Record Notes of Annual Performance Review of TPCODL held on 04.08.2025 at 11:30AM at OERC in the presence of the Commission

Date of Review : 4th August, 2025

Period of Review : April 2024 - March 2025

The performance of TPCODL for the FY 2024-25 was reviewed by the Commission on 4th August, 2025 at 11:30 AM. The CEO, TPCODL presented the performance of TPCODL and senior officials of TPCODL were present during the review.

TPCODL started its operation w.e.f. 01.06.2020 through the Vesting Order dated: 26.05.2020 in Case No.-11/2020 of the Commission. The operational area of TPCODL spreads across 29,354 sq.kms. area of central part of Odisha which includes the state capital (Bhubaneswar). Distribution network comprises of 374 Nos. of 33/11 kV sub-stations (250 Nos. are SCADA enabled), 825 Nos. of PTRs (5479 MVA), 69883 nos. of DTRs (5269 MVA), 4265 kms. of 33 kV lines, 29821 kms. of 11 kV lines and 41568 kms. of LT lines (37469 kms. of LT AB cable) which caters to a consumer base of about 3325438 (as on 31.03.2024) covering 9 Nos. of Revenue Districts (5 Circles, 20 Divisions, 65 Sub-Divisions, 247 Sections & 5 GRFs).

In the FY 2024-25, the EHT sales, HT sales and LT sales are 1993.65 MU, 2326.90 MU and 5370.97 MU respectively and total sales is 9691.52 MU. As compared to the sales in the FY 2023-24, the EHT sales has reduced by about 1% while there has been growth of about 10% and 14% in case of HT & LT sales respectively. Overall increase in sales is by 9.5% over the total sales of 8853.40 MU in the FY 2023-24. The consumer base has increased in the range of 3-4% over the last three years with complete sanitisation of the consumers. The total number of consumers as on 31.03.2025 is 33,25,438. Total numbers of employees of the licensee is 4864 with a ratio of 1.46 per 1000 consumers and 12,828 numbers of BA employees have been engaged by TPCODL.

TPCODL has taken various initiatives like organising programs as “Hum Surakshit, Ghar Surakshit” for BA employees and their families, have daily Safety Sunrise meeting at Section level, conducted 130 rallies for safety awareness and “Surakshit Sachetna Rath” for community outreach program in high risk zones/ elephant corridors. They have provided light weight multifunctional Hot stick and Neon Testers to Fuse Call Centres (FCCs) for ensuring safety. They also have 5 Nos. of Skill Development Centre, 17 Nos. of Practice Yards and have achieved 17872 training man days in the FY 2024-25. They have issued 450 notices to people involved in unsafe construction below/near live line and Electrical Installations.

TPCODL has achieved the Vesting Order targets w.r.t AT&C loss reduction, CAPEX investment and Past Arrear collection. It has 99.87% of the consumer base metered, out of which around 8.6% are Smart Meters. Metering is available at 33 kV feeders (86.64%), 11 kV feeders (94.19%), PTR’s (61.21%) and DTRs >= 100 kVA (66.83%). Around 46 feeders at 33 kV level and 48 feeders at 11 kV level are being controlled through Group Breakers. Further, 84 PTRs at 33 kV side and 48 PTRs at 11 kV side have Group breakers. TPCODL has submitted that these issues are being addressed progressively through CAPEX. Protection system has been restored in previously bypassed equipment at 41 bays and all the PSSs have adequate battery charger and battery set available. They have installed 195 Nos. of 11 kV Auto Reclosures, 2840 Nos. of Fault Passage Indicators, 191 Nos RMUs at 33 kV level and 1045 Nos. of RMUs at 11 kV level. For the FY 2024-25, the SAIFI is 248 Nos. and SAIDI is 210 Hrs. TPCODL has achieved 100% GIS mapping of assets and 96% of Consumer Indexing.

Various initiatives have also been taken by TPCODL for improving the power reliability such as use of expulsion type fuse units on feeder branches, use of humidity sensors and dehumidifiers in indoor breaker panels, application of SFRA and Furan Analysis for assessment of residual life of transformers and the pilot project of load trimming scheme in SCADA. The DTR failure rate has come down to 2.7% in FY 2024-25 from 6% in FY 2020-21.

Commission's Observations/ Directions:

1. The Commission took cognizance of the presentation made by the TPCODL and analysed various performance parameters. The summarized crucial performance parameters for FY 2024-25 presented by TPCODL along with previous years are given in the table below;

ANNUAL PERFORMANCE OF TPCODL as on 31.03.2025

BULK SUPPLY	2022-23	2023-24	2024-25	Commission's approval 2024-25	Increase/ Decrease in FY25 over FY24 (%)
DEMAND (MVA)	1620.00	2,243.82	2,451.93	2349.00	9.27
Energy input (MU)	9902.97	11,299.17	11,981.45	12513	6.04
SALE TO CONSUMERS (MU)					
EHT	1556.41	2020.14	1993.65	2162.878	-1.31
HT	1590.31	2111.22	2326.90	2356.69	10.22
LT	4511.072	4722.04	5370.97	5591.939	13.74
TOTAL	**7,657.79**	**8,853.40**	**9,691.52**	**10,111.51**	9.47
DISTRIBUTION LOSS (%)					
LT	25.91%	26.51%	21.73%	21.96%	-18.04
HT & LT	26.90%	26.36%	22.93%	23.20%	-13.02
OVERALL	**22.67%**	**21.65%**	**19.11%**	**19.19%**	-11.70
BILLING EFFECIENCY (%)					
LT	74.09%	73.49%	78.27%	78.04%	6.51
HT & LT	73.10%	73.64%	77.07%	76.80%	4.66
OVERALL	**77.33%**	**78.35%**	**80.89%**	**80.81%**	3.23
BILLING TO CONSUMERS (CR.)					
EHT	1117.44	1377.92	1383.65	1412.93	0.42
HT	1104.64	1471.07	1641.56	1586.40	11.59
LT	2444.42	2530.80	2866.16	2826.88	13.25
TOTAL	**4,666.50**	**5,379.78**	**5,891.38**	**5,826.21**	9.51
COLLECTION RECEIVED (CR.)					
EHT	1092.78	1377.92	1383.65	1398.80	0.42
HT	1107.53	1434.38	1654.29	1570.54	15.33
LT	2601.79	2596.19	2865.95	2798.61	10.39
TOTAL	**4,802.10**	**5,408.48**	**5,903.90**	**5,767.95**	9.16
COLLECTION EFFICIENCY (%)					
EHT	97.79%	100.00%	100.00%	99.00%	0.00
HT	100.26%	97.51%	100.78%	99.00%	3.35
LT	106.44%	102.58%	99.99%	99.00%	-2.53
HT & LT	104.52%	100.72%	100.28%	99.00%	-0.44
OVERALL	**102.91%**	**100.53%**	**100.21%**	**99.00%**	-0.32
AT & C LOSS (%)					
LT	21.14%	24.61%	21.73%	22.74%	-11.70
HT & LT	23.60%	25.83%	22.71%	23.97%	-12.07
OVERALL	**20.42%**	**21.23%**	**18.94%**	**20.00%**	-10.77

2. From the above table it is observed that there is increase in the sales at HT & LT level whereas no appreciable change is seen in EHT sales. The overall increase in sales of TPCODL in FY 24-25 over FY 23-24 is 9.5%. TPCODL must take proactive steps to reduce the number of interruptions, failure of PTR (2 Nos.) & DTR (2055 Nos.) and time of restoration. Necessary

preventive maintenance of distribution lines, clearing out of vegetation/creepers and condition monitoring of DTRs/ PTRs must be done regularly.

3. The TPCODL system has expanded over the years and system improvement can be identified from the details in the table below;

Particulars	As on 31st March 2023	As on 31st March 2024	As on 31st March 2025
No. of Active Consumers			
EHT	37	38	41
HT	2234	11720	11974
LT	3073159	3194842	3313423
Total	3075430	3206600	3325438
Network System			
No. of PTRs	816	826	825
No. of DTRs.	77549	77,549	69883
MVA Capacity of PTRs	4863	5184	5479
MVA Capacity of DTRs	5702	5768	5269
Length of 33 KV Line (ckm.)	4082	4129	4265
Length of 11 KV Line (ckm.)	39350	39560	29821
Length of LT Line (ckm.)	50435	52851	41568
Length of LT AB cable (ckm)	32925	36631	37469
Percentage of LT cable (%)	65%	69%	90%
Length of HT cable (ckm)	898	1050	996
No. of 33 kV feeders	233	250	262
No. of 11 kV feeders	1411	1404	1377

4. The SAIFI and SAIDI of TPCODL as per their submission are 248 Nos. and 210 Hrs. for the FY 24-25. But in the absence of complete digitization/ metering of all the DTRs, which currently is merely 18.58%, the data of SAIDI and SAIFI cannot be relied upon. Therefore, the DISCOMs directed to install 3 to 4 Smart Meters in every Village to monitor duration of availability of power supply, interruption analysis and deriving SAIFI & SAIDI values. Similarly, the Smart Meters already installed in Urban and Semi-Urban areas may be used for the above purposes. This may be done as an interim arrangement till all the DTRs are provided with Smart Meters.

5. The length of LT lines has reduced (41568 ckm as on 31.03.2025 as compared to 52851 ckm as on 31.03.2024) and LT cable % of the total LT lines in TPCODL is 90%. These are good measures taken by the licensee to reduce LT losses. However, out of 69883 Nos. of DTRs, 49% are less than 63 MVA and out of which 45% are single phase DTRs. TPCODL must take initiative to phase out lower capacity DTRs (i.e. 10 kVA, 16 kVA, 25 kVA) and standardize the DTRs in the system based on the area/ population of consumers. Such action would reduce overall O&M cost, reduce failure as less No. of DTRs can be maintained properly and overall transformer loss will also reduce. All the new DTRs should be planned basing on load growth in that area. Further, steps should be taken to move towards a 3 phase system even in rural areas and such initiative would help DISCOMs to balance loads in all three phases.

6. The total distribution loss is ascertained as 19.19% after assuming no technical loss at EHT level and 8% at HT level on normative basis. TPCODL must endeavor to complete 100%

metering of all 33 kV & 11 kV feeders and DTRs of capacity greater than 63 kVA so that the actual HT & LT loss can be calculated and loss prone area can be identified. This would help to focus the real loss prone areas which is otherwise shielded from corrective actions and normative loss figures at HT level can be assessed properly.

7. The DISCOM must further take necessary steps to reduce these losses at LT level by further reducing the length of LT lines wherever possible, using proper size of conductor, upgradation of overloaded DTRs, preventive maintenance with proper patrolling and actions to detect & check theft of electricity using ABC. The distribution losses have reduced from 22.67% in FY 2022-23 and 21.65% in FY 2023-24 to 19.19% in the FY under review (FY 2024-25). However, considering the CAPEX investments already done in the past years with Commission's approval and the Government's Grants provided under various schemes, the expected losses should have reduced further. The Divisions like NEND (42.59%), PED (30.16%), CED (41.65%), SED (36.30%), AED (50.28%), DED (33.94%) and TED (37.63%) have LT loss above 30% need special attention.

8. The loading level of the DTRs must be continuously monitored and upgraded with higher capacity to avoid failures due to overloading. Phase balancing of the DTRs must also be ensured. The inconvenience of power supply interruption due to overloading failure must be avoided with proactive upgradation beforehand. The swapping of DTRs as well as PTRs must be done for optimum use of DTRs/ PTRs while upgrading the capacity of DTRs.

9. It is observed that out of total 825 Nos. of PTRs, only 718 nos. of PTRs have Circuit Breakers and associated relay protection system which is not expected after more than five years of operation of TPCODL. Any fault in PTRs without proper protection system would affect EHT system of OPTCL thereby tripping of the Power Transformer(s) affecting the power supply of larger area which could have been avoided. TPCODL must ensure installation of CB and the associated protection system in all the PTRs (both on HV & LV side of PTRs) on priority basis. There are 135 Nos. of Group control breakers. However, there should be individual CBs for each 33 kV & 11 kV feeders and PTRs instead of any Group Control Breakers at 33 kV and 11 kV level to achieve the objective of reliable power supply.

10. Action plan should be there to ensure that the protection system complete in all respect including provision of Surge Arresters, is in place at 33 kV & 11 kV level for all feeder/lines/cables, power transformers, etc. along with timeline for completion. The provision of required protection for DTRs should be taken up and completed in phases as early as possible. The relay coordination should be done properly in consultation with OPTCL to avoid tripping at OPTCL end.

11. Out of 374 Nos. of PSSs, 96 Nos. of PSSs (26%) are without boundary wall and out of 69883 Nos. of DSSs, 37828 Nos. (54%) are without proper fencing. This endangers the safety of humans, animals and the equipment. Due to various reasons fatal accidents have occurred in the licensee's area of operations resulting in 34 deaths of human and 32 animal deaths in the FY 2024-25 i.e. average death is about 3 per month. TPCODL needs to take steps to create an accident free operating environment ensuring zero casualty of employees (including BA employees) and create awareness among public regarding electrical safety. The shortcomings of unavailability of boundary walls/ fencing, inadequate safety ground clearance, absence of proper earthing etc. must be addressed with corrective measures.

12. Licensee has taken various initiatives and has developed many platforms for addressing consumer grievances. However, lot more action is still required to increase consumer satisfaction level. It has come to the notice of the Commission that the response from call center or digital media platforms is not upto mark and routine/ standard reply is received by consumers for any query relating to restoration of power supply in case of fault. There seems to be no standard practice for routine maintenance. Wherever possible, outage for providing new connection(s), upgradation/ augmentation work, replacement of DTRs/ defective meters may be clubbed with scheduled maintenance activities covering maintenance of DTRs, PTRs, tree trimming, clearing of vegetations etc. Frequent power interruptions for all such activities must be avoided. The schedule should be planned in advance and accordingly consumers must be intimated. The complaint handling system/ procedure followed at TPCODL end must be reviewed and improved accordingly. Further, as per the submission of TPCODL, around 22,055 Nos. of applications for new connections were pending as on 31.03.2025 whereas it is in the range of 1000-2500 Nos. for the rest of the DISCOMs. TPCODL must dispose of the applications for new connections in a time bound manner as per the Regulations.

13. The Commercial losses of the Divisions like NEND, PED, AED & SED needs to be improved by sensitizing the consumers of such high loss prone areas of the DISCOM. The DISCOM may communicate the consumers of such area in transparent manner by mentioning following information in a Notice Board on monthly basis at Section Office/ PSS Office and if possible, at the Panchayat office in both English and Odia language;
    a. Duration of power supply available in the area.
    b. No. of interruptions and duration of outage due to routine maintenance
    c. Billed amount against consumers in the area
    d. Revenue realized and outstanding dues of the consumers in the area against the bills raised.
14. There is a notion among the consumers that the Smart Meters record higher reading as compared to the Static meters. The DISCOMs may install a Smart Meter alongside the current Static Meter at any government office, such as Panchayat Office to show the consumers that the energy recorded in both the meters are the same. This may remove some of the wrong perceptions/ apprehensions in the mind of consumers about the Smart Meters.

15. TPCODL has employee ratio of 1.46 per 1000 consumers which is almost close to the approved ratio of 1.4 per 1000 consumers as per the direction of the Commission. However, this does not take into account the strength of BA employees engaged by the licensee, which is 12828 who are engaged in O&M of distribution line, PSSs & DTRs and involved in projects and A&G activities. The employee expenses of TP DISCOMs are about 13% of the Average Cost of Supply (ACoS) and the percentage would increase further if the BA employees engaged under A&G and R&M are taken into consideration. As per the Report of Forum of Regulators (FOR) on 'Analysis of Factors Affecting Viability of DISCOMs and Recommendations for its Improvement' published in January 2025, mentions that employee expenses below 5% of ACoS is highly desirable, expenses in the range of 5-6% of ACoS is acceptable and anything beyond 6% requires graded rationalization. However, with utilities in hilly areas and island areas, percentage will vary based on Utility specific factors. Therefore, the employee expenses of TP DISCOMs, which is very high, needs corrective measures for reduction.

16. The TP DISCOMs may put collaborative effort and take up consumer awareness program to create appealing short videos on various power system issues such as importance of earthing,

sensitise benefits related to Smart Meter, digital payments & LCCB in domestic houses, encourage PMSGY scheme & PM-KUSUM scheme etc. These short videos can be circulated in digital platforms and in their official websites. The scrolling related to these topics may be given during the eligible TV channels that people of different age groups prefer, so as to cater the information to all age group viewers.

17. All 33kV & 11kV feeders/lines & 33/11 kV transformers are supposed to be provided with CBs, prioritizing 33kV system followed by 11kV system. Direct tapping of lines/feeders without proper CBs/ RMU and Group control breaker arrangement at 33kV and 11kV level should be removed on priority basis to achieve the objective of reliable power supply.

18. Even after completion of more than 4/5 years of operation, guard wires have not been provided at road/ bridge/ railway crossings to avoid fatal accidents due to conductor snapping. DISCOMs are directed to complete such work by end of FY 2025-26 for 33kV/ 11 kV lines. Conversion to UG cable as proposed under CAPEX investments may be taken up in stages based on importance and cost benefit analysis. To reduce transient faults on lines, tree trimming, clearing of vegetation along the distribution lines and at electric poles/ tower locations need to be taken up regularly.

19. The Distribution Licensee is directed to;

    a. Take initiatives for development and peomotion of EV charging infrastructure in their area of operation.

    b. Take up pilot projects in co-ordination with Government of Odisha for V2G (Vehicle to Grid) projects to support the grid during peak hours.

20. As discussed to realise a trip free system, DISCOMs are directed to start with some identified cities in the operating area of each DISCOM (as advised by the Commission) like Bhubaneswar & Puri (in TPCODL area) Balasore & Keonjhar (in TPNODL area), Berhampur (in TPSODL area) and Rourkela & Sambalpur (in TPWODL area). The planning can be done to start with limited area of operation in the city so that minimum interruption/ interruption free operation is realized and visible by the service provider and the customers. This would enhance the level of confidence and subsequently, operating area may be increased/ extended in phases to cover the entire city or to other areas to achieve the ultimate objective. A broad concept is enclosed as Annexure-I along with a check list.

Annexure-I

Broad concept of interruption free/ minimum interruption operation

The broad criteria/considerations in respect of Planning, Design & Engineering and O&M are expected to be in following line for developing trip free/uninterrupted and safe power supply to cities/towns with ultimate objective of 24x7 quality power supply to all.

(1) Planning :

a) Planning based on Distribution system load flow study should be the basis for strengthening and expansion of distribution network. The load demand of various PSS shall be such that 33 kV and 11 kV feeders, PTRs and DTRs are within 80% of their rated capacity considering present and future load growth for next 5 years.

b) The cyclone resilient Distribution system (Distribution lines & Sub-stations) needs to be planned & designed for coastal areas in line with relevant guidelines of GoI & GoO, to prevent large scale damage to Distribution assets of the State during cyclone.

c) No. of PSS and transformation capacity in the operating area of the Distribution licensee must be adequate for meeting present load and future load for next 5 years.

d) City PSSs should be indoor AIS (indoor switchgear) or indoor GIS (GIS is preferred to AIS, particularly in cyclone prone area, in order to improve reliability and reduce maintenance cost and improve authestics) and SCADA enabled for real time monitoring, remote control & unmanned operation ensuring cyber security and should be suitable for Advance Distribution Management System. The reliability indices i.e. SAIDI, SAIFI, CAIDI & CAIFI must be derived from the SCADA and AMI (smart metering) without human intervention. Adequate space provision for feeders & transformers should be there for future expansion to avoid creation of new PSS in near future in nearby area.

e) The MVA capacity of PSS need to be standardised. All PSSs should have N-I contingency for both incomer (ideally from OPTCL's GSS) and PTR. PTR should be of identical rating and minimum Rating of PTR should be 2X16/12.5 MVA and PSS capacity should be at least 32/25 MVA in initial phase and to be enhanced by addition of 3rd PTR of similar rating. The minimum rating of DTRs in cities/towns should be 63 kVA (11 kV/0.4 kW) and above considering future load growth, thereby the no. of DTRs and tapping points would be reduced at 11 kV level which will support/help in easy monitoring and providing smooth & trouble-free service. Accordingly, provision of No. of 11 kV feeders needs to be planned (at least 4 no. of 11 kV feeder in initial stage and provision for additional feeder in subsequent phase).

f) Formation of ring(s) between PSSs would further improve reliability and ring(s) is to be fed from at least two 132 kV/33 kV GSS or 220 kV/33 kV GSS or combination of both.

g) Important/critical installation like hospital, airport, water works, govt. establishment, defence establishment, etc. should have duplicate connectivity to improve reliability and availability of power supply. As far as possible Agriculture feeder should be segregated for solarisation (pump level & feeder level solarisation under KUSUM-C).

h) All overhead distribution lines have to be either covered conductor or ABC depending on voltage level to avoid any fatal accidents. In city area underground cable system shall be provided at 33 kV level in initial phase and may be extended to 11 kV system in stages.

i) The conductor size and cable size shall be suitable for catering to load growth in next 5 years.

j) Replacement of old & aged assets need to be planned in advance to ensure interruption free power supply.

k) Adoption of state-of-art technology, digitalisation (wherever feasible), adoption of best practices and promotion of innovation should be our prime objective to improve performance, increase operational efficiency and minimize human intervention.

(2) <u>Design & Engineering :</u>

a) The switching scheme (busbar scheme) in each PSS has to be Double Bus/Main & Transfer Bus Scheme with bus coupler or in worst case single bus with sectionalizer at 33 kV level and single bus with sectionalizer at 11 kV level.

b) The length of 33 kV and 11 kV lines should be ideally limited to 20-30 KM and 10-20 KM respectively without any direct tapping at 33 kV level and direct tapping at 11 kV level should be reduced in course of time. Existing direct tapping point should be provided with RMU (i.e. with CB and/motorised isolator for remote control) and RMU should have provision for PT so as to provide required metering arrangement for energy audit. The size of conductor and length of line are to be decided properly to avoid overloading of line and improve voltage profile (address low voltage issue). The conductor size shall be uniform for entire length of line (conductor of different sizes should not be in different sections of existing line).

c) In case of ring formation between PSSs, the size of conductor linking the PSSs as well as the link from GSS need to be properly decided taking into account the load on the PSSs and considering outage of one of the links from GSSs.

d) Provision of Auto reclosure, sectionaliser and Fault Passage Indicator (FPI) are to supplement the reliable and trouble free operation of the system by reducing area of outage during faults.

e) The required relay protection system (using digital numerical relay) including surge arresters should be in place for all 33 kV and 11 kV feeders, PTRs and DTRs. The required fire protection should also be provided in all PSS.

f) The duplicate battery and associated battery charging system should be in place and rating of battery & associated charger should be standardised.

g) Proper earthing of equipment in PSS including transformer and fencing should be done for smooth operation of relays and to avoid accidents. The communication system should be provided with Surge Protective Device (SPD).

h) The Distribution Transformers (DTRs) shall be provided with LT Distribution Boxes (LTDBs).

i) The vacuum type CB should be preferred to SF6 type CB considering environmental hazard.

j) All road crossing of overhead lines should be provided with guard wire and minimum safe electrical ground clearance should be maintained at all places for all overhead lines with bare conductors. DTRs are to be fenced to avoid unauthorised access and accident(s).

k) Provision for islanding scheme should be in place to isolate the faulty section of the feeder connecting rural areas so that power supply to city area is not affected and power supply to entire feeder is not affected.

l) Asset mapping and consumer indexing has to be completed so as to trace the connectivity of a consumer from the delivery point upto DTR/PSS and asset register is to be linked with asset mapping.

m) Metering has to be completed at all level (33 kV and 11 kV feeders, DTR, PTR, consumers of all category) and smart metering shall be the ultimate objective so that actual AT&C loss can be assessed based on energy audit and relevant data can be used for better operation & control of the system.

n) All domestic consumers are to be provided with Earth Leakage Circuit Breaker (ELCB) for safety.

o) Standardisation of rating of equipment/material including PTRs & DTRs, standardisation of MVA capacity of PSS, span length of 33 kV & 11 kV overhead lines and standard specification for all equipment/material including PTR, DTR has to be formulated to optimise cost of procurement, for faster delivery, to avoid repeatation of type tests and to facilitate interchangeability.

p) The insulators of overhead distribution lines in coastal area shall be polymer based and higher thickness of galvanisation of steel structures need to be ensured.

q) All equipment/material should comply to relevant IS; Rules, Regulations and guidelines of CEA, MoP, OERC.

(3) <u>O&M</u> :

a) The condition of poles/towers of existing lines and their foundation need to be checked keeping in view the resilience of the structure and foundation for cyclonic wind speed and accordingly, they are to be replaced/strengthened. The requirement of interposing pole for long spans in existing line(s), double pole and guy wire etc need to be assessed and provided for existing overhead line to maintain required minimum safe electrical ground clearance and to avoid cascade failure. Regular condition monitoring (using modern diagnostic tools) of supporting structures, conductor, insulators, hardware fitting of overhead line and

underground cables, ABCs, covered conductors need to be conducted to ensure healthiness of assets. Regular tree trimming need to be ensured.

b) Condition monitoring of assets in PSS (equipment/material) including PTRs & DTRs need to be carried out by conducting various diagnostic tests using modern diagnostic tools to keep the equipment/material healthy in order to provide trouble free service. In addition, power quality monitoring needs to be done using suitable devices/meters. Earthing system needs to be monitored regularly for safe operation of protection system and safety of human being & animals.

c) Proper database needs to be maintained and need to be available for statistical & econometric analysis, performance assessment/review and validation of result of Distribution system study.

(4) In addition to above, any other additional features may be included based on past experience and future trend adopting best practices & state-of-art technology.