

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

Maximum Load/Demand till Date

|        |               |
|--------|---------------|
| Date:  | July 29, 2020 |
| 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      | 187.02          | 400kV THP - Siliguri Fdr- I                          | 269.45         | +    |   |
|         |                  | Unit- II     | 187.99          | 400kV THP - Siliguri Fdr- II                         | 267.41         | +    |   |
|         |                  | Unit- III    | 186.63          | 400kV THP - Siliguri Fdr- IV                         | 261.37         | +    |   |
|         |                  | Unit- IV     | 186.98          | 400kV THP - Malbase Fdr- III                         | 305.41         | +    |   |
|         |                  | Unit- V      | 187.03          | 400kV Malbase - Siliguri                             | 244.37         | +    |   |
|         |                  | Unit- VI     | 186.82          | -  | -              | -    |   |
|         |                  | <b>Total</b> | <b>1,122.47</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.678%</b>  |      |   |
| 2       | 720MW MHP        | Unit-I       | 197.35          | 400kV MHP - Jigmeling Fdr - I                        | 199.70         | +    | 400kV MHP-JLG IV Standby. Unit-III under shutdown till 4th August,2020. |
|         |                  | Unit-II      | 197.96          | 400kV MHP - Jigmeling Fdr - II                       | 180.20         | +    |   |
|         |                  | Unit-III     | 0.00            | 400kV MHP - Jigmeling Fdr - III                      | 212.30         | +    |   |
|         |                  | Unit-IV      | 198.39          | 400kV MHP - Jigmeling Fdr - IV                       | 0.00           |      |   |
|         |                  | -            | -               | 200MVA, 400/132kV ICT                                |                |      |   |
|         |                  | -            | -               | (Local Load)   |                |      |   |
|         |                  | <b>Total</b> | <b>593.70</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.253%</b>  |      |   |
| 3       | 336MW CHP        | Unit- I      | 91.68           | 220kV CHP - Birpara Fdr- I                           | 122.89         | +    |   |
|         |                  | Unit- II     | 91.24           | 220kV CHP - Birpara Fdr- II                          | 123.21         | +    |   |
|         |                  | Unit- III    | 91.47           | 220kV CHP - Malbase Fdr- III                         | 161.76         | +    |   |
|         |                  | Unit- IV     | 91.24           | 220kV CHP - Semtokha Fdr- IV                         | -56.67         | -    |   |
|         |                  | -            | -               | 220kV Malbase - Birpara Fdr.                         | 76.95          | +    |   |
|         |                  | -            | -               | 66kV CHP - Chumdo Fdr.                               | 3.39           | +    |   |
|         |                  | -            | -               | 66kV CHP - Gedu Fdr.                                 | 8.19           | +    |   |
|         |                  | -            | -               | 3x3MVA, 66/11kV TFR                                  | 1.20           | +    |   |
|         |                  | <b>Total</b> | <b>365.63</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.454%</b>  |      |   |
| 4       | 24MW BHP (U/S)   | Unit- I      | 11.83           | 220kV BHP - Semtokha Fdr.                            | 83.30          | +    |   |
|         |                  | Unit- II     | 11.83           | 66kV BHP - Lobeysa Fdr.                              | 18.11          | +    |   |
|         |                  | <b>Total</b> | <b>23.66</b>    | 220kV BHP - Tsirang Fdr.                             | -36.31         | -    |   |
|         | 40MW BHP (L/S)   | Unit- I      | 21.00           | 5MVA, 66/11kV TFR                                    | 0.63           | +    |   |
|         |                  | Unit- II     | 20.12           | 30MVA ICT, 220/66kV                                  |                |      |   |
|         |                  | <b>Total</b> | <b>41.12</b>    | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>-1.467%</b> |      |   |
| 5       | 126MW DHPC       | Unit-I       | 63.41           | 220kV DHPC - Tsirang Fdr.                            | 126.21         | +    |   |
|         |                  | Unit-II      | 63.35           | 220kV Jigmeling - Dagapela Fdr.                      | 1.80           | +    |   |
|         |                  | -            | -               | 5MVA, 220/33kV TFR                                   |                |      |   |
|         |                  | <b>Total</b> | <b>126.76</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.434%</b>  |      |   |
| 6       | 60MW KHP         | Unit- I      | 16.50           | 132kV KHP - Nangkhon Fdr- I                          | 41.59          | +    |   |
|         |                  | Unit-II      | 16.50           | 132kV KHP - Kilikhar Fdr- II                         | 23.37          | +    |   |
|         |                  | Unit- III    | 16.50           | 5MVA, 132/11kV TFR                                   | 0.15           | +    |   |
|         |                  | Unit- IV     | 16.50           | 132kV Gelephu - Salakati Fdr.                        | 66.84          | +    |   |
|         |                  | -            | -               | 132kV Motanga - Rangia Fdr.                          | 35.53          | +    |   |
|         |                  | -            | -               | 220kV Tsirang - Jigmeling                            | 85.31          | +    |   |
|         |                  | <b>Total</b> | <b>66.00</b>    | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.348%</b>  |      |   |

**Note: Generation-Load Summary for July 29, 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 | 1,679.64              | 228.68                                | 210.39                             | 1,365.65                 | 18.29             |
| 2      | Eastern Grid | 659.70                | 50.44                                 | 48.05                              | 694.57                   | 2.39              |
|        | <b>Total</b> | <b>2,339.34</b>       | <b>279.12</b>                         | <b>258.44</b>                      | <b>2,060.22</b>          | <b>20.68</b>      |

**Note: Generation-Load Summary for July 29, 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 | 1646.22               | 258.19                                | 240.27                             | 1294.65                  | 17.92             |
| 2      | Eastern Grid | 438.9                 | 67.90                                 | 68.10                              | 464.38                   | -0.20             |
|        | <b>Total</b> | <b>2,085.12</b>       | <b>326.09</b>                         | <b>308.37</b>                      | <b>1,759.03</b>          | <b>17.72</b>      |

**NOTE: KHP loads 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

|        |               |
|--------|---------------|
| Date:  | July 30, 2020 |
| Hours: | 09:00 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      | 186.36          | 400kV THP - Siliguri Fdr- I                          | 275.48         | +    |  |
|         |                  | Unit- II     | 187.02          | 400kV THP - Siliguri Fdr- II                         | 272.13         | +    |  |
|         |                  | Unit- III    | 187.19          | 400kV THP - Siliguri Fdr- IV                         | 266.08         | +    |  |
|         |                  | Unit- IV     | 186.89          | 400kV THP - Malbase Fdr- III                         | 290.40         | +    |  |
|         |                  | Unit- V      | 186.70          | 400kV Malbase - Siliguri                             | 255.53         | +    |  |
|         |                  | Unit- VI     | 186.41          | -  | -              | -    |  |
|         |                  | <b>Total</b> | <b>1,120.57</b> | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>1.471%</b>  |      |  |
| 2       | 720MW MHP        | Unit-I       | 197.85          | 400kV MHP - Jigmeling Fdr - I                        | 198.31         | +    | 400kV MHP-JLG IV Standby.<br>Unit III under shutdown till 4th August,2020. |
|         |                  | Unit-II      | 197.94          | 400kV MHP - Jigmeling Fdr - II                       | 198.99         | +    |  |
|         |                  | Unit-III     | 0.00            | 400kV MHP - Jigmeling Fdr - III                      | 193.44         | +    |  |
|         |                  | Unit-IV      | 198.26          | 400kV MHP - Jigmeling Fdr - IV                       | 0.00           |      |  |
|         |                  | -            | -               | 200MVA, 400/132kV ICT                                |                |      |  |
|         |                  | -            | -               | (Local Load)   |                |      |  |
|         |                  | <b>Total</b> | <b>594.05</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.557%</b>  |      |  |
| 3       | 336MW CHP        | Unit- I      | 91.40           | 220kV CHP - Birpara Fdr- I                           | 125.56         | +    |  |
|         |                  | Unit- II     | 91.11           | 220kV CHP - Birpara Fdr- II                          | 124.81         | +    |  |
|         |                  | Unit- III    | 91.37           | 220kV CHP - Malbase Fdr- III                         | 180.72         | +    |  |
|         |                  | Unit- IV     | 92.02           | 220kV CHP - Semtokha Fdr- IV                         | -76.34         | -    |  |
|         |                  | -            | -               | 220kV Malbase - Birpara Fdr.                         | 66.58          | +    |  |
|         |                  | -            | -               | 66kV CHP - Chumdo Fdr.                               | 0.88           | +    |  |
|         |                  | -            | -               | 66kV CHP - Gedu Fdr.                                 | 7.98           | +    |  |
|         |                  | -            | -               | 3x3MVA, 66/11kV TFR                                  | 1.80           | +    |  |
|         |                  | <b>Total</b> | <b>365.90</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.134%</b>  |      |  |
| 4       | 24MW BHP (U/S)   | Unit- I      | 11.85           | 220kV BHP - Semtokha Fdr.                            | 95.14          | +    |  |
|         |                  | Unit- II     | 11.85           | 66kV BHP - Lobeysa Fdr.                              | 16.97          | +    |  |
|         |                  | <b>Total</b> | <b>23.70</b>    | 220kV BHP - Tsirang Fdr.                             | -47.00         | -    |  |
|         | 40MW BHP (L/S)   | Unit- I      | 21.03           | 5MVA, 66/11kV TFR                                    | 0.50           | +    |  |
|         |                  | Unit- II     | 20.20           | 30MVA ICT, 220/66kV                                  |                |      |  |
|         |                  | <b>Total</b> | <b>41.23</b>    | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>-1.649%</b> |      |  |
| 5       | 126MW DHPC       | Unit-I       | 63.44           | 220kV DHPC - Tsirang Fdr.                            | 126.34         | +    |  |
|         |                  | Unit-II      | 63.39           | 220kV Jigmeling - Dagapela Fdr.                      | 1.09           | +    |  |
|         |                  | -            | -               | 5MVA, 220/33kV TFR                                   |                |      |  |
|         |                  | <b>Total</b> | <b>126.83</b>   | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>0.386%</b>  |      |  |
| 6       | 60MW KHP         | Unit- I      | 16.50           | 132kV KHP - Nangkhon Fdr- I                          | 42.32          | +    |  |
|         |                  | Unit-II      | 16.50           | 132kV KHP - Kilikhar Fdr- II                         | 22.17          | +    |  |
|         |                  | Unit- III    | 16.50           | 5MVA, 132/11kV TFR                                   | 0.18           | +    |  |
|         |                  | Unit- IV     | 16.50           | 132kV Gelephu - Salakati Fdr.                        | 61.67          | +    |  |
|         |                  | -            | -               | 132kV Motanga - Rangia Fdr.                          | 39.85          | +    |  |
|         |                  | -            | -               | 220kV Tsirang - Jigmeling                            | 75.13          | +    |  |
|         |                  | <b>Total</b> | <b>66.00</b>    | <b>Error at Station/Auxiliary Consumption/Losses</b> | <b>2.015%</b>  |      |  |

Note: Generation-Load summary for July 30, 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 | 1,678.23              | 216.93                                | 201.24                             | 1,386.17                 | 15.69             |
| 2      | Eastern Grid | 660.05                | 42.92                                 | 38.28                              | 692.26                   | 4.64              |
|        | <b>Total</b> | <b>2,338.28</b>       | <b>259.85</b>                         | <b>239.52</b>                      | <b>2,078.43</b>          | <b>20.33</b>      |

Note: Generation-Load Summary for July 30, 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 | 1653.23               | 249.49                                | 230.37                             | 1,323.73                 | 19.12             |
| 2      | Eastern Grid | 436.94                | 40.79                                 | 39.99                              | 476.16                   | 0.80              |
|        | <b>Total</b> | <b>2,090.17</b>       | <b>290.28</b>                         | <b>270.36</b>                      | <b>1,799.89</b>          | <b>19.92</b>      |

NOTES: KHP 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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