL is unbalanced regional client base and high dependency on inter-regional flows. At the IEX, net congestion faced by market participants is low because the buyers of downstream of congested area are replaced by buyers in upstream of congested area because prices in the upstream area fall due to more sell quantity available there which cannot be evacuated. Similarly, sellers in the downstream of congested area replace sellers of upstream area due to increase in price in the downstream area. These reasons are purely related to choice of the exchange by market participants which should be left to them and should not be dealt through regulatory intervention.

(d) The issue of congestion is being faced by both exchanges. The actual volume lost by the smaller exchange due to curtailment is small whereas other exchange loses huge volumes due to curtailment.

(e) Though the present methodology of pro-rata allocation of transmission corridor is not an optimal methodology, pro-rata allocation is worldwide accepted methodology and does not lead to any discrimination. This methodology considers weightage of the volume transacted and provides level playing field to both exchanges.

9. During the hearing, Prof. S.A. Soman of Indian Institute of Technology in his independent individual capacity gave a presentation on the philosophy adopted in sharing of infrastructure resources intelecom industry, optimal utilization of the corridor and promotion of competition. He made a detailed presentation on the "Allocation of corridors using Max-Min fairness criteria". He touched upon subjects like Pareto optimality/efficiency, min-max and max-min fairness and suggested that policy could be either of allocation of trades to achieve min-max fairness proportionate regret vector or allocation of trades to achieve max-min fairness. He submitted that this solution can be improved using MILP framework and that the solution suggested is not the end solution. He stressed that Kirchoff's Voltage Law (KVL) constraints should be included in the calculations and that a DC network flow should be an acceptable solution. In response to the query of the Commission as to which principle should be suitable, Prof. Soman submitted that some regret should also be shared by the smaller exchange as the

congestion is not solely due to the larger exchange but also due to other allocations done by the NLDC for bilateral, long term, medium term transactions etc.

10. The representative of IEX also made a presentation and the salient points of the presentation are as follows:-

(a) Auction or allocation of national resource should be tested on the yardstick of public good and in the present context public means all participants of both the exchanges and not the exchanges themselves.

(b) The petitioner is confusing between public good and its own good and is trying to utilize public resources for the private gains in an unfair way.

(c) Max-Min principle discussed by Dr. Soman is not relevant in our situation. Nowhere in the world, Max-Min fairness criteria is adopted for allocating transmission capacity. However, Min-Max principle suggested by Dr. Soman is acceptable as it refers to allocation of costs for availing services. However, this principle leads to pro-rata allocation.

(d) Calculation of congestion percentage in PXIL petition is incorrect as IEX faced higher percentage of congestion in actual terms.

(e) In certain cases the total volume cleared on PXIL has not reduced with transmission congestion and there are several instances where this has happened since it is dependent on the bidding pattern of participants, bid area, type of bidders and balance of the portfolios.

(f) An allocation is considered *fair*, if it is Pareto-efficient and it has the property of being equitable. Comparing PXIL's proposed mechanism with the existing pro-rata allocation shows that the proposed methodology is neither pareto-efficient not equitable.

(g) In Nash standard of comparison (Proportional Fairness), a transfer of resources between two players is justified if the gainer's utility increases by a larger percentage than the loser's utility decreases. In the 2010 MIT paper "The Price of Fairness" by Bertismas, Farias and Nikolaos, it has been concluded that relative efficiency loss is small in Proportional Fairness Criteria as compared to Max-Min Fairness. Therefore, proportional fairness is preferred over Max-Min Fairness.

(h) In the present context of Transmission Capacity allocation between power exchanges, between Power Exchanges, social welfare is the measure of Utility and Utility should be considered with reference to participants of power exchanges as they are final beneficiaries of the corridor. Hence social welfare should be the criteria to measure utility and not the volume.

(i) By applying the Nash standard to the present problem of corridor allocation, IEX suggested the following options:-

(i) Option 1- Allowing Exchange participants to participate in the advance scheduling process and e-bidding of transmission

capacity. It also fulfills the proportionate fairness criteria, as entities with highest utility get corridor through explicit auction.

(ii) Option 2-Merging of bids: To allocate capacity to the participants with maximum utility (i.e. social welfare benefit), DAM bids from both the Power Exchanges should be merged so as to fulfill the proportionate fairness criteria.

(iii) Option 3- Min-Max Fairness (supported by Prof.Soman as an alternative): Percentage loss to all the participants in allocation should be equal.' Pro-rata allocation confirms to this fairness.

11. Prof. Soman submitted that fairness is subjective and it is important to establish fairness through a rigor and detailed deliberation process. On the various options suggested by IEX, Prof Soman expressed the view that e-bidding for corridor by participants may not be fair on small players and there may be problem in identification of the corridors for bidding. With regard to Option 2 suggested by IEX, Prof. Soman expressed the view that aggregation of bids of both power exchanges would definitely be a superior solution and the social welfare maximization would be the greatest; however it would be a radical change from what is being followed presently and product innovation may be hampered.

12. PXIL subsequently submitted rejoinder to the presentation made by IEX and reply filed by POSOCO. PXIL has submitted that IEX is mixing issues of transmission allocation with transmission pricing and price discovery and is trying to shift the issue

from exchanges to participants of the exchanges. PXIL has submitted comments on IEX presentation, summary of which is as below.

a) The allocation principle has to ensure the principle of neutrality at the exchanges level and not at the participants' level. Auction as a methodology for auction of public good is only applicable in certain context, primarily when the objective function is revenue maximization, which is not the case in the present context.

b) Max-min principle is specifically relevant to skewed or tilted market conditions that prevail as of now and once the power exchanges compete on level terms, Min-max could be a good alternative.

c) Power markets in India have very unique characteristics and examples of which are rare to find across the globe. After five years of operation, the problems being faced in the allocation methodology may be reduced for the larger good by adopting a different process which will be more efficient than the existing process. Proposed methodology of PXIL cannot be rejected based on an argument which justifies the existing inefficient methodology as *"sine qua non".*

d) Rather than following the principles adopted elsewhere, power exchanges need to learn best practices across the globe. Therefore, Min-max criteria should be adopted in totality.

e) IEX has taken congestion as difference between requested corridor and received corridor rather than taking it as difference between unconstrained market clearing and final market clearing volume. Since, IEX has a regionally balanced portfolio

the non availability of the corridors does not highly impact their market participants. In view of this, the definition of congestion given by the petitioner is more appropriate.

f) IEX data in the presentation shows that corridor requests in their provisional requisition are at times more than the volume cleared. In January 2012 to March 2012, IEX has demanded for more flows than their actual cleared volume in unconstrained matching i.e. requesting for more flow than the requirement. The matter may be separately investigated by the Commission.

g) In the simulation comparison, IEX admits to having a regionally balanced portfolio and lesser corridor availability. However, it does not translate into lower volume for IEX. On the contrary, PXIL participants are deprived of trade due to non-availability of adequate corridor quantum. The equitability aspect needs to be seen from correct perspective rather than from market perspective.

h) The first option of e-bidding of transmission capacity as suggested by IEX is futuristic and would require more time to implement. The second option of merging bids would result in social welfare maximization but would defeat the objective of Multi Exchange model. The third option of Min max fairness is supported by IEX and IIT, Bombay. However it may result in presently practiced pro-rata allocation methodology and hence would be ineffective in applying significant level of correction.

13. We have considered the submissions of the petitioner, POSOCO, IEX and Prof Soman. The Power Exchanges have adopted a double sided closed bid auction with uniform price as the price discovery methodology. In case of transmission congestion, market spitting methodology is adopted. The price discovery process needs to ensure social welfare maximization in the context of optimal transmission corridor utilization. The present auction is an implicit auction where power and transmission corridors are auctioned simultaneously. Transmission corridor allocation between power exchanges in economic parlance is a resource allocation problem. There is vast economic literature on ways to handle resource allocation problems and it is a topic of ongoing research. There are different philosophies on what is a fair solution and there is subjectivity in the matter. Hence, it is important that the issue of transmission corridor allocation is deliberated in detail and that it goes through rigor to arrive at a final solution. We are also of the opinion that improvement in procedure is an ongoing process and any transmission corridor allocation principle that is better than the present methodology is welcome. Taking into consideration the importance, criticality and complexity of the subject matter, we are of the view that the entire matter of transmission corridor allocation should be examined by an Expert Group to find out a solution which will not only be acceptable to both power exchanges but also achieve social welfare maximization.

14. Accordingly, an Expert Group consisting of the following is constituted:

1.	Shri S K Sonee, Chief Executive Officer, POSOCO	Chairperson of Expert Group
2.	Shri Ajay Kumar Saxena, Chief (Engg), CERC	Power System Expert
3.	One officer of the level of Chief Engineer to be nominated by CEA	Power System Planning Expert

4.	Shri Ravinder, Former Member (Power System) Central Electricity Authority	Special Invitee
5.	Power Market Expert	To be Co-opted by Export Group members
6.	One representative each from IEX and PXIL having knowledge and experience in operational matters	Co-opted Members
7.	Any other expert from reputed Academic Institution/Research Institute as Special Invitee	To be Co-opted by the Export Group members
8.	Dr S.K. Chatterjee, Jt. Chief (RA) CERC	Member Secretary

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.

16. PXIL and IEX are directed to send the name of their nominees to the Member Secretary of the Expert Group. IEX and PXIL are directed provide the Expert Group with real life data as may be required by the Expert Group. Member Secretary shall coordinate for the meetings and deliberations of the Expert Group. The Expert Group shall submit its report to the Commission by 30.6.2015.

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