

# Monthly Report on Short-term Transactions of Electricity in India

December, 2018



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## Abbreviations

| Abbreviation     | Expanded Version  |
|------------------|---|
| ACBIL            | ACB ( India) Limited  |
| ACP              | Area Clearing Price   |
| ACV              | Area Clearing Volume  |
| Adani HVDC       | Adani Power Limited (High Voltage Direct Line Current Line) |
| AD HYDRO         | AD Hydro Power Limited                                      |
| BALCO            | Bharat Aluminum Company Limited                             |
| BRBCL            | Bhartiya Rail Bijlee Company Limited                        |
| CEA              | Central Electricity Authority                               |
| CERC             | Central Electricity Regulatory Commission                   |
| CGPL             | Coastal Gujarat Power Limited                               |
| CHUZACHEN HEP    | Chuzachen Hydro Electric Power Project                      |
| COASTGEN         | Coastal Energen Private Limited                             |
| DAGACHU          | Dagachhu Hydro Power Corporation                            |
| DB POWER         | Diligent Power Pvt. Ltd.                                    |
| DCPP             | Donga Mahua Captive Power Plant                             |
| DGEN MEGA POWER  | DGEN Mega Power Project                                     |
| DHARIWAL POWER   | Dhariwal Power Station                                      |
| DOYANG HEP       | Doyang Hydro Electric Project                               |
| DSM              | Deviation Settlement Mechanism                              |
| DVC              | Damodar Valley Corporation                                  |
| EMCO             | EMCO Energy Limited   |
| ESSAR POWER      | Essar Power Limited   |
| ESSAR STEEL      | Essar Steel Ltd   |
| GMR CHHATTISGARH | GMR Chhattisgarh Energy Limited                             |
| GMR KAMALANGA    | GMR Kamalanga Energy Ltd.                                   |
| IEX              | Indian Energy Exchange Limited                              |
| ILF&S            | Infrastructure Leasing & Financial Services Limited         |
| J&K              | Jammu & Kashmir   |
| JAYPEE NIGRIE    | Jaypee Nigrie Super Thermal Power Project                   |
| JINDAL POWER     | Jindal Power Limited  |
| JINDAL STAGE-II  | Jindal Power Ltd Stage II                                   |
| JITPL            | Jindal India Thermal Power Ltd.                             |
| JORETHANG        | Jorethang Loop Hydroelectric Power Project                  |
| KARCHAM WANGTOO  | Jaypee Karcham Hydro Corporation Limited                    |
| KORBA WEST POWER | Korba West Power Company Limited                            |
| KSK MAHANADI     | KSK Mahanadi Power Ltd                                      |
| LANCO BUDHIL     | Lanco Budhil Hydro Power Private Limited                    |
| LANKOAMK         | Lanco Amarkantak Power Private Limited                      |
| LANKOKONDAPALLY  | Lanco Kondapally Power Private Limited                      |
| LOKTAK           | Loktak Power Project  |
| MALANA           | Malana Hydroelectric Plant                                  |
| Maruti Coal      | Maruti Clean Coal and Power Limited                         |
| MB POWER         | MB Power Ltd  |
| MEENAKSHI        | Meenakshi Energy Private Limited                            |
| MP               | Madhya Pradesh  |

|               |   |
|---------------|---|
| MUs           | Million Units   |
| NEEPCO        | North Eastern Electric Power Corporation Limited        |
| NHPC STATIONS | National Hydro Electric Power Corporation Ltd. Stations |
| NLC           | Neyveli Lignite Corporation Limited                     |
| NTPC STATIONS | National Thermal Power Corporation Ltd. Stations        |
| NJPC          | Nathpa Jhakri Hydroelectric Power Station               |
| NLDC          | National Load Despatch Centre                           |
| NSPCL         | NTPC - SAIL Power Company Private Limited               |
| NVVN          | NTPC Vidyut Vyapar Nigam Limited                        |
| NTECL Vallur  | NTPC Tamilnadu Energy Company Limited Vallur            |
| ONGC Platana  | ONGC Tripura Power Company                              |
| OTC           | Over The Counter  |
| PX            | Power Exchange  |
| PXIL          | Power Exchange India Limited                            |
| RANGIT HEP    | Rangit Hydro electric power project                     |
| REC           | Renewable Energy Certificate                            |
| RGPPL         | Ratnagiri Gas and Power Private Limited                 |
| RLDC          | Regional Load Despatch Centre                           |
| RTC           | Round The Clock   |
| Sasan UMPP    | Sasan Ultra Mega Power Project                          |
| SEMBCORP      | Sembcorp Gayatri Power Ltd                              |
| SHREE CEMENT  | Shree Cement Limited                                    |
| SIMHAPURI     | Simhapuri Energy Private Limited                        |
| SKS Power     | SKS Power Generation Chhatisgarh Limited                |
| SPECTRUM      | Spectrum Power Generation Ltd                           |
| TEESTA STG3   | Teesta Stage 3 Hydro Power Project                      |

## Introduction

A well-functioning electricity market requires an effective market monitoring process. As part of the market monitoring process, the monthly report on short-term transactions of electricity, is being prepared and posted on the website of CERC since August 2008. Here, “short-term transactions of electricity” refers to the contracts of less than one year period, for electricity transacted (inter-State & intra-State) through inter-State Trading Licensees and directly by the Distribution Licensees, Power Exchanges (Indian Energy Exchange Ltd (IEX) and Power Exchange India Ltd (PXIL), and Deviation Settlement Mechanism (DSM). The objectives of the report are: (i) to observe the trends in volume and price of the short-term transactions of electricity; (ii) to analyse competition among the market players; (iii) to analyse effect of congestion on volume of electricity transacted through power exchanges; (iv) to analyse bilateral contracts executed by traders; (v) to provide information on volume and price of Renewable Energy Certificates (RECs) transacted through power exchanges; and (vi) to disclose/disseminate all relevant market information. The details of the report for the month of **December, 2018** are as under:

### I: Volume of Short-term Transactions of Electricity

During December 2018, total electricity generation excluding generation from renewable and captive power plants in India was 100537 MUs (Table-1).

Of the total electricity generation, 11749.80 MUs (11.69%) was transacted through short-term, comprising of 5886.30 MUs (5.85%) through bilateral (through traders and term-ahead contracts on power exchanges and directly between distribution companies), followed by 3059 MUs (3.04%) through day ahead collective transactions on power exchanges and 2804.50 MUs (2.79%) through DSM (Table-1 & Figure-2).

Of the total short-term transactions, bilateral constitutes 50.10% (37.45% through traders and term-ahead contracts on power exchanges and 12.65% directly between distribution companies) followed by 26.03% through day ahead collective transactions on power exchanges and 23.87% through DSM (Table-1 & Figure-1). Daily volume of short-term transactions is shown in Table-17 & Figure-3.

The percentage share of electricity traded by each trading licensee in the total volume of electricity traded by all the trading licensees is provided in Table-2 & Figure-4. The volume of electricity transacted by the trading licensees includes bilateral transactions and the transactions undertaken through power exchanges. There were 38 trading licensees as on December, 2018. In December, 2018, 21 trading licensees were engaged in short term trading. Top 5 trading licensees had a share of 75.73% in the total volume traded by all the licensees. These are PTC India Ltd., Arunachal Pradesh Power Corporation (P) Ltd, Manikaran Power Ltd., NTPC Vidyut Vyapar Nigam Ltd. and Mittal Processors (P) Ltd.

Herfindahl-Hirschman Index (HHI) has been used for measuring the competition among the trading licensees. Increase in the HHI generally indicates decrease in competition and increase of market concentration, and vice versa. The HHI below 0.15 indicates non-concentration, HHI between 0.15 and 0.25 indicates moderate concentration and HHI above 0.25 indicates high concentration. The HHI has been computed based on the volume of electricity traded (inter-State & intra-State) by inter-State trading licensees, and it was 0.1481 for the month of December, 2018, which indicates non-concentration of market power (Table-2).

The volume of electricity transacted through IEX and PXIL in the day ahead market was 3058.70 MUs and 0.30 MUs respectively. The volume of total buy bids and sell bids was 4567.62 MUs and 7224.55 MUs respectively in IEX while the same was 10.05 MUs and 17.76 MUs respectively in PXIL. The variation in the volume of buy bids and sell bids placed through power exchanges shows variation in the demand and supply position.

The volume of electricity transacted through IEX and PXIL in the term-ahead market was 97.22 MUs and 41.37 MUs respectively (Table-6 & Table-7).

## **II: Price of Short-term Transactions of Electricity**

(i) *Price of electricity transacted through Traders:* The minimum, maximum and weighted average sale prices have been computed for the electricity transacted through traders and the sale prices were ₹2.17/kWh, ₹4.82/kWh and ₹4.34/kWh respectively (Table-3). The weighted average sale prices were also computed for the transactions during

Round the Clock (RTC) and Off-peak periods separately, and the sale prices were ₹4.41/kWh and ₹3.48/kWh respectively (Table-4).

**(ii) Price of electricity transacted through Power Exchanges:** The minimum, maximum and weighted average prices have been computed for the electricity transacted through IEX and PXIL. The minimum, maximum and weighted average prices were ₹1.75/kWh, ₹7.53/kWh and ₹3.50/kWh respectively in IEX and ₹4.81/kWh, ₹4.81/kWh and ₹4.81/kWh respectively in PXIL (Table-5).

The price of electricity transacted through IEX and PXIL in the term-ahead market was ₹4.01/kWh and ₹4.09/kWh respectively (Table-6 and Table-7).

**(iii) Price of electricity transacted through DSM:** The average deviation settlement price was ₹2.19/kWh. The minimum and maximum deviation settlement prices were ₹0.00/kWh and ₹6.36/kWh respectively (Table-8).

The prices of electricity transacted through trading licensees, power exchanges and DSM and their comparison is shown in Table-18, Figure-5 & 6.

### **III: Volume of Short-term Transactions of Electricity (Regional Entity<sup>1</sup>-Wise)**

Of the total bilateral transactions, top 5 regional entities sold 59.38% of the volume, and these were Punjab, Haryana, Delhi, Damodar Valley Corporation and Andhra Pradesh. Top 5 regional entities purchased 52.12% of the volume, and these were Madhya Pradesh, Andhra Pradesh, Gujarat, Jammu and Kashmir and Chhattisgarh (Table-9& 10).

Of the total power exchange transactions, top 5 regional entities sold 35.53% of the volume, and these were Maharashtra, Delhi, Sembcorp Gayatri Power Ltd., Gujarat and Teesta Stage 3 Hydro Power Project. Top 5 regional entities purchased 47.54% of the volume, and these were Telangana, Tamil Nadu, Punjab, Damodar Valley Corporation and Bihar (Table-11 & 12).

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<sup>1</sup> In case of a state, the entities which are “selling” also include generators connected to state grid and the entities which are “buying” also include open access consumers.



Of the total DSM transactions, top 5 regional entities underdrew 32.44% of the volume, and these were NTPC Stations (Western region), Gujarat, Sasan Ultra Mega Power Project, Andhra Pradesh and Maharashtra (Table-13). Top 5 regional entities overdrew 22.87% of the volume, and these were Rajasthan, Telangana, Tamil Nadu, Damodar Valley Corporation and Odisha (Table-14).

Regional entity-wise total volume of net short-term transactions of electricity i.e. volume of net transactions through bilateral, power exchanges and DSM is shown in Table-15 & 19. Top 5 electricity selling regional entities were Punjab, Delhi, Haryana, Sembcorp Gayatri Power Ltd. and Essar Power Ltd. Top 5 electricity purchasing regional entities were Madhya Pradesh, Jammu and Kashmir, Tamil Nadu, Uttarakhand and Gujarat.

#### **IV: Congestion<sup>2</sup> on Inter-State Transmission Corridor for Day-Ahead Market on Power Exchanges**

Power Exchanges use a price discovery mechanism in which the aggregate demand and supply are matched to arrive at an unconstrained market price and volume. This step assumes that there is no congestion in the inter-State transmission system between different regions. However, in reality, the system operator (NLDC) in coordination with RLDCs limits the flow (due to congestion) in the inter-State transmission system. In such a situation, power exchanges adopt a mechanism called “Market Splitting”<sup>3</sup>.

In the month of December 2018, congestion occurred only in IEX. The details of congestion are shown in Table-16. The volume of electricity that could not be cleared due to congestion and could not be transacted through power exchanges is the difference between

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<sup>2</sup> “Congestion” means a situation where the demand for transmission capacity exceeds the available transfer capability

<sup>3</sup> “Market Splitting” is a mechanism adopted by Power Exchange where the market is split in the event of transmission congestion, into predetermined (by NLDC) bid areas or zones, which are cleared individually at their respective area prices such that the energy balance in every bid area is reached based upon the demand and supply in individual bid areas and using the available transmission corridor capacity between various bid areas simultaneously”

As a result of this market splitting the price of electricity in the importing region, where demand for electricity is more than supply, becomes relatively higher than the price of electricity in the exporting region.

unconstrained cleared volume (volume of electricity that would have been scheduled, had there been no congestion) and actual cleared volume.

During the month, the volume of electricity that could not be cleared in IEX due to congestion was 0.25% of the unconstrained cleared volume. In terms of time, congestion occurred was 3.29% in IEX (Table-16). No congestion occurred in PXIL.

## **V: Bilateral Contracts executed by Traders**

The above sections covered an analysis on short-term transactions of electricity in December, 2018. This section covers an analysis of bilateral contracts executed in January, 2019.

**(i) Duration of bilateral contracts:** During January 2019, a total of 76 bilateral contracts (excluding banking/swap contracts) have been executed by traders for the volume of 1069.51 MUs. Figure-7 shows the percentage of contracts categorized according to the period of power supply. It can be observed from the figure that 73.7% of the bilateral contracts were executed for duration of up to one week, 26.3% of the contracts were executed for duration of more than a week and up to one month, while no contracts were executed for duration of more than one month.

During the month, 29 banking/swapping bilateral contracts were also executed for the volume of 1294.30 MUs.

**(ii) Forward Curve based on price of bilateral contracts:** A forward curve reflects present day's expectation of prices for a future period. The forward curve of electricity prices are based on sale prices of bilateral contracts executed by traders. The price of each contract for each day is taken into consideration while constructing the forward curve. On the basis of these prices, the weighted average price for each day is calculated using various sale prices of contracts for delivery on that particular day.

Figure-8 represents the forward curve of electricity sale prices for the period from 1<sup>st</sup> January, 2019 to 26<sup>th</sup> April, 2019 based on the bilateral contracts<sup>4</sup> executed till January,

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<sup>4</sup>Excluding Banking/Swapping contracts

2019. Forward curves have been drawn for the contracts executed in December, 2018 and January, 2019 for the purpose of comparison. It is observed that forward contract prices are higher for the contracts executed in January, 2019 compared to the contracts executed in December, 2018 during the period 1<sup>st</sup> – 31<sup>st</sup> March 2019.

## **VI: Volume and Price of Renewable Energy Certificates (RECs)**

The concept of Renewable Energy Certificates (RECs) seeks to address mismatch between availability of renewable energy and the requirement of the obligated entities to meet their renewable purchase obligation by purchasing green attributes of renewable energy remotely located in the form of RECs. The REC mechanism is a market based instrument, to promote renewable sources of energy and development of electricity market.

One REC is equivalent to 1 MWh electricity injected into the grid from renewable energy sources. The REC is exchanged only in the power exchanges approved by CERC within the band of a floor price and forbearance (ceiling) price as notified by CERC from time to time. The first REC trading was held on power exchanges in April, 2011.

The details of REC transactions for the month of December, 2018 are shown in Table-20. The market clearing volume of solar RECs transacted on IEX and PXIL were 88272 and 88975 respectively and the market clearing price of these RECs was ₹1450/MWh in IEX and ₹1500/MWh in PXIL. Market clearing volume of non-solar RECs transacted on IEX and PXIL were 295601 and 86799 respectively and the weighted average market clearing price of these RECs was ₹1320/MWh in IEX and ₹1255/MWh in PXIL.

The gap between the volume of buy and sell bids of RECs placed through power exchanges shows about the variation in demand for both solar and non-solar RECs. For Solar RECs, the ratio of buy bids to sell bids was 3.41 and 3.87 in IEX and PXIL respectively. For non-solar RECs, the ratio of buy bids to sell bids was 2.98 and 3.54 in IEX and PXIL respectively.

## VII: Inferences:

- The percentage of short-term transactions of electricity to total electricity generation was 11.69%.
- Of the total short-term transactions, bilateral constitutes 50.10% (37.45% through traders and term-ahead contracts on power exchanges and 12.65% directly between distribution companies) followed by 26.03% through day ahead collective transactions on power exchanges and 23.87% through DSM
- Top 5 trading licensees had a share of 75.73% in the total volume traded by all the trading licensees.
- The Herfindahl Hirschman Index computed for the volume of electricity traded by trading licensees was 0.1481, indicating non-concentration of market power.
- The weighted average price of electricity transacted through trading licensees was ₹4.34/kWh. The weighted average price of electricity transacted through IEX and PXIL was ₹3.50/kWh and ₹4.81/kWh respectively.
- The average price of electricity transacted through DSM was ₹2.19/kWh.
- Top 5 electricity selling regional entities were Punjab, Delhi, Haryana, Sembcorp Gayatri Power Ltd. and Essar Power Ltd. Top 5 electricity purchasing regional entities were Madhya Pradesh, Jammu and Kashmir, Tamil Nadu, Uttarakhand and Gujarat.
- During the month, the volume of electricity that could not be cleared in IEX due to congestion was 0.25% of the unconstrained cleared volume. In terms of time, congestion occurred was 3.29% in IEX. No congestion occurred in PXIL.
- In January 2019, 73.7% of the bilateral contracts were executed for duration of up to one week, 26.3% of the contracts were executed for duration of more than a week and up to one month, while no contracts were executed for duration of more than one month.

- The forward curve of electricity sale prices for the period from 1<sup>st</sup> January, 2019 to 26<sup>th</sup> April, 2019 based on the bilateral contracts<sup>5</sup> executed till January, 2019 shows that forward contract prices are higher for the contracts executed in January, 2019 compared to the contracts executed in December, 2018 during the period 1<sup>st</sup> – 31<sup>st</sup> March 2019.
- The market clearing volume of solar RECs transacted on IEX and PXIL were 88272 and 88975 respectively and the market clearing price of these RECs was ₹1450/MWh in IEX and ₹1500/MWh in PXIL. Market clearing volume of non-solar RECs transacted on IEX and PXIL were 295601 and 86799 respectively and the weighted average market clearing price of these RECs was ₹1320/MWh in IEX and ₹1255/MWh in PXIL.

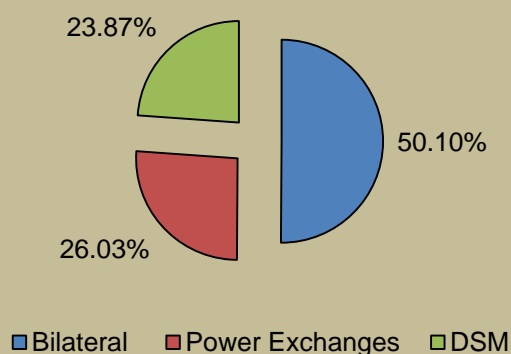
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<sup>5</sup>*Excluding Banking/Swapping contracts*

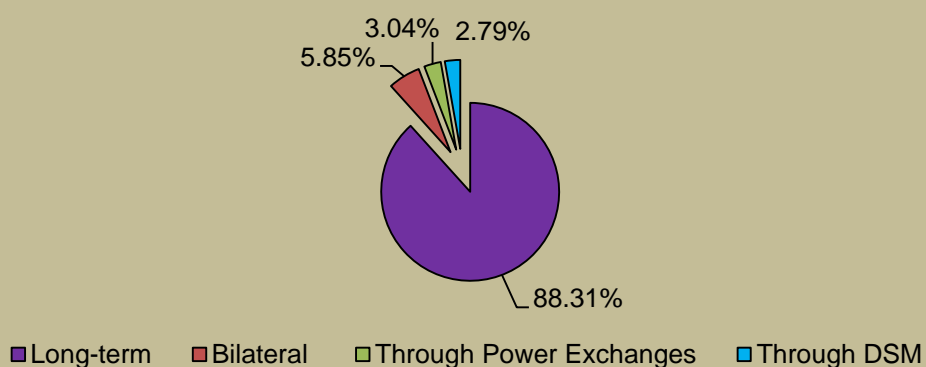
| Table-1: VOLUME OF SHORT-TERM TRANSACTIONS OF ELECTRICITY (ALL INDIA), DECEMBER 2018 |                             |                  |  |                       |
|--|-----------------------------|------------------|--|-----------------------|
| Sr.No  | Short-term transactions     | Volume (MUs)     | % to Volume of short-term transactions | % to Total Generation |
| 1  | Bilateral                   | 5886.30          | 50.10                                  | 5.85                  |
|  | (i) Through Traders and PXs | 4400.46          | 37.45                                  | 4.38                  |
|  | (ii) Direct                 | 1485.84          | 12.65                                  | 1.48                  |
| 2  | Through Power Exchanges     | 3059.00          | 26.03                                  | 3.04                  |
|  | (i) IEX                     | 3058.70          | 26.03                                  | 3.04                  |
|  | (ii) PXIL                   | 0.30             | 0.003                                  | 0.0003                |
| 3  | Through DSM                 | 2804.50          | 23.87                                  | 2.79                  |
|  | <b>Total</b>                | <b>11749.80</b>  | <b>-</b>                               | <b>11.69</b>          |
|  | <b>Total Generation</b>     | <b>100537.00</b> | <b>-</b>                               | <b>-</b>              |

Source: NLDC

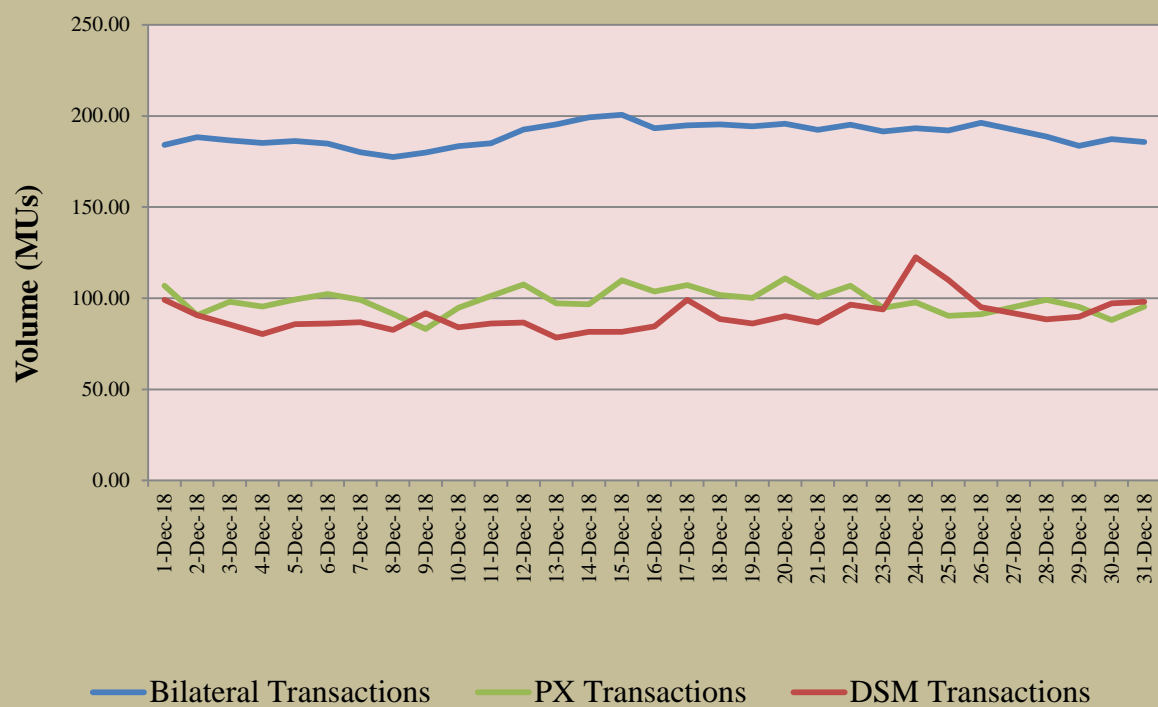
**Figure-1: Volume of Short-term Transactions of Electricity, December 2018**



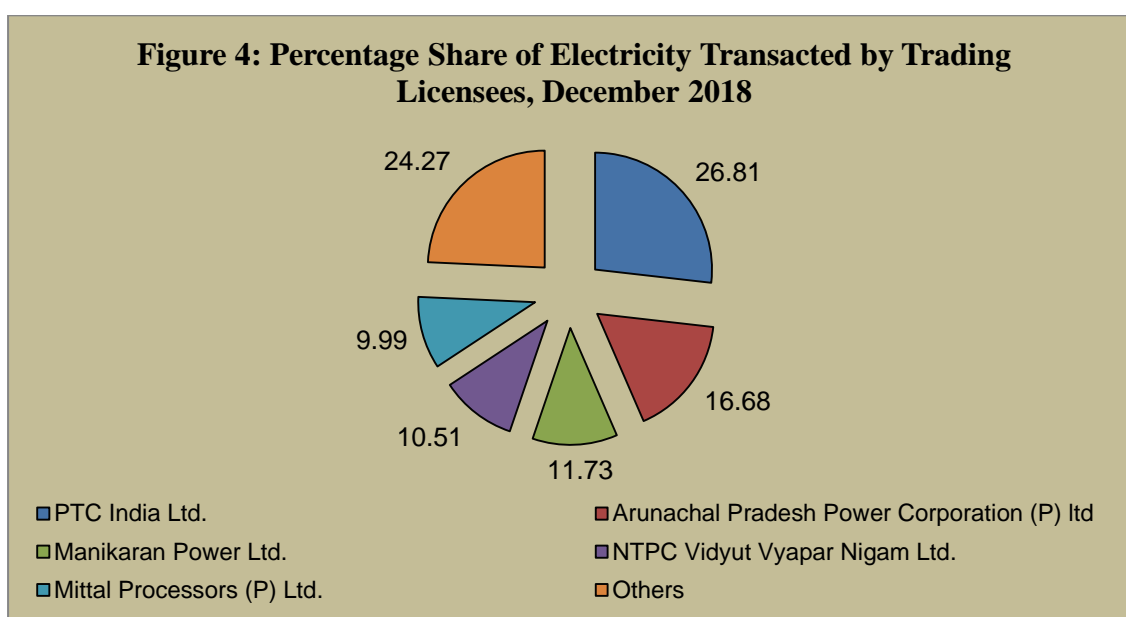
**Figure-2: Volume of Various Kinds of Electricity Transactions in Total Electricity Generation, December 2018**



**Figure-3: Volume of Short-term Transactions of Electricity,  
December 2018 (Day-wise)**



| <b>Table-2: PERCENTAGE SHARE OF ELECTRICITY TRANSACTED BY TRADING LICENSEES, DECEMBER 2018</b>  |   |  |                                   |
|---|---|--|-----------------------------------|
| <b>Sr.No</b>  | <b>Name of the Trading Licensee</b>         | <b>% Share in total Volume transacted by Trading Licensees</b> | <b>Herfindahl-Hirschman Index</b> |
| 1   | PTC India Ltd.                              | 26.81  | 0.0719                            |
| 2   | Arunachal Pradesh Power Corporation (P) ltd | 16.68  | 0.0278                            |
| 3   | Manikaran Power Ltd.                        | 11.73  | 0.0138                            |
| 4   | NTPC Vidyut Vyapar Nigam Ltd.               | 10.51  | 0.0110                            |
| 5   | Mittal Processors (P) Ltd.                  | 9.99   | 0.0100                            |
| 6   | Tata Power Trading Company (P) Ltd.         | 8.47   | 0.0072                            |
| 7   | GMR Energy Trading Ltd.                     | 6.55   | 0.0043                            |
| 8   | Adani Enterprises Ltd.                      | 4.15   | 0.0017                            |
| 9   | Jaiprakash Associates Ltd.                  | 1.38   | 0.0002                            |
| 10  | JSW Power Trading Company Ltd               | 0.80   | 0.0001                            |
| 11  | Knowledge Infrastructure Systems (P) Ltd    | 0.67   | 0.0000                            |
| 12  | RPG Power Trading Company Ltd.              | 0.50   | 0.0000                            |
| 13  | Essar Electric Power Development Corp. Ltd. | 0.43   | 0.0000                            |
| 14  | National Energy Trading & Services Ltd.     | 0.38   | 0.0000                            |
| 15  | Instinct Infra & Power Ltd.                 | 0.35   | 0.0000                            |
| 16  | Statkraft Markets Pvt. Ltd.                 | 0.27   | 0.0000                            |
| 17  | Shree Cement Ltd.                           | 0.18   | 0.0000                            |
| 18  | Customized Energy Solutions India (P) Ltd.  | 0.08   | 0.0000                            |
| 19  | Gita Power & Infrastructure Private Limited | 0.05   | 0.0000                            |
| 20  | Phillip Commodities India (P) Ltd.          | 0.01   | 0.0000                            |
| 21  | My Home Power Private Ltd.                  | 0.01   | 0.0000                            |
| <b>TOTAL</b>  |   | <b>100.00%</b>   | <b>0.1481</b>                     |
| <b>Top 5 trading licensees</b>  |   | <b>75.73%</b>  |                                   |
| <i>Note 1: Volume of electricity transacted by the trading licensees includes bilateral transactions (inter-state &amp; intra-state) and the transactions undertaken through power exchanges.</i> |   |  |                                   |
| <i>Note 2: Volume of electricity transacted by Global Energy is not included.</i>   |   |  |                                   |
| <i>Source: Information submitted by trading licensees</i>   |   |  |                                   |





| <b>Table-3: PRICE OF ELECTRICITY TRANSACTED THROUGH TRADERS, DECEMBER 2018</b> |                  |                                      |
|--|------------------|--------------------------------------|
| <b>Sr.No</b>   | <b>Item</b>      | <b>Sale Price of Traders (₹/kWh)</b> |
| 1  | Minimum          | 2.17                                 |
| 2  | Maximum          | 4.82                                 |
| 3  | Weighted Average | 4.34                                 |

Source: Information submitted by trading licensees

| <b>Table-4: PRICE OF ELECTRICITY TRANSACTED THROUGH TRADERS (TIME-WISE), DECEMBER 2018</b> |                        |                                      |
|--|------------------------|--------------------------------------|
| <b>Sr.No</b>   | <b>Period of Trade</b> | <b>Sale Price of Traders (₹/kWh)</b> |
| 1  | RTC                    | 4.41                                 |
| 2  | PEAK                   | -                                    |
| 3  | OFF PEAK               | 3.48                                 |

Source: Information submitted by trading licensees

| <b>Table-5: PRICE OF ELECTRICITY TRANSACTED THROUGH POWER EXCHANGES, DECEMBER 2018</b> |                  |                             |                              |
|--|------------------|-----------------------------|------------------------------|
| <b>Sr.No</b>   | <b>ACP</b>       | <b>Price in IEX (₹/kWh)</b> | <b>Price in PXIL (₹/kWh)</b> |
| 1  | Minimum          | 1.75                        | 4.81                         |
| 2  | Maximum          | 7.53                        | 4.81                         |
| 3  | Weighted Average | 3.50                        | 4.81                         |

Source: Information submitted by IEX and PXIL

| <b>Table-6: VOLUME AND PRICE OF ELECTRICITY IN TERM AHEAD MARKET OF IEX, DECEMBER 2018</b> |                                 |                                      |                                       |
|--|---------------------------------|--------------------------------------|---------------------------------------|
| <b>Sr.No</b>   | <b>Term ahead contracts</b>     | <b>Actual Scheduled Volume (MUs)</b> | <b>Weighted Average Price (₹/kWh)</b> |
| 1  | Intra-Day Contracts             | 25.72                                | 4.30                                  |
| 2  | Day Ahead Contingency Contracts | 71.49                                | 3.91                                  |
|  | <b>Total</b>                    | <b>97.22</b>                         | <b>4.01</b>                           |

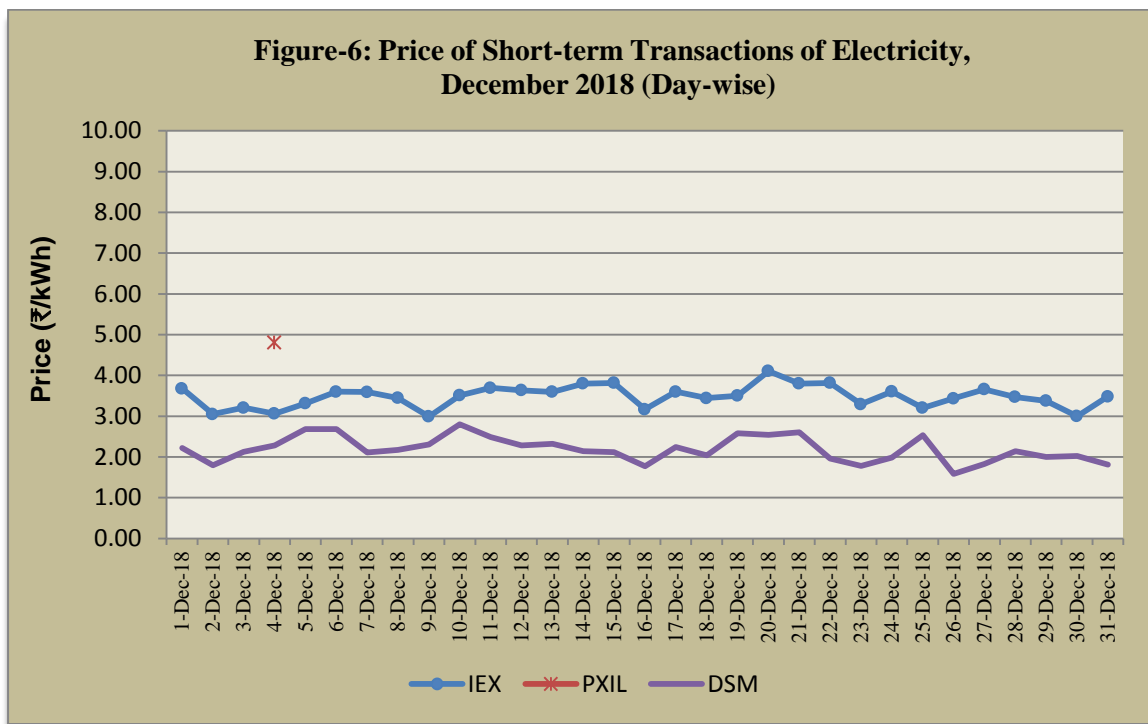
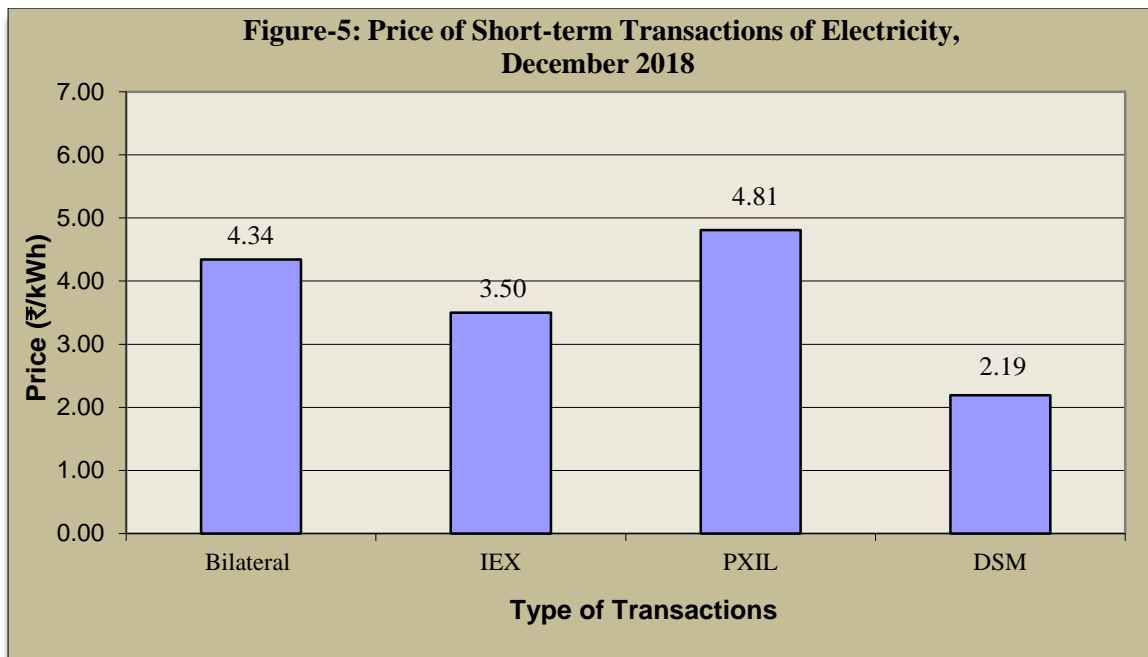
Source: IEX

| <b>Table-7: VOLUME AND PRICE OF ELECTRICITY IN TERM AHEAD MARKET OF PXIL, DECEMBER 2018</b> |                             |                                      |                                       |
|---|-----------------------------|--------------------------------------|---------------------------------------|
| <b>Sr.No</b>  | <b>Term ahead contracts</b> | <b>Actual Scheduled Volume (MUs)</b> | <b>Weighted Average Price (₹/kWh)</b> |
| 1   | Intra-Day Contracts         | 35.60                                | 4.22                                  |
| 2   | Any Day(s) Contracts        | 5.76                                 | 3.30                                  |
|   | <b>Total</b>                | <b>41.37</b>                         | <b>4.09</b>                           |

Source: PXIL

| <b>Table-8: PRICE OF ELECTRICITY TRANSACTED THROUGH DSM, DECEMBER 2018</b> |             |  |
|--|-------------|--|
| <b>Sr.No</b>   | <b>Item</b> | <b>Price in All India Grid (₹/kWh)</b> |
| 1  | Minimum     | 0.00                                   |
| 2  | Maximum     | 6.36                                   |
| 3  | Average     | 2.19                                   |

Source: NLDC



**Note:** In PXIL, transaction was recorded only on 4<sup>th</sup> December 2018.

| <b>Table-9: VOLUME OF ELECTRICITY SOLD THROUGH BILATERAL,<br/>DECEMBER 2018</b> |                             |                    |
|---|-----------------------------|--------------------|
| <b>Name of the Entity</b>   | <b>Volume of Sale (MUs)</b> | <b>% of Volume</b> |
| PUNJAB  | 1213.64                     | 21.88              |
| HARYANA   | 855.74                      | 15.43              |
| DELHI   | 599.15                      | 10.80              |
| DVC   | 325.70                      | 5.87               |
| ANDHRA PRADESH  | 299.39                      | 5.40               |
| UTTAR PRADESH   | 260.27                      | 4.69               |
| CHHATTISGARH  | 234.36                      | 4.23               |
| WEST BENGAL   | 201.31                      | 3.63               |
| ESSAR POWER   | 196.90                      | 3.55               |
| SEBPCORP  | 161.28                      | 2.91               |
| TELANGANA   | 133.04                      | 2.40               |
| ADHUNIK POWER LTD   | 128.31                      | 2.31               |
| ODISHA  | 95.33                       | 1.72               |
| SHREE CEMENT  | 94.81                       | 1.71               |
| JAYPEE NIGRIE   | 79.97                       | 1.44               |
| SKS POWER   | 78.45                       | 1.41               |
| RAJASTHAN   | 70.25                       | 1.27               |
| DB POWER  | 61.42                       | 1.11               |
| GUJARAT   | 57.89                       | 1.04               |
| JITPL   | 48.89                       | 0.88               |
| ONGC PALATANA   | 46.32                       | 0.84               |
| HIMACHAL PRADESH  | 38.02                       | 0.69               |
| ACBIL   | 33.43                       | 0.60               |
| SPECTRUM  | 32.77                       | 0.59               |
| DAGACHU   | 19.60                       | 0.35               |
| JHARKHAND   | 18.14                       | 0.33               |
| MP  | 18.09                       | 0.33               |
| KARNATAKA   | 17.10                       | 0.31               |
| JHABUA POWER_MP   | 15.56                       | 0.28               |
| TASHIDENG HEP   | 14.73                       | 0.27               |
| J & K   | 13.64                       | 0.25               |
| JORETHANG   | 12.91                       | 0.23               |
| MAHARASHTRA   | 12.45                       | 0.22               |
| KERALA  | 9.83                        | 0.18               |
| CHUZACHEN HEP   | 9.19                        | 0.17               |
| LANKO_AMK   | 8.56                        | 0.15               |
| TRN ENERGY  | 7.92                        | 0.14               |
| BALCO   | 4.92                        | 0.09               |
| GMR KAMALANGA   | 4.25                        | 0.08               |
| MIZORAM   | 3.78                        | 0.07               |
| MB POWER  | 3.10                        | 0.06               |
| TRIPURA   | 2.69                        | 0.05               |
| TAMIL NADU  | 2.66                        | 0.05               |
| NTPC STATIONS-WR  | 0.43                        | 0.01               |
| NTPC STATIONS-NER   | 0.43                        | 0.01               |
| BIHAR   | 0.26                        | 0.00               |
| <b>TOTAL</b>  | <b>5546.88</b>              | <b>100.00</b>      |
| <b>Volume Sold by top 5 Regional Entities</b>                                   | <b>3293.61</b>              | <b>59.38</b>       |

| <b>Table-10: VOLUME OF ELECTRICITY PURCHASED THROUGH BILATERAL, DECEMBER 2018</b> |                                 |                    |
|---|---------------------------------|--------------------|
| <b>Name of the Entity</b>   | <b>Volume of Purchase (MUs)</b> | <b>% of Volume</b> |
| MP  | 930.12                          | 15.80              |
| ANDHRA PRADESH  | 647.13                          | 10.99              |
| GUJARAT   | 564.69                          | 9.59               |
| J & K   | 472.07                          | 8.02               |
| CHHATTISGARH  | 453.82                          | 7.71               |
| UTTARAKHAND   | 410.01                          | 6.97               |
| MAHARASHTRA   | 394.80                          | 6.71               |
| HIMACHAL PRADESH  | 381.26                          | 6.48               |
| BANGLADESH  | 213.11                          | 3.62               |
| ESSAR STEEL   | 206.18                          | 3.50               |
| RAJASTHAN   | 172.61                          | 2.93               |
| TAMIL NADU  | 159.28                          | 2.71               |
| NEPAL(NVVN)   | 135.36                          | 2.30               |
| UTTAR PRADESH   | 119.98                          | 2.04               |
| JHARKHAND   | 108.94                          | 1.85               |
| ODISHA  | 80.41                           | 1.37               |
| MEGHALAYA   | 78.88                           | 1.34               |
| HARYANA   | 55.91                           | 0.95               |
| ASSAM   | 49.62                           | 0.84               |
| BIHAR   | 49.57                           | 0.84               |
| WEST BENGAL   | 45.22                           | 0.77               |
| GOA   | 38.05                           | 0.65               |
| DADRA & NAGAR HAVELI  | 37.49                           | 0.64               |
| MANIPUR   | 35.24                           | 0.60               |
| TELANGANA   | 25.39                           | 0.43               |
| DELHI   | 15.01                           | 0.25               |
| SIKKIM  | 2.72                            | 0.05               |
| DVC   | 1.74                            | 0.03               |
| KARNATAKA   | 1.25                            | 0.02               |
| NTPC STATIONS-WR  | 0.43                            | 0.01               |
| MIZORAM   | 0.01                            | 0.00               |
| <b>TOTAL</b>  | <b>5886.30</b>                  | <b>100.00</b>      |
| <b>Volume Purchased by top 5 Regional Entities</b>                                | <b>3067.83</b>                  | <b>52.12</b>       |

| <b>Table-11: VOLUME OF ELECTRICITY SOLD THROUGH POWER EXCHANGES, DECEMBER 2018</b> |                             |                    |
|--|-----------------------------|--------------------|
| <b>Name of the Entity</b>  | <b>Volume of Sale (MUs)</b> | <b>% of Volume</b> |
| MAHARASHTRA  | 266.94                      | 8.73               |
| DELHI  | 260.74                      | 8.52               |
| SEMBCORP   | 221.37                      | 7.24               |
| GUJARAT  | 182.69                      | 5.97               |
| TEESTA STG3  | 155.18                      | 5.07               |
| RAJASTHAN  | 139.00                      | 4.54               |
| TELANGANA  | 118.78                      | 3.88               |
| MP   | 117.85                      | 3.85               |
| KARNATAKA  | 112.29                      | 3.67               |
| TRIPURA  | 100.59                      | 3.29               |
| CHHATTISGARH   | 96.47                       | 3.15               |
| DB POWER   | 92.54                       | 3.03               |
| HIMACHAL PRADESH   | 89.67                       | 2.93               |
| ANDHRA PRADESH   | 79.22                       | 2.59               |
| WEST BENGAL  | 74.06                       | 2.42               |
| NLC  | 71.99                       | 2.35               |
| MB POWER   | 58.62                       | 1.92               |
| BIHAR  | 57.14                       | 1.87               |
| COASTGEN   | 55.55                       | 1.82               |
| ASSAM  | 53.08                       | 1.74               |
| MARUTI COAL  | 48.90                       | 1.60               |
| UTTARAKHAND  | 43.93                       | 1.44               |
| JAYPEE NIGRIE  | 39.67                       | 1.30               |
| TRN ENERGY   | 37.24                       | 1.22               |
| SKS POWER  | 36.41                       | 1.19               |
| ESSAR POWER  | 30.06                       | 0.98               |
| HARYANA  | 28.99                       | 0.95               |
| ODISHA   | 26.95                       | 0.88               |
| SPECTRUM   | 25.12                       | 0.82               |
| GMR KAMALANGA  | 23.03                       | 0.75               |
| NEEPCO STATIONS  | 20.77                       | 0.68               |
| J & K  | 20.72                       | 0.68               |
| CHANDIGARH   | 17.96                       | 0.59               |
| MANIPUR  | 17.10                       | 0.56               |
| UTTAR PRADESH  | 14.86                       | 0.49               |
| KARCHAM WANGTOO  | 14.22                       | 0.46               |
| ACBIL  | 13.89                       | 0.45               |
| SAINJ HEP  | 13.84                       | 0.45               |
| JINDAL STAGE-II  | 13.63                       | 0.45               |
| AD HYDRO   | 13.43                       | 0.44               |
| GOA  | 12.63                       | 0.41               |
| NTPC STATIONS-NER  | 12.25                       | 0.40               |
| JINDAL POWER   | 11.50                       | 0.38               |
| BRBCL,NABINAGAR  | 11.44                       | 0.37               |
| SIKKIM   | 11.04                       | 0.36               |
| DIKCHU HEP   | 10.95                       | 0.36               |
| MIZORAM  | 9.44                        | 0.31               |

|   |                |               |
|---|----------------|---------------|
| JHABUA POWER_MP                               | 9.34           | 0.31          |
| JITPL   | 8.64           | 0.28          |
| TAMIL NADU                                    | 8.30           | 0.27          |
| ONGC PALATANA                                 | 6.67           | 0.22          |
| PUNJAB  | 6.25           | 0.20          |
| SHREE CEMENT                                  | 4.59           | 0.15          |
| ILF&S   | 3.73           | 0.12          |
| KERALA  | 3.10           | 0.10          |
| RANGANADI HEP                                 | 3.08           | 0.10          |
| ADHUNIK POWER LTD                             | 2.94           | 0.10          |
| MEGHALAYA                                     | 2.66           | 0.09          |
| TASHIDENG HEP                                 | 2.16           | 0.07          |
| NTPC STATIONS-SR                              | 1.82           | 0.06          |
| JORETHANG                                     | 1.75           | 0.06          |
| ARUNACHAL PRADESH                             | 1.56           | 0.05          |
| CHUZACHEN HEP                                 | 1.45           | 0.05          |
| DADRA & NAGAR HAVELI                          | 1.04           | 0.03          |
| MALANA  | 0.95           | 0.03          |
| PARE HEP                                      | 0.88           | 0.03          |
| LANCO BUDHIL                                  | 0.85           | 0.03          |
| BALCO   | 0.84           | 0.03          |
| JHARKHAND                                     | 0.84           | 0.03          |
| DVC   | 0.61           | 0.02          |
| DHARIWAL POWER                                | 0.50           | 0.02          |
| DOYANG HEP                                    | 0.40           | 0.01          |
| NTPC STATIONS-WR                              | 0.30           | 0.01          |
| <b>TOTAL</b>                                  | <b>3059.00</b> | <b>100.00</b> |
| <b>Volume sold by top 5 Regional Entities</b> | <b>1086.90</b> | <b>35.53</b>  |

| <b>Table-12: VOLUME OF ELECTRICITY PURCHASED THROUGH POWER EXCHANGES, DECEMBER 2018</b> |                                 |                    |
|---|---------------------------------|--------------------|
| <b>Name of the Entity</b>   | <b>Volume of Purchase (MUs)</b> | <b>% of Volume</b> |
| TELANGANA   | 392.17                          | 12.82              |
| TAMIL NADU  | 379.16                          | 12.39              |
| PUNJAB  | 288.16                          | 9.42               |
| DVC   | 202.37                          | 6.62               |
| BIHAR   | 192.39                          | 6.29               |
| KERALA  | 188.97                          | 6.18               |
| ODISHA  | 136.52                          | 4.46               |
| ESSAR STEEL   | 130.57                          | 4.27               |
| RAJASTHAN   | 123.59                          | 4.04               |
| J & K   | 122.59                          | 4.01               |
| KARNATAKA   | 97.83                           | 3.20               |
| ANDHRA PRADESH  | 95.54                           | 3.12               |
| MAHARASHTRA   | 85.34                           | 2.79               |
| HARYANA   | 80.45                           | 2.63               |
| GUJARAT   | 73.42                           | 2.40               |
| UTTARAKHAND   | 56.20                           | 1.84               |
| JHARKHAND   | 46.45                           | 1.52               |
| ASSAM   | 45.64                           | 1.49               |
| MP  | 41.30                           | 1.35               |
| WEST BENGAL   | 39.37                           | 1.29               |
| DADRA & NAGAR HAVELI  | 36.04                           | 1.18               |
| CHHATTISGARH  | 34.94                           | 1.14               |
| DAMAN AND DIU   | 34.13                           | 1.12               |
| MEGHALAYA   | 33.03                           | 1.08               |
| HIMACHAL PRADESH  | 32.23                           | 1.05               |
| DELHI   | 30.78                           | 1.01               |
| UTTAR PRADESH   | 18.01                           | 0.59               |
| GOA   | 12.39                           | 0.41               |
| ARUNACHAL PRADESH   | 5.44                            | 0.18               |
| NAGALAND  | 2.88                            | 0.09               |
| CHANDIGARH  | 0.81                            | 0.03               |
| MANIPUR   | 0.29                            | 0.01               |
| MIZORAM   | 0.01                            | 0.00               |
| <b>TOTAL</b>  | <b>3059.00</b>                  | <b>100.00</b>      |
| <b>Volume purchased by top 5 Regional Entities</b>                                      | <b>1454.25</b>                  | <b>47.54</b>       |

| <b>Table-13: VOLUME OF ELECTRICITY UNDER DRAWAL (EXPORTED) THROUGH DSM, DECEMBER 2018</b> |                                    |                    |
|---|------------------------------------|--------------------|
| <b>Name of the Entity</b>   | <b>Volume of Underdrawal (MUs)</b> | <b>% of Volume</b> |
| NTPC STATIONS-WR  | 163.55                             | 11.40              |
| GUJARAT   | 78.45                              | 5.47               |
| SASAN UMPP  | 77.51                              | 5.40               |
| ANDHRA PRADESH  | 74.91                              | 5.22               |
| MAHARASHTRA   | 70.74                              | 4.93               |
| NTPC STATIONS-NR  | 70.21                              | 4.90               |
| MP  | 59.92                              | 4.18               |
| RAJASTHAN   | 59.91                              | 4.18               |
| NHPC STATIONS   | 59.43                              | 4.14               |
| UTTAR PRADESH   | 56.62                              | 3.95               |
| KARNATAKA   | 54.36                              | 3.79               |
| HARYANA   | 44.78                              | 3.12               |
| BIHAR   | 40.84                              | 2.85               |
| TAMIL NADU  | 38.33                              | 2.67               |
| NLC   | 33.84                              | 2.36               |
| PUNJAB  | 29.95                              | 2.09               |
| CHHATTISGARH  | 26.75                              | 1.87               |
| WEST BENGAL   | 25.24                              | 1.76               |
| ESSAR STEEL   | 24.28                              | 1.69               |
| UTTARAKHAND   | 23.82                              | 1.66               |
| NTPC STATIONS-SR  | 23.02                              | 1.60               |
| TELANGANA   | 22.99                              | 1.60               |
| NTPC STATIONS-ER  | 20.64                              | 1.44               |
| J & K   | 15.31                              | 1.07               |
| DELHI   | 13.66                              | 0.95               |
| ODISHA  | 13.57                              | 0.95               |
| JHARKHAND   | 12.56                              | 0.88               |
| ASSAM   | 12.53                              | 0.87               |
| MEGHALAYA   | 9.40                               | 0.66               |
| BANGLADESH  | 8.72                               | 0.61               |
| HIMACHAL PRADESH  | 8.70                               | 0.61               |
| TRIPURA   | 7.44                               | 0.52               |
| TEESTA HEP  | 7.42                               | 0.52               |
| LANKO_AMK   | 7.25                               | 0.51               |
| PONDICHERRY   | 7.10                               | 0.50               |
| GMR KAMALANGA   | 6.72                               | 0.47               |
| GOA   | 6.45                               | 0.45               |
| KERALA  | 6.04                               | 0.42               |
| CGPL  | 5.90                               | 0.41               |
| MAITHON POWER LTD   | 5.70                               | 0.40               |
| JINDAL STAGE-II   | 5.56                               | 0.39               |
| DVC   | 5.51                               | 0.38               |
| JAYPEE NIGRIE   | 5.06                               | 0.35               |
| MIZORAM   | 4.59                               | 0.32               |
| URI-2   | 4.59                               | 0.32               |
| BRBCL,NABINAGAR   | 4.47                               | 0.31               |



|   |                |               |
|---|----------------|---------------|
| JHABUA POWER_MP                                   | 4.16           | 0.29          |
| NEEPCO STATIONS                                   | 4.09           | 0.29          |
| SIKKIM  | 3.73           | 0.26          |
| ESSAR POWER                                       | 3.25           | 0.23          |
| JITPL   | 3.25           | 0.23          |
| NJPC  | 3.05           | 0.21          |
| MANIPUR   | 2.97           | 0.21          |
| KSK MAHANADI                                      | 2.79           | 0.19          |
| JINDAL POWER                                      | 2.75           | 0.19          |
| MB POWER  | 2.68           | 0.19          |
| TRN ENERGY  | 2.62           | 0.18          |
| NETCL VALLUR                                      | 2.38           | 0.17          |
| EMCO  | 2.15           | 0.15          |
| RKM POWER   | 2.11           | 0.15          |
| TEESTA STG3                                       | 1.85           | 0.13          |
| RGPPL (DABHOL)                                    | 1.73           | 0.12          |
| CHANDIGARH  | 1.66           | 0.12          |
| RANGANADI HEP                                     | 1.57           | 0.11          |
| ACBIL   | 1.47           | 0.10          |
| TASHIDENG HEP                                     | 1.37           | 0.10          |
| JORETHANG   | 1.22           | 0.08          |
| NSPCL   | 1.14           | 0.08          |
| LOKTAK  | 1.10           | 0.08          |
| COASTGEN  | 1.06           | 0.07          |
| AD HYDRO  | 1.06           | 0.07          |
| ILF&S   | 0.98           | 0.07          |
| ARUNACHAL PRADESH                                 | 0.95           | 0.07          |
| RANGIT HEP  | 0.92           | 0.06          |
| SKS POWER   | 0.89           | 0.06          |
| NAGALAND  | 0.80           | 0.06          |
| DHARIWAL POWER                                    | 0.80           | 0.06          |
| DCPP  | 0.71           | 0.05          |
| THERMAL POWERTECH                                 | 0.66           | 0.05          |
| DIKCHU HEP  | 0.64           | 0.04          |
| SHREE CEMENT                                      | 0.62           | 0.04          |
| CHUZACHEN HEP                                     | 0.56           | 0.04          |
| NEPAL(NVVN)                                       | 0.55           | 0.04          |
| BALCO   | 0.51           | 0.04          |
| DB POWER  | 0.51           | 0.04          |
| DADRA & NAGAR HAVELI                              | 0.51           | 0.04          |
| ADHUNIK POWER LTD                                 | 0.50           | 0.03          |
| LANCO BUDHIL                                      | 0.49           | 0.03          |
| DOYANG HEP  | 0.47           | 0.03          |
| DAMAN AND DIU                                     | 0.20           | 0.01          |
| MALANA  | 0.16           | 0.01          |
| DAGACHU   | 0.08           | 0.01          |
| <b>TOTAL</b>                                      | <b>1434.10</b> | <b>100.00</b> |
| <b>Volume Exported by top 5 Regional Entities</b> | <b>465.16</b>  | <b>32.44</b>  |

| <b>Table-14: VOLUME OF ELECTRICITY OVER DRAWAL (IMPORTED) THROUGH DSM, DECEMBER 2018</b> |                                   |                    |
|--|-----------------------------------|--------------------|
| <b>Name of the Entity</b>  | <b>Volume of Overdrawal (MUs)</b> | <b>% of Volume</b> |
| RAJASTHAN  | 92.09                             | 5.89               |
| TELANGANA  | 73.32                             | 4.69               |
| TAMIL NADU   | 65.26                             | 4.17               |
| DVC  | 64.87                             | 4.15               |
| ODISHA   | 62.21                             | 3.98               |
| NTPC STATIONS-NR   | 60.95                             | 3.90               |
| UTTAR PRADESH  | 58.36                             | 3.73               |
| MAHARASHTRA  | 54.07                             | 3.46               |
| NTPC STATIONS-SR   | 52.29                             | 3.34               |
| NTPC STATIONS-WR   | 46.89                             | 3.00               |
| GUJARAT  | 46.85                             | 2.99               |
| J & K  | 46.01                             | 2.94               |
| MP   | 45.26                             | 2.89               |
| NTPC STATIONS-ER   | 43.50                             | 2.78               |
| PUNJAB   | 38.23                             | 2.44               |
| KARNATAKA  | 37.61                             | 2.40               |
| HIMACHAL PRADESH   | 35.26                             | 2.25               |
| JHARKHAND  | 32.91                             | 2.10               |
| CHHATTISGARH   | 32.29                             | 2.06               |
| HARYANA  | 31.01                             | 1.98               |
| WEST BENGAL  | 30.85                             | 1.97               |
| BIHAR  | 29.04                             | 1.86               |
| DADRA & NAGAR HAVELI   | 27.69                             | 1.77               |
| KERALA   | 27.50                             | 1.76               |
| UTTARAKHAND  | 26.61                             | 1.70               |
| DAMAN AND DIU  | 24.03                             | 1.54               |
| ANDHRA PRADESH   | 21.94                             | 1.40               |
| CGPL   | 21.39                             | 1.37               |
| CHANDIGARH   | 19.76                             | 1.26               |
| DELHI  | 19.27                             | 1.23               |
| NEPAL(NVVN)  | 18.94                             | 1.21               |
| ARUNACHAL PRADESH  | 18.06                             | 1.15               |
| DB POWER   | 17.96                             | 1.15               |
| GMR KAMALANGA  | 17.94                             | 1.15               |
| NHPC STATIONS  | 15.50                             | 0.99               |
| NLC  | 14.54                             | 0.93               |
| BALCO  | 13.60                             | 0.87               |
| EMCO   | 13.15                             | 0.84               |
| NETCL VALLUR   | 12.53                             | 0.80               |
| RGPPL (DABHOL)   | 11.38                             | 0.73               |
| GOA  | 10.19                             | 0.65               |
| ILF&S  | 10.03                             | 0.64               |
| NAGALAND   | 10.02                             | 0.64               |
| ASSAM  | 7.66                              | 0.49               |
| JHABUA POWER_MP  | 6.19                              | 0.40               |
| ACBIL  | 6.01                              | 0.38               |
| MB POWER   | 5.37                              | 0.34               |
| THERMAL POWERTECH  | 5.20                              | 0.33               |
| MAITHON POWER LTD  | 4.85                              | 0.31               |

|   |                |               |
|---|----------------|---------------|
| JINDAL STAGE-II                                   | 4.58           | 0.29          |
| DAGACHU   | 4.35           | 0.28          |
| JITPL   | 3.68           | 0.24          |
| MANIPUR   | 3.66           | 0.23          |
| BANGLADESH  | 3.64           | 0.23          |
| SIKKIM  | 3.24           | 0.21          |
| SHREE CEMENT                                      | 3.20           | 0.20          |
| PONDICHERRY                                       | 2.91           | 0.19          |
| ESSAR STEEL                                       | 2.82           | 0.18          |
| ESSAR POWER                                       | 2.82           | 0.18          |
| TEESTA STG3                                       | 2.54           | 0.16          |
| COASTGEN  | 2.53           | 0.16          |
| TASHIDENG HEP                                     | 2.53           | 0.16          |
| JORETHANG   | 2.53           | 0.16          |
| ADHUNIK POWER LTD                                 | 2.36           | 0.15          |
| TRIPURA   | 2.33           | 0.15          |
| NJPC  | 2.11           | 0.13          |
| MIZORAM   | 2.08           | 0.13          |
| SKS POWER   | 2.02           | 0.13          |
| GMR CHATTISGARH                                   | 1.99           | 0.13          |
| RANGANADI HEP                                     | 1.83           | 0.12          |
| JAYPEE NIGRIE                                     | 1.57           | 0.10          |
| JINDAL POWER                                      | 1.45           | 0.09          |
| BRBCL,NABINAGAR                                   | 1.33           | 0.09          |
| LANKO_AMK   | 1.21           | 0.08          |
| NSPCL   | 1.16           | 0.07          |
| NEEPCO STATIONS                                   | 1.11           | 0.07          |
| KSK MAHANADI                                      | 1.09           | 0.07          |
| MEGHALAYA   | 1.08           | 0.07          |
| DGEN MEGA POWER                                   | 0.93           | 0.06          |
| LANCO BUDHIL                                      | 0.80           | 0.05          |
| SEMBCORP  | 0.78           | 0.05          |
| TRN ENERGY  | 0.67           | 0.04          |
| DIKCHU HEP  | 0.64           | 0.04          |
| LANKO KONDAPALLI                                  | 0.57           | 0.04          |
| SASAN UMPP  | 0.51           | 0.03          |
| KORBA WEST POWER                                  | 0.46           | 0.03          |
| URI-2   | 0.46           | 0.03          |
| RANGIT HEP  | 0.37           | 0.02          |
| TEESTA HEP  | 0.36           | 0.02          |
| CHUZACHEN HEP                                     | 0.26           | 0.02          |
| MEENAKSHI   | 0.25           | 0.02          |
| DCPP  | 0.24           | 0.02          |
| DOYANG HEP  | 0.23           | 0.01          |
| AD HYDRO  | 0.22           | 0.01          |
| LOKTAK  | 0.21           | 0.01          |
| DHARIWAL POWER                                    | 0.13           | 0.01          |
| RKM POWER   | 0.10           | 0.01          |
| <b>TOTAL</b>                                      | <b>1564.40</b> | <b>100.00</b> |
| <b>Volume Imported by top 5 Regional Entities</b> | <b>357.75</b>  | <b>22.87</b>  |

| <b>Table-15: TOTAL VOLUME OF NET SHORT-TERM TRANSACTIONS OF ELECTRICITY (REGIONAL ENTITY-WISE), DECEMBER 2018</b> |                           |  |
|---|---------------------------|--|
| <b>Sr.No.</b>   | <b>Name of the Entity</b> | <b>Total volume of net short-term transactions of electricity*</b> |
| 1   | MP                        | 820.83   |
| 2   | J & K                     | 591.00   |
| 3   | TAMIL NADU                | 554.42   |
| 4   | UTTARAKHAND               | 425.07   |
| 5   | GUJARAT                   | 365.93   |
| 6   | ESSAR STEEL               | 315.28   |
| 7   | HIMACHAL PRADESH          | 312.36   |
| 8   | ANDHRA PRADESH            | 311.09   |
| 9   | TELANGANA                 | 216.07   |
| 10  | BANGLADESH                | 208.03   |
| 11  | KERALA                    | 197.49   |
| 12  | MAHARASHTRA               | 184.09   |
| 13  | BIHAR                     | 172.75   |
| 14  | CHHATTISGARH              | 163.46   |
| 15  | JHARKHAND                 | 156.76   |
| 16  | NEPAL(NVVN)               | 153.75   |
| 17  | ODISHA                    | 143.28   |
| 18  | RAJASTHAN                 | 119.12   |
| 19  | MEGHALAYA                 | 100.92   |
| 20  | DADRA & NAGAR HAVELI      | 99.68  |
| 21  | DAMAN AND DIU             | 57.95  |
| 22  | GOA                       | 41.55  |
| 23  | ASSAM                     | 37.30  |
| 24  | NTPC STATIONS-SR          | 27.46  |
| 25  | NTPC STATIONS-ER          | 22.86  |
| 26  | ARUNACHAL PRADESH         | 20.99  |
| 27  | MANIPUR                   | 19.12  |
| 28  | CGPL                      | 15.48  |
| 29  | NAGALAND                  | 12.10  |
| 30  | EMCO                      | 11.00  |
| 31  | NETCL VALLUR              | 10.15  |
| 32  | RGPL (DABHOL)             | 9.65   |
| 33  | BALCO                     | 7.32   |
| 34  | ILF&S                     | 5.32   |
| 35  | THERMAL POWERTECH         | 4.54   |
| 36  | GMR CHATTISGARH           | 1.99   |
| 37  | CHANDIGARH                | 0.95   |
| 38  | MALANA                    | -1.11  |
| 39  | DHARIWAL POWER            | -1.17  |
| 40  | KSK MAHANADI              | -1.71  |
| 41  | RKM POWER                 | -2.01  |
| 42  | RANGANADI HEP             | -2.82  |
| 43  | URI-2                     | -4.13  |
| 44  | PONDICHERRY               | -4.19  |
| 45  | TEESTA HEP                | -7.06  |
| 46  | SIKKIM                    | -8.81  |
| 47  | NTPC STATIONS-NR          | -9.26  |
| 48  | CHUZACHEN HEP             | -10.94   |
| 49  | DIKCHU HEP                | -10.96   |
| 50  | NTPC STATIONS-NER         | -12.68   |

|    |                   |         |
|----|-------------------|---------|
| 51 | JINDAL POWER      | -12.80  |
| 52 | JORETHANG         | -13.35  |
| 53 | SAINJ HEP         | -13.84  |
| 54 | KARCHAM WANGTOO   | -14.22  |
| 55 | AD HYDRO          | -14.27  |
| 56 | BRBCL,NABINAGAR   | -14.58  |
| 57 | LANKO_AMK         | -14.60  |
| 58 | JINDAL STAGE-II   | -14.61  |
| 59 | DAGACHU           | -15.32  |
| 60 | MIZORAM           | -15.70  |
| 61 | TASHIDENG HEP     | -15.73  |
| 62 | GMR KAMALANGA     | -16.05  |
| 63 | JHABUA POWER_MP   | -22.87  |
| 64 | NEEPCO STATIONS   | -23.76  |
| 65 | ACBIL             | -42.79  |
| 66 | NHPC STATIONS     | -43.94  |
| 67 | KARNATAKA         | -47.06  |
| 68 | TRN ENERGY        | -47.11  |
| 69 | MARUTI COAL       | -48.90  |
| 70 | ONGC PALATANA     | -52.99  |
| 71 | COASTGEN          | -54.08  |
| 72 | JITPL             | -57.09  |
| 73 | SPECTRUM          | -57.90  |
| 74 | MB POWER          | -59.02  |
| 75 | DVC               | -62.84  |
| 76 | SASAN UMPP        | -77.00  |
| 77 | NLC               | -91.29  |
| 78 | SHREE CEMENT      | -96.82  |
| 79 | TRIPURA           | -108.38 |
| 80 | SKS POWER         | -113.73 |
| 81 | NTPC STATIONS-WR  | -116.96 |
| 82 | JAYPEE NIGRIE     | -123.13 |
| 83 | ADHUNIK POWER LTD | -129.39 |
| 84 | UTTAR PRADESH     | -135.40 |
| 85 | DB POWER          | -136.51 |
| 86 | TEESTA STG3       | -154.50 |
| 87 | WEST BENGAL       | -185.16 |
| 88 | ESSAR POWER       | -227.40 |
| 89 | SEMBCORP          | -381.87 |
| 90 | HARYANA           | -762.13 |
| 91 | DELHI             | -808.48 |
| 92 | PUNJAB            | -923.44 |

*\* Total volume of net short-term transactions of electricity includes net of transactions of electricity through bilateral, power exchange and UI*

*(-) indicates sale and (+) indicates purchase*

| <b>Table-16: DETAILS OF CONGESTION IN POWER EXCHANGES, DECEMBER 2018</b>    |  |            |             |
|---|--|------------|-------------|
|   | <b>Details of Congestion</b>   | <b>IEX</b> | <b>PXIL</b> |
| A   | Unconstrained Cleared Volume* (MUs)  | 3066.29    | 0.30        |
| B   | Actual Cleared Volume and hence scheduled (MUs)  | 3058.70    | 0.30        |
| C   | Volume of electricity that could not be cleared and hence not scheduled because of congestion (MUs) (A-B)                            | 7.59       | 0.00        |
| D   | Volume of electricity that could not be cleared as % to Unconstrained Cleared Volume   | 0.25%      | 0.00%       |
| E   | Percentage of the time congestion occurred during the month (Number of hours congestion occurred/Total number of hours in the month) | 3.29%      | 0.00%       |
| F   | Congestion occurrence (%) time block wise  |            |             |
|   | 0.00 - 6.00 hours  | 0.00%      | 0.00%       |
|   | 6.00 - 12.00 hours   | 40.82%     | 0.00%       |
|   | 12.00 - 18.00 hours  | 16.33%     | 0.00%       |
|   | 18.00 - 24.00 hours  | 42.86%     | 0.00%       |
| <i>* This power would have been scheduled had there been no congestion.</i> |  |            |             |
| <i>Source: IEX &amp; PXIL &amp; NLDC</i>                                    |  |            |             |

| <b>Table-17: VOLUME OF SHORT-TERM TRANSACTIONS OF ELECTRICITY IN INDIA<br/>(DAY-WISE) (MUs), DECEMBER 2018</b>  |  |                |   |             |   |   |
|---|--|----------------|---|-------------|---|---|
| <b>Date</b>   | <b>Bilateral</b>                         |                | <b>Power Exchange<br/>(Area Clearing<br/>Volume# of Day<br/>Ahead Market)</b> |             | <b>Deviation<br/>Settlement<br/>(Over<br/>Drawl+Under<br/>Generation)</b> | <b>Total<br/>Electricity<br/>Generation<br/>(MU) as<br/>given at CEA<br/>Website*</b> |
|   | <b>Through<br/>Traders<br/>and PXs**</b> | <b>Direct</b>  | <b>IEX</b>  | <b>PXIL</b> |   |   |
| 1-Dec-18  | 138.50                                   | 45.71          | 106.82  | 0.00        | 99.03   | 3249.00   |
| 2-Dec-18  | 142.23                                   | 46.14          | 90.72   | 0.00        | 90.64   | 3136.00   |
| 3-Dec-18  | 140.66                                   | 45.99          | 98.08   | 0.00        | 85.50   | 3229.00   |
| 4-Dec-18  | 138.51                                   | 46.69          | 95.13   | 0.30        | 80.25   | 3257.00   |
| 5-Dec-18  | 138.13                                   | 48.12          | 99.25   | 0.00        | 85.82   | 3316.00   |
| 6-Dec-18  | 135.80                                   | 49.10          | 102.27  | 0.00        | 86.03   | 3337.00   |
| 7-Dec-18  | 133.46                                   | 46.74          | 99.10   | 0.00        | 86.84   | 3286.00   |
| 8-Dec-18  | 132.28                                   | 45.20          | 91.42   | 0.00        | 82.63   | 3273.00   |
| 9-Dec-18  | 134.96                                   | 45.05          | 83.11   | 0.00        | 91.81   | 3190.00   |
| 10-Dec-18   | 135.40                                   | 48.12          | 94.65   | 0.00        | 84.00   | 3295.00   |
| 11-Dec-18   | 135.78                                   | 49.19          | 101.19  | 0.00        | 86.14   | 3308.00   |
| 12-Dec-18   | 143.68                                   | 48.99          | 107.52  | 0.00        | 86.67   | 3278.00   |
| 13-Dec-18   | 146.24                                   | 49.22          | 97.11   | 0.00        | 78.43   | 3250.00   |
| 14-Dec-18   | 149.85                                   | 49.45          | 96.62   | 0.00        | 81.47   | 3179.00   |
| 15-Dec-18   | 152.15                                   | 48.55          | 109.76  | 0.00        | 81.50   | 3126.00   |
| 16-Dec-18   | 145.70                                   | 47.52          | 103.73  | 0.00        | 84.48   | 3038.00   |
| 17-Dec-18   | 147.37                                   | 47.45          | 107.11  | 0.00        | 99.18   | 3118.00   |
| 18-Dec-18   | 147.27                                   | 48.13          | 101.72  | 0.00        | 88.62   | 3161.00   |
| 19-Dec-18   | 146.27                                   | 48.16          | 100.20  | 0.00        | 86.05   | 3225.00   |
| 20-Dec-18   | 146.15                                   | 49.58          | 110.82  | 0.00        | 90.15   | 3279.00   |
| 21-Dec-18   | 143.23                                   | 49.22          | 100.66  | 0.00        | 86.69   | 3332.00   |
| 22-Dec-18   | 146.30                                   | 48.96          | 106.79  | 0.00        | 96.40   | 3308.00   |
| 23-Dec-18   | 142.83                                   | 48.65          | 94.80   | 0.00        | 93.85   | 3174.00   |
| 24-Dec-18   | 144.72                                   | 48.59          | 97.66   | 0.00        | 122.52  | 3226.00   |
| 25-Dec-18   | 143.14                                   | 48.86          | 90.36   | 0.00        | 109.93  | 3261.00   |
| 26-Dec-18   | 146.68                                   | 49.66          | 91.27   | 0.00        | 95.15   | 3339.00   |
| 27-Dec-18   | 144.91                                   | 51.47          | 102.97  | 0.00        | 91.34   | 3365.00   |
| 28-Dec-18   | 141.43                                   | 47.38          | 99.11   | 0.00        | 88.41   | 3343.00   |
| 29-Dec-18   | 137.40                                   | 46.26          | 95.20   | 0.00        | 89.72   | 3269.00   |
| 30-Dec-18   | 139.26                                   | 48.15          | 88.10   | 0.00        | 97.14   | 3149.00   |
| 31-Dec-18   | 140.21                                   | 45.55          | 95.44   | 0.00        | 98.09   | 3241.00   |
| <b>Total</b>  | <b>4400.46</b>                           | <b>1485.84</b> | <b>3058.70</b>  | <b>0.30</b> | <b>2804.50</b>  | <b>100537.00</b>  |
| <i>Source: NLDC</i>   |  |                |   |             |   |   |
| <i>* Gross Electricity Generation excluding electricity generation from renewable and captive power plants.</i> |  |                |   |             |   |   |
| <i>** The volume of bilateral through PXs represents the volume through term-ahead contracts.</i>               |  |                |   |             |   |   |
| <i># Area Clearing Volume represents the scheduled volume of all the bid areas.</i>                             |  |                |   |             |   |   |

| Table-18: PRICE OF SHORT-TERM TRANSACTIONS OF ELECTRICITY (DAY-WISE)(₹/kWh), DECEMBER 2018   |                         |              |                         |                          |              |                         |  |               |                 |
|--|-------------------------|--------------|-------------------------|--------------------------|--------------|-------------------------|--|---------------|-----------------|
| Market Segment   | Day ahead market of IEX |              |                         | Day ahead market of PXIL |              |                         | Under Drawl/Over Drawl from the Grid (DSM) |               |                 |
| Date   | Minimum ACP             | Maximum ACP  | Weighted Average Price* | Minimum ACP              | Maximum ACP  | Weighted Average Price* | All India Grid                             |               |                 |
|  |                         |              |                         |                          |              |                         | Minimum Price                              | Maximum Price | Average Price** |
| 1-Dec-18   | 2.00                    | 7.05         | 3.68                    | -                        | -            | -                       | 0.36                                       | 3.45          | 2.22            |
| 2-Dec-18   | 2.00                    | 4.14         | 3.05                    | -                        | -            | -                       | 0.00                                       | 3.45          | 1.79            |
| 3-Dec-18   | 1.80                    | 5.10         | 3.21                    | -                        | -            | -                       | 0.00                                       | 4.91          | 2.12            |
| 4-Dec-18   | 1.80                    | 4.22         | 3.06                    | 4.81                     | 4.81         | 4.81                    | 0.36                                       | 6.16          | 2.29            |
| 5-Dec-18   | 1.92                    | 4.92         | 3.31                    | -                        | -            | -                       | 0.00                                       | 5.32          | 2.69            |
| 6-Dec-18   | 2.00                    | 5.00         | 3.60                    | -                        | -            | -                       | 0.00                                       | 5.95          | 2.68            |
| 7-Dec-18   | 2.18                    | 4.82         | 3.59                    | -                        | -            | -                       | 0.00                                       | 3.45          | 2.11            |
| 8-Dec-18   | 2.00                    | 4.83         | 3.45                    | -                        | -            | -                       | 0.00                                       | 5.32          | 2.17            |
| 9-Dec-18   | 2.01                    | 3.80         | 2.99                    | -                        | -            | -                       | 0.00                                       | 5.11          | 2.31            |
| 10-Dec-18  | 1.97                    | 5.30         | 3.51                    | -                        | -            | -                       | 0.00                                       | 6.16          | 2.80            |
| 11-Dec-18  | 2.00                    | 5.70         | 3.70                    | -                        | -            | -                       | 0.00                                       | 5.74          | 2.49            |
| 12-Dec-18  | 1.93                    | 5.62         | 3.63                    | -                        | -            | -                       | 0.00                                       | 5.11          | 2.28            |
| 13-Dec-18  | 1.79                    | 5.31         | 3.60                    | -                        | -            | -                       | 0.00                                       | 3.45          | 2.32            |
| 14-Dec-18  | 1.80                    | 6.07         | 3.80                    | -                        | -            | -                       | 0.00                                       | 5.11          | 2.14            |
| 15-Dec-18  | 1.92                    | 6.60         | 3.81                    | -                        | -            | -                       | 0.00                                       | 5.74          | 2.12            |
| 16-Dec-18  | 1.91                    | 4.21         | 3.17                    | -                        | -            | -                       | 0.00                                       | 5.95          | 1.77            |
| 17-Dec-18  | 1.75                    | 5.20         | 3.60                    | -                        | -            | -                       | 0.00                                       | 5.74          | 2.24            |
| 18-Dec-18  | 1.78                    | 5.10         | 3.44                    | -                        | -            | -                       | 0.00                                       | 3.45          | 2.04            |
| 19-Dec-18  | 1.95                    | 6.77         | 3.50                    | -                        | -            | -                       | 0.00                                       | 6.16          | 2.58            |
| 20-Dec-18  | 2.00                    | 7.53         | 4.11                    | -                        | -            | -                       | 0.00                                       | 6.36          | 2.54            |
| 21-Dec-18  | 2.00                    | 6.79         | 3.80                    | -                        | -            | -                       | 0.00                                       | 5.74          | 2.61            |
| 22-Dec-18  | 2.00                    | 6.80         | 3.82                    | -                        | -            | -                       | 0.00                                       | 3.45          | 1.96            |
| 23-Dec-18  | 2.00                    | 4.93         | 3.29                    | -                        | -            | -                       | 0.00                                       | 5.32          | 1.78            |
| 24-Dec-18  | 1.80                    | 5.80         | 3.61                    | -                        | -            | -                       | 0.00                                       | 5.32          | 1.98            |
| 25-Dec-18  | 1.95                    | 5.65         | 3.20                    | -                        | -            | -                       | 0.00                                       | 5.32          | 2.54            |
| 26-Dec-18  | 2.00                    | 4.96         | 3.44                    | -                        | -            | -                       | 0.00                                       | 3.45          | 1.58            |
| 27-Dec-18  | 2.00                    | 5.73         | 3.66                    | -                        | -            | -                       | 0.00                                       | 3.45          | 1.83            |
| 28-Dec-18  | 1.90                    | 4.60         | 3.47                    | -                        | -            | -                       | 0.00                                       | 4.91          | 2.14            |
| 29-Dec-18  | 1.78                    | 4.93         | 3.38                    | -                        | -            | -                       | 0.00                                       | 5.11          | 2.00            |
| 30-Dec-18  | 1.80                    | 4.26         | 3.00                    | -                        | -            | -                       | 0.00                                       | 6.36          | 2.02            |
| 31-Dec-18  | 1.75                    | 5.01         | 3.48                    | -                        | -            | -                       | 0.00                                       | 3.45          | 1.81            |
|  | <b>1.75#</b>            | <b>7.53#</b> | <b>3.50</b>             | <b>4.81#</b>             | <b>4.81#</b> | <b>4.81</b>             | <b>0.00#</b>                               | <b>6.36#</b>  | <b>2.19</b>     |
| Source: Data on price of PX transactions from IEX and PXIL and data on DSM Price from NLDC.  |                         |              |                         |                          |              |                         |  |               |                 |
| * Weighted average price computed based on Area Clearing Volume (ACV) and Area Clearing Price (ACP) for each hour of the day. Here, ACV and ACP represent the scheduled volume and weighted average price of all the bid areas of power exchanges. |                         |              |                         |                          |              |                         |  |               |                 |
| ** Simple average price of DSM of 96 time blocks of 15 minutes each in a day. DSM price includes Ceiling DSM Rate +40% additional DSM charge.  |                         |              |                         |                          |              |                         |  |               |                 |
| # Maximum/Minimum in the month   |                         |              |                         |                          |              |                         |  |               |                 |



| Table-19: VOLUME OF SHORT-TERM TRANSACTIONS OF ELECTRICITY (REGIONAL ENTITY*-WISE)<br>(MUs), DECEMBER 2018 |                   |               |          |                        |               |         |                                |                            |         |              |
|--|-------------------|---------------|----------|------------------------|---------------|---------|--------------------------------|----------------------------|---------|--------------|
| Name of the Entity   | Through Bilateral |               |          | Through Power Exchange |               |         | Through DSM with Regional Grid |                            |         | Total Net*** |
|  | Sale              | Pur-<br>chase | Net**    | Sale                   | Pur-<br>chase | Net**   | Import<br>(Over<br>Drawl)      | Export<br>(Under<br>Drawl) | Net**   |              |
| PUNJAB   | 1213.64           | 0.00          | -1213.64 | 6.25                   | 288.16        | 281.91  | 38.23                          | 29.95                      | 8.28    | -923.44      |
| HARYANA  | 855.74            | 55.91         | -799.82  | 28.99                  | 80.45         | 51.46   | 31.01                          | 44.78                      | -13.77  | -762.13      |
| RAJASTHAN  | 70.25             | 172.61        | 102.36   | 139.00                 | 123.59        | -15.41  | 92.09                          | 59.91                      | 32.17   | 119.12       |
| DELHI  | 599.15            | 15.01         | -584.14  | 260.74                 | 30.78         | -229.95 | 19.27                          | 13.66                      | 5.61    | -808.48      |
| UTTAR PRADESH  | 260.27            | 119.98        | -140.29  | 14.86                  | 18.01         | 3.15    | 58.36                          | 56.62                      | 1.75    | -135.40      |
| UTTARAKHAND  | 0.00              | 410.01        | 410.01   | 43.93                  | 56.20         | 12.27   | 26.61                          | 23.82                      | 2.79    | 425.07       |
| HP   | 38.02             | 381.26        | 343.24   | 89.67                  | 32.23         | -57.44  | 35.26                          | 8.70                       | 26.56   | 312.36       |
| J & K  | 13.64             | 472.07        | 458.43   | 20.72                  | 122.59        | 101.87  | 46.01                          | 15.31                      | 30.70   | 591.00       |
| CHANDIGARH   | 0.00              | 0.00          | 0.00     | 17.96                  | 0.81          | -17.15  | 19.76                          | 1.66                       | 18.10   | 0.95         |
| MP   | 18.09             | 930.12        | 912.04   | 117.85                 | 41.30         | -76.55  | 45.26                          | 59.92                      | -14.66  | 820.83       |
| MAHARASHTRA  | 12.45             | 394.80        | 382.35   | 266.94                 | 85.34         | -181.60 | 54.07                          | 70.74                      | -16.67  | 184.09       |
| GUJARAT  | 57.89             | 564.69        | 506.79   | 182.69                 | 73.42         | -109.27 | 46.85                          | 78.45                      | -31.60  | 365.93       |
| CHHATTISGARH   | 234.36            | 453.82        | 219.46   | 96.47                  | 34.94         | -61.53  | 32.29                          | 26.75                      | 5.54    | 163.46       |
| GOA  | 0.00              | 38.05         | 38.05    | 12.63                  | 12.39         | -0.24   | 10.19                          | 6.45                       | 3.74    | 41.55        |
| DAMAN AND DIU  | 0.00              | 0.00          | 0.00     | 0.00                   | 34.13         | 34.13   | 24.03                          | 0.20                       | 23.82   | 57.95        |
| DADRA & NAGAR  | 0.00              | 37.49         | 37.49    | 1.04                   | 36.04         | 35.00   | 27.69                          | 0.51                       | 27.19   | 99.68        |
| ANDHRA PR  | 299.39            | 647.13        | 347.74   | 79.22                  | 95.54         | 16.31   | 21.94                          | 74.91                      | -52.96  | 311.09       |
| KARNATAKA  | 17.10             | 1.25          | -15.85   | 112.29                 | 97.83         | -14.45  | 37.61                          | 54.36                      | -16.75  | -47.06       |
| KERALA   | 9.83              | 0.00          | -9.83    | 3.10                   | 188.97        | 185.86  | 27.50                          | 6.04                       | 21.46   | 197.49       |
| TAMIL NADU   | 2.66              | 159.28        | 156.62   | 8.30                   | 379.16        | 370.86  | 65.26                          | 38.33                      | 26.93   | 554.42       |
| PONDICHERRY  | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 2.91                           | 7.10                       | -4.19   | -4.19        |
| TELANGANA  | 133.04            | 25.39         | -107.65  | 118.78                 | 392.17        | 273.39  | 73.32                          | 22.99                      | 50.33   | 216.07       |
| WEST BENGAL  | 201.31            | 45.22         | -156.08  | 74.06                  | 39.37         | -34.69  | 30.85                          | 25.24                      | 5.61    | -185.16      |
| ODISHA   | 95.33             | 80.41         | -14.93   | 26.95                  | 136.52        | 109.57  | 62.21                          | 13.57                      | 48.64   | 143.28       |
| BIHAR  | 0.26              | 49.57         | 49.31    | 57.14                  | 192.39        | 135.25  | 29.04                          | 40.84                      | -11.81  | 172.75       |
| JHARKHAND  | 18.14             | 108.94        | 90.79    | 0.84                   | 46.45         | 45.61   | 32.91                          | 12.56                      | 20.35   | 156.76       |
| SIKKIM   | 0.00              | 2.72          | 2.72     | 11.04                  | 0.00          | -11.04  | 3.24                           | 3.73                       | -0.49   | -8.81        |
| DVC  | 325.70            | 1.74          | -323.97  | 0.61                   | 202.37        | 201.76  | 64.87                          | 5.51                       | 59.36   | -62.84       |
| ARUNACHAL PR   | 0.00              | 0.00          | 0.00     | 1.56                   | 5.44          | 3.88    | 18.06                          | 0.95                       | 17.11   | 20.99        |
| ASSAM  | 0.00              | 49.62         | 49.62    | 53.08                  | 45.64         | -7.45   | 7.66                           | 12.53                      | -4.87   | 37.30        |
| MANIPUR  | 0.00              | 35.24         | 35.24    | 17.10                  | 0.29          | -16.82  | 3.66                           | 2.97                       | 0.69    | 19.12        |
| MEGHALAYA  | 0.00              | 78.88         | 78.88    | 2.66                   | 33.03         | 30.37   | 1.08                           | 9.40                       | -8.33   | 100.92       |
| MIZORAM  | 3.78              | 0.01          | -3.77    | 9.44                   | 0.01          | -9.43   | 2.08                           | 4.59                       | -2.51   | -15.70       |
| NAGALAND   | 0.00              | 0.00          | 0.00     | 0.00                   | 2.88          | 2.88    | 10.02                          | 0.80                       | 9.22    | 12.10        |
| TRIPURA  | 2.69              | 0.00          | -2.69    | 100.59                 | 0.00          | -100.59 | 2.33                           | 7.44                       | -5.11   | -108.38      |
| NTPC -NR   | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 60.95                          | 70.21                      | -9.26   | -9.26        |
| NHPC STATIONS  | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 15.50                          | 59.43                      | -43.94  | -43.94       |
| NJPC   | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 2.11                           | 3.05                       | -0.95   | -0.95        |
| AD HYDRO   | 0.00              | 0.00          | 0.00     | 13.43                  | 0.00          | -13.43  | 0.22                           | 1.06                       | -0.84   | -14.27       |
| KARCHAM WANGT  | 0.00              | 0.00          | 0.00     | 14.22                  | 0.00          | -14.22  | 0.00                           | 0.00                       | 0.00    | -14.22       |
| SHREE CEMENT   | 94.81             | 0.00          | -94.81   | 4.59                   | 0.00          | -4.59   | 3.20                           | 0.62                       | 2.58    | -96.82       |
| LANCO BUDHIL   | 0.00              | 0.00          | 0.00     | 0.85                   | 0.00          | -0.85   | 0.80                           | 0.49                       | 0.31    | -0.54        |
| MALANA   | 0.00              | 0.00          | 0.00     | 0.95                   | 0.00          | -0.95   | 0.00                           | 0.16                       | -0.16   | -1.11        |
| URI-2  | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 0.46                           | 4.59                       | -4.13   | -4.13        |
| SAINJ HEP  | 0.00              | 0.00          | 0.00     | 13.84                  | 0.00          | -13.84  | 0.00                           | 0.00                       | 0.00    | -13.84       |
| NTPC -WR   | 0.43              | 0.43          | 0.00     | 0.30                   | 0.00          | -0.30   | 46.89                          | 163.55                     | -116.66 | -116.96      |
| JINDAL POWER   | 0.00              | 0.00          | 0.00     | 11.50                  | 0.00          | -11.50  | 1.45                           | 2.75                       | -1.30   | -12.80       |
| LANCO_AMK  | 8.56              | 0.00          | -8.56    | 0.00                   | 0.00          | 0.00    | 1.21                           | 7.25                       | -6.04   | -14.60       |
| NSPCL  | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 1.16                           | 1.14                       | 0.01    | 0.01         |
| ACBIL  | 33.43             | 0.00          | -33.43   | 13.89                  | 0.00          | -13.89  | 6.01                           | 1.47                       | 4.54    | -42.79       |
| BALCO  | 4.92              | 0.00          | -4.92    | 0.84                   | 0.00          | -0.84   | 13.60                          | 0.51                       | 13.09   | 7.32         |
| RGPL (DABHOL)  | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 11.38                          | 1.73                       | 9.65    | 9.65         |
| CGPL   | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 21.39                          | 5.90                       | 15.48   | 15.48        |
| DCPP   | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 0.24                           | 0.71                       | -0.47   | -0.47        |
| EMCO   | 0.00              | 0.00          | 0.00     | 0.00                   | 0.00          | 0.00    | 13.15                          | 2.15                       | 11.00   | 11.00        |

|                 |        |        |         |        |        |         |       |       |        |         |
|-----------------|--------|--------|---------|--------|--------|---------|-------|-------|--------|---------|
| ESSAR STEEL     | 0.00   | 206.18 | 206.18  | 0.00   | 130.57 | 130.57  | 2.82  | 24.28 | -21.47 | 315.28  |
| KSK MAHANADI    | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 1.09  | 2.79  | -1.71  | -1.71   |
| ESSAR POWER     | 196.90 | 0.00   | -196.90 | 30.06  | 0.00   | -30.06  | 2.82  | 3.25  | -0.44  | -227.40 |
| JINDAL STAGE-II | 0.00   | 0.00   | 0.00    | 13.63  | 0.00   | -13.63  | 4.58  | 5.56  | -0.98  | -14.61  |
| DB POWER        | 61.42  | 0.00   | -61.42  | 92.54  | 0.00   | -92.54  | 17.96 | 0.51  | 17.45  | -136.51 |
| DHARIWAL POWER  | 0.00   | 0.00   | 0.00    | 0.50   | 0.00   | -0.50   | 0.13  | 0.80  | -0.67  | -1.17   |
| JAYPEE NIGRIE   | 79.97  | 0.00   | -79.97  | 39.67  | 0.00   | -39.67  | 1.57  | 5.06  | -3.49  | -123.13 |
| DGEN MEGA POWI  | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.93  | 0.00  | 0.93   | 0.93    |
| GMR CHATTISGAR  | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 1.99  | 0.00  | 1.99   | 1.99    |
| KORBA WEST POW  | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.46  | 0.00  | 0.46   | 0.46    |
| MB POWER        | 3.10   | 0.00   | -3.10   | 58.62  | 0.00   | -58.62  | 5.37  | 2.68  | 2.70   | -59.02  |
| MARUTI COAL     | 0.00   | 0.00   | 0.00    | 48.90  | 0.00   | -48.90  | 0.00  | 0.00  | 0.00   | -48.90  |
| SPECTRUM        | 32.77  | 0.00   | -32.77  | 25.12  | 0.00   | -25.12  | 0.00  | 0.00  | 0.00   | -57.90  |
| JHABUA POWER_N  | 15.56  | 0.00   | -15.56  | 9.34   | 0.00   | -9.34   | 6.19  | 4.16  | 2.03   | -22.87  |
| SASAN UMPP      | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.51  | 77.51 | -77.00 | -77.00  |
| TRN ENERGY      | 7.92   | 0.00   | -7.92   | 37.24  | 0.00   | -37.24  | 0.67  | 2.62  | -1.95  | -47.11  |
| RKM POWER       | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.10  | 2.11  | -2.01  | -2.01   |
| SKS POWER       | 78.45  | 0.00   | -78.45  | 36.41  | 0.00   | -36.41  | 2.02  | 0.89  | 1.13   | -113.73 |
| NTPC -SR        | 0.00   | 0.00   | 0.00    | 1.82   | 0.00   | -1.82   | 52.29 | 23.02 | 29.28  | 27.46   |
| LANKO KONDAPAL  | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.57  | 0.00  | 0.57   | 0.57    |
| MEENAKSHI       | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.25  | 0.00  | 0.25   | 0.25    |
| COASTGEN        | 0.00   | 0.00   | 0.00    | 55.55  | 0.00   | -55.55  | 2.53  | 1.06  | 1.47   | -54.08  |
| THERMAL POWER   | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 5.20  | 0.66  | 4.54   | 4.54    |
| ILF&S           | 0.00   | 0.00   | 0.00    | 3.73   | 0.00   | -3.73   | 10.03 | 0.98  | 9.05   | 5.32    |
| NLC             | 0.00   | 0.00   | 0.00    | 71.99  | 0.00   | -71.99  | 14.54 | 33.84 | -19.30 | -91.29  |
| SEMBCORP        | 161.28 | 0.00   | -161.28 | 221.37 | 0.00   | -221.37 | 0.78  | 0.00  | 0.78   | -381.87 |
| NETCL VALLUR    | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 12.53 | 2.38  | 10.15  | 10.15   |
| NTPC -ER        | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 43.50 | 20.64 | 22.86  | 22.86   |
| MAITHON POWER   | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 4.85  | 5.70  | -0.84  | -0.84   |
| ADHUNIK POWER   | 128.31 | 0.00   | -128.31 | 2.94   | 0.00   | -2.94   | 2.36  | 0.50  | 1.86   | -129.39 |
| CHUZACHEN HEP   | 9.19   | 0.00   | -9.19   | 1.45   | 0.00   | -1.45   | 0.26  | 0.56  | -0.30  | -10.94  |
| RANGIT HEP      | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.37  | 0.92  | -0.55  | -0.55   |
| GMR KAMALANGA   | 4.25   | 0.00   | -4.25   | 23.03  | 0.00   | -23.03  | 17.94 | 6.72  | 11.23  | -16.05  |
| JITPL           | 48.89  | 0.00   | -48.89  | 8.64   | 0.00   | -8.64   | 3.68  | 3.25  | 0.44   | -57.09  |
| TEESTA HEP      | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.36  | 7.42  | -7.06  | -7.06   |
| DAGACHU         | 19.60  | 0.00   | -19.60  | 0.00   | 0.00   | 0.00    | 4.35  | 0.08  | 4.28   | -15.32  |
| JORETHANG       | 12.91  | 0.00   | -12.91  | 1.75   | 0.00   | -1.75   | 2.53  | 1.22  | 1.31   | -13.35  |
| NEPAL(NVVN)     | 0.00   | 135.36 | 135.36  | 0.00   | 0.00   | 0.00    | 18.94 | 0.55  | 18.39  | 153.75  |
| BANGLADESH      | 0.00   | 213.11 | 213.11  | 0.00   | 0.00   | 0.00    | 3.64  | 8.72  | -5.08  | 208.03  |
| TEESTA STG3     | 0.00   | 0.00   | 0.00    | 155.18 | 0.00   | -155.18 | 2.54  | 1.85  | 0.68   | -154.50 |
| DIKCHU HEP      | 0.00   | 0.00   | 0.00    | 10.95  | 0.00   | -10.95  | 0.64  | 0.64  | -0.01  | -10.96  |
| TASHIDENG HEP   | 14.73  | 0.00   | -14.73  | 2.16   | 0.00   | -2.16   | 2.53  | 1.37  | 1.16   | -15.73  |
| BRBCL,NABINAGA  | 0.00   | 0.00   | 0.00    | 11.44  | 0.00   | -11.44  | 1.33  | 4.47  | -3.14  | -14.58  |
| NTPC -NER       | 0.43   | 0.00   | -0.43   | 12.25  | 0.00   | -12.25  | 0.00  | 0.00  | 0.00   | -12.68  |
| NEEPCO STATION  | 0.00   | 0.00   | 0.00    | 20.77  | 0.00   | -20.77  | 1.11  | 4.09  | -2.98  | -23.76  |
| RANGANADI HEP   | 0.00   | 0.00   | 0.00    | 3.08   | 0.00   | -3.08   | 1.83  | 1.57  | 0.27   | -2.82   |
| DOYANG HEP      | 0.00   | 0.00   | 0.00    | 0.40   | 0.00   | -0.40   | 0.23  | 0.47  | -0.24  | -0.64   |
| ONGC PALATANA   | 46.32  | 0.00   | -46.32  | 6.67   | 0.00   | -6.67   | 0.00  | 0.00  | 0.00   | -52.99  |
| LOKTAK          | 0.00   | 0.00   | 0.00    | 0.00   | 0.00   | 0.00    | 0.21  | 1.10  | -0.89  | -0.89   |
| PARE HEP        | 0.00   | 0.00   | 0.00    | 0.88   | 0.00   | -0.88   | 0.00  | 0.00  | 0.00   | -0.88   |

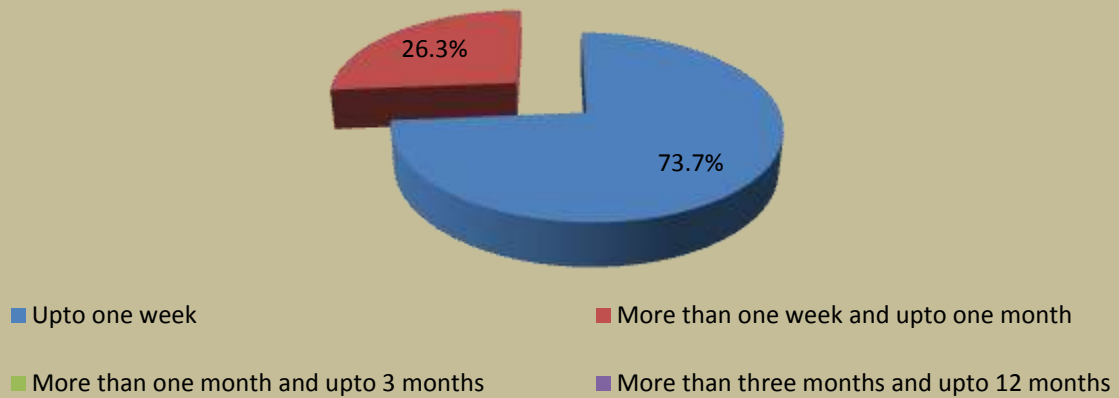
Source: NLDC

\* in case of a state, the entities which are "selling" also include generators connected to state grid and the entities which are "buying" also include open access consumers.

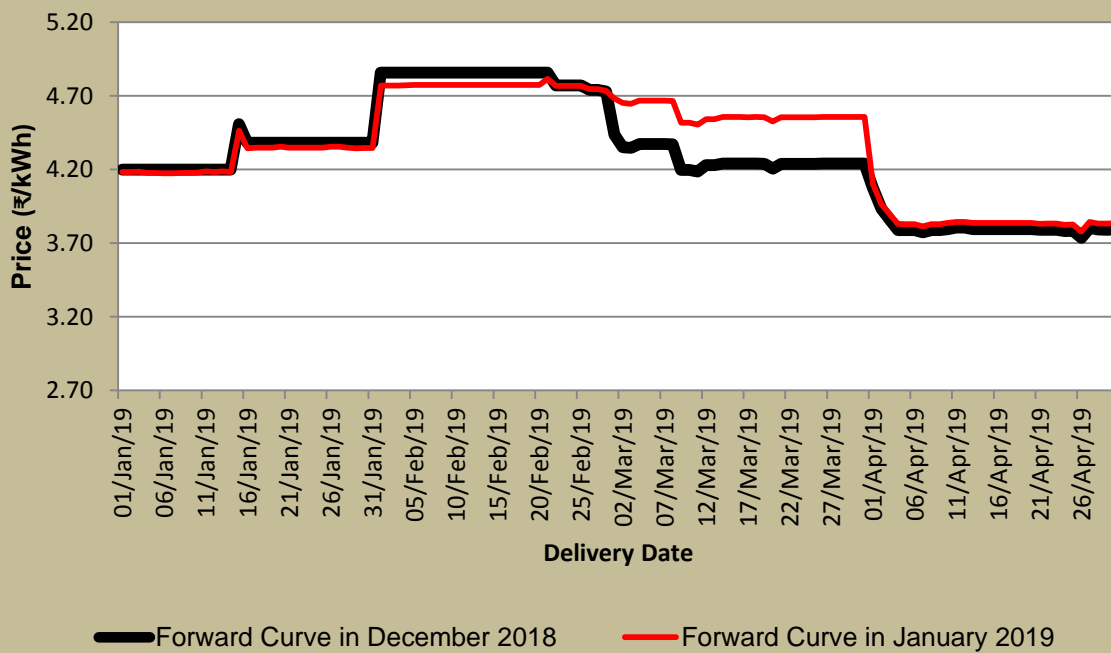
\*\* (-) indicates sale and (+) indicates purchase,

\*\*\* Total net includes net of transactions through bilateral, power exchange and DSM

**Figure 7: Bilateral Contracts executed by Traders in January, 2019**



**Figure-8: Forward Curve based on Prices of Bilateral Contracts**



| <b>Table-20 : VOLUME AND PRICE OF RENEWABLE ENERGY CERTIFICATES (RECs)<br/>TRANSACTIONED THROUGH POWER EXCHANGES, DECEMBER 2018</b> |   |              |                  |              |                  |
|---|---|--------------|------------------|--------------|------------------|
| <b>Sr.No.</b>   | <b>Details of REC Transactions</b>                | <b>IEX</b>   |                  | <b>PXIL</b>  |                  |
|   |   | <b>Solar</b> | <b>Non-Solar</b> | <b>Solar</b> | <b>Non Solar</b> |
| A   | Volume of Buy Bid                                 | 865574       | 1091466          | 606529       | 632153           |
| B   | Volume of Sell Bid                                | 254012       | 366092           | 156862       | 178701           |
| C   | Ratio of Buy Bid to Sell Bid<br>Volume            | 3.41         | 2.98             | 3.87         | 3.54             |
| D   | Market Clearing Volume (MWh)                      | 88272        | 295601           | 88975        | 86799            |
| E   | Weighted average Market<br>Clearing Price (₹/MWh) | 1450         | 1320             | 1500         | 1255             |

Source: IEX and PXIL

Note 1: 1 REC = 1 MWh

| Note 2: <i>Forbearance and Floor Price w.e.f 1st April 2017</i> |                        |                                 |
|---|------------------------|---------------------------------|
| Type of REC   | Floor Price<br>(₹/MWh) | Forbearance<br>Price<br>(₹/MWh) |
| <i>Solar</i>  | <i>1000.00</i>         | <i>2500.00</i>                  |
| <i>Non-Solar</i>  | <i>1000.00</i>         | <i>2900.00</i>                  |