

# Chapter III

## Performance Audit on Augmentation of Transmission Capacity in West Bengal



## CHAPTER-III

### Performance Audit relating to Power Sector Enterprises

#### West Bengal State Electricity Transmission Company Limited

### 3 Performance Audit on Augmentation of Transmission Capacity in West Bengal

#### 3.1 Introduction

Power sector is an important sector for the economy of West Bengal. An extensive network has been developed over the years for transmission and distribution of the electricity generated or purchased, to the consumers across the State. Although West Bengal is a power surplus State, the availability of electricity is not uniform in all areas. Therefore, augmentation of transmission capacity and the efficient utilisation of transmission lines and sub-stations in line with consumer demand remains a critical aspect in power development. Electrical energy transmission is the bulk movement of electrical energy from a generating station to a substation located close to the beneficiary/ consumers. The interconnected lines which facilitate this movement constitute a transmission network.

The Electricity Act 2003 (Act) was a major development in the power sector. As provided under the Act, the Government of India (GoI) formulated (February 2005) the National Electricity Policy (NEPo) in consultation with Central Electricity Authority (CEA) and State Governments. NEPo, *inter alia*, stated that to develop a robust and integrated power system for the country, adequate and timely investment as well as efficient and coordinated action to plan and execute projects in the transmission system is required. The Act also requires Regulatory Commissions to provide for non-discriminatory open access<sup>163</sup> in transmission, thereby promoting competition in power sale across the country. Accordingly, open access was introduced in West Bengal from June 2005.

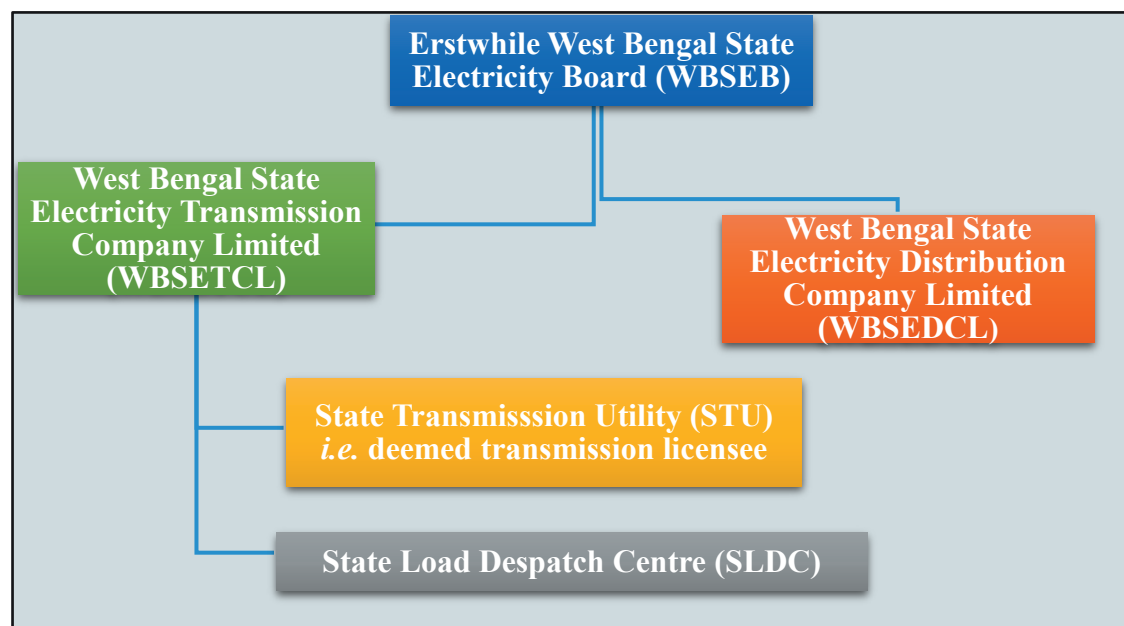
While Power Grid Corporation of India Limited (PGCIL) was, notified (December 1998/ November 2003) as the Central Transmission Utility (CTU) to undertake transmission of electricity through inter-State transmission system; the State Transmission Utility is to undertake transmission of electricity through intra-State transmission system.

#### 3.2 Organisational Structure

The Government of West Bengal unbundled (April 2007) the erstwhile West Bengal State Electricity Board (WBSEB) into West Bengal State Electricity Transmission Company Limited (WBSETCL) and West Bengal State Electricity Distribution Company Limited (WBSEDCL), both incorporated in February 2007. The transmission and load despatch activities of WBSEB were transferred to WBSETCL, a Government company wholly owned by Department of Power, GoWB. Consequently, WBSETCL as the designated State Transmission Utility

<sup>163</sup> Use of transmission line or associated facilities with such line by any licensee or consumer or a person engaged in generation, in accordance with regulations specified by the appropriate Commission.

(STU) is a deemed transmission licensee, and is responsible for transmitting electricity from generating sources to load centres through a transmission network operating at 400 KV, 220 KV, 132 KV and 66 KV, depending on the distance over which the power is to be transmitted and quantum involved. Besides, WBSETCL is also responsible for the State Load Despatch Centre (SLDC), till a separate company is set-up for load management activities. WBSEDCL on the other hand is responsible for distribution of power at 33 KV, 11 KV and below.

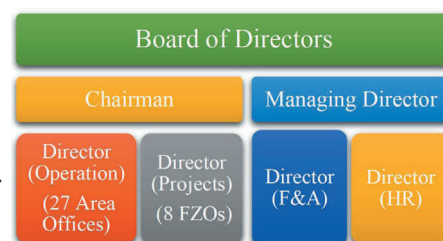


**Fig. 3.1: Profile of West Bengal State Electricity Transmission Company Limited**

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Responsible for coordinating, managing and servicing of the State Grid Code                                                                                                                                                                                                                                                                                                |
|  | Ensures development of an efficient, coordinated and economical system of Intra-State Transmission lines for smooth flow of electricity from a generating station to the load centre.                                                                                                                                                                                      |
|  | Discharges functions of planning and co-ordination relating to State Transmission System (STS) with due correlation with Central Transmission Utility (CTU), State Government, Entities, Eastern Regional Power Committee (ERPC), Central Electricity Authority (CEA), and any other person notified by the State Government.                                              |
|  | Responsible for providing non-discriminatory open access to its transmission system subject to availability of adequate transmission facility for use by any licensee or generating station or any Open Access Customer on payment of necessary transmission charges, other charges, fees and surcharges as provided in different Regulations specified by the Commission. |

**Fig. 3.2: Role of WBSETCL as STU**

WBSETCL's management is vested in a Board of Directors (BoD) headed by a Chairman. As of March 2021, the BoD consisted of ten members, including five full time directors, three independent directors and two Government-nominee directors, all appointed by GoWB. The Managing Director (MD) is the Chief Executive and is assisted by Director (Finance & Accounts), Director (Human Resources), Director (Operations) in charge of operation and maintenance of sub-stations, equipment and lines and Director (Projects) looking after construction/ expansion/ augmentation of sub-stations and transmission lines. WBSETCL functions through eight Field Zonal Offices<sup>164</sup> under the Director (Projects) and 27 Area Offices<sup>165</sup> under the Director (Operations).

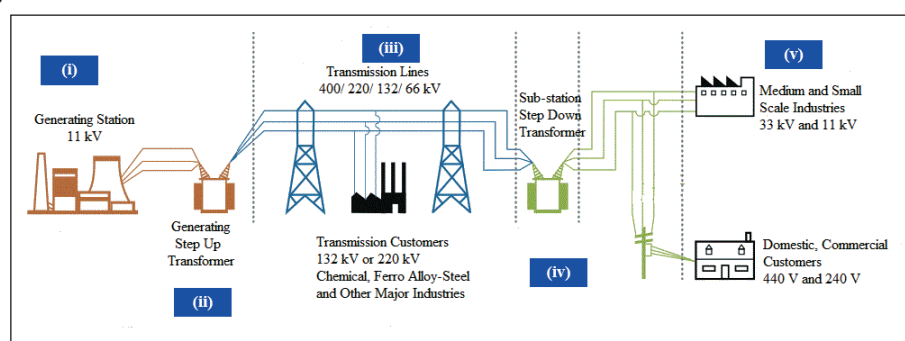


### 3.3 Transmission Voltages

Electrical energy flows through the interconnecting lines in a transmission network at different voltages. The transformers in the substations may convert voltages from low to high (step-up transformers) or high to low (step-down transformers). Transmission lines are any lines with voltage exceeding 33,000 volts or 33 KV. Before entering the transmission system, electricity produced at the generating station is “stepped up,” to minimise losses arising from resistance to flow of electrical energy in these lines.

In India, generation voltage is generally 11 KV but electricity is transmitted at extra high voltages (EHV) ranging from 66 KV to 800 KV. EHV is used in transmission systems because at higher voltages, there is less resistance in the lines and so less energy is wasted. Transmission lines with voltages of 500 KV and above are solely set-up in the Central Sector, mainly, by PGCIL for inter-state connections throughout India. WBSETCL, being a deemed transmission licensee, operates the intra-state transmission system in West Bengal at voltages ranging from 66 KV to 400 KV.

A diagrammatic representation of the transmission system is detailed in **Figure 3.3:**



**Fig. 3.3: Simplified diagrammatic representation of transmission system**

<sup>164</sup> Berhampur, Chinsurah, Durgapur, Kharagpur, Kolkata, Krishnanagar, Siliguri & Malda (8).

<sup>165</sup> Alipurduar, Arambag, Bankura, Barasat, Behala, Berhampore, Birbhum, Burdwan, Chandannagar, Durgapur, Gokarna, Haldia, Howrah, Jalpaiguri, Jeerat, Kasba, Kharagpur, Kharagpur 400, Krishnanagar, Malda, Midnapur, New Chanditala 400, Purulia, Raiganj, Salt Lake, Siliguri and Tamluk (27).

- i) Electrical power is generated in the generating station at 11KV.
- ii) This generated power is fed to the generating step up transformer to suitably increase voltage level to EHV<sup>166</sup> level, *i.e.* up to 66/ 132/ 220/ 400 KV. This EHV level is maintained to transmit the energy over to a long distance to a substation. It is called primary transmission of power.
- iii) Energy-intensive consumers may draw energy in bulk at 132 KV or 220 KV (and step-down energy to their requirements).
- iv) At the end point of primary transmission of power, the step down transformers, in the substation, reduce voltage level to 132 KV (EHV). Secondary transmission of power starts from this substation. Power transformer at the end of the secondary transmission, steps down voltage from 132 KV level to 33 KV (HV) or 11 KV (HV) as required.
- v) Thereafter, primary distribution of power to different distribution stations occurs for stepping down voltage level from 11 KV/ 33 KV to 440 V(L&MV) or 220 V (L&MV) (Line Voltage) for consumers.

### 3.4 Audit objectives

Audit objectives of the Performance Audit on “Augmentation of transmission capacity in West Bengal” by West Bengal State Electricity Transmission Company Limited (WBSETCL) for the period from 2016-17 to 2020-21, were to assess whether WBSETCL had–

- Chalked out plans for transmission capacity addition/ system improvement in line with proposed increase in generation capacities, estimated/ actual growth in demand for electricity, and requirements of the National Electricity Plan 2015 and Electric Power Surveys conducted by the Central Electricity Authority;
- Executed and monitored transmission projects economically, efficiently and effectively and put in proper internal controls for project management; and
- Controlled and operated the transmission system efficiently to ensure stability and reliability in the grid and achieved anticipated outcomes.

### 3.5 Scope and Methodology of audit

The performance audit covering the period from 2016-17 to 2020-21 was conducted from December 2020 to March 2021. Audit examination involved scrutiny of records of different wings at the Head Office *viz.* Central Planning Department, Procurement Department, Project Department and Finance Department of WBSETCL. Audit selected 35 out of 183 projects executed<sup>167</sup> by WBSETCL, through stratified random sampling, based on the letter of award (LoA) values of the projects.

Audit methodology involved scrutiny of records maintained at the Head Office of WBSETCL, Field Zonal Offices and Area Offices. Before commencement

<sup>166</sup> Voltages of 66 KV and above are referred to Extra High Voltage (EHV), 33 KV and 11 KV are High Voltage (HV) while 440 V and 220 V constitute Low and Medium Voltage (L&MV).

<sup>167</sup> Executed between 2015-16 and 2019-20 and including 36 ongoing projects as of April 2015. The 183 projects included construction, upgradation, expansion and augmentation of transmission lines and sub-stations.

of audit, an Entry Conference was held with the Additional Chief Secretary, Government of West Bengal, Department of Power on 24 November 2020 to communicate the audit objectives, scope/ methodology of audit and audit criteria. The audit findings were discussed at an Exit Conference held on 01 June 2022 with the Government and the Management and their responses have been suitably incorporated in this Report.

### 3.6 Audit Criteria

The audit criteria to be adopted for assessing the achievement of audit objectives were -

- Electricity Act 2003, NEPo 2005, Regulations/ orders of Central Electricity Regulatory Commission (CERC)/ WBERC, Grid Code and guidelines of the Central Electricity Authority (CEA).
- National Electricity Plan 2015 and Electric Power Surveys of CEA, Perspective (Five Year Rolling) Plans/ Corporate Plans (Annual) of WBSETCL as well as Annual Administrative Calendars of the Department of Power, GoWB.
- Scheme guidelines and directions from GoI, GoWB.
- Administrative/ Technical sanctions of projects, Detailed Project Reports, Notices Inviting Tenders, Letters of Awards, standard/ general terms and conditions of contracts, Central Vigilance Commission Guidelines, *etc.*

### 3.7 Performance criteria and summarised working results of WBSETCL

Some performance criteria of WBSETCL *vis-a-vis* standards/ norms along with summarised working results for the five years from 2016-17 to 2020-21 are given below at **Tables 3.1, 3.2 and 3.3**.

Audit had observed (April 2022) that unutilised capacity in the transmission network ranged from 14.79 *per cent* to 32.55 *per cent*. However, in their reply and at the Exit Conference, the Government stated (June 2022) that considering an average power factor of 0.95 and calculating network capacity in terms of energy (MU/ MWH) for installed capacity at 132 KV (considering that all power is transmitted at some time at this voltage) was neither justified nor correct. They added that transformation capacity of a new substation, or augmentation of transformation capacity in an existing sub-station for a particular was planned/ determined in terms of power in MVA and not in terms of MWH/ MU. Moreover, transformers can be loaded to 110 per cent of their capacity. Accordingly, the capacity utilisation was reworked by Audit, as follows -

**Table 3.1 : Capacity utilisation of transmission network**

|    | Particulars                                            | 2016-17                                  | 2017-18   | 2018-19   | 2019-20   | 2020-21   |
|----|--------------------------------------------------------|------------------------------------------|-----------|-----------|-----------|-----------|
|    |                                                        | Electricity transmitted annually (in MW) |           |           |           |           |
| 1) | System capacity at start of year ( <i>Refer Note</i> ) | 21,811.85                                | 23,589.20 | 26,392.50 | 28,730.00 | 30,214.10 |
| 2) | Actual Peak demand (in MW)                             | 8,327.00                                 | 8,454.00  | 8,811.00  | 9,077.00  | 8,799.00  |

|    | Particulars                                    | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
|----|------------------------------------------------|---------|---------|---------|---------|---------|
| 3) | Percentage of network utilisation {(2)/(1)}    | 38.18   | 35.84   | 33.38   | 31.59   | 29.12   |
| 4) | Percentage of network underutilised {100- (3)} | 61.82   | 64.16   | 66.12   | 68.41   | 70.88   |

(Source : Information furnished by SLDC)

Notes : 1) Method for calculation of network capacity in MW, is transformer capacity (in MVA) at the beginning of each year multiplied by minimum power factor of 0.85 - WBERC's (State Electricity Grid Code) Regulations 2007, No. 3.5.3.

As seen from the Table, between 2017-18 to 2020-21, the network utilisation showed a declining trend that was mainly due to WBSETCL planning a higher capacity than required as discussed at **Paragraph 3.8.1**. As a result, unutilised capacity ranged from 61.82 per cent to 70.88 per cent. This indicated excess transformer capacity<sup>168</sup> of 15,864 Mega Volt Amperes (MVA)<sup>169</sup> from April 2016 to March 2021, created at a cost<sup>170</sup> of ₹ 517.17 crore.

The Government also stated (June 2022) that transmission system planning considered maximum/ peak load projected/ incident on the network under normal as well as N-1 contingency conditions without any interruption/ overloading. Therefore, the planned/installed capacity of the transformers always remains higher than the average or minimum load projected/ incident on the system at that particular voltage level.

The fact, however, remained that capacity utilisation was low. Moreover, in this connection, the Forum of Regulators observed<sup>171</sup> (April 2021) although there was huge investment in transmission, utilisation of the assets had not been commensurate with investment. Further, while responding to issues on preventive maintenance (**Paragraph 3.11.2**), the Government stated (June 2022) that WBSETCL network had ample redundancy, with adequate flexibility to avail shutdowns. Besides, the Government had not furnished the revised reply as agreed in the Exit Conference.

**Table 3.2: Summarised working results of WBSETCL**

|    | Particulars                | 2016-17                                 | 2017-18         | 2018-19         | 2019-20         | 2020-21         |
|----|----------------------------|-----------------------------------------|-----------------|-----------------|-----------------|-----------------|
|    |                            | Summarised working results (₹ in crore) |                 |                 |                 |                 |
| 1) | Revenue from operations    | 1,258.92                                | 1,298.54        | 1,353.05        | 1,408.17        | 1,828.98        |
| 2) | Other Income               | 36.62                                   | 50.91           | 72.96           | 64.75           | 56.95           |
| 3) | <b>Total Income (1 +2)</b> | <b>1,295.54</b>                         | <b>1,349.45</b> | <b>1,426.01</b> | <b>1,472.95</b> | <b>1,885.93</b> |
| 4) | Employee benefit expenses  | 235.62                                  | 239.83          | 213.78          | 284.28          | 326.98          |
| 5) | Other expenses             | 153.70                                  | 183.17          | 164.34          | 158.20          | 189.39          |

<sup>168</sup> Calculated at 61.82 per cent of 25,661 MVA, being aggregate transformer capacity at the beginning of 2016-17.

<sup>169</sup> The capacity of a power transformer is expressed in megavolt amperes.

<sup>170</sup> Based on average purchase order cost of transformers at all voltage ratios from January 2016 to October 2020 at ₹ 3.26 lakh per MVA.

<sup>171</sup> Paragraph 3.2.1 of report of the Forum of Regulators on "Analysis of Factors impacting Retail Tariff and measures to address them".

|     | Particulars                                            | 2016-17       | 2017-18       | 2018-19       | 2019-20         | 2020-21         |
|-----|--------------------------------------------------------|---------------|---------------|---------------|-----------------|-----------------|
| 6)  | Depreciation                                           | 195.78        | 213.11        | 260.59        | 286.91          | 302.52          |
| 7)  | Finance costs                                          | 238.57        | 245.11        | 271.71        | 275.36          | 297.13          |
| 8)  | <b>Total expenses (4+5+6+7)</b>                        | <b>823.67</b> | <b>881.22</b> | <b>910.42</b> | <b>1,004.75</b> | <b>1,116.02</b> |
| 9)  | Profit before tax (3-8)                                | 471.87        | 468.23        | 515.59        | 468.17          | 769.91          |
| 10) | Income Tax                                             | 100.71        | 100.49        | 110.88        | 81.80           | 134.52          |
| 11) | <b>Profit after tax (9-10)</b>                         | <b>371.16</b> | <b>367.74</b> | <b>404.71</b> | <b>386.37</b>   | <b>635.39</b>   |
| 12) | Other Comprehensive Income                             | 59.59         | 70.38         | 43.59         | -26.04          | 26.45           |
| 13) | <b>Total Comprehensive Income for the year (11+12)</b> | <b>430.75</b> | <b>438.12</b> | <b>448.30</b> | <b>360.33</b>   | <b>661.84</b>   |

(Source : Compiled from Audited Annual Financial Statements)

It was seen that depreciation costs of WBSETCL increased in 2018-19, due to taking over of transmission assets of The Durgapur Projects Limited from January 2019. In addition, employee benefit costs rose in 2017-18 and 2019-20 due to enhancement of annual increments, rising costs of terminal benefits, implementation of revision of pay and allowances in 2020, etc.

The actual unit cost transmission of WBSETCL in comparison with the tariff for the five years from 2016-17 to 2020-21 is given below:

**Table 3.3: Unit cost of transmission**

|    | Particulars                                                          | 2016-17                                      | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
|----|----------------------------------------------------------------------|----------------------------------------------|---------|---------|---------|---------|
|    |                                                                      | <b>Transmission cost per unit (in paisa)</b> |         |         |         |         |
| 1) | As per tariff orders                                                 | 17.18                                        | 15.71   | 15.91   | 17.67   | 17.79   |
| 2) | Actual cost as per accounts (Sr. 8 of Table 3.2/ Sr. 3 of Table 3.1) | 17.87                                        | 17.78   | 18.58   | 21.73   | 24.51   |
| 3) | Difference between tariff orders and actual (1-2)                    | 0.69                                         | 2.07    | 2.67    | 4.06    | 6.72    |

(Source: Information furnished by SLDC, Annual financial statements, tariff orders)

The transmission cost per unit showed an increasing trend during 2016-21, which was attributable to excess capacity in the system (**Table 3.1**) leading to higher per unit capital cost and increase in depreciation and employee benefit costs (**Table 3.2**) etc. The under-utilisation of transmission capacities and increase in transmission costs were also emphasised (April 2021) by the Forum of Regulators. This resulted in higher cost of transmission being passed on to consumers.

## Audit Findings

Audit findings of this Performance Audit have been broadly classified under planning, execution and operations and monitoring as discussed in the succeeding paragraphs:

### 3.8 Planning

GoWB had implemented (2014-19) an electrification drive under 'Sabar Ghare Alo' to provide one crore new electric connections in rural areas of 11 backward districts. GoWB also launched (September 2014) 'Sech Bandhu' to segregate

electric feeders for agricultural purposes and provide for electrification of pump sets. Further, GoI and GoWB jointly initiated (August 2016) “Power for All” (PFA) Project, which aimed to make available 24x7 Power to all electricity consumers and provide electricity access to all unconnected households in the State by 2019. Accordingly, the power transmission network needs to be planned and upgraded to meet the enhanced infrastructure requirements of providing power across the State.

WBSETCL is required to plan and co-ordinate for the State Transmission System (STS) with PGCIL, State Government, agencies like generating and distribution companies, Eastern Regional Power Committee (ERPC), Central Electricity Authority (CEA), *etc.* It is the responsibility of WBSETCL to prepare plans for capacity addition/ system improvement in the transmission system (sub-stations and lines) to match with proposed increase in generation capacities, growth in demand for electricity, requirements of the National Electricity Plan 2015 and Power for All (PFA) Roadmap. Five year rolling plans<sup>172</sup> are formulated in conformity with the guidelines specified in Indian Electricity Grid Code (IEGC), West Bengal Electricity Grid Code (WBEGC) after assessment of district-wise demand for electricity and the existing transmission capacity.

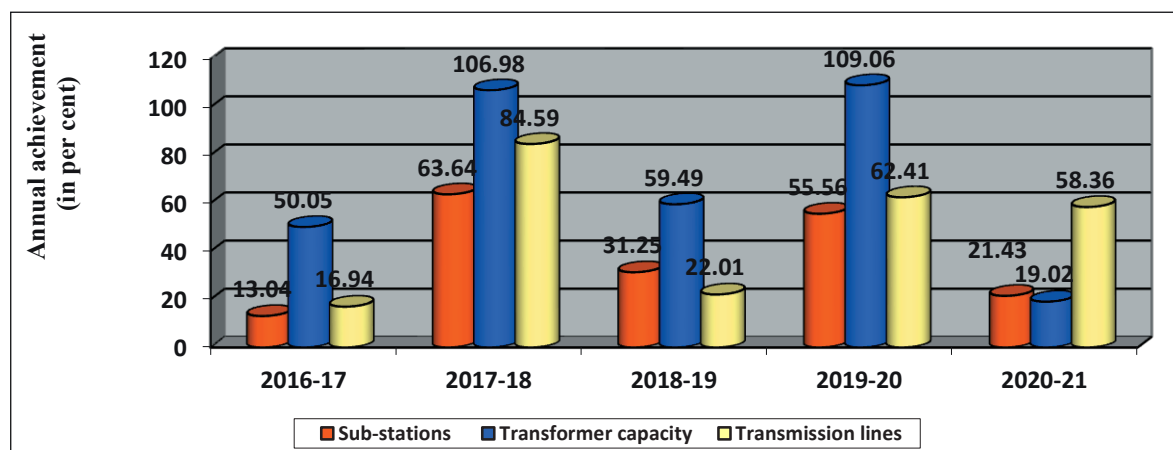
### 3.8.1 Planning *vis-à-vis* achievement of WBSETCL

a) Audit observed that during 2016-21, against targets for construction/ upgradation of 73 sub-stations, WBSETCL constructed only 26 sub-stations (35.62 *per cent*). In the same period, against targets of additional transformer capacity of 14,411 mega volt amperes (MVA) and additional 7,419 circuit kilometres (CKM) of transmission lines, actual achievements were 9,474 MVA (65.74 *per cent*) and 2,960 CKM (39.90 *per cent*), respectively.

The details of annual targets for sub-stations, transformer capacity and transmission lines planned for 2016-21 *vis-à-vis* achievements are detailed in *Appendix- 39*.

**Chart 3.1** below shows the percentage of annual achievements *vis-à-vis* additions planned for sub-stations (SS), transformers and transmission lines by WBSETCL for the period 2016-21.

**Chart 3.1 : Annual achievements of sub-stations, transformers and transmission lines to planned annual additions**



<sup>172</sup> Rolling Plan 2014-15 to 2018-19 and 2019-20 to 2023-24.

It would be seen from the Chart that the transformer capacity added in 2017-18 and 2019-20 exceeded the planned additions, since the capacity augmented in 2017-18 and 2019-20 was not included in the additions planned. The annual capacity planned for addition was not achieved during the period from 2016-17 to 2020-21 for either sub-stations, transformer capacity or transmission lines. Due to delays in completion of projects, WBSETCL faced constraints in meeting the demand of WBSEDCL in a few areas as mentioned in the Report of the Task Force constituted in November 2020 by WBERC to review the position of the State transmission system.

b) Under WBERC's State Electricity Grid Code Regulations 2007, WBSETCL is required to provide load forecast along with demand growth trend of different districts and municipal corporations of West Bengal on their website. WBSETCL has also stated (May 2021) that they had chalked out plans for increasing capacity, depending largely on actual need, future requirement and feedback from drawing entities.

However, Audit observed that –

- i. WBSETCL had not disclosed the requisite information regarding load forecast and demand growth trend on their website.
- ii. WBSETCL had discussed the rolling plan 2014-15 to 2018-19 with WBSEDCL in October 2013. Thereafter, WBSETCL neither held consultations nor obtained feedback on load forecasts from WBSEDCL. Consequently, during 2016-17 to 2020-21, WBSETCL had employed load forecasts which varied from (–) 15.42 *per cent* to (+) 15.97 *per cent vis-a-vis* load forecasts prepared by WBSEDCL.

These indicated shortcomings in WBSETCL's basis of planning that was fairly responsible for decline in overall capacity utilisation of the transmission system.

c) Audit noticed that 27 projects<sup>173</sup> proposed (August 2016) to be taken up under PFA Roadmap for completion before 31 March 2021, were either not included in WBSETCL's rolling plans (16 projects), deferred beyond 2020-21 (10 projects) or dropped (one). Moreover, four projects scheduled for completion after 2020-21 were not included in rolling plans. The reasons for not taking up these projects or deferring them were not communicated to Audit.

The Government stated (June 2022) that planned capacity in the transmission network including transformers needed to meet a single contingency or 'N-1' condition involving the outage of one circuit of a line, one transformer at a sub-station *etc.* Consequently, the aggregate capacity of transformers required at a particular voltage ratio should fulfil N-I contingency conditions without interruptions/ overloading. Due to non-construction of sub-stations proposed under PFA Roadmap, as of March 2021, some existing 132/33 KV sub-stations were overloaded beyond 'N-1' conditions. Some instances are as follows :

- i. Under PFA, a new 220/132/33 KV sub-station (SS) was planned for construction at Burdwan in 2019-20. The proposed SS was to share the load of five adjacent 132/33 KV SSs at Katwa, Mankar, Mahachanda, Raina and Indus. WBSETCL, however, did not incorporate this SS in their

---

<sup>173</sup> Eleven new sub-stations/ upgradation of existing sub-stations and 16 transmission lines.

rolling or annual plans. Instead, WBSETCL awarded (May 2017) work for construction of a new lower capacity 132/33 KV Gas Insulated Sub-station (GIS) at Burdwan, for completion by November 2018. Construction was ongoing till March 2021. As a result, between December 2018 and March 2021, maximum load at four of the five SSs, whose load was to be shared, ranged from 74.41 to 97.93 *per cent*, that resulted in their connected load being in excess of 'N-1' condition as given in the **Table 3.4** below:

**Table 3.4: Details of loads at five sub-stations**

| Sl. No. | Name of SS | Installed capacity (in MVA) | Configuration (Nos. and capacity in MVA) | 'N-1' capacity (in MVA) | Maximum utilisation (in MVA) | Percentage  |
|---------|------------|-----------------------------|------------------------------------------|-------------------------|------------------------------|-------------|
| (1)     | (2)        | (3)                         | (4)                                      | (5)                     | (6)                          | (7)=(6)/(4) |
| 1.      | Katwa      | 150                         | Three of 50 MVA                          | 100                     | 111.62                       | 74.41       |
| 2.      | Mankar     | 94.5                        | Three of 31.5 MVA                        | 63                      | 81.39                        | 86.13       |
| 3.      | Mahachanda | 131.5                       | Two of 50 MVA and one of 31.5 MVA        | 100                     | 115.02                       | 87.47       |
| 4.      | Raina      | 150                         | Three of 50 MVA                          | 100                     | 146.89                       | 97.93       |
| 5.      | Indus      | 100                         | Two of 50 MVA                            | 50                      | 86.81                        | 86.81       |

- ii. Under PFA, a new 132/33 KV SS was proposed at Shyamnagar, for completion by 2019-20, to partly take-over existing load of Laxmikantapur SS. As the proposed SS was not taken up as of March 2021, during 2020-21, the existing three 132/33 KV transformers of 50 MVA capacity each, aggregating to 150 MVA at Laxmikantapur were being loaded up to 84.36 *per cent* (126.55 MVA) of capacity, against maximum recommended of 100 MVA to fulfil 'N-1' condition.

Thus, though overall capacity in the transmission system exceeded requirement, specific SS were found to be congested as geographical distribution of the additional capacity created was not according to load demand. Therefore, planning for distribution of new capacity was not optimised and the transmission system was not uniformly robust.

The Government/ Management stated (June 2022) that several factors and uncertainties directly or indirectly affect objectives of the plans and impose challenges to achieve their targets. Moreover, implementation of open access in Power transmission, liberalisation of generation sector and creation of open market for electricity has brought their own uncertainties. Hence, to the extent possible, adequate flexibility is considered in the plans to meet such uncertainties. Consequently, possibility of stranded assets<sup>174</sup> or congestion could not be ruled out entirely. It also stated that the reasons for delay in execution of the project were not entirely under the control of WBSETCL and could not be attributed to the basis of planning.

The reply needs to be viewed in light of the fact that under WBERC's (State Electricity Grid Code) Regulations 2007, WBSETCL was required to take into account power to be wheeled in long-term open access for the purpose of overall planning. Further, congestion arose as WBSETCL had not optimally distributed

<sup>174</sup> Transmission assets having realisable value below their cost or book value, as anticipated benefits.

additional capacity across geographical locations. Moreover, there were delays in execution of projects which are discussed in **Paragraph 3.10.1**.

### **3.8.2 Inability to assess required transformer capacity led to delay in procurement of transformers**

WBSETCL's procurement policy calls for equipment, materials and services to be made available in the right quantity, at the right time and at the right place. Therefore, the Procurement Department must ensure that the supply schedule, as agreed with the contractors/ suppliers, is strictly adhered to. Further, BPITS (Best Practice in Transmission System) Report, MOP, GOI, provides (January 2002) that a transmission system be divided in packages for procurement, based on cost, availability of materials, completion schedule, *etc.* Sub-stations may be packaged for turnkey execution except transformers/reactors that may be procured separately and erected by turnkey contractor under supervision of the manufacturer, with due consideration that the design philosophy is maintained. The turnkey concept of sub-station execution merely ensures single point responsibility for procurement, co-ordination and project management.

WBSETCL planned (August 2013) a 400/220/132 KV sub-station (SS) at New Chanditala to meet the requirements of Howrah, Rishra and Domjur 220/132 KV SS, with aggregate load of 875 MVA. Accordingly, WBSETCL floated (August 2013) tender and issued (February 2014) Letter of Award (LOA) on M/S Siemens Ltd for supply and erection of New Chanditala SS along with associated works on turnkey basis (excluding supply of power transformers (PTs) to be supplied by WBSETCL). Thereafter, WBSETCL issued (January 2015) purchase order on M/S Alstom T&D India Ltd for supply of two 315 MVA PTs at New Chanditala SS. Each PT had basic price of ₹ 15.04 crore (₹ 7.52 crore each ex-works price), subject to price variations as on delivery dates. As per delivery schedule, WBSETCL was to supply both transformers to M/S Siemens Ltd by July 2015.

Subsequently, WBSETCL's Board Committee for Contracts, Purchases and Procurement decided (February 2016) to procure a third 315 MVA PTs for New Chanditala sub-station. This was as per load flow study (January 2016), in which, New Chanditala SS would cater to load of 880 MVA at Rishra, Domjur and Foundry Park Sub-Stations and only two 315 MVA PTs aggregating to 630 MVA capacity would not be sufficient to meet the demand. Moreover, outage of either PT would lead to severe power shortage. Hence, WBSETCL issued (November 2016) order on M/S TBEA Energy (India) Pvt. Ltd. for procurement of third PT, at ₹ 7.71 crore (ex-works price), subject to price variation on delivery. Against scheduled completion in June 2017, the project was completed in April 2018.

Audit observed that the original load was assessed at 875 MVA in August 2013 and re-assessed in January 2016 at 880 MVA *i.e.* an increase of five MVA only. The initial transformer capacity of 630 MVA would not have met the original or the revised demand. However, due to incorrect assessment of capacity, the project was delayed on account of waiting for delivery of third PT.

The delay in the project was almost two years *i.e.* actual completion was in April 2018 against scheduled completion in June 2016. Besides, WBSETCL also incurred additional expenditure of ₹ 0.56 crore for procurement of third

PT at a higher rate after almost two years. Further, it was also noticed during 2016-17 to 2020-21 that at the 400 KV level, an existing 400 KV SS at Arambag was loaded<sup>175</sup> beyond permissible limit in four out of five years. Consequently, fault occurred (July 2020) at Arambag SS leading to load loss of 61 MW. Thus, the transmission network had not achieved stability even after New Chanditala SS was completed.

The Government/ Management stated (June 2022) that load flow study showed that New Chanditala sub-station was to be connected with three sub-stations at Domjur, Foundry Park and Rishra to cater to load of 880 MVA. Although two 315 MVA Inter connecting Transformers (ICTs) were planned initially; depending upon the changed/ emerging scenario at a later stage, installation of the third 315 MVA ICT was fully justified from technical point of view, even through its cost was a bit additional.

The reply is, however, not tenable as New Chanditala SS was planned to meet load of 875 MVA, which increased by only five MVA, to 880 MVA, during execution. Consequently, incorrect estimate at the planning stage led to alterations in project components during execution, which led to higher expenditure on the third PT and delayed the overall completion of the project, leading to overloading of an existing 400 KV SS (Arambag) beyond permissible limits.

### 3.8.3 Creation of sub-station (SS) capacities in excess of permissible limits

According to WBERC (State Electricity Grid Code) Regulations 2007, the capacity of all the transformers in a single sub-station shall normally not exceed 1,000 MVA for 400 KV and 500 MVA for 220 KV level. Audit noticed that as of March 2021, WBSETCL had 37 sub-stations of 400 KV and 220 KV capacities, of which six sub-stations (16.22 per cent) had capacities exceeding permissible limits, as follows:

**Table 3.5: Sub-stations with installed capacities exceeding State Electricity Grid Code limits**

| Sl. No. | Sub-station voltage (in KV) | Permissible capacity (in MVA) | Total SS (Nos.) | Non-compliant SS (Nos.) | Non-compliant sub-stations |                          |
|---------|-----------------------------|-------------------------------|-----------------|-------------------------|----------------------------|--------------------------|
|         |                             |                               |                 |                         | Names                      | Actual capacity (in MVA) |
| 1)      | 400                         | 1,000                         | 08<br>(Note 1)  | 02<br>(25 per cent)     | Arambag                    | 1,260                    |
|         |                             |                               |                 |                         | Jeerat                     | 1,260                    |
| 2)      | 220                         | 500                           | 29              | 04<br>(13.8 per cent)   | Gokarna                    | 640                      |
|         |                             |                               |                 |                         | Howrah                     | 630                      |
|         |                             |                               |                 |                         | Kasba                      | 620                      |
|         |                             |                               |                 |                         | Durgapur                   | 600                      |

(1) Including Sagardighi Sub-Station of West Bengal Power Development Corporation Limited, managed by WBSETCL.

<sup>175</sup> 2016-17 : 87.21 per cent, 2017-18 : 74.07 per cent, 2018-19 : 84.03 per cent, 2019-20 : 76.88 per cent and 2020-21 : 59.89 per cent.

The reasons for creating capacities in excess of permissible limits in these six SSs was not intimated, though called for in audit. Any disruption in these sub-stations, therefore, increased the risk of disturbances in the grid.

Further, analysis of monthly maximum capacity utilisation at these sub-stations from April 2016 to March 2021 (58 months as no readings were available for March and April 2020), showed that three SS had exceeded permissible loading for 'N-1' condition in 11 to 35 months as follows:

**Table 3.6: Details of overloading of three Sub-Stations**

| Sl. No | Particulars                                                   | Jeerat<br>400/220/132 KV                        | Gokarna<br>220/132 KV                             | Durgapur<br>220/132 KV                         |
|--------|---------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------|------------------------------------------------|
| 1)     | Maximum capacity utilisation in 2020-21 (in <i>per cent</i> ) | 73.32                                           | 82.71                                             | 75.55                                          |
| 2)     | Permissible Limit of Transformer capacity (MVA)               | 1,000                                           | 500                                               | 500                                            |
| 3)     | Installed capacity (in MVA)                                   | 1,260                                           | 640                                               | 600                                            |
| 4)     | Nos. of transformers and capacity                             | Four transformers of 315 MVA each               | Four transformers of 160 MVA each                 | Three transformers of 200 MVA each             |
|        | Installed capacity for fulfilling 'N-1' condition (in MVA)    | 945                                             | 480                                               | 420                                            |
| 5)     | Load observed in excess of 'N-1' condition in 2016-21         |                                                 |                                                   |                                                |
|        | (i) Maximum (in MVA)<br>(Percentage / Month of occurrence)    | 1,128.64<br>(89.57 <i>per cent</i> / July 2016) | 692.75<br>(108.24 <i>per cent</i> / January 2016) | 453.32<br>(75.55 <i>per cent</i> / March 2021) |
|        | (ii) Minimum (in MVA)<br>(Percentage / Month of occurrence)   | 953.64<br>(75.69 <i>per cent</i> / May 2018)    | 490.15<br>(76.59 <i>per cent</i> / May 2018)      | 401.75<br>(66.96 <i>per cent</i> / June 2016)  |
|        | (iii) No. of months                                           | 23                                              | 35                                                | 11                                             |

This showed lack of planning for capacity utilisation across sub-stations, thereby making the grid susceptible to disruptions.

The Government/ Management in its reply (June 2022) stated that as per para 15.4 of Manual on Transmission Planning Criteria published by CEA sub-stations transformer capacity for 400 KV sub-station shall not normally exceed 2,000 MVA and for 220 KV sub-station capacity shall not exceed 500 MVA and as per the Manual cited above, transformer capacity at Gokarna, Howrah, Kasba and Durgapur was within limit. Further, WBSETCL always explored the possibility of planning a new sub-station instead of adding additional capacity but due to non-availability of suitable land for sub-stations and corridors for transmission lines, capacity augmentation were required on emergency basis to meet load growth.

The Government further stated that loading of transformers at Jeerat and Durgapur have not exceeded its permissible limit. Maximum load of 220/132 KV transformers at Gorkarna was found to be 520 MVA in January 2016 (instead of 692.75 MVA) that was within the permissible limit.

The reply of the Government/ Management was not tenable, since both WBEGC 2007 and Indian Electricity Grid Code 2010 restrict the transformer capacity of 400 KV sub-station to 1,000 MVA only and both Grid Codes are issued by the

respective Regulatory Commissions. Further, the load data of sub-stations was taken from data maintained by WBSETCL; discrepancies in the data, needed reconciliation by WBSETCL.

### 3.9 Tendering for award of projects – Operating procedures thereof

The Report of Task Force on Transmission Projects (August 2005) envisages implementation of transmission projects within an average time frame of 24 months. Accordingly, WBSETCL stated (June 2021) that they adhered to the following steps for implementation of projects -

- Based on the load centre, suitable sub-station land is finalised either on land available within existing 33 KV sub-station of West Bengal State Electricity Distribution Company Limited (WBSEDCL), vested land or acquired land.
- After finalisation of sub-station land, Technical and Administrative approval for route survey of associated transmission lines is issued.
- On completion of route survey, estimates for both sub-station and transmission lines are prepared and placed before competent authority for Technical and Administrative approval.
- Tender documents are prepared and sent to Procurement Wing for being put to tender after issue of Technical and Administrative approval.
- Concurrently, investment approval is taken from WBERC and thereafter LoAs are placed on the successful lowest (L1) bidder.

Audit selected 35 projects with aggregate awarded amount of ₹ 2,048.28 crore (46 per cent) of aggregate award value, out of 183 transmission projects having total awarded amount of ₹ 4,465.01 crore; through stratified random sampling for detailed examination.

#### 3.9.1 Delays in tendering

The recommended time from technical/administrative approval of a project to issue of notice inviting tender (NIT) is 300 days. Further, according to WBSETCL's Procurement Policy (August 2009), bids should be opened within 45 days from NIT, bid evaluation completed within 45 days of bid opening and order for execution of work placed within 30 days of completion of bid evaluation. In eight projects there were delays of two to 176 days in tendering (from technical approval to award of work). The details of delays in tendering process of selected projects is given in the **Table 3.7** below:

**Table 3.7: Details of timelines taken by WBSETCL from technical/ administrative approval to award of work**

| Sl. No. | Particulars                                    | Permissible days | Actual range for 35 projects | Nos. of projects beyond norms | Days in excess |
|---------|------------------------------------------------|------------------|------------------------------|-------------------------------|----------------|
| 1)      | From technical/ administrative approval to NIT | 300              | 5 – 490                      | 6<br>(17 per cent)            | 4-190          |
| 2)      | From NIT to bid opening                        | 45               | 23 – 127                     | 29<br>(83 per cent)           | 3-82           |
| 3)      | Bid opening to evaluation                      | 45               | 16-377                       | 19<br>(54 per cent)           | 3-332          |

| Sl. No. | Particulars                                              | Permissible days | Actual range for 35 projects | Nos. of projects beyond norms | Days in excess |
|---------|----------------------------------------------------------|------------------|------------------------------|-------------------------------|----------------|
| 4)      | Bid evaluation to award of work                          | 30               | Same day- 63                 | 6<br>(17 per cent)            | 3-33           |
| 5)      | From technical/ administrative approval to award of work | 420              | 125 - 729                    | 9<br>(26 per cent)            | 2-309          |

(Source: Compiled from data provided by WBSETCL)

Note: Overall delays from technical/ administrative approval to award of work at Sl.No.5 is not total of Sl.No. 1 to 4.

It may be observed from the **Table 3.7** that delays from approval to issue of NIT occurred in 17 per cent of projects, from issue of NIT to opening of bids in 83 per cent, completion of bid evaluation in 54 per cent and from bid evaluation to placement of order in 17 per cent of projects. These delays were attributable, among other reasons, to -

- Intending bidders seeking extension of time by 11 to 55 days to submit bids in eight out of 35 projects (22.86 per cent). Further, in three of the eight projects, these bidders had either not submitted bids or had submitted bids and failed to qualify on techno-commercial grounds. One of the reasons for bidders seeking additional time was to visit the site and evaluate the site requirements before submission of tenders.
- Deviations of the offers quoted from tender specifications in 6 out of 35 projects (17.14 per cent) leading to delays of 39 to 87 days in evaluation and finalisation of bids. This showed that the tender specifications failed to foresee these possibilities even during the pre-bid meetings with potential bidders.

Thus, pre-bid discussions with potential bidders may require to be more rigorous and structured and WBSETCL needs to review timelines and processes for submission of bids.

The Government/ Management in its reply (June 2022) stated that there were specific formats where the bidders were required to declare that they strictly followed the tender terms, schedule of works, bid documents *etc*, but it was often found that bidders had failed to submit such declarations. The bidders also indicated deviations from the bidding terms. The bidders were asked to withdraw such deviations and this whole process was time consuming. It was further stated that proposals at the prebid discussions were assessed and discussed by WBSETCL for achieving good quality of work.

The reply of the Government/ Management while highlighting the problem was generic in nature. Moreover, the reply was also silent about reasons for not adhering to recommendations of the Task Force.

### 3.9.2 Award of works to financially unsound contractors

WBSETCL's standard tender documents for each project/ package have the same three financial criteria for eligible bidders, all based on value of the tender (NIT). These criteria are -

- i. average annual turnover<sup>176</sup> only from business activities over the past three years of each bidder is to be one and a half times of NIT value, spread over the scheduled time for execution,
- ii. net worth to be 25 *per cent* of NIT value, and
- iii. bid security at 2.5 *per cent* of NIT value. However, these criteria did not consider the existing order book position of the bidders or even the numbers of projects of WBSETCL under execution by the bidders.

Audit noticed that in respect of eight projects having aggregate value of ₹ 594.85 crore, WBSETCL had selected two financially unsound bidders *i.e.* M/S Jyoti Structurals Limited (JSL)<sup>177</sup> and M/S EMC Limited (EMC)<sup>178</sup> leading to cancellation of contracts due to poor progress of work as follows-

**A.** National Electricity Policy, 2005 requires that while planning new generation capacities, requirement of associated transmission capacity would need to be worked out simultaneously in order to avoid mismatch between generation capacity and transmission facilities. Moreover, WBERC (Terms and conditions of Tariff) Regulations 2011 requires that a generating station declare commissioning of a new unit within 90 days of synchronisation with the grid.

New generating capacities *viz.* Units III and IV (500 MW each) of Sagardighi Thermal Power Generating Station (SgTPS) were scheduled for commissioning in February and May 2015, respectively. The generation of these two units was proposed to be evacuated by WBSETCL through a new transmission line, namely, Sagardighi TPS –Gokarna 400 KV D/C transmission line. Since, scheduled commissioning was in February 2015, the transmission lines were required to be ready by November 2014. However, WBSETCL had scheduled completion of this line only in 2015-16. This indicates that WBSETCL had not planned for construction of the transmission line sufficiently in advance of scheduled commissioning.

It was noticed that WBSETCL had awarded (July 2013) work for construction of line to M/S Jyoti Structures Limited (JSL) with scheduled completion by July 2015. Similarly, WBSETCL awarded (September 2014) work for construction of New Chanditala -Gokarna 400 KV D/C line on JSL, with scheduled completion by January 2017. However, JSL failed to complete the projects within schedule and WBSETCL granted seven successive time extensions for both projects. Finally, in July 2017, JSL entered insolvency proceedings, initiated by State Bank of India. Meanwhile, Units 3 and 4 of SgTPS were commissioned in July 2016 and December 2016 against schedule of February and May 2015, respectively. WBSETCL cancelled the contracts with JSL only in January 2019 and November 2018, after the lapse of 43 months and 23 months, respectively, from scheduled date of completion.

WBSETCL awarded (July 2019) balance works for both lines to M/S Larsen and Toubro Limited (L&T), at an additional expenditure of ₹ 98.83 crore above

---

<sup>176</sup> If NIT value is ₹ 150 crore and completion time is 24 months, then minimum annual turnover of bidder should be ₹ 112.50 crore.

<sup>177</sup> Two packages for one line each in July 2013 and September 2014 having aggregate LOA value of ₹ 438.12 crore.

<sup>178</sup> Two packages for five lines and one sub-station in August 2015 and May 2018 having aggregate LOA value of ₹ 156.73 crore.

the original cost (₹438.12 crore). L&T completed Sagardighi-Gokarna line in October 2020, while New Chanditala- Gokarna line is still under construction (February 2022). Consequently, WBSETCL had to delay commissioning of the matching transmission line from Sagardighi to Gokarna required for both units by around four years. As a result, from July/ December 2016 to October 2020, existing transmission lines were overloaded, thereby affecting stability of intra-state transmission system. Only after commissioning of Sagardighi-Gokarna 400 KV Double Circuit Line, had the intra-state transmission system become stable in all respects.

Audit observed from the minutes of the tender committee that prior to awarding the projects, WBSETCL was aware (May 2013) that JSL had failed to satisfactorily execute projects awarded to them by WBSEDCL by March 2012 and their performances were shockingly unsatisfactory in all activities; WBSEDCL was also considering taking penal action against JSL on their failure in performing contracts. Yet, WBSETCL awarded both projects to JSL.

WBSETCL encashed (December 2018/ February 2019) six bank guarantees from JSL aggregating to ₹ 63.90 crore for non-performance of contracts. In addition, it withheld ₹ 37.56 crore against retention money (₹ 32.47 crore) and outstanding running bills of JSL (₹ 5.09 crore). However, WBSETCL could not adjust mobilisation advances of ₹ 18.44 crore.

WBSETCL replied (June 2021) that LOA's for both lines were awarded to JSL, but JSL could not complete the projects and balance works were awarded to L&T. Moreover, contract termination was delayed as limited vendors were available to execute 400 KV Quad-Moose type of line. Further, WBSETCL anticipated that JSL would complete left over work earlier than time required to terminate the contract, identify alternative suitable vendor to complete balance work, place order on new vendor and also time required by the new vendor to complete balance work. In addition, resolving right of way (RoW) disputes would be a problem as requisite documents regarding RoW payment would not be available to a new vendor.

The reply is not acceptable since WBSETCL was aware of JSL's poor record in execution of projects, even before awarding the work to them. Moreover, JSL entered insolvency proceedings in July 2017 and cancelling contracts in January 2019 and November 2018 after delays of 18 months and 16 months, respectively, was not justified.

**B.** WBSETCL awarded (August 2015/ May 2018) construction of five<sup>179</sup> transmission lines and 132/33 KV GIS at Ramnagar on M/S EMC Limited (EMC). While the lines were scheduled to be completed between February 2016 and February 2017, the GIS was to be completed by November 2019. The aggregate LOA value of these six projects was ₹ 156.73 crore. In respect of GIS, WBSETCL issued (December 2018) 'notice of default' on EMC due to its poor performance and terminated the contract (January 2019).

---

<sup>179</sup> Subhasgram-Sonakhali 132 KV D/C line, Kharagpur – Burdwan 132 KV D/C line as well as Ukhra-SonpurBazari 132 KV D/C line by February 2017, Kharagpur – Kshiyary 132 KV D/C line by August 2016 and Domjur – Uluberia 132 KV D/C line by February 2016.

Audit noticed that –

- i. An operational creditor<sup>180</sup> registered insolvency proceedings against EMC before National Company Law Tribunal (NCLT) in January 2018. Moreover, despite apprehensions (March 2018) about financial capability of EMC, WBSETCL placed LoA for GIS on EMC. Subsequently, NCLT declared EMC insolvent in November 2018 *i.e.* within six months of LoA in May 2018. Eventually, due to lack of performance on the part of the contractor, the contract was terminated.
- ii. WBSETCL issued (July 2019) fresh LOA on M/S GET&D India Ltd. for construction of GIS at a cost of ₹ 29.63 crore, *i.e.*, ₹ 4.51 crore above value of LOA awarded to EMC.
- iii. Of the five lines scheduled to have been completed by February 2017, TOC was pending in respect of two, while work on the remaining lines was still in progress (February 2022).

WBSETCL should not have awarded construction of SS in May 2018, when insolvency proceedings were initiated against EMC in January 2018. Moreover, WBSETCL had not included in evaluation criteria, parameters such as (a) value of ongoing works awarded by WBSETCL to a bidder and previous performance of the bidder, and (b) cash generated from operations by the bidder to assess the continued financial health of the entity. Therefore, financial criteria prescribed by WBSETCL were not adequate to safeguard their financial interest.

As a result, eight projects awarded to JSL and EMC were delayed by periods ranging from 23 to 63 months. Further, in respect of three of these eight projects, WBSETCL incurred additional expenditure of ₹ 103.34 crore for completion of the works.

The Government/ Management in its reply (June 2022), stated that in case of both EMC and Jyoti, all tendering procedures and evaluation procedures were carried out as per Procurement Policy and adhering to Tender norms.

The reply is not tenable, as WBSETCL was aware of the poor performance of JSL on projects awarded by WBSEDCL and should have not considered them for a major project. Moreover, it should have monitored the financial health of EMC, an existing contractor, that was under liquidation proceedings, information for which was available in the public domain. Moreover, unsatisfactory performance of EMC with respect of LoA for five lines issued in August 2015 had not been considered when awarding the subsequent works of GIS. Due to their financial weakness, the bidders failed to complete works, resulting in time and cost overrun, and lack of stability in the intra-state transmission system. Thus, the financial criteria prescribed in the SBD proved inadequate to evaluate the financial strength of bidders.

### **3.10 Project execution**

WBSETCL schedules construction/ augmentation of sub-stations/ transmission lines based on the rolling and annual plans drawn and approved by the BoD. WBSETCL executed 183 projects between 2015-16 and 2019-20, including 36 ongoing projects as of April 2015, of which 118 projects (64 *per cent*) were

---

<sup>180</sup> According to Section 5(20) of the Insolvency and Bankruptcy Code 2016, an operational creditor is “any person to whom an operational debt is owed and includes any person to whom such debt has been legally assigned or transferred”.

completed and taken over within March 2021. Of the remaining projects, five projects were yet to be taken over, another five were closed/ terminated, while rest were ongoing as of 31 March 2021, with the earliest having been taken up in May 2013. Audit selected 35 projects with aggregate awarded amount of ₹ 2,048.28 crore (46 *per cent*) of aggregate award value, out of 183 transmission projects having total awarded amount of ₹ 4,465.01 crore; through stratified random sampling for detailed examination. The observations are as detailed under.

### 3.10.1 Delays in Execution

Out of 35 selected projects, one project was completed within schedule, while four were either closed or terminated. In respect of 33 (including two re-awarded works) out of 35 projects, delays were broadly due to one or more of the following reasons as mentioned in the **Table 3.8** below:

**Table 3.8: Reasons for delays in execution of projects by WBSETCL**

|    | Reasons                           | No. of projects | Range of delays (Days) | Examples of delays                                                                                                                                               |
|----|-----------------------------------|-----------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) | Belated supply of equipment       | 4               | 42- 684                | Delays in supply of transformers, accessories and oil filtration of transformers.                                                                                |
| 2) | Changes in civil work             | 2               | 138-520                | Check survey by contractor held up due to change of scope and additional works.                                                                                  |
| 3) | Changes in drawings and design    | 8               | 59-280                 | Delays in providing input design for transformers, determining numbers of towers to be installed and ruling (design) span.                                       |
| 4) | Land issues and site clearance    | 6               | 51-270                 | Belated handing over of site, shifting existing line and demolition of building.                                                                                 |
| 5) | Right of Way <sup>181</sup> (ROW) | 15              | 10-617                 | Hindrance in foundation and erection of tower and belated approvals for railway/ road crossings of lines/ cables.                                                |
| 6) | Modification in scope of work     | 4               | 84-328                 | Section of transmission corridor re-surveyed and modified, revision in route due to site conditions.                                                             |
| 7) | Others                            | 11              | 30-601                 | Underground section of line not taken as overhead section was not completed, work held up due to rains/ flooding, judicial order for status quo on construction. |

The aggregate delay in respect of these projects was 20,901 days, of which 4,866 days (23.28 *per cent*) were attributable solely to WBSETCL. Till March 2021, these delays led to cost overrun of ₹ 62.31 crore in 12 projects (**Appendix 40**).

Some of the reasons for delay as noticed in audit could have been obviated as under -

- a) The Task Force on Transmission Projects recommended (August 2005) standardising designs of tower fabrication and uploading the drawings on to website to save time of 6 to 12 months or more in project execution.

<sup>181</sup> Right of Way (RoW) is the strip of land immediately below and adjacent to a transmission line, whose width is determined according to safety considerations.

WBSETCL stated (May 2021) that they uploaded some standard drawings and specifications in their website.

It was seen from WBSETCL's website that they had shared drawings for structures/ equipment support structures, but had not standardised designs of tower fabrication. Consequently, there were delays in finalising of design and drawings in 8 out of 22 line projects, *i.e.*, 36.36 *per cent*.

- b) The Task Force on Transmission Projects recommended (August 2005) undertaking preparatory activities like surveys in advance/ parallel to project appraisal and approval to proceed with construction on receipt of approval. In respect of 12 out of 22 transmission lines, due to time lag of 256 to 1,442 days between technical approval for surveys and issue of LoA for actual project execution, new and additional structures came across their proposed route length. This resulted in higher resistance in obtaining RoW and necessitated working out route realignments.

The Government/ Management in their reply stated (June 2022) that WBSETCL possessed ready bank of drawings and design and uploaded general abstract drawings in tender document; working agencies also promptly submit these drawings and get approval. However, design and drawing of foundation tower and/or sub-station structure varies as it depends on soil condition and working areas, it is done based on availability of report of soil of each project. During execution period, check survey realignment of route at some stretches and adoption of different or special types of tower beyond original scope of work was normally required due to ROW issues.

The Government/ Management added that transmission line projects require approval of different authorities concerned for right of way and all these approvals require time which greatly contribute to delay in completion of lines. Delays in supply of transformers by manufacturers/ suppliers due to various reasons despite timely order and planning contributes in overall delay in project completion. The Management further assured that continuous efforts and actions are underway to arrest, avoid and minimise the delay.

Reply of the Government/ Management was not tenable as there were many factors intrinsic to WBSETCL's functioning which led to delays, such as delays in approval of design/ drawings, changes in scope of civil works, belated handing over of sites to contractors, *etc.* Moreover, in the Exit Conference, the Government added that operationalising the ROW being proposed would significantly reduce project delays.

Due to delays in completion of projects, WBSETCL faced constraints in meeting the demand for electricity of WBSEDCL in a few areas. These were expected to be mitigated only after commissioning of ongoing transmission systems.

### **3.10.2 Impact of premature closure of contract**

WBSETCL decided (February/ July 2015) to construct 220/132 KV sub-station (SS) at New Town AA II C along with hybrid<sup>182</sup> 220 KV D/C line from Power Grid Corporation of India Limited (PGCIL) at Rajarhat to New Town AA II C SS at an aggregate estimated cost of ₹ 192.60 crore. The total length

---

<sup>182</sup> Combination of overhead and underground transmission lines.

of transmission line was about 15.8 Km comprising of 14 Km overhead line and 1.8 Km underground line. WBSETCL split the work into three components viz. overhead line, underground line and sub-station. The components were put to tender between August 2015 to March 2016; with works awarded to three<sup>183</sup> different contractors from February to September 2016.

WBSETCL issued (February 2016) letter of award (LoA) on M/S KEC International Limited (KIL) for construction of overhead transmission line (14 km) to be completed by August 2017 at a price of ₹ 23.71 crore. Similarly, WBSETCL placed (August 2016) order on M/S KEI Industries Limited for underground transmission line (1.8 Km), at a cost of ₹ 20.09 crore with completion by April 2017.

It was noticed that in respect of contracts for both components –

- a) There was limited progress on both components of work till March 2017, with only 0.7 Km of overhead line completed (₹ 4.29 crore). However, WBSETCL had, enhanced (March 2017) LoA value on M/S KEC to ₹ 24.94 crore due to additional items of works like supply of two additional superstructures, rise in cost of check survey and final peg marking, design/ construction of wet-type/ fully submerged type tower foundations, etc.
- b) Due to ‘Right of Way’ (RoW) problems in Bhangar area, further overhead line was not drawn till November 2018. Therefore, WBSETCL decided (December 2018) to partly substitute overhead transmission conductor<sup>184</sup> with underground cable of 2.6 Km, from Rajarhat 400 KV SS to composite tower at PGCIL end. Accordingly, through mutual discussion, WBSETCL amended (December 2018) the LoA on M/S KEC and enhanced LoA value to ₹ 53.82 crore. This increase was mainly due to supply of 16 km length underground conductor.<sup>185</sup> But, while determining the enhanced LoA value, WBSETCL had not deducted value of overhead line (₹ 4.40 crore approximately for 2.6 Km) substituted by underground line.
- c) Till October 2019, overall financial progress was 72.86 *per cent* against supply and 21.14 *per cent* for erection. The significant mismatch between supply and erection means that WBSETCL had not ensured that M/S KEC maintained parity between supply and actual utilisation. In view of poor progress of work 27 months beyond scheduled completion due to right of way issues, WBSETCL and M/S KEC agreed (September 2019) to close this contract on ‘as is where is basis’ under the terms of contract, without any financial implication on either side.
- d) Till October 2019, WBSETCL incurred aggregate expenditure of ₹ 32.51 crore on overhead line (₹ 7.69 crore for 0.7 Km) and underground line (₹ 24.82 crore for 2.60 Km). However, WBSETCL intimated (January 2020) to WBERC that they had incurred expenditure of ₹ 4.29 crore on 0.7 km of overhead line*i.e.* expenditure of ₹ 3.40 crore was not identifiable.

---

<sup>183</sup> Overhead line : M/S KEC International Limited (August 2015/ February 2016), underground line : M/S KEI Industries Limited (February 2016/ August 2016), sub-station : M/S SPML Infra Limited (March 2016/ September 2016).

<sup>184</sup> Cable made of Aluminum conductor Steel reinforced.

<sup>185</sup> Cable made of copper-core cross linked polyethylene.

Ultimately, WBSETCL decided (November 2019) to complete remaining length (around 8.9 Km) of underground line and issued NIT in July 2020. WBSETCL awarded (January 2021) balance work at ₹ 115.20 crore to M/S KEC, with scheduled completion by January 2022. The work is still ongoing (February 2022).

The Government/ Management in its reply (June 2022) stated M/s KEC was allotted the job at the rate quoted by M/s KEI. Although M/s KEC was initially unwilling to execute the work at such old rate, they agreed as a good gesture. Afterwards, entire balance work having route length of nine km was decided to be executed through underground cable line only. Tender was invited in July 2020 and the cost increased compared to originally planned overhead line which was awarded in February 2016.

The reply was however, was silent on the issue of non-achievement of anticipated benefits of the SS and line within time as pointed out in audit. Consequently, the transmission system remained incomplete till March 2021 even after expenditure of ₹ 79.24 crore and the anticipated benefits from the projects had not materialised. Moreover, the cost of transmission line (both UG and Overhead components) rose from ₹ 43.80 crore to ₹ 147.71 crore.

### **3.10.3 Time lags between commissioning of sub-stations and associated lines**

The main aim in constructing a new sub-station is to ensure quality and reliability of power supplied and improve voltage profile in the command area concerned. Further, associated transmission lines from and to the SS are required, thereby constituting transmission system for the command area. Hence, SSs and associated lines are dependent on each other and cannot function in isolation. As per DPRs, WBSETCL proposed construction of new sub-stations and associated lines to make the transmission system effective.

WBSETCL issued (August 2015) LoA on Larsen and Toubro Limited (L&T) for construction of 132 KV line<sup>186</sup> from Gokarna 220 KV SS to proposed Bhadrapur 132 KV GIS with scheduled completion in August 2016. Subsequently, WBSETCL awarded (August 2016) LoA for construction of 132 KV GIS at Bhadrapur to M/S Sterling & Wilson Limited, with scheduled completion in February 2018. It was seen that the line was completed in September 2017, i.e., 12 months beyond scheduled completion of September 2016, at a cost of ₹ 13.34 crore and charged in March 2018. But, GIS was completed (August 2018) at a cost of ₹ 21.69 crore, after delay of six months.

Since WBSETCL had not synchronised construction of GIS and line, line was belatedly put to use only from August 2018. This led to blocking of ₹ 13.34 crore for 11 months and forgoing of anticipated financial benefit of ₹ 1.44 crore to WBSETCL from this line.

WBSETCL stated (June 2021) that tenders for lines were being invited first and after observing progress of lines, tenders for SSs were being invited, as instances had been observed where SSs could not be charged after completion for want of associated transmission lines.

---

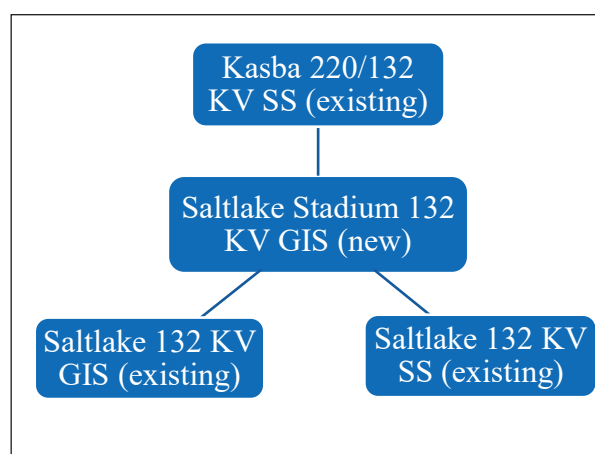
<sup>186</sup> Using existing 132 KV D/C Gokarna – Raghunathganj line.

WBSETCL was, however, silent about reasons for delays in completion of sub-stations. The transmission system could not be put to use due to delays and non-synchronisation of the components of the transmission system.

Moreover, similar mismatch in commissioning of SS and associated lines were observed in another three instances, as a result of which anticipated improvements in the transmission systems had not materialised. These instances are mentioned in brief below:

- a) Minakhan 132/33 KV GIS in North 24 Parganas was completed at a cost of ₹ 20.88 crore in May 2021 against scheduled completion in August 2019. But, GIS could not be put to use due to non-completion of associated 132 KVD/C line from Subhasgram SS till February 2022, against scheduled completion in April 2020. As a result, for a period of nine months from June 2021 to February 2022, WBSETCL had forgone total anticipated benefit of ₹ 1.74 crore<sup>187</sup> from Minakhan GIS.

- b) In the Salt Lake area, there were two substations, namely, Salt Lake 132 KV GIS and Salt Lake 132 KV SS. With view to split their load and



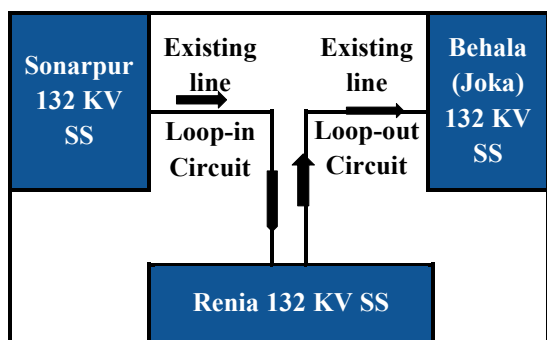
enhance reliability of power at Salt Lake, WBSETCL decided (July 2017) to construct Salt Lake Stadium 132 KV GIS (SLSGIS) with power sourced from 220/132 KV Kasba SS through 132 KVD/C UG line. Further, two 132 KV S/C UG lines to transmit power from SLSGIS to Salt Lake 132 KV GIS and SLSGIS to Salt Lake

132 KV SS, were also planned. The SLSGIS was completed in September 2020 (scheduled completion – May 2018). While 132 KV UG line from Salt Lake 132 KV SS was belatedly completed in February 2020 (scheduled completion- March 2019), the remaining two lines from Kasba SS to SLSGIS and SLSGIS to Salt Lake GIS were either not commissioned or still under construction<sup>188</sup> (February 2022). Consequently, SLSGIS had to be commissioned by drawing power from Salt Lake 132KV SS through 132KV S/C UG, instead of Kasba 220/ 132 KV SS, thereby failing to enhance reliability of power at both Salt Lake 132 KV GIS and Salt Lake 132 KV SS. Besides, 132 KV S/C line from SLSGIS to Salt Lake 132 KV GIS, completed at a cost of ₹ 13.99 crore, was not commissioned as the required line bay at Salt Lake 132 KV GIS was not completed (February 2022). The reasons for delays were not on record, since the projects are not yet closed. Hence, WBSETCL had to forgo anticipated benefit of 132 KV UG line from Salt Lake SS to SLSGIS (cost : ₹ 13.99 crore) for 24 months from March 2020 to February 2022, which is calculated at ₹ 3.45 crore.

<sup>187</sup> Based on the financial internal rate of return (FIRR) of 11.14 percent projected in DPR.

<sup>188</sup> Scheduled completion was March and June 2019.

- c) WBSETCL proposed (July 2017) construction of 132 KV GIS at Renia and associated Double-circuit Loop-in Loop-out<sup>189</sup> of existing 132 KV Kasba-



Sonarpur - Behala line to improve voltage profile by 5.47 to 11.15 *per cent* at Renia and its command area of Tollygunj, Garia, Sonarpur and Behala/ Joka. Neither the Sub Station nor the transmission line were completed within the time schedule of November and August 2019, respectively. WBSETCL

attributed (June 2021) non-completion of Sub Station and the transmission line to poor performance of the vendor and ROW problems, respectively.

The Government/ Management in its reply (June 2022) stated that Bhadrapur 132 KV GUS was delayed due to delay in supply of 50 MVA transformers. Minakhan 132 KV substation, could not be charged at rated voltage due to non-completion of incoming transmission line of which two tower foundations were held up due to court cases and efforts were undergoing to resolve the court cases and complete the line at the earliest. As of May 2022, UG cable line from Salt Lake Stadium 132 KV GIS substation to Salt Lake 132 KV GIS could not be commissioned due to non-readiness of GIS bay. Construction of D/C LILO of existing 132 KV Kasba-Sonarpur-Behala transmission line at proposed Renia 132 KV GIS has been completed. However, it will be charged while commissioning of Renia 132 KV GIS.

The Government/ Management, in its reply, stated the present status of the projects. However, it did not address the reasons for mismatch in scheduling construction of substations and associated lines. Hence, the possibility of constraints in supply of reliable power in the command areas, due to non-commissioning of these projects, cannot be ruled out.

Thus, mismatch in completion of SS and associated lines in three transmission systems<sup>190</sup> had led to blocking of expenditure of ₹ 48.21 crore.<sup>191</sup> Based on the financial internal rate of return (FIRR) projected in DPRs, WBSETCL had forgone aggregate anticipated benefits of ₹ 5.19 crore on the completed one SS and two transmission lines.<sup>192</sup>

#### 3.10.4 Line bays' specifications at Sagardighi SS incompatible with transmission lines

In **Paragraph 3.9.2**, it was observed that WBSETCL decided to construct 400 KV SS at Gokarna along with 400 KV Double Circuit (D/C) transmission line from Sagardighi SS to Gokarna to evacuate power from the new Units (Nos. III and IV) of Sagardighi TPS of West Bengal Power Development Corporation Limited (WBPDC). Accordingly, WBSETCL obtained investment

<sup>189</sup> Two circuits are drawn to feed a substation by tapping into an existing transmission line with the circuits doubling back and to connect with the existing line.

<sup>190</sup> Bhadrapur, Minakhan, Salt Lake.

<sup>191</sup> (₹ 13.34 crore + ₹ 20.88 crore + ₹ 13.99 crore).

<sup>192</sup> Minakhan GIS, 132 KV line from Gokarna to Bhadrapur and 132 KV line from Salt Lake SS to SLSGIS.

approval from WBERC in February 2009 and awarded three<sup>193</sup> LoAs for the work between July 2013 and July 2019.

The new units of WBPDC, including two 400 KV bays, were constructed by their vendor (M/S Bharat Heavy Electricals Limited - BHEL). These bays are interconnection points between SS and lines. Hence, specifications of equipment installed in bays are required to be compatible with transmission line specifications. It was noticed that -

- Whereas WBPDC had placed LoA for two generating units including two line bays on M/S BHEL in February 2011; WBSETCL had finalised specifications of Sagardighi-Gokarna 400 KV D/C line in September 2012 and issued NIT in January 2013. But, WBSETCL had belatedly shared specifications with WBPDC in September 2014, i.e., 21 months after NIT and more than three from LoA on M/S BHEL. As a result, on completion of both bays, WBSETCL observed (April 2015) that the bay specifications were incompatible with the line specifications. The incompatibility in specifications of lines and bays required replacement of equipment in the line bays by WBPDC at cost of ₹ 48.77 lakh, which was avoidable.

The Government/ Management in their reply stated (June 2022) that the mismatch of conductor and equipment of the two bays happened at WBPDC's end and the same was not dependent upon WBSETCL. However, the lower rated Jack Bus conductor and lower rated equipment were replaced by WBPDC at their cost, without any cost implication to WBSETCL. It further replied that the additional expenditure was very small compared to project cost and the lower rated conductor and the equipment must have been utilised by WBPDC in their other jobs, which have resulted in savings of cost and that being accounted, the additional assessed cost of ₹ 48.77 lakh will effectively be reduced.

The reply of Management, however, did not address the aspect of lack of co-ordination between two PSUs (*viz.* WBPDC and WBSETCL) under the same administrative Department of the Government (*i.e.* Department of Power, GoWB).

### 3.10.5 Post-dated issue of Taking over Certificate (TOC)

General Conditions of Contract (GCC) 29 and 29.3 on "Taking Over" of projects, *inter alia*, provides that WBSETCL shall take over works after completion, either in full or in part, upon successful erection, testing and commissioning of works at site by contractor as per contractual terms. Further, WBSETCL will issue ToC (Taking over certificate) to the contractor mentioning the dates on which the works or any part thereof were complete and ready for taking over, after ascertaining that -

- Works have been satisfactorily completed by the contractor as per contractual provisions.
- Required numbers of approved as-built drawings (hard copies & soft copy in CDs) were submitted *etc.* These drawings are required to be in a format from which additional copies can be subsequently reproduced.

<sup>193</sup> M/S Alstom (T&D) India Limited for Gokarna 400 KV SS (November 2013), M/S Jyoti Structures Limited for 400 KV D/C line with 'Quad Moose' conductor (July 2013) and M/S Larsen and Toubro Limited for unexecuted length of line (July 2019).

- Work site is cleared of all surplus materials, scaffolding, shuttering materials, labour huts/ sheds, buildings cleaned of dirt/ debris, sanitary arrangements *etc.* except those required for carrying out rectification works.
- All the defects have been rectified to the complete satisfaction of the Project Manager.

Audit observed that in respect of eight (40 *per cent*) out of twenty completed projects (Transmission Lines: 13, Sub-Stations: 7) examined in audit –

- ToCs were issued (September 2016 to December 2020) to contractors even before completion of entire work under contracts. WBSETCL stated (June 2021) that ToCs were issued when negligible amount of work was left.
- In all eight projects, WBSETCL issued ToC, although ancillary works such as dismantling of towers, stringing of conductors, commissioning of optical ground wire/ outgoing feeders, submission of ‘as built’ drawings/documents in requisite numbers of copies, final joint checking of lines, *etc* were not completed which were in violation of GCC. The dates when works, pending during ToC, were finally completed was not on record.
- These ToCs were issued on a subsequent date but made effective retrospectively by 12 to 409 days prior to their issue, as detailed in **Appendix 41**. Since dates of completion of projects were reckoned retrospectively, LD was also determined from those notional completion dates. Hence, contractors were not penalised for delays in completion of projects beyond their notional completion dates. This has led to short/ non-imposition of LD of ₹ 19.14 crore on these projects. There was, however, no provision in the GCC for WBSETCL to issue ToC from a notional completion date with retrospective effect, thereby allowing undue favour to contractors.

The Government/ Management in their reply (June 2022) stated that issue of TOC on the actual date of energisation, in such conditions of delay in completion of pending jobs of minor nature without effecting the desired performance of the charged elements, have been done as per stipulation of GCC clause no. 30.5 and obviously not to allow undue favour to the contractors. Further, it replied that the charged installations put into operation on the date of commissioning, never gets affected for these pending jobs and continues to operate and perform in the desired manner. Moreover, TOCs have been issued as per provision of contractual stipulation.

The reply was not tenable, as the ToC was issued with retrospective effect, although ancillary work, like dismantling of towers, stringing of conductors, commissioning of optical ground wire/ outgoing feeders *etc.*, was pending. This was contrary to the general conditions of contract.

### **3.11 Operations and monitoring**

Performance of an STU depends on efficient maintenance of its transmission systems for supply of quality power with minimum interruptions. In the course of operation of SS and lines, the supply-demand profile within the constituent

sub-systems is identified and interventions<sup>194</sup> such as, undertaken to reduce line losses and ensure reliability of power by improving voltage profile. Operational Performance of WBSETCL with regard to operations and maintenance of the system is discussed in the succeeding paragraphs.

### 3.11.1 Deviations from prescribed voltage criteria

Voltage stability is important for power quality, equipment safety and grid stability. According to WBERC's Grid Code 2007, voltages to be maintained for 400 KV, 220 KV, 132 KV and 66 KV transmission systems are to be restricted to 380-420 KV, 209-231 KV, 119-145 KV and 59-73 KV, respectively. The Code also requires providing special attention to planning of volt-ampere reactive (VAR) energy compensation in the network so that voltage instability does not occur and lines can transfer designed power within designed operating voltage range. Also, voltages at the same location vary with the time/ day/week/ month/year and indicate reactive power balance locally. During 2016-17 to 2020-21, deviations from the norms occurred on 1,755 instances as given in the Table 3.9 below:

**Table 3.9 : Number of instances of transmission voltage deviating from WBERC norms**

| Voltage Class     | 400 KV                  |                          | 220 KV                  |                          | 132 KV                  |                          | 66 KV                   |                          | Total |
|-------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------|
| Permissible range | 380 to 420 KV           |                          | 209 to 231 KV           |                          | 119 to 145 KV           |                          | 59 to 73 KV             |                          |       |
| Years             | Below permissible range | Beyond permissible range | Below permissible range | Beyond permissible range | Below permissible range | Beyond permissible range | Below permissible range | Beyond permissible range |       |
| 2016-17           | Nil                     | 181                      | Nil                     | 10                       | 1                       | 56                       | Nil                     | 98                       | 346   |
| 2017-18           | Nil                     | 291                      | 5                       | 2                        | Nil                     | 21                       | Nil                     | 51                       | 370   |
| 2018-19           | Nil                     | 243                      | 12                      | 1                        | 3                       | 15                       | Nil                     | 26                       | 300   |
| 2019-20           | Nil                     | 219                      | 14                      | Nil                      | Nil                     | 8                        | Nil                     | 14                       | 255   |
| 2020-21           | Nil                     | 244                      | 23                      | 26                       | 30                      | 141                      | Nil                     | 20                       | 484   |
| Total             | Nil                     | 1,178                    | 54                      | 39                       | 34                      | 241                      | Nil                     | 209                      | 1,755 |

(Source: Records of WBSETCL)

It would be seen from the table that between 2016-17 and 2020-21, the numbers of instances of voltage deviations ranged from a minimum of 255 (2019-20) to maximum of 484 (2020-21), without any discernable trend. Further, in 1,667 instances, voltages were beyond permissible range. Analysis of these voltage fluctuations over the five years according to their months of incidence showed that 18.36 *per cent* occurred in May. In addition, 29.15 *per cent* of the instances of voltage fluctuations occurred during the three months from November to January. In this connection, Audit noticed that-

- According to Power System Operation Corporation Limited (PoSOCO) (March 2021/ June 2021), reliable operation of electricity grid requires proper voltage control measures and management of reactive power

<sup>194</sup> Complete network metering, installing reactive power support like static shunt compensation and dynamic reactive power compensators such as capacitor banks, fixed shunt devices, switched shunt devices, static synchronous compensators, static Volt Ampere Reactive compensators, etc.

flows therein. Management of reactive power is challenging given the seasonal variations in demand. Consequently, load factor<sup>195</sup> is an important consideration in the selection of type of transmission capacities for the system. Further, for minimising of operational risks, system operators need to refer to historical trends of load factor. In West Bengal, lowest load factor was observed in November and December.

- b) During April 2016 to March 2021, the aggregate annual outages in WBSETCL's system worked out to 5,302. It was seen that there was positive correlation of 27.51 *per cent*<sup>196</sup> between month-wise counts of outages and incidence of overloading of lines.

These indicated that voltage fluctuations were tied to seasonality in load factor and increase in instances of excessive loading of lines led to additional outages in the system. Consequently, capacity of WBSETCL's system to maintain prescribed voltage was not aligned to deal with seasonality in load factor by installing reactive power support as required under the Grid Code.

The Government / Management in their reply (June 2022) stated that voltage regulation for 400 KV, 220 KV and 132 KV systems were being monitored and controlled from SLDC and Operations and Maintenance (O&M) Wing. SS follows SLDC's instruction and change bus voltage in 400 KV, 220 KV and 132 KV systems, as directed by SLDC.

Voltage in 66 KV and below are being controlled from EHT Sub-station, by transformer Tap Changing Operation and so the voltage is never below permissible range for 66KV and 33KV system, but generally kept above the permissible range for low voltage problem at remote SS of DCL.

However, WBSETCL is going to install five 125 MVAR Bus Reactors in five 400KV sub-stations viz. Kharagpur 400 KV, Durgapur 400 KV, New Chanditala 400 KV, Gorkarna 400 KV and New PPSP 400 KV Sub Station for reactive power compensation, as well as voltage management. Also, WBSETCL is going to install 33 KV, 670 MVAR, Capacitor Bank in 39 numbers 132 KV SS, for reactive power compensation, as well as voltage management.

The above reply, however, does not address the steps taken for reactive power compensation for 220 KV substation. Moreover, PoSOCO observed (March 2021) that reactive power support by grid operators, viz. WBSETCL, is important for voltage stability, efficiency of transmission network, power quality, equipment safety and above all, the grid stability and continuity of power. Consequently, static reactive power sources like bus reactors, line reactors, capacitor banks *etc.* were required to have been installed by WBSETCL for reactive power management. In addition, generating stations have dynamic reactive power sources like synchronous condenser to control reactive power. Thus, WBSETCL cannot abdicate responsibility for deviation from voltage norms.

Hence, maintaining voltages within permissible limits and avoiding frequent outages/opening of lines under over-voltages requires planning and installing

---

<sup>195</sup> Ratio of average load to peak load in a given time period.

<sup>196</sup> Determined for the five years from 2016-21, by calculating relationship between monthly percentage of instances of outages compared to corresponding percentage for overloading of lines in EXCEL.

reactive power support like static shunt compensation and dynamic reactive power compensators such as fixed shunt devices, switched shunt devices, static synchronous compensators, static VAR compensators, battery energy storage systems *etc.* locally.

### **3.11.2 Inadequate Maintenance**

Live-line working or hotline maintenance involves maintenance, repair or replacement activity carried out on a live and operational line or switchyard apparatus using approved techniques and equipment. To obviate necessity to shut down electrical systems for maintenance services, it is mandatory to develop safe and practical techniques that would allow continuous electrical power supply, thereby reducing the risks and minimising the costs for the transmission and distribution companies.

The Government of India, Ministry of Power, constituted (November 2001) a Committee for updating best practices in Transmission System in the country. The Committee observed (January 2002) that Power Grid Corporation of India Limited (PGCIL) employed live line testing and maintenance techniques for transmission lines and sub-stations to avoid system outage. In addition to scheduled patrolling of lines, the Committee prescribed the following techniques for maintenance of lines -

- Hot line maintenance
- Hot line washing
- Hot line puncture detection of insulators.
- Preventive maintenance by using portable earthing hot line tools.
- Vibration measurement of the line.
- Thermo-scanning.
- Pollution measurement of the equipment.

Accordingly, the Committee recommended utilising the training facilities at Hot Line Training Centre of CEA at Bangalore. WBSETCL, however, did not utilise the facilities to update and equip itself with hot line monitoring and maintenance. As a result, WBSETCL did not have any hot line division, sub-division or manpower trained in hot line maintenance till March 2021. Consequently, WBSETCL had to resort to shut down for maintenance. Adoption of shutdown maintenance increases chances of breakdown and leads to sub-optimal use of manpower and resources.

WBSETCL confirmed (March 2021) they had no hot line maintenance, but did not mention any reasons for not adopting hot line maintenance.

The Government/ Management in its reply (June 2022) stated that WBSETCL system had a vast network of EHT transmission lines and grid substations with adequate flexibility and ample redundancy. WBSETCL had flexibility to avail shutdown for preventive maintenance of lines & SSs.

However, some hot link maintenance like hot line Puncture Detection of Insulators (PID), Partial Discharge test and Thermo vision scanning is being done in live lines as per requirement, to pinpoint the probable fault locations for their rectification. In addition, thermo vision scanning, partial discharge

tests *etc.*, regularly carried out for Switchyard equipment and Third Harmonic Measurements of Lighting Arrestors, were also done periodically.

Moreover, under the present scenario, WBSETCL has no requirement for further infrastructure for hot line maintenance, as it was not cost-effective for the system, having adequate flexibility to avail shutdowns.

The reply of the Government/ Management was, however, not supported by an appropriate cost benefit analysis. Further, the reply was silent on the reasons for non-adherence to the recommendations of the Committee for updating best practices in the Transmission System in the country.

### **3.11.3 Metering, accounting and auditing of energy**

In West Bengal, effective from April 2008, WBERC's (Balancing and Settlement Code) Regulations 2008 regulates intra-state availability-based tariff (ABT) energy accounting and deviation settlement mechanism of all electricity agencies. Subsequently, the National Grid became operational from December 2013, with regional and state power systems working as a single synchronous system. Financial settlement of all energy transactions requires a comprehensive and fail-safe energy accounting and settlement system.

When WBSETCL transmits energy from generating stations/ inter-state boundary points to WBSEDCL, the distribution company, some energy is lost in transmission. Transmission loss is the difference between energy received from generating stations/ grid and energy transferred to WBSEDCL. Energy accounting and deviation settlement is based on metering data from grid boundary points. It was seen that 100 *per cent* metering was not achieved at boundary points. Between April 2017 and March 2021, there were 2,486 to 2,561 boundary points of which 382 (15.37 *per cent*) to 552 (21.55 *per cent*), respectively, were not metered. Consequently, neither total energy drawn by WBSEDCL could be measured nor total transmission loss in WBSETCL system determined. WBSETCL stated (December 2020/ February 2022) that in 2016-17, annual transmission loss was 3.45 *per cent* and thereafter from 2017-18 to 2020-21, annual loss was 3.40 *per cent* (normative value). However, on compiling WBSETCL's month-wise data on energy input/ output, overall loss and technical loss from April 2016 to March 2021, it was seen that actual annual losses, determined by aggregating the monthly data for each year, were lower. These losses ranged from minimum of 2.29 *per cent* (2020-21) to maximum of 2.76 *per cent* (2017-18). Hence, WBSETCL's annual transmission losses were overstated. WBSETCL's reasons for variations were awaited (February 2022).

Meanwhile, to remedy incomplete metering and energy accounting, WBSETCL's BoD proposed (November 2017) to take up a project under SAMAST<sup>197</sup> for 100 *per cent* metering, data acquisition and accounting. WBSETCL applied (December 2017) to take up the project under Power Sector Development Fund (PSDF) scheme of the Ministry of Power, Government of India (MoP GoI). The project was scheduled to be commissioned within December 2018. MoP GoI

---

<sup>197</sup> The Forum of Regulators (FoR) through its Technical Committee had formulated (July 2016) the principles for implementation of SAMAST (Scheduling, Accounting, Metering and Settlement of Transactions in Electricity) at the State Level.

approved (March 2020) the project at a cost of ₹ 11.20 crore. Thereafter, MoP GoI sanctioned (March 2021) ₹ 1.01 crore.<sup>198</sup>

The Government/ Management in their reply (June 2022) stated that, according to the concept of Boundary Metering, meter readings were taken at all incoming and outgoing transmission lines from 132 KV to 400 KV and 33 KV output of Transformers. Hence, the loss calculation includes loss at all 400 KV, 220 KV and 132 KV Buses and at all 400/220, 220/132, 132/66, 132/33 and 66/33 Transformers. Meters were installed at all the above referred boundary points and readings taken regularly for Energy Auditing.

Moreover, the Letter of Award for implementation of SAMAST has already been placed in December 2021, after which real time data will be available for more accurate calculation of transmission loss. The work of implementation of SAMAST project is in progress. At present procurement and supply of different materials is under progress.

The reply of the Government/ Management was not acceptable, as transmission loss was calculated on normative basis, although meter was installed at boundary points and readings being taken regularly. Further, the work of implementation of SAMAST needed to be expedited, as the inordinate delay of more than three years was leading to improper calculation of transmission loss. The calculation of transmission loss on normative basis leads to projection of higher energy requirements for distribution, which passes on to the consumers through tariff.

#### **3.11.4 Monitoring and supervision of projects by WBSETCL – *Non-compliance of Safety Manual***

Clauses- 28 and 60 of Transmission Safety Manual (September 2009) of WBSETCL, require ensuring use of personal protective equipment and deployment of a safety coordinator by the contractor to ensure the implementation of safety requirements of the contract. Scrutiny of records revealed that during of construction (LoA issued in February 2013) of Mathabhanga GIS 132 KV and two 132 KV SS at Coochbehar and Moinaguri, the contractor failed to comply with the aforesaid clauses. Consequently, on two occasions in May and June 2013, accidental deaths of two workers occurred at GIS. However, WBSETCL took no penal action nor issued warning to the contractor for non-compliance on either occasion.

Government/ Management in reply (June 2022) stated that, after occurrence of these incidents, an enquiry committee was formed by WBSETCL and in its report, M/s EMC Ltd. was found responsible for both the incidents. Necessary compensation in this regard was paid by M/s EMC Ltd. for these casualties. M/s EMC Ltd. was instructed to follow safety rules strictly. Thereafter, WBSETCL continued to monitor the compliance of safety protocol followed by the agency and also the overall issue. Presently, all the executing agencies are following the safety measures with use of safety PPEs.

The reply of Government/ Management needs to be seen in light of the fact that the contractor violated the safety measures specified in the Safety Manual of WBSETCL, which resulted in accidental death of two individuals. This also

---

<sup>198</sup> First instalment of 10 per cent of sanctioned amount of ₹ 10.08 crore.

indicated lacunae in monitoring of the project execution by the contractor and the management.

### 3.12 Conclusions and Recommendations

#### 3.12.1 Conclusions

Transmission system in the power sector is the critical component that provides the conduit between power generation and the distribution of power till the last mile, *i.e.*, the consumer. A coordinated and robust transmission infrastructure is therefore essential to ensure that power generated is evacuated and distributed efficiently and safely, with minimum disruptions. It follows that the transmission utility must necessarily closely coordinate with the power generating and the power distribution utilities to be effective.

WBSETCL had planned for higher capacity than required leading to declining trend in overall network utilisation between 2017-18 and 2020-21. The unutilised capacity ranged from 14.79 *per cent* to 32.55 *per cent*; excess transformer capacity of 1,595 MVA in the five years was created at a cost of ₹ 67.79 crore. In the same period, transmission cost per unit rose from 17.87 paisa to 24.51 paisa. Assets utilisation was not commensurate with investment and consumers paid a higher per unit cost for transmission.

During 2016-21, WBSETCL's aggregate achievements for construction/upgradation of sub-stations, additions to transformer capacity and transmission lines were 35.62 *per cent*, 65.74 *per cent* and 39.90 *per cent*, respectively. In this regard, Audit observed that WBSETCL prepared plans based on electricity demand forecasts that varied from WBSEDCL's demand forecasts by (-) 15.42 *per cent* to (+) 15.97 *per cent*. Moreover, while overall capacity in the transmission system exceeded requirement; specific sub-stations were found to be congested as geographical distribution of the additional capacity created was not according to load demand. Thus, planning for creation of new capacity and ensuring its precise distribution in accordance with demand was not optimised and the transmission system was not uniformly robust. This also indicates a lack of coordination between WBSETCL and the generating company, WBPDC and the distribution company, WBSEDCL in planning for transmission infrastructure.

Out of 35 selected projects, WBSETCL had either closed or terminated four projects and only one was completed within schedule. Eight projects were delayed by two to 176 days from technical approval to award of work. These delays were attributable to extension of time for submission of bids and deviations of offers quoted from tender specifications. Other delays seen during execution were changes in drawings and design/ civil works, issues of land/site clearance/ Right of Way (ROW) and belated supply of equipment, *etc.* In consequence, WBSETCL incurred cost overrun of ₹ 62.31 crore.

In eight of the selected projects, WBSETCL had, in violation of General Conditions of Contract, also issued 'Taking-Over' Certificate prior to completion of important works such as dismantling of towers, submission of 'As built' drawings/ documents in requisite numbers of copies, final joint checking of lines, *etc.* This always creates a risk for the owner.

WBSETCL was found to have awarded contracts to a bidder, while being aware that the said vendor had an unsatisfactory track record with WBSEDCL. Similarly, they awarded contracts to a vendor who was already under insolvency proceedings. In case of both vendors the contracts had to be ultimately terminated and work re-awarded at higher cost. The projects were also substantially delayed as a result. This indicated constraints in the WBSETCL's procedure for assessing financial stability of their vendors before awarding contracts. In eight projects, WBSETCL, in violation of General Conditions of Contract, issued Taking Over Certificates, although ancillary works such as dismantling of towers, stringing of conductors, submission of 'as built' drawings/ documents *etc* were not completed. Since dates of completion of projects were reckoned retrospectively, LD of ₹ 19.14 crore not imposed on contractors of these projects.

WBSETCL deviated from the Grid Code voltage criteria due to failure to install requisite reactive power and consider impact of seasonality in demand. These were necessary to ensure power quality, equipment safety and grid stability. In addition, WBSETCL did not have a hotline maintenance division, leading to total dependence on shutdown maintenance, with attendant risks of breakdown and ineffective utilisation of resources. Furthermore, WBSETCL had not achieved 100 *per cent* energy metering at boundary points. The shortfall ranged from 15.37 *per cent* to 21.55 *per cent* of boundary points. Consequently, transmission losses were overstated due to determining loss based on norms (3.40 *per cent*) and not actuals (2.29 *per cent* to 2.76 *per cent*).

### 3.12.2 Recommendations

Based on our audit, the following recommendations are proposed for consideration of the Government and WBSETCL -

- *Reinforce a system of coordination with WBPDC and WBSEDCL for review of Annual and Rolling Plans to ensure that plans and projects can be executed and where necessary modified in line with actual demand of energy, especially at the last mile level.*
- *Review the timelines for tenders and award of work and ensure their compliance as far as practicable.*
- *Modify parameters for selection of bidders to consider their performance against existing orders of WBSETCL and cash generated from operations by the bidders in the past three years to assess their continued financial health.*
- *Maintain capacity of sub-stations within permissible limits under WBERC (State Electricity Grid Code) Regulations 2007.*
- *Complete 100 per cent boundary metering at the earliest to determine actual transmission loss.*
- *Consider to adopt technology such as installation of reactive power sources and hotline maintenance for better grid stability.*

