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Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg, New Delhi – 110001
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Dated: 5th June, 2023

To

The CMD **REC Ltd.** **Plot No.I-4, Sector-29** **Gurugram, Haryana – 122001**	**The CMD** **PFC Ltd.** **Urjanidhi 1, Barakhamba Lane,** **New Delhi- 110001**

Subject: DPRs for System Augmentation and Modernization under RDSS.

Sir,

I am directed to forward herewith the guidelines for scrutiny of DPRs for System Augmentation and Modernization works under RDSS as submitted by CEA, duly approved by the Secretary (Power).

2. In this regard, REC and PFC are requested to take necessary action. Further, requirement of additional funds under RDSS may be worked out accordingly.

3. This issues with the approval of Secretary (Power).

Yours faithfully,

Encl.as above

(Bimlesh Pawar)
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Copy to:

1. PPS to Secretary (Power)
2. Chairperson, CEA,
3. PPS to Joint Secretary (Distribution)

Guiding principles for Preparation of Detailed Project Report (DPRs) for System Augmentation &Modernization Works under RDSS

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Introduction

The guiding principles for preparation of Detailed Project Report (DPR) for System augmentation and modernization works under RDSS enlists various considerations to be ensured for proposed broad categories of works. The guidelines detailed herein are primarily meant for strengthening and modernization of distribution network for 66/33/11 kV system and LT level as proposed by the DISCOMs and subsequently recommended by Nodal Agencies (REC and PFC).

The key objectives of the Detailed Project Reports (DPRs) should be:

1. To ensure design of distribution system to meet projected load growth
2. To ensure optimum network element loading with focus on minimum technical loss
3. To ensure voltage profile are within permissible levels
4. To ensure reasonable overall cost
5. To enhance reliability of the power supply network with formation of ring and radial or combination of both circuits
6. To ensure improvement in quality of power supply
7. To evolve automation and load management system

Key considerations for preparation of DPRs for System Augmentation & Modernization Works

The key parameters which must be considered by DISCOMs/Nodal Agencies for development of a comprehensive Detailed Project Report (DPRs) for modernization works are listed below:

1. **Service conditions of distribution network**
    - Existing network topology in the plan area
    - Load to be served and expected load growth rates in view of socio-economic development in the area
    - Load density in the area
    - Length of lines
    - Source/point of supply
    - Serviceable age of network / equipment

2. **Technical design of distribution network**
    - Voltage regulation at each existing voltage level is as per regulations

- Protection and operation of the system
- Standardization of equipment
- Electrical clearances
- Standardization of all construction and O&M practices in line with the modern and best practices followed in other states

3. Unit Cost

- The unit cost of various equipment should be based upon latest approved Schedule of Rates of respective DISCOMs or the latest awarded cost whichever is lower, with the 5 % increment.
- The rates to be considered must be justified and should be comparable with neighbouring states.

Only after assessing above parameters, the Detailed Project Report (DPRs) should be prepared. Moreover, it is advisable that DISCOMs should conduct exhaustive field surveys and technical studies to prepare Detailed Project Report (DPRs) for modernization works. DPR must provide adequate information and justification of proposed works based upon aforementioned survey and technical study conducted by the DISCOM.

Guiding principles for following broad categories of works to be considered by DISCOMS

The guiding principles for broad categories of works to be considered for new network, network augmentation and upgradation works are listed as below:

1. Substation Works

Sub-station works should be proposed under following two categories:

a. Construction of New Sub-station

Construction of new sub-station should be proposed on the basis of spatial load forecast (expected load growth up to 2030), demographic factors, space availability, right of way considerations, existing network configuration etc.

Looking at future space crunch and increasing cost of land, each substation planned should have enough space to install additional Power Transformer and bays, based on future load growth in the area. Following criteria may be considered for proposing a new sub-station works in modernization DPR.

- Status of land availability /Right of Way
- Peak load of the existing sub-station (from which load is proposed to be shifted to new sub-station) has reached about 80% of the installed capacity
- Capacity of the new sub-station shall be determined on the basis of expected load growth to be met considering peak growth up to 2030
- Shifting of load to nearby Sub-station is not feasible to reduce the loading.
- Augmentation of Power Transformer / addition of power transformer is not feasible due to various reasons viz. space in the control room / switchyard bay is not available to accommodate new equipment/devices, inadequate upstream capacity, space for additional power transformer & related accessories are not available in the existing sub-station, etc.
- Sufficient in-feed capacity (upstream capacity) is available to supply power to proposed new sub-station
- New Sub-Station may also be proposed to curtail length of long 11 kV feeders supplying power to upcoming load centres, if load sharing with the adjacent feeders/sub-stations is not possible.

Note: New sub-stations should not be proposed as a measure to improve only voltage profile of 11 kV feeders emanating from existing 33/11 kV sub-stations in the area. To improve voltage profile DISCOM must consider installation of capacitor banks (reactive power compensation) at existing sub-stations considering Power factor at 11 kV bus at grid is less than 0.9 and Capacitor bank

is not available at 11 kV side of Power Transformer.

- APFC control panel may also be installed in existing sub-station to control the reactive power.

All new equipment proposed to be commissioned/ installed should have SCADA/RTDAS compatibility.

b. Sub-Station Capacity Up-gradation

- **Additional Power Transformer at Existing Sub-Station**

  Additional power transformer at existing sub-station should be proposed considering following points:

  - The peak load of existing Power Transformer has reached about 80% of the installed capacity
  - Shifting of load to another Power Transformer within permissible limit in the same sub-stations is not feasible.
  - Shifting of load to near-by sub-station is not feasible.
  - Space for additional power transformer and related accessories are available.
  - Sufficient in-feed capacity (upstream capacity) is available.
  - All new equipment proposed to be commissioned/ installed should have SCADA compatibility.
  - The capacity of the additional Power Transformer shall be determined on the basis of expected load growth to be met considering peak growth up to 2030

- **Power Transformer augmentation at existing Sub-Station**

  Augmentation of power transformer at existing sub-station should be proposed considering following points:

  - The peak load of existing Power Transformer has reached about 80% of the installed capacity
  - Equipment has outlived its prescribed useful life
  - Sufficient in-feed capacity (upstream capacity) is available.
  - All new equipment proposed to be commissioned/ installed should have SCADA/RTDAS compatibility.
  - The capacity of the augmented Power Transformer shall be determined on the basis of expected load growth to be met considering peak growth up to 2030

2. HT (33 kV, 22 kV and 11 kV) Feeder works (Emanating/ Feeding/ Inter-Connecting Existing Sub-Station)

Standard conductor sizes should be adopted for 33 kV, 22 kV and 11 kV lines. ACSR, AAAC, HTLS conductors or ABC, covered conductors (for lines passing through fault prone areas) may be considered for overhead lines. The parameters to be considered for new feeder works are thermal limit of conductors to meet the expected loads, economic loading and voltage regulation of the lines along with related spare requirements.

a. New 33 kV, 22 kV lines

New 33 kV and 22 kV lines should be proposed considering following points:

- RoW is available
- Existing feeders are loaded more than 80% of the rated capacity
- Load shifting is not feasible
- Upstream capacity and infrastructure and space for bay construction/additional panel is available.
- Interconnections for enhancement of reliability in SCADA DMS towns

Replacement of existing lines may also be considered in case feeder is more than 25 years old and is causing frequent breakdowns.

b. New 11 kV lines from Existing Sub-station

Laying of new 11 kV feeders should be proposed considering following points

- RoW available
- Existing feeders are loaded more than 80% of the rated capacity
- Load shifting is not feasible
- Upstream capacity and infrastructure and space for bay construction/additional panel is available
- Length of the existing feeder is more than 20 KM
- Interconnections for enhancement of reliability in SCADA DMS towns

Replacement of existing lines may also be considered in case feeder is more than 25 years old and is causing frequent breakdowns

c. Augmentation of existing 33 kV, 22 kV and 11 kV Lines

Augmentation of existing 33 kV, 22 kV and 11 kV lines should be proposed considering following points:

- Existing cable/ conductor has outlived its useful life of around 25 years and is causing frequent breakdowns
- Existing cable /conductor is undersized and unable to carry peak load or

overloaded

- Re-conductoring of existing lines to cater load transfer in SCADA DMS Towns

d. Conversion of existing HT (33 kV, 22 kV and 11 kV) Lines into Aerial Bunched Cable/Covered conductor

- Existing HT network with bare conductor has outlived its life (25 Years) and giving frequent trouble in operation. The details of faults during last one year may be considered
- Safety concerns/ safety clearance are not available
- More transient fault in bare conductor lines due to dense vegetation etc.

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Underground cables for 33 kV, 22 kV and 11 kV network should not form part of DPRs for System augmentation and modernisation works.

3. Distribution Transformer Works

For ease of operation and maintenance, the distribution transformers to be installed in distribution system should preferably have standard rating of 25, 63,100, 250, 315, 400, 500, 630, kVA, etc.

Following criteria may be considered for proposed for:

a. New / additional distribution transformers works:

- Availability of land.
- The Peak Load of existing Distribution Transformer has reached 80% of the installed capacity.
- Augmentation of existing distribution transformer is not feasible.
- Sufficient in-feed capacity (upstream capacity) is available.
- For Distribution transformer of capacity 500 KVA or more, suitable plinth arrangement shall be provided.
- The capacity of the Distribution transformer shall be determined on the basis of expected load growth to be met considering peak growth up to 2030

  Replacement of existing DT may also be considered in case DT has been repaired/ rewinded more than 5 times and is causing huge losses and frequent failure.

  New DTs may also be required in case of inclusion of Mini RTU/FRTU based DT Monitoring system (DTMS) for health monitoring of DTs 100KVA or more capacity & integration with SCADA /SMFS/RTDAS.

b. Augmentation of existing Distribution Transformers

- The Peak Load of existing Distribution Transformer has reached 80% of the installed capacity.
- Sufficient in-feed capacity (upstream capacity) is available.
- For Distribution transformer of capacity more than 500 KVA, suitable plinth arrangement shall be provided.
- The capacity of the Distribution transformer shall be determined on the basis of expected load growth to be met considering peak growth up to 2030

4. LT Line Works

DISCOM should prefer LT overhead lines for their ease of operation & maintenance, easy identification of faults, less time for rectification of faults, etc. DISCOM may propose ABC cable/ covered conductor for theft prone arrears or areas not having requisite safety clearances.

a. New LT network lines including LT extension

New LT lines should be proposed considering following:

- Existing LT feeder is overloaded or imbalance of load on existing feeders
- Low voltage conditions exist
- DTs are overloaded and their load need to be shared with other nearby DTs
- To ensure that load growth is catered

Replacement of LT lines may also be considered to support critical LT feeders (due to undersize/sick and aged sections)

b. Conversion of LT network into LT Aerial Bunched Cable/Covered conductor

- Existing LT network with bare conductor has outlived its life (25 Years) and giving frequent trouble in operation. The details of faults during last one year may be considered
- The area is prone to theft
- Safety concerns/ safety clearance are not available
- More transient fault in bare conductor lines due to dense vegetation etc.

c. LT network augmentation

Augmentation of LT network should be proposed when existing conductor is undersized and unable to carry full load or is overloaded.

Underground cables for LT network should not form part of DPRs for System augmentation and modernisation works.

5. High Voltage Distribution System (HVDS)

The DISCOMs may propose conversion of conventional LT line network to HVDS (High Voltage Distribution System) considering the load profile of the specific areas. Conversion of LT network to HVDS may be considered to

a. Reduce AT&C losses on account of pilferage.

b. To cater to scattered load centres.

Works proposed under HVDS should include extension of HT line to the nearest load point through tapping of HT line and installation of a distribution transformer of a capacity nearly matching the load (maximum 25 kVA). LT line should be restricted to the length of the service cable. While proposing HVDS works, following points to be kept in focus.

- Implementation of HVDS in the distribution network must result in improvement of HT: LT ratio of the network area.
- Rated capacity of distribution transformers to be installed under HVDS works must not exceed more than 25 kVA.
- Proposed HVDS works should not include any LT line works except installation of service cables for connecting distribution transformer to load.

6. SCADA/DMS& Basic SCADA /RT-DAS

- SCADA/DMS may be proposed towns having population > =1 Lacs in special category states and towns having population > = 2.75 Lacs in other states as per Census 2011 data, as well as all Capital/DISCOM HQ towns, if not covered earlier including opex for 2 years.
- Basic SCADA may also be proposed in towns based on district-wise or Circle-wise common control centres in all other statutory towns (as per Census 2011) including opex for 2 years
- Upgradation of SCADA/ DMS center and SCADA infrastructure of legacy SCADA under R-APDRP/IPDS
- Enablers to support SCADA/DMS in the form of RMU/ SECTIONILZER/ FPI/ Recondctoring to take load in case load transfer to be considered

For proposed SCADA/DMS works or SCADA works, DISCOMs must ensure readiness to operate and maintain these systems post implementation.

7. Smart Metering Data Analytics

As DPRs for Smart Metering works have already been sanctioned for DISCOM and subsequent implementation is underway, DISCOMs are advised to consider tools for data analytics which will help them in leveraging data generated from smart meters. Advanced data analytics tools may help DISCOM for Energy Auditing & Energy Accounting, implementation of ToD (Time of day) tariff regime for all consumer categories, load management etc. These advanced analytics tools may also help in planning & maintenance strategy for various distribution system components, cost optimization and consumer satisfaction.

Under RDSS, data analytics forms part of scope of AMISP under AMISP SBD. However, the DPRs for System Augmentation and Modernization works may include Smart Metering data analytics onlyif it is not under the purview of scope of AMISP.

8. Operation and Maintenance

Due to implementation of scheme, the distribution network assets of DISCOM are expected to increase significantly which in turn will result in requirement of additional manpower to operate and maintain these assets. In view of this, the DISCOMs must provide details of proposed measures to improve operation and maintenance plan in its Detailed Project Report (DPR) for system augmentation &modernization works.

For preparation of DPRs, applicable technical standards of CEA should be followed.