CENTRAL ELECTRICITY REGULATORY COMMISSION

# STAFF PAPER ON EXTENDED MARKET SESSION ON POWER EXCHANGES

The paper discusses additional contracts for extended market session on power exchanges. This is in response to the deviation settlement mechanism regulation and tightening of the operating frequency band notified recently. These contracts will benefit generators and beneficiaries in contingency conditions and facilitate transition of UI volumes to a scheduled market.

**July 2014**

# Contents

# 1. Introduction

**1.1** In pursuance of objectives of maintaining grid security and grid discipline as envisaged under the Central Electricity Regulatory Commission (Indian Electricity Grid Code), Regulations, 2010 and subsequent amendments (referred to as "Grid Code"), the Commission has further narrowed the operating frequency band. This has been coupled with steep commercial implications as a result of regulations on Deviation Settlement Mechanism with the intent to shift the volume transacted as Unscheduled Interchange (UI) to scheduled transactions. (Refer Deviation Settlement Mechanism Regulations, 2014 at http://www.cercind.gov.in/2014/regulation/noti132.pdf)

**1.2** While maintaining grid frequency at 50 Hz is non-negotiable, it is important to provide grid-connected entities various types of contracts closer to real time to maintain a balanced portfolio. In many developed countries like US (PJM, ERCOT), Nordic countries (Nordpool) in Europe etc., balancing and deviation settlement is achieved through ancillary services. While the need and manner of introduction of ancillary market[1] is being examined by CERC, it is felt that standard contracts need to be available on power exchanges for the period between the existing trading auction timelines and the actual delivery of power. In order to provide grid-connected entities with measures to respond optimally and in line with trading mechanism present internationally, the following options have been explored in this paper for operating additional contracts on the power exchanges :-

(a) **24x7 intraday/contingency contracts -** Extending the day ahead contingency contracts to be operated in remaining hours after gate closure of day ahead market on power exchanges and operating intraday contracts on 24x7 basis;

(b) **Evening market** - Day ahead auction based collective transaction operated in the evening on power exchanges; and operating intraday contracts on 24x7 basis.

**1.3** In the paper, the present regulatory framework under which transactions take place, international practices, and critical facets of the above two options have been discussed. Finally, it is proposed to extend intraday/contingency contracts to bridge the gap between existing trading timelines and delivery of power. The factors critical for successful functioning of the proposed solution have also been listed.

[1]The staff of the Commission had published a paper on "Introduction of Ancillary Services in Indian Electricity Market" in April 2013 and had sought comments of the stakeholders.

## 2. Regulatory Framework – Grid Code & Deviation Settlement Mechanism Regulations

The Commission vide Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Second Amendment) Regulations, 2014 has specified the operating frequency band of 49.90-50.05 Hz. The relevant regulation after amendment is extracted hereunder

> **Regulation 5.2(m) of the Grid Code**: *"All Users, SEB, SLDCs , RLDCs, and NLDC shall take all possible measures to ensure that the grid frequency always remains within the 49.90 - 50.05 Hz band."*

Vide Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2014 (referred to as "Deviation Settlement regulations"), volume restrictions on UI at lower of 12% and 150 MW in each time block and steep commercial implications have been imposed on drawal and injection of power beyond limits. The relevant regulations are extracted herein-below

a. ***Regulation 5(1)***- *Charges for deviation for each 0.01 Hz step is equivalent to 35.60 Paise/kWh in the frequency range of 50.05-50.00 Hz, and 20.84 Paise/kWh in frequency range 'below 50 Hz' to 'below 49.70 Hz' provided that*

   *……*

   ***(iii) -*** *the charges for the Deviation for the under drawals by the buyer in a time block in excess of 12% of the schedule or 150 MW, whichever is less, shall be zero.*

   ***(iv) -*** *the charges for the Deviation for the over-injection by the seller in a time block in excess of 12% of the schedule or 150 MW, whichever is less, shall be zero*

   *…..*

b. ***Regulation 5(2)(a)*** *- The Charge for Deviation shall be zero at grid frequency of 50.05 Hz and above*

c. ***Regulation 5(2)(d)*** *- The Charge for Deviation at grid frequency "below 49.70 Hz" shall be based on the highest of the average energy charges of generating stations regulated by Commission on RLNG for any six month period preferably from July to December of previous year or from January to June for the year or any other six month period if deemed necessary and suitably adjusted upward to coincide with the Deviation Price Vector*

d. ***Regulation 7(1)*** *-The over-drawals/under drawals of electricity by any buyer during a time block shall not exceed 12% of its scheduled drawal or 150 MW, whichever is lower, when grid frequency is "49.70Hz and above". Provided that no overdrawal of electricity by any buyer shall be permissible when grid frequency is "below 49.70 Hz".*

e. ***Regulation 7(2)*** *- The under-injection / over-injection of electricity by a seller during a time-block shall not exceed 12% of the scheduled injection of such seller or 150 MW, whichever is lower when frequency is 49.70 Hz and above. Provided that - (i) no under injection of electricity by a seller shall be permissible when grid frequency is "below 49.70 Hz" and no over injection of electricity by a seller shall be permissible when grid frequency is "50.10 Hz and above"….*

f. ***Regulation 7(3) -*** *In addition to Charges for Deviation as stipulated under Regulation 5 of these regulations, Additional Charge for Deviation shall be applicable for over-drawal as well as under-injection of electricity for each time block in excess of the volume limit specified in Clause (1) and (2) of this regulation when average grid frequency of the time block is "49.70 Hz and above" ……..*

g. ***Regulation 7(4) -*** *In addition to Charges for Deviation as stipulated under Regulation 5 of these regulations, Additional Charge for Deviation shall be applicable for over-injection/under drawal of electricity for each time block by a seller/buyer as the case may be when grid frequency is "50.10 Hz and above" at the rates equivalent to charges of deviation corresponding to the grid frequency of "below 50.01 Hz but not below 50.0 Hz".*

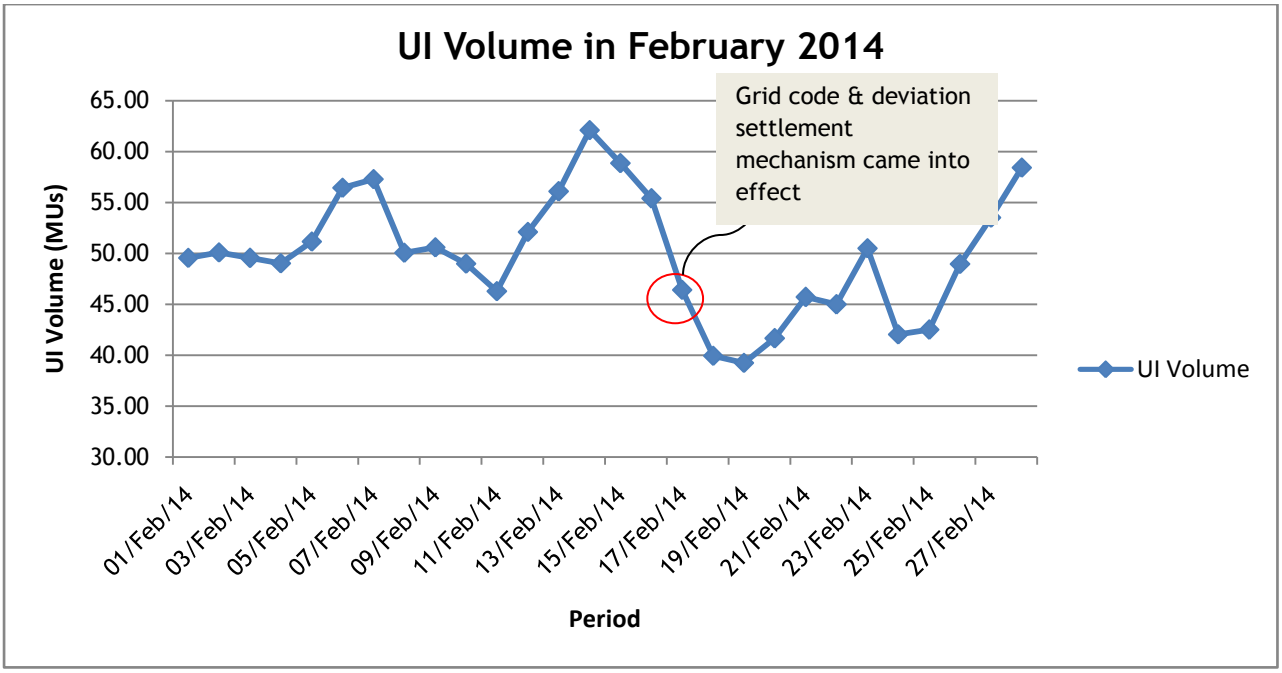
On 3.5.2010, the frequency band was narrowed from 49.2-50.3 Hz to 49.5-50.2 Hz and thereafter, the band was further narrowed to 49.7-50.2 Hz with effect from 17.9.2012. Total electricity generation in the country during the last five years along with electricity transactions in short-term market and volume occurring as UI is given below:

**Volume and Price of Electricity transacted through UI**

| Year | Volume of UI (BU) | Total Volume of Short term (BU) | Total Electricity Generation (BU) | Volume of UI as % of total volume of Short term |
|---|---|---|---|---|
| **2009-10** | 25.81 | 65.90 | 764.03 | 39% |
| **2010-11** | 28.08 | 81.56 | 809.45 | 34% |
| **2011-12** | 27.76 | 94.51 | 874.17 | 29% |
| **2012-13** | 24.76 | 98.94 | 907.49 | 25% |
| **2013-14*** | 20.01 | 96.53 | 878.26 | 21% |

Source: CERC Report on short term market 2012-13 and monthly market monitoring reports of CERC; * - till Feb 2014

As can be observed from the table, while the total generation has increased over the period, volume of Unscheduled Interchange (UI) and its percentage in total volume transacted in short-term market have decreased. These decreases may be attributed to the narrowing of frequency band. The new grid code & deviation settlement regulations have come into effect from 17.2.2014. The volume transacted in UI for the month of February 2014 has been depicted below to exhibit post 17-Feb scenario.




Source: NLDC

The curve shows descent 15-Feb onwards but it again started moving upwards from 19-Feb. The graph is based on a very small data set, on which we cannot comprehensively conclude if volume in UI would decrease or not. However, with historical data (in the table above) it is expected that the narrowing of band with wide commercial implications would lead to a decrease in UI volume with a simultaneous shift by entities transacting in UI to scheduled market.

## 3. Available Transaction Scheduling options

### (a) Balancing market and Scheduling options

Transaction in UI by market participants inter-alia may be attributed to poor demand forecasting and planning but there are real time concerns as well. These concerns are both on the demand and the generation sides. Recently, the Commission received petitions from state entities of Tripura and Madhya Pradesh citing difficulties in implementation of the deviation settlement mechanism regulations.

There are concerns of deviation from schedule that may not be in control of state entities like

- sudden load crash due to storm, heavy rainfall etc. or sudden increase in demand due to increasing temperatures
- non-availability of corridor or congestion resulting in inability to schedule surplus power through open access/power exchange
- unforeseen loss of generation
- integrating intermittent renewable generation – the renewable energy sources are increasing in the grid that lead to unpredictable injection of power. This puts states in

a precarious situation wherein on one hand they are promoting renewable sources in the state and on the other hand, they have to minimize deviations.

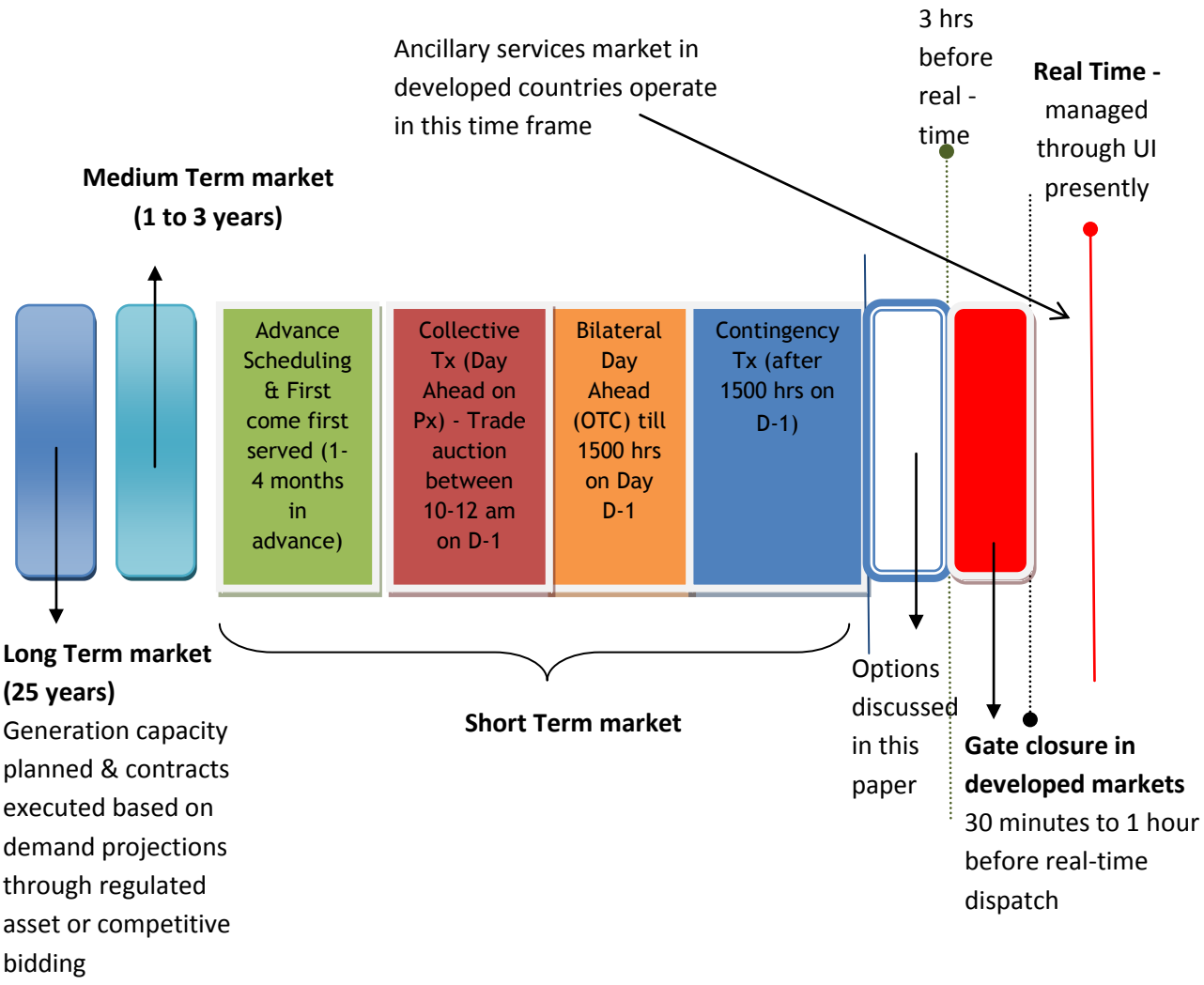
One way to deal with this is to provide markets that operate very close to the real time. In developed countries, balancing market is operated with the aim of settling imbalances in the electricity system from gate closure through to real time and is managed by system operators or balancing authorities (as system operators are called in some countries). In a good market design, generation should follow the load curve at all times even with a load that is constantly changing in real time. The demand and supply should be balanced in space and time, i.e. generators' & beneficiaries' schedules match in each time block and across geography by taking into account transmission flows. In technical terms, the Area Control Error is to be minimized by monitoring the inter link power flows and frequency data. An important aspect of balancing is the approach to procuring ancillary services. The balancing of the demand and supply is achieved through primary response of generator which is immediate (frequency control) - Free Governor Mode of Operation (FGMO) and Restricted Governor Mode of Operation (RGMO); then through secondary response of generators (Automatic Generation Control) which may respond in a few minutes; and thereafter through tertiary response (operating reserves ancillary market) which responds in even longer time period. A special type of ancillary services is Demand Response that may even provide superior response to generators as curtailment of load is typically much faster than ramping of power plants.

Scheduled markets like intraday/contingency market operate close to gate closure and balance the demand and supply in a relatively longer period on a more sustained basis and by voluntary action of market. They also ensure security constrained merit order dispatch. When various forms of product are available in short term market as close to real time as possible and have enough liquidity, the generation is likely to follow the load curve in unison. With these products in the market, the generators tend to operate at optimal operational efficiency, the discom need not shed load to balance their portfolio and overall security constrained merit order is achieved through market mechanism similar to what can be achieved through centralized dispatch and the need for system operator to intervene through ancillary market is minimized.

Intraday market enables buyers and sellers to transact energy within a day, and as close as possible to actual dispatch results in a more accurate generator resource despatch, maintaining system security, and reduction in area control errors during real time. With increasing shares of wind and solar generation, the uncertainty and variability in the net load (load minus wind and solar generation) is increasing. States have to either incur high UI charges or resort to load or RE curtailment. States with limited flexible generation sources can use intraday market to balance the errors between day-ahead schedule and real time dispatch.

As more variable RE generation get connected to the grid, the day-ahead forecast errors in net load are expected to increase, and the need for intraday transactions and/or ancillary services that provide load following reserves will increase. An intraday market could provide a key platform that can be utilized to transact excess or deficit energy within a balancing area closer to real time dispatch.

The figure below depicts the period in which trades are scheduled and ancillary market/UI are operated presently.




Indian market design is decentralized dispatch concept where the merit ordering and scheduling responsibility is with the Discoms and the deviation settlement mechanism provides the Automatic Generation Control (AGC) for the Indian electricity grids and the whole design encourages the gencos/utilities to conserve when in the real time balance becomes surplus and to provide for when in there is a real time shortage and thus maintaining the grid frequency.

While UI is real time in nature and response to frequency variations is almost immediate by grid-connected entities, the options discussed in the paper (24x7 Intraday/contingency contracts &evening market) shall allow participants to trade 3-4 hours before the actual delivery as per the current mechanism. The present regulations allow scheduling of short-term bilateral transactions sixth time block onwards from the time of application but practically it requires at least 3-4 hours between trading auction and delivery of power. This gap is due to multiple concurrences required from NLDC, SLDCs & RLDCs. Hence, scheduled market discussed in the paper cannot be a one to one, or a 100% substitute of a real time mechanism and ancillary services should serve this segment better.

## (b) Rescheduling options

Regulation 6.5 of the Grid Code elaborates scheduling and dispatch procedure for long, medium, and short-term open access. The present set of regulations permit both the generators and the beneficiaries to revise their schedules at short notice.

1. **Regulation 6.5.18 of Grid Code** allows revision in schedules/declared capability for ISGSs/beneficiary from fourth time block onwards.
   *"18. Revision of declared capability by the ISGS(s) having two part tariff with capacity charge and energy charge (except hydro stations) and requisition by beneficiary(ies) for the remaining period of the day shall also be permitted with advance notice. Revised schedules/declared capability in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received in the RLDC to be the first one."*
2. **Regulation 6.5.19 of Grid Code** allows revision of short-term bilateral schedules in case of forced outage of generating unit of capacity 100 MW from fourth time block
   *"19. Notwithstanding anything contained in Regulation 6.5(18), in case of forced outage of a unit for a Short Term bilateral transaction, where a generator of capacity of 100 MW and above is seller, the generator shall immediately intimate the same along with the requisition for revision of schedule and estimated time of restoration of the unit, to SLDC/RLDC as the case may be. With the objective of not affecting the existing contracts, the revision of schedule shall be with the consent of the buyer till 31.07.2010. Thereafter, consent of the buyer shall not be a pre-requisite for such revision of schedule. The schedule of the generator and the buyer shall be revised, accordingly. The revised schedules shall become effective from the 4th time block, counting the time block in which the forced outage is declared to be the first one. The RLDC shall inform the revised schedule to the seller and the buyer. The original schedule shall become effective from the estimated time of restoration of the unit. However the transmission charges as per original schedule shall continue to be paid for two days."*

3. **Regulation 6.5.19A of Grid Code** further corroborates the same fact that the schedules can be revised for short-term transactions.
   *"6.5.19 A. In case of revision of schedule of a generating unit, the schedules of all transactions under the long-term access, medium-term open access and short-term open access (except collective transactions through power exchange), shall be reduced on pro-rata basis."*
4. **Regulation 6.5.8 of Grid Code** allows for revision by SLDC/ISGS.
   *"8 The SLDCs/ISGS shall inform any modifications/changes to be made in drawal schedule/foreseen capabilities, if any, to RLDC by 10 PM or preferably earlier."*

Regulation 13 of Open Access in inter-State Transmission Regulations, 2008 and subsequent amendments (hereinafter referred to as "short term open access regulations") allows the buyer to purchase power to meet its contingency requirements

> *"13. In the event of a contingency, the buyer or on its behalf, a trader may locate, and the power exchange may offer its platform to locate, a source of power to meet short term contingency requirements even after the cut-off time of 1500 hrs of the preceding day and apply to the nodal agency for short-term open access and scheduling and in that event, the nodal agency shall endeavour to accommodate the request as soon as may be and to the extent practically feasible, in accordance with the detailed procedure."*

It may be noted that the facility to meet contingency requirements is available in the OTC market round the clock but is seldom used. The exchanges, however, operate products to meet contingency requirements for limited timeframe only. The next section discusses in detail the short-term scheduling options available to participants on power exchange platform.

## 4. Contingency products on power exchanges presently

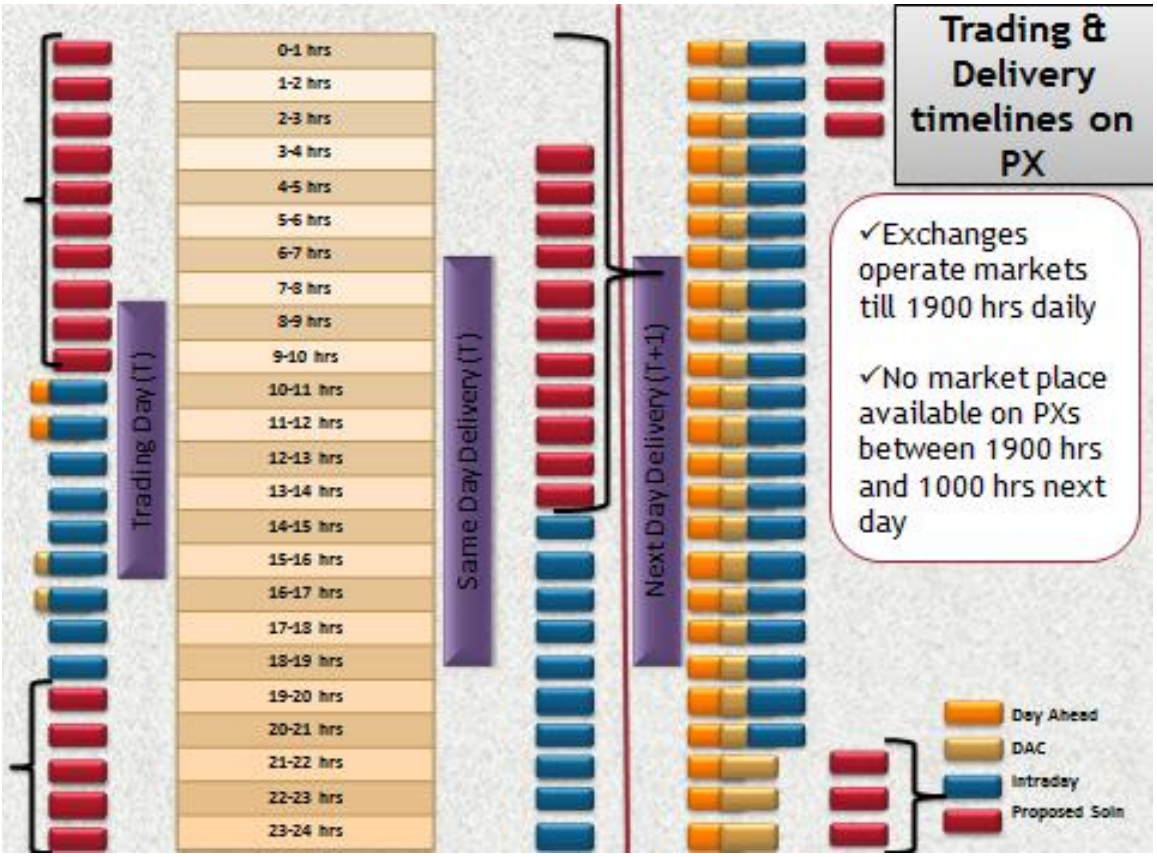
The two power exchanges offer day ahead contingency and intraday products to cater to contingency requirements of the participants. Power Market Regulations, 2010 define Intraday/Contingency contract as

> *"Intraday Contract / Contingency Contract" means contracts where transaction occurs on day (T) after the closure of day ahead transaction window and the delivery of power is on the same day (T) or next day (T+1) and which are scheduled by Regional Load Despatch Centre or National Load Despatch Centre;*

IEX operates day ahead contingency product that offers 24 contracts of one hour each for the next day and intraday product that offers contracts for the delivery on the same day. PXIL likewise operates day ahead contingency product offering 24 contracts of one hour each for the next day. The intraday product of PXIL offers contracts for the same day and until 2100 hrs the next day. The timeframes for trading & delivery of power for the products on the two power exchanges are as below:

| S. No. | Product Type | Power Exchange | Trading timeline | Delivery period |
|---|---|---|---|---|
| 1 | Day Ahead Contingency | IEX | 1500-1700 hrs on D-1 | 0000-0100 hrs till 2300-2400 hrs on Day D |
| | | PXIL | 1530-1630hrs on D-1 | 0000-0100 hrs till 2300-2400 hrs on Day D |
| 2 | Intra-day | IEX | Different trading sessions between 1000 - 1700 hrs on Day D | 1400-2400 hrs on Day D |
| | | PXIL | Different trading sessions between 1000-1900 hrs on Day D | 1400 hrs on Day D to 2100 hrs on D+1 |

**As can be seen in the table above, the power exchanges together conduct auctions till 1900 hrs daily for delivery of power on the same day and next day. For a participant, there is no market place available on either power exchange after 1900 hrs and before 1000 hrs the next day.** Pictorially and for clarity it can be represented as below:




## 5. Contracts for contingency requirements

With gaps assessed in the previous sections, by taking into account international practices and considering the national requirements of a market operating in the timeframe between existing trading auctions and actual delivery of power, following options have been explored:

1. **Market Design 1: Extend the trading window for day-ahead contingency and intraday market so that trading option is available on 24 x 7 basis on power exchanges. These contracts will be on a rolling basis and would operate as close to real time as possible.**
2. **Market Design 2: Operate an additional market based on collective transaction in the evening; and operate intraday contracts on 24x7 basis**

The staff of the Commission had prepared a consultation paper on "Modifications in Power Market Design: Evening market, 15 minute bidding time block and Ancillary market on Power Exchange" which was published on 13.8.2010.

A public hearing in which the stakeholders presented their views followed the publication of paper. The Commission vide its order dated 24.5.2011 in suo motu petition no. 127/2011 (Modification in Market Design of Day Ahead Market in Power Exchanges - Modifications of Time block for bidding from one hour to fifteen minutes and Introduction of Evening Market) had

kept the proposal for introduction of evening market in abeyance. The relevant extracts of the order are as below:

*"13. We have considered the pros and cons of introduction of evening markets in the Power Exchanges. We are of the view that the liquidity in the day ahead morning market is still low and the introduction of evening market will split liquidity further and adversely impact the robustness of price discovery in the morning session. As for the concern regarding uncleared energy in morning session of day ahead market, the existing intra-day and contingency market need to be effectively used to attract such uncleared energy.*

*14. We direct that the proposal for introduction of evening markets be kept in abeyance at present. The power exchanges and POSOCO are directed to analyse the reasons for low liquidity in the intra-day and contingency market and submit their report by 30.06.2011."*

The liquidity in both products was low in 2011 and it is still low as can be figured from the data for the last one year (Mar 2013- Feb2014) shown in the table below:

| | Intra- Day Contracts (in MUs) | | | | Day Ahead Contingency Contracts (in MUs) | | |
|---|---|---|---|---|---|---|---|
| | **IEX** | **PXIL** | **Total** | | **IEX** | **PXIL** | **Total** |
| **Mar-13** | 3.96 | 0.30 | 4.26 | **Mar-13** | 2.84 | 0.00 | 2.84 |
| **Apr-13** | 6.39 | 1.23 | 7.62 | **Apr-13** | 0.34 | 0.00 | 0.34 |
| **May-13** | 3.36 | 0.42 | 3.78 | **May-13** | 0.00 | 0.00 | 0.00 |
| **Jun-13** | 10.77 | 4.60 | 15.37 | **Jun-13** | 0.72 | 0.00 | 0.72 |
| **Jul-13** | 15.90 | 4.76 | 20.66 | **Jul-13** | 2.48 | 0.00 | 2.48 |
| **Aug-13** | 5.10 | 1.10 | 6.20 | **Aug-13** | 1.48 | 0.00 | 1.48 |
| **Sep-13** | 33.17 | 8.11 | 41.28 | **Sep-13** | 28.47 | 2.98 | 31.45 |
| **Oct-13** | 15.56 | 2.22 | 17.78 | **Oct-13** | 0.42 | 0.00 | 0.42 |
| **Nov-13** | 11.24 | 5.55 | 16.79 | **Nov-13** | 2.58 | 0.68 | 3.26 |
| **Dec-13** | 8.12 | 0.15 | 8.27 | **Dec-13** | 7.22 | 2.00 | 9.22 |
| **Jan-14** | 10.40 | 2.46 | 12.86 | **Jan-14** | 6.34 | 1.97 | 8.31 |
| **Feb-14** | 5.54 | 23.81 | 29.35 | **Feb-14** | 24.21 | 0.00 | 24.21 |
| **Total** | **129.51** | **54.71** | **179.96** | **Total** | **77.1** | **7.63** | **84.73** |

Source: CERC market monitoring reports

It is observed that volume transacted in intra-day market over the one-year period is about 15 MUs per month whereas volume transacted in day ahead contingency market is about 7MUs/month. Internationally, for instance in Nordpool market in 2013, 348.9 TWh was traded

on Elspot ( the day-ahead market) & 4.2 TWh was traded on Elbas, the intraday market. Thus volume in Elbas (intraday product) is low which is about 1% if the Elspot (day ahead product).

In some countries like US, the system operation (SO) and market operation (MO) are handled by the same institution – PJM, CAISO, MISO etc. Since system operation is a 24x7 activity, the market can easily remain open at all times. In Indian scenario, the bifurcation of system operator and market operator requires the market operator to be mandated by regulatory fiat to remain open 24x7 even though a liquid intraday/contingency market cannot be envisaged now.

### a) Features of extended trading window for contingency/intraday trades

In order to bring the trading window as close as possible to the actual delivery and operate market on 24x7 basis especially for a product like electricity, an extended trading session for day ahead contingency/intraday trades with the following features may be implemented by both the exchanges:

1. the existing products for day ahead contingency and intraday markets would continue to be operated by the exchanges.
2. the timelines for the products are extended for both exchanges so that trading window is open round the clock. Contingency market to be operated for the entire day after completion of day ahead market.
3. The contracts will be on a rolling basis and as close to real time as possible
4. price discovery mechanism remains exactly same as those for the respective products presently

### b) Features of evening market

As was proposed in the earlier staff paper, the evening market can be operated as another iteration of the morning day ahead market with the following features:

1. double sided closed bid auction
2. price discovery mechanism remains same as that of the morning day ahead market
3. process is totally independent of the morning market and participants bid again in evening session on requirement basis. The processes including trading session, risk management, clearing and settlement, physical settlement will be handled separately by the power exchanges and system operator
4. Additionally bilateral day ahead applications can be accepted until the trading auction for day ahead evening market commences on power exchange. The day ahead contingency product shall be operated after the day ahead evening market.
5. Intraday contingency to operate on 24x7 basis.

## 6. Discussion on critical facets of extended market session options

In this section, various facets of the two market design propositions i.e. evening market and extended intra day contracts have been discussed.

a) **Advantages of implementing either of the options:**

i. Improved grid reliability & utilization of transmission corridor with possible shifting of volume from unscheduled to scheduled market.

ii. The exchanges are already operating morning day ahead market & contingency/intraday markets and minimal changes may be required in the present infrastructure for implementation of either structure.

iii. Discoms should be able to balance their portfolio by making informed decision based on critical considerations like weather, modified load pattern for the next day etc. One such instance could be when the actual load is less than the forecasted load; the discom may request the generator to revise down the schedule. The discom would continue to pay capacity charges. With the options presented, the discom may procure power from the generator during periods of lower actual demand and may sell power in the scheduled market thereby reducing revenue loss (payment of capacity charge) of the utility.

iv. Industrial consumers in some states are procuring power from the exchanges at prices lower than or equal to the threshold price (calculated by discounting applicable charge & losses from the HT tariff of discom). This is leading to power mismanagement and revenue loss for the utility. In the event that either market design (evening market or 24 X & intra day market) is implemented, the SLDCs may provide the utility/discom with daily update on the total quantum purchased by industrial consumer through power exchanges and the utility can then make appropriate arrangements for buying/selling of power through extended market session.

v. Facility to transact power in times of contingency should help generators in achieving better operational efficiency and maintain higher PLFs.

vi. There are instances when the requisition made by the beneficiary is less than its allocation in ISGS. In this case, the ISGS is left with capacity that is not scheduled. This surplus capacity, known as Unrequisitioned Surplus (URS) power, can be sold through extended contingency/Intra-day market or evening market. A fair and equitable principle to share the revenue between the generator and beneficiary has to be devised for successful implementation of this proposal. This selling of URS power through contingency/intra-day market may require changes in the regulations.

**b) Possible low transaction volume in the new proposed market designs**

i. Both generators & open access consumers bid on day ahead market at marginal cost/price and generators (at times) bid lower than marginal cost to ensure scheduling

of their entire generation. If these participants are not cleared in morning day ahead market, the probability of them getting cleared in extended session is remote.

ii. For discoms the reasons for low participation could be
   a. non-availability of decision makers after normal office hours
   b. requirement of taking decision on bid/offer price: Price discovery in contingency/intraday market is on bilateral basis and therefore the discoms have to take a decision on the bid/offer price which may be very different from the price discovered in day ahead market and this difference may attract audit issues.
   c. that the discoms have not adequately invested in load forecasting, adequacy planning and load managements and instead resort to load shedding or overdrawl of power from the grid to manage their portfolios.

iii. Transmission congestion may also lead to lower clearance in volume. With congestion and lower volumes, the evening market may not have an efficient price discovery and the market power may get concentrated with some big players.

iv. Provisioning of funds after normal office hours

**c) Preference in open access:** For evening day ahead market, the contingency market would have to be suspended until transactions are scheduled. During this period, even the traders would not be able to schedule any of their contingency requirement application. This in effect would give power exchanges preference over traders in terms of allocation of transmission corridor. However, if the contingency/intraday contracts timeframe were extended, then both the traders and the power exchanges would get equal opportunity to avail transmission corridor.

**d) Speculative or frivolous bidding:** Evening markets may lead to speculative bidding. However, frivolous bidding might not take place as all charges including transmission charge, operating charge and associated losses are payable by the participants.

**e) Presence of multiple price signals:** The evening market may divide volume between morning and evening day ahead market thereby leading to inefficient price discoveries in both the sessions. Multiple price signals may confuse the participants as well.

f) **Regulatory changes:** The operationalization of evening market would require changes in short-term open access regulations and procedure for open access for both bilateral & collective transactions. For extending the contingency/intraday session, no change would be required in short-term open access regulations or procedure for open access for either bilateral or collective transaction. However, exchanges may need to modify their rules, byelaws and business rules and get it approved by the Commission accordingly for both options.

g) **Procedural issues:** There are procedural impediments in the present form of contingency & intraday markets and the same have been listed below

i. It takes about 3 hours from the time of application to scheduling of contingency/intraday transactions. In addition, there may be intermittent co-

ordination issues between the various RLDCs leading to further delay. There seems to be a strong case for reducing the processing time of applications. It is likely that the capacity to handle the number of applications in contingency/intraday market is limited at present. The system operators may therefore be required to upgrade their facilities to entertain higher number of applications and respond quicker.

ii. High transaction charges in the bilateral segment may deter small participants to transact in the contingency/intraday markets. Operating charge of Rs 2000 per transaction is high for small participants who pay about Rs 300-400 per transaction on day ahead market.

## 7. Proposition

In the given scenario, it might not be prudent to unsettle a well-functioning day ahead market. With possibility of speculative bidding, multiple price points leading to confusing signals to participants, possibility of poor price discovery and undue preference in open access to power exchanges over traders, **it is proposed that the trading of day ahead contingency/intraday contracts be extended round the clock (24 X7) on the power exchange platform.** The details of the market design are as follows:

1. The existing products for day ahead contingency and intraday markets would continue to be operated by the exchanges. As a principle, the timeline for these products is being extended so that trading window is open for periods as mentioned below:
    a) Same day Delivery (upto 2400 hours): The trading window is open round the clock for delivery of power on the same day (minimum delivery period - 3 hours after contract execution subject to corridor availability).
    b) Next day Delivery (0000- 2400 hours): The trading window opens after declaration of day ahead results and remains open till end of day.
2. Price discovery mechanism remains as is for the respective products.
3. The Power Exchanges should workout the finer aspects of auction window timings, duration of contract availability and rolling contracts structure. They should submit the contract specification to the Commission as a part of the response to the discussion paper.
4. The exchanges may be mandated to run the extended session of contingency and the intraday markets for six months on a pilot basis and provide feedback for any adjustments.
5. For the benefit of the market, the exchanges should widely publicize the availability of intraday & day ahead contingency the news products through seminars and workshops with market participants.

6. NLDC should endeavor to provide latest information about available Transmission Margins on inter regional links based on the state of the grid to facilitate any transaction in intra-day market.

## 8. Critical Success factors for the proposition

a) **Latest information about transmission margin available on inter regional links:** The success of round the clock contingency/intraday market depends upon availability of transmission corridors and information about margins on various transmission links to market participants on an active and frequent basis. This information should be conspicuously available on the website of POSOCO/NLDC.

The state & the distribution network provide last mile connectivity for completion of the transaction and therefore SLDCs should publish TTC & ATC on their respective websites in a prominent manner.

b) **Automation in open access processing:** The processing time for scheduling of transactions needs to be reduced. This has to be addressed through an integrated information management system between the NLDC, RLDCs and SLDCs. The process of application and consent from the RLDCs would be automated and a common web based application can be developed that is accessible to stakeholders. The market participants, power exchanges, traders may apply for open access through this electronic web based application and the system operator would process the application on line through the system. In addition, the latest information about the transmission corridor margins as mentioned in point (a) should be available online in this system.

c) **Intra day market close to real-time:** As mentioned earlier, the closer the intra day market is to real time, the better it is for the market participants. For this, the gate closure time for scheduling needs to be reduced.

d) The Power exchanges would be provided with reasonable amount of time to upgrade their infrastructure and human resources before commencement of operations of the propositions.

## 9. Stakeholder Feedback

Comments are invited from market participants, power exchanges, traders, system operators and other stakeholders on the points discussed in this paper in general. The stakeholders are requested to make their observations on the specific points also as mentioned below:

1. Will the intraday 24x7 trading session genuinely address the concerns of grid-connected entities and help respond to contingencies unanticipated like load crash or generator failure etc. and act as a useful risk mitigation mechanism?
2. Should the market be kept open 24x7 or should the trading session extension be undertaken in a calibrated manner by extending the trading session by only a few hours before opening it 24x7?
3. Are there any apprehensions by market participants of possible gaming and market abuse with introduction of extended trading sessions?

The feedback would be an important input for the Commission to consider and decide the future course of action.