**V. ENERGY**

Energy plays a vital role in the socio-economic development and human welfare of a State. Efficient, reliable and competitively priced energy supply is a prerequisite for accelerating economic growth and human development. Making available the required quantity of power of acceptable quality at affordable price is one among the prime responsibilities of Government. The Vision of Power Sector in Kerala is to provide quality power to all at economic prices. Power generation within the State covers Thermal, Diesel, Hydel, Solar, Wind and Waste to Energy Plants which are on the anvil. The various power development activities focusing generation, transmission, distribution, quality, safety, regulation, energy efficiency etc are mainly done through four agencies viz, KSEBL, ANERT, EMC and Electrical Inspectorate. For taking all efforts to maintain a fair, transparent and objective regulatory system in the Power Sector of the State of Kerala a quasi-judicial body namely, the Kerala State Electricity Regulatory Commission (KSERC) is functioning under the State.

In the Budget 2021-22, an amount of ₹115011.00 lakh is provided for Energy sector. Out of this, ₹109375.00 lakh is for Kerala State Electricity Board Ltd (KSEBL), ₹4313.00 lakh for Agency for Non-conventional Energy and Rural Technology (ANERT), ₹560.00 lakh for Meter Testing and Standards Laboratory (MTSL) and ₹763.00 lakh for Energy Management Centre (EMC). These agencies shall work in close co-ordination with each other and will periodically meet to work out joint strategies for energy conservation activities.

The agency wise funds provided under Energy Sector as well as scheme/project wise details are given below:

(₹lakh)

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Department** | **Outlay** |
| 1 | KSEBL | 109375.00 |
| 2 | ANERT | 4313.00 |
| 3 | MTSL | 560.00 |
| 4 | EMC | 763.00 |
|  | **Total** | **115011.00** |

* 1. **KERALA STATE ELECTRICITY BOARD LIMITED (KSEBL)**

KSEBL is one of the significant driving forces behind the economic development of the State of Kerala and is a state owned integrated power utility. It has been responsible for the generation, transmission and distribution of electricity in the State, with the specific mandate to provide electricity at affordable prices to domestic, agricultural and industrial use.

In the Budget 2021-22, an amount of ₹109375.00 lakh is provided for Kerala State Electricity Board Ltd (KSEBL). Out of this, ₹103754.00 lakh is for KSEBL’s own schemes, ₹3300.00 lakh for DRIP (EAP) and ₹2321.00 lakh is provided for the State Plan Schemes of KSEBL. The scheme/project wise details are as follows:

**Ongoing Hydel Projects**

1. **Pallivasal Extension Project (60 MW/153.90 MU)**

**(Outlay: ₹700.00 lakh)**

Pallivasal Extension Project is a hydroelectric scheme on the Muthirappuzha river of Periyar basin in Idukki district. The scheme envisages the efficient utilization of available water at Ramaswami Ayer head works, Munnar by diverting water through a new water conductor system for power generation in the existing Pallivasal power house and the proposed new power house to be located near the existing one. The component structure works of the scheme was not completed in time due to several reasons including geological issues occurred at various sites especially at Intake and Tunnel area, improper planning of the contract, non-mobilization of adequate men, materials and machinery etc. The delinked work was awarded to M/s. BUMI-ZILLION JV and executed the agreement on 15.03.2018 for an amount of ₹109.44 crore. The Contractor has started the works on 19th March 2018 and is progressing as per schedule. The work of Box Culvert and intake pool almost completed ahead of schedule. The overall progress achieved is around 84.65% and is expected that the project can be commissioned during December 2021. An amount of ₹700.00 lakh is provided for the scheme in the Budget 2021-22.

1. **Sengulam Augmentation Project (85 MU)**

**(Outlay : ₹600.00 lakh)**

This Project envisages the diversion of water from Western Kallar River to the existing Sengulam reservoir for augmenting the power generation at Sengulam powerhouse. The project is located in Pallivasal village of Devikulam taluk in Idukki district. The agreement was executed on 15.07.2009 and work commenced on 06.07.2009 with 42 months’ time of completion. Now the work is progressing at intake face. The overall progress achieved is around 70.50% and is expected that the project can be commissioned during March 2022. An amount of ₹600.00 lakh is provided for the scheme in the Budget 2021-22.

1. **Thottiyar Project (40 MW/99 MU)**

**(Outlay: ₹400.00 lakh)**

This project is located in the Devikulam taluk of Idukki district with an installed capacity of 40 MW and generation potential of 99 MU. This project envisages utilization of water from Thottiyar catchment area and involves construction of a 7.5 m high overflow weir with a pondage of gross capacity 0.39 mm3. Total forest land to be diverted for the project is only 3.8134 Ha. The overall progress achieved is around 53.25% and is expected that the project can be commissioned during March 2021. An amount of ₹400.00 lakh is provided for the scheme in the Budget 2021-22.

**4) Mankulam Hydroelectric Project (40 MW/82 MU)**

**(Outlay: ₹500.00 lakh)**

The KSEBL and Government have accorded Administrative sanction for the implementation of Mankulam Hydro Electric Project (40 MW) and the land acquisition for the project is progressing. Environmental Clearance for the project obtained in August 2004 (16 years back) and the forest clearance in June 2009 (11 years back). Forest Department has handed over the forest land to KSEBL after felling of trees in March 2011 (9 years back) and now about 90% of the private land had been acquired. Government sanction is required for effecting payment for the acquisition of river puramboke and land under intention notification. If the rest of the land is acquired and bidding process completed in the next 8 months, the project construction could commence by May 2021. An amount of ₹500.00 lakh is provided for the scheme in the Budget 2021-22.

**5) Perumthenaruvi SHEP (6 MW/25.77 MU)**

**(Outlay: ₹10.00 lakh)**

The Perumthenaruvi Small Hydroelectric Project is a run-off the river scheme in river Pamba of Pamba basin in Pathanamthitta District. The scheme envisages the utilisation of water from 442 sq.km catchment of Pamba and Azhutha rivers for electricity generation. The main components of the scheme are diversion weir, power channel, fore bay, two penstock pipes and powerhouse. The installed capacity of the scheme is 6 MW (2x3 MW) and the annual average generation is 25.77 MU. Administrative sanction for the project was obtained on 10.11.2004. The project commissioned on 23.10.2017. An amount of ₹10.00 lakh is provided for the scheme in the Budget 2021-22 for balance payment.

**6) Chathankottunada -II (6MW/14.76 MU)**

**(Outlay: ₹500.00 lakh)**

The Chathankottunada-II Small Hydro Project envisages the utilisation of water from two streams namely Poothampara and Karingad, tributaries of Kuttiyadi river. The scheme is located in Vadakara taluk of Kozhikode district. Original contract with Coramandel Infrastructure Pvt. Ltd. – Coramandel Energy Pvt. Ltd-Boving Fouress Pvt. Ltd. Consortium foreclosed on 17.05.2017. Balance Civil works awarded to M/s. K.K Builders, Peravoor, Kannur. Now Contract for E&M works awarded to M/S Voith Hydro Private limited at a cost of ₹ 22.45 crore and agreement executed on 30.03.2019 and the contract period is 24 months. The overall progress achieved is around 84.07%. An amount of ₹500.00 lakh is provided for the scheme in the Budget 2021-22.

**7) Barapole SHEP (15 MW /36 MU) (Outlay: ₹20.00 lakh)**

Barapole Small Hydro Project envisages utilization of water from 310 sq.km of catchment area of Barapole river, a tributary of Valapattanam river for power generation. The project is located in Thalassery taluk of Kannur district. Though the scheme is within the territory of Kerala, the catchment area is entirely in Karnataka. Land required for the project is 20 Ha and no forest land is involved. The work commenced on 29.09.2010 and commissioned in February 2016. An amount of ₹20.00 lakh is provided for the scheme in the Budget 2021-22 for balance payment.

**8) Achankovil HEP (30 MW / 75.81 MU)**

**(Outlay: ₹1.00 lakh)**

Achankovil Hydroelectric Project located in Aruvappulam Panchayat of Kozhencherry taluk in Pathanamthitta district envisages development of power by utilising the waters of Achankovil-Kallar, which is a main tributary of Achankovil River. Board accorded Administrative Sanction vide B.O dated 4-11-2006 for an amount of ₹189.88 crore. (2004-2005 price level). Government Sanction obtained vide G.O dated 05-07-2008. Stage I Environmental clearance obtained on 16-09-2008. The Government of Kerala vide letter dtd.22.07.2016 rejected Forest sanction for the proposal of KSEBL for diversion of 146.3 Ha forest land for the construction of the project and hence KSEBL cannot proceed further. The proposal is kept pending in view of Twin Kallar multipurpose project. An amount of ₹1.00 lakh is provided for the scheme in the Budget 2021-22.

**9) Chinnar HEP (24 MW /76.45 MU)**

**(Outlay: ₹700.00 lakh)**

Chinnar SHE Scheme is a run off river scheme proposed to utilize the water available from the catchment area of 143.64 sq.km of Perinjankutty river, a major tributary of Periyar. The scheme involves construction of weir, intake, tunnel, surge, LPP, valve house, penstock and power house. The work awarded to M/s PGCCL- Aryacon consortium on 08/03/2018 at their quoted amount of ₹ 80.61 crore. The contractor commenced the work on 19-3-2018 and contract period is 4 years. Tenders for the balance civil works and E&M works will be invited after completing the land acquisition for power house area. The overall progress achieved is around 53.73% and is expected that the project can be commissioned during May 2022. An amount of ₹700.00 lakh is provided for the scheme in the Budget 2021-22.

**10) Anakkayam Project (7.5 MW/22.83 MU)**

**(Outlay: ₹700.00 lakh)**

The scheme is located at Pariyaram Village, Mukundapuram taluk of Thrissur District. Anakkayam Small Hydro Electric Project is planned purely as a tail race development of the Sholayar Hydro Electric Project without any additional storage/submergence. The project area lies in the buffer zone of Parambikulam Tiger Reserve area and it is within the jurisdiction of Sholayar and Vazhachal forest ranges under Vazhachal Forest Division. An amount of ₹700.00 lakh is provided for the scheme in the Budget 2021-22.

**11) Poringalkuthu Small Hydroelectric Project (24 MW/45.02 MU)**

**(Outlay ₹100.00 lakh)**

Poringalkuthu SHP (1x24MW) envisages utilization of spill water from the existing Poringalkuthu reservoir by constructing 2 km length of water conductor system and a powerhouse near to the existing PLB extension powerhouse. The project is planned in two stages. In the first stage, installation of 1x24 MW is planned with an annual generation of 45.02 MU of energy. In the IInd stage, another 1x24 MW is planned thereby raising the installed capacity to 48 MW and energy generation to 78.78 MU per annum. The project is located in Mukundapuram Taluk of Thrissur District. The overall progress achieved is around 91.01% and is expected that the project can be commissioned during March 2021. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**12) Pazhassi Sagar Project (7.5 MW/25.8 MW**)

**(Outlay: ₹700.00 lakh)**

The Scheme proposed in Padiyoor-Kalyad panchayat of Thaliparamba Taluk in Kannur District which is envisaged as a dam-toe, run-of-the river scheme at Pazhassi Irrigation Barrage of Irrigation Dept. Contract for Civil works has been awarded to R.S Development & Construction Pvt Ltd, Erode on 6-10-2017 at an amount of ₹46.41 crore and work commenced on 27-10-2017. Contract period is 30 Months. Now the progress of works affected due to recent flood. The overall progress achieved is around 17.52% and is expected that the project can be commissioned during March 2021. An amount of ₹700.00 lakh is provided for the scheme in the Budget 2021-22.

**13) Kakkayam SHP (3 MW/ 10.39 MU)**

**(Outlay: ₹1.00 lakh)**

This project is located at Chakkittapara village, Koyilandy taluk of Kozhikode district. The scheme envisages utilization of the tailrace discharge of the Kuttiyadi Additional Extension Scheme. The installed capacity of the project is 3 MW. An overflow type diversion weir is proposed with horizontal Kaplan turbines. With a net head of 18.4m, it is estimated that 10.39 MU of energy can be generated annually from this scheme. The project commissioned on 16.07.2018. An amount of ₹1.00 lakh is provided for the scheme in the Budget 2021-22 for balance payment.

**14) Upper Kallar SHP (2MW/5.14 MU) (Project under RIDF)**

**(Outlay: ₹70.00 lakh)**

The Upper Kallar SHEP (2x1MW, 5.14MU) is located in Anaviratty Village of Devikulam Taluk of Idukki District. The scheme envisages utilization of diverted water from a catchment area of 28.5 Sq. Km of Kallar River in Puyankutty Catchment. Diversion from Puyankutty Catchment is by an existing diversion weir and a tunnel at Viripara known as Kallar diversion, constructed by KSE Board during 1964. The water from Kallar river is presently being diverted to Neriamangalam Power House. The scheme is proposed to have an installed capacity of 2 MW for generating 5.14 MU energy per annum. The overall progress achieved is around 76.75%. An amount of ₹70.00 lakh is provided for the scheme in the Budget 2021-22.

**15) Peechad Small HE Project (3MW/7.74 MU) (Outlay: ₹30.00 lakh)**

Peechad Small HE scheme proposed to utilise the tail race discharge from proposed Upper Kallar Small HE scheme which in turn receives diverted water from Pooyamkutty Basin. Pre-construction survey works of the above scheme is in progress. Project can be tendered after acquiring private land and getting concurrence from Board to go ahead with the Project. An amount of ₹30.00 lakh is provided for the scheme in the Budget 2021-22.

**16) Western Kallar Project (5 MW/ 17.41MU)**

**(Outlay: ₹10.00 lakh)**

The project is located in Devikulam Taluk in Idukki District downstream of Peechad Project. Western Kallar is one of the series of small hydro-electric schemes in the Kallar stream- 2 km d/s of the proposed Peechad SHEP (3MW) which is about 1.5 km d/s of the proposed Upper KallarSHEP (2MW). The weir site is located about 400m. upstream of Kallar bridge in Aluva-Munnar road and powerhouse is proposed downstream of Kallar falls. Board accorded AS for ₹63.05 crore on 11.09.2015 at 2014 CPWD SOR. Govt has issued direction to implement the scheme without affecting the exisitng 50KW scheme of Idukki Jilla Panchayat. The proposal for shifting the powerhouse to the left bank is being explored and DPR is being revised. An amount of ₹10.00 lakh is provided for the scheme in the Budget 2021-22.

**17) Chembukadavu Stage III Project (7.5 MW / 17.715 MU) (Outlay: ₹100.00 lakh)**

The scheme is identified in the downstream of Chembukadavu Stage II scheme. It envisages power development by utilizing the inflow from 21.79 sq. kms catchment area of Chalipuzha, which is a tributary of Iruvanjipuzha in Chaliyar basin. The project lies in Kodenchery and Nellipoyil Villages of Kozhikode Taluk. As per B.O (DB) No. 3374/2014 (DGC/AEE-I/CHEMPKDV/2014) dated 23.12.2014, Board accorded administrative sanction for the implementation of the project at an estimated cost of ₹81.75 crore including IDC, based on CPWD SOR-2014. Subsequently Government sanction for the implementation of the scheme was obtained as per G.O (Rt) No.54/2015/PD dated 09.03.2015. The Government sanction for the acquisition of private land was also obtained as per G.O dated 03.12.2013. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**18) Olikkal Project (5 MW/10.26 MU)**

**(Outlay: ₹300.00 lakh)**

This project is located at Thiruvambadi village in Kozhikode District. Olikkal SHEP is a run off the river scheme utilising the tailrace of Poovaramthode. The installed capacity of the project is 5 MW. The total land required for the project is 6.8 Ha. No forest land is involved. An amount of ₹300.00 lakh is provided for the scheme in the Budget 2021-22.

**19) Poovaramthodu Project (3 MW/5.88 MU)**

**(Outlay: ₹300.00 lakh)**

The Poovaramthode SHEP, a run off the river scheme, proposes to utilize the water resources of Poyilingapuzha, a tributary of Iruvanchipuzha in chaliyar basin. Olikkal SHEP is a run off the river scheme utilising the tailrace of Poovaramthode. The projects are located in Thiruvambadi village of Kozhikode District. As the projects are cascading, KSEB has decided to implement these projects as combined one. Administrative Sanction was accorded for the implementation of Olikkal and Poovaranthode Projects at an estimate cost ₹84.33 crore based on SOR 2014. Total extent of land is required for the implementation of the project is 9.77 Ha (4.83 Ha + 4.94 Ha) and the entire land is purchased and under the possession of KSEBL. An amount of ₹300.00 lakh is provided for the scheme in the Budget 2021-22.

**20) Peruvannamoozhy SHP (6MW/24.70MU)**

**(Outlay: ₹700.00 lakh)**

The scheme proposes to utilize spill water in monsoon from the reservoir of existing Peruvannamuzhy Irrigation dam. Peruvannamoozhy Small Hydro Electric project with a capacity of 6 MW is located in Chakkittappara village of Koyilandy Taluk in Kozhikode District. The scheme aims at generating 24.70 MU of energy on an annual average basis utilizing the excess inflow available over and above the demand for irrigation and water supply at the existing Peruvannamoozhy irrigation dam. The overall progress achieved is around 28.11% and is expected that the project can be commissioned during December 2021. An amount of ₹700.00 lakh is provided for the scheme in the Budget 2021-22.

**21) Ladrum Project (3.5MW/12.13 MU)**

**(Outlay: ₹100.00 lakh)**

The Ladrum Small Hydro Electric Project is a run off the river scheme proposed in Periyar basin. The scheme proposes to utilize the water of Azhutha diversion scheme (Idukki Augmentation) and also the water from the Ladrum thodu, a tributary of Periyar, which has 5.56 sq.km catchment area. As per the revised proposal, 4.608 Ha of land is required. 4.483 Ha private land in Elappara Village is tea estate owned by M/s Gold Vyapar Pvt. Ltd., Kolkatta and 0.125 Ha Revenue tharishu land is in Peerumedu Village. Project can be tendered after acquiring private land and after getting concurrence from Board to go ahead with the Project. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**22) Upper Sengulam Stage - 1 (24 MW/53.22 MU) (Outlay: ₹100.00 lakh)**

The Upper Sengulam HEP envisages utilization of the surplus water available at Sengulam Balancing Reservoir of existing sengulam HEP on completion of Sengulam Augmentation Scheme and PES. The scheme is proposed to be implemented in 2 stages. Installed capacity at the 1st stage is 24 MW, 53.22 MU. The intake structure, tunnel, surge, valve house, low pressure pipe and pressure shaft of the Upper Sengulam scheme is designed for 48 MW capacity and will be utilized together by the stages 1&2. Total land to be acquired is 3.6755 Ha. including revenue puramboke. Application for transfer of 0.95 Ha of forest land has been submitted to forest department. Project can be tendered after transfer of Forest land. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**23) Marmala SHEP (7MW/23.02MU)**

**(Outlay: ₹100.00 lakh)**

Marmala small H.E scheme envisages power development by using the inflow of Marmalathodu in Meenachil basin. The project is proposed at Thalanadu Grama panchayat, of Meenachil Taluk in Kottayam District. The sites for weir, power tunnel, surge, LPP, penstock and power house are in private land area. A weir is proposed about 330m upstream of the Marmala waterfall and the water is diverted through the water conductor system to the PH located in the right bank of the stream and the tail water is proposed to be discharged into the same river. Project can be tendered after acquiring private land and after getting concurrence from Board to go ahead with the Project. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**24) Bhoothathankettu Project (24 MW / 83.50MU)**

**(Outlay: ₹200.00 lakh)**

This project with a capacity of 24 MW aims at utilising the controlled release of water from Lower Periyar and Idamalayar under the Periyar valley irrigation project for power generation. The annual generation expected from the scheme is 83.50 MU. Total land required for the project is 4.14 Ha, out of which 2.18 Ha is irrigation department land on lease and the same was made available to the contractor at the time of commencement of the work. Balance 1.96 Ha. of land is forest land. The progress of works was badly affected due to flood during 2017 and the historic flood of 2018. The overall progress achieved is around 92.05 percent. An amount of ₹200.00 lakh is provided for the scheme in the Budget 2021-22.

**25) Pambar HEP (40 MW / 84.79 MU) (Outlay: ₹2.00 lakh)**

Pambar H.E Scheme proposes construction of a 36.50m high concrete dam across the Pambar river 600m downstream of Kovilkadavu bridge in Devikulam taluk of Idukki district by utilising the waters from 183 sq.km catchment of the Pambar river. An annual energy generation of 84.79 MU is expected from the scheme by installing 2 machines of 20 MW each. An amount of ₹2.00 lakh is provided for the scheme in the Budget 2021-22.

**26) Valanthode HEP (7.5 MW/ 15.291 MU) (Outlay: ₹100.00 lakh)**

Valanthodu Small HE Scheme is proposed as a run off the river scheme utilizing the inflow of Kurumanpuzha, in Chaliyar basin, with a rated net design head of 89.44m. The scheme lies in Akampadam village of Chaliyar Panchayath of Nilambur Taluk in Malappuram District. 4.5 Ha of private land and 1.40 Ha of forest land is required for the project. Pre-construction survey completed and drawings being prepared. Property survey completed and online application sent to Forest Department. Project can be tendered after acquiring private land and after getting concurrence from Board to go ahead with the Project. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**27) Maripuzha SHEP (6 MW/ 14.84 MU) (Outlay: ₹100.00 lakh)**

The proposed project is located in Nellipoyil village of Kodenchery Panchayath in Thamarasseri Taluk in Kozhikode District. The project is planned as a run -of - the river scheme and envisages development of power by using the inflow of Iruvanjipuzha of Chaliyar basin. The river flow is proposed to be intercepted by a trench type weir and diverted to a fore bay tank through power channel and a surface penstock to generate 6MW of Electricity. 6.119 Ha of private land, 0.2296 Ha of Govt land, 3.0337 Ha of forest land and 0.1477 Ha of tribal land is required for the project. Project can be tendered after acquiring private land and after getting concurrence from Board to go ahead with the Project. An amount of ₹100.00 lakh is provided for the scheme in the Budget 2021-22.

**28) Idamalayar HEP (75 MW/380 MU)**

**(Outlay: ₹100.00 lakh)**

The project is located at Kuttampuzha panchayat in Kothamangalam Taluk. The reservoir for this project is constituted by Idamalayar dam. The reservoir in addition to its own catchment area, receive inflow from the spill of Poringalkuthu dam also, through an open channel constructed at "watchmaram". The tailrace discharge from this powerhouse is released to Idamalayar and reaches Periyar and collected in a barrage at Bhoothathankettu in Periyar, for irrigation purpose as part of Periyar Valley Irrigation Project (PVIP). Installed capacity of the project is 75 MW and the annual generating capability is 380 MU. An amount of ₹100.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**29) Idukki HEP (780 MW/2398 MU)**

**(Outlay: ₹500.00 lakh)**

This project is situated in Arakkulam village of Thodupuzha Taluk in Idukki District. The power house has six generators of 130 MW capacity each. The total installed capacity of the project is 780MW and the annual generating capability is 2398MU. There are three Dams associated with this project. They are Idukki Arch Dam, Cheruthoni Dam & Kulamavu Dam. Three Dams Constitute Reservoir of this project. There have been consistent efforts to increase the inflow to the reservoir, thus making it possible the 5 diversion projects viz; Kuttiyar Diversion, Vadakkepuzha Diversion, Azhutha Diversion, Narakakkanam Diversion, Kallar/ Irattayar Diversion. An amount of ₹500.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**30) Kuttiyadi HEP**

**(Outlay: ₹100.00 lakh)**

This project is located at Chakkittappara village in Kozhikode District. This consists of four power houses. Kuttiady old power house (75 MW), Kuttiady Extension Scheme (50 MW), Kuttiady Additional Extension scheme (100 MW) and Kuttiady Tail Race Small Hydro Electric Project (3.75 MW). With an installed capacity of 75 MW, the annual generation capacity of Kuttiady Old power Station is 268 MU. To avoid spillage and loss of generation potential from the reservoir during heavy monsoon, Kuttiady Extension Scheme was formed having 50 MW installed capacity and the annual generation capacity is 75 MU. Kuttiady Additional Extension Scheme was formed by construction of a new powerhouse building adjacent to the Kuttiady Extension Scheme. The firm annual generation capacity of Kuttiady Additional Extension Scheme is 223 MU and the installed capacity of the project raised to 225 MW. An amount of ₹100.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**31) Lower Periyar (180 MW/493 MU)**

**(Outlay: ₹100.00 lakh)**

The project is located at Karimanal in Idukki District. The reservoir for this project is formed by the Pambla dam constructed at Pambla, across the Periyar river. The main inflow to this reservoir is from the tailrace discharge of Neriyamangalam power house. Installed capacity is 180 MW and the annual generating capacity is 493 MU. The tail race discharge from this powerhouse is released to Periyar river and collected in a barrage at Bhoothathankettu, for irrigation purpose as part of Periyar Valley Irrigation Project, along with discharge from Idamalayar Power station. An amount of ₹100.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**32) Pallivasal Hydro Electric Project (37.5 MW/284 MU)**

**(Outlay: ₹100.00 lakh)**

This project is located at Devikulam Taluk in Idukki District. The project was completed in two stages. In the first stage, just a run-off river scheme was initially introduced with three units having capacity of 4.5 MW each. Units 4.5 MW included in the first stage were up-rated to 5 MW by changing the water wheels. The first stage of the project was completed with three units of 5 MW capacity. The second stage development added three units of 7.5 MW each, taking the total installed capacity of the station to 37.5 MW. The annual generating capacity of the project is 284 MU. An amount of ₹100.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**33) Panniar HEP (32.4 MW/158 MU)**

**(Outlay: ₹300.00 lakh)**

Panniar power house is at Vellathooval in Devikulam Taluk of Idukki District. The capacity of the project after renovation is 32.4 MW with firm annual generation capability of 158MU. The Power generated is evacuated using two feeders at 110 kV level to the switch yard of Sengulam Power station. There are two reservoirs for this project, Anayirankal and Ponmudi. The tailrace discharge joins Mudirapuzha river and is flowing downstream to Kallarkutty reservoir. An amount of ₹300.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works, replacement of PRV, which are of capital nature.

**34) Sabarigiri HEP (340 MW/1338 MU)**

**(Outlay ₹600.00 lakh)**

This project is located at Seethathode village in Pathanamthitta district. Two reservoirs Pamba and Kakki contribute the water required for operation of the project. After power generation, water from the power station is released to the Moozhiyar reservoir. The total installed capacity of the station is 340 MW. The power generated in the station is evacuated using six 220 kV feeders including the interstate Moozhiyar -Theni feeder. The firm annual generating capability is 1338 MU. An amount of ₹600.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**35) Sengulam HEP (51.2 MW/182 MU)**

**(Outlay ₹100.00 lakh)**

The Sengulam Project was mainly intended to utilise the tailrace water from Pallivasal project. The project is located at Devikulam Taluk in Idukki District. Sengulam balancing reservoir was formed by constructing a dam at Sengulam. The water level of sengulam balancing reservoir is 10m higher than the tailrace water level of Pallivasal Powerhouse. Hence a pumping system is provided at Pallivasal powerhouse to pump the tail water to Sengulam balancing reservoir. The tailrace discharge joins Mudirapuzha river and is flowing downstream to Kallarkutty reservoir. The installed capacity of the project is 51.2 MW (12.8x4) and the annual generating capability is 182 MU. An amount of ₹100.00 lakh is provided in the Budget 2021-22 for carrying out major maintenance works of capital nature.

**36) Poringalkuthu Left Bank Extension (16 MW/ 74 MU)**

**(Outlay ₹100.00 lakh)**

The Poringalkuthu left bank extension project was made by laying an additional penstock from the Poringalkuthu reservoir and was done to avoid the spill from the dam during intense monsoon. Power house comprises one unit of 16 MW capacity. The project commissioned on 20.03.99. After power generation, water from Poringalkuthu & PLBE is released to the Chalakudi River. Firm annual generating capability is 74 MU. Yard extension works in connection with the upcoming Poringalkuthu SHEP and renovation of governor system at PLBE Power house is the major work planned. An outlay of ₹100.00 lakh is provided in the Budget 2021-22 for the purchase of spares, lube oil filter and replacement of old governors.

**37) Neriamangalam Extension Scheme (25 MW/ 58.27 MU)**

**(Outlay ₹80.00 lakh)**

The Neriamangalam Extension Scheme was commissioned on 27.05.2008. The Neriamangalam Extension Scheme was conceived as a solution to prevent spill from the Kallarkutty reservoir during intense monsoon. The powerhouse building is made adjacent to the Neriamangalam Powerhouse. The annual generation capability is 58.27 MU. An amount of ₹80.00 lakh is provided in the Budget 2021-22 for the implementation of SCADA in Neriamangalam Extension Scheme.

**38) Pambla (10 MW/ 21.14 MU)**

**(Outlay ₹3.00 lakh)**

Pambla SHEP is a run off the river scheme located in Pazhayarithodu, a tributory of river Periyar in Idukki District. The scheme aims at an annual generation of 21.14 MU with an installed capacity of 10 MW. Total land required for the scheme is 11.1 hectares. Out of which 3.9 Ha is forest land, 5.6 Ha is private land and 1.6 Ha is revenue land. An outlay of ₹3.00 lakh is provided in the Budget 2021-22.

**39) Pasukkadavu Small Hydroelectric Scheme (4 MW/10.34 MU)**

**(Outlay ₹1.00 lakh)**

The proposed Pasukkadavu SHE Scheme is located in Kavilumpara Panchayat of Vadakkara Taluk of Kozhikode District. The Scheme is planned as run off the river scheme utilising the inflow of Meenpattipuzha a tributary of Kuttiadi River. The total land required for the scheme is 7.3 Ha and no forest land is involved in the scheme. The average annual energy generation expected from the scheme with an installed capacity of 4 MW (2x 2 MW) comes to 10.34 MU. The geological exploration work completed. An outlay of ₹1.00 lakh is provided in the Budget 2021-22.

**40) Sholayar (54MW)**

**(Outlay ₹30.00 lakh)**

Sholayar HEP (3x18 MW) was commissioned in the year 1966-68. Renovation & modernization of the one unit is progressing. An outlay of ₹30.00 lakh is provided in the Budget 2021-22 for the major maintenance work.

**41) Idukki Extension Scheme (780MW)**

**(Outlay ₹300.00 lakh)**

The proposal for the establishment of a new underground Idukki Extension Scheme with a capacity of 780 MW at an estimate project cost of ₹2730 crore to meet the peak demand more economically was considered by KSEBL and decided to conduct a pre-feasibility study by a Technical Committee. The Technical Committee submitted its report that the proposed Idukki Extension Scheme is Technically & Financially viable. Government sanction was also obtained for the invitation of global tenders for selection of suitable consultant for preparation of Feasibility Study Report (FSR) and Detailed Project Report (DPR). Global tender invited for the selection of suitable consultant for preparation of Feasibility Study Report (FSR) and Detailed Project Report (DPR) and the work order was issued to M/s. WAPCOS Limited on July 2020. Period of completion is 22 months. An outlay of ₹300.00 lakh is provided in the Budget 2021-22.

**42) Keerithodu SHEP (12MW) (New)**

**(Outlay ₹1.00 lakh)**

Keerithodu SHE scheme is planned as a run of the river project with a provision for marginal pondage to generate power by installing a power plant of 12 MW capacity, which operate generally during monsoon. The project proposes to utilize the water resources from a catchment area of 116.9 sq km of Periyar River downstream of Idukki Dam. The land requirement for the project is approximately 12 Ha in which 7 Ha of land is private and 5 Ha is revenue land. No forest land is required for the scheme. The total estimated cost of the project is ₹148.48 crore at 2017 price level. The period of construction of the project is 36 months. MNRE grant of ₹20 crore can be availed as Central financial assistance from Government of India for the project. The DPR of the project was approved in principle and it was decided that execution of the project shall be considered after ensuring availability of funds from GOI/GOK and the availability of land. An outlay of ₹1.00 lakh is provided in the Budget 2021-22.

**43) Small Hydro Projects**

**(Outlay ₹150.00 lakh)**

An amount of ₹150.00 lakh is provided in the Budget 2021-22 for the following small hydro projects for carrying out major maintenance works, which are of capital nature.

1. **Kallada Hydro Electric Project (15 MW/65 MU)**

The Kallada power station utilizes the water released from Kallada Irrigation Reservoir for power generation. The installed capacity of the project is 15 MW and the firm annual generation capability is 65 MU.

1. **Peppara Small Hydro Electric Project (3MW/11.5 MU)**

The reservoir for the project is formed by Peppara Dam across Karamana river. After power generation, water from the power station is released to the Karamana River and collected at Aruvikkara dam for domestic water supply to Thiruvananthpuram city. The installed capacity of the project is 3 MW and the firm annual generation capability is 11.5 MU.

1. **Lower Meenmutti Small Hydro Electric Project (3.5 MW/ 7.63 MU)**

The reservoir for the project is formed by Lower Meenmutty weir across Vamanapuram river in Kallar basin. After power generation, water from the power station is released to the Vamanapuram River. The annual generating capability is 7.63MU.

1. **Ranni Perunad Small Hydro Project (4.00 MW/16.73 MU)**

This project is a tailrace scheme to the Maniyar project. Tail race discharge after power generation, from the power station is released to the Pamba River. The project is located at Mampara in Pathanamthitta District. Total installed capacity of the project is 4MW and the annual generating potential is 16.73 MU.

1. **Peechi Small Hydro Electric Project (1.25 MW)**

The Peechi Dam was constructed across Manali river makes the reservoir for this project. Generation is from the water released for irrigation. The installed capacity is 1.25 MW.

1. **Poozhithode Small Hydro Electric Project (4.8 MW/10.97 MU)**

The waters of Illyanipuzha and Kadantharappuzha are utilised for the project. Overflow type diversion weir is constructed across the river. The installed capacity of the project is 4.8 MW and the annual generating capability is 10.97 MU.

1. **Vilangad Small Hydro Electric Project (7.5 MW/ 22.63 MU)**

The project uses water of the Kavadipuzha and Vaniyampuzha, both tributaries of Mahe river. After power generation, water from the power station is released to the Vaniampuzha river which finally reaches Mahe river. The installed capacity of the project is 7**.**5 MW and the annual generating capability is 22.63 MU.

1. **Malampuzha Small Hydro Electric Project (2.5 MW/5.6 MU)**

Malampuzha dam constructed across Malapuzha river forms the reservoir for this project. The station utilises the irrigation release for the left bank canal together with spill. The installed capacity of the project is 2.5 MW and the annual generating capability is 5.6 MU.

1. **Urumi - I Small Hydro Electric Project (3.75 MW/9.72 MU)**

The installed capacity of the URUMI-1 is 3.75 MW and the annual generating capability is 9.72 MU. After power generation, water from the power station is utilised for Urumi II.

1. **Urumi - II Small Hydro Electric Project (2.4 MW/6.28 MU)**

The installed capacity of the project is 2.4 MW and the annual generating capability is 6.28 MU.

1. **Chembukadavu - I Small Hydro Electric Project (2.7 MW / 6.59 MU)**

The installed capacity of the project is 2.7 MW and the annual generating capability is 6.59 MU. After power generation, water from the power station is utilised for Chembukadavu II.

1. **Chembukadavu – II Small Hydro Electric Project (3.75 MW/ 9.03 MU)**

The installed capacity of the project is 3.75 MW and the annual generating capability is 9.03 MU. After power generation, water from the power station is flowing to Chaliyar river.

**(m)Chimmony Small Hydro Electric Project (2.5 MW/6.7 MU)**

The project utilizes the irrigation release of Chimmony dam in Chimmony river, a tributary of Karuvannur river. Power house was constructed near the toe of the dam. The installed capacity is 2.5 MW and the annual generating capability is 6.7 MU.

**(n)Adyanpara Small Hydro Electric Project (3.5 MW / 9.01 MU)**

The project envisages power generation by utilizing the potential of the stream, Kanjirappuzha, a tributary of Chaliyar located in Nilambur taluk of Chaliyar Panchayat in Malappuram. The installed capacity is 3.5 MW. The annual generating capability is 9.01 MU.

**Other Projects**

**44) Solar Power Projects**

**(Outlay: ₹800.00 lakh)**

KSEBL proposes to implement solar power plants at vacant land available at the sites of existing substations, powerhouses, rooftops of KSEB office buildings and in various government buildings. 8 MWp Clubbed Project in KSEBL land at Brahmapuram, Agali & Kanjicode is progressing. 0.60 MWp Kottiyam Solar PV project was commissioned on 24.01.2020. 70% of payment was made during 2020-21. The scheme was sanctioned under IPDS. Work awarded for 1 MW Mylatty Solar PV project KSEBL in the vacant land owned by KSEBL at 110kV substation, Mylatty for ₹5.82 crore. The project is expected to be commissioned by 2021-22. The work commenced for installing 1MW ground mounted solar project at Ettumanoor on 14.06.2016 but the project was held up as the approval for the construction of a control room in the project site was not received from the Government due to wetland issue. Now sanction received from the Government of Kerala and the project will be completed within January 2021. The Expected Annual Energy generation is approximately 1.4 MU. An amount of ₹800.00 lakh is provided for the solar power projects in the Budget 2021-22.

**45) Wind Farm**

**(Outlay: ₹10.00 lakh)**

KSEBL’s wind farm is located at Kanjikkode at Palakkad District. Installed capacity is 2.025MW. An outlay of ₹10.00 lakh is provided in the Budget 2021-22 for the maintenance works in capital nature at the existing wind project**.**

**46) Soura Project, KSEBL (Roof Top Solar Plants)**

**(Outlay: ₹1000.00 lakh)**

The Government of Kerala has launched the project “Soura” to add 1000MWp Solar Power Plants to the network of KSEB Ltd, under Urja Kerala Mission, a vision to develop the energy sector in the State to global standards and in line with the true spirit of National goal of achieving 100 GW of solar capacity by the year 2022. As part of the Soura project, KSEB Ltd aims to establish 500 MWp of Solar Power Plants by utilizing the Roof Top of domestic, public and private buildings including educational institutions, hospitals and commercial establishments.

**Soura Ist Phase 200 MW**

As first phase project tenders were invited for 200 MW RTS plants under both EPC (50 MW) and RESCO (150 MW) mode. 46.5 MW capacity on EPC mode has been placed with three contractors. In RESCO mode there was no participation in the tender and retendering (60 MW) steps were initiated.

In Phase 1 various business models as below are proposed:

1. KSEB will install and maintain the plant for 25 years and 10% energy will be given to the consumer free of cost for utilising rooftop
2. KSEB will install and maintain the plant for 25 years, incurring full cost by KSEBL and the energy generated will be sold to the consumer at fixed price for 25 years
3. KSEBL will set up the solar plant for the consumer after collecting cost of the plant from the owner. Excess energy after the consumption of the consumer will be settled at APPC rate approved by KSERC

**Present status**

Out of the 2.78 lakh consumers registered in Soura Phase – I Project, 42500 best roofs were selected, after conducting site survey. Project Implementation has commenced and work is progressing in about 160 sites across the State as on 15.10.2020 and the expected date of completion is March 2021.

**Soura Phase – II Subsidy Project**

The Ministry of New and Renewable Energy had announced the subsidy programme of setting up of 4000 MW of Grid connected Solar Roof Top Plants in residential sector with central financial support of the MNRE. The programme is part of the Government of India target to achieve cumulative capacity of 40,000 MW from Roof Top Solar (RTS) by the year 2022. MNRE have allocated 50 MW capacity under the subsidy programme for residential sector in phase II of the RTS programme for the year 2019-20 for KSEBL. Also 200 MW capacity is requested to MNRE, for 2020-21.

**Kerala Model**

In order to attract low paying consumers, without having to invest full amount than subsidy portion, Govt of Kerala has sanctioned Kerala Models. The scheme is applicable for 2 KW and 3 KW plants and for consumers having monthly consumption up to 200 units. The RTS plant cost is shared among Subsidy /CFA amount, Consumer and KSEB Ltd. Energy generated from the plant is shared between consumer and KSEB Ltd and consumer gets energy share proportionate to their investment. As on date, around 6000 consumers for 25 MW capacity is registered. As per GO (Rt) No. 87/2020 (Power), all Government Departments have been directed to explore the possibility for installing RTS plants in their buildings in order to meet electricity requirements in the buildings. Further the capital city of Thiruvananthapuram has been selected to be developed as ‘Green City’ in Kerala by the Govt. of India, whereby all energy needs of the city shall be met through renewable means and public transport shall be electric. An outlay of ₹1000.00 lakh is provided in the Budget 2021-22.

**47) Dam Safety Works Including DRIP (Externally Aided Project) (Outlay: ₹3300.00 lakh)**

Dam Rehabilitation and Improvement Project (DRIP) aims to improve the safety and sustainable performance of existing dams and associated structures with the assistance of World Bank through GOI.

12 HE projects consisting of 37 numbers of dams are selected under DRIP for KSEBL. The works include basic dam facilities, remedial measures and institutional strengthening. Basic facilities and remedial measures includes works relating to providing access to dams and structures, communication networks, installation of hydro metrological equipment, seismic observatories, instruction boards, surveillance boats, water level recorders, security and guard rooms, providing electrification and lighting of dams and rewiring, marking maximum water levels and planting FRL stones, providing generators, hydrographic survey units, studies on deflection, movements and settlement of dam body, seepage measurements, repair to gates and mechanical works to hoist structure, grouting and filling the cavities, arresting seepage with epoxy treatments, cement washing, providing pressure gauges, reaming of blocked drain holes, removal of sand and silt to restore the reservoir to its original capacity and other special repairs to different machinery such as crane, procuring spare wire ropes etc. Dam safety studies and desiltation works conducted by the Board are also included in the scheme. An amount of ₹3300.00 lakh is provided for the scheme in the Budget 2021-22.

**48) Survey, Investigation and Environmental Studies**

**(Outlay: ₹120.00 lakh)**

The Board regularly carries out survey and investigation works for identifying potential sites for setting up new hydroelectric projects, both small and large. Preliminary and detailed investigation and survey jobs are done initially, based on which Preliminary/Detailed Investigation Reports are prepared. For those projects which are found technically feasible and economically viable, detailed studies are then carried out to prepare Detailed Project Reports. An amount of ₹120.00 lakh is provided in the Budget 2021-22 for Survey, and Investigation of Mankulam Stage II, Meloram, Pambla and Keerithodu, Pallivasal Augmentation Scheme, Peerikappara, Perimpilavupuzha, Lower Poozhithodu & Upper Poozhithodu.

**49) Construction of Administrative Complexes and Mechanical Fabrication works**

**(Outlay: ₹3000.00 lakh)**

This includes the works connected with construction of various office complexes**,** section office buildings, store buildings**,** staff quarters and other buildings required for KSEBL.

A separate wing named SPIN (Sports, Pre-engineered Infrastructure and New construction technology Unit) is entrusted in carrying out the construction of various office buildings for KSEBL viz. Shornur Vydyuthi Bhavanam, Harippad Office complex, Manimala control room and Section Office, Section office building at Vizhinjam, Kuravilangad, Parippally, Charumood, Fort Kochi, Chenderi, Chirakkal, Guruvayoor, Alakkode, Koothattukulam, Thottabhagam, Thoppumpady and 2 cottages at Mankulam. Of which, some of them are completed and others are on-going. During 2021-22, construction of many more building for KSEBL is expected to be done. The outlay provided is for the construction of various office complexes, section office buildings, store buildings, staff quarters including the corporate office buildings, Vydyuthi Bhavanam, Pattom.

KSEB has three mechanical fabrication facilities viz. Central Mechanical Facility, Pallom and Mechanical Facilities at Angamaly and Kolathara. These units are responsible for steel fabrication works required for the Generation, Transmission and Distribution wings. The raw materials required for the units are procured mainly from public sector steel companies like SAIL and RINL, thus ensuring quality inputs for quality products. The provision is also made for the procurement of modern machinery, equipments & tools, construction of fabrication sheds, upgradation of mechanical facilities and steel fabrication works of KSEBL.

An amount of ₹3000.00 lakh is provided for scheme in the Budget 2021-22.

**50) IT Enabled Services**

**(Outlay: ₹400.00 lakh)**

For improving efficiency of operation and giving better services to the consumers, software packages catering to the requirement of various IT enabled services are being developed and implemented in KSEB.

The major IT enabled services proposed during the year 2021-22 are:

* Big Data Analytics - It is envisaged to develop a system for Big Data Analytics with an objective to transform data to knowledge base.
* Cyber Security projects - Implementation of advanced cyber security measures like Distributed denial of Service System, Web Application Firewall and Availing ISO Certification for the Data Centre/DR Centre.
* KSEB WAN/KFON- The scope of the project is to build a Wide Area Network across the State in order to provide high speed network connectivity for more than 30000 Government institutions all over Kerala and Internet facility for 20 lakhs households through OFC at last mile.
* Real Time Data Acquisition System (RT-DAS) for Non-SCADA Towns- The objective is to implement Feeder Remote Terminal Units (FRTUs) in the substations within the Non-SCADA towns for the automated measurement of SAIDI/SAIFI (Reliability Indices) to assess the reliability of power.

Other IT projects work includes IT Implementation in non R-APDRP areas, Maintenance of physical infrastructure for Disaster Recovery Centre, Procurement of Servers and accessories for various IT Projects not included in RAPDRP, Roll out of handheld devices in new Electrical sections & Maintenance of handheld devices for meter reading in non-RAPDRP Electrical Sections including spares. An amount of ₹400.00 lakh is provided in the Budget 2021-22 for the various IT enabled programmes.

**51) Institutional Development Programme**

**(Outlay: ₹55.00 lakh)**

Following programmes are included under Institutional Development Programme in the Budget 2021-22.

* Training of employees in the in-house training centres
* Training of employees in other training centres
* Setting up new training centres and other facilities

An amount of ₹55.00 lakh is provided for this scheme in the Budget 2021-22.

**TRANSMISSION**

**52) Transmission-Normal Works (Outlay: ₹30000.00 lakh)**

To meet the increasing demand and power evacuation requirements, KSEBL has taken up the construction of new substations and lines as well as up gradation of existing substations. Capacity enhancements through additional transformers are also proposed. An amount of ₹30000.00 lakh is provided for transmission normal works in the Budget 2021-22.

**53) Modernisation of Load Despatch Stations & Communication System and Relay (System Operation Works) (Outlay: ₹900.00 lakh)**

The work includes modernisation of Load Despatch Station at Thiruvananthapuram, Kalamassery and Kannur, modernisation of protection system and communication system.

The work envisaged, under this scheme, mainly include data acquisition from major generating stations and sub stations, associated works in the SCADA and computer networking, reservoir level monitoring from SLDC, other works at SLDC and modernisation and expansion of meter testing facilities for better energy accounting.

Proper and efficient relay protection scheme is inevitable for maintaining stable and reliable power system. For this, the Relay Wing has to be equipped with modern testing equipments. The project is envisaged for the modernisation of the relay testing equipments and acquisition of modern testing equipments.

The scheme is mainly for modernisation of PLCC. On commissioning of new stations and commissioning/rearrangement of EHT lines, additional PLCC equipments are to be provided. Protection couplers are necessary for major feeders. PLCC equipments, protection couplers, spares are to be procured for the proper maintenance of communication system. An amount of ₹900.00 lakh is provided for the scheme in the Budget 2021-22.

**54) Renovation and Modernisation of Hydro Stations (Outlay: ₹1500.00 lakh)**

Renovation, modernisation and life extension works are to be carried out in the older generating units that exceeded their normal life span of 35 - 40 years, in order to improve their performance and extend useful life. The renovation and modernisation of the following old hydro projects are proposed during 2021-22.

a) Sholayar HEP (54 MW)

b) Kuttiyadi HEP (75 MW)

c) Idukki HEP Stage-1(390 MW)

An amount of ₹1500.00 lakh is provided for the scheme in the Budget 2021-22.

**55) PSDF Works**

**(Outlay: ₹40.00 lakh)**

Providing last mile connectivity to all substations utilizing the funds under the reliable communication project comes under this scheme. Interconnecting the substations using 24/48 pair fiber optic cable and installation of terminal equipments are included in the scheme. Implementation of SAMAST project (Scheduling, Accounting, Metering and Settlement of Transactions of Electricity) is also envisaged under PSDF works. An amount of ₹40.00 lakh is provided for the scheme in the Budget 2021-22.

**DISTRIBUTION**

**56) Distribution – Normal/ Other funded works/ECSC (Outlay: ₹15000.00 lakh)**

An amount of ₹15000.00 lakh is provided in the Budget 2021-22 for normal, other funded works, estimated cost of works under distribution.

**57) Integrated Power Development Scheme (IPDS)**

**(Outlay: ₹50.00 lakh)**

Integrated Power Development Scheme (IPDS) launched by Ministry of Power, Govt. of India is for improving the distribution infrastructure of urban areas. The scheme covers works relating to strengthening and augmentation of sub-transmission & distribution network in the urban areas, metering of distribution transformers/feeders/consumers and IT enabling & strengthening in distribution. Power Finance Corporation has sanctioned DPR for ₹64.36 crore (60% of this amount will be converted to grant) towards implementation of 3,21,800 smart meters for consumers within IPDS towns for UDAY participating States. M/s. KPMG was appointed as the Project Management Agency. Notice Inviting Tender was published on 25.07.2018. The Request for Proposal document was published on 17.06.2019. 10 firms participated in the Pre-bid meeting convened on 27.06.2019. The technical bids were opened on 30.08.2019. Only M/s. United Electrical Industries Ltd. participated in the tender. The Pre-Qualification Committee Meeting decided to proceed with re-tendering by modifying the RFP document. The PMA is still working on the modifications of the RFP document. An amount of ₹50.00 lakh is provided in the Budget 2021-22 for meeting the expenditure of remaining works of IPDS.

**58) Enterprise Resource Planning**

**(Outlay: ₹400.00 lakh)**

Enterprise Resource Planning allow KSEB to use a system of integrated applications to manage the business and automate many back office functions related to accounting, material management and human resources. The project was conceived as a Centrally Sponsored Scheme under IPDS. An amount of ₹42.64 crore (60% is grant) has been sanctioned by PFC on 7.2.2018 based on the DPR submitted by KSEB. The project implementation period is 30 months. An amount of ₹400.00 lakh is provided in the Budget 2021-22.

**59) Flood Resilient construction works**

**(Outlay: ₹700.00 lakh)**

In 2018, Kerala witnessed unprecedented torrential downpour which subsequently lead to landslides and flood. In 2019 also similar situation prevailed. This indicate that Kerala is becoming more prone to geological surprises. KSEB Ltd was one of the worst flood hit utilities in the State during 2018 & 2019. It sustained losses in all fronts viz. Generation, Transmission, Distribution. During the Mid Term Review Meeting by the State Planning Board, it was suggested that KSEB should consider flood resilient constructions in future. An amount of ₹700.00 lakh is provided in the Budget 2021-22.

**60) Dyuthi**

**(Outlay:** ₹**40000.00 lakh)**

Dyuthi is the medium term project commenced during 2018-19 to modernise the distribution grid of KSEBL. The total outlay of the project is ₹4036 crore. The objectives of the project are to provide uninterrupted, quality power to all and to bring down the technical and commercial losses. Dyuthi 2021 has given more focus on reliability, loss reduction and safety. Special components like providing insulated/covered conductors, reconductoring, standardisation, extensive use of switches in HT network, replacement of old and worn out conductors with optimally sized ACSR conductors, standardisation of lines and plants, emphasis to earthing of neutral conductors at regular intervals in LT network, earthing of metal parts of poles in HT network, communicating fault pass detectors (CFPD) and High Voltage Distribution System (HVDS) took prominent place in distribution. Medium term project planning, GIS map preparation and DPR formulation were new for distribution works. An amount of ₹40000.00 lakh is provided in the Budget 2021-22 for the works under Dyuthi.

**61) EV Charging Stations (NEW)**

**(Outlay: ₹70.00 lakh)**

KSEBL is designated as the State Nodal Agency to ensure deployment of E-Vehicle charging stations across the State. KSEBL has planned to set up 32 charging stations covering all districts of the State for ensuring state wide charging facility for e-Vehicles. 6 charging stations were completed and balance are in progress. Tender for installing 26 EV charging stations (by GoK) in various districts in final stage. Work will be awarded shortly. Central Govt has given inprinciple approval for installing EV charging stations in 131 Stations in Thiruvananthapuram, Kochi and Kozhikode districts on experimental basis. Work for 30 Nos will commence shortly.

An amount of ₹70.00 lakh is provided in the Budget 2021-22 for meeting the expenditure of EV Charging Stations.

**STATE PLAN SCHEMES**

**62) Innovation Fund and ESCOT (Energy Saving and Co-ordination Team) (Outlay: ₹2320.00 lakh)**

The objective of the scheme is to promote and practise innovations as well as energy saving activities in the power sector. KSEBL has been providing financial and technical support to selected innovators and entrepreneurs in the Power sector through the Energy Open Innovation Zone in Start up Village. Energy Savings Co-ordination Team (ESCOT) of KSEBL is actively involved in the various energy conservation and demand side activities including energy audit and industry institute interaction programmes. An amount of ₹2320.00 lakh is provided in the Budget 2021-22 as State share for Innovation fund and ESCOT.

**Innovation Fund & ESCOT**

The proposed projects under Innovation Fund and ESCOT for the year 2021-22 include Pilot projects (1) Implementation of Enterprise Resource Planning to integrate varied organizational systems & facilitate error-free transactions across multiple organizational business functions (matching share), (2) Tidal and Wave Energy projects - proposed to invite expression of interest for tidal & wave energy projects, (3) Implementation of Smart grid pilot project in Kochi city, (4) VGF Spillover commitments (5) Other innovative Renewable Energy Projects and (6) implementation of improvement of Distribution Transformer (DTR) Stations and High Voltage Distribution System (HVDS) under ESCOT. An amount ₹2320.00 lakh is provided in the Budget 2021-22.

**63) Transgrid 2.0 (New Generation Transmission Infra)**

**Up-graded State- of -the - art: Two tier Transmission Infrastructure for Kerala**

**(Outlay: ₹1.00 lakh)**

In order to address the intra-state transmission issues, KSEBL is planning to establish an innovative transmission system, Transgrid 2.0, in the 400 kV and 220 kV levels, for intra state system strengthening up to year 2023 period. Also, additional system strengthening schemes are envisaged at the sub transmission levels, like revamping/updating existing corridors, construction of new substations & lines and interlinking existing corridors etc in an optimal manner with minimum additional land requirement utilising the latest technological innovations and construction methods.

The total project cost of Trangrid 2.0 is ₹9425.37 Crore. Government has given administrative sanction on 06.10.2016 for an amount of ₹6375 Crore for the works coming under Phase-I and Phase-II of the Transgrid 2.0 project and included the project for funding under the KIIFB. An amount of ₹1.00 lakh is provided for Transgrid 2.0 as token provision during 2021-22 to take up any complementary works associated with the project.

**5.2 NON-CONVENTIONAL AND RENEWABLE SOURCES OF ENERGY**

Energy can be generally classified as non- renewable and renewable. Over 85% of the energy used in the world is from non-renewable supplies. Most developed nations are dependent on non-renewable energy sources like fossil fuels (coal and oil) and nuclear power. The other renewable or potentially renewable sources are solar, geothermal, hydroelectric, biomass and wind. Most developing countries have abundant renewable energy resources. The main objective of the sub sector is to give thrust on the development of Renewable Energy as well as Energy efficiency through various programmes.

The implementing and regulating agencies associated with the non-conventional and renewable sources of energy in Kerala are (i) Agency for Non-conventional Energy and Rural Technology (ANERT), (ii) Energy Management Centre (EMC) and (iii) Meter Testing and Standards Laboratory (MTSL). Details of programmes /components included in each sub sector are given below:

**5.2.1) AGENCY FOR NON-CONVENTIONAL ENERGY AND RURAL TECHNOLOGY (ANERT)**

**(Outlay ₹4313.00 lakh)**

Agency for Non-conventional Energy and Rural Technology (ANERT) established by the Govt. of Kerala is functioning as an autonomous body under Power Department. The vision of ANERT is to harness maximum possible Renewable Energy to offset consumption of conventional electricity and fossil fuels. ANERT is the nodal agency for the propagation and implementation of program/projects under renewable and potentially renewable energy sources, rural technologies and promoting the idea of Carbon neutral governance for government institutions with renewable energy and electric-mobility.

During 2021-22, ANERT gives more emphasis to promotional activities in order to achieve the ambitious target of 1000 MW through solar power with massive people’s participation. This would mostly be through solar rooftop and ground mounted systems. The funds for the solar power plants would be mobilised from the government institutions, private entities and individuals who would be the beneficiaries of the systems, and from the Government of India. IPP and RESCO mode systems would also form a part of the total capacity added. Promotional and support measures are also required to mobilise the funds.

An amount of ₹4313.00 lakh is provided for ANERT in the Budget 2021-22 for the following three ongoing schemes. The specific programmes/components proposed in the schemes are to be implemented on project mode covering implementation costs. Upcoming technologies such as renewable energy with storage, wave energy, hydrogen/fuel cell, new storage technologies, rural technologies etc. would also be evaluated through demonstration projects.

1. **Programmes on Renewable Energy**

**(Outlay:** ₹**2026.00 lakh)**

The specific programmes under this scheme are 1) Solar power plants in Public buildings 2) e Mobility and 3) Promotion of renewable energy systems.

**A1. Solar power plants in Public buildings**

On-grid/ hybrid solar power plants will be established in public buildings aiming at reducing the dependence on imported fossil fuel based electricity. This could be in any of the following modes:

1. **EPC mode - partnering public buildings consuming energy** - ANERT proposes to establish solar roof top power plants in major public buildings ensuring green energy partnering with various departments/ organizations, targeting 1.5 MW during 2021-22. Part of the funds (maximum 10%) would be met by ANERT and the rest by the respective institutions. This will be one of the main thrust areas for Carbon neutral governance. An amount of ₹300.00 lakh is provided in the Budget.
2. **ANERT as RESCO -** Taking the role of Renewable Energy Service Company, ANERT will establish Solar Roof top Plants in Public Buildings in own and operate mode. The capital cost will be recovered from Departments/ Agencies as a portion of the monthly energy charges currently being paid by them during the project life cycle. The capital cost recovered will be redeployed in upcoming years to scale up the programme. Solar power plants of 5 MW capacity are expected to be established in this mode. An amount of ₹290.00 lakh is provided during 2021-22.
3. **IPP mode (revenue sharing with Departments/ Agencies)** - ANERT will establish and operate solar power plants in unutilized/unproductive lands of Departments/Agencies on revenue sharing mode against competitive tariffs of the energy produced. This could be prioritized till at least the renewable energy obligations targets are met by redeploying the revenue share collected by ANERT in scaling up the project. An amount of ₹270.00 lakh is provided during 2021-22.
4. **Changing off-grid solar plants in Govt buildings to on grid plants**

To convert the off-grid solar power plants installed in Govt. owned buildings to grid connected power plants on expiry of the 5 year comprehensive warranty period. Off-grid solar power plants installed by ANERT under demonstration scheme and deposit work scheme of aggregate capacity 140 kW shall be converted into on grid with the consent of the beneficiaries. An amount of ₹255.00 lakh is provided during 2021-22.

1. **Solar thermal including CST/drier/Biomass steam generation systems in government/ public institutions – demonstration/ pilot – new technologies – support for projects – initial phase**

It is proposed to install solar concentrator/biomass based steam generation systems in the institutions of Govt. / Quasi Govt. / Public sector / Private sector/ LSG’s for the purposes of community cooking, industrial steam generation applications or for drying purpose. The objective of the scheme is to popularise the application of the advanced solar concentrator technology systems in the State by identifying potential public institutions and studying the feasibility. Depending on the size of the system proposed, DPR shall be prepared in house or through MNRE approved agencies. The target proposed is 500 sq. metre of solar concentrator area. An amount of ₹230.00 lakh is provided in the Budget.

**A2 Solar power plants in private buildings/lands**

* 1. **IPP mode (Incentives to IPP’s)** - ANERT will identify, promote and facilitate IPP’s in establishing solar power plants in unutilized lands/abandoned mines/quarries through capital incentives in the form of Viability Gap Funding. 5 MW power plants would be set up under the mode. An amount of ₹270.00 lakh is provided during 2021-22.
  2. **Urja Kerala Mission - Rooftop solar programme (Soura)**

“Urja Kerala Mission” announced by Govt of Kerala proposed as a joint venture between ANERT and KSEB, has targeted 1000 MW from Solar Power by 2021. Out of this a target of 500 MW from the roof top solar is to be achieved in 3 years. During 2021-22, ANERT proposes to implement 15 MW of solar rooftop projects on EPC mode and RESCO mode. An amount of ₹80.00 lakh is provided in the Budget for the programme.

**A3. e - Mobility**

1. **Solar EV charging stations (100 kW)**

Electric vehicles are set to become the main mode of transportation in a few years. Government of Kerala has designated ANERT as the nodal Agency for hiring of E-Cars through EESL. Lack of public EV fast charging stations is a major constraint for the implementation of E-car project. Currently the charging of the electric vehicles is done using conventional electricity. For proper green electric cars, the charging has to be done from renewable energy sources. During 2021-22, ANERT proposes to give incentives for the individuals, agencies, NGO's, hotels, restaurants etc for the installation of solar powered public EV fast charging stations. 5kW to 50kW on grid/off grid/hybrid solar public charging stations would be eligible for subsidy based on guidelines/business models on cost of solarisation to address the demand of electric vehicles charging stations. An amount of ₹81.00 lakh is provided in the Budget 2021-22.

1. **e-Mobility – Electric Cars on hire project**

During 2021-22, ANERT is planning to distribute 500 nos. of e-cars to various Govt. departments. Training to the drivers of e-cars, publicity and awareness programmes for the implementation of the e-cars is required for the smooth implementation of this project. An online portal and separate software will be developed for the public EVCI and lease contract of e- cars project.

ANERT has made available e-cars with driver in most ANERT district offices and 3 models of e-cars in ANERT HQ, demo of e-cars to be supplied to the various departments and institutions, as an alternative to the existing hired ICE cars. This will help users to get familiarised with the new e-cars. An amount of ₹35.00 lakh is provided for e Mobility during 2021-22 to meet expenses connected with PR campaigns, web portal, training and allied activities to scale up use of e-cars.

**A4. Promotion of renewable energy systems**

1. **Renewable Energy Systems for Disaster Relief / camps**

Uninterrupted power supply is a major concern in Disaster Relief Camps. Therefore, ANERT proposes to equip selected disaster relief camps in each district with RE systems comprising solar power plant, solar water heater, biomass/solar cookers, biogas plants and/or provide portable systems for relief operations. An amount of ₹35.00 lakh is provided in the Budget for the purpose.

1. **Saura Suvidha kits distribution through UrjaMithra centres, BuyMySun portal**

To meet minimum scale domestic power demand during natural/other disasters, ANERT proposes to make available “Soura Suvidha kit” powered by solar energy in households. The device consists of emergency light, mobile phone charging facility and FM radio with solar powered battery backup and can also be used for SC/ST colonies, forest department and general beneficiaries who have frequent disruption of electricity from grid. The cost of the unit will be collected from beneficiary and used as revolving fund to scale up the program in all districts. An amount of ₹30.00 lakh is earmarked in the Budget 2021-22.

1. **Solar pumping scheme for farmers**

This project aims to solarise grid connected agriculture pumps. Solarisation would reduce dependence of these pumps on conventional electricity thus reducing the requirement of subsidised electricity for agriculture and provide additional source of income to farmers who will be in a position to sell the surplus power to the utility. As per the PM - KUSUM project of MNRE, Govt. of India, two schemes are sanctioned to ANERT for installing solar pumps by farmers for agricultural purpose.

* 1. **Component-B of PM -KUSUM**

30% of subsidy will be given by MNRE for the installation of stand-alone solar pumps in unelectrified areas and replacement of existing diesel pumps. In Kerala, the number of beneficiaries for this project is very less compared to other states as most of the agriculture lands are electrified. State subsidy up to a maximum of 30% is proposed for the implementation of this project based on viability gap funding mode developing suitable financial models with guidelines. In 2021-22, 100 nos. are proposed. An amount of ₹35.00 lakh is provided in the Budget.

* 1. **Component-C of PM - KUSUM**

30% subsidy will be given by MNRE for the solarisation of existing pump set of farmers. Most of the agricultural connections in Kerala are free connections. So most of the farmers are not interested in implementing this project with 40% beneficiary’s share. The project can be popularised with upto of 30% matching subsidy by State based on viability gap funding mode developing suitable financial models with guidelines. In 2021-22, 100 nos. are proposed. An amount of ₹35.00 lakh is provided in the Budget.

* 1. **Small Stand-alone Solar Pump**

Small solar pump of 0.5 hp capacity is sufficient for the irrigation of 10 cents to 100 cents land. The cost of the pump is about ₹60,000/-. A subsidy of ₹10,000/- per 0.5 hp pump, is envisaged under the programme, so that farmers can be taken into confidence to install this pump for their irrigation purpose. During 2021-22, ANERT is planning to install 300 nos. of such pumps for the irrigation purpose and will also explore MNRE subsidies. An amount of ₹50.00 lakh is provided in the Budget.

**d. Biogas and biomass projects**

Community biogas projects are effective in disposing of biodegradable waste. ANERT proposes to set up projects to dispose biodegradable waste in partnership with other institutions. Based on the availability of biomass, projects to utilise such material either directly generating energy or through pelletisation for ease of transportation and use at other locations would be set up. An amount of ₹30.00 lakh is provided in the Budget.

An amount of ₹2026.00 lakh is provided in the Budget 2021-22 for implementing the above programmes under the scheme ‘Programmes on Renewable Energy’.

1. **Renewable Energy Public Engagement, Outreach, Studies & Development**

**(Outlay:** ₹**468.00 lakh)**

ANERT aims to create a conductive environment or eco-system for renewable energy development in the State through various facilitation and support measures. An amount of ₹468.00 lakh is provided in the Budget 2021-22 for the following specific components. The specific programmes under this scheme are 1) Outreach Programmes and 2) Accreditation, electronic marketplace, insurance. 15 per cent of the outlay of the scheme may be utilized for the programmes focussing women.

**B1.****Outreach Programmes**

1. **Promotional and outreach programm**es

The cost of power from renewable sources has come down and is almost equal or in certain special cases less than the cost of conventional power. The share of renewable energy in the State is below 10%. So by making the people aware of the relevance of renewable energy sources, a significant change in the energy use pattern is possible. The public needs to be made aware of the benefits of using Renewable Energy devices if the goal of sustainable development is to be propagated. To create awareness on Renewable Energy, many promotional and outreach programmes are carried out by ANERT. The programmes include awareness classes, participation & conduct of exhibitions, advertisements, helpdesk facility, partnering with media schools, involving as faculty for many training programmes of other academic institutions and research institutions. An amount of ₹130.00 lakh is provided in the Budget.

1. **Kerala State Renewable Energy Award**

ANERT have introduced “Kerala State Renewable Energy Awards” from 2017-18 onwards in areas like outstanding contribution in Renewable Energy (individual), industrial units, commercial consumers, education institutions, public institutions, non- profit organisations, local self- governments, research and innovations, RE power industry and individuals. The Renewable Energy Awards 2021 will consider activities undertaken in the State of Kerala, from 1st April 2020 to 31st March 2021. An amount of ₹55.00 lakh is provided in the Budget for Renewable Energy award and related activities during 2021-22.

1. **Supporting system for implementing RE Projects at District level**

Selection of appropriate Renewable Energy projects & devices and providing technical support suitable for the public and institutions is an important issue in the field. Considering this, it is proposed to enhance facilitation support in all districts by strengthening the existing district level setup. This system will help efficient implementation of renewable energy projects in local self-governments, other institutions and the public. The activities include visits to the concerned institutions and preparation of feasibility reports, including support and utilisation of the services of Urja Mithra centres. An amount of ₹140.00 lakh is provided in the Budget.

**B2. Accreditation, electronic marketplace, insurance**

1. **eMarketplace – updation and maintenance**

ANERT had established the e-Market place portal for anyone in Kerala to get the details and order a renewable energy system online. The portal with extensive integration with other portals like Aadhaar, MNRE, KSEBL, NGO Darpan, payment gateway, NPCI (for DBT through SBI), etc. and mobile apps has greatly streamlined the installation of renewable energy devices, including those with subsidy. Updation of the e -Marketplace as per upcoming requirements is essential. An amount of ₹23.00 lakh is provided during 2021-22 for meeting the expenses related to modifications to be made in the portal and its workflow/ official backend PMS such as interface updates, integration with K-Swift and Chief Electrical Inspector’s Suraksha portal.

1. **Extending insurance coverage for RE systems installed through buymysun and systems registered through SouraVeedhi mobile application of ANERT**

It is proposed to provide insurance coverage for all renewable energy systems procured through ANERT's eMarketplace platform, viz. BuyMySun. All renewable energy systems and devices registered through the SouraVeedhi mobile application shall have insurance coverage for one year on damages to systems during natural calamities. An amount of ₹50.00 lakh is expected to be the insurance premium for the purchase of devices worth one lakh rupee. An amount of ₹35.00 lakh is provided for the purpose in the Budget 2021-22.

1. **Empanelment / accreditation of vendors:**

RE system integrators/ manufacturers who meet the stringent conditions set by ANERT would be empanelled for ease of implementation. In addition to ensuring quality of the systems, there would also be price control mechanism through this process. An amount of ₹25.00 lakh is provided in the Budget.

1. **Infrastructure upgradation for project implementation**

Existing infrastructure of ANERT such as IT and smart building needs upgradation to meet the changing technology and the new modes of project implementation. An amount of ₹60.00 lakh is provided in the Budget for meeting expenses related to upgrading IT infrastructure including introducing biometric systems in HQ and in district offices, upgrading smart building of HQ including renewable energy systems and E-governance activities

An amount of ₹468.00 lakh is provided in the Budget 2021-22 for implementing the above programmes under the scheme ‘Renewable Energy Public Engagement, Outreach, Studies & Development’.

1. **ANERT as Knowledge Hub for Renewable Energy**

**(Outlay:** ₹**1819.00 lakh)**

The specific programmes under this scheme are 1) New technology development, demonstration, pilots, studies 2) Laboratory and other facilities and 3) Training and Capacity building and 4) Infrastructure upgradation.

**C1. New technology development, demonstration, pilots, studies**

1. **Renewable Energy park, Ramakkalmedu – phase 2 continuation**

Ramakkalmedu project was initiated during 2017-18 to demonstrate and study the effectiveness of the integration of different sources of power with massive storage to dispatch quality power to the grid. It is targeted to complete the installation of 1 MW solar power plant in 2020-21. In the next phase, energy storage would be added to work it as a despatchable generating station. Later on, wind generators would be installed on completing the micrositing process. An amount of ₹430.00 lakh is provided during 2021-22.

1. **Evaluation of new technologies in RE and in-house R&D projects**

Pilot /demonstration plants of new/ upcoming renewable energy technology and storage systemsin theareas of solar, small wind, bio energy, wave energy, building and vehicle integrated PV will be set up for study and evaluation. This would facilitate technology adaptation and developing commercial models. The second phase of the Battery-intervention power supply (BIPS) project is also planned.

Battery Operated Vehicles (BOVs) are being used in increasing numbers, but the time it takes to get fully charged from the grid is a disadvantage in long distance travel. Fuel Cell Electric Vehicles (FCEVs), which use hydrogen that can be filled up in a few seconds is an alternative. Pre-feasibility studies for a pilot project including demonstration hydrogen plant, and preparation of DPR is planned. An amount of ₹280.00 lakh is provided during 2021-22.

1. **Micro-grid with multiple renewable sources, small wind/ hybrid, floating solar**

Some stand-alone micro-grids have been set up by ANERT more than 15 years back using solar in un-electrified areas. Now a hybrid micro-grid have been set up by CDAC with ANERT support. It is proposed to have pilot demonstration projects utilising multiple sources of energy including solar, micro-hydel, wind, etc. This could be grid-tied and support the grid, especially in tail-end areas. An amount of ₹180.00 lakh is provided during 2021-22.

1. **Resource assessment, micrositing and related activities**

ANERT regularly carries out resource assessment of various renewable energy sources within the State. Wind masts were set up at various points across the State to study wind energy potential in collaboration with NIWE (MNRE). Solar resource assessment stations were also established in 4 locations linked to the national network of NIWE-MNRE. These are essential for accurate generation forecast from renewable energy plants, since their share in power generation is becoming significant. Now, it is proposed to explore possibilities of resource assessment and feasibility of wave energy, which is complimentary to solar energy. An amount of ₹180.00 lakh is provided during 2021-22.

1. **Supporting R&D and Innovation**

To promote R&D and innovative ideas and to pilot new models in RE sector, ANERT proposes to give financial assistance to technical studies, technology appraisal, prototype development etc., as per the recommendation of expert committees. It is proposed to have arrangements with reputed institutions to conduct research on areas identified by ANERT and to invite a few innovative proposals. Attractive proposals in relevant areas from other institutes/individuals could also be considered on a case to case basis after evaluating and identifying feasibility. An amount of ₹170.00 lakh is provided in the Budget for supporting R&D and Innovation.

**C2. Laboratory and incubation facilities**

1. **Laboratory for Test and Certification - Phase II.**

A project to set up a renewable energy laboratory to serve as an innovation hub for renewable energy has been initiated with the services of STIC- CUSAT. Besides providing facilities for in-house R&D activities, it would be developed as an accredited test and certification laboratory for renewable energy products. During 2021-22, the additional facilities proposed to be added to the solar lab are for testing of PV modules. The equipments required are sun simulator, IV tracer and electroluminescence tester. An amount of ₹300.00 lakh is provided in the Budget.

1. **Integrated Renewable Energy Knowledge Hub, Kuzhalmannam - Incubation Hub**

ANERT has land available at Kuzhalmannam. The 2 MW solar power plant is operational. It is proposed to develop an incubation hub here. Identification of a consultant for preparing a DPR for basic infrastructure and modelling the incubation hub partnering with reputed institutions is proposed in 2021-22. An amount of ₹60.00 lakh is provided in the Budget.

**C3. Training and Capacity building**

1. **Training programmes**

Training is necessary to all stakeholders and ANERT’s officers in Renewable Energy sector, to have exposure on new developments in the renewable energy field. Seminars, business meet and training programme can be organised for various target groups like students, local body institutions, educational institutions, residence association, church, builders and architects, electrical and electronics technicians.

To ensure quality products and good installation practices, support of technical experts and skilled persons are required. Since the availability of certified inspectors is limited, ANERT will initiate training/capacity building programmes through technical institutes approved by the ‘Skill Council for Green Jobs’ to generate more technical hands in the field.

ANERT is planningto organise high end short-term training programmes for academics, senior officials of renewable agencies and other institutions. Training for engineering students with hands-on experience is also planned to be initiated. An amount of ₹179.00 lakh is provided in the Budget.

**b. Development of new business models and commercialisation of new technology**

Most of the technologies in Renewable Energy are being promoted by incentivising and providing financial assistance. Evolving new business models and making it commercially viable will help to increase the momentum of propagation. In 2021-22, it is proposed to take up commercial projects and to establish technical training facility for various stakeholders. This will support the commercialisation of existing and development of new and commercially viable technologies. An amount of ₹40.00 lakh is provided in the Budget.

An amount of ₹1819.00 lakh is provided in the Budget 2021-22 for implementing the above programmes under the scheme ‘ANERT as Knowledge Hub for Renewable Energy’.

**5.2.2)** **ENERGY MANAGEMENT CENTRE (EMC)**

**(Outlay:** ₹**763.00 lakh)**

EMC is the nodal agency for promoting/ implementing energy conservation activities in order to enhance efficient energy management in the State. The mission of EMC is to enhance energy efficiency through energy conservation and management. Energy saving measures in various Government departments, establishments, Industry, commercial buildings, domestic sector, encouraging development of technologies related to energy management through research, training, demonstration programmes and awareness creation are the main areas of focus. The EMC will also develop guidelines and rules to be followed in new building infrastructure of the State, to adopt energy conservation techniques.

In the Budget 2021-22, an amount of ₹763.00 lakh is provided for the following schemes.

1. **State Energy Conservation Awards.**

**(Outlay:** ₹**10.00 lakh)**

Energy Management Centreisoperating the Kerala State Energy Conservation Award programme, instituted by Government of Kerala to make energy end-users aware of the importance of energy conservation and to recognise best performers in the field of Energy Efficiency and Energy Conservation. Scholarship will be given to the participants from the award winning organisations to participate in the courses offered by Energy Management Institute, EMC. The scheme also covers best practices case sharing programmes, presentation of EE projects of award winners, visit/virtual visit to facilities of Energy Conservation Award Winners, video documentation of best practices and publication of best practices & souvenir. This would create interest to propagate and promote the efforts and projects in energy efficiency and energy conservation. An amount of ₹10.00 lakh is provided for the implementation of the above activities during 2021-22.

1. **Energy Conservation Activities**

**(Outlay:**₹**278**.**00lakh)** The scheme includes i) Capacity Building and Awareness Creation ii) Energy studies and audits in MSMEs owned by women iii) Energy Optimization of tiny and small- scale energy consumers and iv) Promotion of Energy efficiency projects

Capacity building and awareness programmes on energy efficiency and energy conservation in various sectors such as Industrial, domestic, educational, commercial, transportation and agricultural via digital platforms in webinar mode are envisaged.

The programme envisages energy studies and audit services in the MSMEs owned by women entrepreneurs. Through this program, it is also envisaged to provide dedicated capacity building programs to the women entrepreneurs in the field of energy efficiency and energy conservation.

The tiny and small- scale workshops do not possess the necessary skillsets to implement EE. Utilising the services of Registered Energy Auditors/CEA/CEM/Electrical Supervisor Permit holders, the potential areas for energy optimisation can be identified.

It is envisaged to identify energy saving projects through energy audits in PWD operated public buildings. For those buildings and other enterprises not operated by PWD, EMC directly or in association with ESCOs will undertake energy studies preferably through ESCO route.

An amount of ₹278.00 lakh is provided for the implementation of the above activities/ programmes during 2021-22. Out of which ₹50.00 lakh is exclusively provided for the programmes focusing women.

1. **Infrastructure Development and Institutional Strengthening**

**(Outlay:** ₹**100.00 lakh)**

The scheme covers activities of Energy Management Institute, Energy Efficiency Entrepreneurs facilitation centre, Up-gradation of IT infrastructure, Maintenance and up keeping of GOLD rated building, HRD Programmes and NABL accredited Testing Lab.

Energy Management Institute’s activities include design, coordinate and deliver various courses on Energy Management, Energy Audit, skill development programs, promotion of the Research & Development. It is also proposed to offer certificate courses and diploma/ PG Diploma courses.

It is envisaged to promote entrepreneurship in the field of energy efficiency and management. It is envisaged to offer facilities such as testing and calibration, business facilitation, computing, data bank, library and documentation, communication, seminar hall/conference room, common facilities and common utility services.

IT infrastructure, NABL accredited Testing Lab, procurement of new equipment to meet the technological advancements, strengthening of library, periodical maintenance of the green building are included in infrastructure development. Training and capacity building of employees in the area of energy conservation is also covered under the scheme.

An amount of ₹100.00 lakh is provided for the implementation of the above activities during 2021-22.

1. **Kerala State Energy Conservation Fund**

**(Outlay:** ₹**375.00 lakh)**

The objective of the programme is to support the development of innovative methods and techniques in implementing small hydro power in the State. The scheme covers the following activities/programmes

* Energy Conservation Fund: - It is proposed to operate schemes through financial institutions offering soft loans which will in turn act as a revolving fund which is envisaged in EC Fund rules. It also envisioned to operate as On- bill financing (OBF) and repayment (OBR) scheme which is the financing options in which EC fund is utilised for energy efficiency projects and is repaid through regular payments on an existing utility bill or similar financial schemes. The funding will be carried out in the following projects (a) Energy efficiency projects in MSME and SME sectors (b) Propagation of energy - efficient appliances, electric vehicles (c) Replacing inefficient pumps with energy - efficient pumps. Also, it is planned to carry out impact assessment study of the energy conservation programmes and projects implemented in the State.
* Small Hydro Power – Under this, interconnection of micro grids and integration of clustered micro grid with utility grid is envisaged. Inter connection of SHP and solar power plant into the micro grid is envisaged to improve the reliability and resiliency of power systems.

In addition, it is proposed to carry out coordination activities for private sector implementation of SHP projects including own land category projects. It also envisages to empanel Pico Hydel Equipment manufacturers and integrators for implementation of Pico Hydel Projects for small scale electricity generation activities.

* River basin study: - Total river basin study to identify and prioritise the possible SHP sites within individual river basin. DPR preparation of selected sites is envisaged under this scheme to identify the possibilities and opportunities of alternative power generation.

An amount of ₹375.00 lakh is provided in the Budget 2021-22 for implementing the programmes.

**5.2.3) METER TESTING AND STANDARDS LABORATORY (MTSL)**

**(Outlay:** ₹**560.00 lakh)**

The Electrical Inspectorate is functioning under the Department of Power, Government of Kerala. Safety inspections are carried out and sanction for energisation of all HT/ EHT and other medium voltage installation in the State are carried out by this department. Inspection of all electrical accidents in the State and preparing the enquiry report for Government covering actions against responsible person/authority are done by this department.

An amount of ₹560.00 lakh is provided in the Budget 2021-22 for Meter Testing and Standard Laboratory, Thiruvananthapuram for the following programmes.

1. **Meter Testing and Standards Laboratory**

**(Outlay:** ₹**360.00 lakh)**

* Procurement of Testing equipments / Instruments for Inspecting officers for Meter Testing and Standards Laboratory, Thiruvananthapuram and Regional Meter Testing Laboratories
* Construction of the building for District office in Malappuram - “Suraksha Tower”
* Expenses required for maintaining SQMS certification (IS 15700: 2005) accredited by the Bureau of Indian Standards and maintaining all Offices as per SQMS Norms
* Upgradation of IT infrastructure - upgradation of SURAKSHA software, procurement of AutoCAD software for verification of electrical drawing and Annual Maintenance Contract.
* Development of online software for Kerala State Electricity Licensing Board - 2nd phase
* Expenses required for maintaining NABL Accreditation of MTSL and Regional Meter Testing Laboratories.
* Technical Quality Improvement Programme - Training programmes and digital library

An amount of ₹360.00 lakh is provided for the above activities during 2021-22.

1. **Effective Implementation of Quality Control Order**

**(Outlay:** ₹**100.00 lakh)**

* Testing facilities for the samples seized under Quality Control Order inspection and QCO awareness programmes
* E-mobility - Hiring of vehicles in all districts for conducting statutory QCO inspections periodically.
* Developing web portal as an e-market place for quality certified products/appliances.

An amount of ₹100.00 lakh is provided for the above activities during 2021-22.

1. **E-Safe Kerala**

**(Outlay:** ₹**100.00 lakh)**

The scope of the scheme is to conduct awareness to the general public and workman on Safety Practices and to insist on observing rules and standard practices to ensure Electrical Safety preventing electrical accidents in the State.

Electrical Safety Awareness Programmes and awareness through visual, audio media and print advertisement are included in the scheme E-safe Kerala.

The components of safety awareness programmes include electrical safety week celebration, interactive classes by trained officers in 14 districts for residential association, Panchayath and schools, programmes to educate the ward level Asha workers / Kudumbasree workers in all Panchayath to propagate the message of electrical safety to all households, exhibitions, training programmes to electricians/wiremen/ supervisors and other stakeholders in Energy Sector and safety audit. The scheme also includes safety awareness through visual/audio media and print advertisement.

An amount of ₹100.00 lakh is provided for the above activities during 2021-22.