

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

Maximum Load/Demand till Date

|        |                   |
|--------|-------------------|
| Date:  | February 20, 2021 |
| Hours: | 19:00 Hours       |

| 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      | 69.03                    | 400kV THP - Siliguri Fdr- I                          | 39.15          | +    | Unit-III on standby.<br>Unit-IV, V & VI under shutdown.<br>400kV THP-SIL Fdr II on standby.<br>400kV THP-SIL Fdr IV under AMP. |
|          |                  | Unit- II     | 72.94                    | 400kV THP - Siliguri Fdr- II                         | 0.00           |      |  |
|          |                  | Unit- III    | 0.00                     | 400kV THP - Siliguri Fdr- IV                         | 0.00           |      |  |
|          |                  | Unit- IV     | 0.00                     | 400kV THP - Malbase Fdr- III                         | 98.16          | +    |  |
|          |                  | Unit- V      | 0.00                     | 400kV Malbase - Siliguri                             | 24.00          | +    |  |
|          |                  | Unit- VI     | 0.00                     | -  | -              | -    |  |
|          |                  | <b>Total</b> | <b>141.97</b>            | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>3.282%</b>  |      |  |
| 2        | 720MW MHP        | Unit-I       | 0.00                     | 400kV MHP - Jigmeling Fdr - I                        | 0.00           |      | Unit- I standby.<br>Unit-II under maintenance.<br>Unit-III under breakdown.<br>400kV MHP-JLG Fdr I, II & III on standby.       |
|          |                  | Unit-II      | 0.00                     | 400kV MHP - Jigmeling Fdr - II                       | 0.00           |      |  |
|          |                  | Unit-III     | 0.00                     | 400kV MHP - Jigmeling Fdr - III                      | 0.00           |      |  |
|          |                  | Unit-IV      | 105.20                   | 400kV MHP - Jigmeling Fdr - IV                       | 105.16         | +    |  |
|          |                  | -            | -                        | 200MVA, 400/132kV ICT                                |                |      |  |
|          |                  | -            | -                        | (Local Load)   |                |      |  |
|          |                  | <b>Total</b> | <b>105.20</b>            | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.038%</b>  |      |  |
| 3        | 336MW CHP        | Unit- I      | 0.00                     | 220kV CHP - Birpara Fdr- I                           | 0.00           |      | Unit-I & III under Annual Maintenance<br>220kV CHP-BIR I on Standby<br>220kV CHP-MAL line under shutdown                       |
|          |                  | Unit- II     | 40.35                    | 220kV CHP - Birpara Fdr- II                          | -11.67         | -    |  |
|          |                  | Unit- III    | 0.00                     | 220kV CHP - Malbase Fdr- III                         | 0.00           |      |  |
|          |                  | Unit- IV     | 36.53                    | 220kV CHP - Semtokha Fdr- IV                         | 67.90          | +    |  |
|          |                  | -            | -                        | 220kV Malbase - Birpara Fdr.                         | -22.00         | -    |  |
|          |                  | -            | -                        | 66kV CHP - Chumdo Fdr.                               | 16.57          | +    |  |
|          |                  | -            | -                        | 66kV CHP - Gedu Fdr.                                 | 1.83           | +    |  |
|          |                  | -            | -                        | 3x3MVA, 66/11kV TFR                                  | 2.05           | +    |  |
|          |                  | <b>Total</b> | <b>76.88</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.260%</b>  |      |  |
| 4        | 24MW BHP (U/S)   | Unit- I      | 5.10                     | 220kV BHP - Semtokha Fdr.                            | 0.30           | +    | U/S Unit-II under AMP.<br>L/S Unit-I under standby   |
|          |                  | Unit- II     | 0.00                     | 66kV BHP - Lobeysa Fdr.                              | 14.80          | +    |  |
|          | <b>Total</b>     | <b>5.10</b>  | 220kV BHP - Tsirang Fdr. | -0.02  | -              |      |  |
|          | 40MW BHP (L/S)   | Unit- I      | 0.00                     | 5MVA, 66/11kV TFR                                    | 0.89           | +    |  |
| Unit- II |                  | 10.80        | 30MVA ICT, 220/66kV      |  |                |      |  |
|          |                  | <b>Total</b> | <b>10.80</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>-0.440%</b> |      |  |
| 5        | 126MW DHPC       | Unit-I       | 17.64                    | 220kV DHPC - Tsirang Fdr.                            | 17.43          | +    | Unit-II under AMP  |
|          |                  | Unit-II      | 0.00                     | 220kV Jigmeling - Dagapela Fdr.                      | 2.70           | +    |  |
|          |                  | -            | -                        | 5MVA, 220/33kV TFR                                   |                |      |  |
|          |                  | <b>Total</b> | <b>17.64</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.190%</b>  |      |  |
| 6        | 60MW KHP         | Unit- I      | 0.00                     | 132kV KHP - Nangkhon Fdr- I                          | 4.81           | +    | Unit-I on standby.<br>Unit-IV under Annual Maintenance.  |
|          |                  | Unit-II      | 10.11                    | 132kV KHP - Kilikhar Fdr- II                         | 14.53          | +    |  |
|          |                  | Unit- III    | 10.14                    | 5MVA, 132/11kV TFR                                   | 0.52           | +    |  |
|          |                  | Unit- IV     | 0.00                     | 132kV Gelephu - Salakati Fdr.                        | -29.81         | -    |  |
|          |                  | -            | -                        | 132kV Motanga - Rangia Fdr.                          | -2.32          | -    |  |
|          |                  | -            | -                        | 220kV Tsirang - Jigmeling                            | 16.68          | +    |  |
|          |                  | <b>Total</b> | <b>20.25</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.941%</b>  |      |  |

**Note: Generation-Load Summary for February 20, 2021 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 | 252.39                | 206.23                                | 203.93                             | 29.48                    | 2.30              |
| 2      | Eastern Grid | 125.45                | 69.10                                 | 68.67                              | 73.03                    | 0.43              |
|        | <b>Total</b> | <b>377.84</b>         | <b>275.33</b>                         | <b>272.60</b>                      | <b>102.51</b>            | <b>2.73</b>       |

**Note: Generation-Load Summary for February 20, 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 | 344.74                | 266.72                                | 261.15                             | 40.22                    | 5.57              |
| 2      | Eastern Grid | 126.54                | 84.93                                 | 83.38                              | 79.41                    | 1.55              |
|        | <b>Total</b> | <b>471.28</b>         | <b>351.65</b>                         | <b>344.53</b>                      | <b>119.63</b>            | <b>7.12</b>       |

**NOTE- MAL,KHP,MHP & Motanga data 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>February 21, 2021</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      | 69.09                    | 400kV THP - Siliguri Fdr- I                          | 41.99         | +    | Unit-III on standby.<br>Unit-IV, V & VI under shutdown.<br>400kV THP-SIL Fdr II on standby.<br>400kV Tala-Sil IV under AMP. |
|          |                  | Unit- II     | 72.47                    | 400kV THP - Siliguri Fdr- II                         | 0.00          |      |   |
|          |                  | Unit- III    | 0.00                     | 400kV THP - Siliguri Fdr- IV                         | 0.00          |      |   |
|          |                  | Unit- IV     | 0.00                     | 400kV THP - Malbase Fdr- III                         | 95.59         | +    |   |
|          |                  | Unit- V      | 0.00                     | 400kV Malbase - Siliguri                             | 28.00         | +    |   |
|          |                  | Unit- VI     | 0.00                     | -  | -             | -    |   |
|          |                  | <b>Total</b> | <b>141.56</b>            | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>2.812%</b> |      |   |
| 2        | 720MW MHP        | Unit-I       | 0.00                     | 400kV MHP - Jigmeling Fdr - I                        | 0.00          |      | Unit I on Standby<br>Unit-II under maintenance.<br>Unit-III under breakdown.<br>400kV MHP-JLG Fdr I,III & IV on standby.    |
|          |                  | Unit-II      | 0.00                     | 400kV MHP - Jigmeling Fdr - II                       | 97.39         | +    |   |
|          |                  | Unit-III     | 0.00                     | 400kV MHP - Jigmeling Fdr - III                      | 0.00          |      |   |
|          |                  | Unit-IV      | 97.42                    | 400kV MHP - Jigmeling Fdr - IV                       | 0.00          |      |   |
|          |                  | -            | -                        | 200MVA, 400/132kV ICT                                |               |      |   |
|          |                  | -            | -                        | (Local Load)   |               |      |   |
|          |                  | <b>Total</b> | <b>97.42</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.031%</b> |      |   |
| 3        | 336MW CHP        | Unit- I      | 0.00                     | 220kV CHP - Birpara Fdr- I                           | 0.00          |      | Unit-I & III under AMP.<br>220kV CHP-BIR I on Standby<br>220kV CHP-MAL line under shutdown                                  |
|          |                  | Unit- II     | 40.53                    | 220kV CHP - Birpara Fdr- II                          | 13.59         | +    |   |
|          |                  | Unit- III    | 0.00                     | 220kV CHP - Malbase Fdr- III                         | 0.00          | +    |   |
|          |                  | Unit- IV     | 33.59                    | 220kV CHP - Semtokha Fdr- IV                         | 44.10         | +    |   |
|          |                  | -            | -                        | 220kV Malbase - Birpara Fdr.                         | -6.00         | -    |   |
|          |                  | -            | -                        | 66kV CHP - Chumdo Fdr.                               | 12.51         | +    |   |
|          |                  | -            | -                        | 66kV CHP - Gedu Fdr.                                 | 1.56          | +    |   |
|          |                  | -            | -                        | 3x3MVA, 66/11kV TFR                                  | 1.40          | +    |   |
|          |                  | <b>Total</b> | <b>74.12</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.295%</b> |      |   |
| 4        | 24MW BHP (U/S)   | Unit- I      | 5.08                     | 220kV BHP - Semtokha Fdr.                            | 5.80          | +    | U/S Unit-II under AMP.<br>L/S Unit-I under standby.   |
|          |                  | Unit- II     | 0.00                     | 66kV BHP - Lobeysa Fdr.                              | 11.85         | +    |   |
|          | <b>Total</b>     | <b>5.08</b>  | 220kV BHP - Tsirang Fdr. | -1.56  | -             |      |   |
|          | 40MW BHP (L/S)   | Unit- I      | 0.00                     | 5MVA, 66/11kV TFR                                    | 0.50          | +    |   |
| Unit- II |                  | 11.53        | 30MVA ICT, 220/66kV      |  |               |      |   |
|          |                  | <b>Total</b> | <b>11.53</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.120%</b> |      |   |
| 5        | 126MW DHPC       | Unit-I       | 0.00                     | 220kV DHPC - Tsirang Fdr.                            | 17.95         | +    | Unit-I under AMP  |
|          |                  | Unit-II      | 18.15                    | 220kV Jigmeling - Dagapela Fdr.                      | 1.30          | +    |   |
|          |                  | -            | -                        | 5MVA, 220/33kV TFR                                   |               |      |   |
|          |                  | <b>Total</b> | <b>18.15</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.102%</b> |      |   |
| 6        | 60MW KHP         | Unit- I      | 0.00                     | 132kV KHP - Nangkhon Fdr- I                          | 5.80          | +    | Unit-IV under Annual Maintenance.<br>Unit-I & III on standby.   |
|          |                  | Unit-II      | 16.00                    | 132kV KHP - Kilikhar Fdr- II                         | 9.90          | +    |   |
|          |                  | Unit- III    | 0.00                     | 5MVA, 132/11kV TFR                                   | 0.18          | +    |   |
|          |                  | Unit- IV     | 0.00                     | 132kV Gelephu - Salakati Fdr.                        | -15.34        | -    |   |
|          |                  | -            | -                        | 132kV Motanga - Rangia Fdr.                          | -5.85         | -    |   |
|          |                  | -            | -                        | 220kV Tsirang - Jigmeling                            | 15.53         | +    |   |
|          |                  | <b>Total</b> | <b>16.00</b>             | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.750%</b> |      |   |

**Note: Generation-Load summary for February 21, 2021 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 | 250.44                | 157.33                                | 153.47                             | 77.58                    | 3.86              |
| 2      | Eastern Grid | 113.42                | 52.75                                 | 52.60                              | 76.20                    | 0.15              |
|        | <b>Total</b> | <b>363.86</b>         | <b>210.08</b>                         | <b>206.07</b>                      | <b>153.78</b>            | <b>4.01</b>       |

**Note: Generation-Load Summary for February 21, 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 | 213.86                | 241.01                                | 237.41                             | -54.5                    | 3.60              |
| 2      | Eastern Grid | 115.23                | 54.96                                 | 47.34                              | 87.62                    | 7.62              |
|        | <b>Total</b> | <b>329.09</b>         | <b>295.97</b>                         | <b>284.75</b>                      | <b>33.12</b>             | <b>11.22</b>      |

**NOTE: Eastern load and MAL data 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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