# KERALA STATE ELECTRICITY BOARD LIMITED


# Petition for approval of

# ARR, ERC, Tariff Proposal

# & Capital Investment Plan

# For Control Period 2018-22

## PART – I : ARR, ERC & Tariff

Vydyuthi Bhavanam, Pattom, Thiruvananthapuram

# KERALA STATE ELECTRICITY BOARD LIMITED

**AGGREGATE REVENUE REQUIREMENT & EXPECTED REVENUE FROM CHARGES**

**AND PROPOSAL FOR BRIDGING THE REVENUE GAP**

**FOR THE CONTROL PERIOD FROM 2018-19 TO 2021-22**

**SUMBITTED TO**

## HON KERALA STATE ELECTRICITY REGULATORY COMMISSION

## THIRUVANANTHAPURAM

**SUBMITTED BY:**


**KERALA STATE ELECTRICITY BOARD LIMITED**

**VYDYUTHIBHAVANAM, PATTOM, THIRUVANANTHAPURAM – 695 004**

# KERALA STATE ELECTRICITY BOARD LIMITED


| Table of Contents | | |
|---|---|---|
| **Chapter** | **Contents** | **Page** |
| **1** | **Capital Investment plan of SBU - Generation** | **2-22** |
| **2** | **Capital Investment plan of SBU - Transmission** | **23 - 99** |
| **3** | **Capital Investment plan of SBU - Distribution** | **100 -133** |

# CHAPTER 1
# CAPITAL INVESTMENT PLAN OF SBU - GENERATION

Kerala State Electricity Board Limited (KSEBL), is an integrated State Public Sector power utility in the State of Kerala, performing the three functions of Electricity Generation, Transmission, and Distribution through three Strategic Business Units (SBUs). The Generation Strategic Business Unit (SBU G) performs the function of generating electricity to meet the demand of the State. Energy generated by the petitioner's Generation Strategic Business Unit during the FY 2017-18 was 5505.73MU. Out of which 5488.94 MU (99.7%) was from own Hydroelectric Stations and remaining 0.3% was generated from thermal, wind and solar stations. Energy generated during normal monsoon year is about 6300-MU. Source wise generation details for the financial year 17-18 are given below:

**Table 1: Source wise Generation**

| Source | Generation MU |
|---|---|
| Hydel | 5488.94 |
| Thermal | 1.86 |
| Wind | 1.48 |
| Solar | 13.45 |
| **Total (Generation)** | **5505.73** |

Now, the Generation Strategic Business Unit (SBU G) provides around 23% of the total energy requirement of the State. KSEBL has taken up development of a number of projects, both conventional as well as non-conventional type for meeting the future demand of electricity.

This application for approval of Capital investment Plan for the Generation Strategic Business unit for the control period FY 2018-19 to FY 2021-22 is submitted as per the Section181(zp) of the Electricity Act 2003 and Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff), 2018.

The proposal submitted hereunder is for approval of investment in respect of four new small hydel, four Solar and two renovation projects for the current control period. The year wise capital investment requirement, period of completion and current status are given below.

| Table 2: Scheme wise Outlay for Capital Works | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Name of Scheme | Proposed year wise outlay (Rs. Cr.) | | | | Commen-cement | Comple-tion | Project Cost (Rs Cr) |
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 | | | |
| A | **NEW HYDEL PROJECTS** | | | | | | | |
| 1 | Chinnar | 28.15 | 77.66 | 81.54 | 82.51 | 2017-18 | 2022-23 | 269.87 |
| 2 | Pervannamoozhi | 12.31 | 31.87 | 39.93 | 0 | 2018-19 | 2021-22 | 84.11 |
| 3 | Pazhassi Sagar | 11.49 | 46.00 | 13.05 | 9.31 | 2017-18 | 2020-21 | 79.85 |
| 4 | Anakkayam | 0.80 | 4.79 | 23.97 | 47.94 | 2018-19 | 2023-24 | 77.51 |
| | **Sub Total 1** | **52.75** | **160.33** | **158.49** | **139.77** | | | |
| **B** | **R&M WORKS** | | | | | | | |
| 5 | Switchyard Idukki HEP | 8.544 | 3.666 | 0 | 0 | 2018-19 | 2019-20 | 12.2 |
| 6 | Kuttiadi HEP | 4.9 | 150 | 172.3 | 0 | 2018-19 | 2020-21 | 377.41 |
| | **Sub Total 2** | **13.44** | **153.67** | **172.30** | **0.00** | | | |
| **C** | **Solar project** | | | | | | | |
| 7 | Brahmapuram | 11.143 | 26 | 0 | 0 | 2018-19 | 2019-20 | 37.142 |
| 8 | Kanjikkode | 3.42 | 7.98 | 0 | 0 | 2018-19 | 2019-20 | 11.4 |
| 9 | Agali | 0.513 | 1.197 | 0 | 0 | 2018-19 | 2019-20 | 1.71 |
| 10 | Kottiyam | 0.981 | 2.289 | 0 | 0 | 2018-19 | 2019-20 | 3.27 |
| | **Sub Total 3** | **16.06** | **37.47** | **0** | **0** | | | |
| | **Total** | **82.25** | **351.46** | **330.79** | **139.77** | | | |

# Hydro Electric Projects

## New Projects

KSEBL is proposing to take up, the implementation of four new hydro projects during 2018-19 for which the preliminary works have been completed during 2017-18. A brief description of the projects are as below:

### Chinnar Small Hydro Electric Project

Chinnar Small Hydro Electric project is located in Konnathady village at Udumbanchola Taluk in the Iddukki District. The Project is a runoff the river scheme, proposed for utilising the water available from a free catchment area of the 143.64 $km^2$ of Perinjankutty River (Chinnar) for power generation from a surface Power house to be located on the right bank of Periyar at the confluence of Periyar with Mudirapuzha river at Panamkutty. The project on completion will add a firm power of 24 MW (76.45 Mu/Annum). The scheme comprises the construction of the following main components.

1. A concrete weir of 9m high and 114 m long with gross storage of 0.205$Mm^3$ at FRL 532.2m and bridge over the weir.

2. A water conductor system consisting of an intake, power tunnel 3.3m dia, 3160 m long, a surge shaft 6m dia, Low Pressure pipe of 65m length, valve house and one penstock of dia 2m and 550m length with branching near power house.
3. A surface power house of size37X15.5X13.5m located on the bank of Periyar.

Power will be evacuated by constructing four feeder bays in switchyard of Chinnar Power House and linking with the existing Double Circuit line between Koothungal and Neriyamangalam Power houses. The other two bays will be used for connecting the Chinnar power house to Neriyamangalam power house. Around 0.5km of 110kV line on Multi - Circuit Towers will be constructed from Chinnar PH.

At present work order for the Civil work excluding that of power house is issued in the first phase. The tendering of the civil work of power house and E & M work will be carried out in the second phase since the land for the power house is being acquired.

## Peruvannamoozhi Small Hydro Electric Project

The Peruvannamuzhy Small Hydro Electric Project is located in Chakkittapara Village in Quilandy Taluk, Kozhikode District. The proposed hydro Electric Project is located in the left bank of existing Irrigation Dam at Peruvannamuzhy in Kuttiyadi Basin. The scheme envisages development of 24.7 Mu of energy per annum by utilizing the excess inflow available after Irrigation and water supply from the existing Peruvannamuzhy Dam. The project on completion will add a firm power of 6 MW (24.7 Mu/Annum). The scheme comprises the construction of the following main components.

1. A conventional Type intake with leading channel
2. Head race Tunnel of 4.2 m dia and length 340 m
3. Surge Shaft of dia 10 m
4. Pressure shaft of dia 3.30 m and length 240 m
5. Penstock of length 28.22 m
6. Power house of size 32m X 11 m
7. Tail pool of size 20m X 25 m
8. Tail race channel of length 20 m

The power evacuation from this project would be through 5km of 33kV cable from Power House to 110 kV Substation, Chakkittapara and through a new 110/33 kV Transformer and 33 kV bay. The civil work of the project is tendered and work order is issued.

## Pazhassi Sagar Small Hydro Electric Project

Pazhassi Sagar Small Hydro Electric Project is located in Padiyoor – Kalyad Panchayat of Taliparamba Taluk in Kannur District. The project is envisaged as a dam-toe, run-of river scheme proposed on the existing Pazhassi Barrage of Irrigation Department. The project on completion will add a firm power of 15 MW and 42.14 Mu/Annum. The scheme comprises the construction of the following main components.

1. A leading channel of 52 length and rectangular in shape to convey water to intake pool
2. A steel lined tunnel of finished diameter 6.5m having length around 60m to convey water from reservoir to power House
3. An intake pool
4. Over ground Power House

Power Generated from this project will be transmitted by 33DC overhead line to terminal tower of 33 DC line running from 110 kV Mattannur substation to Kuliyoor substation. The length of line is around 1km from generating station. The project is tendered and work order is issued. The Excavation Work is started.

## Anakkayam SHE Project

The Anakkayam SHE Project is located in Pariyaram village of Mukundapuram Taluk of Thrissur District. The project utilizes the water of tailrace of Sholayar Electric Project. The project on completion will add a firm power of 7.5MW and 22.83 Mu/Annum. The scheme comprises the construction of the following main components.

1. Construction of deviation road to SH21 near power house.
2. Construction of intake channel and forebay, underground water conductor system, Surge shaft, Penstock/Liner, Power house
3. Hydro-mechanical and Electro mechanical equipments.
4. The Power evacuation from the project is proposed to be evacuated to Sholayar - Chalakkudy 110kV line by LILO arrangement.

The work order for tree cutting in the forest area acquired is issued. The construction work of the project is not tendered yet.

| Table:3 Abstract of details of these four New Small Hydro Electric projects | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | Name of projects | Capacity MW | Annual MU expected | Project cost (DPR) Rs. Cr | Commencement | Completion | Levelised tariff Rs/kWh |
| 1 | Chinnar | 24 | 76.45 | 269.87 | 2017-18* | 2022-23 | 4.52 |
| 2 | Peruvannamoozhi | 6 | 24.7 | 84.11 | 2018-19 | 2021-22 | 3.59 |
| 3 | Pazhassi Sagar | 7.5 | 25.16 | 79.85 | 2017-18* | 2020-21 | 3.21 |
| 4. | Anakkayam | 7.5 | 22.83 | 91.66 | 2018-19 | 2023-24 | 4.13 |
| **Preliminary works Started.* *MNRE grant (Rs. 20 Cr) is expected for these for these projects.* | | | | | | | |

The summary of the proposed phasing of investment of the new project is given below:

| Table 4: Scheme wise Outlay for Capital Works of the new Hydel projects | | | | | | |
|---|---|---|---|---|---|---|
| **No** | **Name of Scheme** | **Proposed year wise outlay (Rs. Cr.)** | | | | **Project Total (Rs Cr)** |
| | | **2018-19** | **2019-20** | **2020-21** | **2021-22** | |
| 1 | Chinnar | 28.15 | 77.66 | 81.54 | 82.51 | 269.87 |
| 2 | Peruvannamoozhi | 12.31 | 31.87 | 39.93 | 0 | 84.11 |
| 3 | Pazhassi Sagar | 11.49 | 46.00 | 13.05 | 9.31 | 79.85 |
| 4 | Anakkayam | 0.80 | 4.79 | 23.97 | 47.94 | 77.51 |

## Financial Analysis of the new projects

As per prevailing order of MNRE, to promote development of Small hydro Electric Project, CFA @3.5 Cr/MW limited to Rs. 20 Cr for setting up new SHP up to 25 MW station capacity will be available for all these projects. The financial analysis is done as per SERC guide lines and hence it is carried out by considering equity ratio as 70:30. The Levelised tariff calculated with payback period and IRR for each project is noted in the table below.

| Table 5: Scheme wise Financial Analysis for new Hydel projects | | | |
|---|---|---|---|
| **Name of Scheme** | **Levelised tariff (Rs/kWh)** | **Payback period** | **IRR %** |
| Chinnar | 4.52 | 9 years | 24.85 |
| Pervannamoozhi | 3.59 | 9 years | 21.54 |
| Pazhassi Sagar | 3.21 | 12 years | 23.55 |
| Anakkayam | 4.13 | 16 years | 12.74 |

Detailed project reports are prepared for each project. Six copies of DPR in respect to these projects are enclosed separately**.** The details of these Generation projects scheduled for the control period from 2018-19 to 2021-22 in the format prescribed by the Commission is enclosed as **Annexure 1.**

In addition to the above, Eleven new hydro projects are proposed for which preliminary works like Land acquisition, Scrutiny of estimate etc are in various stages. KSEBL is planning to take up the implementation of these projects during the current control period if the land required for the project is obtained in time. KSEBL will be submitting proposals for approval of capital investment separately immediately on firming up the proposals.

## R&M Works of Capital Nature

Most of the hydroelectric projects of KSEBL were commissioned long ago and the generating units of these stations have surpassed their normative useful life. For extending the useful life of these stations and for continued power generation, KSEBL has drawn a systematic plan to renovate and modernise the existing hydroelectric plants that have reached their normal life period. KSEBL has already commenced the R&M of power plants in Sholayar power house as well as Idukki Stage-I.

KSEBL has also planned to take up the R&M of Kuttiyadi and renovation and up gradation of 220kV Switchyard equipment and allied works at Idukki Power station under PSDF fund during the current control period from FY18-19 to FY21-22. The details of R&M Projects are given in **Annexure – 2.**

### Kuttiyadi Hydro Electric Project

The Kuttiyadi Hydro Electric Project having a capacity of 3x25 MW was commissioned during the year 1972. Now the project has completed 44 years of service. The generating units in the powerhouse and its auxiliary equipment frequently develop problems developed because of ageing. Therefore renovation of the generating units and the auxiliary equipment was proposed after carrying out Residual Life Assessment (RLA) studies by Alternate Hydro Energy Centre (AHEC), a Central Government agency under the llT, Roorkee. As per the RLA study report, an up-rating of 10% is possible without any change in the water conducting system (tunnel and penstock) but by way of increase in efficiency of the present day, turbines and generators. Hence, up-rating of each of the three 25 MW units to 27.5 MW with 10% continuous, over loading capability is proposed for Kuttiyadi HEP. The project comprises the following main components.

1. Construction of a new penstock exclusively for unit 4 (KES-50MW.
2. Replacement of the generating units with 3 x 27.5 MW units f( Bearing pads, condition monitoring equipment for the generating unit, bearing coolers, air brake system, fire fighting system) which are not suitable for further service.

3. Advanced systems for the better operation and protection (High-pressure oil pumping unit (HPOP) for thrust bearing, shaft current measuring unit, generator management relay with event recording facility, dust collection system for slip ring and brake etc... )

**220kV Switchyard equipment and allied works at Idukki Power station**

SRPC had constituted Protection Audit Party as directed by MoP subsequent to severe National grid disturbances in July 2012 and they made a number of recommendations for protective systems for 220kV and above systems, KSEBL had availed funds from PSDF for improving the protection system and associated elements in the Power System. Hence, Renovation & Up gradation of 220 kV Switchyard equipments, Implementation of Automatic Generation Control system and Automated Metering System for all Generating stations are proposed in a time bound manner and requesting for assistance from PSDF for completing the proposed works more efficiently. Ministry of Power vide Letter No. 10/1/2014-OM dtd 15.11.2017 of the Under Secretary to Govt of India, has communicated the sanction for the subject project under PSDF Scheme for Rs.22.42 Crore. The source of funding for the project will be 90% from PSDF & 10% from KSEBL. Rs.12.22 Crores has been sanctioned for Idukki project. The project comprises the following main components.

1. Replacement of fully depreciated yard equipment.
2. Up gradation 220kV Switchyard lighting.
3. Renovation of 66kV Substation, Moolamattom
4. Replacement of PCB filled transformers with environment friendly Dry cast indoor transformers
5. Procurement of Essential testing equipments for IHEP
6. Automatic Meter Reading (AMR) system for generation wing

The summary of the new R & M Projects proposed during the control period from 2018-19 to 2021-22 is given below.

**Table 6: R&M projects of Capital nature**

| No | Name of Scheme | Capacity (MW) | Annual Energy (MU) | Project Cost * (Rs. Cr.) | commencement | Completion | Status |
|---|---|---|---|---|---|---|---|
| 1 | 220kV Idukki Switchyard | - | - | 12.2** | 18-19 | 2019-20 | work not tendered |
| 2 | Kuttiyadi | 82.5 | 292.8 | 327.20 | 18-19 | 2020-21 | do |

*as per DPR/Administrative Sanction ** 90% PSDF fund and 10% KSEBL own Fund

The phasing of investment for new Projects under R&M of Hydro Electric Project for the current control period is given below:

| Table 7: Scheme wise Outlay for new R&M projects for the current control period | | | | | |
|---|---|---|---|---|---|
| No | Name of Scheme | Proposed outlay (Rs. Cr.) | | | |
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| 1 | 220kV Switchyard equipments and allied works at Idukki Power station | 8.554 | 3.666 | | - |
| 2 | Kuttiyadi | 4.9 | 150 | 172.3 | - |
| | **Total** | **13.454** | **153.666** | **172.3** | **-** |

## Financial Analysis of the new project

The financial analysis of these projects is done as per SERC guide lines. The project funding comprises of loan and equity of ratio 70:30 at 11% interest rate. Return on equity is taken as 15% for financial analysis as per the guidelines and the loan repayment period is taken as 12 years. The Levelised tariff calculated with payback period and IRR for each project is noted in the table below.

| Table 8: Scheme wise Financial Analysis for R&M projects for the current control period | | | | |
|---|---|---|---|---|
| No | Name of Scheme | Levelised tariff (Rs/kWh) | Payback period Years | IRR % |
| 1 | Idukki 220kV Switchyard | -- | -- | -- |
| 2 | Kuttiyadi | 1.4946 | 12 | 40.96%. |

Detailed project reports were prepared for each project. Six copies of DPR in respect to these projects are enclosed separately.

# Solar Projects

KSEBL has taken up development of several Solar PV plants in line with the existing policy of tapping the renewable energy potential to the maximum, in vacant land areas available with KSEBL and other Government agencies. KSEBL has added 12.981 MW of solar plants in the grid as on 31-03-2018 Also, KSEBL has entered into an agreement with Solar Energy Corporation of India for developing a 200 MW capacity Solar Park in Kasaragode District. In its first phase of 100MW, 50MW has already been commissioned in FY2017-18.

The installation and Commissioning of Grid tied Ground mounted SPV in the land available in Brahamapuram is also proposed for the Control period. Also new projects namely Kanjikode, Agali and Kottiyam Projects are also proposed for Capital investment approval for the control period.

| Table 9 : New Solar projects | | | | | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Name of Scheme** | **Capacity (MWp)** | **Annual Energy (MU)** | **Project Cost * (Rs. Cr.)** | **Commencement** | Completion | **Status** |
| 1 | Brahamapuram | 6.5 | 8.541 | 37.1432 | 18-19 | 19-20 | To be tendered |
| 2 | Kanjikkode | 2 | 2.45 | 11.4 | 18-19 | 19-20 | To be tendered |
| 3 | Agali | 1 | 1.2 | 5.7 | 18-19 | 19-20 | To be tendered |
| 4 | Kottiyam | 0.6 | 0.84 | 3.27 | 18-19 | 19-20 | To be tendered |
| **as per DPR/Administrative Sanction* | | | | | | | |

## Brahamapuram Solar power Project

The Brahamapuram 6.5 MWp Ground Mounted Solar power Project is proposed in the vacant land of KSEBL under Brahmapuram Diesel Power project in Kochi. The total cost of project will be Rs. 37.14 Cr which includes cost of project materials, execution, power evacuation, operation and maintenance for five years including routine maintenance.

The benchmark rate cost approved by MNRE is considered for preparing the estimate. The energy production from the solar plant depends on solar irradiation which in turn depends on the weather and atmospheric condition. The expected annual energy generation of the plant is 8.541 MU. The project implementation period is 180 days. Project Loan will be availed from REC.

Tapping, the renewable energy potential of the State, therefore is a viable option for meeting the demand. The Government of India and the Kerala State Government have been encouraging power production from non-conventional and renewable energy resources. This project of 6.5 MWp grid connected ground mounted solar PV project proposed to aid in meeting the power demand of the state also help KSEBL to meet the RPO.

## Kanjikode Solar power Project

The project envisages installing a 2 MWp plant in 10 acres of vacant land owned by KSEBL at Kanjikode, near to 220KV Substation. Evacuation of the power will be done through the existing 22 kV bus in Kanjikode substation. The land is gifted with good irradiation. Expected annual energy generation is about 2.45 MU. The total cost of the project will be Rs.11.4Crore which includes cost of project materials, execution, power evacuation, operation and maintenance for five years including routine maintenance.

## Agali Solar power Project

A one MWp SPV Power plant is proposed in the vacant land of KSEBL near to the 33kV substation Agali in Palakkad District. Power evacuation is hassle free as 33kV Substation is very adjacent to the site. The project will be known as Agali 1 MWp Ground mounted Solar project. The total cost of the project will be Rs. 5.7 Crore which includes cost of project materials, execution, which includes site leveling & compound wall construction, power evacuation, operation and maintenance for five years including routine maintenance. Capital fund source will be financed as loan from financial institutions such as REC. Annual generation of 1.2 MU is expected.

## Kottiyam Solar power Project

KSEBL intends to develop 0.60 MWp ground mounted Grid interactive Solar Photovoltaic (PV) power plant in the 3.28 Acres of vacant land owned by KSEBL at 110 kV substation, Kottiyam. The project site is located at Adichanalloor Village and is located nearly 12 km from Kollam. The proposed vacant land in possession of KSEBL and is adjacent to the 110 kV substation, Kottiyam. The power generated from the proposed solar PV power plant at LT level shall be stepped up first to 11 kV level through suitably rated transformers between the inverter and the grid connection point. The power from the PV project shall be evacuated from the HT side of the transformer through 11 kV cable to the 11 kV control room of 110 kV Kottiyam substation. The performance ratio of the plant shall be 75-80 %. Expected annual energy generation is about 0.84 MU.

Tender was invited on 22.09.2018 for the appointment of EPC contractor for the implementation of the said project including operation and maintenance of the plant for the first five years from the date of commissioning with the probable amount of contract of Rupees 3.27 Crore.

A year wise summary of the proposed capital investment of the generation SBU as per the capital invest plan for new projects for the control period is given below:

**Table 10 : Scheme wise Outlay for Capital Works of the SBU Generation**

| No | Name of Scheme | Proposed outlay (Rs. Cr.) | | | |
|---|---|---|---|---|---|
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| 1 | New Projects ( 4 nos. ) | 52.75 | 160.33 | 158.49 | 139.77 |
| 2 | R&M New project (2 Nos. ) | 13.44 | 153.67 | 172.30 | 0 |
| 3 | Solar projects-new projects (4 Nos.) | 16.06 | 37.47 | 0 | 0 |
| | **Total** | **82.25** | **351.46** | **330.79** | **139.77** |

## Ongoing Projects

The details of the ongoing hydroelectric project and the expected period of completion are shown below. The Capitalization of these projects will be done in the year of commissioning.

**Table 11 : Ongoing Hydel Projects for the control period**

| No | Name of Scheme | Gen Capacity (MW) | Design Energy (MU) | Completion | Project cost (Rs Cr) |
|---|---|---|---|---|---|
| 1 | Kakkayam | 3 | 10.39 | 2018-19 | 41.42 |
| 2 | Boothathenkettu | 24 | 83.5 | 2019-20 | 214.31 |
| 3 | Upper Kallar | 2 | 5.14 | 2019-20 | 28.31 |
| 4 | Porigalkuthu SHEP | 24 | 45.02 | 2019-20 | 141.13 |
| 5 | Chathankottunada II | 6 | 14.76 | 2020-21 | 95.53 |
| 6 | Thottiyar HES | 40 | 99 | 2020-21 | 235.88 |
| 7 | Sengulam Aug. Scheme | | 85 | 2021-22 | 111.34 |
| 8 | Pallivasal Ext Scheme | 60 | 153.9 | 2021-22 | 467.14 |

The table below shows the ongoing RMU works in Hydel Stations. The Generation Capacity and Energy delivery do not change after the renovation work hence not shown in the table.

**Table 12 : Ongoing R&M Hydel Projects for the control period**

| No | Name of Scheme | Completion | Project cost (Rs Cr) |
|---|---|---|---|
| 1 | Idukki Stage I | 2020-21 | 79 |
| 2 | Sholayar RMU | 2019-20 | 173.26 |
| 3 | Sengulam Pump House RMU | 2019-20 | 20.4 |

In addition to the above mentioned capital works, small capital nature works are routinely being done in the existing generating stations (Hydel, Thermal and Wind Stations). The details of such works are shown in the **Annexure – 4.** KSEB will be submitting the actual capital expenditure such works during truing up. Several other projects are in various stages of design, approval etc. KSEBL will be submitting the capital investment proposal of these projects separately later.

It is appealed that the Hon Commission may approve the Capital Investment Plan for KSEBL Generation. The petitioner may also be allowed to make further submission, adduce further data on these projects.

## List of Annexure and Enclosures

1. Annexure 1- Details of Capital works – New SHEPs (4 Nos )
2. Annexure 2- Details of Capital works – R&M Projects (2 Nos.)
3. Annexure 3- Details of Capital works – Solar projects. ( 4 nos. )
4. Annexure 4– Capital outlay for existing Stations (Hydel, Thermal and Wind )
5. Six Copies of 7 DPRs

## Annexure I (1) : DETAILS OF CAPITAL WORKS - NEW GENERATION PROJECTS

| PAZHASSI SAGAR SHEP | | | | |
|---|---|---|---|---|
| 1 | Installed Capacity (MW) | 7.5 MW | | |
| 2 | Annual Generation ( MU) | 25.16 MU | | |
| 3 | Project Cost including IDC as per DPR (Rs. Cr) | 79.85 | | |
| | a) Civil (Rs. Cr ) | 54.65 | | |
| | b&c) Electrical& Mechanical (Rs. Cr ) | 19.15 | | |
| | d) Subtotal (Rs. Cr) | 73.8 | | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | 3.21 | | |
| 5 | Project cost as per contract (Civil cost & Electrical cost together) | | | |
| | a) Civil (Rs. Cr ) | 46.41 (work awarded) | | |
| | b&c) Electrical & Mechanical (Rs. Cr ) | Tenders to be finalised | | |
| | d) Subtotal (Rs. Cr) | | | |
| 6 | Expected cost of completion (incl IDC andEstab cost) | Rs 79.85 Cr | | |
| 7 | Date of Commencement | 27-10-2017( Civil Work ) | | |
| 8 | Date of agreement | 26.10.2017 | | |
| 9 | Details of Tender | 21.06.2017 | | |
| 10 | Name of contractor | M/s R.S Development and Constr | | |
| 11 | Original Target date of completion | 24.04.2020 (Civil works) | | |
| 12 | Revised Target date of completion | 24.04.2020 | | |
| 13 | Source of funds | | | |
| | a) Debt (Rs. Cr) | 70% | | |
| | b) Interest rate ( Rs.Cr) | 13% | | |
| | c) Own fund (Rs. Cr) | 30% | | |
| | d) Grants / subsidies etc. | Rs 20 Cr MNRE Grant | | |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | |
| 16 | Year wise Physical and Financial target proposed/achieved | | | |
| | Particulars of Work | Physical Target | Financial (Rs. Cr) | |
| | | Achievement | Target | Achvmt |
| | 2018-19 : PH, Intake, gate, liners, Bk filing,E&M | | 11.49 | |
| | 2019-20 : PH Construction, Intake leading channel, E&M, Yard & Trans works | | 46.00 | |
| | 2020-21 : Finishing | | 13.03 | |
| | 2021-22 : Testing & commissioning | | 9.31 | |
| 18 | Details of the Project Management Team | | | |
| | a) Total in house employees | Proj Mangr- 1, AEE-1, AE-4,SE-6,OS-1, Drivr-1 | | |
| | b) Monthly salary and other benefits | Rs 0.14 Cr | | |
| | c)Other establishment cost - monthly | Rs 0.002 Cr | | |

# ANNEXURE 1 (2)

| CHINNAR SMALL HYDRO ELECTRIC PROJECT | | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | 24 | | | |
| 2 | Annual Generation ( MU) | 76.45 | | | |
| 3 | Project Cost including IDC (Rs. Cr) | 269.87 | | | |
| | a) Civil (Rs. Cr ) | 179.75 | | | |
| | b) Electrical& (c) Mechanical (Rs. Cr ) | 73.25 | | | |
| | d) Subtotal (Rs. Cr) | 253 | | | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | 4.52/kwh | | | |
| 5 | Project cost as per contract (Civil cost & Electrical cost together) | | | | |
| | a) Civil (Rs. Cr ) | 80.61 | | | |
| | b) Electrical c) Mechanical (Rs. Cr ) | | | | |
| | d) Subtotal (Rs. Cr) | | | | |
| 6 | Expected cost of completion (incl IDC etc) | 269.87 | | | |
| 7 | Date of Commencement | | | | |
| 8 | Date of agreement | | | | |
| 9 | Details of Tender | E-tender No. CECCS/01/ 2017-18 Dated 13.11.2017 | | | |
| 10 | Name of contractor | M/s. Paulose George Co & Aryacon Contr & Engs Consortium | | | |
| 11 | Original Target date of completion | | | | |
| 12 | Revised Target date of completion | | | | |
| 13 | Source of funds | | | | |
| | a) Debt (Rs. Cr) | **70%** | | | |
| | b) Interest rate ( Rs.Cr) 13% | **13%** | | | |
| | c) Own fund (Rs. Cr)30% | **30%** | | | |
| | d) Grants / subsidies etc | **MNRE** | | | |
| 14 | Loan availed till the beginning of the year (Rs. Cr) | | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed/achieved | | | | |

| Year wise Review of the target (Year of Commencement to Year of Completion) | | | | |
|---|---|---|---|---|
| Particulars of Work | Physical Target | | Financial Target (Rs. Cr) | |
| | Target | Achievement | Target | Achievement |
| Year 1 (2018-19): Tunnel, Surge, Weir, Penstock, Power House, Switchyard and E&M works | 10.30% | | 28.15 | |
| Year 2 (2019-20) : Tunnel lining, Grouting, weir, LPP lining, LPP grouting, Penstock, Power House, Switch yard & E&M works, (machine erection). | 29% | | 77.66 | |
| Year 3 (2020-21): Tunnel lining, Grouting, weir, LPP lining, grouting, Penstock, PH, Yard & E&M | 29% | | 81.44 | |
| Year 4 (2021-22): --do-- | 31.7% | | 82.51 | |
| Total | | | 269.87 | |

| | | |
|---|---|---|
| 17 | Details of the Project Management Team | |
| | a) Total in house employees | EE-1, AEE -2, SE -6, Driver -1 |
| | b) Monthly salary and other benefits | Rs 0.12 Cr |
| | c)Other establishment cost - monthly | Rs 0.009 Cr |

## ANNEXURE 1 (3)

| A.1.3 | PERUVANNAMUZHI SHEP | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | 6MW | | | |
| 2 | Annual Generation ( MU) | 24.7Mu | | | |
| 3 | Project Cost including IDC @ DPR (Rs. Cr) | 84.11 Cr | | | |
| | a) Civil (Rs. Cr ) | 45 | | | |
| | b&c) Electrical & Mechanical (Rs. Cr ) | 27.01 | | | |
| | d) Subtotal (Rs. Cr) | 72.01 | | | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | 3.59 | | | |
| 5 | Project cost as per contract (Civil cost & Electrical cost together) | | | | |
| | a) Civil (Rs. Cr ) | 34.98 | | | |
| | b&c ) Electrical & Mechanocal (Rs. Cr ) | E&M Works re-tendered | | | |
| | d) Subtotal (Rs. Cr) | | | | |
| | | | | | |
| 6 | Expected cost (incl IDC and Est Cost) | Rs.84.11 Cr. | | | |
| 7 | Date of Commencement | April 2018 | | | |
| 8 | Date of agreement | - | | | |
| 9 | Details of Tender | Tenders for Civil Works invited on 28.12.17 (re-tender) | | | |
| 10 | Name of contractor | M/s. TVPPL-KSK-SSEV Consortium, Hyderabad 500033 | | | |
| 11 | Original Target date of completion | May 2021 (Expected) | | | |
| 12 | Revised Target date of completion | 36 months from the date of agreement | | | |
| 13 | Source of funds | | | | |
| | a) Debt (Rs. Cr)70% | 70% | | | |
| | b) Interest rate ( Rs.Cr)13% | 13% | | | |
| | c) Own fund (Rs. Cr)30% | 30% | | | |
| | d) Grants / subsidies etc | 20 Cr MNRE Grant | | | |
| 14 | Loan availed tillyear beginning (Rs. Cr) | | | | |
| 15 | Loan proposed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed/achieved | | | | |
| | Year wise Review of the target (Year of Commencement to Year of Completion) | | | | |
| | Particulars of Work | Physical Target | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | Year 1: 2018-19 | | | | |
| | Cofferdam, Intake structure, Powerhouse excavation, foundation & structure concreting works, access road and tunnelling works. | 15% | | 12.31 | |
| | Year 2: 2019-20 | | | | |
| | Cofferdam, Intake structure, concreting of PH structures , tunnelling works, access road and E&M works | 50% | | 31.87 | |
| | Year 3: 2020-21 | | | | |
| | Cofferdam, Intake structure, concreting of PH structure , tunnelling works, penstock works, access road and E&M works | 35% | | 39.93 | |
| 17 | Details of the Project Management Team | | | | |
| | a) Total in house employees | Project Manager -1, AEE-2, AE-3, SE (c)-7 | | | |
| | b) Monthly salary and other benefits | Rs 0.14 Cr | | | |
| | c)Other establishment cost - monthly | Rs. 0.002 Cr | | | |

## ANNEXURE I (4)

| ANAKKAYAM SHEP | | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | | | 7.5 MW | |
| 2 | Annual Generation ( MU) | | | 22.83Mu | |
| 3 | Project Cost including IDC as per DPR (Rs. Cr) | | | 91.66 Cr | |
| | a) Civil (Rs. Cr ) | | | 59.82 | |
| | b) Electrical (Rs. Cr ) | | | 22.61 | |
| | c) Mechanical (Rs. Cr) | | | | |
| | d) Subtotal (Rs. Cr) | | | 82.43 | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | | | 4.49 | |
| 5 | Project cost as per contract (Civil cost & Electrical cost together) | | | Works Not tendered | |
| 6 | Expected cost of completion ( including IDC etc) | | | Rs.150 Cr. | |
| 7 | Date of Commencement | | | -- | |
| 8 | Date of agreement | | | -- | |
| 9 | Details of Tender | | | -- | |
| 10 | Name of contractor | | | -- | |
| 11 | Original Target date of completion | | | -- | |
| 12 | Revised Target date of completion | | | -- | |
| 13 | Source of funds | | | -- | |
| | a) Debt (Rs. Cr) | | | 70 % | |
| | b) Interest rate ( Rs.Cr) | | | 13 % | |
| | c) Own fund (Rs. Cr) | | | 30 % | |
| | d) Grants / subsidies etc | | | Expected 20 Cr MNRE Grant | |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed | | | | |
| | Year wise Review of the target (Year of Commencement to Year of Completion) | | | | |
| | Particulars of Work | Physical Target | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | Year 1: 2018-19 | | | | |
| | Preliminary and enabling works | 0.5% | | 0.80 | |
| | Year 2: 2019-20 | | | | |
| | Road work, tunnel driving etc | 3% | | 4.79 | |
| | Year 3: 2020-21 | | | | |
| | Road work, tunnel driving etc | 15% | | 23.97 | |
| | Year 4: 2021-22 | | | | |
| | PH, Penstock, Yard, E&M etc. | 30% | | 47.94 | |
| | Year 5: 2022-23 | | | | |
| | PH, Penstock, Yard, E&M etc. | 35% | | 10.00 | |
| | Year 6: 2023-24 | | | | |
| | PH, Penstock, Yard, E&M etc. | 16.5% | | 4.15 | |
| 17 | Details of the Project Management Team | | | | |
| | a) Total in house employees | | | EE -1, AEE-2,AE- 1,SE-5 | |
| | b) Monthly salary and other benefits | | | 7.5 lakhs | |
| | c)Other establishment cost - monthly | | | 27650/- | |
| | Approved project cost is based on 2009 Price level. Projected cost of Rs. 150 Cr is arrived considering the cost of recently awarded works and also considering the special conditions imposed by NTCA regarding restrictions in blasting operations | | | | |

# ANNEXURE 2: DETAILS OF CAPITAL WORKS – R&M PROJECTS

| RMU WORK OF 3X25 MW KUTTIYADI HEP | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Generation Project | | | RMU Work of 3x25 MW Kuttiyadi HEP | |
| 2 | Installed Capacity (MW) | | | Expected uprating from 3X25MW to 3X27.5 MW | |
| 3 | Annual Generation (MU) | | | Expected a MU addition of 24.8 MU (total 292.8 MU) | |
| 4 | Project Cost including IDC as per DPR ( Rs Cr) | | | 377.41 | |
| | a) Civil ( Rs. Cr ) | | | 154.25 | |
| | b) Electrical ( Rs. Cr) | | | 94.89 | |
| | c) Mechanical ( Rs. Cr) | | | 79.26 | |
| | d) Sub Total ( Rs. Cr) | | | 328.4 | |
| 5 | Levelised tariff as per DPR ( Rs. /KWh) | | | 1.4946/unit | |
| 6 | Project cost as per contract ( Civil & Electrical) | | | Work Not Tendered | |
| 7 | Expected cost of completion (including IDC etc.) | | | Rs. 377.41 Cr. | |
| 8 | Date of Commencement | | | | |
| 9 | Date of Agreement | | | | |
| 10 | Details of Tender | | | E&M part to be re-tendered | |
| 11 | Name of Contractor | | | -- | |
| 12 | Original Target date of completion | | | -- | |
| 13 | Revised Target date of completion | | | -- | |
| 14 | Source of funds | | | Loan from PFC/REC | |
| | a) Debt ( Rs. Cr ) | | | | |
| | b) Interest rate ( Rs. Cr) | | | | |
| | c) Own fund ( Rs. Cr ) | | | | |
| | d) Grants/ subsidies etc. | | | | |
| 15 | Loan availed till 2018-19 ( Rs. Cr) | | | | |
| 16 | Loan proposed during 2018-19 ( Rs. Cr) | | | | |
| 17 | Year wise Physical and Financial target proposed / achieved ( Each Civil work & Electrical work may be given separately) | | | | |
| | Particulars of Work | Physical | | Financial (Rs. Cr.) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-2019 | | | 4.9 | |
| | 2019-2020 | | | 150 | |
| | 2020-2021 | | | 172.3 | |
| | Total | | | | |
| 18 | Details of Project Management Team | | | | |
| | a) Total in house employees | No Project Management formed at present | | | |
| | b) Monthly salary and other benefits (Rs Cr.) | | | | |
| | c) Other establishment cost - monthly (Rs Cr.) | Nil | | | |

| Renovation & Up gradation of 220 kV Idukki Switchyard (PSDF) | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Generation Project | Renovation & Up gradation of 220 kV Switchyard Equipments and allied works at Idukki Power Station under PSDF Scheme | | | |
| 2 | Installed Capacity (MW) | NA | | | |
| 3 | Annual Generation (MU) | NA | | | |
| 4 | Project Cost including IDC per DPR ( Rs Cr) | 12.22 Cr(MoP, Sanctioned) | | | |
| | Electrical ( Rs. Cr) | 12.22 | | | |
| | Others ( Rs. Cr) | 0 | | | |
| | d) Sub Total ( Rs. Cr) | 12.2 (90% PSDF fund and 10% KSEBL own Fund) | | | |
| 5 | Levelised tariff as per DPR ( Rs. /KWh) | 0.1891/unit | | | |
| 6 | Project cost as per contract | Project commenced from July 2018. Tendering in progress | | | |
| | a) Civil ( Rs. Cr ) | | | | |
| | b) Electrical & Mechanical ( Rs. Cr) | Two Transformers Rs. 1.89 Cr, 11 kV Panel Set Rs. 0.4412 Cr | | | |
| 7 | Expected cost of completion (inclIDC etc) | Rs. 12.2 Cr. | | | |
| 8 | Date of Commencement | July 2018 | | | |
| 9 | Date of Agreement | 09.03.2018 (Panel) | | | |
| 10 | Details of Tender | KSEB/SCM/eP45/17-18 dtd 13.09.17 (for Transformer) KSEB/SCM/eP16/16-17 dtd 02.07.16 (for Panel) | | | |
| 11 | Name of Contractor | M/s. Atlants Electricals Pvt Ltd (Transformer) M/s Stelmec Ltd, Mumbai (for Panel) | | | |
| 12 | Original Target date of completion | June 2020 | | | |
| 13 | Revised Target date of completion | --- | | | |
| 14 | Source of funds | Own fund/PFC/REC/Other financial Institution | | | |
| | a) Debt ( Rs. Cr ) | | | | |
| | b) Interest rate ( Rs. Cr) | | | | |
| | c) Own fund ( Rs. Cr ) | 1.22 Cr | | | |
| | d) Grants/ subsidies etc. | PSDF : Rs. 11 Cr(90% of Rs. 12.22 Cr) | | | |
| 15 | Loan availed up to year 2018-19 ( Rs. Cr) | -- | | | |
| 16 | Loan proposed during 2018-19 ( Rs. Cr) | -- | | | |
| 17 | Year wise Physical and Financial target proposed / achieved | | | | |
| | Particulars of Work | Physical | | Financial (Rs. Cr.) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-2019 | 10 MVA Transformer | | 8.554 | |
| | | 220kV Circuit Breaker | | | |
| | | 220kV Isolator | | | |
| | | 220kV CT | | | |
| | | 33 kV Tranfr (2) | | | |
| | | 11kV 10 panel set | | | |
| | | Transformer Panel | | | |
| | | 11 kV UG Cable | | | |
| | | Testing Equipments | | | |
| | 2019-2020 | 220kV Isolator | | 3.666 | |
| | | 220 kV Post Insulator | | | |
| | | 220kV Surge Arrestor | | | |
| | | Testing Equipment | | | |
| | | Yard Lighting | | | |
| 18 | Details of Project Management Team : No special team is continued; Supervised by the maintenance staff | | | | |

# Annexure 3 : DETAILS OF CAPITAL WORKS – SOLAR PROJECTS

| BRAHMAPURAM | | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | | | 6.5 MW | |
| 2 | Annual Generation ( MU) | | | 8.541 Mu | |
| 3 | Project Cost as per DPR (Rs. Cr) (Civil, Mech and Elec) | | | 37.1432 | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | | | ----- | |
| 5 | Project cost as per contract (Civil & Electrical) | | | Works to be tendered | |
| 6 | Expected cost of completion (incl IDC etc) | | | 37.1432 | |
| 7 | Date of Commencement | | | -- | |
| 8 | Date of agreement | | | -- | |
| 9 | Details of Tender | | | -- | |
| 10 | Name of contractor | | | -- | |
| 11 | Original Target date of completion | | | -- | |
| 12 | Revised Target date of completion | | | -- | |
| 13 | Source of funds | | | Loan from REC | |
| | a) Debt (Rs. Cr) | | | 70 % | |
| | b) Interest rate ( Rs.Cr) | | | 13% | |
| | c) Own fund (Rs. Cr) | | | 30% | |
| | d) Grants / subsidies etc | | | -- | |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed | | | | |
| | Particulars of Work | Physical | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-19 : Solar power plant at BDPP | 30% | | 11.1432 | |
| | 2019-20 : Solar power plant at BDPP | 70% | | 26. | |
| 18 | Details of the Project Management Team | | | | |
| | a) Total in house employees | | No special Team necessary for supervising work | | |
| | b) Monthly salary and other benefits | | NA | | |
| | c)Other establishment cost - monthly (Rs. Cr) | | NA | | |

| KANJIKKODE | | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | | | 2 MW | |
| 2 | Annual Generation ( MU) | | | 2.45 MU | |
| 3 | Project Cost as per DPR (Rs. Cr) (Civil, Mech and Elec) | | | 11.4 | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | | | | |
| 5 | Project cost as per contract (Civil & Electrical) | | | Works to be tendered | |
| 6 | Expected cost of completion (incl IDC etc) | | | 37.1432 | |
| 7 | Date of Commencement | | | -- | |
| 8 | Date of agreement | | | -- | |
| 9 | Details of Tender | | | -- | |
| 10 | Name of contractor | | | -- | |
| 11 | Original Target date of completion | | | -- | |
| 12 | Revised Target date of completion | | | -- | |
| 13 | Source of funds | | | Loan from REC | |
| | a) Debt (Rs. Cr) | | | 70 % | |
| | b) Interest rate ( Rs.Cr) | | | 13% | |
| | c) Own fund (Rs. Cr) | | | 30% | |
| | d) Grants / subsidies etc. | | | -- | |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed | | | | |
| | Particulars of Work | Physical | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-19 : Solar power plant Kanjikkode | 30% | | 3.42 | |
| | 2019-20: Solar power plant Kanjikkode | 70% | | 7.98 | |

| | | |
|---|---|---|
| 18 | Details of the Project Management Team | |
| | a) Total in house employees | No special Team necessary for supervising work |
| | b) Monthly salary and other benefits | NA |
| | c)Other establishment cost - monthly (Rs. Cr) | NA |

| KOTTIYAM | | | | | |
|---|---|---|---|---|---|
| 1 | Installed Capacity (MW) | | | 0.6Mwp | |
| 2 | Annual Generation ( MU) | | | 0.84 MU | |
| 3 | Project Cost as per DPR (Rs. Cr) (Civil, Mech and Elec) | | | 3.27 | |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | | | | |
| 5 | Project cost as per contract (Civil & Electrical) | | | Works to be tendered | |
| 6 | Expected cost of completion (incl IDC etc) | | | 3.27 | |
| 7 | Date of Commencement | | | -- | |
| 8 | Date of agreement | | | -- | |
| 9 | Details of Tender | | | -- | |
| 10 | Name of contractor | | | -- | |
| 11 | Original Target date of completion | | | -- | |
| 12 | Revised Target date of completion | | | -- | |
| 13 | Source of funds | | | Loan from REC | |
| | a) Debt (Rs. Cr) | | | 70 % | |
| | b) Interest rate ( Rs.Cr) | | | 13% | |
| | c) Own fund (Rs. Cr) | | | 30% | |
| | d) Grants / subsidies etc | | | -- | |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | | | | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | | | | |
| 16 | Year wise Physical and Financial target proposed | | | | |
| | Particulars of Work | Physical | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-19 : Solar power plant at Kottiyam | 30% | | 0.981 | |
| | 2019-20 : Solar power plant at Kottiyam | 70% | | 2.289 | |
| 18 | Details of the Project Management Team | | | | |
| | a) Total in house employees | | No special Team necessary for supervising work | | |
| | b) Monthly salary and other benefits | | NA | | |
| | c)Other establishment cost - monthly (Rs. Cr) | | NA | | |

| AGALI | | |
|---|---|---|
| 1 | Installed Capacity (MW) | 1.00 MW |
| 2 | Annual Generation ( MU) | 1.2 Mu |
| 3 | Project Cost as per DPR (Rs. Cr) (Civil, Mech and Elec) | 5.7 |
| 4 | Levelised tariff as per DPR (Rs. /kWh) | |
| 5 | Project cost as per contract (Civil & Electrical) | Works to be tendered |
| 6 | Expected cost of completion (incl IDC etc) | 5.7 |
| 7 | Date of Commencement | -- |
| 8 | Date of agreement | -- |
| 9 | Details of Tender | -- |
| 10 | Name of contractor | -- |
| 11 | Original Target date of completion | -- |
| 12 | Revised Target date of completion | -- |
| 13 | Source of funds | Loan from REC |
| | a) Debt (Rs. Cr) | 70 % |
| | b) Interest rate ( Rs.Cr) | 13% |
| | c) Own fund (Rs. Cr) | 30% |
| | d) Grants / subsidies etc | -- |
| 14 | Loan availed up to the beginning of the year (Rs. Cr) | |
| 15 | Loan proposed to be availed during the year (Rs. Cr) | |

| | | | | | |
|---|---|---|---|---|---|
| 16 | Year wise Physical and Financial target proposed | | | | |
| | Particulars of Work | Physical | | Financial Target (Rs. Cr) | |
| | | Target | Achievement | Target | Achievement |
| | 2018-19 : Solar power plant at Agali | 30% | | 1.71 | |
| | 2019-20 : Solar power plant at Agali | 70% | | 3.99 | |
| 18 | Details of the Project Management Team | | | | |
| | a) Total in house employees | No special Team necessary for supervising work | | | |
| | b) Monthly salary and other benefits | NA | | | |
| | c)Other establishment cost - monthly (Rs. Cr) | NA | | | |

## ANNEXURE IV

| Indicative Outlay for Capital Works in existing Hydel/ Thermal/ Wind projects | | | | | | |
|---|---|---|---|---|---|---|
| No | Name of Station | Proposed year wise outlay (Rs. Cr.) | | | | Total (Rs Cr) |
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 | |
| 1 | Adyanpara | 3.68 | 10.23 | 0.12 | 0.14 | 14.17 |
| 2 | Edamalayar | 0.48 | 0.50 | 0.50 | 0.50 | 1.98 |
| 3 | Idukki | 12.03 | 1.71 | 1.35 | 0.95 | 16.04 |
| 4 | Kuttiyadi | 6.17 | 4.42 | 1.93 | 1.97 | 14.48 |
| 5 | Lr Periyar | 5.88 | 5.50 | 1.50 | 1.50 | 14.38 |
| 6 | Pallivasal | 13.38 | 21.20 | 8.70 | 1.20 | 44.48 |
| 7 | Sabarigiri | 18.65 | 12.25 | 12.95 | 4.95 | 48.80 |
| 8 | Sengulam | 0.16 | 3.40 | 0.20 | 0.20 | 3.96 |
| 9 | Sholayar | 0.5 | 1.63 | 0.00 | 0.00 | 2.13 |
| 10 | Kakkad | 8.45 | 0.00 | 0.00 | 0.00 | 8.45 |
| 11 | Poringal | 7.50 | 7.97 | 8.15 | 0.55 | 24.17 |
| 12 | Panniyar | 20.62 | 17.00 | 0.00 | 0.00 | 37.62 |
| 13 | N'mangalam | 2.37 | 0.20 | 0.20 | 0.20 | 2.97 |
| 14 | SHEPs | 6.43 | 2.19 | 1.00 | 2.00 | 11.62 |
| 15 | Wind | 0.00 | 0.08 | 0.08 | 0.05 | 0.21 |
| 16 | BDPP | 0.50 | 0.90 | 0.90 | 0.90 | 3.20 |
| 17 | KDPP | 1.51 | 1.87 | 3.34 | 2.93 | 9.65 |
| | Total | 108.32 | 91.05 | 40.92 | 18.03 | 258.31 |

| Details of Works proposed in Existing Generating Stations Annual Plan 2018- 2022 | | | | |
|---|---|---|---|---|
| **Stations** | **2018-19** | **2019-20** | **2020-21** | **2021-22** |
| **Adyanpara** | Flood related works | Sluice valve, intake modification | Water conduit Strengthening | Civil protection works |
| **Idamalayar** | Yard modification & fencing, CCTV Security | water conducting system | Improving lighting system | Overhauling MIV, bypass valves |
| **Idukki** | -Drain Construction, Transformer(2 No) Refurbishment, Replacement of PCB filled transformers, Installation of CCTV, Replacing 220 kV CTs & Isolators &CBs, Cavern lighting etc | Yard lighting, 66kV Transformer upgradation, Feeder rearrangement, Butterfly valve refurbishment | Yard equipment Renovation PSDF works | Auxiliary Equipment Renovation |
| **Kuttiyadi** | Construction of Flats & Vehicles | Security modernization Modification of MIV-nit5, Store building, Bearing Pad Replacement ( Unit5) | Control System Renovation, Civil works | Civil works<br>Auxiliary Equipments Renovation |
| **Lower Periyar** | Renovation of governing system | PSDF works | PSDF works/Transformer protection(GT) | New sequence controller for all units |
| **Pallivasal** | Butterfly Valve Replacement Penstock life enhancement , Purchasing of new runner Replacement of 10 MVA transformer etc | Replacement of BV, Penstocks Life enhancement , 66 kV bays, Sengulam pump house | Penstock works<br>Yard equipment Renovation | GT/Breaker renovation |
| **Sabarigiri** | Construction of studio apartments, 66 kV yard modification Purchase of 22 MVA GT-3 Nos, Purchase of test lab equipments | Installation of GT transformer, Distribution line modification, SCADA relays, Studio apartments | New GTS | New Auxiliary Transformer/ Yard modifications |
| **Sengulam** | Replacement of Penstock & BV, Valve house Road Replacement of 110/66 kV,25 MVA TF | Replacement of penstock & BV | Strengthening water conducting system | Strengthening water conducting system |
| **Sholayar** | Civil Works | Civil works | | |
| **Kakkad** | PLC, SCADA & new digital governing systems | | | |
| **P'kuthu &PLBE** | Dormitory & Conference hall 11 kv feeder to Dam | Spares, Lube oil filter, Replmt of governors | Common SCADA & Control | Common SCADA & Control |
| **Panniar** | Replacement of PRV& draft tube | Replacement of PRV | | |
| **N'mgalam & NES** | SCADA at NPS,11 kV panel replacement | Fencing Board & Land at Kallarkutty | Moog Valves | Oil filter |
| **Small Hydro Projects** | Additional 11 kv VCB panel at Chimmoney Malampuzha Excitation work to digital AVR Spares at MLKRA, Relay at Madupetty, Office building at PZTHDE, Dormatary at Urumi, Renovation Cooling water system at Chembukdve, Deluge system at Kallada, Oil filter for LM, Battery at RP, Additional sluice valve at Adyanpara | Hydraulic/Pneumatic control works | Hydraulic/Pneumatic control works | Hydraulic/Pneumatic control works |
| **Wind Farm** | | Renovation of units. | Procuring new gear box | Strengthening of units |
| **BDPP** | Reroofing of Power house Building | Spares | Spares, Strengthening Exhaust | Spares,<br>Strengthening Exhaust system |
| **KDPP** | Procurement of emergency Engine and Auxiliary spares, Installation of Fire protection system | Spares, Engine modifications | Boiler renovation | engine modifications |

---

# CHAPTER 2

# CAPITAL INVESTMENT PLAN OF SBU-TRANSMISSION

Kerala State Electricity Board Limited (KSEBL), is an integrated State Public Sector power utility in the State of Kerala, performing the three functions of Electricity Generation, Transmission, and Distribution through three Strategic Business Units (SBUs) with SBU-T carrying out the function of State Load Dispatch Centre also.

As per the second transfer scheme, it is the function of the State Transmission Utility to ensure development of an efficient, co-ordinated and economical system of intra-state transmission lines for smooth flow of electricity from a generating station to the load centres. Further, the second transfer scheme entrusts the responsibility on the STU to develop and execute long term plans for evacuation and supply of power at voltages of and above 33KV, in consultation and co-ordination with the other SBUs and under the policy framework developed by KSEB Ltd. so as to satisfy the present and future needs to the generation and distribution SBUs. The SBU-T handles the total energy sold to consumers and licensees within the state, power drawn by open access consumers and the small quantum of energy sold outside the state.

Transmission system is the backbone of the power system. The growth of transmission system should match with the growth of generation capacity in the State and ideally it must be ahead of generation both in time and capacity to avoid congestion or bottling up of power. Efficient operation of transmission system in terms of providing reliability, avoidance of disturbance, maintaining voltage level and reducing transmission losses requires continuous strengthening of transmission system.

The transmission planning by KSEBL is done for achieving the above objective and also to provide 24 x 7 power supply to all consumers with n-1 and n-1-1 and n-2 reliability. Further, the transmission planning inside the State has to move ahead synchronously with generation addition and development of regional and inter regional transmission planning. Development of transmission system must match with generating capacity on one side and growing demand on the other side. With Open Access in transmission, the role of transmission has changed from a mere infrastructure to an enabler in operation of a competitive power market.

Investments in transmission are made with prudence and benefits are socialized. In addition to the financial benefit as evaluated through IRR computation, there are other intangible benefits on account of realization of the planned elements including the benefits on account of better capacity utilization and consequently higher energy yield from generating stations, opportunity financial gains on account of transmitting additional power through the strengthened network to meet additional loads etc. which cannot be quantified.

Thus, for transmission projects, though the initial investment cost appears to be high and financial benefit lower, the benefit due to the project available in the long run including intangible benefits is manifold which spans for more than 35 years from the date of commissioning.

## Present Intra State Transmission Capacity

As per the second Transfer Scheme, SBU-T is entrusted with the construction of 33KV and above system of KSEBL. The voltage level wise capacity of Transmission system and number of substations and transmission lines within the State as on 31st March, 2018 is summarized below:

**Table 1 : Transmission System (as on 31-3-2018)**

| No | Item | Unit | Quantity |
|---|---|---|---|
| 1 | 400 kV Lines | Ckt-km | 855.96* |
| 2 | 220 kV Lines | Ckt-km | 2855.98 |
| 3 | 110 kV Lines | Ckt-km | 4528.08 |
| 4 | 66 kV Lines | Ckt-km | 2154.63 |
| 5 | 33KV lines | Ckt-km | 1943.51 |
| 6 | 400 kV Substations | Nos | 5* + 1 |
| 7 | 220 kV Substations | Nos | 22 |
| 8 | 110 kV Substations | Nos | 154 |
| 9 | 66KV Substations | Nos | 76 |
| 10 | 33 KV Substations | Nos | 148 |
| **11** | **Total transmission capacity (MVA)** | **MVA** | **19994.70** |
| | **PGCIL owned* | | |

## Limitations of the present Intra state transmission network

The presently available intra-state transmission system in the State is analyzed to be insufficient for catering to the current demand in an unconstrained manner. There were very little additions in the state in 220 and 400kV level since 1992 and the infrastructure created is not sufficient to meet the increasing load growth. With the projected load in the coming years and the existing transmission network, there can be serious consequences as submitted below:

- Absence of additional capacity will lead to extreme low voltage pockets and chances of system collapse. Analysis carried out indicate that the voltage profile in Malabar area is even below the statutory requirement under the present loading conditions and is observed to reach an extreme low value under the horizon scenario studied with a projected demand of 4800MW.
- Under utilization of assets due to de-rating resulting in financial loss.
- The peak load system loss will increase heavily causing huge financial loss.

The planning criteria mandated by the Central Electricity Authority requires that the transmission network should not be subjected to any constraints like overloading or under voltage consequent to an [n-1] condition like the loss of any one circuit of a double circuit feeder or one transformer of a multi transformer installation. The present day transmission system in KSEBL is found to be not fully complying with these criteria and is analyzed to be deficient in meeting the current demand in a secure and reliable manner as well as extremely inadequate to meet the projected future demand.

Consequent to the formation S3 region for Kerala control area, the import capability (ATC) of the state will be assessed periodically based on which sanction for Long Term and Medium Term Open Access will be granted for the import of power from outside the State. The ATC in-turn depends on the transmission capability of the intra-state network to transmit the power in an unconstrained manner satisfying all the statutory planning and operational criteria as laid out in Central Electricity Authority's planning criteria and Grid code respectively. Any constraints like low voltages or security issues violating the contingency criteria consequent to the absence of a strong and stable transmission network inside the state will lead to the reduction of the import capability. Therefore the augmentation of intra state transmission network is essential.

## Multi Year Capital Expenditure Plan 2018-19 to 2021-22

To achieve the above objective, SBU-T has evolved a multi year capital expenditure plan which is grouped as follows:

A. **Ongoing projects & New projects costing less than Rs.10Cr**
B. **Normal capital works (above 10Cr) proposed in the control period 2018-19 to 2021-22**
C. **Transgrid works.**
D. **SLDC related capital works.**

There are many ongoing capital works of SBU-T that have started in the previous control period and which extend to this control period, the details of which are included under **Annexure-T1.** The new capital works proposed for the control period come under two categories - those having project cost above Rs.10 Cr and those below Rs.10Cr. The details of new capital works below Rs.10Cr are included under **Annexure-T1**.

## Ongoing projects & New projects costing less than Rs.10Cr

An abstract of the capital expenditure as on the year of CoD of ongoing projects and new projects having individual cost less than Rs.10 Cr projected for the control period 2018-19 to 2021-22 under various Transmission Circles and SLDC is summarized below. It is submitted that the capital expenditure projected for each year of the control period as shown in the table below is the total capital cost as on CoD for the project.

| Table 2 : GFA addition – Ongoing projects & new projects less than Rs.10Cr (Rs Cr) | | | | |
|---|---|---|---|---|
| **In Area Under** | **2018-19** | **2019-20** | **2020-21** | **2021-22** |
| Transmission Circle Thrissur | 60.27 | 32.29 | 11.20 | 0.00 |
| Transmission Circle, Pallom | 23.59 | 54.82 | 0.00 | 0.00 |
| Transmission Circle, Thodupuzha | 13.84 | 22.90 | 11.60 | 88.70 |
| Transmission Circle, Kannur | 31.06 | 28.03 | 0.00 | 0.00 |
| Transmission Circle, Kalamassery | 185.26 | 13.57 | 0.00 | 0.00 |
| Transmission Circle, Kozhikode | 188.91 | 282.51 | 172.33 | 157.46 |
| Transmission Circle, Trivandrum | 103.23 | 46.77 | 0.00 | 0.00 |
| Transmission Circle, Kottarakara | 37.20 | 0.00 | 0.00 | 0.00 |
| Transmission Circle, Alapuzha | 66.39 | 30.90 | 0.00 | 0.00 |
| Transmission Circle, Palakkad | 44.42 | 56.94 | 1.15 | 8.10 |
| Trans Division, Pathanamthitta | 23.54 | 0.00 | 0.00 | 0.00 |
| Transmission Circle, Malappuram | 26.42 | 0.00 | 0.00 | 0.00 |
| **Total** | **804.12** | **568.73** | **196.28** | **254.26** |
| PSDF/Grant/Deposit work/IPDS for SBU-T | 196.6 | 41.60 | 0 | 0 |
| **SBU-T : KSEBL fund** | **607.52** | **527.13** | **196.28** | **254.26** |
| System Operation, Kalamassery | 14.72 | 7.14 | 0 | 0 |
| PSDF grant for SLDC | | 4.77 | | |
| **SLDC : KSEBL fund** | **14.72** | **2.37** | **0** | **0** |
| **Capital cost of ongoing works of SBU-T & SLDC (incl Grant/Deposit/PSDF)** | **818.84** | **575.87** | **196.28** | **254.26** |
| **Capital cost of ongoing works of SBU-T & SLDC (excl grant/deposit/PSDF)** | **622.24** | **529.50** | **196.28** | **254.26** |

For projects above Rs.10Cr, Detailed project reports are attached. The details of new projects above Rs.10 Cr along with the DPRs are enclosed as **Annexure-T2**. An abstract of the capital expenditure projected for the control period both new and ongoing are submitted below.

| Table 3 : TOTAL GFA addition OF SBU-T & SLDC(Rs Cr) | | | | | |
|---|---|---|---|---|---|
| No. | Name of Work | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| **SBU-T** | | | | | |
| 1 | Ongoing projects plus new small works | 804.12 | 568.73 | 196.28 | 254.26 |
| 2 | New Capital Works above 10Cr | 0 | 662.59 | 421.83 | 41.65 |
| 3 | Transgrid Works | 0 | 362.57 | 2073.84 | 260.96 |
| 4 | Edamon-Kochi Line compensation | 10 | 118.02 | | |
| | **Total** | **814.12** | **1711.91** | **2691.95** | **556.87** |
| **SLDC** | | | | | |
| 1 | Ongoing projects plus new small works | 14.72 | 7.14 | 0 | 0 |
| 2 | New projects | 12 | 53 | 12 | 212.45 |
| | **Total** | **26.72** | **60.14** | **12** | **212.45** |
| | **Total CAPEX for SBU-T & SLDC** | **840.84** | **1772.05** | **2703.95** | **769.32** |

In this application for approval of proposed Capital Investment Plan for the Transmission Strategic Business unit for the control period FY 2018-19 to FY 2021-22 is based on Section181(zp) of the Electricity Act 2003, read with Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff),2018.

As per Regulation 54 of the Tariff Regulations, 2018, the transmission business/licensee shall along the petition for Aggregate Revenue Requirements for the Control Period submit to the Commission for its approval, a detailed capital investment plan, financing plan and physical targets. Such investments may be undertaken for strengthening and augmenting the intra-State transmission system for meeting the requirement of power evacuation, load growth, reduction in transmission losses, improvement in quality of supply, reliability, metering, etc., for the Control Period, in accordance with the 'Guidelines for In-principle Clearance of Capital Investment' specified at Annexure-IV of the Tariff Regulations**.**

As per the guidelines for In-principle clearance of capital investment specified, the transmission businesses/licensees and State Load Despatch Centre shall submit the capital investment plan outlining the major schemes proposed in the manner directed by the Commission. Such plan shall be uniform and consistent with other relevant proposals, and supporting information as desired by the Commission shall be included in the submission.

Further, for the capital investment schemes exceeding the amount of Rs. 10 crore in the case of KSEB Ltd, detailed project report shall be submitted for the Commission's in-principle approval with a broad cost-benefit analysis and other details for substantiating the investment as specified.

In accordance with the above, SBU-T has prepared Detailed Project Report for all projects costing more than Rs.10 Crore. The DPR prepared includes the following:

- Need for investment.
- Technical justification
- Timing of the investment
- Prudence of the investment
- Cost benefits analysis.

## Normal capital works proposed in the control period 2018-19 to 2021-22

About 40 new capital works are proposed for the control period exceeding Rs.10 Crore, for which DPR are prepared and enclosed. In addition 12 capital works come under 'Transgrid 2.0 scheme' and 2 major capital works under SLDC are planned for this control period, details of which are submitted in the succeeding paragraphs. The DPRs of all these projects are enclosed. The list of new projects planned for the control period along with the expected CoD are submitted below:

**Table 4 : LIST OF MAJOR WORKS (above 10Cr) TARGETTED FOR 4 YEARS**

| No | Name of Work | Target year |
|---|---|---|
| 1 | 110 KV DC line 220 KV S/S, Palakkad to 110KV S/S Malampuzha | 2019-20 |
| 2 | New 220kV Substation at Kottayi near Palakkad | 2020-21 |
| 3 | New 110kV GIS in the existing 110kV Substation, Vennakkara | 2019-20 |
| 4 | New 110KV S/S Pattambi | 2019-20 |
| | LILO 110 kV Shornur- Malapparamba D/c feeder to 110 kV S/S Pattambi | |
| 5 | 66 kV S/S Chandranagar in 110 kV | 2019-20 |
| | 110 kV Kanjikode - Chandranagar D/c feeder | |

| | | |
|---|---|---|
| | 110 kV Chandranagar - Vennakkara D/c Feeder | |
| 6 | 110 kV Substation, Mannuthy | 2019-20 |
| | LILO 110 kV Madakkathara - Ollur D/c feeder to 110 kV S/S Mannuthy | |
| 7 | Upgradation of 66kV Pudukkad – Kattoor SC line to 110kV DC and construction of 2 Nos. 110kV feeder bays at Pudukkad Substation | 2020-21 |
| 8 | Upgradation of Viyyur -Ollur 66kV line to 110kV | 2020-21 |
| 9 | Upgradation of Pallom - Ettumanoor 66 kV S/c line to 110 kV D/c | 2020-21 |
| | Upgradation of 66 kV Substation Gandhinagar to 110 kV | 2020-21 |
| | Upgradation of 66 kV Substation Kottayam to 110 kV | 2020-21 |
| 10 | Upgradation 66 kV Koothattukulam - Kuravilangadu S/c line to 110 kV D/c and upgradation of 66kV Kuravilangad Substation | 2019-20 |
| 11 | Upgradation 66 kV Kothamangalam - Koothattukulam S/c to 110 kV D/c. | 2019-20 |
| 12 | Up-gradation of 66kV Substation Koothattukulam to 110kV-vaikom | 2019-20 |
| 13 | 66 kV Single Circuit Pala-Ettumanoor feeder to 110 kV DC feeder and construction of feeder bays at 110 kV Substation, Pala | 2019-20 |
| 14 | Upgradation of 66kV Substation Ettumanoor to 110kV | 2019-20 |
| 15 | 110 kV Substation, Vazhoor | 2019-20 |
| 16 | 110 kV GIS substation, Kowdiar | 2019-20 |
| 17 | Upgradation of 66 kV Substation Palode to 110 kV | 2019-20 |
| 18 | Upgradation of TVT No: 1 and 2 feeders. | 2020-21 |
| 19 | 110 kV switching cum S/S at Panthalacode with 8 feeder bays and two transformer bays and erecting 2 x 12.5 MVA, 110/11 kV T/F with double bus | 2020-21 |
| 20 | 110 kV S/S, Chithara LILO of 110 kV Edamon -Paruthippara feeder to 110 kV S/S Chithara | 2019-20 |
| 21 | 110 kV GIS Kollam - Kottiyam (SC, UG cable) | 2019-20 |
| 22 | 66kV substation Anchal to 110kV with 2 nos, 110/11kV, 12.5MVA power transformer and upgradation of 66kV SC Edamon- Ayoor to 110kV DC line | 2019-20 |
| 23 | 66kV Substation, Karunagappally to 110kV and upgradation of line from 110kV Substation, Sasthamcotta to 66kV Substation, Karunagapally | 2019-20 |
| 24 | 110 kV Kayamkulam -Karunagapally D/c feeder | 2021-22 |
| 25 | 66 kV S/S Kuttanad to 110 Kv, Upgradation of Poopally- Kuttanad portion of 66kV Kuttanad - Alappuzha S/c feeder to 110 kV D/c | 2020-21 |
| 26 | Upgradation of 66 kV Punnapra -Alappuzha DC feeder to 110 kV DC | 2020-21 |
| 27 | 110 kV Substation, Seethangoli | 2019-20 |
| | LILO of 110 kV Vidyanagar - Kubanoor feeder to 110 kV S/s Seethangoli | |
| 28 | 110 kV GIS Substation, Malappuram | 2020-21 |
| 29 | 110 kV Chemberi | 2019-20 |
| 30 | Ambalathara Solarpark | 2019-20 |
| 31 | Upgradation of 33 kV Substation Thambalamanna to 110 kV | 2019-20 |
| | 110 kV Agasthiamuzhy -Thambalamanna (S/c, UG cable) | |
| 32 | Upgradation of 66 kV Substation Kuthumunda to 110 kV | 2019-20 |
| 33 | Upgradation of 66 kV Substation Mankada to 110 kV | 2019-20 |
| | 110 kV D/c line from Valambur to Elachola, upgrading 66 kV Malappuram - Mankada S/c feeder to 110 kV D/c feeder upto Valambur | |
| 34 | 66 kV Kaniyampetta-Sulthanbattery feeder to 110 kV level and LILO-ing to 110 kV S/s Ambalavayal | 2019-20 |
| 35 | LILO of 110 kV Nallalam - Kizhissery feeder to proposed 110 kV S/s Pulikkal | 2019-20 |
| 36 | 110 kV Tirur - Parappanangadi D/c feeder | 2020-21 |
| 37 | 110 kV Mylatty -Vidyanagar S/c line to 110/220 kV MCMV line | 2019-20 |
| 38 | Doubling 66 kV Kunnamangalam - Thamarassery line in 110 kV parameters | Ongoing works 2019-20 |

| | | |
|---|---|---|
| 39 | Upgrading Methottuthazham (tap point) - Mankavu portion of 66 kV Nallalam - Kuttikkattoor S/c line to 110 kV D/c | Ongoing works 2019-20 |
| 40 | LILO of 110 kV Tirur- Kuttipuram, Edappal -Kuttipuram and Tirur- Ponnani feeder to 110 kV Substation Vengaloor | 2020-21 |
| | **TRANSGRID WORKS** | |
| 41 | Kolathunadu | 2021-22 |
| 42 | Chalakkudy | 2020-21 |
| 43 | NRHTLS | 2019-20 |
| 44 | Thalasseri | 2020-21 |
| 45 | Eranad | 2019-20 |
| 46 | Aluva | 2019-20 |
| 47 | Kaloor | 2019-20 |
| 48 | Kottayam, Thuravur & Ettumanoor | 2020-21 |
| 49 | Kothamangalam & Chithirapuram | 2020-21 |
| 50 | Kunnamangalam | 2019-20 |
| 51 | Manjeri | 2020-21 |
| 52 | Kunnamkulam | 2020-21 |
| | **SLDC Works** | |
| 1 | SAMAST | 2019-20 |
| 2 | Reliable Communication & Data Acquisition | 2021-22 |

A brief summary of the new capital works planned for the control period 2018-19 to 2021-22 are submitted below:

**Construction of 110KV DC line from 220KV Substation, Palakkad to 110KV substation, Malampuzha.**

As part of transmission system improvement in and around Palakkad Town, KSEBL has evolved a new proposal "Construction of 110KV Double circuit Line from 220KV Substation Palakkad to 110KV substation Malampuzha. This proposal comprises of construction of 110KV Double circuit line form 220KV substation Palakkad to 110KV substation Malampuzha. Presently three 110KV substations Malampuzha, Kalladikkode and Mannarkkad is fed from 110KV substation Vennakkara through a Single circuit line. This proposal is beneficial to 4 lakh people in Malampuzha, Mannarkkad and Agali area besides facilitating the industrial development of Palakkad Town and its adjoining area where a large number of premier institution are presently functioning and also the sustainable development of tribal areas of Agali. The strengthened transmission system is a strong support to the rapidly increased distribution network in and around Malampuzha, Mannakkad and Agali area.

The estimated cost of the project is Rs 14.86 Cr and is expected to be commissioned by 2019-20.

**Construction of a new 220KV Substation at Kottayi near Palakkad**

The project is expected to facilitate the industrial development and meet future demand in and around Palakkad town and improve the quality and reliability of supply to about 4.5 Lakh customers in Tarur, Parali, Ottappalam, Palakkad, and Kuzhalmannam area. The project will support the power requirement of forthcoming new projects in Palakkad such as BEML, Rail coach

Factory, IIT-Palakkad etc: in public sector and related ancillary industrial and commercial projects in private sector by relieving the load of existing 220KV Substation, Kanjikode (Palakkad) and 220KV Subastation, Shornur.

Further since the proposed substation is interlinked with 400KV substation, Elappuly and Madakkathara, it can bring up more flexibility in 220 and 110KV feeding arrangements and most versatile part of the proposed project is that it can bring down the peak transmission loss by an extent of 14 MW. The estimated cost of the project is Rs. 59.3 Cr and is expected to be commissioned in the year 2020-21.

**Construction of a new 110KV GIS in the existing 110KV Substation, Vennakkara**

The project is aimed at improving the transmission system in and around Palakkad Town. The proposal consists of two parts. The first part consists of up-gradation and R&M of the present Vennakkara 110 kV Air-Insulated-Substation (AIS) using modern Gas-Insulated-Substation (GIS) and Substation with automation Systems (SAS) Technology. The project is expected to facilitate the industrial development and meet future demand in Palakkad town and improve the quality and reliability of supply to about 7.5 Lakh customers in the Town and 4 Lakh consumers in Nenmara and Kunnampully substation supply area. The estimated cost of the project is Rs 39.50Cr and is expected to be commissioned by 2019-20.

**Construction of a new 110KV Substation at Pattambi and LILO of one circuit of 110 kV Shornur-Malapparamba DC feeder to 110 kV Substation Pattambi**

As part of transmission system improvement in and around Palakkad Town, KSEBL has evolved a new proposal of 110kV Substation Pattambi with LILO from 110kV Shornur Edappal and Shornur Kootanad lines. This proposal is beneficial to Pattambi municipality, Ongallur panchayath and some parts of Muthuthala Panchayath. The estimated cost of the project is Rs 20.6 Cr and is expected to be commissioned by 2019-20.

**Charging of 66 kV Substation Chandranagar in 110 kV, 110 kV Kanjikode - Chandranagar D/c feeder, 110 kV Chandranagar - Vennakkara D/c Feeder**

The project is aimed at improving the transmission system in and around Palakkad Town. The proposal consists of up gradation of 66kV Palakkad Medical College Sub Station and its associated line to 110kV. The project is expected to ensure power to Suburban areas of Palakkad Town in Normal Condition and provide back up to Vennakkara Sub Station in the events of planned and unplanned outages. Also the project creates an additional connectivity between 220kV Palakkad and Vennakkara which gives considerable relief to existing PKVN feeders. The estimated cost of the project is Rs 19.38 Cr and is expected to be commissioned by 2019-20.

**Construction of 110 kV Substation, Mannuthy and LILO of one circuit of 110 kV Madakkathara - Ollur D/c feeder to 110 kV Substation Mannuthy**

The present project is aimed at improving the transmission system in and around Thrissur Corporation. The proposal consists of constructing a new 110kV GIS substation at Mannuthy at Kerala Veterinary and Animal Science University Campus.

The project is expected to facilitate the industrial development and meet future demand in Mannuthy area in Thrissur District and improve the quality and reliability of supply to about 7.5 Lakh customers around Thrissur Corporation Area and 4 Lakh consumers in Madakkathara and Ollur substation supply area. The estimated cost of the project is Rs 22.42 Cr and is expected to be commissioned by 2019-20

**Upgradation of 66KV Pudukkad-Kattoor SC line to 110KV DC line and construction of 2 numbers of 110KV feeder bays at Pudukkad substation.**

The project is aimed at improving the transmission system at Chalakkudy, Pudukkad and Kattoor substations. The work of up gradation of 66 kV Pudukkad – Kattoor SC line to 110kV DC can act as a tie line between Madakkathara and Chalakkudy Substations. Generating stations namely Poringalkuthu, Sholayar and Edamalayar are connected to Chalakkudy Substation and Central Grid supply is connected to Madakkathara 400kV Substation. Kattor, Irinjalakuda, Valppad, Cherpu and forth coming 110kV substation Kodungalloor Substation can be fed from Chalakkudy supply through the proposed Pudukkad – Kattor line when Madakkathara supply fails. This in effect reduces the burden of Madakkathara 400kV Substation. The proposal consists of two parts. The first part consists of up-gradation of existing Pudukkad to Kattoor 66kV SC line to 110 kV DC line. The Second part consists the construction of 2 nos of 110kV bays at Pudukkad Substation. The estimated cost of the project is Rs.11.20 Cr and is expected to be commissioned by 2020-21.

**Upgradation of Viyyur-Ollur 66KV line to 110KV**

The present project is aimed at improving the transmission system in and around Thrissur Corporation. The proposal of Line Upgradation of 66kV (Ollur- Viyyur) 6OLVI feeder to 110kV by upgrading 66kV towers to 110kV towers at 43 locations will ensure that 110kV Substation Viyyur get an alternate source from 110kV Substation Ollur. The only EHT consumer (Thrissur Corporation) is upgrading their Substation from 66kV to 110kV in near future.

The project is expected to facilitate the strengthening of transmission network in Thrissur. After the completion of the project new transmission Ring can be formed and there will be general improvement in Voltage Profile, consequent to which problems and issues related to under voltage, can be resolved. The estimated cost of the project is Rs 13.40Cr and is expected to be commissioned by 2020-21.

**Upgradation of Pallom-Ettumanoor 66KV S/C line to 110KV D/C and upgradation of 66KV Gandhinagar and Kottayam substations**

The project is aimed at improving the transmission system in and around Kottayam. The project comprises of upgradation works of 66kV Pallom-Ettumanoor DC feeder to 110kV DC and upgradation of existing 66kV Kottayam, Gandhinagar Substation to 110kV and upgradation of 66kV

Pallom-Ettumanoor and 66kV Pallom-Gandhinagar feeder bays to 110kV level along with installation of one 20MVA 110/11kV transformer at 220kV Pallom Substation. The existing tap line to Kottayam Substation is to be converted to LILO arrangement for better reliability of supply in Kottayam town and its surrounding area. with the establishment of the proposed project both Gandhinagar and Kottayam Substation can be fed from 220kV substation, Poovanthuruthu as well as from Ettumanoor Substation which results in better supply reliability at Kottayam Town. The project is expected to facilitate the industrial development and meet future electricity demand in Kottayam District and improve the quality and reliability of supply to about 35000 consumers under Electrical sections Kottayam East, Puthuppally, Manarcaud, Nattakom, Gandhinagar, Athirampuzha, Ettumanoor & Aymanam. The total estimated cost of the project is Rs 6200 Lakhs and is expected to be commissioned by 2020-21.

**Upgradation of 66KV Koothattukulam-Kuravilangadu S/C line to 110KV D/C and upgradation of 66KV Kuravilangad substation**

The project is aimed at improving the transmission system in and around Kuravilangad and koothattukulam Towns. The proposal consists of two parts. The first part is up-gradation of 66 KV Kuravilangad Substation to 110 KV. The Second Part is to up-gradation of the Kuravilangad – Koothattukulam 66 KV feeder to 110 KV DC line. The project is expected to meet future demand in Koothattukulam and kuravingad, Marangattupally, Peruva and Kaduthuruthy areas and improve the quality and reliability of supply in these area which will result in the development. The project is expected to facilitate the industrial development and meet future demand in kuravilangad, Kaduthuruthi , Marangattupilly and peruva area in Kottayam District and improve the quality and reliability of supply to about 22000 Thousand customers around Kuravilangad and associated areas . The estimated cost of the project is Rs. 17.75 Cr and is expected to be commissioned by 2019-20.

**Upgradation of 66KV Kothamangalam-Koothattukulam S/C line to 110KV D/C**

The present project is aimed at improving the transmission system in and around Kuravilangad and koothattukulam Towns. The proposal consists of two parts. The first part is up-gradation of 66 KV Kuravilangad Substation to 110 KV. The Second Part is to up-gradation of the Kuravilangad –Koothattukulam 66 KV feeder to 110 KV DC line. The project is expected to meet future demand in Koothattukulam and kuravingad, Marangattupally, Peruva and Kaduthuruthy areas and improve the quality and reliability of supply in these area which will result in the development. The project is expected to facilitate the industrial development and meet future demand in kuravilangad, Kaduthuruthi ,Marangattupilly and peruva area in Kottayam District and improve the quality and reliability of supply to about 22000 Thousand customers around Kuravilangad and associated areas . The estimated cost of the project is Rs. 12.20 Cr and is expected to be commissioned in 2019-20.

**Upgradation of 66KV substation Koothattukulam to 110KV**

Koothattukulam Substation currently provides a back feeding facility to the Thodupuzha 66kV Substation and Moolamattom 66kV Substation through IDKK feeder in case of failure of Moolamattom supply. The project is expected to facilitate the industrial development and meet

future demand in Koothattukulam area in Ernakulam District and improve the quality and reliability of supply to about 9000 customers around Koothattukulam Municipality Area and 13000 consumers in Elanji, Thirumarady, Palakuzha, Veliyannoor, Arakkuzha and Muvattupuzha substation supply area. The estimated cost of the project is Rs 13.27 Cr and is expected to be commissioned in 2019-20.

**Conversion of 66 kV Single Circuit Pala-Ettumanoor feeder to 110 kV DC feeder and construction of feeder bays at 110 kV Substation, Pala**

The proposal envisages upgradation of existing 66kV Single Circuit Pala-Ettumanoor Feeder to 110KV double Circuit feeder and construction of of 2 no.s of 110KV feeder bays named Pala Ettumannoor No.1 and Pala Ettumanoor No.2, extension of control room and stringing of new 110KV bus and interconnection between buses using 250m 110KV UG cable at 110KV substation Pala.

At present 66kV Substation Ettumanoor is fed from 110kV Substation Pala through Pala – Ettumanoor 66kV feeder. Under normal condition Kuravilangad and Gandhinagar Substations are not directly fed from Pala substation. But during emergency situations the supply is fed from Pala substation which results the feeder to reach its full load capacity. At present the demand of both these substations can not be met simultaneously by the single circuit Pala – Ettumanoor 66kV feeder. As 66kV Ettumanoor substation is upgrading to 110kV substation, 110 kV feeders to Ettumanoor substation has to be drawn from Pala substation. **This project is considered to be one of the down stream work of TRANSGRID 2 of Kottayam district.** The project is expected to facilitate the industrial development and meet future demand in Ettumanoor areas in Kottayam District and improve the quality and reliability of supply to about 23000 customers around Ettumanoor Municipal area and 15000 consumers in Nendoor, Athirampuzha, Kidangoor, Manjoor Panchayat Area. The estimated cost of the project is Rs 1265 lakh and is expected to be commissioned by 2019-20.

**Upgradation of 66kV Substation Ettumanoor to 110kV-vaikom**

This proposed project will cater the power supply requirements of Ettumanoor Muncipality and its surrounding area. It will facilitate operational flexibility, system improvements and meet expected load growth in and around the Ettumanoor area in near future. Besides, the proposed substation will provide a link between 110 kV Substation Pala and 110 kV Substation Vaikom and thereby open a path for the up gradation of 66 kV Substations Kottayam, Gandhinagar, Kuravilangad and Koothattukulam. The entire Power evacuation from Sengulam & Neriamangalam Power Houses is possible through Pala Substation once the proposed 110kV Substation Ettumanoor is established. In the event of simultaneous failure of 110 kV incoming feeders to Vaikom substation, the 110 supply from Ettumanoor Substation can be extended to Vaikom Substation. Also the proposed 110kV supply can be extended to Gandhinagar, Kottayam and Pallom Substations in case of supply from Pallom is not available. The project is expected to facilitate the industrial development and meet future demand in Ettumanoor areas in Kottayam District and improve the quality and reliability of supply to about 23000 customers around Ettumanoor

Municipal area and 15000 consumers in Nendoor, Athirampuzha, Kidangoor, Manjoor Panchayat Area. The estimated cost of the project is Rs 16.7 Cr and is expected to be commissioned in 2019-20.

**New 110KV Substation, Vazhoor**

The project is aimed at improving the transmission system in Vazhoor. The proposal envisages the establishment of one 110kv substation at Vazhoor. The project is expected to facilitate the industrial development and meet future demand in Vazhoor and nearby areas. Also improves the quality and reliability of supply to 3000 customers in the Town and 11500 consumers in Kanam, Vazhoor and Pathanadu. Construction of a 110kV substation at Vazhoor will provide immediate benefit to around ten thousand consumers in and around Vazhoor area and three HT consumers who regularly lodge complaints regarding frequent power failures and low voltage issue. The estimated cost of the project is Rs 11.40 Cr and is expected to be commissioned by 2019-20.

**110KV GIS Substation, Kowdiar**

The project is one of such new proposals and is aimed at improving the reliability of electric supply at Thiruvananthapuram City. The proposal consists of the construction of 110 kV GIS Substation at Kowdiar by installing 2 Nos of 12.5MVA 110/11kV Transformers and laying of 110kV SC, 1x630sqmm XLPE UG cable from 110kV substation, Paruthippara to 110kV GIS substation at Kowdiar. The project is expected to facilitate the development and meet future demand in Thiruvananthapuram City and improve the reliability of supply to the customers in the City. The estimated cost of the project is Rs 33.5 Cr and is expected to be commissioned by 2019-20.

**Upgradation of 66KV substation Palode to 110KV**

The project given in this report is one of such new proposals and is aimed at improving the reliability of electric supply at North East region of Thiruvananthapuram. The proposed project envisages up gradation works to 110kV at 66kV substation Palode, upgrading the existing SC feeder from to Palode to 110k v DC feeder by LILO-ing the existing 110kV Edamon- Paruthippara no2 feeder at Mithrumala The project is expected to facilitate the development and meet future demand in North East region of Thiruvananthapuram and improve the reliability of supply to the customers in this region. The estimated cost of the project is Rs 16 Cr and is expected to be commissioned in 2019-20.

**Upgradation of TVT No.1 and 2 feeders**

The project is aimed at improving the transmission system around South portion of Thiruvananthapuram District. The proposal is the upgradation of 66 kV TVT I & II feeders to 110 kV double Circuit using Wolf conductor from Thirumala to Parassala and consequently to upgrade the Substations connected to the above line and retaining the Paruthippara-Thirumala portion at 66 kV after replacing the deteriorated towers and strengthening with DOG conductor. The estimated cost of the project is Rs 54 Cr and is expected to be commissioned in 2020-21.

## Construction of 110KV switching cum substation at Panthalacode

The project is aimed at improving the transmission system in and around Thiruvananthapuram district. The proposed 110 kV substation at Panthalacode located at Vembayam village in Nedumangad Taluk, Thiruvananthapuram District comes under the jurisdiction of Transmission Sub Division, Paruthippara under Transmission Division, Thiruvananthapuram.

Proposal for constructing an 110kV switching cum substation at Panthalacode was prepared to meet more flexibility in the EHV feeding of Thiruvananthapuram city and sub urban areas and also the low voltage problem and high interruption rates of the area which is fed by 11kV feeders from 110kV substation Paruthippara and 220kV substation Pothencode. The project is expected to improve the system stability, quality and reliability of supply. The estimated cost of the project is Rs.22.18 Cr. and is expected to be commissioned in 2020-21.

## 110 kV Substation, Chithara LILO of 110 kV Edamon -Paruthippara feeder to 110 kV Substation Chithara

The project is aimed at improving the transmission system in and around Kollam district. The proposed 110kV substation at Chithara located at Mankode village in Kottarakkara Taluk, Kollam District comes under the jurisdiction of TC Sub Division, Kottarakkara under Transmission Construction Division, Kottarakkara. Proposal for constructing a 110kV substation at Chithara was prepared to meet the low voltage problem and high interruption rates of the area which are fed by 11 kV feeders from 33kV substation, Kadakkal, 66kV substation, Anchal and 66kV substation, Thenmala. The project is expected to improve the system stability, quality and reliability of supply to the consumers of this area. The estimated cost of the project is Rs. 11Cr. and is expected to be commissioned in 2019-20.

## 110KV GIS Kollam to Kottiyam interlinking

The present project is a new proposal and is aimed at improving the stability and reliability of electric supply at Kollam Town. The proposal consists of Interlinking 3 runs of 1 x 630 sq.mm 110kV XLPE Aluminium UG cable of length 11km from 110kV Substation Kottiyam to 110kV GIS Substation Kollam and construction of one number of 110kV feeder bay at 110kV Substation Kottiyam. The provision for future feeder bay at GIS, Kollam is already completed and commissioned along with the phase 1 construction of 110kV GIS Kollam. The project is expected not only to facilitate the industrial development and meet future demand in Kollam Town but also most importantly to improve the reliability of supply to the customers in the Kollam Town. The estimated cost of the project is Rs. 54.37 Cr and is expected to be commissioned in 2019-20.

## Upgradation 66kV substation Anchal to 110kV and upgradation of existing 66kV SC Edamon-Ayoor to 110kV DC line

The present project is aimed at improving the transmission system in around Anchal and Ayur Towns. The proposal consists of four parts.

| | |
|---|---|
| **Phase I** | 1. Constructing 2nos of 110kV Bay at Edamon Sub station.<br>2. Upgragdation of 12km 66kV SC Edamon-Anchal line to 110kV DC<br>3. Upgradation of 66kV Anchal Substation to 110kV |
| **Phase II** | 4. Upgragdation of 9km 66kV SC Anchal-Ayur line to 110kV DC |

The project is expected to facilitate the industrial development and meet future demand in Anchal & Ayur town and improve the quality and reliability of supply to about 5 lakh customers in these Town. The estimated cost of the project is Rs 37.78 Cr and is expected to be commissioned in 2019-20.

**Up gradation of 66kV Substation, Karunagappally and 66kV Sasthamcotta-Karunagapally line**

The present project is aimed at improving the transmission system in and around Karunagappally Town. The proposal consists of two parts.

1. Upgragdation of 66kV Sasthamcotta- Karunagappally line to 110kV
2. Upgradation of the present 66kV substation, Karunagappally to 110 kV

The project is expected to facilitate the industrial development and meet future demand in Karunagappally town and improve the quality and reliability of supply to about 7.5 Lakh customers in the Town and 4 Lakh consumers in nearby area. The estimated cost of the project is Rs 16.50 Cr and is expected to be commissioned in 2019-20.

**110KV Kayamkulam –Karunagapally D/C feeder**

The project is aimed at improving the transmission system in and around Karunagapally Town. The proposal consists of two parts. The first part consists of Construction of 110kV DC line using 220/110kV MCMV tower from Kayamkulam to Karunagapally and second part consists of Construction of 2 Nos of 110kV feeder bays at Kayamkulam substation.

110 kV Kayamkulam Substation was commissioned on June 14, 1999. There are two 10 MVA, 110/ 11 kV Transformers and one 12.5 MVA, 110/11kV Transformer at Kayamkulam 110 kV Substation along with one 16 MVA, 110/ 33kV Transformer. 33 KV Oachira Substation is now being fed from here. The consumers of Electrical Sections Kayamkulam East, Kayamkulam West, Muthukulam, Krishnapuram , Arattupuzha and Oachira are mainly fed from this Substation, via 11 kV feeders Koprapura, Kandalloor, Muthukulam, Highway, Perumpally, Kayamkulam Town, Eruva and 33 kV feeder Oachira.

The 66kV Karunagappally Substation was inaugurated in 1994. There are three 10 MVA, 66/ 11kV Transformers in Karunagappally Substation. The Electrical sections Karunagappally North, Karunagappally South, Manappally , Mainagappally, Oachira and Panmana are mainly fed from Karunagappally Substation via 11kV feeders Kannetty, Karunagappally, N H, Kerafed, Vallikkavu, Alappadu, Oachira, Thazhava, Chavara, Mainagappally and Town.

The Electrical Energy consumption of these thickly populated areas are spontaneously increasing day by day. By implementing this project, KSEB Ltd shall be able to supply the increase in

load and durability of supply can be ensured. The estimated cost of the project is Rs.40.90 Crores and is expected to be commissioned in 2021-22.

**Upgradation of 66 kV Substation Kuttanad to 110 kV, Upgradation of Poopally- Kuttanad portion of 66kV Kuttanad - Alappuzha S/c feeder to 110 kV D/c**

The Project given in this report is one of such proposals for upgradation and is aimed at improving the reliability of electric supply in the Kuttanadu area of Alappuzha district. The proposed project envisages upgrading works of 66kV substation Kuttanadu to 110kV, upgrading the Kuttanadu –Pooppally portion of the existing SC Kuttanadu- Alappuzha feeder to 110kV DC feeder from the crossing point of 66kV Kuttanadu- Alappuzha and 110kV Kodimatha- Punnapra at Pooppally junction with LILO arrangement.

Kuttanadu being the rice bowl of Kerala, there is a seasonal agricultural load on this Substation twice in a year, used to operate pump sets for cultivation of rice. The major load on the Substation is of domestic consumers. During pumping season, the load on the Substation is around 74% and otherwise it is around 62% of the station capacity. The Project is expected to facilitate the developments in this region and meet the future demands and improve the reliability of supply. The estimated cost of the project is Rs 13.85 Cr and is expected to be commissioned in 2020-21.

**Upgradation of 66 kV Punnapra -Alappuzha DC feeder to 110 kV DC**

The project is aimed at improving the transmission system in and around Alappuzha Town. The proposal consists of upgrading the existing 66kV Double circuit Punnapra- Alappuzha feeder to 66kV Substation Alappuzha to 110kV DC feeder.

In this proposal, the existing 66kV Double circuit Punnapra- Alappuzha feeder to 66kV Substation Alappuzha will be upgraded as 110kV DC feeder. This upgradation will establish a strong connectivity with 220kV Substation Punnapra, 110kV Alappuzha and 110kV Substation Cherthala. The 66kV Substation Alappuzha will be upgraded as 110kV for reliability and security. The project is expected to facilitate the infrastructure development of Alappuzha and industrial development of Cherthala. The estimated cost of the project is Rs 16Cr and is expected to be commissioned in 2020-21.

**110 kV Substation, Seethangoli and LILO of 110 kV Vidyanagar - Kubanoor feeder to 110 kV Substation Seethangoli**

The present project is aimed at improving the transmission system in Kasaragod district to the area north of Cherkala. The project is expected to facilitate the industrial development and meet future demand in the area as well as to act as a backup to 110 kV Vidyanagar Substation which is the sole source of supply in a very large area to the north of Cherkala. The estimated cost of the project is Rs 10.00 Cr and is expected to be commissioned in 2019-20.

## New 110KV GIS Substation, Malappuram

The present project is aimed at improving the transmission system in and around Malappuram Town. The proposal consists of up-gradation, Renovation and Modernisation of the very old Malappuram 110 kV Air-Insulated-Substation (AIS) using modern Gas-Insulated-Substation (GIS) and Substation Automation Systems (SAS) Technology. The project is expected to facilitate the industrial development and meet future demand in Malappuram town and improve the quality and reliability of supply. Presently this station has connectivity from 2nos 220kV substations (viz 220kV substation, Areekode and 220kV substation, Malaparamba). Also this station will have connectivity from the proposed 220kV substation at Manjeri (Elankur). Presently this station has single bus facility only. This will very much affect the reliability of this station. There is no space to construct conventional Air Insulated Substation. Hence GIS is the only solution to renovate and modernize the station. The estimated cost of the project is Rs 58 Cr and is expected to be commissioned in 2020-21.

## New 110KV Substation Chemberi

The project aims to reduce the supply interruptions in Chemperi and Sreekandapuram regions by constructing a 9.61km 110kV DC line from Sreekandapuram to Chemperi and constructing a 110/11kV Substation at Chemperi. The 110kV Supply is proposed to be tapped from proposed 110KV Sreekandapuram-Mattannur feeder. Since Sreekandapuram-Mattannur is an under loaded feeder, tapping from this feeder become more economical than the construction of new 110kV line. Also this project aims to provide alternate 11kV feeders to Payyavoor, Chemperi, Kudiyanmala, Nellikutty etc. area thereby reducing the interruptions and increasing of reliability of supply. The population growth as well as industrial development increasing day by day, So this project is highly inevitable to meet the future power demand. The project is expected to facilitate the industrial development and meet future demand in Chemperi, Eruvessi, Payyavur, Kudiyanmala etc. area and improve the quality and reliability of supply to about 1.5 Lakh customers in the Chemperi region and 1.5 Lakh consumers in Sreekandapuram region. Since the population growth in this region is increasing day by day, construction of new 110kV Substation is inevitable to avoid future load problems and interruptions. The estimated cost of the project is Rs.25.00 Cr and is expected to be commissioned in 2019-20.

## Ambalathara Solar Park

The project is aimed at improving the transmission system in and around Kasaragod district. 220/33kV Substation at Ambalathara has been commissioned on 30$^{th}$ Aug 2018, for the power evacuation from 50MW solar park at Ambalathara. 10 acres of land has been kept for the construction of substation. Presently 220kV Feeding arrangement is LILO arrangement with import/export to 220kV Substation Kanhirode and/or 220kV Substation Mylatty. Five numbers of 33kV generating feeders are emanating from the solar, Park. Two numbers of 33kV feeders is equipped to 110kV Substation, Kanhangad for feeding three 33kV Substation viz Kanhangad Town, Belur and Nileshwar.

Presently the normal 110kV feeding arrangement is from Mylatty Substation, radially to 110kV Substation, Kanhangad, radially to 110kV Substation, Cheruvathur, then to traction Substation, Cheruvathur. Slight increase in the demand from traction substation, cheruvathur leads to the overloading of ACSR wolf make 110kV line from Mylatty Substation, results in power outage to all substations, including traction purpose. Also This project is to be taken up invariably to facilitate doubling of existing 110 kV SC feeder from 220kV Substation, Mylatty to 110 kV Substation , Mundayad as 220/11OkV MC/MV feeder under Transgrid 2.0 project, irrespective of its financial viability. The estimated cost of the project is Rs.33.65 Cr and is expected to be commissioned in 2019-20.

**Upgrading the 33kV substation, Thambalamanna to 110kV by laying 110kV XLPE UG cable from 110kV substation Agastyamoozhi to Thambalamanna**

As part of globalised renewable energy resourcing, a solar park scheme was declared by the Ministry of New and Renewable Energy (MNRE), Govt. of India , as a part of which a 200 MW solar park is also proposed to be set up in Kasargod District. Various SHEPs exist there in Iruvanjipuzha basin of Kozghikode district viz. Chembukadavu stage 1( 2.7MW) & 2( 3.75 MW) SHEPs and Urumi stage 1 ( 3.75MW) & 2 ( 2.4MW) SHEPs, power from which are being evacuated to 33kV substation Thambalamanna, . More SHEPs like Poovaranthode (3MW) and Olikkal (6MW) by KSEBL are also to come up in the area , land acquisition for which are already in full swing.

The total power from these projects exceed12 MVA and for the evacuation of power above 12 MVA, the voltage level of feeders is to be 66kV or above ( KSEBL has adopted a policy to eliminate the 66kV level from its Transmission system),Considering the above and also the development of SHEPs expected in the belt, the station was proposed to be upgraded to 110kV in the Long term Transmission Plan envisaged by the Board .

Originally it was proposed for upgrading the existing 33kV Double Circuit OH line to 110kV DC line. But later, 110kV DC line was revised as 110 kV XLPE Under Ground cable. The project includes upgrading the 33kV substation, Thambalamanna to 110kV by laying 110kV XLPE UG cable from 110kV substation Agastyamoozhi to Thambalamanna . The estimated cost of the project is Rs.33.25 Cr and is expected to be commissioned in 2019-20.

**Upgradation of 66 kV Substation Kuthumunda to 110 kV**

This proposal envisages the construction of new control room and Modenization of 66KV Substation to 110KV gis substation, Kuthumunda with installed capacity of 2X12.5 MVA. It is reported that, 66kV Substation, Kuthumunda is the first and the oldest substation in Wayanad district and was in operation from early 50's. At present Kuthumunda Substation has got 4Nos. of 66kV feeders (66kV Kuthumunda-Thamarassery, 66kV Kaniyambetta-Kuthumunda and 66kV Kuthumunda-Uppatty interstate D/c feeder- not in service) and 2nos.of 10MVA, 66/11kV transformers. The 66kV Kuthumunda-Uppatty D/c feeder (Interstate) is kept idly charged from this substation upto the border. Power evacuation of Upcoming Kanthanpara HEP (45MW) is also

planned to this Substation through Uppatty feeder. The estimated cost for the work is Rs 31 crores and is expected for commissioning in 2019-20.

**Upgradation of 66 kV Substation Mankada to 110 kV, Constructing 110 kV D/c line from Valambur to Elachola and upgrading the existing 66 kV Malappuram - Mankada S/c feeder to 110 kV D/c feeder upto Valambur**

The work of upgradation of 66 KV Substation , Mankada is proposed mainly due to the system constrain that all the 66 KV Substations fed from 110 KV Substation, Malappuram are getting upgraded to 110 KV. If 66KV Substation, Mankada is not upgraded, then this will be the only 66 KV Substation fed through the transformer and 66 KV Bus at 110 KV SS Malappuram for which the 66 KV arrangement in Malappuram is to be maintained. Load flow study for the work is conducted and they have noted a loss reduction of 0.262 MW. The Substation is having 1x10 MVA transformer, which is fed from 110kV Substation Malappuram through a single circuit 66kV line having a length of 11.1 Km (9.49 Km of Mink conductor and 1.52 Km of Wolf conductor). The substation is feeding the load of Mankada, Angadippuram and adjacent Panchayaths. It has 5.5 MVA load at peak hours and in case of back feeding to other station limits it may raise further

The existing power loss and voltage drop through the 66kV line can be nullified with this proposal. There is no much financial viability in this up gradation work. But the work is mainly due to the system requirement and this work avoids further maintenance of 66 KV arrangements at 110 KV Substation, Malappuram. The estimated cost of the project is Rs. 12.68 Cr and is expected to be commissioned in 2019-20.

**Upgradation of existing 66 kV Kuthumunda - Uppatty feeder to 110 kV level and LILO-ing to 110 kV Substation Ambalavayal**

The present project is aimed at improving the transmission system in and around Ambalavayal Town. The proposal consists of two parts. The first part consists of construction of 66kV substation in 110kV parameter with 66kV/11kV ,2X10MVA Transformer and 2No 66kV feeder bay and the second part is Construction of 66kV DC line in 110kV parameter from Kolagappara location 47 on Tapping feeder of Kaniyambetta- Sulthan Bathery 66kV feeder.

The project is expected to giving uninterrupted and quality power supply to the area under Ambalavayal, Thomattuchal, Cheeral, Sulthanbathery Kuppadi, Vazhavatta, Nenmani and back feeding facility for Meppadi, Meenangadi, Sulthan Bathery etc. in wayanad District which are selected as minority concentrated Villages. The estimated cost of the project is Rs 12.56Cr and is expected to be commissioned in 2019-20.

**LILO of 110 kV Nallalam - Kizhissery feeder to proposed 110 kV Substation Pulikkal**

The project is aimed for improving the transmission system in and around Pulikkal, Ramanattukara, Edavannappara and Kondotty areas. The project is expected to facilitate the commercial and industrial development of the area and and to meet future demand, improve the

quality and reliability of supply to about 4.0 Lakh customers in and around Pulikkal, Ramanattukara, Edavannappara and Kondotty areas. The estimated cost of the project is Rs 1300 Lakhs and is expected to be commissioned in 2019-20.

**110 kV Tirur - Parappanangadi D/c feeder**

This project is aimed for strengthening the 110kV transmission line network in and around western region of Malappuram District and also to meet the load variation of Railway Traction substation Tirur. The estimated cost of the project is Rs 13.60 Crore and is expected to be commissioned in 2020-21.

**Conversion of 110 kV Mylatty -Vidyanagar S/c line to 110/220 kV MCMV line**

The project is aimed at improving the transmission system in and around Kasaragod district. The 110 kV single circuit line from Mylatty to Thoudugoli has been constructed during 1960s. Administrative sanction for Rs. 20.09 crores have been received for converting this single circuit line to double circuit line along the same right of way vide BO(FM) No. 1816/2013 (M(T &SO)/T3/Interstate- Mylatty-Thoudugoli line/12-13 dated 24.08.2013 and the amount for the same was met from the Kasaragod package of the Govt of Kerala. The first phase of the work ie., doubling of Vidyanagar-Attegoli portion has been completed now. The doubling of Attegoli-Morthana & Morthana - Thoudugoli portion ie., Phase II and III(a) has been started and is expected to be completed by December 2018.

Meanwhile, considering the future load requirements of the 110kV Vidyanagar substation and also in the wake of the conversion of 110kV SC line from Mylatty to Kanhirode to 220/110 kV MCMV line envisaged in Kolathunadu line strengthening package under Transgrid 2.0, it is decided to modify the fourth phase of the work ie., item No. 7 & 8 mentioned in the above table to 220/110kV Multi Circuit Multi Voltage (MCMV) line, instead of DC line, proposed earlier. Evacuation can be done from the proposed 400kV substation at Cheemeni, through this MCMV circuit so as to overcome the pathetic condition of lack of quality power suuply prevailing at north Kerala. The estimate project cost is Rs.47 Cr and is expected to be commissioned in 2019-20.

**Doubling of 66 kV Kunnamangalam - Thamarassery line in 110 kV parameters**

The project is aimed at improving the transmission system in and around Kasaragod district. This line is passing through densely populated areas and in many locations there is no additional space for new tower other than existing tower foot area. Currently number of projects are under progress to augment the transmission infrastructure in northern grid and a key project among theme is the proposed proposal.The estimated cost of the project is Rs 16.0 Cr and is expected to be commissioned in 2019-20.

**Upgrading of Methottuthazham (tap point) - Mankavu portion of 66 kV Nallalam - Kuttikkattoor S/c line to 110 kV D/c using narrow based tower and Wolf conductor (for Mankavu upgradation)**

The present project is aimed at improving the transmission system in and around Kozhikode Town. The project is for up grading the 87 year old 66kV substation, Mankave to 110kV level. The estimated cost of the project is Rs. 11.86 Cr and is expected to be commissioned in 2019-20.

**LILO of 110 kV Tirur- Kuttipuram, Edappal -Kuttipuram and Tirur- Ponnani feeder to 110 kV Substation Vengaloor**

The proposal envisages construction of 110kV substation Vengaloor with 2 x 12.5MVA transformers and feeding arranged by LILOing 110kV Edappal-Kuttippuram, Kuttippuram-Tirur, and Ponnani-Tirur feeders with Double Bus bus arrangement. The estimated cost of the project is Rs 42.00 Crores and the is expected to be commissioned in 2020-21.

A summary of the new capital works planned for the control period 2018-19 to 2021-22 and the proposed outlay are submitted below:

**Table 5 : Normal Capital works proposed (Rs Cr)**

| | | Outlay (Amount in Rs. Crores) | | | | Expected COD |
|---|---|---|---|---|---|---|
| No. | Project | **2018-19** | **2019-20** | **2020-21** | **2021-22** | |
| 1 | Linking between 110kV Kanhangad – Cheruvathuer feeder to 220kV S/s Ambalathara | 30.00 | 6.06 | | | 2019-20 |
| 2 | Upgradation of 66kV Palakkad Medical College Substation and line | 4.00 | 19.10 | | | 2019-20 |
| 3 | 110 kV GIS Project Vennakkara | 5.00 | 39.60 | | | 2019-20 |
| 4 | Construction of Palakkad- Malampuzha 110kV Line | 4.38 | 10.00 | | | 2019-20 |
| 5 | 110kV Substation Pattambi | 5.00 | 20.50 | | | 2019-20 |
| 6 | Mannuthy 110 kV GIS Project | 6.30 | 20.00 | | | 2019-20 |
| 7 | Upgradation of 66kV Substation Ettumanoor to 110kV | 8.00 | 12.80 | | | 2019-20 |
| 8 | Upgradation of 66kV Substation, Kuravilangadu and Koothattukulam-Kuravilangadu to 110 kV | 6.65 | 15.00 | | | 2019-20 |
| 9 | Upgradation of 66kV Substation Koothattukulam to 110 kV | 6.00 | 9.01 | | | 2019-20 |
| 10 | Upgradation of 66KV Kothamangalam-Kotthttukulam Feeder to 110 KV | 4.67 | 10.00 | | | 2019-20 |
| 11 | Upgradation of 66kV SC Pala-Ettumanoor feeders to 110kV | 3.00 | 12.55 | | | 2019-20 |
| 12 | Upgradation of 66kV Substation Anchal to 110kV and Upgradation of 66kV SC Edamon – Anchal-Ayur line to 110kV DC | 29.86 | 12.80 | | | 2019-20 |
| 13 | Up gradation of 66kV Substation, Karunagappally and 66kV SC Sasthamcotta-Karunagapally line to 110kV DC | 12.74 | 5.46 | | | 2019-20 |
| 14 | Construction of 110kV Substation, Chithara | 3.68 | 8.59 | | | 2019-20 |
| 15 | Interlinking 110kV GIS Substation, Kollam and 110kV Kottiyam Substation | 12.65 | 50.58 | | | 2019-20 |
| 16 | 110kV GIS substation at Kowdiar, Thiruvananthapuram | | 34.93 | | | 2019-20 |
| 17 | Upgradation of 66kV Substation Palode to 110kV | | 18.45 | | | 2019-20 |
| 18 | 66kV Substation, Ambalavayal and 66kV DC | 5.00 | 8.49 | | | 2019-20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | line from 66kV Kaniyambetta-Sulthanbathery feeder in 110kV Parameters | | | | | |
| 19 | 110kV Substation, Chemperi and line | 14.00 | 13.77 | | | 2019-20 |
| 20 | Upgradation of Kunnamangalam _ Thamarasserry line to 110kV | 8.06 | 10.00 | | | 2019-20 |
| 21 | Upgradation of Kuthumunda to110kV GIS | 3.98 | 30.00 | | | 2019-20 |
| 22 | Upgradation of Mankada S/s to 110kV | 4.65 | 10.00 | | | 2019-20 |
| 23 | Upgradation of 66kV Substation, Mankavu to 110kV | 5.56 | 8.00 | | | 2019-20 |
| 24 | Upgradation of 110kV SC/DC line to 220/110kV MC MV line from Mylatty s/s to Vidyanagar | 20.00 | 9.43 | | | 2019-20 |
| 25 | 110kV Substation, Pulikkal | 1.68 | 13.00 | | | 2019-20 |
| 26 | 110kV Substation, Seethangoli | 4.59 | 7.00 | | | 2019-20 |
| 27 | Upgradation of 33 kV Substation Thambalamanna to 110 kV & 110 kV Agasthiamuzhy -Thambalamanna (S/c, UG cable) | 18.02 | 20.00 | | | 2019-20 |
| 28 | 220KV Substation Kottayi | 0.50 | 30.50 | 35.00 | | 2020-21 |
| 29 | Upgradation of Pudukkad to Kattoor 66kV SC Line to 110kV DC Line | 1.00 | 7.00 | 5.91 | | 2020-21 |
| 30 | Conversion of Ollur Viyyur feeder to 110 kV | 0.72 | 7.00 | 9.00 | | 2020-21 |
| 31 | Upgradation of 66kV Pallom-Ettumanoor feeder and associated substations to 110kV | 9.00 | 35.00 | 25.54 | | 2020-21 |
| 32 | Construction of 110kV substation Vazhoor | 1.00 | 8.00 | 5.40 | | 2020-21 |
| 33 | Upgradation of 66kV Substation Kuttanadu to 110kV | | 7.58 | 7.58 | | 2020-21 |
| 34 | Upgradation of 66kV PUNNAPRA-ALAPPUZHA DC Feeder to 110 kV | | 8.77 | 8.77 | | 2020-21 |
| 35 | 110kV Switching Cum Substation at PANTHALACODE | | 12.58 | 12.58 | | 2020-21 |
| 36 | Upgradation of 66 kV TVT No. I & II feeders | 18.00 | 30.00 | 12.03 | | 2020-21 |
| 37 | Renovation and modernisation 110kV GIS Substation, Malappuram | 2.02 | 30.00 | 30.00 | | 2020-21 |
| 38 | LILO on 110kV Edarikode- Tirur to Parappanangadi S/s | 1.96 | 10.00 | 3.00 | | 2020-21 |
| 39 | Construction of 110kV GIS Substation , Vengaloor | 2.00 | 19.48 | 24.91 | | 2020-21 |
| 40 | Construction of new 110kV DC line from Kayamkulam to Karunagapally | | 15.30 | 13.30 | 13.05 | 2021-22 |
| | **Total** | **263.67** | **656.33** | **193.02** | **13.05** | |

## TRANSGRID WORKS

### Kolathunadu Package:

Transgrid 2.0 – envisaged for long term transmission plan to develop a transmission system capable of meeting the demand at any part of the network without overloading, reliable, efficient and economic manner even under contingency condition and to meet the projected future demand. Kolathunadu Line Strengthening Package is included in the phase-1 works of TransGrid .

Additional ISTS corridors including a 2000MW HVDC Corridor have been sanctioned to the state. The present available intra-state transmission system will not be sufficient for catering the additional transmission capacity required for dispersing the ISTS Power received as above from the upcoming ISTS nodes. Especially in Northern Kerala the ISTS node at Kasaragod will be connected to Uduppi Ultra Mega Power Project, which now under tendering stage. Hence the downstream power evacuation from Kannur to Kasaragod shall ensure N-1 criteria to establish 24X7 power to the customers. This shows the high dependency on import of power to the state.The "Kolathunadu Line Strengthening Package" is one of the packages of the TransGrid 2.0 project, proposed with an aim of establishing a second 220kV circuit in the existing corridor right from Kasaragod to Kannur. The estimate cost of the project is Rs. 239.77 Cr and the project is proposed for commissioning in 2021-22.

**Chalakudy package**

"220kV AIS Chalakudy & NSIP Phase I Project A" is one of the packages of the TransGrid 2.0 project. This package contains establishing of one important transmission line connecting the Central and Northern part of Kerala for uninterrupted transmission of power flow. 110kV Substation Chalakudy is the major backbone of 110kV network in Thrissur district which receives power generated from Sholayar, Poringalkuthu and Idamalayar HEPS and if any disturbances occur to the lines, the central and south regions of Thrissur district, including feeding substations, will face black out as there are no redundant and dependable back up supporting to Chalakudy. 220kV AIS Chalakudy & NSIP Phase 1 (Project A) consists of proposals for following substations and transmission line projects.

1. *Project A: 220kV AIS Chalakudy : Up gradation of existing 110kV AIS to 220kV AIS at Chalakudy in Thrissur District with station capacity 2x100 MVA Transformer and 4 x 220 kV feeder bays*
2. *Project B : Konnakuzhy-Chalakudy 220/110kVline (NSIL Phase 1 Project A) : Upgrading existing Poringal - Chalakudy 110kV DC Transmission line to 220/110kV MCMV Transmission line in Thrissur District (LILO from Madakkathara – Lower periyar) using Twin Panther conductor – Route Length 11.726 km.*

The estimate cost of the project is Rs. 63.11 Cr and the project is proposed for commissioning in 2020-21.

**NRHTLS**

This project proposal is to use the State-Of-the-Art technology in upgrading the existing Transmission line by changing the conductor using High Performance Conductor (HPC) like HTLS/INVAR/STACIR etc, which in turn will enhance the power transfer capability of the existing line without changing the Towers or expanding the Right of Way (RoW). This package envisages two major works that involves changing the conductor of existing 110kV lines with suitable HPC which are emanating from Nallalam 220kV substation in Kozhikode District of Kerala. This proposal consists two parts. The first part is for Up-rating Kakkayam - Nallalam 110kV line (45km) with an estimated cost of Rs. 433452299/- & Upgrading Nallalam-Chevayur-Westhill-Koyilandy-Mepayur110kV Single Circuit line in to Double Circuit line (32km) with an estimated cost of Rs.

457896921**/-.** The total estimated cost of the project is Rs.89.134922Cr and is expected to be commissioned in 2019-20.

## Thalasseri

The project is aimed to strengthen the transmission network in Kannur Kasaragode area by constructing new 220kV transmission lines and new 220kV Substations. The proposed new 220kV/110kV substation with additional 110kV feeders at Thalassery can meet the increased demand in this region to a great extent. Also the proposed additional 110kV feeders can satisfy N-1 criteria to have system stability in the region.

The DPR consists of two parts. In the first part, the existing Air Insulated 110kV Substation will be upgraded to 220/110kV Gas-Insulated-Substation (GIS). The Second part include Construction / Up gradation of 66kV SC line to 220/110kV DC line using narrow base MCMV Towers from Mundayad to Thalassery for feeding and load evacuation from the proposed 220/110kV GIS Substation.

The project is expected to facilitate the industrial development and meet future demand in Thalassery town in particular and southern part of Kannur district in general. This will improve the availability and reliability of supply in the region. Reduction in transmission losses and system stability in the region helps to generate more revenue from additional Sale of energy. Intangible benefits like customer satisfaction, better reliability etc. not accounted for analyzing the financial viability of the project.

The proposed 220kV/110kV GIS substation at Thalassery can be constructed in existing 110kV substation compound such that present switch yard can be replaced with the new 110kV GIS with additional 110kV feeders. The land available with KSEBL in the existing 110kV Thalassery is not adequate for accommodating conventional Air Insulated Substation. Hence Gas Insulated Switchgear Substation is proposed without acquiring extra land thereby compensating for the additional cost of land with additional amount for GIS Substation. Feeding to the substation at 220kV level reduces transmission losses and the enhancement of capacity helps to increase the sale of power.

The estimated cost of the project is Rs.133.48r and is expected to be commissioned in 2020-21.

## Ernad Package

The “Eranand Lines Package” is proposed for improving the transmission network of northern Kerala. The 95 kM, Madakkathara – Areacode transmission 400 kV line (Project-A) of this package was originally a part of 400 kV power evacuation infrastructure from Kudamkulam Atomic Power Plant (KKNPP). This line was approved in the 30$^{th}$meetingof the Standing Committee on Power System Planning of Southern Region of Central Electricity Authority held on 13$^{th}$ April 2010.The work was then entrusted to the Central Transmission Utility, Power Grid

Corporation of India (PGCIL) in 2010. However the project did not take-off as expected for a long time. A suitable route with sufficient Right-of-Way for this transmission line could not be finalised by PGCIL because of high density population and public opposition. In the subsequent standing committee meetings, PGCIL requested KSEBL to surrender the RoW of Madakkathara – Malaparamaba – Areacode Single Circuit 220kV line of KSEBL for construction of this line. But, later in the 39th meeting of the Standing Committee held on 28th and 29th December 2015 decided that this work be taken up by KSEBL as state project considering the commercial issues involved regarding sharing of RoW and assets of existing 220kV lines between PGCIL and KSEBL.

The 220 kV lines between Madakkathara HVDC Station and Nallalam (Of which Kizhissery to Nallalam portion is executed as Project-B) is envisaged as a second circuit for enhancing supply security to Kozhikode City by ensuring the single contingency (N-1) reliability criteria mandated in CEA Transmission Planning Guide lines. The estimated cost of the project is Rs.610 Cr and is expected to be commissioned in 2019-20.

**Aluva Package**

Aluva is a major load centre now fed by Kalamassery at 110kV level and partly supported by 66kV line from Pallivasal. Considering the load growth, the present feeding will not be sufficient.

PGCIL has immediate plans to construct 320kV, 2000MW HVDC line from Pugalur to Thrissur. The power from upcoming HVDC substation capable of importing 2000MW at Thrissur is proposed to be evacuated through 400kV Cochin East-Madakkathara DC line. Accordingly, for economic and efficient evacuation of power pooled at 400kV Cochin East (Pallikara) substation, additional 220kV outlets are to be planned. Thus, this line will provide redundancy as well as enable KSEBL to import more power from the interstate PGCIL substation. At present, there is only one double circuit line from PGCIL Kochi substation to KSEBL, which is Kalamassery. To facilitate the import of more power, connectivity of 220kV SS Aluva from 400kV S/s Pallikara is proposed and that will enable KSEBL to draw nearly 400MW. This will make Aluva an interstate power import point.

A total of eleven (11), 220kV feeder bays are to be accommodated in Aluva SS including feeders for receiving power from 400kV PGCIL Pallikara substation, the up gradation of existing 66kVfeeders from Pallivasal, North Paravur and 110 KV feeders from Chalakudy to 220kV feeders. Sufficient land is not available at Aluva for construction of AIS and gradient difference in the available land necessitates huge earth work. Hence 220kVGIS is proposed at Aluva. The estimated cost of the project is Rs.168 Cr and is expected to be commissioned in 2019-20.

**Kaloor Package**

The project is to enhance the capacity of existing 110kV Kaloor substation which feeds the Metropolitan area of Kochi city.Kaloor and Edappally substations are presently fed by Kalamassery – Kaloor 110kV double circuit feeder. With the present load growth, this line will reach its full capacity

by 2018-19. 220kV GIS is planned at the existing Kaloor substation premises with a capacity of 360MVA. Kaloor is connected with 66kV GIS Marine drive and 110kV Ernakulam North substation for city feeding. Enhanced capacity at Kaloor can be used to feed 110kV Edappally substation too.

The 220 kV Kaloor GIS would increase the reliability of supply as the 220 kV incoming feeders are from BrahmapuramSub Station and the existing two 110 kV feeders(KL-KA, EP-KA) are from Kalamassery Sub Station. This also enhances the flexibility in operation and avoids total black out in case of feeder failures. As per the load flow study conducted, the system loss will be reduced by 10.71 MW equivalent to an energy savings of 52 MU per year.

The 220 kV supply is proposed to be availed by constructing 4.5 kM of 220/110 kV MCMV line along the existing RoW of 110 kV Brahmapuram– Kalamassery 1 & 2 feeders up to Thuthiyur and through UG cable from Thuthiyoor to Kaloor. The estimated cost of the project is Rs.165.39 Cr and is expected to be commissioned in 2019-20.

## Kottayam, Thuravur & Ettumanoor

The "KottayamUpgradation Package" is one of the packages of the TransGrid 2.0 project.This package isproposed to enable drawal of power from 400kV network at central Kerala and strengthen the transmission system in Kottayam District and the Northern side of Alappuzha District. The project is envisaged with:

- a 400 kV GIS substation at Kottayam,
- a 220kV GIS at Ettumanoor,
- a 220kV AIS at Thuravur, and
- an interconnecting lines as below
    - 27.6 km 220/110 KV MCMV line from Kottayam to Thuravoor
    - 6.5 km 220/110 KV MCMV line from Kottayam to Ettumanoor
    - 3.8 km 220kV double circuit LILO from Pallom-Ambalamugal
    - to Kottayam Substation
    - 4.8 km 110kV DC line in Kuravilangad – Vaikom – Ettumanoor
    - line route

The estimated cost of the project is Rs.501.40 Cr and is expected to be commissioned in 2020-21.

## Kothamangalam & Chithirapuram

The Kothamangalam and Chithirapuram Package is one of the works in the TransGrid 2.0 project. This package is proposed to upgrade existing 66kV Kothamangalam and Chithirapuram substations to 220kV level, construction of 220/110kV MCMV line from Pallivasal to Aluva with LILO of one circuit to Kothamangalam SS and the construction of 220/110kV line from Karukadom to Kothamangalam. The project is to enhance the capacity of existing 66kV Kothamangalam and Chithirapuram substations to 220kV, construction of 220/110kV MCMV line from Pallivasal to Aluva with LILO to Kothamangalam and the construction of 220/110kV line from Karukadom to

Kothamangalam. The estimated cost of the project is Rs.370.90 Cr and is expected to be commissioned in 2020-21.

## Kunnamangalam

220kV GIS Kunnamkulam & TLSP Phase I consists of proposals for following substation and transmission line projects.

1. **Project A - 220kV GIS Kunnamkulam:**
   Upgradation of existing 110kV AIS to 220kV GIS at Kunnamkulam in Thrissur District with station capacity 2x100 MVA Transformers and 2 x 220 kV feeder bays
2. **Project B–Wadakkanchery-Kunnamkulam 220/110KV MCMV TLSP Phase I :**
   Upgrading existing Wadakkanchery - Kunnamkulam 66kV SC Transmission line to 220kV DC Transmission line in Thrissur District (LILO to Madakkathara - Malapparamba/Nallalam) using HTLS Drake equivalent conductor – Route Length 22.8 km

   The estimated cost of the project is Rs.117.98 Cr and is expected to be commissioned in 2019-20.

## Manjeri

This proposal envisages an integral development of the transmission system in the eastern part of the Malappuram District especially Manjeri, Nilambur and Edakkara areas. This proposal consists two parts. The first part is for the construction of new 220 kV Air Insulated Substation at Manjeri and the second part is for the 220kV LILO arrangement to Manjeri substation. The estimated cost of the project is Rs.44.50 Cr and is expected to be commissioned in 2020-21.

## Kunnamkulam

220kV GIS Kunnamkulam & TLSP Phase I consists of proposals for following substation and transmission line projects.

1. **Project A - 220kV GIS Kunnamkulam:**
   Upgradation of existing 110kV AIS to 220kV GIS at Kunnamkulam in Thrissur District with station capacity 2x100 MVA Transformers and 2 x 220 kV feeder bays
2. **Project B–Wadakkanchery-Kunnamkulam 220/110KV MCMV TLSP Phase I :**
   Upgrading existing Wadakkanchery - Kunnamkulam 66kV SC Transmission line to 220kV DC Transmission line in Thrissur District (LILO to Madakkathara - Malapparamba/Nallalam) using HTLS Drake equivalent conductor – Route Length 22.8 km

The estimated cost of the project is Rs.117.98 Cr and is expected to be commissioned in 2020-21.

A summary of the capital outlay for Transgrid 2.0 project is furnished below:

| Table 6 : TRANSGRID WORKS | | | | | | | |
|---|---|---|---|---|---|---|---|
| No. | Project | Outlay (Amount in Rs. Crores) | | | | Expected COD | Total |
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 | | |
| 1 | Aluva | 127.87 | 54.80 | 0.00 | | 2019-20 | 182.67 |
| 2 | Kaloor | 125.93 | 53.97 | 0.00 | | 2019-20 | 179.90 |
| 3 | Kothamangalam & Chithirapuram | 119.655 | 219.37 | 59.83 | - | 2020-21 | 398.85 |
| 4 | Kottayam, Thuravur & Ettumanoor | | 379.169 | 162.5 | - | 2020-21 | 541.67 |
| 5 | Chalakudy | 7.14 | 35.71 | 28.57 | - | 2020-21 | 71.42 |
| 6 | Kunnamkulam | 13.03 | 65.15 | 52.12 | - | 2020-21 | 130.30 |
| 7 | Manjeri | 5.11 | 25.55 | 20.44 | - | 2020-21 | 51.10 |
| 8 | Thalasseri | 15.70 | 78.52 | 62.81 | - | 2020-21 | 157.03 |
| 9 | Kunnamangalam | 9.19 | 45.95 | 36.76 | - | 2020-21 | 91.90 |
| 10 | Eranad | 195.00 | 295.00 | 62.00 | | 2020-21 | 552.00 |
| 11 | NRHTLS | 23.88 | 23.88 | 31.81 | | 2020-21 | 79.57 |
| 12 | Kolathunadu | 26.1 | 104.38 | 78.29 | 52.19 | 2021-22 | 260.96 |
| | **Total** | **668.61** | **1381.45** | **595.13** | **52.19** | | |
| | PSDF Funding | | | | | | |
| | NRHTLS (70% PSDF) | 16.72 | 16.72 | 22.27 | | | 55.70 |
| | Eranad (90% PSDF) | 120.57 | 182.40 | 30.91 | | | 333.88 |
| | **Total outlay for Transgrid works less funding** | **531.32** | **1182.33** | **541.95** | **52.19** | | |

## SLDC related Capital Works

**1. SAMAST**

'Scheduling, Accounting, Metering and Settlement of Transactions in Electricity' (SAMAST) issued by Forum of Regulators in July 2016 for Scheduling, Accounting, Metering and Settlement system of Transactions in Electricity in the States is a Comprehensive accounting and settlement system involving scheduling , measurement of physical delivery, book keeping, settlement and clearing of energy in financial terms. The implementation of SAMAST is carried out by SLDCs and STU in a time bound manner under the oversight of the respective State Electricity Regulatory Commissions. An amount of Rs.53 Crores is estimated for implementation of SAMAST as follows:

| Table 7 : SAMAST PROJECT COST | | |
|---|---|---|
| **No** | **Particulars** | **Cost (Rs Cr)** |
| 1 | Metering infrastructure | 30.27 |
| 2 | Software | 7.43 |
| 3 | Hardware | 10.74 |
| 4 | Communication network service charges | 0.19 |
| 5 | Project Management | 1.77 |
| 6 | Handholding of 1 year after implementation | 0.30 |
| 7 | Maintenance contract for 5 years thereafter | 2.04 |
| | **Total** | **53.00** |

The financing of the project is from PSDF fund to the possible extent and balance to be arranged by KSEBL. The action plan proposed by the SLDC for the implementation of SAMAST include (i) appointment of Project Management Agency/ consultant for preparation of software and hardware specifications route for preparation of DPR and tender specifications and (ii) tendering for the system and implementation. The DPR of the project will be submitted before Hon'ble Commission in due course. The project is expected for commissioning in 2019-20.

**Reliable Communication and Data Acquisition System.**

Along with the growth of the power system and opening of power markets, it became necessary to adopt new technologies for Load Management, supervisory control, system protection, data acquisition, energy accounting, automation etc for efficient communication and coordination to ensure quality and reliability of supply. The present Power Line Carrier Communication (PLCC) systems for the above purpose are largely inadequate because of its poor bandwidth and frequency congestion. Modern Optical Fibre based communication systems can meet the challenges of above communication issues. Communication through Optical Ground Wire (OPGW) is very much suitable for power system applications.

A communication system for power sector shall be resilient and reliable and shall survive disasters and natural calamities. It shall also support to maintain power system with minimum interruption. Hence VSAT based communication system is also proposed for voice backup. Hence this project proposes OPGW based fibre optic communication for primary voice, data and protection application and VSAT systems for backup voice communication. After the implementation of the project, all new technologies required for the efficient and effective operation of the power system can be implemented. With better communication facility the power system shall also become highly resilient and reliable.

The estimated cost of the project was Rs. 212.45 Crores which was pruned by the PSDF Secretariat based on the PGCIL data to Rs.147.52 Crores. 50 % grant was accorded from PSDF vide letter No.10/1/2014-OM dated 15.11.2017 from The Ministry of Power , Government of India and balance portion has to be met from KSEBL funds. The project is expected for commissioning by 2021-22.

**Miscellaneous capital works below Rs.10 Cr**

In addition to the major works as submitted above, SLDC is carrying out miscellaneous capital works each amounting to less than Rs.10Cr. A budget provision of Rs.12 Cr is earmarked for the years 2018-19 and 2020-21 for miscellaneous capital works under SLDC.

The capital works proposed under SLDC are summarized below:

| Capital outlay for SLDC works (Rs.Cr.) | | | | | |
|---|---|---|---|---|---|
| No. | Name of Work | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| 1 | SAMAST | | 53 | | |
| 2 | Reliable Communication and Data Acquisition System | | | | 212.45 |
| 3 | Miscellaneous capital works | 12 | | 12 | |
| | **Total** | **12** | **53** | **12** | **212.45** |
| | **Less: PSDF grant** | | **25** | | **100** |
| | **Net KSEBL fund** | **12** | **28** | **12** | **112.45** |

# Miscellaneous Expenses

## Edamon-Kochi Compensation package

Government of Kerala vide G.O.(MS)No.29/2015/PD dtd.30-7-2015 had ordered 'Special Compensation Package' for land owners affected by the construction of Edamon-Kochi 400KV line which was subsequently modified vide G.O.(MS)No.19/2016/POWER dtd. 31-8-2016.

The construction of Edamon-Kochi 400KV line is in progress. As on 30-7-2018, 393 tower foundation and 333 tower erection out of a total of 447 locations and 57.78 km line stringing out of 148km have been completed. The disbursement of compensation for Tower Standing Area (TSA) and trees/crops damaged are in progress.

An estimate on the amount payable as per the special compensation package was prepared by taking the average enhanced fair value of the land as Rs.85,334/- per Are. The actual design area of tower footings is taken for estimating tower standing area compensation and 16m wide RoW is taken for line corridor compensation. The total land compensation for tower footings (100%) comes to Rs.88.69 Crores and that of line corridor (40%) including displacement allowance comes to Rs.379.10 Crore. Compensation for houses beneath the line is estimated as Rs.3.80 Cr. A lumpsum of Rs.2 Crores is added for nominal land left after the line construction. **The total compensation comes to around Rs.473.59 Crores with KSEBL/GoK share of around Rs.256.04 Crore** as submitted below:

| No | Particulars | Amount (Rs.Cr.) | PGCIL | | KSEBL/GoK | |
|---|---|---|---|---|---|---|
| 1 | Tower standing area (100%) | 88.69 | 85% | 75.39 | 15% | 13.30 |
| 2 | Line corridor (40%) | 379.10 | 15/40 | 142.16 | 25/40 | 236.94 |
| 3 | Nominal Land | 2 | | | | 2 |
| 4 | Compensation for houses under line | 3.80 | | | | 3.80 |
| | **Total** | **473.59** | | **217.55** | | **256.04** |

The amount payable by KSEBL and GoK together is Rs.256.04 Cr. This amount has to be shared by KSEBL and GoK in the ratio of 50:50. It is expected that out of the KSEBL share amount of Rs.128.02 Cr, Rs.10 Cr will be payable in 2018-19 and balance in 2019-20. KSEBL has already submitted a petition before Hon'ble Commission seeking approval for the expenses.

A summary of the GFA addition projection for the control period 2018-19 to 2021-22 for SBU-T and SLDC are submitted below.

| TOTAL GFA addition OF SBU-T & SLDC(Rs Cr) | | | | | |
|---|---|---|---|---|---|
| No. | Name of Work | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| **SBU-T** | | | | | |
| 1 | Ongoing projects plus new small works | 804.12 | 568.73 | 196.28 | 254.26 |
| 2 | New Capital Works above 10Cr | 0 | 662.59 | 421.83 | 41.65 |
| 3 | Transgrid Works | 0 | 362.57 | 2073.84 | 260.96 |
| 4 | Edamon-Kochi Line compensation | 10 | 118.02 | | |
| | **Total** | **814.12** | **1711.91** | **2691.95** | **556.87** |
| **SLDC** | | | | | |
| 1 | Ongoing projects plus new small works | 14.72 | 7.14 | 0 | 0 |
| 2 | New projects | 12 | 53 | 12 | 212.45 |
| | **Total** | **26.72** | **60.14** | **12** | **212.45** |
| | **Total for SBU-T & SLDC** | **840.84** | **1772.05** | **2703.95** | **769.32** |

Detailed project reports were prepared for each project. Six copies of DPR in respect to these projects are enclosed separately**.**

## Financial Analysis of new projects

The financial analysis is done as per the guide lines in KSERC (Terms and Conditions for determination of Tariff) Regulations,2018 and hence it is carried out by considering 100% loan with 10% interest rate and the loan repayment period is taken as 12 years. The detailed cost benefit analyses of the projects are included in the respective DPRs. The remaining projects are in proposal/design/ approval/ stages, their details can be provided to the Commission as and when the projects are ready for implementation.

This submission contains the available details of the Capital Investment proposal for the control period. Hon Commission may please condone any inadvertent error/omission that may have crept in this petition. The petitioner may be given an opportunity to rectify the same detected subsequently. The petitioner may also be allowed to the petitioner to make further submission, addition and alteration to this petition as may be necessary from time to time.

KSEBL humbly request before the Honourable Commission to

1. Approve the capital Investment plan for Transmission SBU and SLDC for the control period 2018-19 to 2021-22.

2. pass any order as the Hon'ble Commission may deem fit and appropriate under the circumstances of the case and in the interest of justice.

## List of Annexure and Enclosures

- Formats for submitting details of CIP
- Detailed Project Report

| Annexure- 1 : Ongoing and New Works | | | | | | |
|---|---|---|---|---|---|---|
| No | Project | Project Cost * Rs Cr | Commencement | Completion | Status ** | |
| | | | | | Physical (%) | Financial Rs Cr |
| | **Circle - Kottarakkara** | | | | | |
| 1 | Karunagapalli SS & Sasthamkotta TL Upgrdn to 110 | 16.5 | 19-04-2017 | 2018-19 | 15 | 0.5682 |
| 2 | Anchal 66kV SS of & Ayoor TL Upgdn to 110kV | 13 | 15-05-2017 | 2018-19 | 14 | 0.02903 |
| 3 | Ayoor 66kV SS Upgradation | 7.3 | 11-10-2016 | 2018-19 | 24 | 0.188 |
| | **Circle - Alappuzha** | | | | | |
| 1 | Eramalloor 110 kV SS & LILO | 11.3 | Jul-17 | 2018-19 | 46 | 3.81 |
| 2 | Kattanam 33kV SS Upgradation to 66 kV | 11.8 | 09-01-2017 | 2018-19 | SS-19/TL- 1 | 0.71 |
| 3 | Alappuzha 110 kV SS | 30.9 | Sept. 2017 | 2019-20 | 1 | 0.27 |
| 4 | Capacity Enhancement of 220 kV SS Punnapra | 6 | Aug-17 | 2018-19 | 85 | 2.4 |
| 5 | Kalarcode 33kV Substation & Punnapra TL | 5.8 | 2017-18 | 2018-19 | 0.8 | 4.64 |
| 6 | Mattancherry bay extension work | 1 | 2017-18 | 2018-19 | 0.8 | 0.8 |
| 7 | Aroor 110kV SS - 20MVA TF | 3 | 2017-18 | 2018-19 | 0.8 | 2.4 |
| 8 | Edathua 110/33kV 16MVA T/F at 110kV SS. | 2 | 2017-18 | 2018-19 | 0.8 | 1.6 |
| 9 | Edappon 220kV SS-110/33kV 16MVA TF | 2.787 | 2017-18 | 2018-19 | 0.8 | 2.2296 |
| 10 | Vallikunnam 33 kV SS - 33kV bay & 5MVA TF | 1 | 2017-18 | 2018-19 | 0.8 | 0.8 |
| 11 | Eramalloor 110kV SS 2 x 12.5MVA & DC LILO | 11.3 | 2017-18 | 2018-19 | 0.8 | 9.04 |
| 12 | Kalarcode 33kV SS- 2 x 5MVA TF and SC TL | 5.8 | 2017-18 | 2018-19 | 0.8 | 4.64 |
| 13 | Aroor 110kV SS- Mattancherry bay Ext. | 0.746 | 2017-18 | 2018-19 | 0.8 | 0.5968 |
| 14 | Aroor 110kV SS- 20MVA TF | 2.613 | 2017-18 | 2018-19 | 0.8 | 2.0904 |
| 15 | Edathua 110kV SS,- 110/33kV 16MVA TF | 1.94 | 2017-18 | 31.12.2018 | 0.8 | 1.552 |
| | **Circle - Poovanthuruthu** | | | | | |
| 1 | Erumely 110 kV SS & DC TL (REC Loan) (TL Comptd) | 18.12 | 02-02-2006 | 2018-19 | SS-99 | 16.994 |
| 2 | 33 kV SS Manimala & TL to Ranni (REC Loan) | 8.75 | 21-07-2011 | 27-05-2018 | 100 | 6.2488 |
| 3 | 33 kV SS Kallara & Line (SS& TL Commissioned) | 5.16 | 20-05-2013 | 18-04-2018 | 100 | 4.3717 |
| 4 | Upgradation of 110 kV SS Kanjirappally (2nd Phase) | 8.9 | 25-03-2015 | 2019-20 | 94 | 8.01 |
| 5 | Puthupally 110 kV SS & LILO of Pallom – Pampady | 8.1 | 2018-19 | 2019-20 | 0 | 3.02 |
| 6 | 110 kV feeder bay at 220kV S/S, Pallom | 2.9 | 03-01-2017 | 2018-19 | 19 | 0.45 |
| 7 | Mundakkayam 66 KV SS & Kanjirappally TL Upgdn | 17.4 | 11-07-2016 | 2018-19 | 75 / 51 | 1.77 |
| 8 | Koothattukulam 66 KV SS Upgrdn to 110 kV. | 13.27 | | 2019-20 | | |
| 9 | Pala 110kV SS - 110kV feeder bay | 2.75 | 2017-18 | 2019-20 | | |
| 10 | Kanjirappally 110 KV SS – 2 feeder bays | 0.39 | 2017-18 | 31-10-2018 | 73 | 0.3268 |
| 11 | Pala-Ettumanoor 66kV SC line Upgrdn to 110 kV | 9.9 | 2017-18 | 30.09.2019 | 10 | 0.3268 |
| 12 | Ettumanoor 66kV SS Upgdn (phase I) | 16.7 | 2017-18 | 30.09.2019 | 55 | 0.3268 |
| 13 | Mundakkayam 66kV SS Upgdn to 110kV | 11.1 | 2017-18 | 31-10-2018 | 93 | 0.3268 |
| 14 | Kothamangalam-Koothattukulam TL Upgdn to 110 | 12.2 | | 31.08.2019 | 25 | |
| 15 | Pallom 220 kV SS - 1X110kV Feeder Bay | 5.8 | 2017-18 | 30.11.2018 | 23.5 | 0.3268 |
| | **Circle - Thodupuzha** | | | | | |
| 1 | Kumily 33kV SS and TL fm Vandiperiyar DDUGJY | 6.5 | 28-12-2015 | 2018-19 | 53 | 1.63 |
| 2 | Muttom 110 kV SS | 5.3 | 23-05-2016 | 2018-19 | 98 | 3.73 |
| 3 | Adimaly 110 kV SS Capacity Enhancement | 1.56 | Feb. 2017 | 2018-19 | 97 | 0.16 |
| 4 | Kulamavu 66 kV SS Renovation | 1.35 | 17-08-2015 | 2018-19 | 30 | 0.41 |
| 5 | Marady 110 kV SS & LILO | 17.9 | 05-09-2016 | 2018-19 | 97 | 5.67 |
| 6 | Odakkali 66 kV SS in 110 kV Std & LILO | 11.4 | 05-03-2017 | 2018-19 | 96 | 2.15 |
| 7 | Rayonpuram 110 kV SS Capty Enht & 33 kV DC TL | 2.6 | 25-01-2017 | 2018-19 | 100 / 40 | 1.86 |
| 8 | Kuruppanpady 110 kV SS Cap Enht,CR & TL DDUGJY | 2.38 | 18-06-2017 | 2018-19 | 40 | 0.02 |
| 9 | Koovappady 33kV SS - CR Ext & feeders (DDUGJY) | 0.98 | 27-09-2016 | 2018-19 | 70 | 0.27 |
| 10 | Mazhuvannoor 33kV SS – CR EXT & feedersDDUGJY | 0.98 | 27-09-2016 | 2018-19 | 50 | 0.27 |
| 11 | Vandanmedu 33kV SS & SC TL to – Vandanmed | 7.1 | 05-06-2017 | 2018-19 | 10 | 0.35 |
| 12 | Pallivasal Extension HEP - 220 kV SC line | 1.3 | 2018-19 | 2019-20 | 0.01 | 0.01 |
| 13 | Kothamangalam – B'kettu 66 kV TL Upgrdn | 12 | 30-05-2017 | 2018-19 | 79 | 0.87 |
| | **Circle - Kalamassery** | | | | | |
| 1 | Thammanam 33kV SS & UGC (APDRP) (SS energized) | 12.5233 | 29-11-2016 | 2018-19 | 95 | 7.58 |
| 2 | Supply LULU Hotel Bolgatty (Deposit work) | 1.58 | 2017-18 | 2018-19 | 100 | 0.84 |
| 3 | Edapally 110 kV SS -Supply to DM Medicity (DW) | 5.26 | 2017-18 | 2018-19 | 75 | 4.16 |
| 4 | Brahmapuram 220 kV SS – Connecty to DLF (DW) | 4.68 | Apr-15 | 2018-19 | 90 | 4.21 |
| 5 | Cherai 110 kV SS & Mannam line (REC, SS Compl2012) | 23.631 | 2010 | 2018-19 | 95.2 | 22.497 |
| 6 | Kadanad 110 kV SS – Capacity Enht ( Tx compl 2017) | 1.67 | 12-11-2016 | 2018-19 | 99 | 1.65 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | Thrikkakkara 66 kV SS– Capacity Enht (IPDS) | 3.25 | 01-01-2017 | 2018-19 | 6.5 | 0.21 |
| 8 | Perumanoor 66 kV SS – Capacity enht (IPDS) | 2.24 | 03-06-2017 | 2018-19 | 0.31 | 0.01 |
| 9 | Kizhakkambalam 110 kV SS– Capacity Enht (Tx Compl0 | 1.5 | 30-11-2017 | 2018-19 | | 0.5 |
| 10 | Thrikkakkara 66 kV SS – Providing Earth Mat (IPDS) | 0.17 | 2017-18 | 2018-19 | 20 | 0.05 |
| 11 | Kalamassery 220kV SS - BB protn & sectionalizer | 3.2 | | 2019-20 | | |
| 12 | SAS - Automation of 7, 110 kV feeders- ( PSDF) | 2.21 | | 2018-19 | | |
| 13 | Automation 4, 110 kV feeders : (Part DW) | 1.28 | | 2018-19 | | |
| 14 | Automation of 10 x 110 kV TL | 3.18 | | 2019-20 | | |
| 15 | Automation of 4 x 220 kV TL @ Kalamassery SS | 1.5 | | 2019-20 | | |
| 16 | Enhancing the 220kV main bus | 3.7 | 2017-18 | 2018-19 | 50 | 1.85 |
| 17 | Kalamassery -Earth mat @ 66kV yard | 1.07 | 2017-18 | 2018-19 | 50 | 0.535 |
| 18 | Feeder bays for 110kV KLPM feeder | 2.985 | | 2019-20 | | |
| 19 | KLY SS - Neutralizing PCB - 120MVA Trs | 2 | | 2019-20 | | |
| 20 | Kalamassery 220 kV SS - LT panel | 0.62 | 2017-18 | 30.11.2018 | 50 | 0.31 |
| 21 | Renovation of Auxiliary No.2 | 0.1 | 2017-18 | 31.10.2018 | 50 | 0.05 |
| 22 | Erection and commissioning of DCDB panels | 0.25 | 2017-18 | 15.12.2018 | 50 | 0.125 |
| 23 | 66kV line control - Pallivasal-Aluva &Edathala | 0.7 | | 31.03.2020 | | |
| 24 | Renovation of AB structure | 0.022 | 2017-18 | 31.12.2018 | 50 | 0.011 |
| 25 | Remetalling of yard | 0.215 | 2017-18 | 31.01.2019 | 50 | 0.1075 |
| 26 | Providing LAs for 110/66kV Transformers. | 0.035 | 2017-18 | 30.10.2018 | 50 | 0.0175 |
| 27 | Bushings reolacement of 63 MVA Transformers | 0.134 | 2017-18 | 31.12.2018 | 50 | 0.067 |
| 28 | Vyttila UG cable feeder Eqpt & bus coupler bay | 0.62 | 2017-18 | 31.12.2018 | 50 | 0.31 |
| 29 | Construction of new control room | 3.27 | 2017-18 | 31.12.2018 | 50 | 1.635 |
| 30 | Puthencruz 66kV Substation | | 2017-18 | 31.12.2018 | 50 | 0 |
| 31 | Capacity Enht -1x 10MVA transformer | 1.75 | 2017-18 | 28.02.2019 | 50 | 0.875 |
| 32 | Cherai 110 KV new SS & Mannam-Cherai TL | 23.63(AS) | 2017-18 | 2018-19 | 50 | 12 |
| 33 | Kurumassery 110kV SS | | 2017-18 | 2018-19 | 50 | 0 |
| 34 | Kurumassery 110kV SS - 5MVA Transformer | 1.45(AS) | 2017-18 | 2018-19 | 50 | 0.75 |
| 35 | Thammanam 33kV GIS – SCADA | 0.224 | 2017-18 | 2018-19 | 50 | 0.112 |
| 36 | Mattancherry 110kV SS - Capacity Enht | 1.62 | 2017-18 | 2018-19 | 50 | 0.81 |
| 37 | NParavur 110 kV SS - 12.5MVA TF | 2.35 | 2017-18 | 2018-19 | 50 | 1.175 |
| 38 | KLSY 220 - Repl cross bus and CTs of 6 bays ( IPDS) | 0.05 | 2017-18 | 2018-19 | 50 | 0.025 |
| 39 | KLSY-Vyttila 66kV TL Reconductoring (IPDS) | 4.3 | 2017-18 | 2018-19 | 50 | 2.15 |
| 40 | Edayar SS Solar plant : SCADA & CCTV (IPDS) | 0.08 | 2017-18 | 2018-19 | 50 | 0.04 |
| 41 | Vyttila-P'Cruz 66 kV TL - UG OFC & OPGW-IPDS | 0.2 | 2017-18 | 2018-19 | 50 | 0.1 |
| 42 | Solar panel 25kWp (IPDS) | 0.175 | 2017-18 | 2018-19 | 50 | 0.0875 |
| 43 | Solar panel 25kWp (IPDS) | 0.175 | 2017-18 | 2018-19 | 50 | 0.0875 |
| 44 | Independent control to 66kV supply IPDS | 1.18 | 2017-18 | 2018-19 | 50 | 0.59 |
| 45 | Replacement 2x8MVA TRs with 16MVA- IPDS | 3.25 | 2017-18 | 2018-19 | 50 | 1.625 |
| 46 | Tripunithura 66kV GIS IPDS | 21.75 | 2017-18 | 2018-19 | 50 | 10.875 |
| 47 | Perumanoor 66kV SS – Cap Enh – 2x 16 MVA -IPDS | 2.6 (AS ) | 2017-18 | 2018-19 | 50 | 1 |
| 48 | Njarakkal 66 kV SS Cap Enht - 16MVA -IPDS | 1.69(AS ) | 2017-18 | 2018-19 | 50 | 1 |
| 49 | Varapuzha 33 kV SS – R&M (DDUGJY) | 1.01(AS) | 2017-18 | 2018-19 | 50 | 1 |
| 50 | Alangad 33kV S/S – R&M DDUGJY | 1 (AS) | 2017-18 | 2018-19 | 50 | 1 |
| 51 | Kurumassery 33 kV SS – R&M – DDUGJY | 1.03(AS) | 2017-18 | 2018-19 | 50 | 1 |
| 52 | Puthenvelikkara 33kV SS - R&M - DDUGJY | 1 (AS) | 2017-18 | 2018-19 | 50 | 1 |
| 53 | Petronet LNG Supply at 110 kV (DW) | 82.25 | 2017-18 | 2018-19 | 50 | 41.125 |
| 54 | Inland Waterways Authority – TLShifting (DW) | | 2017-18 | 2018-19 | 50 | 0 |
| 55 | Kalamassery-Njarackal 66kV feeder | 0.94 | 2017-18 | 2018-19 | 50 | 0.47 |
| 56 | Kalamassery- Vytila 66kV TL-2 crossing (DW) | 1.55 | 2017-18 | 2018-19 | 50 | 0.775 |
| 57 | Kalamassery- Vytila 110kV feeder | 1.24 | 2017-18 | 2018-19 | 50 | 0.62 |
| 58 | Kalamassery-Njarackal 66kV feeder | 0.94 | 2017-18 | 2018-19 | 50 | 0.47 |
| 59 | Kalamassery- Aroor 110kV feeder | 0.68 | 2017-18 | 2018-19 | 50 | 0.34 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 60 | Kalamassery-Brahmapuram 110kV - 3&4 feeder | 1.67 | 2017-18 | 2018-19 | 50 | 0.835 |
| 61 | Brahmapuram-Kadavanthra 110kV TL- 2 crossings | 3 | 2017-18 | 2018-19 | 50 | 1.5 |
| 62 | Vyttila-puthencruz 66kV feeder | 1.25 | 2017-18 | 2018-19 | 50 | 0.625 |
| 63 | Kalamassery-Edayar -110kV | 1.07 | 2017-18 | 2018-19 | 50 | 0.535 |
| 64 | KL-ED 110 KV TL Inserting tower | 0.2 | 2017-18 | 2018-19 | 50 | 0.1 |
| 65 | BRAM 1&2 feeder - Converting to UG cable | | 2017-18 | 2018-19 | 50 | 0 |
| 66 | Kochi Metro Supply from 110kV New Vyttila (DW) | 1.542 | 2017-18 | 2018-19 | 50 | 0.771 |
| 67 | MES (NAVY) - 110kV feeder bay W'Island SS | 1.31 | 2017-18 | 2018-19 | 50 | 0.655 |
| 68 | AIMS, Ponekkara – 33 Kv from Edappally SS | 4.89 | 2017-18 | 2018-19 | 50 | 2.445 |
| | **Circle - Pathanamthitta** | | | | | |
| 1 | Pandalam 33kV SS & SC TL to Edappon IPDS | 5.16 | 17-03-2015 | 2018-19 | SS68/TL17 | 1.8018 |
| 2 | Enathu 66 kV SS (110 kV Std) & TL to Adoor | 18.38 | 05-04-2016 | 2018-19 | SS46/TL29 | 4.0452 |
| | **Circle - Kozhikode** | | | | | |
| 1 | Kinaloor 110 kV SS & LILO | 9.5 | 19-11-2015 | 11-02-2017 | Commd | 6.0501 |
| 2 | Cyber Park 66 kV SS & LILO (Part DW) (TL- Compltd) | 9 | 22-04-2016 | 2018-19 | SS- 97 | 5.2002 |
| 3 | K'betta – Kuthumunda TL doubling @ 110 kV | 12.37 | 21-01-2017 | 2018-19 | 82 | 3.7159 |
| 4 | Gandhi Road- Chevayur 110 kV UG Cable | 23 | 23-01-2017 | 2018-19 | 65 | 14.3862 |
| 5 | Thambalamanna SS Upgdn 110 & UGC to A'muzhi | 33.25 | 2017-18 | 2018-19 | 70 | 23.275 |
| 6 | Ambalavayal 66 kV SS and TLs | 12.56 | 2017-18 | 2018-19 | 70 | 8.792 |
| 7 | Kaniyambetta - Kuthumunda 66kV SC to DC TL | 12.37 | 2017-18 | 2018-19 | 70 | 8.659 |
| 8 | Kalpetta 33kV - Cap Enht - 8 MVA TF (IPDS) | 0.53 | 2017-18 | 2018-19 | 70 | 0.371 |
| 9 | Kunnamangalam 110kV SSS Upgdn to 220kV & TL | 111 | 2017-18 | 2018-19 | 70 | 77.7 |
| 10 | S'bathery- Kainatty 66 kV SC TL Upgdn -110 DC | 19.15 | | 2019-20 | | |
| 11 | Kuthumunda 110 kV std SS | 27 | | 2019-20 | | |
| 12 | Adivaram 110kV SS & 110kV DC line. | 15 | | 2019-20 | | |
| 13 | Kaniyambetta 220 kV SS - Cap Enht - 100MVA TF | 13 | | 2019-20 | | |
| 14 | NIT campus 33kV Substation & Lines | 6.5 | | 2019-20 | | |
| 15 | Ambalaparamba - 66kV SS - Cap Enh - 10MVA TF | 0.82 | | 2019-20 | | |
| 16 | K'betta-Mananthavady TL - Upgrdn to 110 kV DC | 18.45 | | 2020-21 | | |
| 17 | Mananthavady 66 kV SS Upgrdn - 110kV GIS *(IPDS)* | 21 | | 2020-21 | | |
| 18 | Thamarassery SS - Upgdn to 110kV | 10 | | 2020-21 | | |
| 19 | Anjukunnu SS Upgdn to 110kV | 2.5 | | 2020-21 | | |
| 20 | Sulthan Bathery 66kV SS Upgdn to 110 kV | 8.5 | | 2020-21 | | |
| 21 | Thettamala new 110kV SS & Lines | 26 | | 2021-22 | | |
| 22 | Mankavu 66kV SS Upgration to 110kV | 11.86 | 2017-18 | 01-02-2019 | 75 | 8.895 |
| 23 | Kunnamangalam- Kuttikkattor Line to 110 KV | 5 | 2017-18 | 01-02-2019 | 75 | 3.75 |
| 24 | Gandhi Road – Chevayur 110 kV UGC & bays | 23 | 2017-18 | 01-03-2019 | 75 | 17.25 |
| 25 | Nallalam 220kV SS Cap Enht - Power transformers | 17.21 | | 01-05-2019 | | |
| 26 | Kuttikkattur SS Upgradation to 110kV | 8 | | 01-06-2019 | | |
| 27 | Ramanattukara 33kV SS – 5MVA TF (DDUGJY) | 0.66 | 2017-18 | 2018-19 | 75 | 0.495 |
| 28 | Nallalam 220kV SS - Downstream works | 3.5 | | 01-03-2020 | | |
| 29 | Kunnamangalam 220 SS - LILO @ NLKG | 3.05 | | 01-03-2020 | | |
| 30 | Puthiyara SS Upgdn to 110kV GIS (IPDS - proposed) | 66.87 | | 01-03-2020 | | |
| 31 | Nallalam - 220kV Double bus & two feeders | 9 | | 01-03-2020 | | |
| 32 | Thamarassery- Kunnamangalam 66kV TL -Doubling | 16 | | 01-03-2020 | | |
| 33 | Pantheerankavu New 110kV SS & cabling | 16.9 | | 01-03-2020 | | |
| 34 | Ramanattukara - Feroke - 33kV UGC & 33kV bays | 4.84 | | 01-03-2020 | | |
| 35 | Chelari- Ramanattukara 33kV line Doubling | 8.26 | | 01-03-2021 | | |
| 36 | Nallalam 220kV SS - 66 kV Bus Upgrdn to 110 kV | 6.85 | | 01-03-2021 | | |
| 37 | Kalipoika 110kV GIS & Cabling (IPDS propsd) | 26 | | 01-03-2021 | | |
| 38 | Nallalam-Kuttikkattor 66kV feeder Doubling | 8.67 | | 01-03-2021 | | |
| 39 | Ambalaparamba tap line Doublling | 11.5 | | 01-03-2021 | | |
| 40 | Kallai 110kV GIS & Cabling (IPDS propsd) | 70 | | 01-03-2022 | | |
| 41 | Medical College 110kV GIS & Cabling (IPDS propsd) | 71.94 | | 01-03-2022 | | |
| 42 | Kinaloor 110 kV SS - 12.5MVA TF | 1.68 | 2017-18 | 2018-19 | 75 | 1.26 |
| 43 | Panthalayani (Koyilandy) New 110 KV Substation | 30 | | 2019-20 | | |
| 44 | Meppayur 110kV SS Cap Enht - 2x12.5MVA TF | 2.67 | | 2019-20 | | |
| 45 | Maniyur (NEW) 110kV substation | 22 | | 2020-21 | | |
| 46 | Thiruvallur 33 kV SS Cap Enht - 2x8MVA | 1.4 | | 2020-21 | | |
| 47 | Vatakara 110kV SS Cap Enht - 20MVA TF | 1.2 | | 2020-21 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 48 | Peruvannamuzhi-Chakkittappara – 33 kV Cable | 2.31 | | 2021-22 | | |
| 49 | Chakkittapara 110kV SS - Yard for P'muzhi SHEP | 3.48 | | 2021-22 | | |
| 50 | Kuttiady SS - Chathangottunada 33kV UGC | 5 | | 2021-22 | | |
| 51 | Kuttiady 110 kv SS – TF bay & 33kV feeder bay | 2.83 | | 2021-22 | | |
| 52 | Chathangottunada SHEP Power evacuaation | 1.9 | | 2021-22 | | |
| | **Circle - Malappuram** | | | | | |
| 1 | Perinthalmanna SS Upgdn to 110 kV & DC LILO | 16.7 | 05-04-2015 | 31-03-2017 | Commsnd | 8.5593 |
| 2 | 33 kV SS Pothukallu & connected lines | 5.72 | 11-01-2012 | 2018-19 | 47 | 1.93 |
| 3 | Malaparamba to Ramapuram DC Line to MC | 3.44 | 29-04-2013 | 29-04-2018 | Commsnd | 1.98 |
| 4 | Kalpakanchery & Edarikode 33kV SS – SC Tap Line | 3.45 | 04-04-2016 | 04-06-2017 | Commsnd | 2.883 |
| 5 | Malappuram – Tirur 110 kV Line Doubling (Ph1&2) | 1.55 | Sep-16 | 2018-19 | 100/89 | 2.038 |
| 6 | Manjeri SS Upgdn to 110 kV & Nilambur feeder | 8.21 | 11-01-2012 | 2018-19 | 100/23 | 2.83 |
| 7 | Tirur Traction SS supply with UGC (DW) | 9.08 | | 2018-19 | 93/100 | 2.61 |
| 8 | Kizhissery – Edavanna 33kV Line | 4.07 | 30-09-2017 | 2018-19 | 33 | 0.03175 |
| 9 | Ramapuram – Melattur 110 kV TL & Melattur Bays | 2.95 | 06-06-2016 | 2018-19 | TL-100 | 2.9 |
| 10 | Nilambur & Edakkara SS Upgdn to 110 kV & TL | 13.21 | Feb-18 | 2018-19 | TL-15 | 0.021 |
| 11 | Shanthinagar – Pokkottumpadam 33kV Line | 2.85 | | 2018-19 | TL-100 | 0.2687 |
| | **Circle - Thrissur** | | | | | |
| 1 | Madakathara 400 kV SS - 200 MVA, TF | 12.1 | 02-10-2016 | 2018-19 | 91 | 11.011 |
| 2 | Valapad – Kandassankadavu 110 kV DC Line | 4.1 | 24-06-2016 | 31-08-2017 | 100 | 4.1 |
| 3 | Madakathara SS - 200 kV Bus Enhancement PSDF | 2.9 | 11-08-2016 | 2018-19 | 69 | 2.001 |
| 4 | Kodungallur 66 KV SS Upgdn to 110 kV & Irjk TL | 14.5 | 2007 | 2018-19 | SS –74 | 3.7 |
| 5 | Chalkdy - Kodungallur DC to 110 kV Upgrdn-IPDS | 6.5 | May-17 | 2018-19 | 45 | 2.925 |
| 6 | Chalakkudy - Kodungallur TL to 110 kV DC & Bays | 11.2 | May-17 | 2018-19 | SS –78 | 0.994 |
| 7 | Blangad & Punna (Chavkd) 33kV SS– Blangad TL | 7.04 | 30-09-2017 | 2018-19 | 80 | 5.632 |
| 8 | Valapad 110 kV SS– Capacity enhancement | 1.62 | 30-09-2017 | 2018-19 | 99 | 1.6038 |
| 9 | Athani 110 kV SS – Capacity enhancement | 2.6 | 10-03-2017 | 2018-19 | 88 | 2.288 |
| 10 | Mundur 33 kV SS – Cap Enht & 33kV Vyr – ParprTL | 1.84 | 2017-18 | 2018-19 | 20 | 0.368 |
| 11 | Mala 66 KV SS - Upgdn to 110 kV | 5.25 | 2017-18 | 2018-19 | 48 | 2.52 |
| 12 | Malayattoor SS – Bays & 110kV SC TL (4) to DC | 18.8 | Apr-17 | 2018-19 | 13 | 2.1 |
| 13 | Pudukkad - Kattoor TL upgr to 110kV (HC Case) | 11.2 | | 2020-21 | | |
| 14 | Pazhayannur 110kV SS - 1X TF & 33kV TL to Chlk | 6.79 | | 2019-20 | | |
| 15 | Karukutty 66kV SS - CB, C&R Panels, Etc & LILO | 1.86 | | 2019-20 | | |
| 16 | Koratty 33kV SS - control room | 0.5 | | 2019-20 | | |
| 17 | Irinjalakuda 110kV SS - Cap Enht | 3.5 | 2017-18 | 2018-19 | 10 | 1.75 |
| 18a | Chalakudy 110KV SS - DP shifting (8) | 0.084 | 2017-18 | 2018-19 | 50 | 0.042 |
| 18b | Chalakudy 110KV SS - Shifting of 33,11and LT lines | 0.34 | 2017-18 | 2018-19 | 50 | 0.17 |
| 19c | Chalakudy 110 SS – 110 kV Cable Laying | 3.8 | 2017-18 | 2018-19 | 50 | 1.9 |
| 18d | (d) Chalakudy 110Kv Ss Rearranging water line | 0.012 | 2017-18 | 2018-19 | 50 | 0.006 |
| | **Circle -Thiruvananthapuram** | | | | | |
| 1 | Kattakkada 220 kV SS & TL to Pothencode | 112.15 | 23-09-2009 | 2018-19 | complted | 104.26 |
| 2 | Mutathara 110 kV Substation (DW-GoK Aided) | 45.26 | 16-04-2017 | 2018-19 | 5 | 1.41 |
| 3 | Veli 66kV SS Upgdn & TL to 110kV (REC Loan) | 20.86 | 25-09-2009 | 2018-19 | 6/50 | 2.72 |
| 4 | Aryanad 33 kV SS Upgradation of & SC TL | 8.41 | 07-09-2014 | 2018-19 | 95 | 8.05 |
| 5 | Vilakulam 33 kV SS Upgdn & SC TL (RAPDRP) | 8.3 | 16-03-2016 | 2018-19 | 30/50 | 3.05 |
| 6 | Kacheri 33 kV SS Upgdn & UGC (RAPDRP) | 6.6 | 21-09-2016 | 2018-19 | 95/100 | |
| 7 | Kattakkada – Vizhinjam - MC/DC Line (DW) | 59.97 | 15-08-2014 | 2018-19 | TL- 85 | |
| 8 | Vydyuthi Bhavanam 33 kV SS & UGC (IPDS) | 7.43 | 15-02-2018 | 2018-19 | 2 | 0.02 |
| 9 | Neyyattinkara SS Upgdn 110 kV | 8.37 | 12-01-2017 | 2018-19 | 2 | 0.38 |
| | **Circle - Kannur** | | | | | |
| 1 | Ambalathara 220 kV SS & LILO | 32.7 | 05-06-2016 | 31-05-2017 | 100 | 17.97 |
| 2 | Rajapuram 33kV Indoor SS | 6.48 | Jul-16 | 2018-19 | 27 | 0.6906 |
| 3 | Kelakam 33kV Indoor SS | 10 | 22-08-2017 | 2018-19 | SS 12/TL-4 | 0 |
| 4 | Coast Guard DW - Azhikode 110 kV SS & 33kV UGC | 8.8 | 03-01-2014 | 2018-19 | 100/ 93 | 9.4702 |
| 5 | KIAL Supply – Mattanr 110 kVTF & 33kV UGC(DW) | 15.05 | | 25-01-2017 | | 15.16 |
| 6 | Nedumpoyil 66 KV SS Upgdn to110 kV & DC Line | 13.55 | 15-12-2015 | 2018-19 | SS33/TL51 | 4.1271 |
| 7 | Sreekandapuram 66 KV SS Upgr to 110 kV & TL | 9.95 | 26-04-2017 | 2018-19 | SS 0/TL-34 | 0.395 |
| 8 | Valiyavelicham 110 kV SS – (KSIDC DW) | 11.85 | Oct-16 | 31-05-2018 | Compltd | 5.38 |
| 9 | Kubanur 110 kV SS – Uppala Railway SS (DW) | 21.45 | Apr-17 | 30-10-2017 | Compltd | 4.6188 |
| 10 | Tholambra 33KV SS - Conversion to indoor | 0.63 | 2017-18 | 2018-19 | 50 | 0.315 |
| 11 | Pinarayi 110KV SS - Capacity Enht | 3.38 | | 2019-20 | | |
| 12 | Dharmadam 33 kV SS - Conversion to indoor | 0.92 | | 2019-20 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | Kodiyeri 33 kV SS -Conversion to indoor | 0.97 | 2017-18 | 2018-19 | 50 | 0.485 |
| 14 | Panoor110kV SS - Cap enht -1 x 16MVA TF & bay | 2.6 | 2017-18 | 2018-19 | 50 | 1.3 |
| 15 | Puthur 33kV SS - Conversion to indoor | 0.92 | | 2019-20 | | |
| 16 | Kannur Sports Council -shifting of 110 kV line (DW) | 1.25 | 2017-18 | 2018-19 | 50 | 0.625 |
| 17 | 11kV Indoor 8 Panel set Convertion | 0.76 | 2017-18 | 2018-19 | 50 | 0.38 |
| 18 | New 11kV Outlet | 0.07 | 2017-18 | 2018-19 | 50 | 0.035 |
| 19 | Erection of 220 kV bus isolators | 0.09 | 2017-18 | 2018-19 | 50 | 0.045 |
| 20 | Yard metalling | 0.04 | 2017-18 | 2018-19 | 50 | 0.02 |
| 21 | Renovation of 220kV Isolators | 0.05 | 2017-18 | 2018-19 | 50 | 0.025 |
| 22 | Puthiyatheru 33 kV SS - 11kV panel to indoor Conv | 0.9 | 2017-18 | 2018-19 | 50 | 0.45 |
| 23 | Providing chain link fencing | 0.08 | 2017-18 | 2018-19 | 50 | 0.04 |
| 24 | Leak proofing of control room | 0.09 | 2017-18 | 2018-19 | 50 | 0.045 |
| 25 | Renovation of store compund | 0.18 | 2017-18 | 2018-19 | 50 | 0.09 |
| 26 | Capacity Enhancement - 20MVA TF | 1.75 | 2017-18 | 2018-19 | 50 | 0.875 |
| 27 | Second 16MVA Transformer | 2.5 | 2017-18 | 2018-19 | 50 | 1.25 |
| 28 | Water connection to yard | 0.02 | 2017-18 | 2018-19 | 50 | 0.01 |
| 29 | Mylatty 220kV SS - Nitrogen drying of TF | 0.2 | 2017-18 | 2018-19 | 50 | 0.1 |
| 30 | Mylatty 220kV SS – Replacing 220kV TF CB & BC | 0.0215 | 2017-18 | 2018-19 | 50 | 0.01075 |
| 31 | Mylatty 220kV SS - Overhauling 100MVA TF | 0.05 | 2017-18 | 31/12/18 | 50 | 0.025 |
| 32 | Mylatty 220 kV SS – Quarters Renewal | 0.1495 | 2017-18 | 13/12/18 | 50 | 0.07475 |
| 33 | Mylatty 220kV SS - Solar LED street lights | 0.03 | 2017-18 | 24/12/18 | 50 | 0.015 |
| 34 | Mylatty 220kV SS- Switch Yard Renweal | 0.0465 | 2017-18 | 30/1/19 | 50 | 0.02325 |
| 35 | Mylatti 220kV SS –Workshop & store Convertion | 0.06 | 2017-18 | 30/11/18 | 50 | 0.03 |
| 36 | Mylatty 220 kV SS – Yard Renovation | | 2017-18 | 30/11/19 | 50 | 0 |
| 37 | Mulleria 110KV SS – TF Bay Extn - 16 MVA TF | 2.3 | 2017-18 | 31.12.2018 | 50 | 1.15 |
| 38 | Badiadka - 33 KV Substation - Conversion to indoor | 0.25 | 2017-18 | 31.03.2019 | 50 | 0.125 |
| 39 | Perla 33 KV SS - Control room and cable trench | 0.17 | 2017-18 | 31.03.2019 | 50 | 0.085 |
| 40 | Perla 33 KV SS - Store shed | 0.0451 | 2017-18 | 2018-19 | 50 | 0.02255 |
| 41 | West Eleri 33 kV SS – 5 MVA TF | 0.7 | 2017-18 | 31.12.2018 | 50 | 0.35 |
| 42 | Cheruvathur 110 kV SS – Cap Enh 2X10 MVA TF | 1.99 | 2017-18 | 31.03.2019 | 50 | 0.995 |
| 43 | Thrikkaripur - 33 KV SS - Conversion indoor | 0.88 | 2017-18 | 31.03.2019 | 50 | 0.44 |
| 44 | Belur 33 KV SS - Conversion to indoor | 0.99 | 2017-18 | 31.03.2019 | 50 | 0.495 |
| | **Circle - Palakkad** | | | | | |
| 1 | Kollengode – Vadakkenchery 110 kV DC TL | 32 | 18-03-2017 | 2018-19 | 30 | 2 |
| 2 | Olavakkode 33 kV SS & Line - RAPDRP | 8.45 | 24-01-2017 | 2018-19 | 10 | |
| 3 | Agali 33 kV SS - 5 MVA TF - DDUGJY | 0.91 | 21-10-2017 | 2018-19 | 75 | 0.72 |
| 4 | Kollengode 110 kV SS - Replacing 33 kV TF | 3.35 | 21-11-2017 | 2019-20 | 15 | 0.3 |
| 5 | Palakkad 220 kV SS - 160 MVA TF | 10 | 2017-18 | 2018-19 | 20 | 0.27 |
| 6 | 1 X 160MVA TF Installation with Accessories | 5.5 | 2017-18 | 2018-19 | 50 | 5 |
| 7 | Bay Extension for 110kV DC Line to Malampuzha | 0.8 | 2017-18 | 2018-19 | 50 | 2.75 |
| 8 | Replacing Faulty Spare Unit 53.33 MVA TFR | 0.25 | 2017-18 | 2018-19 | 50 | 0.4 |
| 9 | Control Room Window for Leak Proofing of AC | 0.005 | 2017-18 | 2018-19 | 50 | 0.125 |
| 10 | Construction of Bike shed infront of control room | 0.0125 | 2017-18 | 2018-19 | 50 | 0.0025 |
| 11 | Compound wall & tiles | 0.0558 | 2017-18 | 2018-19 | 50 | 0.00625 |
| 12 | Concrete interlocking tiles at courtyard | 0.034 | 2017-18 | 2018-19 | 50 | 0.0279 |
| 13 | New record room for Transmisssion Circle | 0.0413 | 2017-18 | 2018-19 | 50 | 0.017 |
| 14 | Replacing 2x220kV CB of Transformer Bank | 0.26 | 2017-18 | 2018-19 | 50 | 0.02065 |
| 15 | Yard concreting & spreading Metal (6th Phase) | 0.3 | 2017-18 | 2018-19 | 50 | 0.13 |
| 16 | Providing security camera in 220/11KV Yard | 0.03 | 2017-18 | 2018-19 | 50 | 0.15 |
| 17 | Capacity enhancement -2x200MVA transformers | 14 | 2017-18 | 2018-19 | 50 | 0.015 |
| 18 | Second 110V 400 AH battery with charger | 0.135 | 2017-18 | 2018-19 | 50 | 7 |
| 19 | New Yard and road | 0.13 | 2017-18 | 2018-19 | 50 | 0.0675 |
| 20 | 220 kV yard metalling | 0.39 | 2017-18 | 2018-19 | 50 | 0.065 |
| 21 | Yard Security Camera (220/11KV Yard) | 0.03 | | 2019-20 | | |
| 22 | Tiles in 11kV control room | 0.06 | | 2019-20 | | |
| 23 | Concreting of 110kV yard | 0.33 | | 2019-20 | | |
| 24 | Retaining wall and drainage for the 110kV yard | 0.1 | | 2019-20 | | |
| 25 | New control room | 1.05 | | 2019-20 | | |
| 26 | Renovation of 3 Quarters | 0.08 | | 2019-20 | | |
| 27 | Renovation of TR Room | 0.05 | | 2019-20 | | |
| 28 | Capacity enhancement 2x20MVA transformers | 0.3 | | 2019-20 | | |
| 29 | Renovation of control room & office | 0.095 | | 2019-20 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 30 | Road Tarring | 0.015 | | 2019-20 | | |
| 31 | 110kV upper yard metalling | 0.05 | | 2019-20 | | |
| 32 | New stack yard | 0.05 | | 2019-20 | | |
| 33 | Capacity Enht - 2x20MVA TF | 0.25 | | 2020-21 | | |
| 34 | Bus coupling Replacment @ 110kV - Outdoor GIS | 0.1 | | 2020-21 | | |
| 35 | Security Cabin | 0.05 | | 2020-21 | | |
| 36 | Strengthning of 110kV Double Bus arrangement | 0.1 | | 2020-21 | | |
| 37 | Bus Coupler on 110kV Double Bus | 0.25 | | 2020-21 | | |
| 38 | Construction of fire wall | 0.05 | | 2019-20 | | |
| 39 | Bay extention for Kollengode Vadakkencherry line | 1.75 | | 2019-20 | 25 | 0.0125 |
| 40 | Replacing 2X 5MVA & 2 x 12.5MVA TFs | 2 | 2017-18 | 2018-19 | 50 | 0.875 |
| 41 | Standby LT to substation with change over facility | 0.01 | 2017-18 | 2018-19 | 50 | 1 |
| 42 | Providing new pipe connection inside the yard | 0.0078 | 2017-18 | 2018-19 | 50 | 0.005 |
| 43 | Nalleppilli DP Structure - 11kV AB switch | 0.0025 | 2017-18 | 2018-19 | 50 | 0.0039 |
| 44 | Curb wall around the yard and remetalling | 0.03 | 2017-18 | 2018-19 | 50 | 0.00125 |
| 45 | Linking 11kV DP structures earthing with main mat | 0.005 | | 2019-20 | | |
| 46 | Control Room - Interlock tiles | 0.01 | | 2019-20 | | |
| 47 | Kollengode to vadakkencherry 110 kV TL | 1.1 | | 2019-20 | | |
| 48 | Construction of vehicle shed | 0.01 | | 2019-20 | | |
| 49 | Metaling of 11kV DP structure area | 0.01 | | 2019-20 | | |
| 50 | Strengethening of earthing system | 0.2 | | 2019-20 | | |
| 51 | Flooring of Tiles and Repair | 0.02 | | 2019-20 | | |
| 52 | Vadakkenchery SSSD - Road (300m Appx.) | 0.05 | | 2019-20 | | |
| 53 | Replacing 11kV VCB panel (12panel set) | 0.4 | | 2019-20 | | |
| 54 | Construction of firewall | 0.12 | | 2019-20 | | |
| 55 | Installation 20/25MVA TF & bus Etn extension | 2 | | 2019-20 | | |
| 56 | Providing earthmat in existing yard | 0.3 | | 2019-20 | | |
| 57 | Feeder Bay extension - for Vennakkara GIS TL | 0.25 | | 2019-20 | | |
| 58 | Instruments, tools and safety equipments | 0.003 | | 2019-20 | | |
| 59 | Mac road up to transformer and fencing | 0.05 | | 2019-20 | | |
| 60 | Instruments, tools and safety equipments | 0.005 | | 2019-20 | | |
| 61 | Tower Insertion - Sreekrishnapuram and Kongad 33 kV | 0.1 | | 2019-20 | | |
| 62 | 110kV GIS at existing station compound | 12.3 | | 2020-21 | | |
| 63 | Yard metalling, Earthing (11 KV) etc | 2 | 2017-18 | 2018-19 | 50 | 6.15 |
| 64 | Feeder Bay (2 Nos) : Malampuzha to Kalladikkode | 1.1 | 2017-18 | 2018-19 | 50 | 1 |
| 65 | Mat Earthing | 0.15 | 2017-18 | 2018-19 | 50 | 0.55 |
| 66 | Transformer (110 kV )CB Replacment | 0.09 | 2017-18 | 2018-19 | 50 | 0.075 |
| 67 | Providing additional yard light | 0.006 | 2017-18 | 2018-19 | 50 | 0.045 |
| 68 | Mannarkkad 110kV SS - GI roofing | 0.19 | 2017-18 | 2018-19 | 50 | 0.003 |
| 69 | Feeder Bay – for Kalladikkode to Mannarkkad TLs | 0.55 | 2017-18 | 2018-19 | 50 | 0.095 |
| 70 | Palakkad & Malampuzha SS Interlinking – 2 TLs | 1.2 | 2017-18 | 2018-19 | 50 | 0.275 |
| 71 | Malampuzha 110kV SS – 1x 10MVA TF & Bay | 1.5 | 2017-18 | 2018-19 | 50 | 0.6 |
| 72 | Feeder Bay - 110kV feeder Bay – Kalladikkode TL | 0.55 | 2017-18 | 2018-19 | 50 | 0.75 |
| 73 | Replacing CB 110kV OTCR I and Transformer No II | 0.12 | | 2019-20 | | |
| 74 | Replacement of 110kV CT &OTCR | 0.09 | | 2019-20 | | |
| 75 | Construction of Pillars for Gate in front of Yard | 0.002 | 2017-18 | 2018-19 | 50 | 0.045 |
| 76 | Replacement of old Battery Charger 30A | 0.009 | 2017-18 | 2018-19 | 50 | 0.001 |
| 77 | Installation of 110kV Bus Coupler (Gas Insulated) | 0.47 | 2017-18 | 2018-19 | 50 | 0.0045 |
| 78 | Providing 1 No 11 kV feeder outlet (pengattiri) | 0.0025 | | 2019-20 | | |
| 79 | Construction of vehicle shed | 0.001 | | 2019-20 | | |
| 80 | Replacement of Station Battery 200AH | 0.031 | | 2019-20 | | |
| 81 | Construction of vehicle shed | 0.001 | | 2019-20 | | |
| 82 | Improving yard lighting with LED lamps | 0.01 | | 2019-20 | | |
| 83 | Splitting of 110 KV Bus by providing Bus Isolator | 0.06 | | 2019-20 | | |
| 84 | 110 KV Bus PT- 3 Nos | 0.04 | | 2019-20 | | |
| 85 | Koottanad 110kV SS - 16 MVA TF | 2.2 | | 2019-20 | | |
| 86 | Compound wall 110 Kv yard | 0.02 | | 2019-20 | | |
| 87 | Replacing 11 kV AB switch | 0.014 | | 2019-20 | | |
| 88 | Additional 11 kV pT at incomer No 2 | 0.0048 | | 2019-20 | | |
| 89 | Providing 110KV Bus spliting isolator | 6 | | 2019-20 | | |
| 90 | Yard fencing infront of Control room. | 1 | | 2019-20 | | |
| 91 | Installation of 110/33kV transformer | 0.005 | | 2019-20 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 92 | Providing interlock paving tiles | 0.015 | | 2019-20 | | |
| 93 | Kollengode Vadakkenchery 110kV Line | 24 | | 2019-20 | | |
| 94 | Control Room - Paving interlock tiles | 0.02 | | 2019-20 | | |
| 95 | Kannampully SS Upgrdn 110kV & Yard Extn | 0.5 | | 2021-22 | | |
| 96 | Providing floor tiles in control room | 0.04 | | 2019-20 | | |
| 97 | Power evacuation of 1.5MW solar | 0.01 | | 2020-21 | | |
| 98 | Upgradation of Nemmara to 110kV S/S | 1.1 | | 2021-22 | | |
| 99 | Water pump and pump house electrification | 0.005 | | 2019-20 | | |
| 100 | Replacement of Transformer breaker | 0.1 | | 2019-20 | | |
| 101 | Strengethening of earthing system | 0.05 | | 2019-20 | | |
| 102 | Procurement of filter plant | 0.2 | | 2019-20 | | |
| 103 | Palakkad Medical College Upgradation to110kV | 0.2 | | 2021-22 | | |
| 104 | Replacing11 autoreclosure by ODCB | 0.02 | 2017-18 | 2018-19 | 50 | 0.1 |
| 105 | Replacing of 11kV Kalpaka feeder ARC with ODC | 0.02 | 2017-18 | 2018-19 | 50 | 0.01 |
| 106 | Yard light - LED lamp | 0.05 | 2017-18 | 2018-19 | 50 | 0.01 |
| 107 | 33 KV Feeder(3 KPPT) - conductor replacement of | 0.5 | | 2019-20 | | |
| 108 | Replacement of station battery | 0.05 | | 2019-20 | | |
| 109 | Kothachira & NH Feeders - Autoreclosure Replcmt | 0.06 | | 2019-20 | | |
| 110 | New Control Room Civil works | 0.1 | | 2019-20 | | |
| 111 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 112 | New prefab Control room with 11 kV indoor panel | 0.75 | | 2019-20 | | |
| 113 | Thiruvegapura 33 SS -Cap Enh - -1x 5 MVA TF | 0.4 | 2017-18 | 2018-19 | 50 | 0.375 |
| 114 | Metalling 11kV Yard | 0.02 | | 2019-20 | | |
| 115 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 116 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 117 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 118 | Additional water facility | 0.02 | | 2019-20 | | |
| 119 | Replacing 100AH VRLA Battery | 0.02 | | 2019-20 | | |
| 120 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 121 | Construction of compound wall | 0.01 | 2017-18 | 2018-19 | 50 | 0.075 |
| 122 | Installation of 5MVAR capacitor bank | 0.15 | | 2019-20 | | |
| 123 | Replacing ARC with ODC | 0.05 | | 2019-20 | | |
| 124 | Replacement of Battery | 0.015 | | 2019-20 | | |
| 125 | Replacing ARC with ODC | 0.05 | | 2019-20 | | |
| 126 | Tarur - Pazhayannur 33kV interlink | 0.1 | | 2019-20 | | |
| 127 | Modernisation of Transmission Division, Palakkad | 0.0025 | | 2019-20 | | |
| 128 | Kottayi 220kV SS - Land purchase | 6 | | 2019-20 | | |
| 129 | Kottayi-Kuzhalmnm 220kV TL; 220kV TL Kottayi SS | 0.25 | | 2021-22 | | |
| 130 | Kottayi –Parali 110kV line | 0.25 | | 2021-22 | | |
| 131 | 110kV Kanjikode-PMC-Vennakkara line | 1 | | 2021-22 | | |
| 132 | Palakkad - Malampuzha 110kV DC line | 5.5 | | 2021-22 | | |
| 133 | Olavakkode Substation civil work icluding filling | 0.4 | | 2019-20 | | |
| 134 | Olavakkode Substation drawing 33kV ABC | 0.16 | | 2019-20 | | |
| 135 | Olavakkode Substation drawing 33kV OH line | 0.85 | | 2019-20 | | |
| 136 | Olavakkode Substation Equipment & Erection | 1.2 | | 2019-20 | | |
| 137 | Olavakkode Substation containerised substation | 2.5 | | 2019-20 | | |
| **System Operation** | | | | | | |
| 1 | DPLCC, Prot Coupler Etc - MDA – PKD & KKM-KHD | 0.7255 | 2017-18 | 2018-19 | 75 | 0.544125 |
| 2 | SDH for FOC - (OPGW-DWSM) Etc | 1.92 | 2017-18 | 2018-19 | 75 | 1.44 |
| 3 | Kattakada Substation – GPS System | 0.02 | 2017-18 | 2018-19 | 75 | 0.015 |
| 4 | OFC & OPGW - Mylatty, Talipba and Nileswar SS | 3.77 | 2017-18 | 2018-19 | 75 | 2.8275 |
| 6 | Mini RTU for Small Hydro Electric Power Stations | 0.682 | 2017-18 | 2018-19 | 75 | 0.5115 |
| 7 | PDH Equipments | 2.31 | 2017-18 | 2018-19 | 75 | 1.7325 |
| 8 | Power Quality Analyser for Kannur & Kalamassery | 0.1055 | 2017-18 | 2018-19 | 75 | 0.079125 |
| 9 | SLM for SOCs (Kannur, T'puram and Klsy) | 0.3452 | 2017-18 | 2018-19 | 75 | 0.2589 |
| 10 | OFC (ADSS) etc -Sholayar and Poringal | 1.124 | 2017-18 | 2018-19 | 75 | 0.843 |
| 11 | Dam Level Monitoring System 7 locations | 0.5 | 2017-18 | 2018-19 | 75 | 0.375 |
| 12 | Digital ProtCoupler & PLCC – K'Kulam Sch & 3 SS | 1.035 | 2017-18 | 2018-19 | 75 | 0.77625 |
| 13 | ADMS for 322 Substations - PSDF Scheme. | 7.14 | 2017-18 | 2019-20 | 50 | 5.355 |
| 14 | T'puram PET SD - CB timing Kit | 0.114 | 2017-18 | 2018-19 | 75 | 0.0855 |
| 15 | Edappon Relay Sub Dvn - 3ph relay test kit | 0.4015 | 2017-18 | 2018-19 | 75 | 0.301125 |
| 16 | Kalamassery SLDC building Lift replacement | 0.1834 | 2017-18 | 2018-19 | 75 | 0.13755 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | Edappon Com Sb Dvn - 2nos of O4LC card | 0.0104858 | 2017-18 | 2018-19 | 75 | 0.007864 |
| 18 | Kannur SOC Purchase of 6 DCDB Panel | 0.04 | 2017-18 | 2018-19 | 75 | 0.03 |
| 19 | Purchase of Battery 48V,100Ah/200Ah | 0.125 | 2017-18 | 2018-19 | 75 | 0.09375 |
| 20 | Purchase of Battery 48V,50A | 0.1155 | 2017-18 | 2018-19 | 75 | 0.086625 |

## Annexure-T2

## DETAILS OF NEW CAPITAL WORKS – TRANSMISSION SUBSTATIONS AND LINES

(Details of new projects proposed to be commissioned during the 4 year block from 2018-19 to 2021-22)

| | | | | | |
|---|---|---|---|---|---|
| | Name of the Transmission Project (Substation/lines) | | | Palakkad Medical College 66 kV Substation and line Up-gradation | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 8 km | |
| 4 | Type of Project(System strengthening/evacuation) - | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 2.3 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 21.78 | |
| 7 | Cost benefit analysis/IRR | | | 5.4% | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in house establishment cost (Employee cost, A&G expense etc) | | | Rs 23.1 Cr | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | Nil | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 23.1 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned (Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on (Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 25 % | 75% | |
| | Financial Target | -- | 4 | 19.1 | |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in house employees (including workmen)(nos) | | | | |
| | (b) Monthly salary and other benefits of the in house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | 110 kV GIS Project Vennakkara | |
| 2 | Capacity (MVA) | | | 2X20 MVA , 1x16 MVA | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System Strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | NA | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 42.8 | |
| 7 | Cost benefit analysis/IRR(%)) | | | NA | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 44.6 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Not started | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 44.6 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 22 % | 80% | -- |
| | Financial Target | -- | 5 | 39.6 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.2 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **220KV Substation Kottayi** | |
| 2 | Capacity (MVA) | | | 2X100MVA & 2x12.5MVA | |
| 3 | Length of Transmission line (Ckt-km) | | | 25 km | |
| 4 | Type of Project(System strengthening/evacuation) | | | System Strengthening | |
| 5 | Likely energy savings/benefits(MU)(Brief description also may be provided) | | | 7.5 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 62.32 | |
| 7 | Cost benefit analysis/IRR(%) | | | 17.6% | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 66 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | Not yet started | |
| | (a) Physical - in (%) & | | | | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 66 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 50 % | 50% | -- |
| | Financial Target | -- | 30.5 | 35 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Palakkad- Malampuzha 110kV Line | |
| 2 | Capacity (MVA) | | | NA | |
| 3 | Length of Transmission line (Ckt-km) | | | 36 | |
| 4 | Type of Project(System strengthening/evacuation) - | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 1.25 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 16.24 | |
| 7 | Cost benefit analysis/IRR(%) | | | 15.4% | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 14.38 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 5 | |
| | (b) Financial (Rs Cr) | | | 0.38 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 95 | |
| | (b) Financial (Rs Cr) | | | 14.0 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 30% | 70% | -- |
| | Financial Target | -- | 4.38 | 10 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | 110kV Substation Pattambi | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 6 | |
| 4 | Type of Project(System strengthening/evacuation) - | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 6.1 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 24.26 | |
| 7 | Cost benefit analysis/IRR(%) | | | 12.8 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in house establishment cost(Employee cost, A&G expense etc) | | | 25.5 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | - | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 25.5 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 20% | 80% | -- |
| | Financial Target | -- | 5 | 20.5 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | Name of the Transmission Project(Substation/lines) | | | Mannuthy 110 kV GIS Project | |
|---|---|---|---|---|---|
| 2 | Capacity (MVA) | | | 2x20 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.3 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 24.53 | |
| 7 | Cost benefit analysis/IRR(%) | | | 10.4 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 26.33 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | Not started | |
| | (a) Physical - in (%) & | | | | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 26.33 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 30% | 70% | -- |
| | Financial Target | -- | 6.3 | 20 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **Upgradation of Pudukkad to Kattoor 66kV SC Line to 110kV DC Line** | |
| 2 | Capacity (MVA) | | | NA | |
| 3 | Length of Transmission line (Ckt-km) | | | 26 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.7 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 12.31 | |
| 7 | Cost benefit analysis/IRR(%) | | | 1 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 13.91 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | - | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 13.91 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 10% | 50% | 40% |
| | Financial Target | -- | 1 | 7 | 5.91 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.00 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Conversion of Ollur Viyyur feeder to 110 kV | | |
| 2 | Capacity (MVA) | | | | | |
| 3 | Length of Transmission line (Ckt-km) | | | 21.4 | | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | | |
| 5 | Likely energy savings/benefits(MU) | | | 1.9 | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 15.12 | | |
| 7 | Cost benefit analysis/IRR(%) | | | 6.3 | | |
| 8 | Project Cost as per contract | | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 16.72 | | |
| 10 | Date of commencement | | | 2018-19 | | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | | |
| 13 | Present status of the project at the beginning of the year | | | Not started | | |
| | (a) Physical - in (%) & | | | | | |
| | (b) Financial (Rs Cr) | | | | | |
| 14 | Balance work at the beginning of the year | | | | | |
| | (a) Physical - in (%) & | | | 100 | | |
| | (b) Financial (Rs Cr) | | | 16.72 | | |
| 15 | Details of Source of finance | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | |
| | (c) Other source of finance (own investment, grant etc) | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | |
| | Year | 2017-18* | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| | Physical Target | SS : 4/ 20%, TL : 0 /100% | TL : 10 | 70% | 40 | |
| | Financial Target | 2.57 / 5 | 0.72 | 20 | 7 | |
| 17 | Details of the Project Management Team | | | | | |
| | (a) Total in-house employees (including workmen(nos) | | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.05 | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | | |

** Achievement / Target shown*

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 66kV Substation Ettumanoor to 110kV | |
| 2 | Capacity (MVA) | | | 2x20 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 3.5 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 18.23 | |
| 7 | Cost benefit analysis/IRR(%) | | | 30.9 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 20.8 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2018-19 | |
| 12 | Target date of completion (as per revised schedule) | | | 2018-19 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 5 | |
| | (b) Financial (Rs Cr) | | | 1.8 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 95 | |
| | (b) Financial (Rs Cr) | | | 19.0 | |
| 15 | Details of Source of finance | | | Board's fund | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | 0.02 /0.1 | 40% | 60% | -- |
| | Financial Target | 0.215/0.3571 | 8 | 12.8 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Up gradation of 66kV Substation, Kuravilangadu and Koothattukulam-Kuravilangadu to 110kV. | |
| 2 | Capacity (MVA) | | | 2 X 12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 26.2 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 20.9 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 19.8 | |
| 7 | Cost benefit analysis/IRR(%) | | | 8.1 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 21.65 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | Not started | |
| | (a) Physical - in (%) & | | | | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 21.65 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | SS-27/50%<br>TL-0/50% | 25% | 75% |
| | Financial Target | -- | 4.82 | 6.65 | 15 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Up gradation of 66kV Substation Koothattukulam to 110 kV | |
| 2 | Capacity (MVA) | | | 2X12.5 and 1X40 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 20.9 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 13.27 | |
| 7 | Cost benefit analysis/IRR(%) | | | 8.1 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 15.01 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 10 | |
| | (b) Financial (Rs Cr) | | | 1 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 90% | |
| | (b) Financial (Rs Cr) | | | 14.01 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 40% | 60% | -- |
| | Financial Target | -- | 6 | 9.01 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 66KV Kothamangalam-Koothattukulam Feeder to 110 KV | |
| 2 | Capacity (MVA) | | | Nil | |
| 3 | Length of Transmission line (Ckt-km) | | | 37 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 20.9 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 13.58 | |
| 7 | Cost benefit analysis/IRR(%) | | | 8.1 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 14.67 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 14.67 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 25% | 75% | -- |
| | Financial Target | -- | 4.67 | 10 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees (including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.00 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 66kV SC Pala-Ettumanoor feeder s to 110kV | |
| 2 | Capacity (MVA) | | | Nil | |
| 3 | Length of Transmission line (Ckt-km) | | | 32.4 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 5.9 | |
| 6 | Project Cost including IDC as per DPR(Rs Cr ) | | | 14.55 | |
| 7 | Cost benefit analysis/IRR(%) | | | 14.1 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 15.55 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | Work not started | |
| | (a) Physical - in (%) & | | | | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 15.55 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 20% | 80% | -- |
| | Financial Target | -- | 3 | 10 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 66kV Pallom-Ettumanoor feeder and associated substations to 110kV | |
| 2 | Capacity (MVA) | | | 4X20 | |
| 3 | Length of Transmission line (Ckt-km) | | | 37.16 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 3.4 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr )\ | | | 65.84 | |
| 7 | Cost benefit analysis/IRR(%) | | | 7.6 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 69.54 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | Not started | |
| | (a) Physical - in (%) & | | | | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 69.54 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100%loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 15% | 50% | 35% |
| | Financial Target | -- | 9 | 35 | 25.54 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 15 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Construction of 110kV substation Vazhoor | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 1.62 | |
| 6 | Project Cost including IDC as per DPR(Rs Cr ) | | | 12.3 | |
| 7 | Cost benefit analysis/IRR(%) | | | 5.9 | |
| 8 | Project Cost as per contract | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost (Employee cost, A&G expense etc) | | | 14.04 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 14.04 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 10 | 50 | 40 |
| | Financial Target | -- | 1 | 8 | 5.4 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | 7 | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 0.25 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | Upgradation of 66kV Substation Anchal to 110kV and Upgradation of 66kV SC Edamon –Anchal-Ayur line to 110kV DC | | | |
| 2 | Capacity (MVA) | | | | x12.5 | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | 42 ckt-km | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 3.81MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 42.66 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR < 1% | | | |
| 8 | Project Cost as per contract | | | | | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 44.66 | | | |
| 10 | Date of commencement | | | | 2018 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2019-20 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2019-20 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | Work started. | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 42.66 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on ..... (Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2018-19** | | | | **Target for the year 2019-20** | | | |
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount |
| | Substation and line | 70% | 29.86 | 70% | Substation and line | 30% | 12.8 | 30% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 9.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Up gradation of 66kV Substation, Karunagappally and 66kV SC Sasthamcotta-Karunagapally line to 110kV DC | |
| 2 | Capacity (MVA) | | | 2x20 | |
| 3 | Length of Transmission line (Ckt-km) | | | 29 ckt-km | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 11.6MU | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 18.2 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR-6.7% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 20.5 | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | Substation work started. | |
| | (a) Physical - in (%) & | | | 0 | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 18.2 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 70% | 30% | -- |
| | Financial Target | -- | 12.74 | 5.46 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10.00 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| 1 | **Name of the Transmission Project(Substation/lines)** | | | | **110kV Substation, Chithara** | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | Capacity (MVA) | | | | 2x12.5 | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | LILO | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 5.48MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 12.27 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR-7.5% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 14.0 | | | |
| 10 | Date of commencement | | | | 2018 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2019-20 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2019-20 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 18.2 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2018-19** | | | | **Target for the year 2019-20** | | | |
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount |
| | | 30% | 3.68 | 30% | | 70% | 8.59 | 70% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Interlinking 110kV GIS Substation, Kollam and 110kV Kottiyam Substation | |
| 2 | Capacity (MVA) | | | -- | |
| 3 | Length of Transmission line (Ckt-km) | | | 11km of 110kV UG cable | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 4.55MU | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 63.23 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR-4.2% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 65 | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 0 | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 63.23 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own invest, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 25% | 75% | -- |
| | Financial Target | -- | 4.67 | 10 | -- |

| | **Target for the year 2018-19** | | | | **Target for the year 2019-20** | | | |
|---|---|---|---|---|---|---|---|---|
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount |
| | | 20% | 12.65 | 20% | | 80% | 50.58 | 80% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of in-house employees (at present scale)(Rs Lakh) | | | | 9.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | Up gradation of 66kV Substation Kuttanadu 110kV | | | |
| 2 | Capacity (MVA) | | | | 2x12.5 | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | LILO (10 ckt-km) | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 2.99MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 15.16 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR-22.0% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 17.0 | | | |
| 10 | Date of commencement | | | | 2019 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2020-21 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2020-21 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 15.16 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2019-20** | | | | **Target for the year 2020-21** | | | |
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount |
| | | 50% | 7.58 | 50% | | 50% | 7.58 | 50% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | Up gradation of 66kV PUNNAPRA-ALAPPUZHA DC Feeder to 110KV | | | |
| 2 | Capacity (MVA) | | | | -- | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | 8.9km 66kV DC to 110kV DC | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 7.95MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 17.54 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR-18.02% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 19.50 | | | |
| 10 | Date of commencement | | | | 2019 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2020-21 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2020-21 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 17.54 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2019-20** | | | | **Target for the year 2020-21** | | | |
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount |
| | | 50% | 8.77 | 50% | | 50% | 8.77 | 50% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Construction of new 110kV DC line from Kayamkulam to Karunagapally | |
| 2 | Capacity (MVA) | | | ---- | |
| 3 | Length of Transmission line (Ckt-km) | | | 36 ckt km | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 3.99 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 43.65 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 0.1% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 46.50 | |
| 10 | Date of commencement | | | 2019 | |
| 11 | Target date of completion as per the original schedule | | | 2021-22 | |
| 12 | Target date of completion (as per revised schedule) | | | 2021-22 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 43.65 | |
| 15 | Details of Source of finance | | | 100% loan | |
| | (a) Loan sanctioned(Rs Cr) | | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
| | Physical Target | -- | 35 | 35 | 30 |
| | Financial Target | -- | 15.3 | 13.3 | 13.05 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1, Sub Engineer(Electrical)- 2 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.75 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | 110kV GIS substation at Kowdiar, Thiruvananthapuram. | | | |
| 2 | Capacity (MVA) | | | | -- | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | 5.5km UG cable | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 2.3MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 34.93 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR-8.0% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 35.75 | | | |
| 10 | Date of commencement | | | | 2019 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2019-20 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2019-20 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 34.93 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2019-20** | | | | | | | |
| | Physical target | | Financial target(Rs Cr) | | | | | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | | | | |
| | | 100% | 34.93 | 100% | | | | |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | Upgradation of 66kV Substation Palode to 110kV | | | |
| 2 | Capacity (MVA) | | | | 2x12.5 | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | 19.2 ckt-km | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 6.23MU | | | |
| 6 | Project Cost including IDC as per DPR(Rs Cr ) | | | | 18.45 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR-8.1% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 19.75 | | | |
| 10 | Date of commencement | | | | 2019 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2019-20 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2019-20 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 18.45 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2019-20** | | | | | | | |
| | Physical target | | Financial target(Rs Cr) | | | | | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | | | | |
| | | 100% | 18.45 | 100% | | | | |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.0 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | | 110kV Switching Cum Substation at PANTHALACODE | | | |
| 2 | Capacity (MVA) | | | | 2x12.5MVA | | | |
| 3 | Length of Transmission line (Ckt-km) | | | | The proposed site is below the existing lines | | | |
| 4 | Type of Project(System strengthening/evacuation) | | | | System strengthening | | | |
| 5 | Likely energy savings/benefits(MU) | | | | 4.98MU | | | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | | 25.16 | | | |
| 7 | Cost benefit analysis/IRR(%) | | | | IRR < 1% | | | |
| 8 | Project Cost as per contract | | | | To be awarded | | | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | | 27.00 | | | |
| 10 | Date of commencement | | | | 2019 | | | |
| 11 | Target date of completion as per the original schedule | | | | 2020-21 | | | |
| 12 | Target date of completion (as per revised schedule) | | | | 2020-21 | | | |
| 13 | Present status of the project at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 0 | | | |
| | (b) Financial (Rs Cr) | | | | 0 | | | |
| 14 | Balance work at the beginning of the year | | | | | | | |
| | (a) Physical - in (%) & | | | | 100% | | | |
| | (b) Financial (Rs Cr) | | | | 25.16 | | | |
| 15 | Details of Source of finance | | | | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | | 100% loan | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | | | | |
| 16 | Physical and financial target proposed for the year | | | | | | | |
| | **Target for the year 2019-20** | | | | **Target for the year 2020-21** | | | |
| | Physical target | | Financial target(Rs Cr) | | Physical target | | Financial target(Rs Cr) | |
| | Works target | (%) of total work | Amount(Rs Cr) | (%) of total amount | Works target | (%) of total work | Amount (Rs Cr) | (%) of total amount |
| | | 50% | 12.58 | 50% | | 50% | 12.58 | 50% |
| 17 | Details of the Project Management Team | | | | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1, Sub Engineer(Electrical)- 1 No, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1, Workmen-2No, Driver-1No | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | | 10.00 | | | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | | 0.5 | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Up gradation of 66 kV TVT No. I & II feeders | |
| 2 | Capacity (MVA) | | | 3x12.5, 2x12.5, 2x12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 65.4 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 1.85 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 60.03 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 3.6% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 64.00 | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 60.03 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 30 | 50 | 20 |
| | Financial Target | -- | 18 | 30 | 12.3 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-3Nos, Sub Engineer(Electrical)-4Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-6Nos, Driver-1No] | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 13.85 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.8 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Renovation and modernisation 110kV GIS Substation, Malappuram | |
| 2 | Capacity (MVA) | | | Nil | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | NA | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 62.02 | |
| 7 | Cost benefit analysis/IRR(%) | | | NA | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 63.916 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 62.02 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 2 | 50 | 48 |
| | Financial Target | -- | 2.02 | 30 | 30 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | 66kV Substation, Ambalavayal and 66kV DC line from 66kV Kaniyambetta-Sulthanbathery feeder in 110kV Parameters | |
| 2 | Capacity (MVA) | | | 2X10 MVA | |
| 3 | Length of Transmission line (Ckt-km) | | | 10 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.22 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 13.49 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR- 3.7% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 15.242 | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 13.49 | |
| 15 | Details of Source of finance | | | 100% loan | |
| | (a) Loan sanctioned(Rs Cr) | | | | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 50 | 50 | -- |
| | Financial Target | -- | 5 | 8.49 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | 9Nos [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.05 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines | | | 110kV Substation, Chemperi and line | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 19.4 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.15 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 27.77 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR 5.9% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 29.966 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 27.77 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 50 | 50 | |
| | Financial Target | -- | 14 | 13.77 | |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2Nos, Sub Engineer(Electrical)-3Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 8.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **Upgradation of Kunnamangalam _ Thamarasserry line to 110kV** | |
| 2 | Capacity (MVA) | | | NA | |
| 3 | Length of Transmission line (Ckt-km) | | | 17.7 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.61 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 18.06 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 10.4% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 20.016 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 18.06 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan sanctioned | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 30 | 70 | -- |
| | Financial Target | -- | 8.06 | 10 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **Upgradation of Kuthumunda to 110kV GIS** | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | ----- | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 33.98 | |
| 7 | Cost benefit analysis/IRR(%) | | | 10.3% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house | | | 35.876 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 5 | 95 | -- |
| | Financial Target | -- | 3.98 | 30 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| 1 | **Name of the Transmission Project(Substation/lines)** | | | **Upgradation of Mankada S/s to 110kV** | |
|---|---|---|---|---|---|
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 30 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 1.61 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 14.65 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 10.3% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 15.748 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 14.65 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 10 | 90 | -- |
| | Financial Target | -- | 4.65 | 10 | -- |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2Nos, Sub Engineer(Electrical)-3Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 8.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 66kV Substation, Mankavu to 110kV | |
| 2 | Capacity (MVA) | | | 2x20 | |
| 3 | Length of Transmission line (Ckt-km) | | | - | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.62 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 13.56 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 12.5% | |
| 8 | Project Cost as per contract | | | 13.56 | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 14.436 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | - | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100% | |
| | (b) Financial (Rs Cr) | | | 13.56 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 50 | 50 | - |
| | Financial Target | -- | 5.56 | 8 | - |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No] | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.05 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **Upgradation of 110kV SC/DC line to 220/110kV MC MV line from Mylatty s/s to Vidyanagar** | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | 23.706km 110kV<br>23.706km 220kV | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 6.6 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 29.43 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 1.1% | |
| 8 | Project Cost as per contract | | | 29.43 | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 31.95 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 29.43 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 75 | 25 | - |
| | Financial Target | -- | 20 | 9.43 | - |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | 11Nos [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2Nos, Sub Engineer(Electrical)-3Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 10 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| 1 | **Name of the Transmission Project(Substation/lines)** | | | **110kV Substation, Pulikkal** | |
|---|---|---|---|---|---|
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | ---- | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 14.68 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR < 1% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 16.636 | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target dat of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 14.68 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 5 | 95 | |
| | Financial Target | -- | 1.68 | 13 | |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **110kV Substation, Seethangoli** | |
| 2 | Capacity (MVA) | | | 2X12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 3.5 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 11.59 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 29.0 % | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 13.342 | |
| 10 | Date of commencement | | | 201 8 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 11.59 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 20 | 80 | - |
| | Financial Target | -- | 4.59 | 7 | - |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.05 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Linking between 110kV Kanhangad – Cheruvathur feeder to 220kV S/s Ambalathara | |
| 2 | Capacity (MVA) | | | 2x100MVA 220/110kV | |
| 3 | Length of Transmission line (Ckt-km) | | | 12 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | ------ | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 36.06 | |
| 7 | Cost benefit analysis/IRR(%) | | | 0.1% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 37.956 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2018-19 | |
| 12 | Target date of completion (as per revised schedule) | | | 2018-19 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 36.06 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 100 | - | - |
| | Financial Target | -- | 136.06 | - | - |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-1Nos, Sub Engineer(Electrical)-2Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | Name of the Transmission Project(Substation/lines) | | | Upgradation of 33 kV Substation Thambalamanna to 110 kV & 110 kV Agasthiamuzhi -Thambalamanna (S/c, UG cable) | |
| 2 | Capacity (MVA) | | | 2X16 | |
| 3 | Length of Transmission line (Ckt-km | | | 12 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 1.28 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 38.02 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 0.5% | |
| 8 | Project Cost as per contract | | | 38.02 | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 39.8995Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2019-20 | |
| 12 | Target date of completion (as per revised schedule) | | | 2019-20 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 38.02 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 80 | 20 | - |
| | Financial Target | -- | 18.02 | 20 | - |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | 11Nos [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2Nos, Sub Engineer(Electrical)-3Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 8.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.3 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **LILO on 110kV Edarikode- Tirur to Parappanangadi S/s** | |
| 2 | Capacity (MVA) | | | NA | |
| 3 | Length of Transmission line (Ckt-km | | | 32 | |
| 4 | Type of Project(System strengthening/evacuation) | | | System strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 0.33 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 14.96 | |
| 7 | Cost benefit analysis/IRR(%) | | | IRR – 13.64% | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 17.156 Cr | |
| 10 | Date of commencement | | | 2018 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | 0 | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 14.96 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 5 | 70 | 25 |
| | Financial Target | -- | 1.96 | 10 | 3 |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | 11Nos [Assistant Executive Engineer-1No, Assistant Engineer(Electrical)-2Nos, Sub Engineer(Electrical)-3Nos, Assistant Engineer(Civil)-1No, Sub Engineer(Civil)-1No, Workmen-2Nos, Driver-1No | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 8.65 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.5 | |

| | | | | | |
|---|---|---|---|---|---|
| **1** | **Name of the Transmission Project(Substation/lines)** | | | **Construction of 110kV GIS Substation , Vengaloor** | |
| 2 | Capacity (MVA) | | | 2 X 12.5 | |
| 3 | Length of Transmission line (Ckt-km) | | | Nil | |
| 4 | Type of Project(System strengthening/evacuation) | | | System Strengthening | |
| 5 | Likely energy savings/benefits(MU) | | | 11.77 | |
| 6 | Project Cost including IDC as per DPR (Rs Cr ) | | | 46.39 | |
| 7 | Cost benefit analysis/IRR(%) | | | 7.1 % | |
| 8 | Project Cost as per contract | | | To be awarded | |
| 9 | Expected cost of completion including IDC and in-house establishment cost(Employee cost, A&G expense etc) | | | 48.13 | |
| 10 | Date of commencement | | | 2018-19 | |
| 11 | Target date of completion as per the original schedule | | | 2020-21 | |
| 12 | Target date of completion (as per revised schedule) | | | 2020-21 | |
| 13 | Present status of the project at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | Work not started | |
| | (b) Financial (Rs Cr) | | | - | |
| 14 | Balance work at the beginning of the year | | | | |
| | (a) Physical - in (%) & | | | 100 | |
| | (b) Financial (Rs Cr) | | | 46.39 | |
| 15 | Details of Source of finance | | | | |
| | (a) Loan sanctioned(Rs Cr) | | | 100% loan | |
| | (b) Loan availed as on .....(Rs Cr) | | | | |
| | (c) Other source of finance (own investment, Govt grant etc) | | | | |
| 16 | Physical and financial target proposed for the year | | | | |
| | Year | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
| | Physical Target | -- | 10 | 30 | |
| | Financial Target | -- | 2 | 19.48 | |
| 17 | Details of the Project Management Team | | | | |
| | (a) Total in-house employees(including workmen(nos) | | | | |
| | (b) Monthly salary and other benefits of the in-house employees (at present scale)(Rs Lakh) | | | 7.0 | |
| | (c) Other establishment cost(monthly)(Rs Lakh) | | | 0.25 | |

# CHAPTER 3

# CAPITAL INVESTMENT PLAN OF SBU - DISTRIBUTION

The petitioner, Kerala State Electricity Board Limited (KSEBL), is an integrated State Public Sector Power Utility in the State of Kerala, performing the three functions of Electricity Generation, Transmission, and Distribution through three Strategic Business Units (SBUs). The Distribution Strategic Business Unit (SBU D) performs the function of the distribution of electricity across the entire State except in few pocket areas where other distribution licensees operate. The DBU supplies electricity nearly 99% of the consumers in the State.

This is an application for approval of proposed Capital investment Plan for the Distribution Strategic Business Unit for the control period 2018-19 to 2021-22 under Section181(zp) of the Electricity Act 2003, read with Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff), 2018.

Kerala State Electricity Board Limited (henceforth referred to as "KSEBL" or "Petitioner") is submitting its proposed Investment Plan Petition for the control period 2018-19 to 2021-22.

The distribution network in the State has been developed over a period of several decades. The petitioner has taken earnest efforts in expediting the network and providing supply to all consumers in the State. In 2017, the petitioner completed the mission and achieve 100% electrification of households in the State. Thus at present the distribution network has reached everywhere in the State except for a few pockets because of non-accessibility and forest clearance issues. Now the distribution network consists of the following elements as detailed below:

**Table 1 -Distribution Network**

| No | Components | Quantity |
|---|---|---|
| 1 | 33 KV lines in km | 1943 |
| 2 | 11 KV lines& 22 KV lines in km | 60892 |
| 3 | LT lines in km | 286784 |
| 4 | Distribution Transformers | 77724 |
| 5 | Energy sales in MU | 20880.70 |

This Utility supplies power to 1.22 Cr of consumers in the State.

The consumption of the State has been increasing at a CAGR of 7.4% from FY2004-05 to FY2015-16. However during the last 2 years (2015-16 to 2017-18) the rate has reduced to 3.95%. This could be caused by several reasons such as completion of total electrification of

households, penetration of energy efficient LED bulbs, roof top solar generation by consumers etc. It is anticipated that the rate would be continued in the coming years also. The network has to be augmented to cater the future demand.

Because of the evenly spread habitation pattern in Kerala, unlike in other States, the length of LT lines are substantially high in our State. The ratio of HT to LT line is 1:4.75 at present. This is a major factor that contributes to technical losses in the network. However the losses in the system has been continuously reduced owing to the earnest and sustained effort taken by the Petitioner during the last two decades. The losses in the transmission and distribution system are at present 13.07% which is among the lowest in the country.

A major portion of the Distribution network in the State except in the cities are radial in topology. This configuration distributes power from a substation in a radial fashion without sufficient feedback facility, which causes reliability issues. Sufficient network redundancy could not be built in the system; because of insufficient capital investment caused by poor financial status of the Utility. Therefore the reliability of the network has been poor. There is frequent supply interruption which is also caused by the interference due to falling of trees and branches especially during monsoon season. This has also caused relatively high electrical accidents rates in the State. The following table provides indicative figure in respect of network reliability.

**Table 2 – Indicative Comparison of Interruptions (2015-16)**

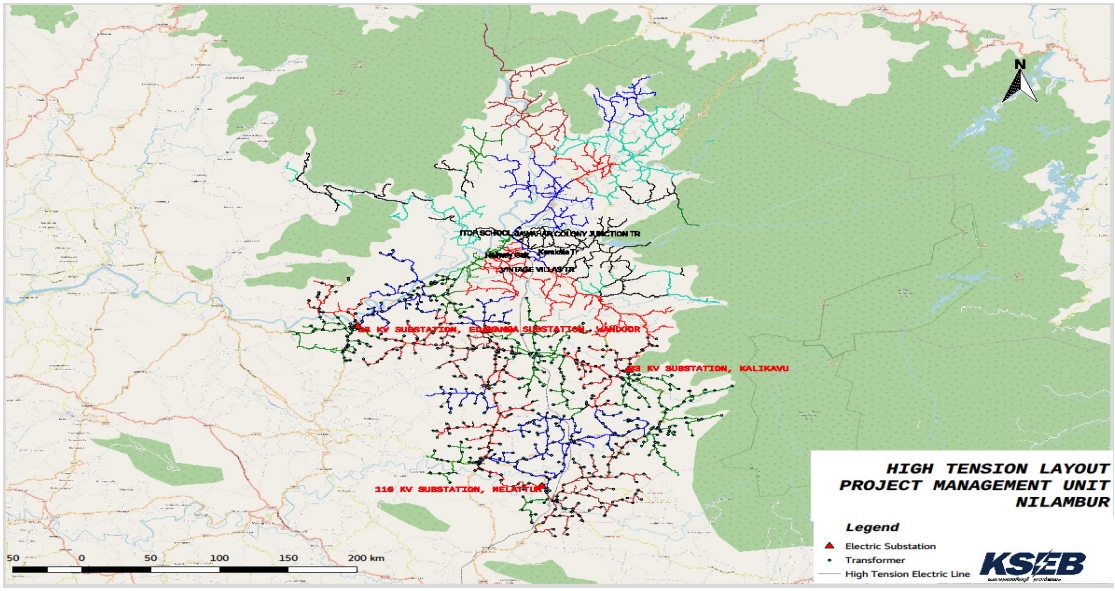
| No. | Particulars | Yearly interruption (minutes) | Interruptions per year(nos.) |
|---|---|---|---|
| 1. | Major cities ( world) | 52 | 0.9 |
| 2. | In India(Major cities) | 1697 | 95 |
| 3. | In Kerala (Major Towns) | 4686 | 307 |

## Normal Development Dhyuthi – 2021

A comprehensive plan for improving the Distribution system is necessary to improve quality and reliability supply.The other objective of the investment plan were further reducing AT&C losses further, enhancing safety and smooth integration of decentralised renewable energy. The Petitioner,thus constituted a special team called project management unit (PMU) in all 25 Electrical Distribution Circle, by pooling Engineers with experience, assigned the task for preparation of a detailed plan and project at the Circle level for augmenting the distribution network called **"Dhyuthi – 2021".** The objectives of the planning exercise was to (a) Enhance reliability and quality of the power supplied, (b) Improve distribution efficiency by reducing losses, (c) Ensure safe installations, (d) ensure that the State remain totally electrified in the plan period, (e) ensure hassle free integration of renewable sources.

Under the guidance of PMU, the Petioner's field staff surveyed and recorded the location, length and type of all existing HT distribution elements (Transformer, HT line poles, AB Switches etc.) using a mobile application developed for the purpose.

An open sourced, android platform based mobile software called 'Geo data collect' developed by a society formed by Govt of Kerala named 'integrated centre for free and open source software'(ICFOSS), customized to suit KSEBL requirement. The entire 60,000kms of High tension lines were surveyed and mapped with about 15 lakhs network features. The data, thus gathered, was used to create the entire 11kV network of the Kerala Distribution network using Java Open Street Map Editor (JOSM). A sample network map thus developed is given below.




The data and geographical map of network for each Circle was used there to find the optimal remedy for mitigating the present difficulties and supporting future requirements. A four year horizon period (2018-2022) was chosen for the planning purpose. The steps involved in the planning process is given in the diagram below.


The high tension (HT) network was first divided into Power Zones and Sub Zones. Power zone consists of a HT feeder emanating from a substation, its branches, tap lines, subrings along the route leading to another substation or to dead-end transformer station. Each zone is further

divided into sub zones, for detailed planning. Interruption statistics indicate that breakdown of a single LT lines generally affects 24 consumers whereas power interruption on HT lines affect 4900 consumers on an average. Thus the reliability of supply and HT lines is very important.

The network was analysed from Geo referenced map in detail to identify the load centers, feeding arrangements with load in each feeder under normal and extreme feeding conditions, to identify failure prone segments etc. Centralized Customer Care reports and data from complaint register, OMS data / R-APDRP Part A reports, HT interruption data, Substation Data and feedback from section staff were widely used for this.

Subsequently possible alternate solutions were identified that satisfy planning objective and criteria. For ensuring 100% redundancy, ie HT lines Ring Main Systems with at least two separate sources of supply (Substations) were considered. Constructing distribution lines with insulated or covered conductors, fault detectors, Sectionalisers are also suggested wherever it was inevitable. The lines are to be constructed and maintained as per standards. Multiple HT overhead lines on same poles were avoided as far as possible.

To reduce system loss, re-conductoring with optimal alternatives, HVDS, dismantling of redundant lines, installation of Capacitor Banks and proper earthing at Transformer and pole locations together with standardization of lines were considered. Facilities to measure and monitor system reliability and loss indices are given special attention in the plan. DTR meters and Border meters with AMR facility for ring fencing at Electrical Division were ensured in the plan. Focus to improve Safety, Standardization of lines and structures to meet requirements under statutory regulations, replacement of damaged conductors &structures, elimination of AAC & Copper conductors and ensuring AB switches in all DTRs etc. were also done in the planning process. Unutilized lines will be dismantled and all other lines including rarely used ones will be maintained properly. Special attention will be given to minimize lines drawn cross country, along coastal area and in thickly vegetated area. Accordingly, nearly one Lakh works were identified across the State, some of them having benefits to multiple Sections and some with intra Section benefits.

Formulating and selecting the optional work among several alternatives, the following criteria were considered.

I. Licensee’s obligation to supply electricity on request.
II. Obligations to maintain reliability Indices as per SOP
III. Least cost work
IV. Return on Investment.

On analysing the identified works, substantial capital investment will be required to achieve the set goals, especially for improving reliability & safety and for containing the technical losses.

However, considering the limitation in resources, tentative financial limits (as given in**Annexure II**) were set to each Project area namely Electrical Circles under Distribution SBU. Available information on status of existing distribution network, extent of area and other geographical peculiarities etc. and works proposed under Centrally Aided Projects like IPDS & DDUGJY were given due considerations while setting the tentative financial limits. The above mentioned limits were excluding the cost of replacement of faulty meters in the system.

An inhouse developed software called 'PROMOS' originally designed for monitoring progress of Central Aided Projects was remodeled for preparing the DPR of this plan. It was used to capture tangible benefits of technical loss reduction, additional sales by improved reliability etc. These data was used in analysis of the financial benefits like IRR, pay back etc. along with the Supply Chain Management (SCM) software for the purpose.

There would also be certain tangible feedback such as reduction in R&M expenses because of the project. These benefits are difficult to be estimated and are not considered in financial analysis. Similarly intangible benefits like customer satisfaction and loyalty which are subjective in nature, are also not considered.

Detailed project reports were prepared for Project area of each PMU (i.e. Electrical Circle). Six copies of DPR in respect to all PMUs are enclosed separately**.** The general structure of all DPR are the same but differ only in

a. Features and particulars of projects proposed pertaining to that project area
b. Case studies covering problem statement, detailed analysis of the problem, various options considered & criteria for selection of optimal solution, benefits of the project, financial analysis and JOSM image of the network elements
c. Detailed financial analysis of the projects

A task wise consolidation of works for each Financial Year is appended as **Annexure V.** The taskwise consolidation of works reveal significant departure from previous plan period, with focus shifting to network reliability, loss reduction and safety. New and innovative works like installation of fault detectors, SCADA, HVDS etc. extensive deployment of switching devices to improve operational flexibility of network, extensive use of Insulated or Covered conductors, significantly higher HT:LT ratio in proposed works, extensive deployment of standard earthing for existing network elements, standardisation of transformer structures, lines, extensive replacement of worn out and old bare conductors etc. finds place in the project evolved by all the PMUs. A consolidated list of task wise details of work planned is given in the table below.

| Table 3 - Task wise Consolidation of works | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | **Master Group** | **unit** | **FY-19** | **FY-20** | **FY-21** | **FY-22** | **Total** |
| 1 | Construction - HT line | km | 1978 | 3279 | 2786 | 1893 | 9936 |
| 2 | Construction - LT line | km | 1139 | 1822 | 1527 | 1096 | 5583 |
| 3 | Construction - DTR | No | 974 | 1100 | 987 | 680 | 3741 |
| 4 | Replacement - DTR | No | 312 | 373 | 400 | 336 | 1421 |
| 5 | Construction - FPI | km | 4827 | 5820 | 3409 | 2202 | 16258 |
| 6 | Construction - Switches | No | 10531 | 8016 | 4836 | 3135 | 26518 |
| 7 | Conversion - HT OH to ABC | km | 269 | 691 | 635 | 398 | 1993 |
| 8 | Conversion - 1 Ph to 3 Ph OH | No | 2852 | 4250 | 3551 | 2582 | 13236 |
| 9 | Reconductoring - HT line | km | 1586 | 2838 | 2750 | 1693 | 8868 |
| 10 | Reconductoring - LT line | km | 30107 | 51283 | 47693 | 31239 | 160321 |
| 11 | Standardization– HT& LT line | km | 145 | 1443 | 1412 | 1063 | 4862 |
| 12 | Standardization - Structures | No | 24036 | 39138 | 33046 | 33399 | 129619 |
| 13 | Metering - Boarder Meter | No | 685 | 77 | 62 | 56 | 880 |
| 14 | Metering - DTR Meter | No | 4662 | 4505 | 2887 | 2386 | 14440 |
| 15 | Metering - Faulty Meter Changing | No | 715446 | 653227 | 565231 | 500478 | 2434382 |
| 16 | Shifting DTR | No | 208 | 168 | 137 | 74 | 587 |
| 17 | Shifting HT& LT line | km | 65 | 88 | 115 | 51 | 321 |
| 18 | Earthing | No | 99204 | 150586 | 132539 | 102060 | 484389 |
| 19 | Dismantling - Lines | km | 226 | 274 | 234 | 267 | 1000 |
| 20 | Dismantling - DTR/ Structure | No | 19 | 3 | 7 | 1 | 30 |

The detailed Circle wise split up of normal development work and faulty meter replacement of capital investment plan, Dhyuthi – 2021for each Financial Year for the control period is appended as **Annexure III and IV**

## Cost Benefit Analysis

The overall goals envisaged from the project include enhancing reliability of the power supplied, reducing the AT&C losses and also ensuring supply on demand. The goal wise consolidation is given in table below:

| Table 4 – Goal wise consolidation of works -PMU Total | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2018-19 | | 2019-20 | | 2020-21 | | 2021-22 | | **Total** | |
| No | Goals | works | Cost (Rs Cr) | works | Cost (Rs Cr) | works | Cost (Rs Cr) | works | Cost (Rs Cr) | **works** | **Cost (Rs Cr)** |
| 1 | Reliability | 3200 | 139.55 | 3763 | 231.6 | 3617 | 210.01 | 2707 | 149.88 | **13287** | **731.07** |
| 2 | Loss Reduction | 2451 | 73.10 | 2570 | 88.0 | 2219 | 72.22 | 1933 | 62.26 | **9173** | **295.62** |
| 3 | Safety | 2252 | 57.86 | 2637 | 78.5 | 2534 | 73.12 | 2039 | 55.38 | **9462** | **264.84** |
| 4 | Connecting RE Sources | 22 | 2.75 | 21 | 1.3 | 36 | 1.17 | 12 | 0.41 | **91** | **5.61** |
| 5 | Total Electrification | 21 | 3.47 | 24 | 1.3 | 15 | 0.57 | 22 | 3.94 | **82** | **9.31** |
| 6 | Multiple goals | 12461 | 506.31 | 16822 | 859.5 | 15635 | 751.00 | 11664 | 495.55 | **56582** | **2612.33** |
| | **Total** | **20407** | **783.03** | **25837** | **1260.2** | **24056** | **1108.09** | **18377** | **767.42** | **88677** | **3918.77** |

## Methodology for Calculation of IRR

The IRR of each project is calculated by considering the factors like total cost of the project, benefit of the project.

**Total cost of the project**: It is assumed that the entire project cost is spend at the end of the Financial Year. For calculating project cost, the material cost, labour & transportation (including contractor's profit) and supervision charges are taken as per methodology approved by KSERC.

1. Material cost: For calculating project cost, the materials which have KSERC approved cost, the same is taken and for other materials, the weighted average purchase cost of the particular material (during the past 12 months) is taken. In addition to the above, the cost of materials, proposed to be used for standardisation and which has not been purchased by KSEB in the recent past, is derived through market enquiry.
2. Labour & Transportation charges: The labour & transportation charges is generally taken from the Uniform Labour Data. In cases where the approved rates are not available, man hour requirement was assessed based on field study and labour rates as per DSR is considered.

**Benefit of the project.** It is assumed that the benefit is uniform throughout the life of the project, starting from the financial year next to the one in which project is completed. In normal case the life of the project is assumed as 25 years. Benefit from the following aspects only are considered for calculation of IRR.

1. **Savings due to reduction in technical loss ($I^2R$ loss):** $I^2R$ loss in the entire system (HT network, Distribution Transformer & LT network) before and after the modification is considered. For arriving technical loss in feeders, the Voltage level, Conductor type & Specification (e.g. ACSR Rabbit, AAAC 7/3.15 etc), Conductor length & Peak Load in the feeder as obtained from site inspection data were considered. In the case of transformers, condition of the transformer (whether repaired / with star rating / without star rating etc), capacity and peak load is considered. To calculate the average load, load factor is applied, which is calculated taking in to account the loss load factor. As per standard practice, Loss Load Factor (LLF) for feeder is taken as $(0.8xLF^2+0.2xLF)$ where LF is the load factor. For simplicity, the Load Factor in urban feeder is 0.7 and that in rural feeder is 0.5. LLF for transformer is taken as $(0.7xLF^2+0.3xLF)$. The savings in energy (in kWh) is first calculated, which is subsequently converted to money value considering the average realisation in the

particular Section. For this the demand raised and unit sold to HT & LT consumers in that particular Section during 2017 is considered. If a project benefits only HT consumers or only LT consumers, the average realisation from that sector alone is considered.

2. **Additional sale due to improved reliability:** Many projects will considerably improve the reliability of the system. This in turn will enable KSEBL to provide uninterrupted supply to consumers which in turn increases the energy consumption. The impact is assessed based on previous experience of field officers and considering different aspects such as number of consumers benefitted (HT & LT separately), average energy consumption for the section during 2017, type of HT system like availability of HT back feeding, bare OH multi circuit line, availability of functional DTR ABs etc, and type of LT system in the present and post modification scenarios. The reliability of different components in the system is calculated based on above factors is attached as **Annexure VII.** Probable additional energy consumption in kWH is first calculated considering possibility of deferred consumption and this is later converted to money equivalent considering the average realisation for the section during 2017 and average power purchase cost.

The IRR of each work is calculated based on the factors noted above. One of the work, shifting transformer to load centre from MG College to Vyasa Nagar near IAS academy, proposed under Electrical Section, Kesavadasapuram is taken as case study. The steps for calculating IRR incorporating the above factors is attached as **Annexure VIII**

All capital Investments covered under a project management unit (Electrical Circle) is grouped together as a scheme and cost benefit analysis is conducted accordingly. The Circle wise total outlay, Annual savings, Yearly financial gain and IRR are given in the table below.

**Table 5 - Abstract of Cost Benefit Analysis of Dhyuthi 2021**

| No. | Electrical Circle | Total Outlay Rs. Cr. | Annual Savings MU | Yearly Financial Gain (Rs Cr) | IRR% |
|---|---|---|---|---|---|
| 1 | Thiruvananthapuram | 170.08 | 57.20 | 28.34 | 12.69 |
| 2 | Kattakada | 149.81 | 53.00 | 22.69 | 10.94 |
| 3 | Kollam | 139.66 | 44.52 | 22.38 | 11.96 |
| 4 | Kottarakara | 132.01 | 50.45 | 22.21 | 12.88 |
| 5 | Pathnamthitta | 166.26 | 70.81 | 33.91 | 16.81 |
| 6 | Kottayam | 154.06 | 56.55 | 28.79 | 14.96 |
| 7 | Pala | 91.32 | 36.60 | 18.03 | 16.11 |
| 8 | Alappuzha | 125.58 | 48.18 | 21.28 | 13.02 |

| | | | | | |
|---|---|---|---|---|---|
| 9 | Harippad | 93.00 | 30.67 | 13.36 | 10.00 |
| 10 | Ernakulam | 195.94 | 58.77 | 31.42 | 11.97 |
| 11 | Perumbavoor | 218.37 | 71.08 | 37.58 | 13.31 |
| 12 | Irinjalakuda | 165.00 | 69.66 | 30.88 | 14.99 |
| 13 | Thrissur | 209.38 | 70.49 | 34.28 | 12.36 |
| 14 | Thodupuzha | 149.00 | 38.97 | 18.74 | 7.78 |
| 15 | Palakkad | 185.88 | 85.88 | 34.51 | 14.82 |
| 16 | Shornur | 140.05 | 66.86 | 28.53 | 16.79 |
| 17 | Manjeri | 112.00 | 71.54 | 33.91 | 27.07 |
| 18 | Nilambur | 78.97 | 34.03 | 14.79 | 15.01 |
| 19 | Tirur | 190.19 | 56.00 | 27.02 | 9.82 |
| 20 | Kalpetta | 106.11 | 50.32 | 22.65 | 17.83 |
| 21 | Kozhikode | 174.98 | 69.20 | 31.04 | 13.91 |
| 22 | Vadakara | 113.86 | 45.90 | 19.50 | 13.22 |
| 23 | Kannur | 140.15 | 60.69 | 30.12 | 17.98 |
| 24 | Sreekandapuram | 152.96 | 47.17 | 19.27 | 7.80 |
| 25 | Kasaragode | 180.07 | 68.25 | 28.89 | 11.99 |
| | **Total** | **3734.68** | **1412.81** | **654.12** | |

About 1412 MU energy savings is expected annually on completion of Dhyuthi 2021 and the excepted yearly financial gain is **Rs. 654.12 Cr.** Detailed financial analysis for each project area are available in the respective DPRs and the circle wise abstract is enclosed as **Annexure VI.**

The details of the project as in the prescribed format as specified by the Honourable Commission is attached as format.

A year wise summary of the capital investment plan, Dhyuthi – 2021 for the control period is given below.

**Table 6- Capital Investment Plan (Summary ) of Dyuthi (Rs. Cr.)**

| Financial Year | Normal development | Faulty Meter Replacement | Continued Electrification | Special Projects | Total |
|---|---|---|---|---|---|
| 2018-19 | 723.64 | 60.00 | 5.00 | 5.00 | **793.64** |
| 2019-20 | 1221.06 | 54.49 | 20.00 | 20.00 | **1315.64** |
| 2020-21 | 1066.65 | 47.61 | 20.00 | 20.00 | **1154.26** |
| 2021-22 | 720.68 | 42.18 | 5.00 | 5.00 | **772.86** |
| **Total** | **3732.03** | **204.27** | **50.00** | **50.00** | **4036.30** |

In addition to the normal Development under Dyuthi, the petitioner has to undertake and complete the ongoing Centrally Aided projects for system strengthening and IT initiatives works in a time bound matter. Also the other funded works such as Consumer contribution works and MP, MLA, Local body funded works has to be carried out on priority basis. A tentative outlay was proposed for the other funded works for the financial year 2018-19 and a one percent increase for every coming years of the rest of the control period is estimated.

## CENTRALLY AIDED WORKS- SYSTEM STRENGTHENING WORKS

## DDUGJY WORKS- ONGOING

In addition to normal Dyuthi works the following quantum of work is proposed to be completed under DDUGJY during 2018-19.

**Table 7 : Works proposed to carry out through DDUGJY (2018-19)**

| No | Particulars | Physical quantity |
|---|---|---|
| 1 | Service connections (No:s) | 7492 |
| 2 | Construction of 11kV lines(ckt km) including 11kV UG cable | 742 |
| 3 | Construction of LT lines(ckt km) | 624 |
| 4 | Installation of distribution transformers (Nos) | 184 |
| 5 | Enhancement of distribution transformers (Nos) | 35 |
| 6 | Faulty meters replacement -Electronic (Nos) | 791141 |
| 7 | LT Reconductoring (ckt. km) | 324 |
| 8 | HT Reconductoring ckt. km) | 179 |

## IPDS WORKS- ONGOING

**Table 8 : Works proposed to carry out through IPDS (2018-19)**

| No | Particulars | Physical |
|---|---|---|
| 1 | Construction of 11kV lines(ckt km) and UG cables | 458.179 |
| 2 | Construction of LT lines(ckt km) | 200.392 |
| 3 | LT Augmentation/Reconductoring -(km) | 2046.193 |
| 4 | Installation of distribution transformers (No:s) | 809 |
| 5 | Enhancement of distribution transformers (No:s) | 382 |
| 6 | Faulty meters replacement -Electronic (No:s) | 344882 |
| 7 | HT Reconductoring (ckt km) | 148.63 |

## OTHER FUNDED WORKS- CONSUMER CONTRIBUTION, MP, MLA etc..

**Table 9: Other Funded Works proposed (2018-19)**

| No | Particulars | Physical |
|---|---|---|
| 1 | Construction HT Line in Ckm | 182 |
| 2 | Construction LT line in Ckm | 3303 |
| 3 | Construction / Replacement DTR in Nos. | 373 |
| 4 | Conversion HT line/ Lt line | 402 |
| 5 | New Service Connection | 291517 |

## Safety Plan

The main objective of safety wing in KSEB Ltd is to maintain a persistent and systematic safety culture in the organization by reducing the accidents to zero level. The major activities of safety wing are briefed hereunder,

- With a view to minimize the accidents from Board's installations, the slogan "ZERO ACCIDENT YEAR – 2018" was implemented and this slogan has helped in strengthening the message of "Safety First" in the minds of all field staff of KSEB Ltd.

- The present practice of using earthing chain for work site earthing is proved to be ineffective and it was decided to implement equipotential bonding and grounding method by using earth discharge rods / earth discharge rods with shorting clamps, to avoid chain earthing at worksite in KSEB Ltd.

- Accidents due to falling from height while working in overhead Electric lines were increasing recently and to curb such accidents, it is decided to ensure the usage of full body safety belt in all Electrical sections.

- Many training programs on First aid, usage of Personal Protective Equipments and Safety awareness classes to Board Staff and Contract Workers in Division/ Subdivision level were conducted as per CEA safety Regulations 2011. Conducted on-job training to all staff in shift duty and maintenance wing in Substations and Generating stations as per CEA safety Regulations 2011.

- First week of May every year is observed as 'Electrical Safety Week' and various activities are being conducted during "Safety Week" for increasing the awareness on Electrical safety. KSEB Ltd has accorded sanction to observe May 2018 as "Safety Month" for increasing the safety awareness of Board staff, contract workers and Public with a view to reduce the accidents. Awareness activities by including mass rallies, Street dramas, art forms like Oottan Thullal, distribution of leaflets/posters etc and training programs for public, contract workers and Board employees were conducted during May 2018 to reduce the number of electrical accidents.

### New Initiatives in safety wing

KSEBL has decided to issue safety kit to all line staff in Electrical section offices and Executive Engineers in Electrical Divisions were authorized to issue safety kit containing 14 safety equipments in carry bag to all linemen in distribution wing.

The following proposals from Safety wing is under active consideration for implementation for the current control period. The capital outlay for safety plan is as shown in table below:

**Table 10 : Capital Outlay for Safety Plan**

| No | Particulars | Amount ( Rs in Cr.) | | | | |
|---|---|---|---|---|---|---|
| | | 18-19 | 2019-20 | 2020-21 | 2021-22 | Total |
| 1 | Providing safety kit to line staff | 15 | 5 | 5 | 3 | 28 |
| 2 | Aerial lift for SBU-D | 2 | 12 | 12 | 13 | 39 |
| 3 | Safety Equipment SBU-T | 1 | 2.5 | 3 | 2.5 | 9 |
| | Total | 18 | 19.5 | 20 | 18.5 | 76 |

The major proposals for improving the safety culture of employees and adopting new technologies for reducing the number of accidents from KSEB Ltd installations are listed below,

**1. Providing safety kit to all line staff in Distribution wing:** It was decided to issue a safety kit containing 14 safety equipments such as gloves, helmet, Safety belt, safety shoes, rain coat, jacket, L.T tester, L.T Earth rod etc to every lineman in distribution wing by accounting it through HRIS. The objective is to ensure the usage of personal protective equipments as per CEA Safety regulation 2010, Regulation 19 by all line staff in Electrical section offices. The safety kit is proposed for all line staff in Electrical section offices and around 14,000 numbers of kits will be required and the expenditure is estimated as Rs. 20,000/- per kit and the total financial commitment will be Rs 28 Cr for 4 year period.

**2. Procurement of vehicle with aerial lift in Electrical section offices :** The number of accidents due to falling from height while working in overhead Electric lines was increasing recently and one of the reasons is the practice of climbing manually using ladders on poles for maintenance works. Road transport authorities have issued notice against transporting ladder on top of department jeep, due to road safety violation. Hence, it is not possible to transport ladders on top of department jeep and KSEB Ltd is forced to find an alternate method for climbing on posts. Modern technologies for working in overhead lines by using aerial lifts shall be adopted for ensuring safety of line staff while carrying out maintenance works in overhead electric lines. The proposal is for mounting aerial lift in pick up Auto rickshaw and the anticipated expenditure is Rupees Five Lakhs per unit and the total financial commitment for implementing this proposal in 771 Electrical sections of KSEB Ltd will be Rs 39 Cr for 4 year period.

**3. Procurement of modern safety equipments for Transmission wing :** Many fire accidents have occurred in KSEB Ltd Substations recently and it is noted that proper fire detection and prevention system is required in all major substations to prevent huge financial loss and long interruptions due to fire accidents. Modern fire detection and prevention systems are being adopted by all major power sector utilities and it shall be adopted in KSEB Ltd Substations as well.

Also, modern equipments for accurate measurement of earth resistance are to be procured for ascertaining earth resistance values correctly and to take remedial actions for improving the earth resistance of substations and Transmission lines. Anticipated expenditure for implementing these proposals is Rs 9 Cr for 4 year period.

# IT Plan

## Initiative in information Technology -IT Wing

KSEB Ltd is in the process of transforming in to a fully automated Power Utility for becoming one of the model Utilities in India. Completing the process of building up a solid IT infrastructure which includes Data Centre, Data Receiving Centre, Wide Area Network connecting all offices etc. along with necessary Software Applications for the core functional areas of the Utility is the primary objective. As part of the above, the following activities are being carried out.

1. Software development, testing, implementation and maintenance related to the automation of various functional areas.
2. Setting up and maintaining IT infrastructure including Enterprise class Servers, Storage, Backup Units, LAN/WAN, Network Security devices etc.
3. Assessing hardware requirements, providing technical specifications and conducting technical evaluations for procurement for various offices
4. Providing complete technical support for running and up keeping of IT Systems for around 1200 field offices which contains nearly 15000 desktops and other peripherals
5. Arranging IT based training for KSEB employees.
6. Implementation of various IT and SCADA Projects under RAPDRP scheme.

## Major IT Projects implemented in KSEBL

The primary focus of computerization activities is given to the automation of core functional areas of the Organization. Thus considerable achievements in the automation of billing of LT & HT/EHT consumers, Corporate Accounting, Supply Chain Management, Human Resource Management etc were attained. The major projects carried out are noted in the table below:

**Table 11 : Major IT Projects**

| No | Projects | Application |
|---|---|---|
| 1 | ORUMA | LT Billing Application Software |
| 2 | ORUMANET | Centralised LT Billing Application software- |
| 3 | ORUMA WEB | Online Portal for LT Consumers |
| 4 | HRIS | Human Resource Management System |
| 5 | Energize | HT/EHT Billing System |
| 6 | SARAS | ARU Accounting System |
| 7 | SCM | Supply Chain Management System |
| 8 | RAPDRP | IT infrastructure (Data Centre, WAN etc) for 43 towns |

The details of the project implemented are described as **Annexure1**

In addition to the above, the following IT related projects was also envisaged with financial support under Central Aided Schemes and own fund. Capital Investment Plan of IT - under Distribution SBU for the control period is also submitted as under for approval.

## CENTRALLY AIDED NEW – IT PROJECTS

The following new IPDS projects are envisaged under Centrally aided Scheme:

### IPDS – Real Time Data Acquisition System (RT-DAS) for Non-SCADA Towns

The objective of this scheme is to implement Feeder Remote Terminal Units (FRTUs) and Real Time Data Acquisition System in the substations within the Non-SCADA towns for the automated measurement of SAIDI/SAIFI (Reliability Indices) to assess the reliability of power As per the direction of PFC, a DPR amounting to Rs.5.25 Crore was prepared with an estimated cost of Rs.2.75 Lakhs per substation having 5 or lesser number of feeders and Rs. 3 Lakhs per substation having 5 or more number of feeders for setting up FRTU and Rs. 1.5 Cr for setting up RT-DAS at Data center. Approval of the DPR is awaited.

### IPDS-Phase 2 : Incremental IT for 21 Towns/municipalities.

The project is for IT enabling of 21 Towns / municipalities as Phase II for facilitating Energy Audit. The work includes supply and installation of additional hardware in the towns (such as router, switches, PC, printer etc), GPS based GIS survey of assets, data migration and project management. The project also covers preparation of Feeder and Town wise consumer database / bill book and linking with existing GIS Application, so that Feeder wise AT&C loss and Town wise AT&C loss can be calculated. An amount of Rs 22.86 Cr for 21 towns has been approved. About 60 % of the project cost (ie Rs 13.72 Cr) would be GOI grant. The project was sanctioned on 20.02.2017 and to be completed within 30 months.

### IPDS-ERP Implementation

The Enterprise Resource Planning implementation under IPDS covers the area of Human Resource Management, Financial Accounting and Supply Chain Management system. M/s. KPMG Advisory Service Private Limited was appointed as the Project Management Agency (PMA) to conduct an As-Is-Study and Gap-Analysis of business processes & work flow applications. The approved amount of the project **Rs. 42.64 Cr.** GoI Grant would be Rs. 25.58 Crores (60% of the Project Cost). The project was sanctioned on 07.02.2018 and expected to be completed within 30 months from date of sanction.

## IPDS-Smart Meter Implementation

The objectives of this scheme is to convert Energy meters of **(a)***all consumers* under Electrical Section, Kesavadasapuram to smart meters at a project cost Rs 19.5251 Cr (approval awaited) and **(b)** another 3,21,800 energy meters with per month consumption more than 230 units from all categories for UDAY participating states. M/s KPMG Advisory Service Private Limited has been appointed as Project Management Agency. The Approved Amount of the project is Rs. 64.36 Cr (for 3,21,800 nodes) with 60% GoI Grant amounting to Rs. 38.62 Cr. The project was sanctioned on 28.03.2018 and to be commissioned by 30 months from date of sanction.

## Smart Grid Kochi

The Scope of Work and proposed features of implementation of Smart Grid in Kochi Smart City covering five electrical sections includes the following:

| | | | |
|---|---|---|---|
| I. | AMI (Approx One Lakh Nos) | II. | EV Charging Stations. |
| III. | Peak Load Management. | IV. | Estimated cost:- Rs 103.35 Cr |
| V. | Distribution Trans Monitoring (240) | VI. | Approved cost: Rs 90.87 |
| VII. | Facilitate Distr Gen (Roof top PV). | VIII. | GoI Grant:- 30% |
| IX. | Energy Storage Systems (500 kWh x 2nos). | X. | Project to be completed in 18 months |

## CYBER SECURITY-OWN FUND

The request for Proposal for Appointment of Consultant for Cyber Security Assessment, Preparation of Cyber Security Policy & Security audit for KSEBL is in progress. Rfp floated and tender opened on 15-09-2018. PQ evaluation is in progress. Estimated cost is Rs. 50 Lakhs. Project implementation is planned for the control period 2018-19.

## CENTRALLY AIDED NEW – ONGOING IT PROJECTS

## R – APDRP (Part A) Scheme- Status of implementation

Government of India sanctioned R-APDRP scheme during 2010, which focuses on actual demonstrable performance in terms of sustained loss reduction. In Kerala, 43 schemes were sanctioned under Part A and B. The total outlay for Part A schemes comes to Rs.214.32 Crore towards IT and Rs 83.15 Cr towards SCADA scheme

**Part-A of R-APDRP – IT:** This scheme includes works related for IT enabling of 43 Town schemes for installation of Data Centre, Customer Care Centre and related applications for facilitating Energy Audit, IT based consumer indexing GIS mapping etc. with 100 % grant. The details of projects are given below.

- Total Project Cost Sanctioned by PFC : Rs. 214.38 Cr
- IT Implementing Agency : M/s. KEPCO KDN
- LoA for IT Implementation issued on : 07.11.2012
- Date of Completion of Implementation : 31st March 2018
- Financial Closure : 30th April 2018
- Estimated Project cost at completion : Rs 175.23 Cr
- Amount Received so far from PFC : Rs. 141.23Cr.
- TPIEA verification by PGCIL completed and reports submitted to PFC.

The project stand closed and financial closure is submitted. Release of balance tranche Rs 34.03 Cr is pending from PFC for which letter already issued to Nodal Officer, PFC. Physical Status of the same is attached as **Annexure. 4.1**

**PART A of R-APDRP- SCADA (Ongoing Project):** This scheme envisages the advanced distribution automation, loss reduction and reliability improvement in three cities of Trivandrum, Kochi & Kozhikode. For this scheme, 100 % grant is provided by Government of India. The details of project are as follows:

- Implementation Agency : M/s Schneider Electric India Pvt. Ltd.
- Total Project cost as Approved by PFC : Rs. 83.15Cr
- Awarded cost to Schneider Electric (SIA) : Rs. 56.7Cr
- Target date of Completion :30.09.2018
- **Status:** Control Centre Equipments installed at Trivandrum, Ernakulam & Kozhikode and DR Centre have been installed & is operational. Substation RTU installation & LDMS integration works completed. End to end test of 96% substations with control room completed (48/50). Erection works of 96% FRTUs (2750/2865), integration of 78% FRTUs (2225/2865) with RMUs are also completed. FRTU end to end testing is just commenced (16/2865). Tender floated for GIS – SCADA integration interface adaptor in CIM XML format using a middleware solution.
- Financial Progress: Out of Rs 27.915 Cr Grant received, Rs. 22 Cr is already spent. An amount of Rs. 17 Cr each will be required for FY 2018-19 and FY 2019-20.

| Table 12 : Capital Outlay for IT under SBU - DISTRIBUTION | | | | | | |
|---|---|---|---|---|---|---|
| **No.** | **Particulars** | **FY-19** | **FY-20** | **FY-21** | **FY - 22** | **Total for the Control Period** |
| | **IT Related works** | | | | | |
| 1 | IPDS- Phase II Incr IT | 7 | 11 | 4.86 | 0 | 22.86 |
| 2 | IPDS--ERP | 4 | 26 | 12.64 | 0 | 42.64 |
| 3 | IPDS-Smart Metering -Kesevadasapuram | 19.525 | 0 | 0 | 0 | 19.525 |
| 4 | IPDS-Smart metering- UDAY | 19 | 32 | 13.36 | 0 | 64.36 |
| 5 | Smart Grid | 0 | 20 | 40 | 43.4 | 103.4 |
| 6 | RT-DAS | 1 | 3 | 1.25 | 0 | 5.25 |
| 7 | Cyber security | 0.5 | 0 | 0 | 0 | 0.5 |
| | **Sub Total** | **51.025** | **92** | **72.11** | **43** | **258.135** |

| Table 13 : Capital Investment Plan for Approval (Summary ) in (Rs. Cr.) | | | | | | |
|---|---|---|---|---|---|---|
| **No.** | **Particulars** | **18-19** | **19-20** | **20-21** | **21-22** | **Total** |
| A | Dhyuthi *(New Capital works)* | 793.64 | 1315.64 | 1154.26 | 772.86 | 4036.3 |
| B | Other Funded Works- Contribution, MLA Fund | 199.7 | 201.69 | 203.71 | 205.74 | 810.84 |
| C | IT projects *(New Capital works)* | 51.025 | 92 | 72.11 | 43 | 258.135 |
| D | Safety (*New Capital works)* | 18 | 19.5 | 20 | 18.5 | 76 |
| | **Total Distribution** | **1062.365** | **1628.83** | **1450.08** | **1040.1** | **5181.275** |

Therefore KSEBL humbly request Hon Commission that the above Capital Investment Plan for SBU- Distribution be approved.

| Annexure I (A) : Distribution Projects - proposed during the year 2018-19 | | | | |
|---|---|---|---|---|
| No | Particulars | Normal Category under Dyuthi | | |
| | | Unit | Physical | Financial (Rs. Lakhs) |
| 1 | Construction - HT line | km | 1978 | 17670.14 |
| 2 | Construction - LT line | km | 1139 | 6720.09 |
| 3 | Construction - DTR | No | 974 | 3526.83 |
| 4 | Replacement - DTR | No | 312 | 664.89 |
| 5 | Construction - FPI | No | 4827 | 579.24 |
| 6 | Construction - Switches | No | 10531 | 4927.92 |
| 7 | Conversion - HT line | km | 269 | 3979.31 |
| 8 | Conversion - LT line | km | 2852 | 7952.20 |
| 9 | Reconductoring - HT line | km | 1586 | 1283.60 |
| 10 | Reconductoring - LT line | km | 30107 | 12916.32 |
| 11 | Standardisation - HT line | km | 945 | 1649.81 |
| 12 | Standardisation - Other Structures | No | 24036 | 3849.55 |
| 13 | Metering - Border Meter | No | 685 | 377.96 |
| 14 | Metering - DTR Meter | No | 4662 | 460.16 |
| 15 | Faulty Meter Changing | No | 715446 | 5999.90 |
| 16 | Shifting DTR | No | 208 | 150.63 |
| 17 | Shifting lines | km | 65 | 181.16 |
| 18 | Earthing | No | 99204 | 1045.86 |
| 19 | Dismantling - Lines | km | 226 | 178.16 |
| 20 | Dismantling - DTR/ Structure | No | 19 | 1.23 |
| 21 | Other works | | | 4248.74 |
| | **Total** | | | **78363.69** |
| | | | | **Rs.783.63 Cr.** |

| Annexure I (B) : Distribution Projects - proposed during the year 2019-20 | | | | |
|---|---|---|---|---|
| No | Particulars | Unit | Normal Category under Dyuthi | |
| | | | Physical | Financial (Rs. Lakhs) |
| 1 | Construction - HT line | km | 3279 | 32063.25 |
| 2 | Construction - LT line | km | 1822 | 11927.17 |
| 3 | Construction - DTR | No | 1100 | 3924.26 |
| 4 | Replacement - DTR | No | 373 | 793.23 |
| 5 | Construction - FPI | No | 5820 | 698.40 |
| 6 | Construction - Switches | No | 8016 | 5493.79 |
| 7 | Conversion - HT line | km | 691 | 10230.14 |
| 8 | Conversion - LT line | km | 4250 | 11990.28 |
| 9 | Reconductoring - HT line | km | 2838 | 2296.24 |
| 10 | Reconductoring - LT line | km | 51283 | 21976.04 |
| 11 | Standardisation - HT line | km | 1443 | 2552.97 |
| 12 | Standardisation - Other Structures | No | 39138 | 7251.93 |
| 13 | Metering - Border Meter | No | 77 | 42.49 |
| 14 | Metering - DTR Meter | No | 4505 | 444.78 |
| 15 | Faulty Meter Changing | No | 653227 | 5448.85 |
| 16 | Shifting DTR | No | 168 | 122.81 |
| 17 | Shifting lines | km | 88 | 249.75 |
| 18 | Earthing | No | 150586 | 1554.94 |
| 19 | Dismantling - Lines | km | 274 | 216.14 |
| 20 | Dismantling - DTR/ Structure | No | 3 | 0.14 |
| 21 | Other works | | | 8277.03 |
| | **Total** | | | **127554.62** |
| | | | | **Rs.1275.54 Cr.** |

| Annexure I (C) : Distribution Projects - proposed during the year 2020-21 | | | | |
|---|---|---|---|---|
| No: | Particulars | | Normal Category under Dyuthi | |
| | | Unit | Physical | Financial (Rs.Lakhs) |
| 1 | Construction - HT line | km | 2786 | 25707.21 |
| 2 | Construction - LT line | km | 1527 | 9849.86 |
| 3 | Construction - DTR | No | 987 | 3454.07 |
| 4 | Replacement - DTR | No | 400 | 841.94 |
| 5 | Construction - FPI | No | 3409 | 409.08 |
| 6 | Construction - Switches | No | 4836 | 4539.96 |
| 7 | Conversion - HT line | km | 635 | 9397.33 |
| 8 | Conversion - LT line | km | 3551 | 9991.90 |
| 9 | Reconductoring - HT line | km | 2750 | 2225.13 |
| 10 | Reconductoring - LT line | km | 47693 | 20442.83 |
| 11 | Standardisation - HT line | km | 1412 | 2589.91 |
| 12 | Standardisation - Other Structures | No | 33046 | 8868.34 |
| 13 | Metering - Border Meter | No | 62 | 34.21 |
| 14 | Metering - DTR Meter | No | 2887 | 284.88 |
| 15 | Faulty Meter Changing | No | 565231 | 4761.00 |
| 16 | Shifting DTR | No | 137 | 98.52 |
| 17 | Shifting lines | km | 115 | 324.07 |
| 18 | Earthing | No | 132539 | 1416.29 |
| 19 | Dismantling - Lines | km | 234 | 184.73 |
| 20 | Dismantling - DTR/ Structure | No | 7 | 0.45 |
| 21 | Other works | | | 6004.53 |
| | **Total** | | | **111426.23** |
| | | | | **Rs. 1114.26 Cr.** |

| Annexure I (D) : Distribution Projects - proposed during the year 2021-22 | | | | |
|---|---|---|---|---|
| No | Particulars | | Normal Category under Dyuthi | |
| | | Unit | Physical | Financial (Rs. Lakhs) |
| 1 | Construction - HT line | km | 1893 | 17046.47 |
| 2 | Construction - LT line | km | 1096 | 7019.73 |
| 3 | Construction - DTR | No | 680 | 2431.90 |
| 4 | Replacement - DTR | No | 336 | 713.64 |
| 5 | Construction - FPI | No | 2202 | 264.24 |
| 6 | Construction - Switches | No | 3135 | 2809.29 |
| 7 | Conversion - HT line | km | 398 | 5889.89 |
| 8 | Conversion - LT line | km | 2582 | 7366.00 |
| 9 | Reconductoring - HT line | km | 1693 | 1370.01 |
| 10 | Reconductoring - LT line | km | 31239 | 13392.24 |
| 11 | Standardisation - HT line | km | 1063 | 1714.30 |
| 12 | Standardisation - Other Structures | No | 33399 | 6705.50 |
| 13 | Metering - Border Meter | No | 56 | 30.90 |
| 14 | Metering - DTR Meter | No | 2386 | 235.65 |
| 15 | Faulty Meter Changing | No | 500478 | 4217.53 |
| 16 | Shifting DTR | No | 74 | 52.66 |
| 17 | Shifting lines | km | 53 | 148.31 |
| 18 | Earthing | No | 102060 | 1054.06 |
| 19 | Dismantling - Lines | km | 267 | 211.05 |
| 20 | Dismantling - DTR/ Structure | No | 1 | 0.09 |
| 21 | Other works | | | 3611.99 |
| | **Total** | | | **76285.47** |
| | | | | **Rs. 762.85 Cr.** |

# Annexure II

| Tentative financial limit set for different Project Areas | | | | | | |
|---|---|---|---|---|---|---|
| **No** | **Project Area** | **Tentative Financial Limits (Rs in Lakh)** | | | | |
| | | 2018-19 | 2019-20 | 2020-21 | 2021-22 | **2018-22** |
| 1 | Thiruvananthapuram | 3000 | 4900 | 4500 | 3000 | **15400** |
| 2 | Kattakkada | 2600 | 4300 | 3900 | 2600 | **13400** |
| 3 | Kollam | 1900 | 4400 | 3900 | 2600 | **12800** |
| 4 | Kottarakkara | 2500 | 3900 | 3500 | 2400 | **12300** |
| 5 | Pathanamthitta | 2200 | 4800 | 4300 | 2900 | **14200** |
| 6 | Kottayam | 3600 | 4700 | 4200 | 2800 | **15300** |
| 7 | Pala | 1500 | 2700 | 2500 | 1700 | **8400** |
| 8 | Alappuzha | 2500 | 3600 | 3200 | 2200 | **11500** |
| 9 | Harippad | 1700 | 2800 | 2600 | 1700 | **8800** |
| 10 | Ernakulam | 3000 | 6200 | 5500 | 3700 | **18400** |
| 11 | Perumbavoor | 3100 | 7400 | 6700 | 4500 | **21700** |
| 12 | Thodupuzha | 2900 | 4800 | 4300 | 2900 | **14900** |
| 13 | Thrissur | 5100 | 6300 | 5700 | 3800 | **20900** |
| 14 | Irinjalakkuda | 3200 | 5300 | 4800 | 3200 | **16500** |
| 15 | Palakkad | 3400 | 5800 | 5200 | 3500 | **17900** |
| 16 | Shornur | 3500 | 3900 | 3500 | 2400 | **13300** |
| 17 | Tirur | 4000 | 5400 | 4800 | 3200 | **17400** |
| 18 | Manjeri | 1700 | 3400 | 3100 | 2100 | **10300** |
| 19 | Nilambur | 1600 | 2500 | 2300 | 1500 | **7900** |
| 20 | Kozhikode | 3500 | 4900 | 4500 | 3000 | **15900** |
| 21 | Vadakara | 2000 | 3400 | 3000 | 2000 | **10400** |
| 22 | Kalpetta | 2200 | 3300 | 3000 | 2000 | **10500** |
| 23 | Kannur | 2100 | 4200 | 3800 | 2600 | **12700** |
| 24 | Sreekandapuram | 2600 | 5100 | 4600 | 3100 | **15400** |
| 25 | Kasargode | 3200 | 5500 | 4900 | 3300 | **16900** |
| | **State Total** | **68600** | **113500** | **102300** | **68700** | **353100** |

# Annexure III

| Annexure III : Plan Proposals - Normal Development Works (Rs Cr) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Circle** | **Limit Set** | **2018-19** | **2019-20** | **2020-21** | **2021-22** | **Total** |
| 1 | Thiruvananthapuram | 170.00 | 32.26 | 62.70 | 46.51 | 28.61 | 170.08 |
| 2 | Kattakada | 150.00 | 29.77 | 43.40 | 41.09 | 35.55 | 149.81 |
| 3 | Kollam | 140.00 | 25.31 | 47.81 | 41.72 | 24.82 | 139.66 |
| 4 | Kottarakkara | 132.00 | 24.69 | 40.53 | 38.92 | 27.86 | 132.01 |
| 5 | Pathanamthitta | 165.00 | 28.97 | 50.09 | 46.89 | 40.29 | 166.24 |
| 6 | Kottayam | 154.00 | 36.79 | 46.75 | 42.11 | 28.40 | 154.06 |
| 7 | Pala | 91.00 | 18.14 | 28.99 | 27.32 | 16.56 | 91.01 |
| 8 | Alappuzha | 125.00 | 24.44 | 39.88 | 34.05 | 27.21 | 125.58 |
| 9 | Harippad | 93.00 | 18.42 | 28.48 | 26.84 | 19.26 | 93.00 |
| 10 | Ernakulam | 196.00 | 31.44 | 65.00 | 57.42 | 41.99 | 195.85 |
| 11 | Perumbavoor | 219.00 | 30.42 | 76.63 | 69.29 | 42.04 | 218.37 |
| 12 | Thodupuzha | 149.00 | 29.01 | 47.99 | 43.00 | 29.00 | 149.00 |
| 13 | Thrissur | 209.00 | 50.97 | 62.92 | 56.91 | 38.06 | 208.86 |
| 14 | Irinjalakuda | 165.00 | 25.63 | 65.78 | 49.15 | 24.44 | 165.00 |
| 15 | Palakkad | 191.00 | 35.34 | 59.29 | 55.33 | 35.93 | 185.88 |
| 16 | Shoranur | 140.00 | 32.29 | 46.59 | 38.80 | 22.36 | 140.05 |
| 17 | Tirur | 190.00 | 42.41 | 59.43 | 53.22 | 35.13 | 190.19 |
| 18 | Manjeri | 112.00 | 22.58 | 32.11 | 34.30 | 23.01 | 112.00 |
| 19 | Nilambur | 79.00 | 15.35 | 26.11 | 20.34 | 15.44 | 77.25 |
| 20 | Kozhikode | 175.00 | 38.08 | 54.77 | 48.83 | 33.30 | 174.98 |
| 21 | Vadakara | 114.00 | 21.24 | 44.63 | 29.28 | 18.71 | 113.86 |
| 22 | Kalpetta | 106.00 | 24.24 | 33.53 | 29.64 | 18.70 | 106.11 |
| 23 | Kannur | 140.00 | 26.70 | 47.22 | 42.27 | 23.96 | 140.15 |
| 24 | Sreekandapuram | 153.00 | 26.24 | 54.77 | 42.17 | 29.78 | 152.96 |
| 25 | Kasaragod | 180.00 | 32.92 | 55.65 | 51.24 | 40.27 | 180.07 |
| **State Total** | | **3738.00** | **723.64** | **1221.06** | **1066.65** | **720.68** | **3732.03** |

# Annexure IV

| Annexure IV : Plan Proposals –Replacement of faulty meters (Rs Cr) | | | | | | |
|---|---|---|---|---|---|---|
| **No** | **Circle** | **2018-19** | **2019-20** | **2020-21** | **2021-22** | **Total** |
| 1 | Thiruvananthapuram | 4.06 | 2.43 | 2.19 | 1.43 | 10.11 |
| 2 | Kattakada | 1.47 | 1.51 | 1.33 | 1.34 | 5.64 |
| 3 | Kollam | 2.52 | 1.52 | 1.63 | 1.26 | 6.93 |
| 4 | Kottarakkara | 0.93 | 1.93 | 0.82 | 1.10 | 4.78 |
| 5 | Pathanamthitta | 1.93 | 1.77 | 1.93 | 1.82 | 7.45 |
| 6 | Kottayam | 2.66 | 2.52 | 2.49 | 2.07 | 9.74 |
| 7 | Pala | 2.63 | 1.28 | 1.47 | 0.75 | 6.13 |
| 8 | Alappuzha | 1.82 | 1.11 | 1.04 | 0.53 | 4.50 |
| 9 | Harippad | 2.19 | 0.90 | 0.31 | 0.27 | 3.66 |
| 10 | Ernakulam | 4.87 | 4.75 | 4.69 | 4.43 | 18.75 |
| 11 | Perumbavoor | 1.68 | 2.25 | 1.56 | 1.40 | 6.89 |
| 12 | Thodupuzha | 1.68 | 1.76 | 1.25 | 1.29 | 5.98 |
| 13 | Thrissur | 5.30 | 4.07 | 3.44 | 3.20 | 16.01 |
| 14 | Irinjalakuda | 3.52 | 4.10 | 2.94 | 2.81 | 13.37 |
| 15 | Palakkad | 2.82 | 2.35 | 2.28 | 2.41 | 9.86 |
| 16 | Shoranur | 2.26 | 1.75 | 1.88 | 2.18 | 8.07 |
| 17 | Tirur | 3.03 | 3.01 | 2.35 | 1.57 | 9.95 |
| 18 | Manjeri | 2.08 | 1.83 | 1.53 | 1.20 | 6.65 |
| 19 | Nilambur | 1.99 | 1.55 | 1.21 | 1.07 | 5.82 |
| 20 | Kozhikode | 2.05 | 1.95 | 2.12 | 1.39 | 7.51 |
| 21 | Vadakara | 1.97 | 1.64 | 1.65 | 1.57 | 6.84 |
| 22 | Kalpetta | 1.83 | 1.75 | 1.83 | 1.87 | 7.28 |
| 23 | Kannur | 1.10 | 2.58 | 1.62 | 1.33 | 6.64 |
| 24 | Sreekandapuram | 0.93 | 1.59 | 1.95 | 1.69 | 6.16 |
| 25 | Kasaragod | 2.67 | 2.56 | 2.13 | 2.20 | 9.56 |
| **State Total** | | **60.00** | **54.49** | **47.61** | **42.18** | **204.27** |

| Annexure V : Task wise Consolidation | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gp Code** | **Master Group** | **Unit** | **2018-19** | **2019-20** | **2020-21** | **2021-22** | **Total** |
| 11-1 | Construction - HT line - OH | km | 1539 | 2271 | 2062 | 1449 | 7322 |
| 11-2 | Construction - HT line - ABC | km | 122 | 344 | 257 | 211 | 935 |
| 11-3 | Construction - HT line - CC | No | 31 | 84 | 68 | 43 | 226 |
| 11-4 | Construction - HT line - UG | No | 278 | 575 | 383 | 189 | 1425 |
| 11-5 | Conversion - LT OH to HVDS | km | 8 | 5 | 16 | 1 | 29 |
| **11** | **Construction - HT line** | **km** | **1978** | **3279** | **2786** | **1893** | **9936** |
| 12-1 | Construction - LT Line - OH | km | 747 | 984 | 850 | 622 | 3202 |
| 12-2 | Construction - LT Line - ABC | km | 392 | 837 | 677 | 474 | 2380 |
| 12-4 | Construction - LT Line - UG | No | 0 | 0 | 0 | 0 | 0 |
| **12** | **Construction - LT line** | **km** | **1139** | **1822** | **1527** | **1096** | **5583** |
| 13-1 | Construction - DTR - 15/25 kVA | km | 28 | 62 | 98 | 39 | 227 |
| 13-2 | Construction - DTR - 100 kVA | km | 913 | 1015 | 869 | 629 | 3426 |
| 13-3 | Construction - DTR - 160 kVA | No | 29 | 19 | 16 | 11 | 75 |
| 13-4 | Construction - DTR - 250 kVA | No | 4 | 4 | 4 | 1 | 13 |
| **13** | **Construction - DTR** | **No** | **974** | **1100** | **987** | **680** | **3741** |
| 14-2 | Misc - Replacing DTR - 100 kVA | No | 166 | 191 | 205 | 167 | 729 |
| 14-3 | Misc - Replacing DTR - 160 kVA | No | 112 | 144 | 134 | 112 | 502 |
| 14-4 | Misc - Replacing DTR - 250 kVA | km | 34 | 37 | 56 | 54 | 181 |
| 14-5 | Misc - Replacing DTR - 500 kVA | km | 0 | 1 | 5 | 3 | 9 |
| **14** | **Replacement - DTR** | **No** | **312** | **373** | **400** | **336** | **1421** |
| **15** | **Construction - FPI** | **km** | **4827** | **5820** | **3409** | **2202** | **16258** |
| 16-1 | Construction - Switches - AB S/w | km | 10339 | 7278 | 3879 | 2601 | 24097 |
| 16-2 | Construction - Switches - LB | No | 71 | 241 | 432 | 199 | 943 |
| 16-3 | Construction - Switches - RMU | No | 121 | 497 | 525 | 335 | 1478 |
| **16** | **Construction - Switches** | **No** | **10531** | **8016** | **4836** | **3135** | **26518** |
| **19** | **Construction - Others** | **km** | **87039** | **169570** | **126331** | **74937** | **457878** |
| **21** | **Conversion - HT OH to ABC** | **km** | **269** | **691** | **635** | **398** | **1993** |
| **22** | **Conversion - SP to TP OH** | **No** | **2852** | **4250** | **3551** | **2582** | **13236** |
| *Continued…..* | | | | | | | |

| *……Continued* | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gp Code** | **Master Group** | **UoM** | **2018-19** | **2019-20** | **2020-21** | **2021-22** | **Total** |
| **31** | **Reconductoring - HT line** | **km** | **1586** | **2838** | **2750** | **1693** | **8868** |
| **32** | **Reconductoring - LT line** | **km** | **30107** | **51283** | **47693** | **31239** | **160321** |
| 41-1 | Standardisation - HT line | No | 132 | 230 | 298 | 93 | 753 |
| 41-2 | Standardisation - LT line | No | 813 | 1212 | 1114 | 970 | 4109 |
| **41** | **Standardisation - HT line** | **km** | **945** | **1443** | **1412** | **1063** | **4862** |
| 42-1 | Standardisation - Transformer Station | No | 2714 | 4922 | 5674 | 4576 | 17886 |
| 42-2 | Standardisation - Poles &Structures | No | 21322 | 34216 | 27372 | 28823 | 111733 |
| **42** | **Standardisation(Other Structures)** | **No** | **24036** | **39138** | **33046** | **33399** | **129619** |
| **51** | **Loss Redn - Metering - Boarder Meter** | **km** | **685** | **77** | **62** | **56** | **880** |
| **52** | **Loss Redn - Metering - DTR Meter** | **km** | **4662** | **4505** | **2887** | **2386** | **14440** |
| **53** | **Loss Redn - Meteg - Faulty Meter Chg** | **No** | **715446** | **653227** | **565231** | **500478** | **2434382** |
| **54** | **Loss Reduction - Shifting DTR** | **No** | **208** | **168** | **137** | **74** | **587** |
| 55-1 | Loss Reduction - Shifting HT line | No | 44 | 48 | 65 | 31 | 188 |
| 55-2 | Loss Reduction - Shifting LT line | No | 20 | 40 | 50 | 22 | 132 |
| **55** | **Shifting lines** | **km** | **65** | **88** | **115** | **53** | **321** |
| 56-1 | Loss Reduction - Trfr Earthing | No | 5645 | 7335 | 5568 | 4089 | 22637 |
| 56-2 | Loss Reduction - Pipe Earthing | No | 3748 | 4903 | 6597 | 3702 | 18950 |
| 56-3 | Loss Reduction - Pole Earthing | No | 89811 | 138348 | 120374 | 94269 | 442802 |
| **56** | **Earthing** | **No** | **99204** | **150586** | **132539** | **102060** | **484389** |
| **91** | **Dismantling - Lines** | **km** | **226** | **274** | **234** | **267** | **1000** |
| **92** | **Dismantling - DTR/ Structure** | **No** | **19** | **3** | **7** | **1** | **30** |

## Annexure VI

| Annexure VI (A) : Financial Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Distribution South** | | | | | | | |
| **Particulars** | **Amount in Cr** | | | | | | |
| | T'puram | Kattakada | Kollam | Kottarakara | P'thitta | Kottayam | Pala |
| Annual Savings (Units) due to reduction in technical loss resulted from feeder modification (other than re-conductoring & conversion) | 2.53 | 1.90 | 1.11 | 2.35 | 1.50 | 2.46 | 1.39 |
| Annual Savings (Units) due to reduction in technical loss resulted from Transformer modification / re-arrangement | 0.05 | 0.10 | 0.02 | 0.05 | 0.01 | 0.13 | 0.01 |
| Annual Savings (Units) ) due to reduction in technical loss resulted from re-conductoring alone | 1.88 | 2.00 | 2.03 | 1.46 | 1.80 | 1.26 | 0.47 |
| Annual Savings (Units) due to reduction in technical loss resulted from conversion of Single Phase lines to Three Phase | 1.27 | 1.31 | 1.30 | 1.18 | 3.77 | 1.80 | 1.77 |
| Annual reduction in technical loss (savings in Units) | 5.72 | 5.30 | 4.45 | 5.04 | 7.08 | 5.65 | 3.65 |
| Expected additional sales (Units) due to increased reliability | 0.84 | 1.33 | 3.44 | 0.93 | 3.86 | 4.25 | 3.01 |
| Financial Gain (in Rs) due to reduction of technical loss | 27.23 | 22.05 | 19.87 | 21.77 | 31.51 | 24.55 | 16.03 |
| Financial Gain (in Rs) due to additional sales resulted from increased reliability | 1.11 | 0.65 | 2.50 | 0.45 | 2.39 | 4.24 | 1.94 |
| Total Yearly Financial gain (Rs) | 28.34 | 22.69 | 22.38 | 22.21 | 33.90 | 28.79 | 17.98 |
| Total investment (Rs) | 170.08 | 149.81 | 139.66 | 132.01 | 166.24 | 154.06 | 91.01 |
| Internal rate of Return of the Project | 12.69% | 10.94% | 11.96% | 12.88% | 16.81% | 14.96% | 16.12% |

| Annexure VI (B) : Financial Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|
| Distribution Central | | | | | | | |
| Particulars | Amount in Cr | | | | | | |
| | Alappuzha | Harippad | Ernakulum | Perumbavoor | Thodupuzha | Irinjalakuda | Thrissur |
| Annual Savings (Units) due to reduction in technical loss resulted from feeder modification (other than re-conductoring & conversion) | 2.69 | 0.23 | 3.34 | 2.33 | 1.76 | 2.65 | 0.86 |
| Annual Savings (Units) due to reduction in technical loss resulted from Transformer modification / re-arrangement | 0.00 | 0.00 | 0.19 | 0.07 | 0.05 | 0.01 | 0.00 |
| Annual Savings (Units) ) due to reduction in technical loss resulted from re-conductoring alone | 0.81 | 1.26 | 1.20 | 2.95 | 0.74 | 2.54 | 2.89 |
| Annual Savings (Units) due to reduction in technical loss resulted from conversion of Single Phase lines to Three Phase | 1.32 | 1.58 | 1.14 | 1.75 | 1.34 | 1.77 | 3.26 |
| Annual reduction in technical loss (savings in Units) | 4.82 | 3.07 | 5.87 | 7.11 | 3.90 | 6.97 | 7.01 |
| Expected additional sales (Units) due to increased reliability | 1.48 | 0.74 | 2.13 | 5.08 | 2.85 | 2.09 | 3.69 |
| Financial Gain (in Rs) due to reduction of technical loss | 20.22 | 13.07 | 28.52 | 33.15 | 17.11 | 29.95 | 30.98 |
| Financial Gain (in Rs) due to additional sales resulted from increased reliability | 1.07 | 0.29 | 2.86 | 4.42 | 1.64 | 0.94 | 3.13 |
| Total Yearly Financial gain (Rs) | 21.28 | 13.36 | 31.38 | 37.58 | 18.74 | 30.88 | 34.11 |
| Total investment (Rs) | 125.58 | 93.00 | 195.85 | 218.37 | 149.00 | 165.00 | 208.86 |
| Internal rate of Return of the Project | 13.02% | 10.00% | 11.96% | 13.31% | 7.78% | 14.99% | 12.32% |

| Annexure VI (C) : Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|
| **Distribution North** | | | | | | |
| **Particulars** | **Amount in Cr** | | | | | |
| | Palakkad | Shornur | Manjeri | Nilambur | Tirur | Kozhikode |
| Annual Savings (Units) due to reduction in technical loss resulted from feeder modification (other than re-conductoring & conversion) | 1.84 | 2.75 | 3.92 | 2.03 | 0.41 | 3.20 |
| Annual Savings (Units) due to reduction in technical loss resulted from Transformer modification / re-arrangement | 0.07 | 0.03 | 0.09 | 0.01 | 0.02 | 0.03 |
| Annual Savings (Units) ) due to reduction in technical loss resulted from re-conductoring alone | 3.03 | 1.41 | 0.68 | 0.56 | 1.89 | 1.57 |
| Annual Savings (Units) due to reduction in technical loss resulted from conversion of Single Phase lines to Three Phase | 3.65 | 2.49 | 2.47 | 0.80 | 3.28 | 2.12 |
| Annual reduction in technical loss (savings in Units) | 8.59 | 6.69 | 7.15 | 3.40 | 5.60 | 6.92 |
| Expected additional sales (Units) due to increased reliability | 1.21 | 2.22 | 3.17 | 0.68 | 3.53 | 0.83 |
| Financial Gain (in Rs) due to reduction of technical loss | 33.76 | 27.37 | 31.66 | 14.13 | 25.03 | 30.48 |
| Financial Gain (in Rs) due to additional sales resulted from increased reliability | 0.75 | 1.16 | 2.25 | 0.66 | 2.00 | 0.55 |
| Total Yearly Financial gain (Rs) | 34.51 | 28.53 | 33.91 | 14.79 | 27.02 | 31.04 |
| Total investment (Rs) | 185.88 | 140.05 | 112.00 | 78.97 | 190.19 | 174.98 |
| Internal rate of Return of the Project | 14.82% | 16.79% | 27.08% | 15.01% | 9.82% | 13.91% |

| Annexure VI (D) : Financial Analysis | | | | | |
|---|---|---|---|---|---|
| **Distribution North Malabar** | | | | | |
| **Particulars** | **Amount in Cr** | | | | |
| | Kalpetta | Kannur | S'puram | Kasargode | Vadakara |
| Annual Savings (Units) due to reduction in technical loss resulted from feeder modification (other than re-conductoring & conversion) | 2.49 | 2.65 | -0.13 | 2.64 | 1.07 |
| Annual Savings (Units) due to reduction in technical loss resulted from Transformer modification / re-arrangement | 0.03 | 0.05 | 0.05 | 0.11 | 0.30 |
| Annual Savings (Units) ) due to reduction in technical loss resulted from re-conductoring alone | 0.42 | 1.37 | 2.13 | 1.12 | 1.15 |
| Annual Savings (Units) due to reduction in technical loss resulted from conversion of Single Phase lines to Three Phase | 2.09 | 1.99 | 8.83 | 2.95 | 2.06 |
| Annual reduction in technical loss (savings in Units) | 5.03 | 6.07 | 10.89 | 6.83 | 4.59 |
| Expected additional sales (Units) due to increased reliability | 1.31 | 2.79 | 2.62 | 0.77 | 0.25 |
| Financial Gain (in Rs) due to reduction of technical loss | 21.71 | 27.18 | 44.73 | 28.53 | 19.37 |
| Financial Gain (in Rs) due to additional sales resulted from increased reliability | 0.94 | 2.95 | 1.52 | 0.38 | 0.13 |
| Total Yearly Financial gain (Rs) | 22.65 | 30.13 | 46.25 | 28.91 | 19.50 |
| Total investment (Rs) | 106.11 | 140.15 | 152.96 | 180.07 | 113.86 |
| Internal rate of Return of the Project | 17.83% | 17.99% | 27.04% | 12.00% | 13.22% |

| Annexure VII : RELIABILITY OF DIFFERENT COMPONENTS | |
|---|---|
| **Components** | **Reliability Factor** |
| **1. HT System** | |
| 1.1. HT UG Cable | 99.90% |
| 1.2. HT ABC | 99.80% |
| 1.3. HT Covered conductor | 99.50% |
| 1.4. HT OH line (with line ABs at least at 2 km interval) | 99.00% |
| 1.5. HT OH line w/o line ABs at 2 km interval) | 98.00% |
| 1.6. HT OH line with cross country alignment (with line ABs) | 98.00% |
| 1.7. HT OH line with cross country alignment (w/o line ABs) | 97.50% |
| **2. HT Back feeding system** | |
| 2.1. HT Ring Main (with RMU) | 99.95% |
| 2.2. HT Ring Main (with FPI) | 99.40% |
| 2.3. HT Ring Main (w/o RMU or FPI) | 99.00% |
| 2.4. HT Radial System (with FPI) | 98.90% |
| 2.5. HT Radial System (w/o FPI) | 98.40% |
| **3. Availability of Transformer AB** | |
| 3.1. Having Transformer AB (depending on % of functional Abs) | 98.0 to 100% |
| 3.2. Without Transformer AB | 98.0% |
| **4. LT System** | |
| 4.1. LT ABC | 99.90% |
| 4.2. LT UG Cable | 99.80% |
| 4.3. LT Covered Conductor | 99.70% |
| 4.4. LT system with properly graded branch fuse | 99.20% |
| 4.5. LT system w/o properly graded branch fuse | 99.00% |
| 4.6. LT OH line with cross country alignment | 98.80% |
| **5. Presence of OH multi circuit system** | |
| 5.1. Bare OH multi circuit lines not present | 100% |
| 5.2. Bare OH multi circuit lines present | 98.5% |

## Annexure VIII : Sample IRR calculation

1. One of the work proposed in Dyuthi Scheme under Electrical Section, Kesavadasapuram is related to shifting transformer from MG College to Vyasa Nagar near IAS academyie, load centre. The quantum of work involved is construction of 1.5 km 11 kV UG Cable, dismantling the 250 kVA Distribution Transformer from the present location and re-erecting the same at the load centre and rearrangement of LT feeders.
2. The present & post modification network (which undergoes change) is given below

| Feeders-Prior to Modification | | | | | | |
|---|---|---|---|---|---|---|
| **Feeder** | **Configuration Conductor** | | **Conductor Spec** | **Circuit length in km** | **Load in feeder** | **Unit** |
| Feeder 1 | LT 3P | ACSR | ACSR Rabbit | 0.900 | 84.0000 | A |
| Feeder 2 | LT 3P | ACSR | ACSR Rabbit | 1.000 | 100.0000 | A |
| **Feeders-Post Modification** | | | | | | |
| **Feeder** | | | **Conductor Spec** | **Circuit length in km** | **Load in feeder** | **Unit** |
| Feeder 1 | HT 11kV | UG | 11 kV UG (3x300) | 1.5 | 5.25 | A |
| Feeder 2 | LT 3P | ACSR | ACSR Rabbit | 0.500 | 84.0000 | A |
| Feeder 3 | LT 3P | ACSR | ACSR Rabbit | 0.500 | 50.0000 | A |
| Feeder 4 | LT 3P | ACSR | ACSR Rabbit | 0.500 | 50.0000 | A |

3. The 250 kVA is now having a peak load of 84 A; it is estimated that at the load centre, the peak load will be 134 A.The proposed modification will benefit 150 LT consumers in the area. The present and proposed HT line uses 11 kV XLPE UG cable; however, at present, there is no HT back feeding facility; whereas at the proposed location, DTR will be a part of the Ring Main. The DTR is already having AB switch, LT system is having with properly graded branch fuse; these status will remain the same in post modification scenario.

### Savings in Technical Loss

4. Feeder modification: The Total $I^2R$ loss in the present and post modification scenario are calculated as 27.08 kW & 10.00 kW respectively. This means that the net saving in feeder is 17.08 kW. The proposed location is in urban area and the Load Factor (LF) is taken as 0.7. The Loss Load Factor LLF (for feeder) is 0.532 (i.e. $0.8xLF^2+0.2xLF$). The Annual Saving will be 79603.48 units (17.08 kW x 0.532 x 8760 hrs). Average realization for the section during 2017 from LT consumers was Rs 6.05/kWh. The annual savings due to feeder modification will be Rs.4,81,288.28.

5. Savings due to relocation of transformer: No load loss of a 250 kVA, 11 kV / 440 V DTR (without Star rating) is 580W. The Copper loss with 84 A load is 179.34W, and that with 134A will be 456.39W. With a Loss Load Factor of 0.553, there will be slight increase in transformer loss 3.68 kWh/day. For calculating annual saving/loss, it is assumed that the transformer will be in service for 350 days a year. With this consideration, the annual increase in transformer loss will be 1286.93 kWh. Converting to money value this comes to Rs 7780.85 (loss). The net saving due to reduction in technical loss is Rs 473507.42.

## Additional sale due to improved reliability

6. The reliability of system is calculated considering the present scenario. HT UG cable system (reliability factor: 0.9990), HT radial system with RMU at feeding end (reliability factor: 0.9890), 100% AB switch are functioning (reliability factor: 1), LT system with properly graded branch fuse (reliability factor: 0.9920), Bare OH multi circuit lines not present (reliability factor: 1). With these consideration HT reliability before modification is 0.988011 and LT reliability before modification is 0.980106912.
7. After modification there will be improvement due to use of HT Ring Main (with RMU) (reliability factor 0.9950). The overall HT reliability after modification will be 0.9985005 and overall LT reliability after modification will be 0.990512496. The possible additional sales is calculated by taking in to account the number of beneficiaries (150 LT consumers) average consumption / consumer in Electrical Section Kesavadasapuram (2584 units / LT consumer), possibility of deferred consumption etc. The probable additional sales due to improved reliability is calculated as 2584.283 units. After Considering the Average realisation and average purchase price of energy, the net benefit from improved reliability is calculated as Rs 4978.30.

## IRR calculation

8. The net annual saving in the first year after completion of the project is Rs 478485.73. The total investment of the project is Rs 5044683.16. The O&M charges during the first year after completion of the project is taken as 3% of the capital cost, thereafter an escalation of 1% is considered every year on O&M cost. The investment & return in each year is tabulated below. The IRR in the above scenario is 3.41%.

| Year wise Investment/Return | | | |
|---|---|---|---|
| Year | Investment (-) / Return (+) in Rs | Year | Investment (-) / Return (+) in Rs |
| 0 | -5044683.16 | 13 | 307951.47 |
| 1 | 327145.23 | 14 | 306246.13 |
| 2 | 325631.83 | 15 | 304523.73 |
| 3 | 324103.29 | 16 | 302784.11 |
| 4 | 322559.46 | 17 | 301027.10 |
| 5 | 321000.20 | 18 | 299252.51 |
| 6 | 319425.35 | 19 | 297460.18 |
| 7 | 317834.74 | 20 | 295649.92 |
| 8 | 316228.23 | 21 | 293821.56 |
| 9 | 314605.66 | 22 | 291974.92 |
| 10 | 312966.86 | 23 | 290109.81 |
| 11 | 311311.67 | 24 | 288226.05 |
| 12 | 309639.93 | 25 | 286323.46 |

9. However, the following factors are also considered while selection of the project.

- The Distribution Transformer is at present located in a gated compound. This makes operation of transformer difficult during odd hours and also during holidays.
- The DTR is now used exclusively for feeding a residential area, but the DTR is located in a far off place. Thus the voltage at the consumer premises is considerably low. Similarly voltage at consumer premises in the fag end of two other DTRs (viz. Paruthippara & Lakshminage) also can be improved by rearranging the load. Improved consumer satisfaction is an intangible benefit, which is not reflected in above IRR.
- Two important feeders (viz. PWD 1 & PWD 2 feeding the city) emanating from Paruthippara substation can be interconnected easily, if this project is through. While calculating the IRR for the above project, benefit of consumers directly affected (i.e. who are coming under this DTR) is considered. But since this will enable interlinking of two feeders, the reliability of many more consumers will be improving. The operational flexibility is another intangible benefit.

**----**