

## BHUTAN POWER SYSTEM OPERATOR LOAD-GENERATION BALANCE REPORT

Maximum Load/Demand till Date

|               |                         |
|---------------|-------------------------|
| <b>Date:</b>  | <b>October 25, 2020</b> |
| <b>Hours:</b> | <b>19:00 Hours</b>      |

| Date      | Time     | Load(MW) |
|-----------|----------|----------|
| 27-Dec-18 | 18:18hrs | 399.35MW |

| Sl. No. | Hydropower Plant | Unit         | MW            | Name of Feeders                                      | Load (MW)      | Sign | Remarks                                                                                                                                             |
|---------|------------------|--------------|---------------|------------------------------------------------------|----------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | 1020MW THP       | Unit- I      | 0.00          | 400kV THP - Siliguri Fdr- I                          | 154.58         | +    | Unit-I, Unit-II & 400kV THP-SIL Fdr II under Standby.                                                                                               |
|         |                  | Unit- II     | 0.00          | 400kV THP - Siliguri Fdr- II                         | 0.00           | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 100.57        | 400kV THP - Siliguri Fdr- IV                         | 148.16         | +    |                                                                                                                                                     |
|         |                  | Unit- IV     | 141.18        | 400kV THP - Malbase Fdr- III                         | 188.36         | +    |                                                                                                                                                     |
|         |                  | Unit- V      | 137.20        | 400kV Malbase - Siliguri                             | 137.09         | +    |                                                                                                                                                     |
|         |                  | Unit- VI     | 120.12        | -                                                    | -              | -    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>499.07</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.597%</b>  |      |                                                                                                                                                     |
| 2       | 720MW MHP        | Unit-I       | 160.00        | 400kV MHP - Jigmeling Fdr - I                        | 158.01         | +    | Unit-III under maintenance (22/09/20-30/11/2020). Unit-IV under standby. 400kV MHP-JLG Fdr II under Breakdown. 400kV MHP-JLG Fdr III under standby. |
|         |                  | Unit-II      | 160.00        | 400kV MHP - Jigmeling Fdr - II                       | 0.00           | +    |                                                                                                                                                     |
|         |                  | Unit-III     | 0.00          | 400kV MHP - Jigmeling Fdr - III                      | 0.00           | +    |                                                                                                                                                     |
|         |                  | Unit-IV      | 0.00          | 400kV MHP - Jigmeling Fdr - IV                       | 159.26         |      |                                                                                                                                                     |
|         |                  | -            | -             | 200MVA, 400/132kV ICT                                |                |      |                                                                                                                                                     |
|         |                  | -            | -             | (Local Load)                                         |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>320.00</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.853%</b>  |      |                                                                                                                                                     |
| 3       | 336MW CHP        | Unit- I      | 0.00          | 220kV CHP - Birpara Fdr- I                           | 69.07          | +    | Unit-I Standby                                                                                                                                      |
|         |                  | Unit- II     | 79.33         | 220kV CHP - Birpara Fdr- II                          | 69.03          | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 81.96         | 220kV CHP - Malbase Fdr- III                         | 102.18         | +    |                                                                                                                                                     |
|         |                  | Unit- IV     | 80.71         | 220kV CHP - Semtokha Fdr- IV                         | -11.53         | -    |                                                                                                                                                     |
|         |                  | -            | -             | 220kV Malbase - Birpara Fdr.                         | 35.71          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 66kV CHP - Chumdo Fdr.                               | 6.87           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 66kV CHP - Gedu Fdr.                                 | 4.19           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 3x3MVA, 66/11kV TFR                                  | 1.25           | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>242.00</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.388%</b>  |      |                                                                                                                                                     |
| 4       | 24MW BHP (U/S)   | Unit- I      | 9.60          | 220kV BHP - Semtokha Fdr.                            | 42.15          | +    |                                                                                                                                                     |
|         |                  | Unit- II     | 9.60          | 66kV BHP - Lobeysa Fdr.                              | 14.42          | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>19.20</b>  | 220kV BHP - Tsirang Fdr.                             | -2.05          | -    |                                                                                                                                                     |
|         | 40MW BHP (L/S)   | Unit- I      | 18.16         | 5MVA, 66/11kV TFR                                    | 0.59           | +    |                                                                                                                                                     |
|         |                  | Unit- II     | 17.64         | 30MVA ICT, 220/66kV                                  |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>35.80</b>  | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>-0.200%</b> |      |                                                                                                                                                     |
| 5       | 126MW DHPC       | Unit-I       | 38.24         | 220kV DHPC - Tsirang Fdr.                            | 74.95          | +    |                                                                                                                                                     |
|         |                  | Unit-II      | 37.20         | 220kV Jigmeling - Dagapela Fdr.                      | 1.90           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 5MVA, 220/33kV TFR                                   |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>75.44</b>  | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.650%</b>  |      |                                                                                                                                                     |
| 6       | 60MW KHP         | Unit- I      | 13.53         | 132kV KHP - Nangkhon Fdr- I                          | 28.47          | +    |                                                                                                                                                     |
|         |                  | Unit-II      | 13.39         | 132kV KHP - Kilikhar Fdr- II                         | 23.72          | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 13.38         | 5MVA, 132/11kV TFR                                   | 0.30           | +    |                                                                                                                                                     |
|         |                  | Unit- IV     | 13.49         | 132kV Gelephu - Salakati Fdr.                        | 29.09          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 132kV Motanga - Rangia Fdr.                          | 46.30          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 220kV Tsirang - Jigmeling                            | 54.00          | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>53.79</b>  | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>2.413%</b>  |      |                                                                                                                                                     |

**Note: Generation-Load Summary for October 25, 2020 at 19:00hrs.**

| Sl. No | Region       | Total Generation (MW) | Total Load [Generation - Export (MW)] | Total Load [Feeder Summation (MW)] | Total Export/Import (MW) | Load Balance (MW) |
|--------|--------------|-----------------------|---------------------------------------|------------------------------------|--------------------------|-------------------|
| 1      | Western Grid | 871.51                | 203.87                                | 196.48                             | 613.64                   | 7.39              |
| 2      | Eastern Grid | 373.79                | 35.13                                 | 31.10                              | 392.66                   | 4.03              |
|        | <b>Total</b> | <b>1,245.30</b>       | <b>239.00</b>                         | <b>227.58</b>                      | <b>1,006.30</b>          | <b>11.42</b>      |

**Note: Generation-Load Summary for October 25, 2019 at 19:00hrs.**

| Sl. No | Region       | Total Generation (MW) | Total Load [Generation - Export (MW)] | Total Load [Feeder Summation (MW)] | Total Export/Import (MW) | Load Balance (MW) |
|--------|--------------|-----------------------|---------------------------------------|------------------------------------|--------------------------|-------------------|
| 1      | Western Grid | 868.9                 | 283.20                                | 275.01                             | 540.66                   | 8.19              |
| 2      | Eastern Grid | 327.43                | 63.43                                 | 62.84                              | 309.04                   | 0.59              |
|        | <b>Total</b> | <b>1,196.33</b>       | <b>346.63</b>                         | <b>337.85</b>                      | <b>849.70</b>            | <b>8.78</b>       |

**NOTE: KHP, MHP & Motanga datas collected from site.**

- The Instantaneous load balance is calculated as (Total generation - (Total export-Import) - Total domestic load) do not tend towards zero. This could be due to the following reasons:
  - Not all the meters are digital and nor are all the meter at all locations can be read at same time (say 9:00hrs) due to many meter to be read manually.
  - The clocks of all the locations are not synchronized.
- This report is generated to give an idea of the generation & load flow for the system at a particular instant.

**BHUTAN POWER SYSTEM OPERATOR LOAD-GENERATION BALANCE REPORT**

**Maximum Load/Demand till Date**

|               |                         |
|---------------|-------------------------|
| <b>Date:</b>  | <b>October 26, 2020</b> |
| <b>Hours:</b> | <b>09:00 Hours</b>      |

|             |             |                 |
|-------------|-------------|-----------------|
| <b>Date</b> | <b>Time</b> | <b>Load(MW)</b> |
| 27-Dec-18   | 18:18hrs    | 399.35MW        |

| Sl. No. | Hydropower Plant | Unit         | MW            | Name of Feeders                                      | Load (MW)      | Sign | Remarks                                                                                                                                             |
|---------|------------------|--------------|---------------|------------------------------------------------------|----------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | 1020MW THP       | Unit- I      | 0.00          | 400kV THP - Siliguri Fdr- I                          | 164.55         |      | Unit-I, Unit-II & 400kV THP-SIL Fdr II under Standby                                                                                                |
|         |                  | Unit- II     | 0.00          | 400kV THP - Siliguri Fdr- II                         | 0.00           | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 101.12        | 400kV THP - Siliguri Fdr- IV                         | 157.47         |      |                                                                                                                                                     |
|         |                  | Unit- IV     | 141.30        | 400kV THP - Malbase Fdr- III                         | 170.06         | +    |                                                                                                                                                     |
|         |                  | Unit- V      | 138.29        | 400kV Malbase - Siliguri                             | 153.05         | +    |                                                                                                                                                     |
|         |                  | Unit- VI     | 119.85        | -                                                    | -              | -    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>500.56</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.694%</b>  |      |                                                                                                                                                     |
| 2       | 720MW MHP        | Unit-I       | 194.84        | 400kV MHP - Jigmeling Fdr - I                        | 192.89         | +    | Unit-III under maintenance (22/09/20-30/11/2020). Unit-IV under standby. 400kV MHP-JLG Fdr II under Breakdown. 400kV MHP-JLG Fdr III under standby. |
|         |                  | Unit-II      | 194.16        | 400kV MHP - Jigmeling Fdr - II                       | 0.00           |      |                                                                                                                                                     |
|         |                  | Unit-III     | 0.00          | 400kV MHP - Jigmeling Fdr - III                      | 0.00           |      |                                                                                                                                                     |
|         |                  | Unit-IV      | 0.00          | 400kV MHP - Jigmeling Fdr - IV                       | 194.83         | +    |                                                                                                                                                     |
|         |                  | -            | -             | 200MVA, 400/132kV ICT                                |                |      |                                                                                                                                                     |
|         |                  | -            | -             | (Local Load)                                         |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>389.00</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.329%</b>  |      |                                                                                                                                                     |
| 3       | 336MW CHP        | Unit- I      | 0.00          | 220kV CHP - Birpara Fdr- I                           | 83.73          | +    | Unit-I under standby.                                                                                                                               |
|         |                  | Unit- II     | 85.00         | 220kV CHP - Birpara Fdr- II                          | 83.77          | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 83.27         | 220kV CHP - Malbase Fdr- III                         | 135.73         | +    |                                                                                                                                                     |
|         |                  | Unit- IV     | 84.58         | 220kV CHP - Semtokha Fdr- IV                         | -61.30         | -    |                                                                                                                                                     |
|         |                  | -            | -             | 220kV Malbase - Birpara Fdr.                         | 33.16          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 66kV CHP - Chumdo Fdr.                               | 3.97           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 66kV CHP - Gedu Fdr.                                 | 4.82           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 3x3MVA, 66/11kV TFR                                  | 1.02           | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>252.85</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.439%</b>  |      |                                                                                                                                                     |
| 4       | 24MW BHP (U/S)   | Unit- I      | 11.73         | 220kV BHP - Semtokha Fdr.                            | 87.16          | +    |                                                                                                                                                     |
|         |                  | Unit- II     | 11.73         | 66kV BHP - Lobeysa Fdr.                              | 17.03          | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>23.46</b>  | 220kV BHP - Tsirang Fdr.                             | -38.89         | -    |                                                                                                                                                     |
|         | 40MW BHP (L/S)   | Unit- I      | 20.37         | 5MVA, 66/11kV TFR                                    | 0.41           | +    |                                                                                                                                                     |
|         |                  | Unit- II     | 20.64         | 30MVA ICT, 220/66kV                                  |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>41.01</b>  | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>-3.024%</b> |      |                                                                                                                                                     |
| 5       | 126MW DHPC       | Unit-I       | 52.26         | 220kV DHPC - Tsirang Fdr.                            | 104.00         | +    |                                                                                                                                                     |
|         |                  | Unit-II      | 52.20         | 220kV Jigmeling - Dagapela Fdr.                      | 1.90           | +    |                                                                                                                                                     |
|         |                  | -            | -             | 5MVA, 220/33kV TFR                                   |                |      |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>104.46</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.440%</b>  |      |                                                                                                                                                     |
| 6       | 60MW KHP         | Unit- I      | 16.50         | 132kV KHP - Nangkhon Fdr- I                          | 40.32          | +    |                                                                                                                                                     |
|         |                  | Unit-II      | 16.50         | 132kV KHP - Kilikhar Fdr- II                         | 24.24          | +    |                                                                                                                                                     |
|         |                  | Unit- III    | 16.50         | 5MVA, 132/11kV TFR                                   | 0.27           | +    |                                                                                                                                                     |
|         |                  | Unit- IV     | 16.50         | 132kV Gelephu - Salakati Fdr.                        | 38.17          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 132kV Motanga - Rangia Fdr.                          | 48.39          | +    |                                                                                                                                                     |
|         |                  | -            | -             | 220kV Tsirang - Jigmeling                            | 61.25          | +    |                                                                                                                                                     |
|         |                  | <b>Total</b> | <b>66.00</b>  | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.773%</b>  |      |                                                                                                                                                     |

**Note: Generation-Load summary for October 26, 2020 at 09:00hrs.**

| Sl. No | Region       | Total Generation (MW) | Total Load [Generation - Export (MW)] | Total Load [Feeder Summation (MW)] | Total Export/Import (MW) | Load Balance (MW) |
|--------|--------------|-----------------------|---------------------------------------|------------------------------------|--------------------------|-------------------|
| 1      | Western Grid | 922.34                | 185.36                                | 178.45                             | 675.73                   | 6.91              |
| 2      | Eastern Grid | 455.00                | 41.97                                 | 39.52                              | 474.28                   | 2.45              |
|        | <b>Total</b> | <b>1,377.34</b>       | <b>227.33</b>                         | <b>217.97</b>                      | <b>1,150.01</b>          | <b>9.36</b>       |

**Note: Generation-Load Summary for October 26, 2019 at 09:00hrs**

| Sl. No | Region       | Total Generation (MW) | Total Load [Generation - Export (MW)] | Total Load [Feeder Summation (MW)] | Total Export/Import (MW) | Load Balance (MW) |
|--------|--------------|-----------------------|---------------------------------------|------------------------------------|--------------------------|-------------------|
| 1      | Western Grid | 815.8                 | 261.29                                | 252.66                             | 516.48                   | 8.63              |
| 2      | Eastern Grid | 328.76                | 53.51                                 | 52.18                              | 313.28                   | 1.33              |
|        | <b>Total</b> | <b>1,144.56</b>       | <b>314.80</b>                         | <b>304.84</b>                      | <b>829.76</b>            | <b>9.96</b>       |

**NOTES: KHP,MHP & Motanga datas collected from site.**

- The Instantaneous load balance is calculated as (Total generation - (Total export-Import) - Total domestic load) do not tend towards zero. This could be due to the following reasons:
  - Not all the meters are digital and nor are all the meter at all locations can be read at same time (say 9:00hrs) due to many meter to be read manually.
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