

KERALA STATE ELECTRICITY BOARD LIMITED



**Petition for approval of
ARR, ERC, Tariff Proposal
& Capital Investment Plan
For Control Period 2018-22**

PART – I : ARR, ERC & Tariff

Vydyuthi Bhavanam, Pattom, Thiruvananthapuram

KERALA STATE ELECTRICITY BOARD LIMITED

**AGGREGATE REVENUE REQUIREMENT & EXPECTED REVENUE FROM CHARGES
AND PROPOSAL FOR BRIDGING THE REVENUE GAP
FOR THE CONTROL PERIOD FROM 2018-19 TO 2021-22**

SUMBITTED TO

**HON KERALA STATE ELECTRICITY REGULATORY COMMISSION
THIRUVANANTHAPURAM**

SUBMITTED BY:

KERALA STATE ELECTRICITY BOARD LIMITED

VYDYUTHIBHAVANAM, PATTOM, THIRUVANANTHAPURAM – 695 004

BEFORE THE KERALA STATE ELECTRICITY REGULATORY COMMISSION

At its office at C V Raman Pillai Road, Vellayambalam, Thiruvananthapuram

FILING No. /2018

CASE No.

IN THE MATTER OF:

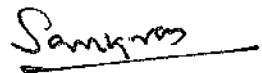
Application for approval of the Aggregate Revenue Requirement (ARR) and Expected Revenue from Charges (ERC) for the control period from FY 2018-19 to FY 2021-22 under section 64 of the Electricity Act 2003

AND

IN THE MATTER OF:

Kerala State Electricity Board Limited, Vidyuthi Bhavanam, Pattom, Thiruvananthapuram,
petitioner

Applicant



Chairman and Managing Director,
Kerala State Electricity Board Limited

**AFFIDAVIT VERIFYING THE APPLICATION ACCOMPANYING FILING THE ARR & ERC
OF KSEB FOR THE CONTROL PERIOD FROM FY 2018-19 TO FY 2021-22**

I, **N Sivasankara Pillai**, S/o Narayana Pillai, aged 58 years, residing at, **Aptment – 1A, SFS ONLY ONE, Nandavanam, Palayam, Thiruvananthapuram -695033** do hereby solemnly affirm and state as follows:

I am the Chairman and Managing Director of the Kerala State Electricity Board Limited, Vidyuthi Bhavanam, Pattom, Thiruvananthapuram, and the petitioner in the above matter and I am duly authorized by the Board of Directors to make this affidavit on its behalf. I solemnly affirm at Thiruvananthapuram on this, the 30th day of October 2018 that

- (1) the contents of the above petition are true to my information, knowledge and belief. I believe that no part of it is false and no material has been concealed there from.
- (2) the statements made in paragraphs of the accompanying application are true to my knowledge and are derived from the official records made available to me and are based on information and advice received which I believe to be true and correct.

Deponent

Sankaran

Chairman and Managing Director
Kerala State Electricity Board Limited,
Vidyuthi Bhavanam, Pattom, Thiruvananthapuram – 695 004

VERIFICATION

I, the above named deponent, solemnly affirm at Thiruvananthapuram on this, 30th day of October 2018 that the contents of the affidavit are true to my information, knowledge and belief, that no part of it is false and that no material has been concealed there from.

Deponent

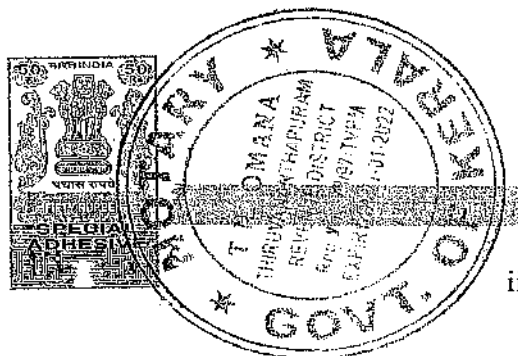
Sankaran

Chairman and Managing Director
Kerala State Electricity Board Limited,
Vidyuthi Bhavanam, Pattom, Thiruvananthapuram – 695 004.

Solemnly affirmed and signed before me.

Advocate and Notary

T.N. Omana
30.10.2018
T.N. OMANA
Advocate & Notary
Thiruvananthapuram Revenue District
Kerala State South India



**BEFORE THE HONOURABLE
KERALA STATE ELECTRICITY REGULATORY COMMISSION
AT THIRUVANANTHAPURAM**

Filing No:

Case No :

IN THE MATTER OF : **Application for approval of Capital Investment Plan, Aggregate Revenue requirement and Expected Revenue from Charges and Tariff Revision Proposal for the Control Period from 2018-19 to 2021-22.**

And

IN THE MATTER OF : **The Petitioner, Kerala State Electricity Board Limited,
Vydyuthi Bhavanam, Pattom, Thiruvananthapuram -695035**

The petitioner named above respectfully submits as under:

Hon Commission has notified the regulation for determination of Tariff for the control period FY 2018-2022 on 05-10-2018. The regulation requires the licensees to submit the petitions for Capital Investment Plan (CIP), Aggregate Revenue Requirement (ARR), and Expected Revenue from Charges (ERC) and the Tariff Revision Proposal (TRP) for the four year control period stipulated in the regulation beginning from FY 2018-19 to FY 2020-21 by 2018 October 31.

This petition submitted by the petitioner company, KSEBL, is in compliance with the provisions contained in the KSEERC (Terms and conditions of determination of Tariff) Regulation, 2018, Electricity Act 2003, and National Tariff Policy. This petition contain ARR, ERC related to the three Strategic Business Unit (SBU) of the petitioner and TRP related to the electricity retail supply business SBU – Distribution in separate chapters in Part-I and the Capital Investment Plan (CIP) of all the SBUs in Part-II. The Annexure and formats specified in the Regulation are attached to the related chapters. The Detailed project Reports related to Capital Investment Plan and other reports, however, are submitted as separate books along with this petition. The Tariff revision Proposal is given in the **last chapter** of Part-I of this petition.

A summary of the Capital Investment Plan of each SBU of KSEBL explained in Part-II of this petition is given in the Table below:

Table 1: Summary of Capital Investment Plan (Rs Cr)					
SBU	2018-19	2019-20	2020-21	2021-22	Total
SBU-G	190.57	442.51	371.71	157.8	1162.59
SBU-T	1758.4	2777.53	996.43	531.95	6064.31
SBU-D	3011.34	4848.87	2818.2	1729.9	12408.31
Total	4960.31	8068.91	4186.34	2419.65	19635.21

A summary of total Net ARR, ERC and Net Revenue Gap, of KSEBL for each year in the control period, explained in the chapters of Part-I of the petitions is shown in the table below:

Table 2: Summary of ARR, ERC and Revenue Gap					
No	Year	2018-19	2019-20	2020-21	2021-22
1	ARR	14247.34	15512.45	16348.70	17240.93
2	ERC	13146.64	14113.20	14283.48	14722.01
3	Gap	1100.70	1399.05	2065.28	2518.92

Considering the above substantial estimated revenue gaps for each year and the un-bridged revenue gap previously approved by Hon Commission, KSEBL proposes for Tariff Revision in the first year and third year of the Control period. A summary of the Tariff Revision proposed are given in the two Tables below.

Table 3: Summary of proposed tariff revision for 2018-19 (Rs Cr)				
No	Category	Present Revenue	Proposed Revenue (On full Year Basis)	Increase
1	LT-I Domestic	4481.52	5218.10	736.58
2	LT-IV (A)	777.73	820.54	42.81
3	LT-IV(B)	6.56	7.12	0.55
4	LT-VA	71.41	86.23	14.82
5	LT VB	12.45	13.56	1.11
6	LT VIA	145.97	156.45	10.48
7	LT VIB	98.58	98.46	-0.12
8	LT VI C	259.68	258.88	-0.80
9	LT VI D	4.00	4.44	0.44
10	LT VI E	1.65	1.73	0.08
11	LT VI F	860.48	859.92	-0.56
12	LT VI G	72.43	71.61	-0.83
13	LT-VII(A)	1327.17	1326.98	-0.20
14	LT-VII(B)	133.59	143.12	9.53
15	LT-VII(C)	15.60	15.56	-0.04
16	LT-VIII A	141.19	152.62	11.43
17	LT VIII B	33.14	38.67	5.54
18	HT1 (A)	1406.88	1516.24	109.35
19	HT-1(B)	9.73	9.68	-0.06
20	HT-II A	127.38	137.01	9.63
21	HT II B	519.99	519.69	-0.29
22	HT-III(A)	4.08	4.27	0.19
23	HT-III(B)	0.95	0.99	0.04
24	HT-IV	623.11	622.51	-0.60
25	HT-V	12.34	11.90	-0.44

26	EHT 66 kV Industrial	205.23	236.04	30.81
27	EHT-110 kV Industrial	419.58	464.74	45.16
28	EHT- 220 kV Industrial	55.26	63.96	8.69
29	EHT- General A	7.11	8.34	1.23
30	EHT - General B	47.93	47.89	-0.04
31	Railway traction	167.89	191.45	23.56
32	KMRL	9.39	10.71	1.32
33	Licensees	370.59	412.91	42.33
	Total	12430.59	13532.90	1101.72

Table 4 : Tariff revision proposal (2020-21) (Rs Cr)				
No	Category	Revenue at ruling tariff	Proposed Revenue	Increase
1	LT-I Domestic	5738.12	6135.41	397.30
2	LT-IV (A)	893.81	901.08	7.27
3	LT-IV(B)	7.72	7.76	0.04
4	LT-VA	92.82	99.99	7.16
5	LT VB	14.63	15.09	0.46
6	LT VIA	179.11	190.12	11.01
7	LT VIB	112.86	114.07	1.21
8	LT VI C	295.89	295.89	0.00
9	LT VI D	5.13	5.39	0.26
10	LT VI E	1.99	2.05	0.06
11	LT VI F	984.79	984.63	-0.17
12	LT VI G	86.04	85.93	-0.12
13	LT-VII(A)	1588.00	1587.42	-0.58
14	LT-VII(B)	162.70	166.74	4.04
15	LT-VII(C)	19.03	18.92	-0.11
16	LT-VIII A	149.57	189.96	40.39
17	LT VIII B	42.63	46.91	4.28
18	HT1 (A)	1686.32	1827.69	141.38
19	HT-1(B)	10.77	11.27	0.50
20	HT-II A	156.25	164.95	8.70
21	HT II B	600.09	600.09	0.00
22	HT-III(A)	4.56	4.97	0.41
23	HT-III(B)	1.06	1.14	0.08
24	HT-IV	709.45	709.45	0.00
25	HT-V	13.57	14.05	0.48
26	EHT 66 kV Indl	251.19	267.19	16.00
27	EHT-110 kV Indl	492.55	516.26	23.70
28	EHT- 220 kV Indl	71.03	77.66	6.64
29	EHT- General A	8.86	8.90	0.04
30	EHT - General B	50.73	51.05	0.32
31	Railway traction	213.72	226.24	12.52
32	KMRL	11.94	12.74	0.80
33	Licensees	457.34	473.71	16.37
	Total	15114.25	15814.69	700.44

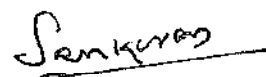
It is earnestly submitted before the Hon Commission that, KSEBL has exercised due diligence possible in estimation of ARR, ERC petition. Care has also been taken to minimise the impact of tariff revision to all consumers especially certain deserving weaker sections of the society without much burden on the finances of the organisation. KSEBL has submitted the relevant information related to the claims made in this petition in the body text of the petition, annexure and formats provided therein. However, It is appealed that should the commission require any additional related information on these aspects, KSEBL may please be given the opportunity to submit such information before the Hon Commission.

KSEBL is constantly pursuing its visions to become the best power utility in India so as to provide quality electricity to customers adequately, safely, sustainably at affordable cost. The Petitioner, therefore, seeks the support of the Hon Commission in fulfilling its endeavour to achieve the mission and vision.

Prayer

And therefore it is humbly prayed before the Hon commission to admit this petition and approve the -

1. Capital Investment Plan for Generation, Transmission and Distribution Strategic Business Units of the petitioner for the Control period as given in chapter 1,2, &3 of Part-II of this petition,
2. Estimate of the Annual Revenue Requirement for Generation, Transmission and Distribution Strategic Business units for the control period as provided in the chapter 2, 3 and 4 in Part-I of the petition,
3. Estimated Revenue from Charges for each business Unit estimated in the above chapter
4. Revenue gap determined for each financial year and provided in the same chapters and
5. Tariff Revisions proposed in FY 2018-19 and FY 2020-21 during the control period detailed in the chapter 5 in Part I of this petition.



(N Sivasanakara Pillai IA &AS)
Chairman and Managing Director,
KSEB Limited.

KERALA STATE ELECTRICITY BOARD LIMITED

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CHAPTER 1

INTRODUCTION

The Petitioner, KSEBL, is an integrated, state public sector electricity utility company in Kerala, serving almost 99 % of the electricity consumers in the state. The State Government constituted and re-vested the functions of the erstwhile electricity board taken over by the Government earlier with the Company vide the second transfer scheme vide notification No. GO (P) No. 46/2013/PD dated 31st October 2013. Subsequently, in exercise of the powers conferred by sub-section(2) of section 131 of the Electricity Act-2003 read with sub-clause (2) of clause-9 of the Kerala Electricity Second Transfer Scheme (Re-vesting) 2013, the State Government vide the notification G.O (P) No.3/2015/PD dated 28th January 2015 amended the sub-clause (8) and (9) of clause 6 of the Kerala Electricity Second Transfer Scheme (Re-vesting) 2013 issued under G.O (P) No. 46/2013/PD dated 31st October-2013. Further, vide the amendment notification; GoK has notified the opening balance sheet of KSEBL as on 01-11-2013 under Part II of Schedule-A of Second Transfer Scheme.

The KSEB as well as KSEBL has been striving continuously to provide reliable and quality electricity at least cost and related services to the consumers in the state. The tariff to a majority of consumers in the state has been one among the least in the country. KSEBL has been successful in providing electricity to every residence in the state through a well coordinated effort in 2016-17 and the state was declared one with 100% electrified houses in May 2017. Over a period of several years in the past, the petitioner was able to make substantial progress in operation and service performance functions. One among the several efficiency gains achieved by the petitioner is the reduction in overall Transmission and distribution losses from a level of 30.76 % in 2003-04 to 13.07% in 2017-18 and the respective savings in total power purchase cost of Rs 18,431.93 Cr during this period.



As a continuation to these achievements during the last two years, the petitioner has planned ambitious expansion of the transmission and distribution network with the objective of enhancing the quality and reliability of supply and enhanced service to the consumers in the state. The Government have announced a comprehensive plan named 'Urkerala Mission' with an aim to expand the energy sector. This mission is a package of five projects and will be implemented in a

short period of 3 years with the participation of various government agencies such as ANERT, EMC, and Electrical Inspectorate Department.



One component plan of this mission is named '**Transgrid 2.0**' which involves the expansion and strengthening of the present intra-state Transmission network for supporting the future power demand in the state. The plan involves several projects that use advanced technology to overcome the land space constraints in the state and will be executed in two phases. The Transgrid-2 Projects envisages to improve the electricity transmission network of the State by way of increasing transmission capacity and to reduce transmission losses and is expected to be developed with Capital Outlay of Rs 10000 Cr, in two stages. The first stage is expected to complete by 2021. The project package involves addition of new 400 kV Transmission lines, new 220 kV substations and associated lines, up gradation of 110kV substations to 220 kV. The exiting right of way will be used to draw lines at higher voltage level. For the first stage of the project (Rs 6375 Cr), GOK has granted administrative sanction and accorded project funding from KIFBI. A detailed discussion of the first phase of the plan is given in the Capital Investment Plan proposal in Part-II of transmission business unit seeking approval.

Another major expansion plan component in the mission is named '**Dyuthi-2021**' and has been prepared for implementation spanning four years. This mission aims to provide uninterrupted supply to consumers, reduce distribution loss, to develop safe distribution network. The project also envisage modernisation of network using fault passage detectors, modern air break switch, load break switches, ring main units, high voltage Distribution system (HVDS), covered conductors, pole top distribution boxes for easy operation fault detection and automatic fault clearance. The estimated cost of the project is Rs 4036.30 Cr. A brief description of this plan and investment requirement is provided in the Section related to the Distribution business of the petitioner.

The Government has announced a major mission named "**Saura**" for developing a total 1000 MW of solar generation from land, roof-top, canal-top, high-way and solar park installations within a period of three years in addition of solar generation capacity from the petitioners own land. About 500MW will be developed from roof top solar, 200MW from private developers through reverse bidding process, 150 MW from solar parks, 100 MW of from floating solar projects (in Kerala) and 59 MW from Canal top and highway sides. For implementation of rooftop solar project, three financial

models are being considered. The petitioner company, KSEBL will implement Saura through various agencies like NTPC, NHPC, THDC, ANERT and private participation. It is expected that the Renewable Purchase Obligation (RPO) of the petitioner can also be met through these projects.

The 'Urjakerala Mission' also envisages a separate project called **"Filament Free Kerala"** for replacing the entire filament lamps, being used even now, in the state by energy efficient LED lamps. This is implemented with co-operation of local self governments and EMC. It is planned to distribute about seven crore LED bulbs and three crore LED tubes. Quality assured LED lamps will supplied to consumers and its cost will be recovered from consumers in instalments along with monthly electricity bills.

"E-Safe Kerala" is the fifth project component of Urjakerala Mission, to make the state free from Electricity Accidents. This project will be implemented jointly with Electrical inspectorate. This project plans to modernize transmission and distribution network on phased manner to make a safer network. The bare conductors would be replaced in stages by underground cables, covered conductors and include circuit breakers and auto enclosures in distribution network. The ELCBs will be provided to installations of BPL and SC/ST consumers which are not having ELCBs. The project also envisages the power quality audit in future. KSEBL is thus poised to become the top public sector utility in India.

However, despite the KSEBL best effort to make progress, the utility suffered a major setback caused by natural calamity during in 2018. During the month of South-West Monsoon of June, July and August, the state was struck by disastrous torrential rain causing landslides and rivers to overflow and resulting in wide spread flood and damage. Almost all the districts in the state except Thiruvananthapuram and Kasargod were affected by floods. Several Lakhs of houses were flooded and about 10 Lakhs of people had to be relocated. The petitioner's installations were badly affected. Five major generating stations and 10 small hydel stations were severely affected. Fifty Substations in Ten districts were impaired by floods and had to be switched off for safety reasons. As many 10 Power transformers submerged in water. Transmission towers toppled and as many as 10 major transmission lines were disrupted. The distribution infrastructure was also damaged severely. Supply services from 16158 distribution transformers were affected. About 1735 Distribution Transformers, 106 RMUs, more than one Lakh poles and 5276 kms of distribution lines were damaged during this disaster. Almost 25 Lakhs of homes were without electricity. A few photographs of the infrastructure below shows the extent of damage and loss suffered due to the calamity.





KSEBL, despite damage caused, earnestly undertook the massive effort in restoring the damaged installations during the subsequent period. The petitioner undertook “**Mission Reconnect**” operation on war footing for rebuilding the power infrastructure and restore supply to affected homes and consumers. Special Task forces at state level, District / Circle level as well as Section level were constituted and five Chief Engineers were designated as district level special officers in worst affected district for coordinating and executing the massive work involved in the mission. The petitioner had internally set August 31, 2018 as the target date for restoration which was generally achieved.

KSEBL suffered a loss of Rs 351.59 Cr as per initial estimates. However, the petitioner utility, with the support from other utilities, departments and government was able to restore electricity supply within few weeks. Despite the loss suffered, the petitioner took several measures to ease the burden on affected customers, such as:

- Deferred issuing Electricity bills in flood affected areas by one billing cycle during the calamity from generation of bills for the next billing cycle.
- Extended the due date and disconnection date of bills which were already issued and generated for monthly /bimonthly consumers by that time in flood affected areas up to 31.01.2019 in deserving cases
- Waived reconnection fees and late payment surcharge for deserving consumers in flood affected areas
- Provided suitable instalment facility for remittance of bills for LT consumers of flood affected areas in deserving cases
- Provided suitable instalment facility for remittance of bills for HT & EHT consumers of flood affected areas in deserving cases

As mentioned earlier, this petition has two separate parts. The Part-I contains the estimation of ARR, ERC related to the three business units of KSEBL and the net Revenue Gap for each year. Part-II describes the capital Investment planned during the control

period. The formats required as per regulation and other documents such as DPR are furnished separately.

Part – I of this petition comprises of -

- Chapter - 1 : Introduction to the petition
- Chapter - 2 : ARR & Transfer Cost for SBU-Generation
- Chapter - 3 : ARR & Transfer Cost for SBU-Transmission
- Chapter - 4 : ARR & ERC for SBU-Distribution
- Chapter - 5 : Summary of the ARR, ERC and revenue gap of the utility
- Chapter - 6 : Tariff Revision Proposal and

Part – II comprises of –

- Chapter - 1 : Capital Investment Plan of SBU- Generation
- Chapter - 2 : Capital Investment Plan of SBU- Transmission
- Chapter - 3 : Capital Investment Plan of SBU- Distribution
- Chapter - 4 The summary of the CIP of the three SBUs

The next chapter (Chapter-2) contains the forecast of ARR and corresponding *Transfer Cost* related to SBU-Generation.

CHAPTER – 2

ARR OF SBU – GENERATION

The present generation in KSEBL comprises a mix of Hydel, Thermal, solar and wind power stations. The total installed capacity of KSEBL as on 31.03.2018 is **2232.442 MW** of which 92.08 % of the installed capacity is Hydel, 7.16% is Thermal, 0.66 % from solar and rest from the wind.

There are altogether 37 **hydroelectric generating stations** owned by KSEBL of which 15 are Major Hydel Stations and the rest are Small Hydro Plants. The Major Hydel stations contribute to a total capacity of 1938.75MW whereas the small Hydro stations contribute to 117MW. The lists of all the Hydro stations are shown in **Annexure G1**.

There are two **thermal stations** owned by KSEBL which have a total installed capacity of 159.96MW with a firm annual generation capability of 1035.6 MU. However, due to high variable cost of thermal stations, presently KSEBL is limiting the generation from these liquid fuel stations to the extent essential.

KSEBL presently owns **one wind farm** at Kanjikode which is having an installed capacity of 2.025 MW and an annual generation capability of 4MU. KSEBL has an installed capacity of **14.707 MW** on solar projects as on 2017-18. Further, KSEBL has targeted to add around 10.1 MW during the current control period. The list of all solar projects to be completed and planned during the control period is shown in **Annexure G2**.

The gross energy generated from the KSEBL owned stations for the year 2017-18 was 5505.73MU, out of which 5488.94MU (99.7%) was from own hydro electric stations and the remaining 0.3% was generated from thermal, wind and solar stations. The source wise capacity and generation details are given in the Table below.

Table 2.1 : Source wise Generation		
Source	Generation (MU)	Installed Capacity (MW)
Hydel	5488.94	2055.75
Thermal	1.86	159.96
Wind	1.48	2.025
Solar	13.45	14.707
Total (Generation)	5505.73	2232.442

Capital Investment for the control period

To meet the increasing energy demand of the State, KSEBL has planned for new projects in Hydro and solar systems in the coming years of the control period. 4 SHEPs are proposed during the control period of 2018-19 to 2021-22. Renovation of two Hydro Projects has also been planned during the regulated control period. The details of the above works including the expected period of completion are shown below.

Table 2. 2 : New Hydel Projects for the control period					
No	Name of Scheme	Gen Capacity (MW)	Design Energy (MU)	Expected year of Completion	Project cost (Cr.)
1	Pazhassi Sagar	7.5	25.16	2020-21	87.99
2	Peruvanamuzhi	6	24.70	2021-22	87.23
3	Chinnar	24	76.45	2022-23	283
4	Anakkayam	7.5	22.83	2022-23	77.51

R&M works are proposed for Kuttiyadi HEP and at Idukki Power Station. The Kuttiyadi Project is now having a capacity of 75 MW (3 X 25MW) is proposed to up rate it to 82.5 MW (3X27.5MW). The project is now having 44 of years of age and frequently shows problems in generating units and in auxiliary equipments. The renovation work involves construction of penstock for unit No.4 (for Kuttiyadi Extension Scheme-50 MW) and replacement of all the three units with higher capacity machines. Another R&M is envisaged for Idukki Power station. The work involves replacement of fully depreciated yard equipment, up gradation and renovation of switchyard, Moolamattom.

Table 2.3 : New R&M projects for the Control period						
No	Name of Scheme	Capacity (MW)	Annual Energy (MU)	Project Cost * (Rs. Cr.)	Expected year of Completion	Status of the project
1	Idukki 220 kV Yard	--	--	12.22	2019-20	work in progress
2	Kuttiyadi	82.5	292.8	327.20	2020-21	to be tendered

The solar projects having a total capacity of around 10.1MW is proposed by KSEBL during the control period 2018-19 to 2021-22. There are more solar projects under the consideration of KSEBL which also includes Saura projects and will be appropriately submitted before Hon. Commission on firming up of the proposals. The installation and Commissioning of Grid tied Ground mounted SPV in the land available in Brahmapuram is proposed for the financial year 2019-20. The solar projects finalized for implementation are listed below.

Table 2.4 : New Major Solar projects for the control period						
No	Name of Scheme	Capacity (MWp)	Annual Energy (MU)	Project Cost (Rs. Cr.)	Expected Completion	Status
1	Brahmapuram	6.5	8.541	37.14	2019-20	To be tendered
2	Kottiyam	0.6	0.84	3.27	2019-20	To be tendered
3	Kanjikode	2	2.45	11.40	2019-20	To be tendered
4	Agali	1	1.2	5.70	2019-20	To be tendered

Apart from the new projects mentioned above, there are ongoing projects which are planned to be commissioned during the current control period. The details of the same are shown below.

Table 2.5 : Ongoing Hydel Projects for the control period					
No	Name of Scheme	Gen Capacity (MW)	Design Energy (MU)	Expected Completion	Project cost (Cr.)
1	Kakkayam	3	10.39	2018-19	41.42
2	Boothathenkettu	24	83.5	2019-20	214.31
3	Upper Kallar	2	5.14	2019-20	28.31
4	Porigalkuthu AES	24	45.02	2019-20	141.13
5	Chathankottunada	6	14.76	2020-21	95.53
6	Thottiyar HES	40	99	2020-21	235.88
7	Sengulam Aug. Scheme		85	2021-22	111.34
8	Pallivasal Ext Scheme	60	153.9	2021-22	467.14

The following RMU works are also undergoing and planned to be completed during the control period. The details of the same are shown below.

Table 2.6 : Ongoing RMU projects			
No	Name of Scheme	Completion	Project Cost (Cr)
1	Sholayar RMU	2020-21	173.26
2	Sengulam Pump House RMU	2019-20	20.4
3	Idukki Stage I	2020-21	79

An year wise summary of the capital outlay for the new and ongoing generation projects planned for the control period is given below.

Table 2.7 : Capital Works of the SBU Generation					
No	Name of Scheme	Proposed Asset Addition (Rs. Cr.)			
		2018-19	2019-20	2020-21	2021-22
1	New Projects hydel			87.99	87.23
2	R&M work- new project		12.22	327.20	
3	New projects solar		57.51		
4	Ongoing Projects Hydel	99.47*	384.5	331.41	578.48
5	Ongoing RMU projects		20.4	252.26	
6	Others(Drip+misc exp + tidal)		3.0	100	
	Total	99.47	477.63	1098.86	665.71
<i>*The capital cost of Perunthenaruvi SHEP commissioned during the FY 2017-18, is capitalized.</i>					

Apart from the above, there are more capital works planned by KSEBL in the coming years in existing Hydel/Thermal/Wind projects, which are proposed to be commissioned in the coming years. The detail of the above works has been submitted in Annexure IV to the Capital Investment Plan of SBU-G. The capitalization of the above projects will be intimated as and when they are commissioned and it is requested that the same may be considered during the truing up process.

Estimation of Generation for the Control Period

Estimation of Hydro–availability

The generation expected from the Hydel Station mainly depends on the monsoon during the year. Hence the energy availability based on the inflow anticipated in the reservoirs is calculated based on the historical data available. The actual inflow is taken upto Sep-2018 and for Oct -2018 inflow has been calculated based on the actual daily average and thereafter 10 years average is taken for projection upto 2021-22. The total inflow for the year 2018-19 to 2021-22 is enclosed as **Annexure G3**. The average inflow estimated in the four major reservoirs namely, Idukki, Pamba & Kakki, Kuttiyadi and Idamalayar are also calculated based on the historical data available and given in **Annexure G3 (1) to G3 (4)**. Small hydro plants do not have significant storage capacity and so the generation of SHP's is assessed for monsoon months only.

Based on the existing storage position and the inflow anticipated, the estimated Hydro generation from all the stations for the financial year 2018-19 from November, 2018 is 2492.5 MU (actual upto sep-2018 and Oct-2018 calculated based on daily average). Accordingly, for the years of the **control period from 2018-19 to 2021-22**, generation is estimated as 7881.25MU, 6925.931 MU, 6375.06 MU and 6131.188 MU respectively. However, the actual generation of hydro plants will have to be regulated based on the energy and peak demand, availability of power from CGS, traders, energy exchanges and short term markets etc. Accordingly, there may be changes in the estimated values based on the actual condition. The scheduling of hydro plants has been made by following the principles detailed below.

- 1. During the monsoon months, from June to November, run-of-the-river plants and small hydro stations are operated continuously to avoid spillage of water.*
- 2. The Scheduling of storage plants like Idukki, Sabarigiri etc is limited to peak hours during monsoon months so as to store the maximum water for generation, irrigation, drinking and Industrial purposes, salinity control etc during summer months.*

3. *The annual maintenance works of the run-of-the-river and low storage plants are scheduled during summer months so that the same will be available for generation during monsoon months. On the contrary, storage plants, the annual maintenance are scheduled during monsoon months for ensuring their availability during the summer months. Maintenance schedule of the Hydro plants is given in **Annexure G4 (1) to G4 (4)***
4. *Buffer storage of water is maintained in major reservoirs in the beginning of June, to meet contingencies related to delayed monsoon. The month wise generation of plants is scheduled by considering the above aspect.*

However, the actual scheduling of hydro plants depend on other factors such as availability of power from short term markets, energy exchange, power availability at competitive rates through traders, energy demand, vagaries of monsoon etc. Hence the targets proposed may be considered only as tentative plan in respect of hydro plants. Further, KSEBL will take all efforts to optimize the hydro generation by minimizing spillage. The Hydro generation estimated for each year of the control period is shown in **Annexure G5 (1) to G5 (4)**

Energy availability of Thermal Stations

As already mentioned earlier, because of the high variable cost of power from the two thermal stations, KDPP and BDPP, no generation has been proposed from these thermal generating stations throughout the control period. However, in case of contingency situations, the same can be scheduled for having stability in the system and also for providing quality and reliable power in the northern parts of the State. The auxiliary consumption for BDPP is fixed at 5% and that of KDPP is 2.5% of gross generation as per the Tariff Regulation. Even though the thermal stations are not scheduled in the proposed generation plan, the auxiliary consumption of above thermal stations needs to be accounted and hence the past actual is considered in the calculation of energy availability throughout the control period.

Estimation of energy generation from renewable sources

Energy generation from solar projects: As on 31.03.2018, the KSEB Ltd has an installed capacity of 14.707MW with an annual generation of about 13.45 MU. Further, KSEBL has targeted to add more solar projects in the future. The generation of the solar plants has been estimated by assuming a capacity utilization factor of around 16% and analyzing the historical data. The solar plants existing and proposed to be commissioned during the control period is shown in **Annexure G2**. The expected generation based on solar projects for the years of the control period is shown in **Annexure G6**.

Energy generation from wind projects: The total wind energy capacity of KSEBL is of **2.025MW**. Based on the historical data an annual generation of **1.9MU** is expected.

Auxiliary consumption of Generating Plants

The permissible auxiliary consumption of existing and new hydroelectric generating stations, as per regulation, ranges between 0.7 % to 1.2 % based on type of plants (Surface/underground) and excitation system. Accordingly the auxiliary consumption of these hydro plants for the control period is given in **Annexure G7**.

Generation plan for the control period

A consolidated generation schedule of the Hydel stations including proposed projects is shown below. The net generation of KSEBL plants is calculated after deducting the auxiliary consumption from the gross generation.

Table 2.8 : Hydel Generation Plan			
Financial Year	Gross Hydel available(MU)	Aux. Consumption (MU)	Net Hydel Available(MU)
2018-19	7886.445	82.45679	7803.987916
2019-20	6998.423	72.67052	6925.752584
2020-21	6564.437	67.85607	6496.581
2021-22	6471.7719	66.802269	6404.9697

Since, no generation proposed from the thermal stations of KSEBL, a minimum auxiliary consumption needed for running the station is taken as 1.2 MU per year based on past actuals.

Table 2.9 : The Total Generation Plan					
Financial Year	Net Hydel (MU)	Solar (MU)	Wind (MU)	Aux. Cons wind + thermal	Generation Available (MU)
2018-19	7803.9879	14.96	1.79	1.2145	7819.5234
2019-20	6925.75258	42.608	2.036	1.2165	6969.18008
2020-21	6496.581	47.595	2.0828	1.2168	6545.042
2021-22	6404.9697	47.595	1.7898	1.2145	6453.14

The entire capacity and generation is allocated to the Distribution Business Unit of KSEBL. Energy in excess of SBU-D, if any, only will be sold to other utilities and consumers.

* * *

Estimation of ARR of SBU-G for the control period

The estimation of ARR for Generation Business of KSEBL is prepared as per the KSERC (Terms and Conditions for determination of Tariff) Regulations, 2018, especially, Regulation 10 and 44

Estimation of Operation & Maintenance Expenses

Regulation 45 (1a) of the ruling tariff regulation, **operation and maintenance expenses as per the norms** in Annexure-VII are allowed to be recovered. The Regulation further allows recovery of **one time maintenance of special nature**.

The Operation & Maintenance Expenses allowed for **existing generating stations** of SBU-G of KSEBL for the control period from 2018-19 to 2021-22 given in the Annexure-VII Tariff regulation is shown below.

Table – 2.10 : O&M Expense for Existing Stations				
Item	2018-19	2019-20	2020-21	2021-22
O&M Expenses (Rs Cr)	123.77	129.77	136.05	142.63

The Regulation further allows O&M expenses for **new generating stations** at four percent (4%) of the original project cost (excluding cost of rehabilitation and resettlement works) in the first year of operation and for the subsequent years, by applying an escalation rate of 4.84 % on first year expenses. The list of new generating stations and units expected to be commissioned during the control period and their O&M Cost calculation are given in the Table below. The O&M has been calculated for new projects (including solar projects) by taking 4% of the project cost in the first year of operation and for the subsequent years of the control period the escalation rate of 4.84% has been taken.

Table 2.11 : O&M expense for new Generating stations (Rs Cr)						
New Stations	Project cost	Expected completion	2018-19	2019-20	2020-21	2021-22
Perunthenaruvi SHP*	58.80	2017-18	2.352	2.466	2.585	2.7103
Kakkayam HEP	41.42	2018-19	1.6568	1.736	1.8211	1.9092
Boothathankettu SHEP	214.31	2019-20		8.57	8.9873	9.4223
Uppar Kallar SHEP	28.31	2019-20		1.1324	1.1872	1.2447
Porigalkuthu AES	141.13	2019-20		5.6452	5.9184	6.2049
Sengulam PH	20.40	2019-20		0.816	0.8555	0.8969
Chathankottunada SHEP	95.53	2020-21			3.82	4.0061
Pazhassisagar SHEP	87.99	2020-21			3.5196	3.6899
Thottiyar HES	235.88	2020-21			9.4352	9.8919
Shengulam Aug. Scheme	111.34	2021-22				4.4536

Peruvanamuzhi SHEP	87.29	2021-22				3.4916
Pallivasal Extn	467.14	2021-22				18.6856
Kottiyam Solar	3.27	2019-20		0.1308	0.1371	0.1438
Kanjikode Solar	11.40	2019-20		0.456	0.4781	0.5012
Agali Solar	5.70	2019-20		0.228	0.2390	0.2506
Brahmapuram Solar	37.14	2019-20		1.4856	1.5575	1.6329
Total O&M Cost	--	--	4.0088	22.666	40.541	69.1355
<i>*The Perunthenaruvi SHP commissioned on 24.10.2017 is also included, as capitalized on 2018-19</i>						

Thus, the O&M cost as per norms for the control period 2018-19 to 2020-21 for SBU-G is submitted below:

Table 2.12 : Total Operation & Maintenance Cost of SBU-G				
O&M Cost for	2018-19	2019-20	2020-21	2021-22
Existing Stations (Rs Cr)	123.77	129.77	136.05	142.63
New Stations (Rs Cr)	4.088	22.666	40.541	69.1355
Total O&M cost (Rs Cr)	127.858	152.436	176.591	211.7655

The State of Kerala has witnessed continuous and highest rainfall in a century across the State from 1st June of 2018 with the monsoon reaching its severity in the 2nd week of August 2018. This unprecedented rainfall caused huge flood and landslides and severe losses to KSEBL installation and functions. Five major hydro generating stations and fourteen small hydel stations of KSEB Ltd were badly affected in the natural calamity. The loss of generation was 400 MW. The estimated cost for reconstruction subsequent to the flood in August 2018, in generation sector is Rs 80.85 Cr. A Loss of Rs 25.96 Cr in five Major Stations and Rs. 54.89 Cr in Small Stations. This is, however, excludes business loss.

However, with earnest efforts, KSEBL have now restored generation at Idamalayar Power House (2x37.5MW), Poringalkuthu PLBE (1X16MW) and Lower Periyar. Six Small Hydel Projects are also normalized. Porigalkuthu HEP has been partially restored. All the stations except Adiyannpara are expected to be restored by the end of the current financial year. Adiyannpara SHEP is expected to be in operation in the next financial year (2019-20) only.

It is submitted that the natural calamity occurred in 2018 were beyond the control of the petitioner and was 'Force Majeure' event. The expenses additionally required in Generation Business for restoration are onetime expenses coming under the definition of the first proviso to Regulation 45 of the Tariff Regulations and also coming under the definition of 'Uncontrollable Factors' (Regulation 12) in the Regulations. Regulation 13 provides for the mechanism of pass through of losses on account of uncontrollable factors.

However, SBU-G has not included the amount in the projection of ARR of SBU-G. The actual expenditure incurred will be submitted before Hon'ble Commission at the time of truing up of accounts

for 2018-19. It is humbly requested that the damages that occurred in the generation sector of KSEBL due to natural calamity may kindly be treated as 'Force Majeure' event and the additional financial expenditure incurred for restoration may be allowed as onetime expense of SBU-G for 2018-19 over and above that for normal operations at the time of truing up of accounts for the year 2018-19.

Pay Revision Expenses

The Regulation 14 (3) provides for admission of expenses relating to pay revision during the control period for the same level of employees as admitted in the truing up of accounts for the year 2016-17. The pay revision of Officers/workmen of KSEBL is due from July / August 2018. The additional liability is estimated at 10% of Basic pay and DA. Accordingly, the amount of provision required is furnished below:

Table 2.13 : Pay Revision Expenses (Cr)				
Particulars	2018-19	2019-20	2020-21	2021-22
Basic + DA	2429.97	2631.10	2843.33	3067.19
10% of above	242.997			
Provision for Pay Revision	182.25	263.11	284.33	306.72

The SBU wise breakup of the above anticipated expenses in employee cost ratio is given in the table below and that related to SBU-G for the control period are high-lighted in the table.

Table 2.14 : SBU wise Pay revision expenses					
Business Unit	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU G	5.13	9.35	13.49	14.58	15.73
SBU T	11.32	20.63	29.78	32.18	34.71
SBU D	83.56	152.28	219.84	237.58	256.28
Total	100	182.25	263.11	284.33	306.72

However, SBU-G has not included the above amount in the projection of MYT of SBU-G. The Hon Commission may allow the said expense through the truing process as an when it is materialized.

Thus, the total Operation & Maintenance expenses of SBU-G projected for the control period **as per the Regulation** is summarised below:

Table 2.15 : Total O&M Cost of SBU - G (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Normative O&M cost	127.858	152.436	176.591	211.766
One-time expenses	--	--	--	--
Pay revision expenses	--	--	--	--
Total O&M Cost	127.858	152.436	176.591	211.766

The projection of the O&M expenses of SBU-G for the control period based on the past actuals is shown in the table below.

Table 2.16 : Projection based on past actual (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
O&M Cost of SBU-G	190.51	205.15	221.72	239.31

It may kindly be noted that, the O&M expenses as per norms for the control period are below the actual expense projection. This will lead to under recovery of genuine O&M costs. However, KSEBL is taking earnest efforts to control the O&M expenses to the extent possible. If any variation is found beyond its control then it is humbly requested that the same may be allowed at actual during true up.

Depreciation

Hon Commission, in the Truing up order for FY 2015-16, had approved Rs 334.87 Cr for depreciation for the year after excluding that for Consumer contribution and grants, as shown below:

Table 2.17 : Depreciation approved in Truing up order for FY 2015-16 (Rs Cr)				
Item	SBU-G	SBU-T	SBU-D	Total
GFA at the beginning of the year	16395.04	4097.22	6115.79	26608.05
Less: Revaluation	11988.98			11988.98
GFA excluding revaluation	4406.06	4097.22	6115.79	14619.07
Addition during the year	34.79	212.24	491.41	738.44
Total	4440.85	4309.46	6607.2	15357.51
Depreciation for the year	122.05	132.84	236.13	491.02
Less: Claw back depreciation			156.15	156.15
Net depreciation allowable	122.05	132.84	79.98	334.87
Average rate of depreciation (gross)	2.77	3.24	3.86	3.36
Average rate of depreciation (net)	2.77	3.24	1.31	2.29

In this petition KSEBL has followed the same approach taken by Hon Commission in the true up order. The depreciation of the fixed assets of SBU-G has been calculated at the net average rate of depreciation approved by Hon Commission. The depreciation in line with Regulation 27 of the Tariff Regulations, 2018 for the control period is given below:

Table 2.18 : Depreciation for control period (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
GFA excl revaluation	4413.63	4513.09	4970.32	6069.18
Addition during the year	99.47	457.23	1098.86	665.71
Total	4513.09	4970.32	6069.18	6734.89
Depreciation for the year	122.26	125.01	137.68	168.12
Less: Claw back depreciation	--	--	--	--
Net depreciation allowable	122.26	125.01	137.68	168.12

Interest and Finance Charges

Interest on Capital liabilities:

The Regulation 29(2) stipulates that the normative loan outstanding as on the First day of April, 2018, shall be worked out by deducting the amount of cumulative repayment as approved by the Commission up to the Thirty First day of March, 2018, from the normative loan.

Further, the Regulation 29(5) mandates that the interest on loan shall be calculated average loan as per the norms approved by the Commission for the financial year by applying the weighted average rate of interest. The Regulation 29(4) stipulates that the rate of interest allowed shall be the weighted average rate of interest calculated on the basis of the actual loan portfolio at the beginning of each financial year. In accordance with the provisions of the above, the Interest on Capital Liabilities for the control period is computed as follows:

The normative opening loan as on 01.04.2018 has been determined after considering GFA, approved depreciation, applicable consumer contribution and grants. Normative loan thus determined is allocated among SBU G, SBU T & SBU D in GFA ratio. Thus, opening normative loan for KSEBL for the control period is determined at Rs 4627.54 Cr (actual Rs.6479.35 Cr) and Rs.1127.26 Cr for SBU G as detailed below:

Table 2. 19 : Computation of Normative loan as on 01.04.2018 (Rs Cr)					
No	Item	SBU G	SBU T	SBU D	Total
1	GFA as on 01.04.2018	16402.61	5314.77	8390.15	30107.53
2	Less: revalued	11988.98			11988.98
3	Balance GFA as on 01.04.2018	4413.63	5314.77	8390.00	18118.39
4	Less: Approved depreciation till 01.04.2017				6840.99
5	Net Fixed Assets				11277.40
6	Less: Equity				3499.00
7	Less: Contributions & grants (62% of Rs.5747 Cr)				3563.14
8	Normative loan 01.04.2017				4215.26
9	Less: Estimated depreciation for 2017-18				405.00
10	Normative loan balance (A)				3810.26
11	Asset addition 2017-18				1390.57
12	Less: contribution received in 2017-18				573.45
13	Normative loan for 2017-18 (B)				817.12
14	Normative loan as on 31.03.2018				4627.38
15	GFA ratio				
16	GFA as on 01.04.2018	16402.61	5314.77	8390.00	30107.38
17	Less: revalued	11988.98			11988.98
18	Balance GFA as on 01.04.2018	4413.63	5314.77	8390.00	18118.55
19	Proportion	24.36	29.33	46.31	
20	SBU wise Loan balance	1127.23	1357.37	2142.78	4627.38

After considering the normative loan as on 01-4-2018, asset addition as well as contribution/ grant anticipated, allowable depreciation etc for each year of the control period is duly taken into account while ascertaining the interest on normative loan. Details are furnished below.

Table 2.20 : Interest on capital liabilities (Rs Cr) for SBU-G				
Item	2018-19	2019-20	2020-21	2021-22
Opening loan	1127.23	1104.44	1436.65	2397.83
GFA addition	99.47	457.23	1098.86	665.71
Less: Consumer contribution & Grants	--	--	--	--
Less: Allowable depreciation	122.26	125.01	137.68	168.12
Normative loan during the year	-22.79	332.22	961.18	497.59
Closing normative loan	1104.44	1436.65	2397.83	2895.42
Average normative loan	1115.83	1270.54	1917.24	2646.63
Interest *	106	127.05	191.72	264.66
<i>* @ 9.50% for 2018-19 and @10% thereafter</i>				

Interest on security deposits

SBU-G does not hold any security deposit and hence no amount is considered on this account.

Interest on General Provident Fund

Interest on PF for the control period is estimated @8.40% on the average anticipated balance as and given below:

Table 2.21 : Estimation of interest on provident fund (Rs Cr)					
Item	2017-18	2018-19	2019-20	2021-21	2021-22
Opening: Provident Fund as on 1 st April	2029.93	2207.33	2357.33	2507.33	2657.33
Addition (net) during the Financial Year	177.40	150	150	150	150
Closing: Provident Fund as on 31 st March	2207.33	2357.33	2507.33	2657.33	2807.33
Average PF during the Financial Year	2118.63	2282.33	2432.33	2582.33	2732.33
Average interest rate (%)		8.40	8.40	8.40	8.40
Interest Charges - Rs. Cr	156.26	191.72	204.32	216.92	229.52

The function wise segregation is done on the basis of actual employee cost ratio for 2017-18 and the share of SBU G is highlighted in the table below:

Table 2.22 : SBU wise interest on provident fund (Rs Cr)					
SBU	Employee cost ratio (2017-18)	2018-19	2019-20	2020-21	2021-22
SBU G	5.13	9.83	10.48	11.12	11.77
SBU T	11.32	21.7	23.12	24.55	25.97
SBU D	83.56	160.19	170.72	181.24	191.77
Total	100	191.72	204.32	216.92	229.52

Interest on Master Trust Bonds

State Government, as per notifications dated 31.10.2013 and 28.01.2015, ordered creation of a Master Trust for meeting the unfunded liability of pension, gratuity and leave surrender as on 31.10.2013, in respect of the personnel transferred from erstwhile KSEB to KSEBL. The total liability as on 31.10.2013 was estimated at Rs.12418.72 Cr and necessary funding arrangements put in place through issue of 2 series of Bonds. Hon Commission recognized the unfunded pension liabilities as above and approved recovery of interest on KSEBL share of Bonds as per Tariff Regulations, 2014 and 2018. Thus KSEBL claimed interest on the bond issued by KSEB Ltd (Rs 8144.00 Cr) in the present control period.

Tariff Regulations, permits claims on interest on the share of bonds issued to Master Trust . The repayment has started from 2017-18 and the interest due for the control period and its SBU wise segregation are furnished below:

Table 2.23 : Interest on Master Trust Bonds (Rs Cr)					
Item	2017-18	2018-19	2019-20	2020-21	2021-22
Bond Amount	8144	7736.8	7329.6	6922.4	6515.2
Repayment	407.2	407.2	407.2	407.2	407.2
Interest	814.4	773.68	732.96	692.24	651.52
Balance	7736.8	7329.6	6922.4	6515.2	6108

Table 2.24 : SBU wise Interest on Master Trust Bonds (Rs Cr)					
SBU	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU G	5.13	39.67	37.58	35.50	33.41
SBU T	11.32	87.56	82.95	78.34	73.73
SBU D	83.56	646.45	612.43	578.4	544.38
Total	100	773.68	732.96	692.24	651.52

The operationalization of the Master Trust was delayed due to Income tax exemption and other issues. The Master Trust became operational only from 01.04.2017. KSEBL has been making pension payments, gratuity and leave surrender of the employees retired from 01.11.2013 to 31.03.2017, 'as you go principle', as was done by KSEBL till 31.10.2013 and the Hon Commission was pleased to approve the same till the truing up of 2016-17.

Since the actual date of operationalization of the master trust is made only from 01.04.2017, actuarial valuation has been done on 31.03.2017 and assessed the unfunded pension liability, gratuity liability and leave surrender liability at Rs.16147.70 Cr ie Rs.3728.98 Cr increase in liability for the period from 01.11.2013 to 31.03.2017. Thus the net additional unfunded liability as on 01.04.2017 was Rs 3728.98 Cr over that on 31.10.2013.

To honor the additional liability as crystallized above, it is decided to issue 20 year bonds amounting to Rs. 3728.98 Cr at a coupon rate of 10% to the Master Trust. The interest liability of the additional bonds during the control period is apportioned among the SBUs is shown in the table below and the total interest liability to the Trust is shown there under.

Table 2.25 : Interest on Additional Bond to MT					
SBU	Emp. ratio	2018-19	2019-20	2020-21	2021-22
G	5.13	19.12	19.12	19.12	19.12
T	11.32	42.20	42.20	42.20	42.20
D	83.56	311.58	311.58	311.58	311.58
Total	100.00	372.90	372.90	372.90	372.90
Total Interest on the total Liability to Master Trust					
G	--	58.79	56.7	54.72	52.53
T	--	129.76	125.15	120.54	115.93
D	--	958.03	924.01	889.98	855.96
Total	--	1146.58	1105.86	1065.14	1024.42

Further, the Tariff Regulations also provide that, the annual pension contribution by KSEBL to the Master Trust based on the actuarial valuation is also allowed to recover through tariff on annual basis. Claiming the entire additional contribution to the Master Trust in one-go is likely to result in tariff shock. Therefore, KSEBL proposes to prepare a detailed scheme in consultation with the Government and submit before Hon Commission separately.

Interest on Working Capital

The Interest on Working Capital for SBU-G is calculated, as per regulation 32, on the normative level of working capital for each financial year. Regulation 32(2) allows Interest on normative level of working at two percent higher rate than the base rate as on first of April of the year of ARR filing. Therefore the Interest on Working Capital in this petition is computed at a rate of 10.70% (8.70% as on 1-4-2018 + 2%). However, the regulation does not allow receivables to be considered for computing working capital for generation owned by the distribution licensee. The parameters adopted for computation of Interest on Working capital for the control period for SBU-G are given below:

Table 2.26 : Parameters for Interest on Working Capital (SBU-G)				
Item	2018-19	2019-20	2020-21	2021-22
Opening GFA (RsCr)	4413.63	4513.09	4970.32	6069.18
O&M Cost (RsCr)	127.858	152.436	176.591	211.7655

Table 2.27 : Interest on Working capital (SBU-G) (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	O&M expenses (as per norms)	10.65843	12.703	14.7159	17.64713
2	Maintenance Spares (as per norms)	44.1363	45.1309	49.7032	60.6918
3	Receivables (as per norms)	0	0	0	0
4	Less: security deposits	0	0	0	0
5	Total Working Capital	54.79463	57.8339	64.4191	78.33893
6	Interest Rate (as per norms)	10.70%	10.70%	10.70%	10.70%
7	Interest on Working Capital	5.863	6.188	6.893	8.382

The summary of interest and finance charges estimated for SBU-G for the control period is submitted below:

Table 2.28 : Summary of Interest & Finance Charges for SBU-G (Rs.Cr.)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Interest on capital liabilities	106	127.05	191.72	264.66
2	Interest on GPF	9.83	10.48	11.12	11.77
3	Interest on Bonds issued to Master Trust	39.67	37.58	35.50	33.41
4	Interest on working capital	5.86	6.19	6.89	8.38
5	Interest on additional Bonds to Trust	19.12	19.12	19.12	19.12
6	Total Interest & Finance Charges	180.48	200.42	264.35	337.34

One Time Expenses CMDRF

In connection with the damage caused on the State due to the heavy rain fall, flood and landslides during August-2018, the KSEBL has contributed an amount of Rs 35Cr to the Chief Minister's Relief Fund. It is requested that the amount of Rs 1.79Cr contributed by SBU-G in this behalf may be allowed as onetime expense incurred.

Return on Equity

The equity of Government of Kerala as per the Second Transfer Scheme published under section 131 of the Act has to be considered, as per regulation 34 (b), for the computation of return on equity. The Government equity in KSEB as per the second transfer scheme is Rs 3499 Cr. The Regulation 28 allows an RoE of 14% per annum. Accordingly, the RoE of KSEBL is Rs 489.86 crore (14% on the equity of Rs 3499 Cr).

As per the annual accounts for the year 2017-18, the equity share of the SBU-G, SBU-T and SBU-D is given below. The RoE of SBU-G is apportioned based on the above.

Table 2.29 : SBU Wise Return on Equity (Rs Cr)			
SBU	Equity Share	% of Equity	RoE
SBU-G	83126.92	23.76	116.38
SBU-T	85704.62	24.49	119.99
SBU-D	181073.46	51.75	253.50

Thus the ROE for SBU-G would be Rs. 116.38 Cr each year during the Control Period.

Aggregate Revenue Requirement

The SBU-G handles the Generation assets of KSEB Ltd and manages bulk generation of power and supply to SBU-D. The revenue requirement of SBU-G is the transfer cost of internal generation to SBU-D. The revenue requirement for SBU-G during the regulatory control period are submitted below:

Table 2.30 : ARR of SBU-G for FY 2019-22					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Operation & Maintenance Expenses	127.86	152.44	176.59	211.77
2	Interest on long-term loans	106	127.05	191.72	264.66
3	Interest on Master Trust Bonds	39.67	37.58	35.50	33.41
4	GPF Interest	9.83	10.48	11.12	11.77
5	Depreciation	122.26	125.01	137.68	168.12
6	Interest on WC	5.86	6.19	6.89	8.38
7	Interest on Additional Bond to Trust	19.12	19.12	19.12	19.12
8	One Time Expenses CMDRF	1.79	--	--	--
9	Adjustment Controllable factors Etc	0	0	0	0
10	Total Revenue Expenditure	432.39	477.87	578.62	717.23
11	Return on Equity	116.38	116.38	116.38	116.38
12	Tax on RoE	0	0	0	0
13	Aggregate Revenue Requirement	548.77	594.25	695.0	833.61

Non-Tariff Income

The non-tariff income of SBU-G includes income from sale of scrap, interest on advances made to contractors, interest on staff loans and advances, Rent from buildings etc. The projection of Non-Tariff income of SBU-G for the control period is submitted below:

Table 2.31 : Non-Tariff Income for SBU-G (Rs Cr)					
No	Other Income	2018-19	2019-20	2020-21	2021-22
1	Interest on loans and adv to licensees	0.33	0.33	0.33	0.33
2	Interest on adv.to suppliers and contractors	2.32	2.47	2.61	2.76
3	Interest on staff loan	0.01	0.01	0.01	--
4	Interest from banks FD	1.47	1.47	1.47	1.47
5	Income from sale of scrap & tender forms	3.11	7.73	8.69	9.66
6	Rental from staff quarters	0.06	0.06	0.07	0.08
7	Rental from contractors	0.12	0.14	0.15	0.17
8	Rent from others	0.62	0.72	0.81	0.9
9	Excess found on PV	0.01	0.02	0.02	0.02
10	SD forfeited	13.77	15.83	17.89	19.95
11	Sale of trees	0.02	0.03	0.03	0.03
12	Usufructs	0.14	0.16	0.18	0.21
13	Penalty/LD from Contractors /suppliers	1.68	1.94	2.19	2.44
14	Outside Student Project	0.03	0.03	0.03	0.04
15	Cost of DPR PVT shp developers	0.13	0.15	0.17	0.19
16	Revenue energy audit consultancy	0.01	0.01	0.01	0.01
17	Testing fee from contractors	0.02	0.02	0.02	0.02
18	Others	1.98	2.28	2.58	2.88
	Total other Income	25.83	33.38	37.28	41.17

Other Business of SBU-G

KSEBL as per BO (CMD) No: 2556/2015(CE/Civil Design/Prefab) dated 12.10.2015, formed a separate wing 'SPIN'- Sports, Pre-engineered Infrastructure and New construction technology Unit, for executing Pre-engineered Buildings, Sports Infrastructure works of the State and other New construction . Government of Kerala have also designated KSEBL as an accredited agency; authorized to execute public works of various Departments, since August 2015 and have now authorized to execute public works, as Project Management Consultant for works of value up to Rs.565 Crore in a financial year, by charging centage ranging from 5 to 8% or on competitively bided rates. Board as per B.O.(DB) No.1578/2018(DGC/AEE IV/GNL/2014) dated 26.06.2018 has also accorded in principle approval for the proposal for setting up of an exclusive SPV "**Kerala EB Consultancy & Infrastructure Ltd.**"(KEBCIL), for scaling up of consultancy works it is offering currently under Chief Engineer (Civil- Dam safety & DRIP).

Government of Kerala has also declared KSEBL as a Special Purpose Vehicle (SPV) for implementing the infrastructure projects of Health and Family Welfare Department with KIIFB funding. The developments of 5 Hospital Projects have been entrusted to KSEBL, for a total amount of Rs. 476 Crores. Works costing Rs.21 Crores have already been completed by the Consultancy Wing and PMC as well as execution of works costing Rs.520 Crores are going on for completion within next two years. The amount earned from this business will be appropriately accounted in the truing up exercise of the corresponding years.

Net ARR of SBU-G

The net ARR of SBU-G, thus, for the control period 2018-19 to 2021-22 is submitted below:

Table 2.32 : Net ARR for SBU-G					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Gross ARR	548.77	594.25	695.00	833.61
2	Less: Other Income	25.83	33.38	37.28	41.17
3	Net ARR of SBU-G	522.94	560.87	657.72	792.44

Since the entire energy generated by SBU-G is treated as delivered / sold to SBU-D, the above Net-ARR would be the transfer cost to SBU-D.

* * *

Annexure G1 - Hydel Power Projects of KSEBL						
No	Name of Station	Installed Capacity			Date of Commissioning	
		No of Machines	Plant Capacity	Design Energy	Original Date	After Renovation
I	Major HEP					
1	Idukki	6 x 130	780	2398	22.03.1986	
2	Sabarigiri	4 x 55 + 2x 60	340	1338	26.11.0967	06.05.2014
3	Idamalayar	2 x 37.5	75	380	03.02.1987	
4	Sholayar	3x18	54	233	14.05.1968	
5	Pallivasal	3 x 5+ 3x7.5	37.5	284	07.03.1951	26.08.2002
6	Kuttiyadi	3x25	75	268	28.11.1972	
7	Kuttiyadi Extension	1x50	50	75	27.01.2001	
8	Kuttiyadi Add Ext	2x50	100	223	11.05.1963	
9	Panniar	2 x 16.2	32.4	158	26.01.1964	01.02.2003
10	Neriamangalam	3 x17.55	52.65	237	11.05.1963	31.11.2005
11	NES	1x25	25	58.27	27.05.2008	
12	Lower Periyar	3 x 60	180	493	28.11.1997	
13	Poringalkuthu	4x9	36	191	06.02.1960	29.05.2015
14	Sengulam	4 x 12.8	51.2	182	05.01.1955	30.11.2002
15	Kakkad	2x25	50	262	13.10.1999	
	Sub Total (HEP)	49 Nos	1938.75	6780.27		
II	Small HEPs					
1	Kallada	2x7.5	15	65	05.09.1994	
2	Peppara	1x3	3	11.5	15.06.1996	
3	Malankara	3x3.5	10.5	44	23.10.2005	
4	Madupatty	1x2	2	6.4	14.01.1998	
5	Malampuzha	1x2.5	2.5	5.6	26.11.2001	
6	Lower Meenmutty	(1x0.5+ 2x1.5)	3.5	7.63	25.03.2006	
7	Chembukadavu - 1	3x0.9	2.7	6.59	19.08.2003	
8	Chembukadavu - 2	3x1.25	3.75	9.03	04.09.2003	
9	Urumi -1	3x1.25	3.75	9.72	25.01.2004	
10	Urumi -2	3x0.8	2.4	6.28	25.01.2004	
11	KTR	3x1.25	3.75	15	23.10.2009	
12	Poozhithode	3 x 1.6	4.8	10.97	25.06.2011	
13	Ranni-Perinadu	2x2	4	16.73	16.02.2012	
14	Peechi	1x1.25	1.25	3.31	07.01.2013	
15	Vilangad	3x2.5	7.5	22.63	19.01.2014	
16	Chimmony	1x2.5	2.5	6.7	22.05.2015	
17	Adyanpara	2x1.5 +0.5	3.5	9.01	09.03.2015	
18	Barapole	3 x 5	15	36	29.02.2016	
20	PLBE	1x16	16	74	20.03.1999	
21	Vellathooval	2 x 1.8	3.6	12.7	08.09.2016	
22	Peruthenaruvi	2 x3	6	25.77	24.10.2017	
	Sub Total (SHEP)	22Nos	117	404.57		
	Total (Hydel)	80 Nos	2055.75	7184.84		

ANNEXURE G2 : Solar Power Projects of KSEBL			
Existing projects			
No	Name of the stations	Installed Capacity(MW)	Date of Commissioning
1	Solar KSEB(Kanjikode)	1	10.08.2015
2	Solar KSEB(Edayar)	1.25	06.09.2016
3	Solar KSEB(Kollengode)	1	08.08.2016
4	Solar 1MW Barapole Canal Bank*	1	07.11.2016
5	Solar 3MW Barapole Canal Top*	3	17.11.2016
6	Agali -Chaliyur-96kW,	0.96	31.08.2015
7	Poringalkuthu PH 50kW	0.5	10.09.2015
8	Moozhiyar RT 125kW	0.125	Aug-16
9	*Meencut RT-25kW, NES	0.025	Jun-16
10	Kothamangalam RT-125kW	0.125	Jul-16
11	Moolamattom RT 50 kW	0.05	
12	Floating Solar 10kW –B'sagar	0.01	Jan-16
13	*Thrissur RT-345kW	0.345	Jul-16
14	Padinjarathara RT- 440kW	0.44	29.08.2016
15	KDPP, Kozhikode	0.035	10.03.2017
16	Thalakulathur-650kW	0.65	22.04.2017
17	Vydyuthi Bhavanam HQ RT-30KW	0.03	13-06-2017
18	Manjeswaram-500kW	0.5	24-05-17
19	Moovattupuzha-1250kW	1.25	Jan-18
20	Pothencode -2000kW	2	Feb-18
Total solar		14.26	
Projects on 2018-19			
1	Peerumedu (Idk) GM SPV	0.5	2018-19
2	Ponnani G. Mounted SPV	0.5	2018-19
3	Schools RT - 8 Nos -5kWp each	0.04	2018-19
4	IPDS- South & Central- Roof Top SPV	0.445	2018-19
Projects on 2019-20			
1	IPDS North - Roof Top SPV Project	0.675	2019-20
2	Medical College TVM 300kWp	0.3	2019-20
3	KWA, Alappuzha 1MW	1	2019-20
4	Kottiyam Ground mounted	0.6	2019-20
5	BDPP GM SPV	6.5	2019-20
6	West Kallada Floating solar	10	2019-20
7	Saura Rooftop Solar	50	2019-20
8	Madakathara Choolissery	1.5	2019-20
9	Kanjikode Ground mounted	2	2019-20
10	Agali Ground mounted	1	2019-20
11	LSGD Palakkad	0.5	2019-20
12	Mylatty (Kasargode) G Mounted SPV	1	2019-20
Total solar			

ANNEXURE G3 : INFLOW DETAILS FROM 1998-99 ONWARDS OF MAJOR RESERVOIRS (WATER YEAR)														
No.	Year	June	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
1	1998-99	678.7	1476.49	2357.6	1036.91	1243.8	694.7	457.53	157.27	118	94.11	96.03	421.89	8833.03
2	1999-00	1046.46	1416.49	973.6	441.59	1198.43	451.57	197.19	130.38	148	82.9	104	98.6	6289.21
3	2000-01	835.07	946.1	2199.13	789.14	502.59	227.58	198.97	153.05	80.74	47.5	162.21	127.2	6269.28
4	2001-02	1062.21	1765.9	1079.95	501.1	865.14	712.89	231.18	116.03	86.99	81.26	71.06	161.75	6735.46
5	2002-03	489.76	750.9	1255.86	322.19	585.44	391.14	134.13	78.51	63.04	63.21	52.63	81.22	4268.03
6	2003-04	304.74	748.03	916.01	376.53	983.43	325.98	160	91.92	78.81	39.28	58.56	426.2	4509.49
7	2004-05	1401.61	986.94	1436.86	510.74	716.44	464.39	208.73	155.27	70.42	72.18	109.3	99.29	6232.17
8	2005-06	569.38	2261.04	1252.98	1475.76	715.88	714.76	442.33	217.85	110.07	170.31	154.37	434.29	8519.02
9	2006-07	725.23	1596.83	1117.81	963.41	1009.56	907.56	253.21	164.44	90.93	111.6	123.39	113.14	7177.11
10	2007-08	1002.94	2797.48	1499.21	1700.29	1095.25	596.39	283.09	140.5244	126.85	214.1	180.18	132.23	9768.5344
11	2008-09	433.63	1144.88	1358.87	962.98	629.358	297.351	169.3	69.864	44.425	78.414	65.672	115.774	5370.518
12	2009-10	330.869	2023.7	779.469	1147.562	898.7	642.91	242.242	128.347	76.47	81.11	102.159	128.296	6581.834
13	2010-11	800.02	1407.075	1175.575	818.336	921.176	651.47	364.2	167.411	122.624	103.11	208.129	136.99	6876.116
14	2011-12	1236.187	1318.659	1654.185	1192.892	592.55	587.895	262.645	127.97	88.15	90.26	132.78	94.84	7379.013
15	2012-13	340.07	726.86	893.79	744.06	435.67	245.57	102.811	53.308	35.017	76.89	75.527	65.056	3794.629
16	2013-14	1642.94	2392.97	1895.437	1164.5	634.76	441.3921	213.8418	120.2269	68.19692	96.71712	88.4	180.09	8939.4718
17	2014-15	583.25	1678.1	1798.89	1034.02	843.43	540.03	273.58	143.588	79.231	113.477	241.44	255.403	7584.439
18	2015-16	1053.951	1106.8266	829.56	614.38	619.18	605.9906	420.6586	148.6973	92.3638	86.8715	90.83459	107.889449	5777.2031
19	2016-17	582.8727	1105.0913	748.03516	393.7508	267.5849	152.9335	81.91116	57.87296	40.62692	94.89989	70.59566	107.458398	3703.6333
20	2017-18	569.72	633.92	1323.47	1269.17	706.25	487.89	326.86	110.03	68.37	113.65	122.90	242.448012	5973.3528
21	2018-19G*	1569.08	3146.6	4471.27	668.14	--	--	--	--	--	--	--	--	
	2018-19N*	1460.22	2461.90	492.56	455.14	936.87	465.34	245.81	112.73	71.55	93.54	119.84	143.42	7058.94
22	2019-20	860.01	1485.51	1159.10	883.38	685.62	482.14	253.46	117.02	74.26	95.05	125.26	146.19	6366.99
23	2020-21	912.92	1431.69	1197.06	856.96	664.31	466.07	254.58	115.88	74.04	96.45	127.57	147.98	6345.51
24	2021-22	924.21	1434.15	1199.21	860.83	638.62	447.53	243.62	110.73	69.18	95.78	119.51	149.08	6292.45
The actual inflow is taken upto Sep-2018 and the Oct -2018 has been calculated based on the actual available inflow and thereafter 10 years average is taken for projection. 2018-19G*- Gross actual Inflow received in the Reservoirs; 2018-19N*- Net inflow in the reservoirs considering spill														

Annexure G3 (1) : IDUKKI RESERVOIR- Month wise inflow in MM3															
No	Month	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
1	June	113.61	89.88	236.06	343.92	101.66	433.49	155.64	255.67	145.20	158.74	387.53	230.78	244.87	245.75
2	July	277.21	471.72	355.98	353.51	196.43	638.59	401.27	277.95	270.18	136.55	803.37	390.55	382.44	385.08
3	Aug	333.59	170.04	322.90	424.47	197.20	510.27	481.32	178.13	153.63	316.74	301.17	305.59	319.14	318.76
4	Sep	264.44	277.41	217.75	275.43	175.30	333.38	241.91	140.09	78.80	352.03	95.65	218.77	212.91	212.43
5	Oct	131.63	196.01	245.93	138.26	88.33	175.19	200.00	147.67	54.72	161.51	153.93	156.16	152.17	142.79
6	Nov	59.94	119.08	164.59	128.29	45.00	90.99	143.44	118.55	21.54	84.22	97.57	101.33	99.55	93.05
7	Dec	26.21	39.83	74.02	48.20	11.62	31.09	36.68	85.42	5.81	48.26	40.71	42.16	42.40	39.24
8	Jan	5.34	16.10	27.17	22.61	1.35	19.89	15.98	17.60	3.14	13.08	14.23	15.11	15.02	13.80
9	Feb	2.67	13.81	28.98	15.15	0.00	7.46	8.69	13.31	4.19	7.08	10.13	10.88	10.59	8.75
10	Mar	17.29	17.19	21.97	23.17	10.83	18.40	16.42	14.19	18.69	20.24	17.84	17.89	17.96	17.56
11	Apr	13.21	23.27	64.08	28.18	32.42	22.28	73.02	16.50	15.33	22.39	31.07	32.85	33.81	30.78
12	May	30.24	36.62	50.24	20.95	34.50	52.10	69.34	27.24	21.37	66.49	40.91	41.98	42.51	41.74
	Total	1275.38	1470.96	1809.65	1822.15	894.64	2333.14	1843.71	1292.31	792.60	1387.34	1994.09	1564.06	1573.37	1549.74
The actual inflow considering spill is taken upto Sep-2018 and thereafter 10 years average is taken for projection upto 2021-22															

Annexure G3 (2) : PAMBA & KAKKI RESERVOIR- Month wise inflow in MM3														
FY	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
June	31.9	35.9	82.6	136.6	26.9	193.1	55.0	110.7	67.3	63.4	173.0761	94.5	100.3	102.1
July	126.3	205.9	187.2	142.0	68.9	246.7	176.5	110.2	117.3	49.1	315.5122	161.9	157.5	154.6
Aug	142.1	94.2	140.5	170.0	95.1	178.9	184.5	94.4	76.1	151.9	76.7035	126.2	129.4	128.3
Sep	102.6	134.9	89.8	126.8	75.3	136.1	103.9	58.7	37.1	145.6	57.2	96.6	92.7	93.0
Oct	87.7	108.1	104.0	67.6	65.5	81.9	99.0	72.9	25.1	75.7	78.7	77.8	74.8	71.9
Nov	45.2	107.2	82.7	89.8	30.1	71.0	71.0	100.8	28.8	87.9	71.4	74.1	70.8	69.6
Dec	28.8	34.8	57.5	42.1	18.0	41.0	41.4	67.4	18.3	58.6	40.8	42.0	42.7	41.2
Jan	14.1	20.8	35.4	19.0	10.2	21.4	17.2	20.6	12.0	16.7	18.7	19.2	19.1	17.4
Feb	14.2	13.3	19.1	16.3	9.6	13.2	13.2	12.8	7.8	10.1	13.0	12.8	12.8	12.2
Mar	13.8	18.2	22.2	19.4	16.5	21.2	21.0	14.1	14.2	22.6	18.3	18.8	18.8	18.5
Apr	12.1	18.1	30.1	18.1	16.4	14.4	33.0	16.5	9.2	24.2	19.2	19.9	20.1	19.1
May	19.8	16.0	13.0	16.0	19.6	24.1	28.2	12.6	13.2	25.3	18.8	18.7	18.9	19.5
Total	638.5	807.4	864.1	863.9	452.1	1043.1	843.9	691.7	426.4	731.2	901.5	762.5	758.0	747.4
The actual inflow is taken upto Sep-2018 and thereafter 10 years average is taken for projection upto 2021-22														

Annexure G3 (3) : IDAMALAYAR RESERVOIR- Month wise inflow in MM ³														
FY	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
June	88.67	50.53	150.43	231.20	60.37	358.03	99.86	200.31	104.58	88.40	316.1882	165.99	177.54	180.25
July	238.25	478.43	292.94	309.24	146.06	543.18	363.47	229.08	245.55	146.90	628.0438	338.29	324.27	327.41
Aug	266.16	192.68	255.70	396.60	226.47	388.83	455.61	165.35	148.62	280.30	148.385	265.85	273.17	274.92
Sep	205.77	305.87	189.97	335.80	178.51	255.04	251.10	103.81	84.12	293.67	31.96	202.98	192.69	192.97
Oct	105.93	201.57	240.40	88.52	55.88	132.12	186.49	88.63	56.55	118.10	127.42	129.57	122.37	110.56
Nov	38.66	85.26	202.75	87.56	37.43	59.63	69.33	52.69	20.71	46.85	70.09	73.23	72.03	58.96
Dec	17.60	30.05	61.04	39.16	13.69	25.83	39.73	42.75	15.56	22.95	30.84	32.16	32.37	29.50
Jan	12.93	21.63	33.26	22.20	4.99	17.60	17.10	15.58	9.47	19.05	17.38	17.83	17.45	15.87
Feb	8.00	13.03	15.87	17.08	6.48	15.26	13.91	10.32	5.27	9.86	11.51	11.86	11.74	11.33
Mar	5.25	10.07	10.01	15.76	2.63	10.18	15.16	10.20	14.80	7.92	10.20	10.69	10.75	10.83
Apr	2.66	7.61	14.72	7.61	9.46	10.01	22.04	1.96	2.33	2.94	8.13	8.68	8.79	8.20
May	6.35	7.51	5.69	7.51	16.61	11.27	21.89	13.01	11.88	19.70	12.14	12.72	13.24	14.00
Total	996.22	1404.23	1472.78	1558.25	758.58	1826.98	1555.69	933.69	719.43	1056.66	1412.28	1269.86	1256.42	1234.78
The actual inflow considering spill is taken upto Sep-2018 and thereafter 10 years average is taken for projection upto 2021-22														

Annexure G3 (4) : KUTTIADI RESERVOIR- TOTAL INFLOW (including Thariode Reservoir)														
FY	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
June	79.88	28.39	72.44	140.28	33.63	177.64	78.76	116.48	56.91	60.97	161.1637	92.67	99.09	101.76
July	122.26	258.89	126.01	151.65	102.42	260.12	249.81	115.52	103.16	98.21	197.851	166.36	157.11	160.22
Aug	112.83	77.17	105.13	155.65	138.61	107.89	125.44	76.03	91.57	130.21	85.81404	109.35	112.57	113.32
Sep	59.30	72.98	72.43	99.29	92.69	82.32	84.79	40.84	50.64	84.97	27.54	70.85	70.64	70.46
Oct	57.37	52.77	34.81	29.59	21.61	41.74	45.48	33.69	23.34	41.61	38.20	36.28	34.63	34.62
Nov	16.42	23.84	21.34	18.11	18.26	19.92	19.06	19.56	9.03	15.45	18.10	18.27	17.71	17.35
Dec	10.88	15.03	10.58	12.30	7.84	13.60	10.18	9.28	4.80	9.38	10.39	10.34	9.87	9.80
Jan	5.42	13.20	9.34	10.88	7.64	10.17	7.97	9.59	8.30	4.54	8.70	9.03	8.62	8.54
Feb	0.08	6.56	8.52	8.39	2.71	9.02	9.21	9.41	5.44	8.21	6.76	7.42	7.51	7.41
Mar	10.43	7.32	8.27	3.59	12.17	7.55	10.69	10.69	10.91	11.46	9.31	9.19	9.38	9.49
Apr	9.92	7.85	9.85	7.85	7.34	8.48	11.80	7.79	8.91	9.20	8.90	8.79	8.89	8.79
May	6.18	9.34	6.16	9.34	11.39	9.03	17.42	9.42	15.77	19.72	11.38	11.90	12.15	12.75
Total	490.96	573.34	484.88	646.92	456.32	747.47	670.61	458.31	388.78	493.92	584.09	550.46	548.18	554.51
The actual inflow is taken upto Sep-2018 and thereafter 10 years average is taken for projection upto 2021-22														

Annexure G4 (1) : Annual Maintenance Schedule (2018-19)															
No	Name of Station	Installed Capacity (MW)		Unit #1		Unit #2		Unit #3		Unit #4		Unit #5		Unit #6	
				From	To	From	To	From	To	From	To	From	To	From	To
1	Idukki	6 X130	780	01.06.2018	31.03.2019	01.10.2018	05.05.2019	15.06.2017	31.05.2018	01.08.2018	31.08.2018	01.10.2018	31.10.2018	01.11.2018	30.11.2018
2	Sabarigiri	4x55+2x60	340	16.11.2018	15.12.2018	16.09.2018	15.10.2018	01.08.2018	15.09.2018	01.06.2018	30.06.2018	01.07.2018	30.07.2018	16.10.2018	15.11.2018
3	Kuttiyadi	3x25+1x50+2x50	225	04.01.2019	30.01.2019	03.12.2018	26.12.2018	Jan-2019	Aug 2019	02.05.2018	30.05.2018	02.04.2018	30.04.2018	04.02.2019	28.02.2019
4	Lower Periyar	3x60	180	01.05.2018	30.05.2018	01.02.2019	03.03.2019	01.01.2019	31.01.2019						
5	Neriamangalam	3x17.55+1x25	77.65	Jan-2019		Apr-2018		May-2018		Feb 2019					
6	Idamalayar	2x37.5	75	15.06.2018	14.07.2018	12.10.2018	10.11.2018								
7	Sholayar	3x18	54	Jul-2018		Jun-2018	Jan-2019								
8	Kakkad	2x25	50	01.01.2019	30.01.2019	01.02.2019	02.03.2019								
9	Sengulam	4x12	48	Jan-2019		Feb-2019		Apr-2018		May-2018					
10	Poringal+PLBE	4X9+1X16	52	Dec-2018		Mar-2019		Apr-2018		May-2018		15.01.2019	15.02.2019		
11	Pallivasal	3x5+3x7.5	37.5	May-2018		Mar-2019		Apr-2018		Jan-2019		Feb-2019		Dec-2018	
12	Panniyar	2x16	32	Apr-2018		Jan-2019									
13	Kallada	2x7.5	15	Jun- 2018		Jul- 2018									
14	Malankara	3x3.5	10.5	01.11.2018	30.11.2018	01.12.2018	31.12.2018	1.10.2018	31.10.2018						
15	Poozhithode	3X1.6	4.8	Apr-2018		Mar-2019		Feb-2019							
16	L Meenmutty	(1X0.5+2 X1.5)	3.5	Feb-2019		Mar -2019		Apr- 2018							
17	Peppara	1X3	3	Jun-2018											
18	Mattupetty	1x2	2	Aug-2018											
19	Malampuzha	1 x2.5	2.5	Sep- 2018											
20	KTR	1.25X3	3.75	Apr-2018		Jan-2019		Feb-2019							
21	Chembukadavu-1	(3 x0.9)	2.7	Jan 2019		Jan 2019		Feb-2019							
22	Chembukadavu-2	(3X1.25MW)	3.75	Feb-2019		Mar-2019		Apr-2018							
23	Urumi-1	(3X1.25 MW)	3.75	Jan 2019		Jan 2019		Feb-2019							
24	Urumi-2	(3X0.8MW)	2.4	Feb-2019		Mar-2019		Apr-2019							
25	Ranni-Perinadu	(2X2.25MW)	4	Apr-2018		Mar-2019									
26	Peechi	(1 x1.25 MW)	1.25	May-2018	Jun-2018										
27	Vilangad	2.5MWx3	7.5	Feb-2019		Mar-2019		Apr-2018							
28	Adyanpara	(1X0.5+1.5X2)	3.5	Apr-2018	May-2018	Apr-2018	May-2018	Apr-2018	May-2018						
29	Chimmoney	2.5 MW	2.5	May-2018	Sep-2018										
	Sub Total (Hydel)		2046.15												

Annexure G4 (2) : Annual Maintenance Schedule (2019-20)															
				Unit #1		Unit #2		Unit #3		Unit #4		Unit #5		Unit #6	
No	Name of Station	Installed Capacity (MW)		From	To	From	To	From	To	From	To	From	To	From	To
1	Idukki	6 X130	780	R&M till March 2020		01.10.2018	05.05.2019	01.06.2019	30.06.2019	01.08.2019	31.08.2019	01.10.2019	31.10.2019	01.11.2019	30.11.2019
2	Sabarigiri	4x55+2x60	340	Sep- 2019		Oct-2019		Aug-2019		Jun-2019		Jul-2019		Nov-2019	
3	Kuttiyadi	3x25+1x50+2x50	225	06.01.2020	30.01.2020	Sep-2019	Apr 2020			01.04.2019	30.04.2019	03.05.2019	30.05.2019	03.02.2020	28.02.2020
4	Lower Periyar	3x60	180	01.05.2019	30.05.2019	01.02.2020	03.03.2020	01.01.2020	31.01.2020						
5	Neriamangalam	3x17.55+1x25	77.65	Jan-2020		Apr-2019		May-2019		Feb-2020					
6	Idamalayar	2x37.5	75	15.06.2019	14.07.2019	12.10.2019	10.11.2019								
7	Sholayar	3x18	54	Feb-2019				Jun-2019							
8	Kakkad	2x25	50	01.01.2020	30.01.2020	01.02.2020	02.03.2020								
9	Sengulam	4x12	48	Jan-2020		Feb-2020		Apr-2019		May-2019					
10	Poringal+PLBE	4X9+1X16	52	Dec-2019		Mar-2020		Apr-2019		May-2019		15.01.2020	15.02.2020		
11	Pallivasal	3x5+3x7.5	37.5	May-2019		Mar-2020		Apr-2019		Jan-2020		Feb-2020		Dec-2019	
12	Panniyar	2x16	32	Apr-2019		Jan-2020									
13	Kallada	2x7.5	15	Jun- 2019		Jul- 2019									
14	Malankara	3x3.5	10.5	01.11.2019	30.11.2019	01.12.2019	30.12.2019	1.10.2019	31.10.2019						
15	Poozhithode	3X1.6	4.8	Apr-2019		Mar-2020		Feb-2020							
16	LMeenmutty	(1X0.5+2 X1.5)	3.5	Feb-2020		Mar -2020		Apr- 2019							
17	Peppara	1X3	3	Jun-2019											
18	Mattupetty	1x2	2	Aug-2019											
19	Malampuzha	1 x2.5	2.5	Sep- 2019											
20	KTR	1.25X3	3.75	Apr-2019		Jan-2020		Feb-2020							
21	Chembukadavu-1	(3 x0.9)	2.7	Jan 2020		Jan 2020		Feb-2020							
22	Chembukadavu-2	(3X1.25MW)	3.75	Feb-2020		Mar-2020		Apr-2019							
23	Urumi-1	(3X1.25 MW)	3.75	Jan 2020		Jan 2020		Feb-2020							
24	Urumi-2	(3X0.8MW)	2.4	Feb-2020		Mar-2020		Apr-2019							
25	Ranni-Perinadu	(2X2.25MW)	4	Apr-2019		Mar-2020									
26	Peechi	(1 x1.25 MW)	1.25	May-2019	Jun-2019										
27	Vilangad	2.5MWx3	7.50	Feb 2020		Mar-2020		Apr-2019							
28	Adyanpara	(1X0.5+1.5X2)	3.5	Apr-2019	May-2019	Apr-2019	May-2019	Apr-2019	May-2019						
29	Chimmoney	2.5 MW	2.5	May-2019	Sep-2019										
	Sub Total (Hydel)		2046.15												

Annexure G4 (3) : Annual Maintenance Schedule (2020-21)															
				Unit #1		Unit #2		Unit #3		Unit #4		Unit #5		Unit #6	
No	Name of Station	Installed Capacity (MW)		From	To	From	To	From	To	From	To	From	To	From	To
1	Idukki	6 X130	780	01.06.2020	30.06.2020	01.07.2020	31.07.2020	01.08.2020	31.08.2020	01.09.2020	30.09.2020	01.10.2020	31.10.2020	01.11.2020	30.11.2020
2	Sabarigiri	4x55+2x60	340	Sep- 2020		Oct-2020		Aug-2020		Jun-2020		Jul-2020		Nov-2020	
3	Kuttiyadi	3x25+1x50+2x50	225	May-2020	Dec-2020			04.11.2020	30.11.2020	01.04.2020	30.04.2020	04.05.2020	30.05.2020	01.02.2021	26.02.2021
4	Lower Periyar	3x60	180	01.05.2020	30.05.2020	01.02.2021	03.03.2021	01.01.2021	31.01.2021						
5	Neriamangalam	3x17.55+1x25	77.65	Jan-2021		Apr-2020		May-2020		Feb- 2021					
6	Idamalayar	2x37.5	75	15.06.2020	14.07.2020	12.10.2020	10.11.2020								
7	Sholayar	3x18	54	Jun-2020		Jul-2020		Aug-2020							
8	Kakkad	2x25	50	01.01.2021	30.01.2021	01.02.2021	02.03.2021								
9	Sengulam	4x12	48	Jan-2021		Feb-2021		Apr-2020		May-2020					
10	Poringal+PLBE	4X9+1X16	52	Dec-2020		Mar-2021		Apr-2020		May-2020		15.01.2021	15.02.2021		
11	Pallivasal	3x5+3x7.5	37.5	May-2020		Mar-2021		Apr-2020		Jan-2021		Feb-2021		Dec-2020	
12	Panniyar	2x16	32	Apr-2020		Jan-2021									
13	Kallada	2x7.5	15	Jun- 2020		Jul- 2020									
14	Malankara	3x3.5	10.5	01.11.2020	30.11.2020	01.12.2020	30.12.2020	1.10.2020	30.10.2020						
15	Poozhithode	3X1.6	4.8	Apr-2020		Mar-2021		Feb-2021							
16	LMeenmutty	(1X0.5+2 X1.5)	3.5	Feb-2021		Mar -2021		Apr- 2020							
17	Peppara	1X3	3	Jun-2020											
18	Mattupetty	1x2	2	Aug-2020											
19	Malampuzha	1 x2.5	2.5	Sep- 2020											
20	KTR	1.25X3	3.75	Apr-2020		Jan-2021		Feb-2021							
21	Chembukadavu-1	(3 x0.9)	2.7	Jan 2021		Jan 2021		Feb-2021							
22	Chembukadavu-2	(3X1.25MW)	3.75	Feb-2021		Mar-2021		Apr-2020							
23	Urumi-1	(3X1.25 MW)	3.75	Jan 2021		Jan 2021		Feb-2021							
24	Urumi-2	(3X0.8MW)	2.4	Feb-2021		Mar-2021		Apr-2020							
25	Ranni-Perinadu	(2X2.25MW)	4	Apr-2020		Mar-2021									
26	Peechi	(1 x1.25 MW)	1.25	May-2020	Jun-2020										
27	Vilangad	2.5MWx3	7.50	Feb 2021		Mar-2021		Apr-2020							
28	Adyanpara	(1X0.5+1.5X2)	3.5	Apr-2020	May-2020	Apr-2020	May-2020	Apr-2020	May-2020						
29	Chimmony	2.5 MW	2.5	May-2020	Sep-2020										

Annexure G4 (4) : Annual Maintenance Schedule (2021-22)															
				Unit #1		Unit #2		Unit #3		Unit #4		Unit #5		Unit #6	
No	Name of Station	Installed Capacity (MW)		From	To	From	To	From	To	From	To	From	To	From	To
1	Idukki	6 X130	780	01.06.2021	30.06.2021	01.07.2021	31.07.2021	01.08.2021	31.08.2021	01.09.2021	30.09.2021	01.10.2021	31.10.2021	01.11.2021	30.11.2021
2	Sabarigiri	4x55+2x60	340	Sep-2021		Oct-2021		Aug 2021		Jun 2021		Jul 2021		Nov 2021	
3	Kuttiyadi	3x25+1x50+2x50	225	04.01.2022	30.01.2022	02.12.2021	26.12.2021	04.11.2021	30.11.2021	01.04.2021	30.04.2021	04.05.2021	30.05.2021	01.02.2022	26.02.2022
4	Lower Periyar	3x60	180	01.05.2021	30.05.2021	01.02.2022	03.03.2022	01.01.2022	31.01.2022						
5	Neriamangalam	3x17.55+1x25	77.65	Jan-2022		Apr-2021		May-2021		Feb-2022					
6	Idamalayar	2x37.5	75	15.06.2021	14.07.2021	12.10.2021	10.11.2021								
7	Sholayar	3x18	54	Jun-2021		Jul-2021		Aug-2021							
8	Kakkad	2x25	50	01.01.2022	30.01.2022	01.02.2022	02.03.2022								
9	Sengulam	4x12	48	Jan-2022		Feb-2022		Apr-2021		May-2021					
10	Poringal+PLBE	4X9+1X16	52	Dec-2021		Mar-2022		Apr-2021		May-2021		15.01.2022	15.02.2022		
11	Pallivasal	3x5+3x7.5	37.5	May-2021		Mar-2022		Apr-2021		Jan-2022		Feb-2022		Dec-2021	
12	Panniyar	2x16	32	Apr-2021		Jan-2022									
13	Kallada	2x7.5	15	Jun- 2021		Jul- 2021									
14	Malankara	3x3.5	10.5	01.11.2021	30.11.2021	01.12.2021	30.12.2021	1.10.2021	30.10.2021						
15	Poozhithode	3X1.6	4.8	Apr-2021		Mar-2022		Feb-2022							
16	Lower Meenmutty	(1X0.5+2 X1.5)	3.5	Feb-2022		Mar -2022		Apr- 2021							
17	Peppara	1X3	3	Jun-2021											
18	Mattupetty	1x2	2	Aug-2021											
19	Malampuzha	1 x2.5	2.5	Sep- 2021											
20	KTR	1.25X3	3.75	Apr-2021		Jan-2022		Feb-2022							
21	Chembukadavu-1	(3 x0.9)	2.7	Jan 2022		Jan 2022		Feb-2022							
22	Chembukadavu-2	(3X1.25MW)	3.75	Feb-2022		Mar-2022		Apr-2021							
23	Urumi-1	(3X1.25 MW)	3.75	Jan 2022		Jan 2022		Feb-2022							
24	Urumi-2	(3X0.8MW)	2.4	Feb-2022		Mar-2022		Apr-2021							
25	Ranni-Perinadu	(2X2.25MW)	4	Apr-2021		Mar-2022									
26	Peechi	(1 x1.25 MW)	1.25	May-2021	Jun-2021										
27	Vilangad	2.5MWx3	7.50	Feb 2022		Mar-2022		Apr-2021							
28	Adyanpara	(1X0.5+1.5X2)	3.5	Apr-2021	May-2021	Apr-2021	May-2021	Apr-2021	May-2021						
29	Chimmony	2.5 MW	2.5	May-2021	Sep-2021										
	Sub Total (Hydel)		2046.15												

Annexure G5 (1) : Generation 2018-19													
Month	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	TOTAL
Kuttiady+KES	51.2183	39.1109	69.8713	122.2286	133.5946	71.4314	102.29304	50.147795	25.62947	26.271107	31.02402	68.318095	791.1386
Poringal	10.08821	1.46558	21.83025	28.32423	13.78833	0	0	0	0	2.9127711	1.6143107	2.1176178	82.1413
PLBE	2.2255	5.214	11.09	12.31675	7.54475	11.61175	6.163959	3.7686869	1.7051026	0	2.1666296	3.8983086	67.70544
Sholayar	22.0216	16.2658	17.56674	4.3293	24.5719	23.83386	9.2918186	6.909301	5.3379599	6.0085177	6.6575679	11.930479	154.7248
EDMR	36.90345	31.17865	11.73705	19.46095	45.67375	49.6039	59.921361	44.106434	24.295333	23.008652	24.541845	44.981706	415.4131
Pallivasal	17.2097	17.0744	18.5434	19.2515	13.6339	17.4801	12.043396	9.2538571	4.0642979	4.0477133	4.780017	7.8636131	145.2459
Sengulam	0	9.3533	10.4367	13.2142	14.2272	11.2808	7.6192913	5.5965338	2.1848394	2.1759241	2.5695876	4.4912425	83.14962
Panniar	10.5118	12.5529	16.7063	23.042	10.9331	0	0	0	0	3.6174738	4.2719394	4.4821941	86.11771
NLM	12.6516	21.9966	43.2057	54.2839	45.6602	41.8077	29.907667	16.90015	6.3037583	6.2780355	7.4138443	7.0642465	293.4734
LP	13.688	24.48	80.744	108.512	42.168	21.84	52.633656	29.15725	6.8772786	6.5351902	7.7175228	7.0738575	401.4268
Idukki	260.591	233.812	107.374	217.137	456.217	327.595	356.95051	262.78439	183.43863	179.60673	229.39657	449.85894	3264.762
Sabarigiri	166.4625	153.268	111.0955	150.8728	179.2625	180.8475	200.83084	150.72492	71.570078	69.351601	84.931823	162.08013	1681.298
Kakkad	22.182	22.0624	20.3328	26.411	26.8668	24.2708	13.649981	10.686386	4.2951957	4.277669	4.6135778	8.2736108	187.9222
Kallada	5.2331	3.537	6.1598	10.5555	11.0479	6.7868	2.1580998	1.8885423	1.0229021	1.0187281	1.2030342	2.4356499	53.04706
Peppara	0.09756	0.155462	0.79614	1.25602	1.35994	0.48248	0.3117255	0.276372	0.1613802	0.1607217	0.1897991	0.1588496	5.40645
Madupetty	0.655707	0.39866	0.076524	0.000246	0.093279	0	0.1198944	0.092124	0.054621	0.0543981	0.0642397	0.3145766	1.92427
Chembukadav	0	0	2.075198	3.079422	1.23933	0.12303	1.401376	0.8436299	0.4990372	0.4970008	0.5869172	0	10.34494
Malampuzha	0	0	0	0	1.08321	0.375435	0.0005635	0	0	0.0326389	0.0385438	0	1.530391
Urumi	0	0	1.658057	2.62159	1.442076	0.292674	1.4513638	0.8324425	0.4990372	0.4970008	0.5869172	0	9.881159
Malankara	3.3162	3.4917	2.9544	2.5806	1.9494	2.3865	1.7192142	1.0516794	0.566862	0.5645489	0.6666859	1.1836559	22.43145
Lwr Meenmutty	0.034	0.566965	1.234575	0.990005	1.006425	0.3045	0.3567069	0.2321249	0.1365525	0.1359953	0.1605992	0.0244538	5.182903
Ktdy. tail race	0.48741	0.562091	0.992726	1.421281	1.45252	0.80859	0.5718493	0.3881475	0.2234495	0.2225377	0.2627987	0.3607418	7.754143
Poozhithode	0	0.0881	2.2003	2.9372	0.8294	0.5977	1.5149789	0.87332	0.4707251	0.4688043	0.5536194	0.0010165	10.53516
Ranni-Perunadu	0.423155	0.75948	0.951508	0.784917	0.314215	0	0	0	0	0.2349009	0.2773987	0.2770436	4.022618
Peechi	0.165918	0	0	0.084355	0.593412	0.09077	0.052555	0.0819731	0.0521382	0.0519255	0.0613197	0.0830106	1.317377
Vilangad	0	0.04072	0	0	0.51922	0.815011	1.8623836	1.01121	0.5760031	0.5736527	0.6774367	0.0010948	6.076732
Chimini	0.292283	0.002572	1.893535	2.156231	1.790706	0.987923	0.1812681	0.1985742	0.1191731	0.1186868	0.1401593	0.000717	7.881828
Adiyanpara	0.01064	0.11635	0.07982	0	0	0	0	0	0	0	0	0	0.20681
Vellathuval	0.0357	0.1461	3.4952	0.9784	0.4879	0	0	0	0	0.13105	0.1547593	0.1716507	5.60076
Barapole	0.025574	0.219324	0.945263	0.002461	0.00084	0.001333	0	0	0	1.6467789	1.9447106	0.1732162	4.959501
Perunthenaruvi	0.057092	1.419932	2.502922	2.954372	0.599596	0	0	0	0	0.2002839	0.2365189	0.0167444	7.987461
Maniyar	2.554353	3.61176	5.1913	5.936422	2.51633	0.01248	0	0.4652263	0.3418718	0.1043969	0.1267648	0.7890955	21.65
Kuthungal	6.1894	3.1785	4.97	8.9142	4.3355	4.4703	1.9917823	1.7288794	0.5742369	0.1944386	0.3686657	2.0741965	38.9901
HYDRO Total	645.3318	606.1292	578.711	846.6374	1046.803	800.1383	864.99928	599.99995	340.99994	340.99987	420.00014	790.49976	7881.25
BDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
KDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind Mill	0.0671	0.078922	0.123859	0.208945	0.245259	0.118235	0.3865203	0.0693159	0.114048	0.1050607	0.2044416	0.0684529	1.790159
Solar KSEB	0.8308	0.7196	0.3813	0.3695	0.3523	1.0129	1.0444911	1.3058041	1.333721	2.2639515	2.0897429	2.7865774	14.49069
Internal Total	646.2297	606.9278	579.2162	847.2158	1047.401	801.2695	866.43029	601.37507	342.44771	343.36889	422.29433	793.35479	7897.531

Annexure G5(2) : Generation 2019-20													
Month	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	TOTAL
Kuttiady+KES	70.171471	71.538324	72.004425	94.51508	84.864219	82.831541	68.38947	36.29	32.433191	36.529034	45.42108	53.937373	748.9252
Poringal	2.7699606	4.4454111	8.9993576	17.25465	16.511107	15.42896	13.250704	9.1953592	5.4422697	4.8277235	3.2122659	3.4896938	104.8275
PLBE	4.6282423	4.1574243	6.2824976	9.465497	9.4440921	8.9208432	8.6181352	6.9332662	5.5753892	6.3877461	6.1690462	7.5932123	84.17539
Sholayar	15.077608	13.639607	7.4648032	1.396643	5.9386971	14.295351	14.656184	15.550655	16.270524	16.497387	17.249972	21.983419	160.0209
EDMR	50.54449	44.57987	22.559087	18.7964	28.749641	33.937622	31.210086	20.282023	20.170151	24.833353	26.213277	37.863787	359.7398
Pallivasal	9.4913422	10.343569	13.942881	15.6958	16.06345	15.434315	15.380557	12.783419	10.659926	10.538133	10.791479	13.856322	154.9812
Sengulam	5.1830485	6.2562797	9.4773223	13.36525	15.692654	13.101502	13.020502	9.2342738	7.3169912	6.1148478	5.8325236	7.1853684	111.7806
Panniar	4.1754976	4.8505768	4.6044813	11.56904	13.500033	14.121432	13.759388	12.864516	8.8493908	5.0936695	4.9517374	10.417517	108.7573
NLM	7.3726106	8.8726407	21.641062	36.79451	38.504999	34.666575	30.17469	23.202577	14.784219	9.3933606	8.4934794	14.608663	248.5094
LP	7.4776	9.4664804	40.322095	73.01365	75.39842	60.799321	46.740978	33.874371	19.748595	10.630642	8.6002154	14.438299	400.5107
Idukki	369.20659	408.52977	215.48326	144.4255	197.90074	213.75227	229.12836	154.98535	140.38353	175.87207	183.30196	244.72649	2677.696
Sabarigiri	205.83079	164.09191	84.925271	90.50294	102.94092	116.45096	115.36944	91.925029	93.398509	74.719828	76.544222	144.97777	1361.678
Kakkad	11.015234	9.3035304	9.7767416	13.79682	14.466893	14.560275	13.457872	10.811672	10.234628	8.8191111	9.1021324	15.423621	140.7685
Kallada	2.523013	1.866951	1.2955358	2.298535	3.7645232	3.7842861	4.2169844	4.5892562	5.4029667	2.2927316	2.7982244	5.2247978	40.0578
Peppara	0.1563989	0.0806652	0.021297	0.339191	0.4122028	0.5677102	0.6939273	0.631129	0.4472206	0.3178753	0.2848043	0.2364346	4.188856
Madupetty	0.3520144	0.3761802	0.1705296	0.001353	0.0145863	0.2588724	0.2214776	0.1050052	0.1965487	0.2641081	0.3903777	0.5441588	2.895212
Chembukadav	0	0	1.4645854	2.401807	1.8861753	1.4624979	0.9963075	0.2726652	0.0364903	0	0	0	8.520529
Malampuzha	0	0	0	0	0.0007619	0.0945025	0.2594645	0.4050323	0.7848661	0.613942	0.1218379	0	2.280407
Urumi	0	0.0075183	1.6890321	2.535097	2.0550537	1.5086551	1.1116216	0.1631767	0.0530582	0	0	0	9.123213
Malankara	1.5351209	1.5169732	2.2230543	2.46389	2.3149551	1.8739217	2.0997082	1.9866002	1.6286042	1.7567256	1.8260221	2.393906	23.61948
Lwr Meenmutty	0.0434562	0.1662832	0.5105098	0.546533	0.5025248	0.5465301	0.5605191	0.6123666	0.2991703	0.0794234	0.0297415	0.0442357	3.941294
Ktdy. tail race	0.4033716	0.3872362	0.5489047	0.813278	0.7526685	0.6446837	0.4729447	0.3199136	0.352496	0.3619442	0.3462919	0.5932815	5.997015
Poozhithode	0.003252	0.048906	1.4955658	2.342635	2.0807072	1.5228521	1.0232207	0.2642991	0.0978258	0.0384008	0	0	8.917665
Ranni-Perunadu	0.3277548	0.3484836	0.6150697	0.710388	0.6621297	0.7689231	0.7638519	0.584114	0.291549	0.1264487	0.1319562	0.4902393	5.820908
Peechi	0.0237456	0	0	0.005771	0.0710542	0.1442358	0.1261714	0.136601	0.2864208	0.1711533	0.1727315	0.1662967	1.304182
Vilangad	0.1672642	0.1886328	1.5868327	3.244813	3.127466	2.3830415	2.0071216	0.965252	0.5241304	0.191158	0.110837	0.3350524	14.8316
Chimini	0.4729955	0.3712153	0.7839859	1.8343	2.0353717	1.4157294	1.4387875	1.4137256	0.7262298	0.5978806	1.1389173	1.4771648	13.7063
Adiyanpara	0	0.0022519	0.310705	0.806173	1.2030025	0.7336791	0.2046352	0.16991	0.078151	0.0121897	0.0012279	0.0010334	3.522959
Vellathuval	0.1925091	0.2042421	0.2320513	0.427044	0.8482128	0.6480636	0.3618745	0.1322427	0.0916982	0.0449009	0.0374849	0.1534531	3.373778
Barapole	7.3298224	6.0125909	2.9504226	3.124411	3.6617873	3.6716835	3.1905418	3.3625375	2.7217571	1.6832435	1.8142415	5.7729173	45.29596
Perunthenaruvi	0.0323445	0.8748412	2.0603272	2.394473	2.3944733	1.5053133	1.5053133	1.5053133	0.7488879	0.1118469	0.1389981	0.024813	13.29695
Maniyar	1.0250682	1.2924301	2.7527996	3.602118	3.5351706	3.0827921	2.947575	2.1192554	1.2560195	0.4274172	0.3862543	1.5431365	23.97004
Kuthungal	2.4668647	1.1797021	1.8055053	2.488893	3.2766633	3.1984547	3.0540199	3.3760092	2.3815169	0.7841602	1.0950459	3.7904814	28.89732
HYDRO Total	779.99948	775.0005	540	572.9724	654.57536	668.11739	640.41243	461.04691	403.67292	400.13246	416.70838	613.29293	6925.931
BDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
KDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind Mill	0.0902081	0.1406515	0.1337859	0.161834	0.4085638	0.2786541	0.3028399	0.052533	0.0981687	0.1020712	0.2022772	0.064963	2.036551
Solar KSEB	2.786577	2.786577	2.856657	3.207057	3.207057	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	42.60772
Internal Total	782.87626	777.92773	542.99045	576.3413	658.19098	672.3623	644.68153	465.0657	407.73735	404.20079	420.87692	617.32415	6970.575

Annexure G5(3) : Generation 2020-21													
Month	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	TOTAL
Stations	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)	Gen (MU)
Kuttiady+KES	47.754195	42.9093599	53.85113	97.08244	84.349566	71.708752	62.316206	34.9422197	33.942013	36.94489	46.39402	57.675611	669.8704
Poringal	4.558925	4.53346441	10.401509	20.56054	16.865405	13.362244	10.574775	7.86461153	4.2222798	5.4633627	3.2120718	3.2822917	104.9015
PLBE	6.0006408	5.41262895	6.8878818	10.1267	9.2217466	9.5535099	8.743734	7.25964425	5.2705956	5.0036745	6.2645698	7.797139	87.54246
Sholayar	20.415319	16.3013138	9.963122	1.726472	6.6496488	14.518051	16.340079	16.5527506	14.256532	17.821659	17.337374	21.19942	173.0817
EDMR	35.023392	29.1763484	16.283704	17.74543	29.032106	33.515049	25.355709	18.1226474	21.939727	25.749526	27.732095	38.680409	318.3561
Pallivasal	13.21944	13.7455257	14.368531	16.47098	15.807815	15.854807	15.951963	13.2954077	11.337992	11.047231	10.73793	14.367862	166.2055
Sengulam	6.016027	8.37497133	9.8561404	14.33205	15.553288	12.70616	12.454696	9.28352716	7.5951735	6.4094376	5.9160151	7.404349	115.9018
Panniar	7.1163832	7.95912945	6.4511043	12.68182	10.88341	10.147166	9.3357321	9.67444989	7.9346826	5.6114661	6.5216887	10.102758	104.4198
NLM	11.182482	13.7930484	24.087578	38.15854	37.235395	33.341114	30.767616	24.2277147	17.243832	10.896467	10.991848	14.575863	266.5015
LP	11.463625	14.8008773	44.414743	71.81504	64.185614	48.88555	49.234537	36.9546215	22.363993	12.226913	11.433027	14.463476	402.242
Idukki	244.94332	238.282415	130.09841	157.0043	232.12883	223.09535	191.68479	139.397622	150.64722	173.87309	192.24244	268.76385	2342.162
Sabarigiri	150.89102	119.298957	79.14433	97.41235	109.57284	115.20316	94.390288	83.2765405	89.51248	79.924494	79.177701	137.50444	1235.309
Kakkad	15.969713	13.41111	12.037712	14.54106	15.34967	14.708945	12.466811	10.9762193	10.407998	9.846771	9.4291592	15.191438	154.3366
Kallada	4.0457614	3.11957188	2.3262554	4.018422	4.8218715	3.2547364	2.5820103	3.0533277	4.6497925	1.6831762	2.6015968	4.8816482	41.03817
Peppara	0.1891329	0.09316613	0.144188	0.355254	0.3668238	0.4208209	0.7579477	0.65139013	0.5266473	0.389965	0.3407541	0.2324935	4.468583
Madupetty	0.4846088	0.48736868	0.1635822	0.00175	0.0189767	0.163374	0.0896366	0.10098668	0.2038695	0.2340518	0.2975876	0.5741557	2.819948
Chembukadav	0	0	1.3805196	2.420958	1.7387224	1.1601012	1.2109141	0.55813588	0.3771243	0.34278	0.34278	0	9.532036
Malampuzha	0	0	0	0	0.184888	0.0839103	0.0547553	0.18571427	0.4884234	0.3894559	0.0755588	0	1.462706
Urumi	0	0.00197804	1.5229585	2.437973	1.8701086	1.1253901	1.1689323	0.44726328	0.4067518	0.34278	0.34278	0	9.666916
Malankara	2.4514504	2.31324657	2.3087013	2.471465	2.3308633	2.0639451	2.1599853	1.81468913	1.5189082	1.7002712	1.778906	2.4530394	25.36547
L. Meenmutty	0.0634699	0.28462278	0.6243088	0.543005	0.4472691	0.5106868	0.5543649	0.58652069	0.3549436	0.1564245	0.118368	0.0355595	4.279544
Ktdy. tail race	0.5740705	0.53087316	0.5696379	0.886878	0.8068656	0.6397143	0.6094204	0.39943865	0.4404962	0.4607923	0.5001664	0.6384964	7.05685
Poozhithode	0.0042534	0.05249963	1.5101661	2.416636	1.9200505	1.3266304	1.2309501	0.54509973	0.4044065	0.3560045	0.323333	0.000382	10.09041
Ranni-Perunadu	0.4365455	0.52226935	0.6609018	0.686355	0.5103792	0.5440601	0.5018634	0.39538775	0.2936386	0.3059964	0.2884396	0.4666812	5.612518
Peechi	0.0676592	0	0	0.0156	0.1161497	0.0458289	0.041499	0.09536052	0.2325194	0.1488446	0.2082329	0.1419713	1.113666
Vilangad	0.0478575	0.06291144	1.1550281	2.815229	2.9072995	1.8366448	1.7244189	0.79085695	0.5975766	0.4750673	0.4242935	0.0711029	12.90829
Chimini	0.1827113	0.09808194	0.4853382	0.75368	0.8367869	0.613405	0.4296673	0.59619517	0.4799198	0.6772151	0.535134	0.4343701	6.122505
Adiyanpara	0.0017247	0.02063737	0.2067202	0.50889	0.7593857	0.5433004	0.2899672	0.19188008	0.0907728	0.0076946	0.0007751	0.0006523	2.622401
Vellathuval	0.5791319	0.6123212	1.317904	1.125127	1.3035874	0.9053571	0.8109604	0.4676381	0.3725081	0.2128903	0.200569	0.3497025	8.257697
Barapole	2.1637429	1.66682422	1.3162274	2.341257	3.1651728	3.4583304	2.3181837	1.29381715	0.9159225	1.6761797	1.6229209	1.3502508	23.28883
Perunthenaruvi	0.0185088	0.46033335	0.8536834	1.007661	0.6060842	0.316739	0.316739	0.63347798	0.315153	0.1852035	0.1966295	0.0167348	4.926948
Maniyar	1.5280008	1.90304567	3.1334871	3.581731	3.1025973	2.2636392	1.9647148	1.65231917	1.2402345	0.4595023	0.3761388	1.4753696	22.68078
Kuthungal	4.4649201	2.18775176	2.4193381	3.072566	2.4593093	3.158479	2.6163156	3.27653276	2.5239478	0.7848606	0.642953	3.308809	30.91578
HYDRO Total	591.85803	542.416652	439.94484	601.1182	677.10852	641.03495	561.05018	429.564008	413.10808	411.80814	438.60786	627.44033	6375.06
BDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
KDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind Mill	0.0879037	0.11668764	0.1287849	0.171905	0.4867295	0.3113949	0.3073491	0.05736996	0.1057463	0.1036928	0.137729	0.0674999	2.082793
Solar KSEB	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	47.59508
Internal Total	595.91219	546.499597	444.03989	605.2563	681.56151	645.3126	565.32379	433.587635	417.18008	415.87809	442.71185	631.47409	6424.738

Annexure G5(4) : Generation 2021-22 (MU)													
Month	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	TOTAL
Kuttiady+KES	52.47917	42.7746	52.62981	96.48972	88.73134	75.2883	65.50899	37.3184	33.67242	35.95262	44.22452	56.47256	681.5425
Poringal	4.345963	3.183687	9.425329	18.65906	14.8371	10.91469	8.17261	5.730755	2.898087	5.34054	3.175381	3.045976	89.72917
PLBE	6.457078	6.19478	6.291053	9.26554	8.270582	8.761427	7.891256	6.365773	5.321149	3.942512	5.379797	7.137403	81.27835
Sholayar	20.6189	16.97252	8.955029	1.523281	6.865295	14.11566	14.07148	13.76662	14.12735	16.43949	15.66797	19.48049	162.6041
EDMR	36.31027	28.81908	15.13196	14.76424	26.55539	33.14166	25.17501	19.68235	22.61488	26.36269	26.55336	37.89594	313.0068
Pallivasal	13.63132	14.42685	12.87604	15.01308	14.24609	14.3846	14.54982	11.60694	10.00113	9.564844	9.102814	12.96486	152.3684
Sengulam	5.802364	8.740395	8.547476	12.7063	14.26181	11.64491	11.35917	7.916147	6.246752	5.403537	5.123272	6.490868	104.243
Panniar	6.948701	6.619467	5.232845	11.04207	9.044243	9.584157	8.55753	7.478862	5.829655	4.948447	5.64227	8.587806	89.51605
NLM	10.90928	12.88277	21.42145	33.97618	34.27484	31.66916	28.92319	20.89465	14.24182	9.67511	9.763383	12.59359	241.2254
LP	10.97185	13.85489	39.85791	64.73873	59.29408	46.30011	46.75965	32.27507	17.90859	10.81241	10.26225	12.6782	365.7137
Idukki	256.8095	219.7449	121.0522	141.3426	227.2039	212.6709	184.4403	140.0953	152.5903	173.4487	188.7946	263.9984	2282.192
Sabarigiri	149.7773	115.5158	71.39551	90.2068	101.72	115.5538	94.2539	87.65267	89.00855	75.4306	74.43384	137.8739	1202.823
Kakkad	16.44284	13.60215	10.62887	13.00414	13.77087	13.98702	11.66341	10.83136	9.805355	8.819946	8.331797	14.18103	145.0688
Kallada	3.843226	3.044794	2.119873	3.928086	4.769616	3.562062	2.81861	3.075046	3.6395	1.682129	2.396041	4.223673	39.10266
Peppara	0.211173	0.096324	0.158387	0.390142	0.402948	0.461535	0.654933	0.574554	0.4632	0.3829	0.296431	0.187809	4.280336
Madupetty	0.499241	0.503712	0.126022	0.001922	0.020846	0.17942	0.098464	0.07258	0.130374	0.188921	0.224885	0.505667	2.552053
Chembukadav	0	0	1.314854	2.271714	1.656813	1.010505	1.085633	0.511364	0.394301	0.376536	0.376536	0	8.998257
Malampuzha	0	0	0	0	0.203095	0.092174	0.060147	0.154984	0.386617	0.321998	0.072347	0	1.291363
Urumi	0	0.002497	1.414992	2.277833	1.786601	1.068265	1.059725	0.429118	0.399341	0.376536	0.376536	0	9.191445
Malankara	2.561306	2.304098	2.077611	2.160161	2.021122	1.886822	2.052687	1.650345	1.427813	1.537305	1.596848	2.202724	23.47884
L.Meenmutty	0.038024	0.279738	0.595909	0.477333	0.442914	0.435974	0.469653	0.488151	0.311535	0.150543	0.121683	0.035057	3.846513
Ktdy. tail race	0.593409	0.519742	0.507124	0.798712	0.761922	0.608254	0.574223	0.38949	0.398849	0.428329	0.448021	0.575658	6.603731
Poozhithode	0.001874	0.039608	1.448589	2.256214	1.803486	1.250414	1.170663	0.506192	0.417615	0.380354	0.355174	0.00042	9.630602
Ranni-Perunadu	0.4177	0.50095	0.568215	0.615815	0.517937	0.46662	0.410328	0.330387	0.220785	0.297872	0.280547	0.444676	5.071833
Peechi	0.070442	0	0	0.017136	0.127588	0.050342	0.045586	0.071551	0.211748	0.118896	0.178738	0.120645	1.012674
Vilangad	0.060419	0.079425	1.084931	2.554934	2.651789	1.751738	1.590372	0.780661	0.61934	0.50483	0.46349	0.077929	12.21986
Chimini	0.23067	0.123827	0.533133	0.827901	0.825158	0.539214	0.402996	0.491189	0.447548	0.579703	0.584048	0.477146	6.062533
Adiyanpara	0.002177	0.026054	0.227078	0.559005	0.834169	0.523415	0.171333	0.13331	0.061777	0.008452	0.000851	0.000717	2.548338
Vellathuval	0.243843	0.266823	0.87493	0.580563	0.804956	0.540228	0.357575	0.16203	0.121185	0.147659	0.141118	0.211746	4.452658
Barapole	2.731691	2.104339	1.445847	2.57182	3.476873	3.7989	2.546474	1.42123	1.006121	1.841247	1.782743	1.483221	26.21051
Perunthenaruvi	0.023367	0.581163	0.937753	1.106894	0.66577	0.347931	0.347931	0.695862	0.346189	0.203442	0.215993	0.018383	5.490678
Maniyar	1.441775	1.896342	2.869309	3.27909	2.781129	2.032271	1.624949	1.463376	1.074364	0.418557	0.333978	1.448267	20.66341
Kuthungal	4.456455	1.765668	1.844493	2.791343	2.38024	3.069302	2.376741	2.542384	1.886673	0.597999	0.622439	2.835061	27.1688
HYDRO Total	608.9313	517.467	403.5945	552.1983	648.0104	621.6918	541.2453	417.5587	398.2309	396.6856	417.3237	608.2498	6131.188
BDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
KDPP	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind Mill	0.100004	0.127286	0.13919	0.18472	0.30814	0.204633	0.25193	0.056462	0.098576	0.100856	0.1491	0.068864	1.789761
Solar KSEB	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	47.59508
Internal Total	612.9976	521.5605	407.6999	556.3493	652.2848	625.8627	545.4635	421.5815	402.2958	400.7528	421.439	612.2849	6180.572

Annexure G6: Generation from ongoing Solar Projects (2018-19) (MU)													
Year	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Total
2018-19	0.8308	0.7196	0.3813	0.3695	0.3523	1.0129	1.044491	1.305804	1.333721	2.263952	2.089743	2.786577	14.49069
2019-20	2.786577	2.786577	2.856657	3.207057	3.207057	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	42.60772
2020-21	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	47.59508
2021-22	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	3.966257	47.59508

Annexure G7 - Auxiliary Consumption												
Stations	Type of station	Excitation system	Aux Consp norm (%)	2017-18	2018-19		2019-20		2020-21		2021-22	
				Actual Aux Consp *	Anticipated energy (MU)	Aux as per norms (MU)	Anticipated energy (MU)	Aux as per norms (MU)	Anticipated energy (MU)	Aux as per norms (MU)	Anticipated energy (MU)	Aux as per norms (MU)
Kuttiady+KES	surface hydro	rotating	0.7	2125948	791.138628	5.5379704	748.9252114	5.24247648	669.8704	4.6890928	681.5424627	4.770797239
Poringal	surface hydro	brushless	1	1161458	82.1413016	0.82141302	104.8274631	1.048274631	104.9014746	1.049014746	89.72917231	0.897291723
PLBE	surface hydro	brushless	1		67.7054366	0.67705437	84.17539158	0.841753916	87.54246143	0.875424614	81.27834928	0.812783493
Sholayar	surface hydro	brushless	1	803076	154.724834	1.54724834	160.0208504	1.600208504	173.0817422	1.730817422	162.6040748	1.626040748
EDMR	surface hydro	static	1	310325	415.41308	4.1541308	359.7397858	3.597397858	318.3561466	3.183561466	313.0068472	3.130068472
Pallivasal	surface hydro	brushless	1	510160	145.245894	1.45245894	154.9811942	1.549811942	166.2054878	1.662054878	152.3684032	1.523684032
Sengulam	surface hydro	static	1	7933120	83.1496187	0.83149619	111.7805618	1.117805618	115.901835	1.15901835	104.2430074	1.042430074
Panniar	surface hydro	static	1	678056	86.1177074	0.86117707	108.7572764	1.087572764	104.419794	1.04419794	89.51605447	0.895160545
NLM	surface hydro	static	1		293.473401	2.93473401	248.5093908	2.485093908	266.5014987	2.665014987	241.2254243	2.412254243
LP	surface hydro	static	1	1863191	401.426756	4.01426756	400.5106669	4.005106669	402.2420219	4.022420219	365.7137399	3.657137399
Idukki	underground	static	1.2	8129282	3264.76177	39.1771413	2677.695847	32.13235016	2342.161652	28.10593983	2282.191501	27.38629801
Sabirigiri	surface hydro	static	1	3332762	1681.29814	16.8129814	1361.677577	13.61677577	1235.308609	12.35308609	1202.822635	12.02822635
Kakkad	surface hydro	rotating	0.7	712202	187.92222	1.31545554	140.7685266	0.985379686	154.3366042	1.080356229	145.0687856	1.015481499
Kallada	surface hydro	static	1	110887	53.0470564	0.53047056	40.05780483	0.400578048	41.03817054	0.410381705	39.10265674	0.391026567
Peppara	surface hydro	static	1	21768	5.4064501	0.0540645	4.188856313	0.041888563	4.468583192	0.044685832	4.28033583	0.042803358
Madupetty	surface hydro	static	1	53915	1.92426979	0.0192427	2.895211906	0.028952119	2.819948115	0.028199481	2.552053036	0.02552053
Chembukadav	surface hydro	static	1	49511	10.3449411	0.10344941	8.5205288	0.085205288	9.532035596	0.095320356	8.998257095	0.089982571
Malampuzha	surface hydro	static	1	31624	1.53039118	0.01530391	2.280407187	0.022804072	1.462706005	0.01462706	1.291363242	0.012913632
Urumi	surface hydro	static	1	55256	9.8811588	0.09881159	9.123212992	0.09123213	9.66691616	0.096669162	9.191444966	0.09191445
Malankara	surface hydro	static	1	295881	22.4314465	0.22431447	23.61948111	0.236194811	25.36547041	0.253654704	23.47884224	0.234788422
Lower Meenmutty	surface hydro	static	1	84731	5.18290253	0.05182903	3.941294114	0.039412941	4.279543918	0.042795439	3.846512979	0.03846513
Ktdy. tail race	surface hydro	static	1	128736	7.7541425	0.07754143	5.99701458	0.059970146	7.056849633	0.070568496	6.603731474	0.066037315
Poozhithode	surface hydro	static	1	53193	10.5351642	0.10535164	8.917664707	0.089176647	10.09041138	0.100904114	9.630602448	0.096306024
Ranni-Perunadu	surface hydro	static	1	127933	4.02261813	0.04022618	5.820908027	0.05820908	5.612518003	0.05612518	5.071833292	0.050718333
Peechi	surface hydro	static	1	40681	1.31737699	0.01317377	1.304181814	0.013041818	1.113665567	0.011136656	1.012673564	0.010126736
Vilangad	surface hydro	static	1	95604	6.07673196	0.06076732	14.83160192	0.148316019	12.90828608	0.129082861	12.21985839	0.122198584
Chimini	surface hydro	static	1	38325	7.88182845	0.07881828	13.70630383	0.137063038	6.122505264	0.061225053	6.062533345	0.060625333
Adiyanpara	surface hydro	static	1	41726	0.20681	0.0020681	3.522958631	0.035229586	2.622400698	0.026224007	2.548338209	0.025483382
Vellathuval	surface hydro	static	1	110671	5.60075991	0.0560076	3.37377752	0.033737775	8.257696551	0.082576966	4.452657543	0.044526575
Barapole	surface hydro	static	1	160735	4.95950077	0.04959501	45.29595689	0.452959569	23.28882981	0.232888298	26.21050563	0.262105056
Perunthenaruvi	surface hydro	static	1	36723	7.98746148	0.07987461	13.29694527	0.132969453	4.926948029	0.04926948	5.490677548	0.054906775
Maniyar	surface hydro	static	1		21.6500002	0.2165	23.9700369	0.239700369	22.68078039	0.226807804	20.66340612	0.206634061
Kuthungal	surface hydro	static	1		38.9900994	0.38990099	28.89731679	0.288973168	30.91578293	0.309157829	27.16879759	0.271687976
Existing HYDRO Total				29097480	7881.2499	82.40484	6925.931207	71.94562255	6375.059776	65.96230005	6131.187539	63.39642464
Ongoing Hydro			1		5.1948	0.051948	72.4919	0.7249	189.3769	1.8938	340.5844	3.4058
Total Hydro					7886.4447	82.456788	6998.423107	72.67052255	6564.436676	67.85610005	6471.771939	66.80222464
Net Existing Hydro					7803.98792		6925.752584		6496.580576		6404.969714	

CHAPTER – 3

ARR OF SBU – TRANSMISSION

The Strategic Business Unit – Transmission of KSEBL performs functions of the State Transmission Utility, to ensure development of an efficient, co-ordinated and economical system of intra-state transmission lines for smooth flow of electricity from generating station to the load centers. The second transfer scheme entrusts the responsibility on the STU to develop and execute long term plans for evacuation and supply of power at voltages of and above 33KV, in consultation and co-ordination with the other SBUs and under the policy framework developed by KSEBL. SBU-T is also carrying out the functions of State Load Despatch Centre, as provided in Part-II of Schedule-A1 of the second Transfer scheme.

As per the second Transfer Scheme, all assets of voltage level of 66KV and above is assigned to SBU-Transmission. At the same time, SBU-T is entrusted with the construction of 33KV and above system. The voltage level wise capacity of Transmission system and number of substations and transmission lines as on 31st March, 2018 in the State is summarized below:

Table 3.1 : Transmission System (as on 31-3-2018)			
No	Item	Unit	Quantity
1	400 kV Lines	Ckt-km	855.96*
2	220 kV Lines	Ckt-km	2855.98
3	110 kV Lines	Ckt-km	4528.08
4	66 kV Lines	Ckt-km	2154.63
5	33KV lines	Ckt-km	1945.64
6	400 kV Substations	Nos	5* + 1
7	220 kV Substations	Nos	22
8	110 kV Substations	Nos	154
9	66KV Substations	Nos	76
10	33 KV Substations	Nos	148
11	Total transmission capacity (MVA)	MVA	19994.70
	*owned by PGCIL		

The SBU-T handles the total energy sold to consumers and licensees within the state, power drawn by open access consumers and the small quantum of energy sold outside the state.

Capital Investment for the control period

The present intra-state transmission system in the state is not sufficient for catering to the current demand in an unconstrained manner. There were very little additions in the state in 220

and 400kV level since 1992 and the infrastructure created is not sufficient to meet the increasing load growth.

There would be serious consequences in future, if the transmission network is not expanded sufficiently, such as, extreme low voltage pockets in the system and chances of frequent system collapse. Analysis carried out indicate that the voltage profile in Malabar area is below the statutory requirement under the present loading conditions and is observed to reach an extreme low value with the existing transmission system.

The planning criteria mandated by the Central Electricity Authority require that the transmission network should not be subjected to any constraints like overloading or under voltage consequent to an [n-1] condition. The present day transmission system in KSEBL does not fully comply with these criteria and is analyzed to be deficient in meeting the current demand in a secure and reliable manner as well as extremely inadequate to meet the projected future demand.

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

To achieve this objective, SBU-T has evolved a Capital Investment Plan for the Multi Year Tariff period 2018-19 to 2021-22, submitted separately as '**Capital Investment Plan**' for SBU-T.

The System Operation Work includes the modernization of LD stations at Thiruvananthapuram, Kalamassery and Kannur, modernization of protection and communication system. Further, the System Operation is also entrusted to carry out works associated with compliance of the mandate provided by Central Electricity Regulatory Commission for improving the functioning of SLDCs and protection system.

The details of Gross Fixed Asset additions proposed during the control period 2018-19 to 2021-22 by SBU-T and SLDC are summarised below:

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

- 3.1.1 As a State Transmission Utility, SBU-T has been making substantial investments in Transmission. With the objective of developing additional transmission infrastructure required to meet the increasing demand and additional power evacuation requirements, SBU-T had started construction of a number of new substations and transmission lines as well as upgradation of existing substations and lines in the previous control period, which are planned for commissioning in the new control period. In addition, many small capital works having individual cost of capital less than Rs.10 Cr are also newly proposed for the control period in addition to major works.
- 3.1.2 The details of ongoing capital works of SBU-T and SLDC, as well as the details of new capital works proposed for the control period are enclosed along with Capital Investment Plan submitted as Volume –II of the ARR petition. An abstract of the capital expenditure as on the year of CoD of ongoing projects and new projects having individual cost less than Rs.10 Cr projected for the control period 2018-19 to 2021-22 under various Transmission Circles and SLDC is summarized below. It is submitted that the capital expenditure projected for each year of the control period as shown in the table below is the total capital cost as on CoD for the project, i.e. the GFA addition in the respective years of the control period.

Table 3.2 : GFA addition – Ongoing projects & new projects (Rs Cr)				
In Area Under	2018-19	2019-20	2020-21	2021-22
Transmission Circle Thrissur	60.27	32.29	11.20	0.00
Transmission Circle, Pallom	23.59	54.82	0.00	0.00
Transmission Circle, Thodupuzha	13.84	22.90	11.60	88.70
Transmission Circle, Kannur	31.06	28.03	0.00	0.00
Transmission Circle, Kalamassery	185.26	13.57	0.00	0.00
Transmission Circle, Kozhikode	188.91	282.51	172.33	157.46
Transmission Circle, Trivandrum	103.23	46.77	0.00	0.00
Transmission Circle, Kottarakara	37.20	0.00	0.00	0.00
Transmission Circle, Alapuzha	66.39	30.90	0.00	0.00
Transmission Circle, Palakkad	44.42	56.94	1.15	8.10
Trans Division, Pathanamthitta	23.54	0.00	0.00	0.00
Transmission Circle, Malappuram	26.42	0.00	0.00	0.00
Total	804.12	568.73	196.28	254.26
PSDF/Grant/Deposit work/IPDS for SBU-T	196.6	41.60	0	0
SBU-T : KSEBL fund	607.52	527.13	196.28	254.26

System Operation, Kalamassery	14.72	7.14	0	0
PSDF grant for SLDC		4.77		
SLDC : KSEBL fund	14.72	2.37	0	0
Capital cost of ongoing works of SBU-T & SLDC (incl Grant/Deposit/PSDF)	818.84	575.87	196.28	254.26
Capital cost of ongoing works of SBU-T & SLDC (excl grant/deposit/PSDF)	622.24	529.50	196.28	254.26

New projects (above 10Cr) planned in the control period

3.1.3 The details of new capital works having individual cost above Rs.10Cr planned for the control period 2018-19 to 2021-22 along with the Detailed Project Reports are submitted in detail in the Capital Investment Plan. An abstract of the same is given below. It is submitted that the capital expenditure projected for each year of the control period as shown in the table below is the total capital cost as on CoD for the projects, i.e. the GFA addition in the respective years of the control period.

Table 3.3 : GFA addition- project above 10Cr (Rs.Cr.)					
No.	Name of Work	2018-19	2019-20	2020-21	2021-22
1	New major Capital Works	0	662.59	421.83	41.65
2	Transgrid Works	0	362.57	2073.84	260.96
3	SLDC works	12	53	12	212.45
4	Edamon-Kochi line compensation package	10	118.02		
	Total	22	1196.18	2507.67	515.06
	Less: PSDF grant for Transgrid works			389.58	
	Less: PSDF grant for SLDC works		25		100
	Net Capital expenditure for SBU-T & SLDC as on CoD of the projects	22	1171.18	2118.09	415.06

A summary of the Gross Fixed Asset addition of SBU-T and SLDC projected for the control period 2018-19 to 2021-22 are given below:

Table 3.4 : SUMMARY – TOTAL GFA addition OF SBU-T & SLDC(Rs Cr)					
No.	Name of Work	2018-19	2019-20	2020-21	2021-22
SBU-T					
1	Ongoing projects and new small projects	804.12	568.73	196.28	254.26
2	New major Capital Works	0	662.59	421.83	41.65
3	Transgrid Works	0	362.57	2073.84	260.96
4	Edamon-Kochi Line compensation	10	118.02		
	Total	814.12	1711.91	2691.95	556.87

SLDC					
1	Ongoing projects	14.72	7.14	0	0
2	New projects	12	53	12	212.45
	Total	26.72	60.14	12	212.45
	Total GFA addition for SBU-T & SLDC	840.84	1772.05	2703.95	769.32

A summary of the net capital expenditure of SBU-T and SLDC projected for the control period 2018-19 to 2021-22 after accounting Grant/deposit is given below:

Table 3.5 : SUMMARY – NET CAPITAL ADDITION OF SBU-T & SLDC(Rs Cr) excl grant					
No.	Name of Work	2018-19	2019-20	2020-21	2021-22
SBU-T					
1	Ongoing projects and new small projects	607.52	527.13	196.28	254.26
2	New Capital Works	0	662.59	421.83	41.65
3	Transgrid Works	0	362.57	1684.26	260.96
4	Edamon-Kochi Line compensation	10	118.02		
	Total	617.52	1670.31	2302.37	556.87
SLDC					
1	Ongoing projects and new small projects	14.72	2.37	0	0
2	New projects	12	28	12	112.45
	Total	26.72	30.37	12	112.45
	Net CAPITAL ADDITION for SBU-T & SLDC	644.24	1700.68	2314.37	669.32

3.2 Aggregate Revenue Requirement of SBU-T for the control period

The ARR for SBU-T is submitted as per the Regulation-10 and 57 of the ruling KSERC (Terms and Conditions for determination of Tariff) Regulations, 2018.

Interest and Finance Charges

Interest on Capital liabilities:

The normative Loan for SBU-T and other SBUs as on 01-April-2018 has been calculated in **Table 2.21** in *Chapter 2 : ARR for SBU-G*. The Interest on normative loan is determined after considering asset addition as well as contribution/ grant anticipated, allowable depreciation etc for each year of the control period while ascertaining the interest on normative loan. Details are furnished in the Table below.

Table 3.6 : Interest on capital liabilities (Rs Cr) for SBU-T and SLDC					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Opening loan	1357.41	1834.24	3346.63	5411.19
2	GFA addition	840.84	1772.05	2703.95	769.32
3	Less: Consumer contribution & Grants	196.60	71.37	389.58	100.00
4	Less: Allowable depreciation	172.32	199.58	257.03	344.70
5	Normative loan during the year	471.92	1501.10	2057.34	324.62
6	Closing normative loan	1829.34	3330.44	5387.78	5712.40
7	Average normative loan	1593.37	2579.89	4359.11	5550.09
8	Interest for the year*	151.37	257.99	435.91	555.01
* @ 9.50% for 2018-19 and @10% thereafter.					

Interest on security deposits

SBU-T does not hold any security deposit and hence no amount is assigned on this account.

Interest on GPF

The SBU wise Interest on GPF is estimated in **Table 2.24** in **Chapter 2 : ARR for SBU-G**. The interest on GPF for SBU-T is reproduced in the Table Below:

Table 3.7 : SBU wise interest on provident fund (Rs Cr)					
SBU	Employee cost ratio (2017-18)	2018-19	2019-20	2020-21	2021-22
SBU T	11.32 %	21.7	23.12	24.55	25.97

Interest on Master Trust bonds

SBU wise interest on Master Trust Bond is calculated in **Table 2.26** in **Chapter 2 : ARR for SBU-G**. The interest for SBU-T is reproduced in the Table below. This includes the interest contribution of existing bonds as well as the interest on the additional liability to master trust based on actuarial valuation.

Table 3.8 : SBU wise Interest on Master Trust Bonds (Rs Cr)						
SBU	Employee cost ratio	Item	2018-19	2019-20	2020-21	2021-22
SBU T	11.32 %	Existing bond	87.56	82.95	78.34	73.73
		Additional contribution to Master Trust	42.20	42.20	42.20	42.20
Total			129.76	125.15	120.54	115.93

Interest on Working Capital

The working capital for SBU-T and SLDC comprise of, as per Regulation 32, one month O&M cost, cost of maintenance spares at 1% historical cost and receivables for one month less security deposit held, if any. The interest rate allowed, as per Regulation 32(2), is 2% higher than the Base rate on First of April of the ARR filing Year. Therefore the Interest on Working Capital in this petition is computed at a rate of 10.70% (8.70% as on 1-4-2018 + 2%).

The parameters adopted for computation of Interest on Working capital for the control period 2018-19 to 2021-22 are given below:

Table 3.9 : Parameters for Working Capital (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
SBU-T				
Opening GFA (Rs.Cr.)	5307.41**	6144.33**	7861.27**	10565.22**
O&M Cost (Rs.Cr.)	386.81	419.17	472.53	508.66
SLDC				
Opening GFA (Rs.Cr.)	7.36	34.08	93.11	105.1
O&M Cost (Rs.Cr.)	17.35	19.22	21.28	23.55

**** excluding GFA of SLDC**

The Interest on Working Capital projected for the control period for SBU-T and SLDC are given in the tables below:

Table 3.10 : SBU-T :Interest on Working capital (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	O&M expenses (as per norms)	28.82	31.52	35.97	38.98
2	Maintenance Spares (as per norms)	53.07	61.22	78.35	105.27
3	Receivables (as per norms)	79.26	92.18	116.19	136.43
4	Less: security deposits				
5	Total Working Capital	161.15	184.92	230.50	280.67
6	Interest Rate (as per norms)	10.70%	10.70%	10.70%	10.70%
7	Interest on Working Capital	17.24	19.79	24.66	30.03

Table 3.11 : SLDC : Interest on Working capital (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	O&M expenses (as per norms)	1.45	1.60	1.77	1.96
2	Maintenance Spares (as per norms)	0.07	0.34	0.93	1.05
3	Receivables (as per norms)	1.77	1.93	2.12	2.33
5	Total Working Capital	3.28	3.88	4.83	5.34
6	Interest Rate (as per norms)	10.70%	10.70%	10.70%	10.70%
7	Interest on Working Capital	0.35	0.41	0.52	0.57

The summary of interest and finance charges estimated for SBU-T and SLDC for the control period is submitted below:

Table 3.12 : Summary of Interest & Finance Charges (Rs Cr) for SBU-T and SLDC					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Interest on capital liabilities	151.37	257.99	435.91	555.01
2	Interest on GPF	21.70	23.12	24.55	25.97
3	Interest on Bonds issued to Master Trust	129.76	125.15	120.54	115.93
4	Interest on working capital	17.60	20.20	25.18	30.60
5	Total Interest & Finance Charges	320.43	426.46	606.18	727.51

Operation & Maintenance Expenses

As mentioned in **Chapter 2**, The Tariff regulation allows recovery of **operation and maintenance expenses as per the norms** as well as **one time maintenance of special nature**. The O&M cost for SBU-T and SLDC are thus estimated and given below.

Operation & Maintenance Expenses as per norms

The Operation & Maintenance Expenses norms of SBU-T for the control period is given in Annexure-VIII of the Tariff Regulations, 2018 and is reproduced in the first and second row of the below. The number of bays and line length in ckt-km for 66KV and above projected for the control period considering the capital addition planned for these years are given in the rows thereafter. The O&M expense for each year in the Control Period is determined and provided last row.

Table 3.13 : O&M norms for SBU-T						
No	Item	2018-19	2019-20	2020-21	2021-22	Remarks
1	O&M cost for Bay (Rs lakh /Bay)	10.71	11.23	11.77	12.34	Norm
2	O&M cost (Rs lakh /circuit km)	0.93	0.98	1.03	1.08	Norm
3	Bays (No.) (for Previous year)	2564	2682	2914	3007	Projected
4	Line (Ckt-Km)(for previous year)	9529.589	9823.195	10670.15	11130.965	Projected
5	Normative O&M cost (Rs.Cr.)	363.23	397.46	452.88	491.28	Estimated

Segregation of accounts of SLDC

The Regulation 66 (2) requires in case separate accounts are not available, the Commission may approve as the Aggregate Revenue Requirement of State Load Despatch Centre, a portion of the approved Aggregate Revenue Requirement of the transmission business of KSEB Limited, based on the proposal submitted by it only for the first year of the Control Period.

KSEBL has taken earnest efforts to segregate the accounts of SBU-T and SLDC. However, the segregation has not been finalized. However, as part of these efforts, KSEBL could arrive at a provisional segregation of O&M expenses and GFA of SLDC as per the following methodology, based on which, the projection of accounts of SLDC for the control period is made.

Expenditure incurred for the following offices are considered as SLDC expenditure for segregation and for assessing the O&M expenses of SLDC, the details corresponding to the following offices are extracted from SARAS software.

- Main LD station at Kalamassery and Sub LD at Thiruvananthapuram
- SCADA Sub division, Kalamassery and Thiruvananthapuram
- TNMS, Kalamassery
- Office of Chief Engineer, Transmission – System Operation, Kalamassery.

Ownership of the land rests with Transmission Circle, Kalamassery. Total amount capitalised under SCADA and IT system (under SCADA – up gradation project) in the books of accounts of SLDC during the financial year is Rs. 9.55 Cr. Value of assets capitalised excluding relay equipments is Rs.6.30 Cr and furnished in the FORM S5 for the FY 2017-18.

For projecting the expected normal increase in expenditure for the subsequent years, an escalation of 10% is taken. In the case of repairs and maintenance expenditure, additional amount of Rs. 14 lakhs per year is also included considering the high AMC charges for SCADA equipments.

The GFA of SLDC for each year of the control period is computed based on the asset addition projected for the respective year as per the Capital Investment Plan for SLDC submitted along with the ARR petition.

Based on the above methodology adopted for segregation of accounts of SLDC, the O&M expenses of SLDC projected for the control period are given below.

Table 3.14 : O&M expenses of SLDC (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
O&M expenses	17.35	19.22	21.28	23.55

The details are furnished under S-2 of the SLDC ARR forms attached as **Annexure-T1**.

The net O&M expenses of SBU-T for the control period as per norms are submitted below:

Table 3.15 : Net O&M Expenses of SBU-T (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Normative O&M cost	363.23	397.46	452.88	491.28
Less: SLDC expenses	17.35	19.22	21.28	23.55
Net Normative O&M Cost	345.88	378.24	431.6	467.73

The details are furnished under T-2 of the Transmission tariff forms attached as **Annexure-T1**.

Onetime maintenance expenses

As already discussed in Chapter 2, the SBU-T of KSEBL suffered badly during the Monsoon floods of 2018. The flood impaired operation of 50 Substations in 10 districts across the State. As many as ten Power Transformers were submerged in flood water. Many transmission towers were toppled and 10 major transmission lines were disrupted by flooding. The financial loss estimated for SBU-T for rectification works is assessed as Rs.29.77 Cr as submitted below. With earnest efforts, KSEBL could restore the transmission system fully by 1-9-2018.

Table 3.16 : Loss due to Floods (Rs Cr)		
No	Description	Amount
1	Loss due to Tower / Insulator / Conductor failure	13.68
2	Loss due to equipment / transformer failure	14.03
3	Civil components	2.06
	TOTAL	29.77

SBU-T has not included the amount in the projection of ARR of SBU-T. The actual expenditure incurred will be submitted before Hon'ble Commission at the time of truing up of accounts for 2018-19. It is humbly requested that the damages that occurred in the transmission sector of KSEBL due to natural calamity may kindly be treated as 'Force Majeure' event and the additional financial expenditure incurred by SBU-T for restoring normalcy may be allowed as one time expense of SBU-T for 2018-19 over and above that for normal operations at the time of truing up of accounts for the year 2018-19.

Pay Revision Expenses

SBU-T is not claiming pay revision expenses along with this ARR petition. However, it is requested that pay revision expenses as and when arising in the control period may be allowed over and above the norms in line with CERC norms and Kerala State Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2018. An estimate of pay revision expenses of SBU-T and SLDC are submitted below.

Table 3.20 : SBU wise Pay revision expenses (Rs.Cr.)					
Business Unit	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU T	11.32%	20.63	29.78	32.18	34.71

The projection of Pay Revision expenses for SBU-T and SLDC are segregated based on the above methodology as submitted below:

Table 3.21 : Projection of Pay revision expenses (Rs.Cr.) for SBUT & SLDC				
SBU	2018-19	2019-20	2020-21	2021-22
SBU-T	20.01	28.88	31.21	33.66
SLDC	0.62	0.90	0.97	1.05
Total	20.63	29.78	32.18	34.71

Based on the above, the Operation & Maintenance expenses of SBU-T and SLDC projected for the control period are given in the two Tables below:

Table 3.22 : Total O&M Cost of SBU-T (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Total O&M cost	345.88	378.24	431.6	467.73

Table 3.23 : Total O&M Cost of SLDC (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Total O&M cost	17.35	19.22	21.28	23.55

A projection of the O&M expenses of SBU-T based on actual of past years are given in the Table below. The figures shown are excluding the pay revision expenses and contribution to Master Trust. It is seen that the O&M expenses allowed as per norms for the control period are below the actual and may lead to under recovery of cost.

Table 3.24 : O&M Projection based on past actuals (Rs Cr)				
O&M Cost	2018-19	2019-20	2020-21	2021-22
SBU-T	445.18	485.16	529.98	581.68

The details are included in Form-T2 of the Transmission tariff sheets attached as **Annexure-T1**.

In the matter of O&M of SBU-T, Hon Commission may please note that the CERC norms (Regulation 29(4) (a) of CERC (T&C of Tariff) Regulations, 2014) for the above drivers are Rs. 34.36 Lakh per bay (for 132 KV and below) and 0.346 for (Double Circuit single conductor) lines for 2018-19. Applying these norms, the O&M cost will be Rs.966.27 Cr. Therefore, it is submitted that the O&M norms allowed for SBU-T is substantially lower than CERC allowed benchmark costs. At the same time KSEB Ltd. is taking earnest efforts to control the O&M expenses during the control period and the same will be submitted along with truing up petition. Accordingly, it is requested that since projection based on actual O&M of SBU-T is lower than benchmark CERC norms, actual O&M cost incurred may be allowed during the truing up process if it increases above the norms.

Depreciation

Table 3.25 : Depreciation approved in Truing up order for FY 2015-16 (Rs Cr)				
Item	SBU-G	SBU-T	SBU-D	Total
GFA at the beginning of the year	16395.04	4097.22	6115.79	26608.05
Less: Revaluation	11988.98			11988.98
GFA excluding revaluation	4406.06	4097.22	6115.79	14619.07
Addition during the year	34.79	212.24	491.41	738.44
Total	4440.85	4309.46	6607.2	15357.51
Depreciation for the year	122.05	132.84	236.13	491.02
Less: Claw back depreciation			156.15	156.15
Net depreciation allowable	122.05	132.84	79.98	334.87
Average rate of depreciation (gross)	2.77	3.24	3.86	3.36
Average rate of depreciation (net)	2.77	3.24	1.31	2.29

Hon Commission, as per Truing up order for 2015-16 has approved Rs 132.84 Cr as depreciation for the year after excluding depreciation applicable for Consumer contribution and grants as given in **Table 2.19** in **Chapter 2 : ARR for SBU-G**. The Depreciation on the fixed assets of SBU-T & SLDC has been calculated at the net average rate of depreciation approved by the Hon Commission. The depreciation in line with Regulation 27 of the Tariff Regulations, 2018 for the control period is given below:

Table 3.26 : Depreciation for SBU-T & SLDC (Rs.Cr.)				
Item	2018-19	2019-20	2020-21	2021-22
GFA excl revaluation	5314.77	6155.61	7927.66	10631.61
Addition during the year	840.84	1772.05	2703.95	769.32
Total	6155.61	7927.66	10631.61	11400.93
Depreciation for the year	172.32	199.58	257.03	344.70
Less: Claw back depreciation	--			
Net depreciation allowable	172.32	199.58	257.03	344.70

Return on Equity

The SBU wise return on equity is calculated and given in Table 2.30 in Chapter 2. The ROE for SBU-T (including SLDC) is Rs. 119.99 Cr each year during the Control Period. This ROE is apportioned to SLDC based on GFA ratio calculated in **Table 3.18** above and given below.

Table 3.27 : Segregation of ROE (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
SBU-T	119.82	119.82	119.82	119.82
SLDC	0.17	0.17	0.17	0.17
Total	119.99	119.99	119.99	119.99

Other items

As part of helping the flood affected to rebuild their lives, Government of Kerala requested everyone to contribute generously to the Chief Minister's Distress Relief Fund. KSEBL vide its Full Board and Extraordinary General Meeting decisions dated 20-8-2018 and pursuant to the provisions of Section 181 and other applicable provisions, if any, of the Companies Act, 2013, as amended from time to time and subject to clause 42(12) of the Articles of Association of the Company, resolved to contribute to the Chief Minister's Distress Relief Fund on behalf of KSEBL an amount of Rs.35,00,00,000/- (Rupees Thirty Five Crores only) in view of the huge destruction caused by natural calamity during August 2018 in the State of Kerala. It is humbly requested that the same may be allowed in the ARR. The contribution of SBU-T under this head is Rs.3.96 Crores.

Aggregate Revenue Requirement

The SBU-T handles the transmission assets of KSEB Ltd and manages bulk transmission of power within the State for supply to SBU-D. SBU-T as an independent business unit, the cost is recovered as transfer cost from SBU-D as intra-state transmission charges. Separate ARR for SLDC is not prepared. It is submitted that KSEBL expects to submit separate ARR for SLDC at the time of mid term review in 2019-20. The total Aggregate Revenue Requirement of SBU-T and SLDC for the control period 2018-19 to 2021-22 are submitted below:

Table 3.36 : ARR of SBU-T & SLDC (Rs.Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Operation & Maintenance Expenses	363.23	397.46	452.88	491.28
2	Interest and finance charges	151.37	257.99	435.91	555.01
3	Interest on Bonds	129.76	125.15	120.54	115.93
4	GPF Interest	21.7	23.12	24.55	25.97
5	Depreciation	172.32	199.58	257.03	344.7
6	Interest on WC and deposits	17.60	20.20	25.18	30.60
7	Adjustment of Controllable/uncontrollable factors	0	0	0	0
8	Other items	3.96			
10	Total Revenue Expenditure	859.94	1023.50	1316.09	1563.49
11	Return on Equity	119.99	119.99	119.99	119.99
12	Tax on RoE	0	0	0	0
13	Aggregate Revenue Requirement (10+11+12)	979.93	1143.49	1436.08	1683.48

Non-Tariff Income

The non-tariff income of SBU-T includes income from sale of scrap, interest on advances made to contractors, interest on staff loans and advances, Rent from buildings etc. The projection of Non-Tariff income of SBU-T for the control period is given below.

Table 3.37 : Other Income					
No	Other Income (Rs. Cr.)	2018-19	2019-20	2020-21	2021-22
1	Interest on staff loans and advances	0.01	0.02	0.02	0.03
2	Income from statutory investments	0	0	0	0
3	Income from rent of land or buildings	0.47	0.5	0.52	0.55
4	Income from sale of scrap	5.07	2.87	3.01	3.17
5	Income from staff welfare activities	0	0	0	0
6	Rental from staff quarters	0.11	0.12	0.12	0.13
7	Excess found on physical verification	0.03	0.03	0.04	0.04
8	Interest on investments, FD and call deposits and bank balances	1.75	0.05	0.05	0.05
9	Interest on advances to suppliers/contractors	0.33	0.05	0.05	0.05
10	Income from hire charges from contractors and others	0.01	0	0	0
11	Income from fibre optic cables/co-axial cables on transmission system	3.79	3.9	4.49	5.07
12	Income from advertisements, etc.	0	0	0	0
13	Miscellaneous receipts	17.28	29.76	33.52	37.26
	Total Other Income (Rs.Cr.)	28.85	37.3	41.82	46.35

Net ARR of SBU-T and SLDC

The net ARR of SBU-T and SLDC for the control period are given below. These amounts are the transfer cost to the SBU-Distribution ARR.

Table 3.38 : Net ARR for SBU-T and SLDC					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Aggregate Revenue Requirement	979.93	1143.49	1436.08	1683.48
2	Less: Other Income	28.85	37.3	41.82	46.35
3	Less: Revenue from Open Access	--	--	--	--
4	Less: Income from Other Business	--	--	--	--
5	ARR from Transmission Tariff	951.08	1106.19	1394.26	1637.13

Norms for Operation during the control period

Transmission System Availability

The availability of transmission system projected for the control period 2018-19 to 2021-22 is 98%. However, Hon Commission may please consider the fact that, as already discussed,

many of the transmission facilities had been badly damaged and out of service for several weeks during the monsoon period of 2018 and that has severely affected the performance norms of SBU-T. Therefore it is humbly requested before the Hon Commission that the performance norms for the year 2018-19 may be relaxed in view of the above force majeure event. The matter was already submitted before Hon Commission vide an affidavit dated.11.09.2018. It is also humbly requested that relaxation may be allowed to KSEBL from meeting the availability norms during shutdown works carried out at the time of execution of 'TRANSGRID WORKS'.

Transmission losses

A projection of the transmission loss of SBU-T based on the capital addition for the control period 2018-19 to 2021-22 is submitted below.

Table 3.39 : Transmission Losses (%)					
		2018-19	2019-20	2020-21	2021-22
	Transmission loss up to 66KV	4.05	3.95	3.85	3.75
Note : The figures show the losses up to the respective voltage level (%)					

Transmission charges

SBU-T handles the energy flow to the entire consumers of SBU-D as well as open access consumers. The projection of the energy input to the Transmission network, energy handled, transmission losses and the transmission charges estimated for the control period 2018-19 to 2021-22 are submitted below. The Transmission charges in Rs/MW/day is calculated assuming a system load factor of 72%.

Table 3.40 : Transmission Charges					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Energy injected into the system (MU)	24846.15	26243.43	27247.53	28295.30
2	Percentage of loss (%)	4.05	3.95	3.85	3.75
3	Loss of energy (MU)	1006.27	1036.62	1049.03	1061.07
4	Energy handled (MU) (1-3)	23839.88	25206.81	26198.50	27234.23
5	Transmission Charges (Rs./unit)	0.40	0.44	0.53	0.60
6	Peak demand projection	4040	4175	4384	4517
7	Transmission Charges STOA (Rs/MW/day)	8958	10082	12102	13791
8	LTA/MTOA Transmission Charges (Rs/MW/month or part thereof)	272471	306662	368095	419489
9	SLDC ARR (Rs.Cr.)(excl I&F charges & Dep)	17.84	19.77	21.93	24.26
10	SLDC charges for LTA (Rs/MW/month)	5111	5482	5791	6216
11	SLDC charges for STOA (Rs/MW/day)	168	180	190	204

KSEBL, humbly requests Hon Commission to consider the above ARR for SBU-Transmission and approve the expenses, income, transfer cost and transmission charges for the control period as forecasted above.

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Chapter 4

ARR & ERC for SBU- Distribution

Introduction

The Distribution Strategic Business Unit (SBU-D) performs the function of the distribution of electricity across the entire State except in areas where other distribution licensees operate. SBU-D supplies electricity to about 99% of consumers in fourteen districts of Kerala. The key statistics related to the SBU-D is given in the table below:

Table 4.1 : Key Statistics of KSEBL Distribution business (31.03.2018)	
Particulars	Statistics
Area Sq.km.	38863 km ²
Districts No's	14
Electrical Circle Offices	25
Population (Cr)	3.45
Consumers (Nos)	12276321
Distribution transformers (Nos)	77724
HT lines (11 KV,22 KV,33 KV lines) (Ckt Kms)	62835
LT lines (Ckt. Kms)	286784
Energy sales in MU	20880.70
Total consumption(in MU)	21258.71
Per capita consumption (units)	609
Consumption per consumer (units)	1701

The growth and performance of the distribution business during the 15 years are shown in the Table below:

Table 4.2 Performance of KSEBL Distribution system			
Particulars	Units	2002-03	2017-18
Consumers	Nos	6947803	12276321
Energy sales in MU	MU	8752.1	20880.70
T&D loss	%	29.08	13.07
Revenue	Rs Cr	2480.69	12058.06
Distribution transformers	Nos	32637	77724
HT lines :			
33 KV lines	Ckt Km	408.17	1943
11 KV& 22 KV lines	Ckt Km	31455	60892
LT lines	Ckt Km	199721	286784

Continuous capital investment in distribution is necessary to meet electricity demand of the state. A brief description of infrastructural development undertaken and planned is given in the following section.

Capital Investment Plan

In continuation to the past efforts, KSEBL is engaged in the strengthening the distribution network in the state with an aim to supply reliable and quality electricity to the consumers safely and at affordable cost. After accomplishing the great task of providing 100% electrification of households, the next target of utility is to improve the quality of supply. KSEBL has prepared a detailed plan with a horizon of four years for augmenting the distribution network, called “**Dhyuthi – 2021**”. This plan envisages construction 9936kms of HT lines, installation of 3741 distribution transformers, standardization of lines, and improvement in HT & LT ratio etc. at total cost of Rs. **4036.30 Cr.** The capital Investment plan is submitted separately along with this petition as ‘**Capital Investment Plan SBU Distribution**’ in **Part-II** of this petition. The capital outlay proposed for the work in Distribution SBU includes works under Dyuthi -2021, Centrally Aided Projects (Both system strengthening and IT related works), Safety related works, Other funded works such as Consumer contribution works , MP, MLA etc. fund works are listed in the table below:

Table 4.3 : Capital Outlay for SBU - DISTRIBUTION

No	Particulars	FY-19	FY-20	FY-21	FY - 22	Total
A	Dhyuthi					
1	Normal -Dhyuthi (Normal work + Falty meter Repl)	783.64	1275.55	1114.26	762.86	3936.31
2	Continued Electrification	5	20	20	5	50
3	Special Projects like SCADA	5	20	20	5	50
	Sub Total	793.64	1315.64	1154.26	772.86	4036.3
B	Other Funded Works (New Capital works)	199.7	201.69	203.71	205.74	810.84
C	Centrally Aided Projects					
C1	System Strengthening works					
1	R APDRP PART B -(ongoing Capital works)	111	0	0	0	111
2	IPDS (ongoing Capital works)	507.31	0	0	0	507.31
3	DDUGJVV (ongoing Capital works)	246.29	0	0	0	246.29
	Sub Total	864.6	0	0	0	864.6
C2	IT Related works					
1	IPDS- Phase II Incr IT	7	11	4.86	0	22.86
2	IPDS--ERP	4	26	12.64	0	42.64
3	IPDS-Smart Metering @ Kumarapuram	19.525	0	0	0	19.525
4	IPDS-Smart metering- UDAY	19	32	13.36	0	64.36
5	Smart Grid	0	20	40	43.4	103.4
6	RT-DAS	1	3	1.25	0	5.25
7	Cyber security	0.5	0	0	0	0.5
8	RAPDRP PART A- IT -SCADA (Ongoing work)	17	17	0	0	34
	Sub Total	68.025	109	72.11	43	292.135
D	Safety Works					
1	Safety (New Capital works)	18	19.5	20	18.5	76
	Total Distribution	1943.965	1645.83	1450.08	1040.10	6079.975

It may be noted that, in addition to the Capital works of Rs. 1062.36 Cr for FY 2018-19 given in the *Capital Investment Plan for Distribution in Part-II*, Certain on-going Centrally Aided Projects amounting to Rs. 864.6 Cr (Item C1) and Ongoing SCADA work for Rs. 17 Cr (Item C2.8) has been included in the above Table. The Details of these Projects are given in **last annexure (4.10)**. The corresponding addition to the fixed assets during the control period would be as given in the table below:

Table 4.4 : Addition to Gross fixed assets					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Normal woks -Dhyuthi 2021	808.64	1300.55	1139.26	787.86
2	Estimated & other funded Works	199.7	201.69	203.71	205.74
3	System strengthening & IT works	1593.91			
4	IT related works (CAP)				258.14
5	Safety	18	19.5	20	18.5
	Total	2620.25	1521.74	1362.97	1270.24

Energy Sales forecast

Review of energy consumption in previous years

The energy sales forecasting is done based on the previous years data on consumer strength, energy consumption, connected load, consumers added / dismantled, increasing trend in consumption per consumer, regional characteristics of consumers, seasonal variations and change in consumer habits etc. The projections are done considering the past trends and expectation on economic and other conditions. The Category wise energy consumption during the period 2010-11 to 2017-18 is depicted in the table given below.

Table 4.5 Energy Consumption in MU								
Category	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	6Y CAGR
Domestic	7705.86	8313.36	8739.52	9367.26	9943.48	10280.74	10574.84	5.44
Commercial	2141.22	2224.06	2229.34	2418.28	2735.36	2957.95	3063.48	6.14
Industrial	1097.04	1101.96	1096.56	1096.93	1103.23	1131.91	1112.33	0.23
Agricultural	286.18	306.08	310.24	291.41	279.48	321.98	346.03	3.22
Streetlight	294.26	313.2	319.06	346.43	366.62	375.77	373.48	4.05
Sub Total (LT)	11524.56	12258.66	12694.72	13520.31	14428.16	15068.35	15470.15	5.03
HT category	2586.27	2687.56	2791.64	2988.14	3130.94	3301.83	3494.04	5.14
EHT Category	1243.12	1217.59	1243.85	1158.45	975.06	826.38	1041.94	-2.90
Railways	154.49	173.67	200.69	205.31	212.83	229.59	265.8	9.47
Bulk Supply	472.09	500.76	523.15	554.06	578.08	612.1	608.77	4.33
Total Sales	15980.53	16838.24	17454.05	18426.27	19325.07	20038.25	20880.7	4.56
Open Access *				4.43	135.25	441.55	378.02	
Total Conspn	15980.53	16838.24	17454.05	18430.7	19460.32	20479.8	21258.71	4.87

* includes captive generation energy

About 74% of the total energy sales were to LT consumers, that to HT consumers were 17.17% and that to EHT consumers were 4.99%. The total energy sales grew at a CAGR of 4.87% during this period. The sales at LT and HT Levels grew by 5.03% and 5.14% respectively where as the sales to EHT consumers (excluding open access consumption) fell by 1.38% due to open access and captive generation. The yearly (year to year) growth rate (%) of energy consumption of different categories of consumers during the above period is shown in the table below:

Table 4.6 : Category wise sales growth (%)							
Category	FY -12	FY -13	FY -14	FY -15	FY -16	FY -17	FY -18
Domestic	12.04	7.88	5.13	7.18	6.15	3.39	2.86
Commercial	9.71	3.87	0.24	8.48	13.11	8.14	3.57
Industrial	4.14	0.45	-0.49	0.03	0.57	2.60	-1.73
Agricultural	23.59	6.95	1.36	-6.07	-4.09	15.21	7.47
Streetlight	10.76	6.44	1.87	8.58	5.83	2.49	-0.61
Total (LT)	11.02	6.37	3.56	6.50	6.71	4.44	2.67
HT category	8.57	3.92	3.87	7.04	4.78	5.46	5.82
EHT Category	5.25	-2.05	2.16	-6.87	-15.83	-15.25	26.08
Railway Traction	-1.21	12.42	15.56	2.30	3.66	7.88	15.77
Bulk Supply	5.35	6.07	4.47	5.91	4.34	5.88	-0.54
Total (HT & EHT)	6.92	2.77	3.93	3.08	-0.18	1.49	8.87
Total sales	9.85	5.37	3.66	5.57	4.88	3.69	4.20
Total consmptn	9.85	5.37	3.66	5.60	5.59	5.24	3.80

In this regard, it may be noted that, the sales growth does not follow a uniform pattern for many categories and vary considerably from year to year. This could be due to a number of reasons such as yearly climatic variation, growth or decline of the sector, Open Access drawal of power, change in tariff classification and so on. The category wise growth in number of consumers for this period is depicted in the table below:

Table 4.7 : Consumer Strength in numbers							
Category	FY-12	FY-13	FY-14	FY-15	FY-16	FY-17	FY-18
Domestic	8324961	8573938	8788916	8987947	9124747	9384957	9562253
Commercial	1538786	1633689	1795160	1830937	1923402	1994916	2081567
Industrial	132051	131583	137744	142001	136693	141683	136964
Agricultural	455078	460263	463006	461287	473882	447551	462763
St Lights	3160	3505	3789	4072	4281	20350	27131
Total (LT)	10454036	10802978	11188615	11426244	11663005	11989457	12270678
HT category	3540	3854	4217	4592	4963	5293	5577
EHT Category	40	40	39	40	42	42	43
Railways	8	8	8	8	9	12	12
Bulk Supply	13	10	11	11	12	12	11
Total HT& EHT	3601	3912	4275	4651	5026	5359	5643
Total	10457637	10806890	11192890	11430895	11668031	11994816	12276321

Review of energy consumption for the year 2017-18.

The category wise consumer strength, consumption and Connected Load / Contract Demand for the year 2017-18 are given in the tables below.

Table 4.8 : Energy sales to LT Consumers for 2017-18				
No	Particulars	Consumers	Consumption (MU)	CL /CD (MW/MVA)
1	LT I Domestic	9562060	10569.99	15132.94
2	LT II	193	4.85	3.09
3	LT III	135	1.47	2.12
4	LT IV A Industrial	135048	1102.76	1687.31
5	LT IV B Industrial	1916	9.57	10.79
6	LT V A Agriculture	443486	297.52	861.87
7	LT V B Agriculture	19277	48.51	53.28
8	LT VI A General	121046	197.43	286.46
9	LT VI B General	43788	119.27	144.83
10	LT VI C General	40153	238.16	255.35
11	LT VI D General	28163	20.94	33.50
12	LT VI E General	9003	11.56	7.34
13	LT VI F General	406786	874.74	839.81
14	LT VI G General	15029	62.93	104.48
15	LT VII A Commercial	869185	1324.47	1786.80
16	LT VII B Commercial	545335	192.38	203.23
17	LT VII C Commercial	828	18.14	17.46
18	LT VIII A Pub lightg	1783	293.52	106.18
19	LT VIII A Pub lightg	25348	79.96	43.61
20	LT Adv & Hoardings	2116	1.99	2.60
21	LT total	12270678	15470.15	21583.05

The table below shows the corresponding details related to HT & EHT Consumers in FY 18.

Table 4.9 : Energy sales at HT, EHT & to Licensees for 2017-18				
No	Particulars	Consumers	Consumption(MU)	CL /CD (MW/MVA)
1	HT I A Industrial	2136	2050.72	803.38
2	HT I B Industrial	22	12.27	6.95
3	HT II A General	308	175.06	77.74
4	HT II B General	1013	586.58	192.08
5	HT III A Agriculture	51	7.52	12.67
6	HT III B Agriculture	9	2.09	1.32
7	HT IV Commercial	1938	644.82	329.24
8	HT V Domestic	100	14.97	10.32
	HT Total	5577	3494.04	1433.71
1	EHT I 66 KV Industrial	15	247.34	91.05
2	EHT II 110 KV Industrial	20	631.13	168.55
3	EHT III 220 KV Industrial	1	77.99	40.00
4	EHT General A	2	12.52	3.00
5	EHT General B	3	57.62	21.00

6	EHT Railway Traction	12	265.80	96.00
7	KMRL	2	15.35	6.50
8	EHT Total	55	1307.74	426.10
1	Cochin Port Trust	1	34.55	9.5
2	CSEZ	1	55.74	10
3	KDHPCL	1	52.40	9
4	KPUPL	1	82.47	19.5
5	MES	1	71.40	17.822
6*	<i>Elec Dept Pondicherry UT</i>	1	30.13	0
7	Karnataka	1	0.78	0.15
8	Rubber Park Ltd	1	30.21	6.7
9	Technopark	1	86.26	20
10	Thrissur Corporation	1	154.69	8
11	Infopark, Cherthala	1	7.43	3.55
12	Smart City	1	2.73	1.5
13	Total (Licensees)	11	608.77	105.722
14	Grand Total	12276321	20880.70	21583.05/1965.53
*Electricity Department, Mahe, ceased to be KSEB Consumer now drawing power directly through REA				

Thus the total no. of consumers as on 31-March-2018 was 1,22,76,321 and the energy sales within the State for was 20880.70 MU. Now, since the advent of solar distributed generation by *prosumers*, part of the energy injected into the grid is being adjusted against their drawal from the grid as per the respective RE regulations in force. There are also *Captive Generators* who generate electricity for their own use.

Thus, the total consumption in the state is inclusive of such generation and use. The details of **total electricity consumption** of the State are summarized in table below:

Table 4.10: Total Consumption of the State for FY 2017-18					
Category	KSEBL Sales (MU)	OA Energy (MU)	Captive (MU)		Total MU
			SHP	Solar	
LT total	15470.15	0		6.04	15476.19
HT Total	3494.04	27.87		2.59	3524.50
EHT Total	1307.74	241.99	68.03	30.69	1648.45
Bulk Licensees	608.77				608.77
Off- grid Solar				0.80	0.80
Grand Total	20880.7	269.86	68.03	40.12	21258.71

The Percentage growth in energy sales of each category of consumers during the year 2016-17 and 2017-18 is given below.

Table- 4.11 : Comparison of energy sales growth in (MU)				
Category	2015-16	2016-17	2017-18	Change (%)

LTI -Domestic	9936.22	10274.70	10569.99	2.87
LT II - Colonies	7.26	6.03	4.85	-19.57
LT III - Temporary Supply	5.68	1.65	1.47	-11.14
LT IV - Industrial	1103.23	1131.91	1112.33	-1.73
LT V - Agriculture	279.48	321.98	346.03	7.47
LT VI - General	1396.61	1523.87	1525.03	0.08
LT VII - Commercial	1331.39	1430.66	1534.99	7.29
LT VIII - Public Lighting	366.62	375.77	373.48	-0.61
LT IX - Advt and Hoardings	1.68	1.78	1.99	12.06
LT total	14428.17	15068.35	15470.15	2.67
HT I - Industrial	1852.13	1952.53	2062.99	5.66
HT II - General	678.04	722.18	761.64	5.46
HT III - Agriculture	6.82	9.22	9.61	4.22
HT IV - Commercial	584.39	604.23	644.82	6.72
HT V - Domestic	9.56	13.67	14.97	9.52
HT Total	3130.94	3301.83	3494.03	
EHT I - 66 KV Industrial	233.12	187.96	247.34	31.59
EHT II - 110 KV Industrial	639.82	507.72	631.13	24.31
EHT III - 220 KV Industrial	33.75	65.97	77.99	18.22
EHT General	68.38	64.73	70.14	8.35
Railway Traction	212.83	229.59	265.80	15.77
KMRL			15.35	
Licensees	578.08	612.10	608.77	-0.54
EHT & Licensees total	578.08	612.1	608.77	-0.54
Grand Total	19325.07	20038.25	20880.70	4.20

The following general inferences can be made from the recent growth trend of various sectors in the state:

- The **total energy consumption** shows an overall increase of 3.80% compared to 5.24% of previous year. The energy sales in LT categories show an increase of 2.67 %. where as energy sales to HT & EHT category shows a net increase of 8.87%.
- The **domestic consumption** increased only by 2.87% against 3.40 % growth during previous year. The decrease is caused by LED bulb and solar penetration as well as the saturation caused by 100 % electrification. There is an increase of 7.47 % in **agricultural** category, 7.29% in **LT Commercial** category and of 0.8% in **LT General** Category. Whereas the consumption of **LT Industrial** consumers shows a slight decreasing trend.
- The consumption of **HT Industrial** category (excluding energy drawal through OA) shows an overall increase of 5.66% against 6.66% of previous year. There is high growth in EHT category is due to the reduction in Open access purchase by embedded consumers. Taking the impact of open access and captive generation the total energy sales of HT & EHT consumers shows an increase of 6.84 %.

- The reduction in energy consumption in the case of **licensees** caused by Electricity Department Pondicherry switching over and purchasing power directly from CGS accounted through REA.

Energy sale forecast for the current control period

The energy sales of each consumer category was estimated based on the past actual data such as (i) category wise consumer strength, (ii) category wise consumption, (iii) Compound Annual Growth Rate (CAGR), (iv) actual consumption during the year 2018-19 till September-2018, (v) new service connections proposed during the ensuing years, (vi) DSM initiatives taken by the Board and impact of wheeled energy, solar penetration etc. The energy consumption forecast has also considered the economic growth, regional characteristics of consumers, seasonal variations, change in consumer habits, cumulative average growth rate during the previous years etc. Now, the CAGR of sales during the time period are calculated and given below:

Table 4.12 : Historical trends in CAGR							
Category	10 year CAGR	6 year CAGR	5year CAGR	4year CAGR	3 year CAGR	2 year CAGR	1Yr increase
Domestic	6.55	5.44	4.96	4.90	4.13	3.14	2.87
Commercial	8.31	6.14	6.60	8.28	8.22	5.83	3.56
Industrial	1.23	0.23	0.19	0.36	0.47	0.41	-1.73
Agricultural	4.14	3.22	2.48	2.77	5.89	11.27	7.47
Street Lights	4.16	4.05	3.58	3.85	2.54	0.93	-0.61
LT II		-17.82	-19.29	-19.13	-10.08	-18.27	-19.57
LT Advt and Hoardings					-10.69	8.96	12.06
Total	6.24	5.03	4.76	5.07	4.59	3.55	2.67
HT I	3.63	4.57	4.39	4.18	4.23	5.95	5.59
HT II	18.68	37.03	43.62	55.27	11.57	6.32	6.13
HTIII	0.40	2.87	2.85	6.18	11.84	18.74	4.21
HT IV	2.44	-4.81	-5.83	-7.52	3.67	5.04	6.72
HT V	0.00	0.00	0.00	0.00	22.37	25.15	9.54
EHT-1	1.49	-0.18	1.13	1.39	1.77	11.19	-1.25
EHT-II	0.45	-2.68	-2.15	-0.56	1.89	2.49	3.23
EHT-III			15.51	3.85	22.01	65.26	39.69
EHT Non industrial				3.74	2.54	1.28	8.36
Railway Traction	9.30	9.47	8.88	7.28	8.99	11.76	15.77
Bulk	5.49	4.33	3.98	3.86	3.19	2.62	-0.54
HT&EHT Total	4.65	4.13	4.40	4.52	4.98	6.25	5.49
Total	5.79	4.78	4.67	4.92	4.70	4.25	3.41

The energy consumption for various customer categories are estimated primarily based on the CAGR trends during past years. Wherever it is observed that the trend is unusual, the growth factors have been corrected to arrive at more realistic projections based on experience. For the year 2018-19, the energy demand for the first half of the financial year showed a considerable reduction owing to the heavy monsoon and consequent floods. The energy demand for the first six months from April-August of the financial 2017-18 and 2018-19 and deviation of actual from normal estimation is given in table below.

Table 4.13 : Energy Demand in the first half of financial year					
Month	2017-18	2018-19	Growth (%)	Projection (2018-19)	Deviation (%)
April	2233.75	2240.75	0.31	2271.18	-1.36
May	2174.14	2154.72	-0.89	2264.41	-5.09
June	1889.13	1932.05	2.27	1949.30	-0.89
July	1940.58	1894.86	-2.36	2024.03	-6.82
August	2009.53	1791.12	-10.87	2080.83	-16.17
September	1909.66	2017.95	5.67	2026.95	-0.45
Total	12156.79	12031.45	-1.03	12616.71	-4.86

The demand gets drastically reduced during the monsoon months. The projections for the year 2018-19 are arrived by applying the change rate from previous year consumption. The energy sales for 2018-19 is projected after analysing the actual energy consumption during the period from April to September 2018, the CAGR, existing consumer strength and seasonal variations For the remaining control period, compound annual growth rate is taken.

- For domestic category, the consumption shows a steady decelerating trend (3 year CAGR 4.13 against 6 year CAGR of 5.44%) during last three years. As 2012-13 year was a drought year 5 year CAGR cannot be applied for projection. Since the factors contributing reduction in consumption (Saturation, LED DSM impact, Solar penetration etc) are applicable to last three years, CAGR of 3 years seems to be appropriate for domestic category. An allowance of 0.25% reduction is allowed for DSM activities savings. The 6 year CAGR is used for energy sales projection of LT Commercial, LT Agriculture and Public lighting category.
- As for Industrial category, the consumption shows a small negative growth rate CAGR for last 6 years and YOY change from 2017-18 is negative. Hence 1 % growth is considered for projection.
- Impact of Solar installations by consumers in future years not considered for projection because of difficulty in predicting the same.
- In the case of HT & EHT category, it is not possible to predict the quantum of energy purchase by open access consumers because they resort to short term power purchase and have not furnished any definite proposals for the future. Hence energy sales including energy wheeled by embedded open access consumers is also considered for future projections. Energy consumed from captive generation is not considered for future energy sales projection.
- The 6 year CAGR is used for energy sales projection of HT Industrial, Commercial & General combined, HT Agriculture category. HT domestic is relatively a new category formed in 2014-15 and CAGR is on the higher side. Hence a growth of 5 % growth is considered.

- In the case of EHT categories, 3 year CAGR is taken for EHT 66 KV, 110 KV and EHT non-industrial category because of re-categorisation of categories during 2012-13 and 2013-14. In the case of EHT 220 KV, being a captive generator, there is a wide variation in their consumption; hence projection based on their previous trends cannot be relied.
- In addition to the sale to its own consumers, KSEBL has been providing electricity to other licensees at the BST approved by the Hon Commission. In the case of licensees, 6 year CAGR is taken for energy sales projection.
- The estimated energy consumption of the Bulk Consumers for the next control period based on 6 year CAGR is given in table below II.

Table 4.14 : Energy sale projection to Licensees				
Licensee	2018-19	2019-20	2020-21	2021-22
Cochin Port Trust	36.05	37.62	39.25	40.96
Cochin Special Economic Zone	56.86	57.99	59.15	60.34
Kannan Devan Hills Plantation Corporation Limited (KDHPCL)	53.13	53.86	54.60	55.36
Kinesco Power (KPUPL)	88.14	94.20	100.68	107.60
Military Engineer Services	74.87	78.50	82.32	86.31
Electricity Department Karnataka	0.83	0.89	0.95	1.02
Rubber Park Ltd	31.80	33.47	35.23	37.08
Technopark	91.27	96.57	102.18	108.11
Thrissur Corporation	161.54	168.70	176.17	183.98
Infopark, Cherthala	7.80	8.19	8.60	9.03
Smart City	2.87	3.01	3.16	3.32
Total	605.14	632.99	662.29	693.10

Thus the energy sales forecast for the control period, estimated as described in preceding paragraphs, is given in table below.

Table 4.15 : Category wise sales projection				
Category	2018-19	2019-20	2020-21	2021-22
Domestic	10856.52	11439.87	11901.30	12381.33
Commercial	3168.22	3448.97	3660.73	3885.49
Industrial	1100.98	1134.68	1146.03	1157.49
Agricultural	350.02	368.65	377.80	387.19
Street Lights	380.84	404.36	420.75	437.81
LT II	4.90	5.05	5.10	5.15
LT IX	2.01	2.12	2.18	2.25
LT Total	15863.49	16803.69	17513.88	18256.70
HT I	2137.66	2280.91	2385.08	2494.01
HT II	797.91	864.87	918.70	975.88
HTIII	9.69	10.17	10.46	10.76
HT IV	671.26	727.59	772.88	820.98
HT V	15.41	16.51	17.33	18.20
EHT I	355.56	369.22	375.75	382.38

EHT II	748.67	778.40	793.12	808.12
EHT III	94.83	101.61	106.69	112.02
EHT non industrial	70.48	73.75	75.62	77.54
Railway Traction	273.51	293.05	307.70	323.09
Bulk	593.03	632.99	662.29	693.10
KMRL	15.79	16.92	17.77	18.66
HT & EHT Total	5783.80	6165.98	6443.38	6734.74
Total	21647.29	22969.67	23957.26	24991.44
Growth (%)	2.35	6.10	4.30	4.32

Based on the above projection, the forecast of each tariff Category for the next control period is made and provided in table below.

Table 4. 16 : Sales Projection for LT Category (MU)					
No	Category	2018-19	2019-20	2020-21	2021-22
1	LT I Domestic	10856.52	11439.87	11901.3	12381.33
2	LT II Colony	4.9	5.05	5.1	5.15
3	LT IV A Industrial	1091.53	1124.95	1136.2	1147.56
4	LT IV B Industrial	9.45	9.74	9.83	9.93
5	LT V A Agriculture	303.01	319.14	327.07	335.19
6	LT V B Agriculture	47	49.5	50.73	51.99
7	LT VI A General	207.1	225.45	239.29	253.99
8	LT VI B General	124.31	135.32	143.63	152.45
9	LT VI C General	242.82	264.34	280.57	297.8
10	LT VI D General	22.21	24.18	25.67	27.24
11	LT VI E General	3.19	3.47	3.68	3.91
12	LT VI F General	906.39	986.71	1047.3	1111.6
13	LT VI G General	72.18	78.57	83.39	88.52
14	LT VII A Commercial	1369.82	1491.2	1582.76	1679.94
15	LT VII B Commercial	200.92	218.73	232.16	246.41
16	LT VII C Commercial	19.28	20.98	22.27	23.64
17	LT VIII A Public Lighting	299.13	317.61	330.48	343.88
18	LT VIII B Public Lighting	81.71	86.75	90.27	93.93
19	LT IX Ads and Hoardings	2.01	2.12	2.18	2.25
	LT Subtotal	15863.49	16803.69	17513.88	18256.7

The Projection for HT and EHT consumer categories are given below:

Table 4.17 : Sales Projection for HT & EHT Category (MU)					
HT category					
No	Category	2018-19	2019-20	2020-21	2021-22
1	HT I A Industrial	2124.95	2267.35	2370.9	2479.19
2	HT I B Industrial	12.71	13.56	14.18	14.83
3	HT II A General	182.24	197.54	209.83	222.89
4	HT II B General	615.66	667.33	708.87	752.99
5	HT III A Agriculture	7.58	7.95	8.18	8.42
6	HT III B Agriculture	2.11	2.22	2.28	2.34
7	HT IV Commercial	671.26	727.59	772.88	820.98

8	HT V Domestic	15.41	16.51	17.33	18.2
	HT Sub Total	3631.92	3900.04	4104.45	4319.83
EHT Category					
No	Category	2018-19	2019-20	2020-21	2021-22
1	EHT 66 KV Industrial	355.56	369.22	375.75	382.38
2	EHT 110KV Industrial	748.67	778.4	793.12	808.12
3	EHT 220 KV Industrial	94.83	101.61	106.69	112.02
4	EHT General A	12.32	12.89	13.22	13.56
5	EHT General B	58.16	60.85	62.4	63.99
6	EHT Railway Traction	273.51	293.05	307.7	323.09
7	KMRL	15.79	16.92	17.77	18.66
8	EHT Sub Total	1558.85	1632.95	1676.64	1721.81

Similarly, the projection for Licensees and others are given below:

Table 4. 18 : Sales Projection for Licensees and others (MU)					
No	Category	2018-19	2019-20	2020-21	2021-22
1	KPUPL	86.37	94.2	100.68	107.6
2	CSEZ	55.72	57.99	59.15	60.34
3	RPL	31.16	33.47	35.23	37.08
4	Technopark	89.44	96.57	102.18	108.11
5	Cochin Port trust	35.33	37.62	39.25	40.96
6	Thrissur Corporation	158.31	168.7	176.17	183.98
7	KDHPCL	52.06	53.86	54.6	55.36
8	MES	73.37	78.5	82.32	86.31
9	Karnataka	0.81	0.89	0.95	1.02
10	Infopark	7.64	8.19	8.6	9.03
11	Smart City	2.81	3.01	3.16	3.32
	Subtotal	593.03	632.99	662.29	693.1
	Grand Total	21647.29	22969.67	23957.26	24991.44

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Aggregate Technical and Commercial Losses

The AT & C losses comprises of two components – Technical loss and Commercial loss. The Technical losses include the inherent loss in the Transmission and Distribution system up to the point of supply at the premises of the consumer. The technical losses primarily take place due to (1) Transformation Losses (at various transformation levels) and (2) I^2R losses on distribution lines due to inherent resistance and poor power factor in the transmission and distribution networks. The Transmission & Distribution loss depends upon various factors such as size of the network, energy demand, connected Load etc. KSEBL has consistently been reducing the Transmission and Distribution losses of its system.

The Commercial Losses include losses due to theft and pilferage, low metering efficiency, non reading of meters, faulty meter reading, inefficient billing, under billing, faulty bill distribution, software errors, prolonged disputes, inadequate revenue collection etc.

The Technical Losses in the power system is an inherent character, and as such this power loss cannot be totally eliminated. The major share of distribution loss results from LT distribution network. However, Kerala State Electricity Board Ltd. is continuously carrying out the following improvement works to minimise the AT & C losses such as augmenting the transmission and distribution infrastructure, timely replacing sluggish meters with modern electronic and smart meters, conducting anti-power theft inspections, conducting energy audits, motivating consumers to reduce reactive energy by providing incentives etc. Through the above activities during the period between 2001-02 and 2017-18, the T&D loss of KSEBL has reduced from 30.76% to 13.07%, a reduction of 17.69% during the last 16 years. However a high loss reduction target for coming years is not practicable. Further significant reduction in T&D loss requires higher capital investments which are being proposed under Transgrid 2.0 and Dyuthi 2021 projects, the results of which are expected from 2019-20 onwards. Hence KSEBL is estimating a target T&D loss reduction of 0.25% in 2018-19 and 0.4% annually thereafter. The target and the voltage wise transmission losses are explained in **Chapter 3** of the petition.

Table 4.19 : T&D loss during the next control period					
No	Particulars	FY-19	FY-20	FY-21	FY-22
1	T&D loss reduction estimated	0.25%	0.4%	0.4%	0.4%
2	T & D loss	12.82%	12.42%	12.02%	11.62%
3	Transmission Losses	4.05 %	3.95 %	3.85 %	3.75 %

The voltage wise losses of distribution network, KSEBL committed to furnish the same before the Honorable Commission once R-APDRP works were completed. However, the loss report obtained from R-APDRP scheme does not provide realistic values as all the updation works are not completed and cannot be used for actual segregation of the distribution losses. The abnormal values obtained could be due to frequent Network topology changes in the field which is not automatically updated in the system. Though KSEBL had planned and taken earnest effort to complete the data sanitization works and submit the loss data along with this petition, the massive flood had hit the distribution infrastructures badly including the R-APDRP towns. The network of IT infrastructure created for Energy Audit and AT&C loss calculation has been severely damaged as border, feeder & DTR meters and modems were submerged. Replacement has to be done for restarting Energy Audit and AT&C loss calculation activities.

Therefore, exemption was requested from PFC for a period of at least one year for the generation of loss reports and also to waive the 15% loss target condition conversion of loan to grant. KSEBL has given priority to the restoration works during the period. Under these circumstances KSEBL is not in a position to furnish the voltage wise distribution losses as well as segregation of technical losses along with this petition. Hence KSEBL humbly requests before the Honorable Commission to permit KSEBL to furnish the same along with mid-term review petition to be filed during November-2019. For the time being KSEBL humbly requests before the Honorable Commission to consider the figures in the table below.

Table 4.20 : Projected Losses					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Energy injected into the system (MU)	24846.15	26243.43	27247.53	28295.30
2	Percentage of loss (%)	4.05	3.95	3.85	3.75
3	Loss of energy (MU)	1006.27	1036.62	1049.03	1061.07
4	Energy handled (MU)	23839.88	25206.82	26198.50	27234.22
5	Sale of energy at 66 KV and above (MU)	2023.64	2130.57	2198.85	2269.92
6	Less Substation Aux Consumption (MU)	15.58	16.36	17.18	18.04
7	Energy transmitted to HT system (MU)	21800.66	23059.89	23982.47	24946.26
8	HT loss (MU)	5.35%	5.15%	5.00%	4.85%
9	Energy handled at HT level (MU)	20634.33	21872.31	22783.34	23736.37
10	Loss of energy at HT level (MU)	1166.34	1187.58	1199.12	1209.89
11	Sale of energy at HT level(MU)	3760.16	4035.42	4244.53	4464.82
12	Energy transmitted to LT system(MU)	16874.16	17836.89	18538.81	19271.55
13	Energy sale at LT level(MU)	15863.49	16803.69	17513.88	18256.70
14	Loss at LT level(MU)	1010.68	1033.20	1024.93	1014.85
15	LT level loss %	5.99	5.79	5.53	5.27
16	Distribution loss for sale at HT level (MU)	9.18	8.90	8.66	8.42
17	Distribution loss for sale at LT level (MU)	9.85	9.56	9.21	8.86
18	Total Distribution Losses	9.99	9.63	9.27	8.92

Operational Norms for control period

Supply Availability and Collection efficiency

KSEBL has taken earnest efforts to ensure supply availability at 100% throughout the control period. The details are given in Tariff Format D.6.1. KSEBL is estimating the collection efficiency target as 98% for next control period.

Forecast of Energy for the control period

The consolidated sales projections for the control period from FY 20 to FY 22 are in growth rate of 4.3 %. It is proposed to reduce the transmission and distribution losses by a factor of 0.25 % for 2018-19 and @.4% each year for the remaining control period. The transmission loss is 4.05%, 3.95%, 3.85% and 3.75% for FY-19, FY-20 and FY-21 & FY-22. Accordingly, the energy requirement at the generation points is computed. The peak load is arrived based on load factor as well as average energy requirement. It is to state that the load factor for 2017-18 is 0.72 and the same is used for arriving load requirement.

Table 4.21 : Forecast of Energy requirement and Peak Demand					
No	Particulars	FY-19	FY-20	FY-21	FY-22
1	Total energy sales projected	21647.29	22969.67	23957.26	24991.44
2	Sales growth rate projected		6.11%	4.30%	4.32%
3	T&D Loss In %	12.82%	12.42%	12.02%	11.62%
4	Energy at IF Points in MU	24830.57	26227.07	27230.35	28277.26
5	Substation auxiliary Consumption	15.582	16.3611	17.17916	18.03811
6	Energy at Gen. Points in MU	24846.15	26243.43	27247.53	28295.30
7	Energy Input growth rate (%)		5.62%	3.83%	3.85%
8	Average MW Requirement	2836.3186	2995.8257	3110.4483	3230.0566
9	Peak MW requirement @72% LF	3939	4161	4320	4486
	Peak demand (6Y CAGR)	4040	4174	4384	4516.7

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Aggregate Revenue Requirement of SBU-D

The forecast of aggregate revenue requirement of SBU-D is described in the following paragraphs.

Cost of Internal Generation

The total energy required for meeting the electricity demand for the next control period and corresponding T&D losses and auxiliary consumption is given in table below. The month wise peak demand is estimated based on 6 year CAGR except for March 2019 to May 2019. KSEBL is expecting a higher peak demand during these months owing to ongoing elections. The energy requirement and peak demand requirement for the next control period is given in table below

Table 4.22 : Energy Requirement for FY 2019-22				
Particulars	2018-19	2019-20	2020-21	2021-22
Energy sales(MU)	21647.29	22969.67	23957.26	24991.44
T&D loss in %	12.82%	12.42%	12.02%	11.62%
Substation Aux Conspn (MU)	15.58	16.36	17.18	18.04
Energy requirement (MU)	24846.15	26243.43	27247.53	28295.3
Peak Demand (MW)	4040	4175	4384	4517

The above requirement will be met through generation from plants by SBU-G and purchase of power from various sources. The details of energy generation and cost of generation is given in **Chapter 2** of the petition. The source-wise details of net generation are given in table below.

Table 4.23: Net Generation from own Stations (MU) and Cost (Rs Cr)				
Source	2018-19	2019-20	2020-21	2021-22
Hydel	7803.99	6925.75	6496.58	6404.97
Wind	1.79	2.04	2.08	1.79
Solar	14.96	42.61	47.56	47.56
Aux Consumption	-1.21	-1.22	-1.22	-1.21
Total Quantum(MU)	7819.53	6969.18	6545.01	6453.11
Total Cost (Rs Cr)	522.94	560.87	657.72	792.44

It is expected that no energy from thermal stations will need to be used. Because of high cost, thermal stations will be reserved for use only during extreme exigencies.

Cost of power purchase

The entire energy requirement of the state cannot be met from own generation alone. Balance requirement is met by purchasing power from different sources such as Central Generating Stations (CGS), Independent power producers (IPP) within as well as outside the State, traders and power exchanges. KSEBL has entered into several long term agreements or contracts which have been approved by the Hon Commission. The year-wise energy availability and the cost of thereof are forecasted in the paragraphs hereunder.

The forecast or projection is made based on the certain factors and assumptions: (1) Forecast of purchase of power from different sources and cost are based on Merit Order Dispatch Principle except renewable energy purchase; (2) The transmission charges and incentives payable to the ISTS operator PGCIL are only considered for cost forecast, in addition to fixed and variable charges payable to IPPs / Traders. Other supplementary claims will be claimed during the time of truing up based on actual figures.

Power Purchase for FY 2018-19

The power purchase for remaining period of FY 2018-19, is projected considering the actual availability during the first six months and the terms of contract.

The cost projections are made based on annual monthly fixed charges approved by Hon CERC and actual variable charges for FY-18. Transmission losses & Transmission charges are arrived based on the average of actual point-of-connection (PoC) losses and transmission charges from April to September 2018.

Central Generating Stations

The total allocated share of power from CGS for the state is 1677.92 MW. It is expected that about **35.92 MW** of power, that is 4.49 % of 1 x 800 MW, would be additionally available from **NTPC Kudgi III unit** from January 2019. The power from Bhavini Nuclear Power Plant, (43 MW = 8.6 % of 1 x 500 MW) would be available from June 2019 only. Therefore this allocation is not considered for current year. The total capacity available from CGS including new CGS scheduled for commissioning is given in the Table below

Table 4.24 : Capacity allocation from CGS				
No	Station	Installed Capacity (MW)	Allocation (%)	Allocation (MW)
1	RSPTS Stage I & II	2100	11.67%	245.07
2	RSTPS Stage III	500	12.20%	61
3	TALCHER - Stage II	2000	21.35%	427
4	Simhadri Exp	1000	8.29%	82.9
5	NLC-II- Stage-1	630	10.00%	63
6	NLC-II- Stage-2	840	10.71%	89.96
7	NLC- Exp- Stage-1	420	15.93%	66.91
8	NLC - II Exp	500	15.93%	79.65
9	MAPS	440	5.23%	23.01
10	KAIGA Stg I	440	8.64%	38.02
11	KAIGA Stg II	440	7.96%	35.02
12	Kudamkulam Unit I	1000	13.91%	139.1
13	Kudamkulam unit II	1000	13.30%	133
14	Vallur JV with	1500	3.33%	49.95
15	NTPL(Tuticorin JV)	1000	7.25%	72.5
16	Kudgi Unit I	800	4.49%	35.92
17	Kudgi Unit II	800	4.49%	35.92
18	Kudgi Unit III	800	4.49%	35.92
	Total			1713.85

The energy availability estimated from CGS for the year 2018-19 after making judicious assumptions for PLF and auxiliary consumption considering the operational Norms specified in CERC (Terms and Conditions of Tariff) Regulations, 2014, Operating norms of the CGS as per the invoices raised by these stations and past performance.

The interstate transmission losses in the PGCIL lines for evacuating power from CGS is calculated on the basis of the average of PoC losses for the period from April-September 2018 approved by CERC vide orders dated 05.06.2018 and 30.08.2018.

However, during the recent floods KSEBL could not avail power from CGS for a few days due to the demand crash due to incessant rain and consequent floods. Further, the availability of contracted power from CGS has been badly affected by severe coal shortage. But KSEBL is expecting that the coal shortage will be relieved within short time and estimate the availability based on that fact. KSEBL humbly requests before the Hon Commission to allow the variation, if any, caused by coal shortage at the time of truing up.

Further, due to maintenance of Kudamkulam station only 60 MW is available till November. Therefore, full availability cannot be expected from Central Generating Stations. The energy availability from CGS at the generator bus and KSEB periphery is estimated after considering the above aspects.

Table 4.25 : Energy procurement from CGS for FY-19							
No.	Station	Allocation (MW)	Aux Cons (%)	Target PLF	Ex-bus Energy (MU)	ISTS losses (MU)	Net Energy (MU)
1	RSPTS Stage I & II	245.07	6.68%	85%	1763.58	67.17	1696.40
2	RSTPS Stage III	61	5.75%	85%	426.10	16.44	409.66
3	TALCHER - Stage II	427	5.75%	85%	3105.98	130.14	2975.83
4	Simhadri Exp	82.9	5.25%	85%	550.33	19.29	531.04
5	NLC-II- Stage-1	63	10.00%	80%	397.35	15.02	382.32
6	NLC-II- Stage-2	89.96	10.00%	80%	557.67	21.23	536.44
7	NLC- Exp- Stage-1	66.91	8.50%	80%	429.02	15.90	413.12
8	NLC - II Exp	79.65	10.00%	75%	282.58	10.24	272.34
9	MAPS	23.01	10.50%		85.30	3.12	82.18
10	KAIGA Stg I& II	73.04	10.50%		486.75	19.58	467.18
11	Kudamkulam I& II	272.2	7.80%		1285.78	53.08	1232.69
12	Vallur JV with	49.95	5.75%	85%	346.70	11.58	335.12
13	NTPL(Tuticorin JV)	72.5	7.01%	85%	486.64	20.53	466.11
14	Kudgi Unit I II & III	107.76	7.50%	85%	472.19	18.37	454.96
	Total	1713.95			10675.96	421.69	10255.41

The month wise schedule of Central Generating Stations is attached as **Annexure 4.1**

The fixed charges are computed based on the annual fixed charges approved by CERC for the year 2018-19. The variable charges are computed by taking the average variable cost for the period from FY-18. The tariff approved by the Department of Atomic Energy (DAE) for KAIGA APS and MAPS has been adopted for estimating the cost of power from these stations. The fixed cost and variable cost of various central generating stations is given in the table below.

Table 4.26 : Fixed and Variable Cost of CGS						
No	Name of Station	Capacity (MW)	Allocation (%)	Allocation (MW)	Fixed Cost (Rs Cr)	Av. variable Cost (Rs /unit)
1	RSPTS I & II	2100	11.67%	245.07	123.85	2.36
2	RSTPS III	500	12.20%	61	33.00	2.31
3	TALCHER II	2000	21.35%	427	215.04	1.56
4	Simhadri Exp	1000	8.29%	82.9	89.01	2.84
5	NLC-II- Stage-1	630	10.00%	63	29.90	2.96
6	NLC-II- Stage-2	840	10.71%	89.964	44.25	2.97
7	NLC- Exp- Stage-1	420	15.93%	66.906	44.00	2.73
8	NLC - II Exp	500	15.93%	79.65	73.24	2.73

9	MAPS	440	5.23%	23.012		2.79
10	KAIGA - I & II	880	8.30%	73.04		3.63
11	Kudamkulam I & II	2000	13.61%	272.2		4.09
12	Vallur JV with	1500	3.33%	49.95	61.53	2.89
13	NTPL (Tuticorin JV)	1000	7.25%	72.5	79.04	3.10
14	Kudgi Unit I	800	4.49%	35.92	39.12	3.50
15	Kudgi Unit II	800	4.49%	35.92	39.12	3.50
16	Kudgi Unit III	800	4.49%	35.92	9.78	3.50
	Total	16210		1713.952	880.86	

In addition to the fixed cost and variable energy charges the beneficiary State utilities are liable to pay incentive, income tax, water-cess, foreign exchange rate variation etc. However, these expenses are not taken into the present forecast.

Table 4.27 : Cost of Power Purchase (CGS)

No	Name of CGS	Ex- bus Energy (MU)	External loss (MU)	Net Energy (MU)	Fixed Cost (Rs Cr)	Variable cost (Rs Cr)	Total cost (Rs Cr)	Avg.Rate (Rs/Unit)
1	RSPTS Stage I & II	1763.58	67.17	1696.40	123.85	416.27	540.11	3.06
2	RSTPS Stage III	426.10	16.44	409.66	33.00	98.52	131.52	3.09
3	TALCHER - Stage II	3105.98	130.14	2975.83	215.04	484.45	699.49	2.25
4	Simhadri Exp	550.33	19.29	531.04	89.01	156.50	245.51	4.46
5	NLC-II- Stage-1	397.35	15.02	382.32	29.90	117.55	147.45	3.71
6	NLC-II- Stage-2	557.67	21.23	536.44	44.25	165.55	209.79	3.76
7	NLC- Exp- Stage-1	429.02	15.90	413.12	44.00	117.12	161.12	3.76
8	NLC - II Exp	282.58	10.24	272.34	73.24	77.18	150.42	5.32
9	MAPS	85.30	3.12	82.18		23.81	23.81	2.79
10	KAIGA Stg I & II	486.75	19.58	467.18		176.90	176.90	3.63
11	Kudamkulam I & II	1285.78	53.08	1232.69		525.40	525.40	4.09
12	Vallur JV with	346.70	11.58	335.12	61.53	100.23	161.76	4.67
13	NTPL (Tuticorin JV)	486.64	20.53	466.11	79.04	151.10	230.14	4.73
14	Kudgi Unit I,II & III	472.19	18.37	454.96	88.02	165.05	253.07	5.36
17	Total	10675.96		10255.41	880.86	2775.64	3656.50	3.42

The cost of power purchase as detailed above is exclusive of water cess, duties and other state levies etc, which will be claimed at the time of truing up process.

Inter-State Transmission Charges

The transmission charges to be paid for ISTS for 2018-19 are estimated on the basis of PoC charges for the period from April to September 2018 approved by CERC vide order dated 05.06.2018, 30.08.2018 and 19.09.2018. The transmission charges for the year 2018-19 are given below.

Table 4.28 : Transmission charges payable to PGCIL						
No	Source	Allocated capacity (MW)	PoC charges (Rs/ MW)	Reliability support charges (Rs/MW)	HVDC charges (Rs/MW)	Total Transmission charges (Rs Cr)
1	RSPTS Stage I & II	245.07	176395	28506	18355	65.66
2	RSTPS Stage III	61	176395	28506	18355	16.34
3	TALCHER - Stage II	427	176395	28506	18355	114.40
4	Simhadri Exp	82.9	176395	28506	18355	22.21
5	NLC-II- Stage-1	63	176395	28506	18355	16.88
6	NLC-II- Stage-2	89.964	176395	28506	18355	24.10
7	NLC- Exp- Stage-1	66.906	176395	28506	18355	17.92
8	NLC - II Exp	79.65	176395	28506	18355	21.34
9	MAPS	23.012	176395	28506	18355	6.17
10	KAIGA Stg I	38.016	176395	28506	18355	10.18
11	KAIGA Stg II	35.024	176395	28506	18355	9.38
12	Kudamkulam Unit I	139.1	176395	28506	18355	37.27
13	Kudamkulam unit II	133	176395	28506	18355	35.63
14	Vallur JV with	49.95	176395	28506	18355	13.38
15	NTPL(Tuticorin JV)	72.5	176395	28506	18355	19.42
16	Kudgi Unit I	35.92	176395	28506	18355	9.62
17	Kudgi Unit II	35.92	176395	28506	18355	9.62
18	Kudgi Unit III	35.92	176395	28506	18355	2.41
Total						451.93

Power procurement from renewable energy sources

The Renewable Purchase obligation to be met during the control period as per the KSERC (Renewable Energy) Regulations, 2017 is as follows:

Table 4.29 : RPO Targets for next control period				
Particulars	Quantum in MU			
	2018-19	2019-20	2020-21	2021-22
Energy sales excl bulk licensees(1)	21054.25	22336.68	23294.98	24298.35
Hydro(2)	7886.44	6998.42	6564.44	6471.77
Small hydro(3)	665.36	725.61	824.80	863.28
Net Energy sales(1)-(2)+(3)	13833.17	16063.86	17555.34	18689.85
Non Solar RPO Targets	968.32	1285.11	1579.98	1915.71
Solar RPO Targets as per RE regulations	380.41	642.55	921.66	1261.57

The petitioner has been earnestly attempting to meet the RPO through own generation as well as through procurement. The RE procurement arrangement from existing SHP, Wind and Solar sources are shown in the Tables below:

Table 4.30 : Renewable Power Purchase from IPPs					
No	Small Hydel	Capacity (MW)	Annual Energy availability (MU)	Per unit cost (Rs/unit)	Total cost (Rs.Cr.)
1	Ullumkal	7	17.79	2.44	4.34
2	Iruttukanam I & II	3+1.5	24.69	2.7	6.67
3	Karikkayam	10.5	37.56	4.16	15.62
4	Meenvallom	3	8.44	4.88	4.12
5	Pathamkayam	8	11.09	5.47	6.06
6	Pambumkayam	0.11	0.09	4.88	0.04
7	Kallar	0.05	0.08	5.47	0.04
	SHP Total	33.16	99.74	3.70	36.9
1	Agali	13.8	29.72	3.14	9.33
2	Koundikkal	4.8	12.56	3.14	3.94
3	Ramakkalmedu	14.25	27.87	3.14	8.75
4	Ahalya	8.4	20.98	5.23	10.97
5	INOX	16	16.33	4.09	6.68
	Wind Total	57.25	107.47	3.69	39.67
1	Kasargod solar Park	50	70.08	3.69	25.86
2	Anert,Kuzhalmannam	2	2.8	3.14	0.88
	Sub Total	52	72.88	3.67	26.74
	Grand Total	142.41	280.09	3.69	103.31

Note: Formal PPA has not been signed with ANERT. The Agency has agreed the rate of average pooled Power purchase cost approved for FY 2016-17 and hence the same is taken for cost calculation.

In addition to the above procurement KSEBL has taken steps to meet the target through own generation and through banking arrangements. The details are enclosed as **Annexure 4.2**.

Power Purchase through Long Term contracts

The petitioner has already made following contracts with generators / traders for meeting the power requirements of the forthcoming years. KSEBL had made contracts for 450 MW with various generators for a period of 25 years with the approval of Honorable Commission. Further KSEBL contracted 865 MW for a period of 25 years through DBFOO basis and the Hon Commission has allowed drawing power in accordance with the said contracts. Among this 100 MW PPA with M/s ECEPL has not materialized as the project is yet to achieve COD and KSEBL encashed the performance security in view of the failure of the generator. The details of power procured through long term contracts are as follows. The details of approvals are enclosed separately.

During the past few months, the targeted capacity of power IPPs could not be fully utilized because of (a) demand crash during August 2018 due to incessant rains and consequent flood and (b) Reduction in availability caused by coal shortage. Thus, the energy availability from long term contracts for FY-18 is given in table below. The availability is arrived by taking the actual from April to August 2018 and taking into consideration of the reduction in availability due to coal shortage. The monthly schedule is attached as **Annexure. 4.3**

Table 4.31 : Energy availability through long term contracts for 2018-19						
No	Trader/Source	contracted capacity (MW)	Aux. consumption (%)	PLF (%)	Ex-bus Energy (MU)	Energy at KSEB periphery
1	Maithon power limited	150	6.5	90%	991.63	960.83
2	Maithon power limited	150	6.5	90%	991.63	960.83
3	DVC-Mejia TPS	100	5.25	85%	686.96	666.03
4	DVC-Reghunathpur TPS	50	6.5	85%	244.94	237.45
5	Jindal Power Limited	200	5	90%	1,486.29	1,420.67
6	Jindal Power Limited	150	5	90%	1,117.19	1,067.86
7	Jindal India Thermal Ltd	100	5	90%	695.25	669.93
8	Jhabua Power Limited	115	5	90%	733.26	700.19
9	Jhabua Power Limited	100	5	90%	625.27	597.06
10	BALCO	100	5	90%	748.98	718.46
	TOTAL	1215			8,321.40	7,999.32

The details of power procurement through long term contracts and the cost of power purchase are given in table below.

Table 4.32 : Power Purchase through Long Term contracts (2018-19)									
No	Trader/Source	Energy at exbus	Energy at Kerala periphery	Fixed Charges	Variable Charges per unit	Total Fixed Charges	Total variable charges	Other Charges	Total
		MU	MU	Rs/unit	Rs/unit	Rs Cr	Rs Cr	Rs Cr	RsCr
1	Maithon power	991.63	960.83		1.90	155.10	188.41		343.51
2	Maithon power	991.63	960.83		1.90	155.10	188.41		343.51
3	DVC-Mejia TPS	686.96	666.03		2.21	101.92	151.76		253.68
4	DVC-R'nathpur	244.94	237.45		2.36	58.15	57.88		116.03
5	Jindal Power-Bid I	1,486.29	1,420.67	2.62	1.15	392.47	170.51	-22.03	540.95
6	Jindal Power-Bid II	1,117.19	1,067.86	3.34	1.19	375.24	133.43	-19.48	489.20
7	Jindal India Ltd	695.25	669.93	3.45	1.03	258.40	71.53	-12.09	317.84
8	Jhabua Power-Bid I	733.26	700.19	2.1	1.80	180.88	131.95	-11.44	301.39
9	Jhabua Power-Bid II	625.27	597.06	2.89	1.73	216.46	108.28	-11.32	313.41
10	BALCO	748.98	718.46	3.17	1.09	237.43	81.27	-12.34	306.36
	TOTAL	8,321.40	7,999.32			2131.12	1283.44	-88.69	3325.87

In the case of power purchase through DBFOO contracts the transmission charges and losses at the time of bidding is encapsulated in the bid rate. The difference between

transmission charges and transmission losses has to be remitted, which is shown in the column other charges.

Transmission charges for power procurement through long term contracts

The transmission charges of remaining long term contracts other than that contracted through DBFOO basis is given below.

Table 4.33 : Power Purchase through Long Term contracts (2018-19)						
No	Trader/Source	Contracted Capacity (MW)	PoC charges (Rs/MW)	Reliability support charges (Rs/MW)	HVDC charges (Rs/MW)	Total Transmission charges (Rs Cr)
1	Maithon power Ltd	150	176395	28506	18355	40.19
2	Maithon power Ltd	150	176395	28506	18355	40.19
3	DVC-Mejia TPS	100	176395	28506	18355	26.79
4	DVC-Reghunathpur	50	176395	28506	18355	13.40
	Total					120.56

As mentioned earlier, the ISTS transmission charges are estimated based on CERC approved rates.

Energy procurement from liquid fuel stations

The capacity and energy availability from the liquid fuel station, RGCCPP, in the State is given below. Due to high fuel cost and consequent power cost, no power is proposed to be used from this plant. This plant will be used only during extreme exigencies. However, there is a fixed charge obligation of Rs 200 Cr per year.

Table 4.34 : Energy availability from liquid fuel stations				
Station	Capacity (MW)	Capacity Available (MW)	Energy availability (MU/day)	Fixed cost (Rs Cr)
RGCCPP	360	320	7.45	200

Transmission charges for the year 2018-19

The transmission charges for the year 2018-19 is given in table below

Table 4.35 : Transmission charges for 2018-19		
No	Source	Amount
1	Central Generating Stations (Rs Cr)	451.93
2	Long Term Contracts	120.56
3	RGCCPP	8.16
	Total	580.65

Summary of month wise energy availability

The summary of the month-wise energy availability and power from Hydel, CGS, traders/ generators for the remaining part of financial year 2018-19 is given in the tables below.

Table 4.36 : Summary of the total energy availability for FY 2018-19

Month	Demand MU	Generation (MU)			Power Purchase MU)			Aux cons MU	Total availability MU	Surplus/ Deficit MU
		Hydro MU	Wind MU	Solar MU	S.IPPs MU	CGS MU	LTA MU			
Oct-18	2090.38	856.84	0.39	1.04	28.32	852.00	547.77	0.10	2286.26	195.89
Nov-18	2058.98	594.51	0.07	1.31	18.44	933.04	761.26	0.10	2308.52	249.54
Dec-18	2086.79	338.17	0.11	1.33	18.86	1007.38	794.71	0.10	2160.47	73.68
Jan-19	2111.01	338.18	0.11	2.26	15.56	1052.84	794.71	0.10	2203.56	92.54
Feb-19	2049.19	416.31	0.20	2.09	14.42	950.60	717.80	0.10	2101.32	52.14
Mar-19	2418.35	782.78	0.07	2.79	20.89	1052.84	798.25	0.10	2657.51	239.15
Total	12814.70	3326.79	0.95	10.82	116.50	5848.70	4414.50	0.61	13717.64	902.95

The month wise requirement and availability of peak time is estimated below.

Table 4.37 : Summary of Peak time availability

Month	Demand (MW)	Hydro (MW)	S. IPPs (MW)	CGS (MW)	LTA (MW)	Outages (MW)	Total (MW)	Sale (MW)	Balance (MW)
Oct-18	3700	1460	21	1253	960	-200	3494	-103	-309
Nov-18	3800	1431	17.5	1322	967	-100	3637.5		-162.5
Dec-18	3850	1401	16.5	1400	1100	-250	3667.5		-182.5
Jan-18	3900	1664	7.5	1449	1100	-250	3970.5		70.5
Feb-18	3907	1678	8.5	1449	1100	-250	3985.5		78.5
Mar-18	4040	1764	7.5	1455	1100	-250	4076.5		36.5

Purchase from Short term market

KSEBL has already purchased 157.39 MU for the first half of the financial year upto September 2018 for a total cost of Rs 39.58 Cr at optimum rates. Hon Commission may please note that this petition has been prepared based on the normal load conditions and hence the peak demand is projected based on 6 year CAGR. But in view of the coming elections combined with extreme summer conditions, KSEBL expected an abnormal hike in demand as occurred during April 2016 under similar circumstances. During April 2016, peak demand increases from 3517 MW to 4000 MW and persists around the same figure without hike for two years. Hence there is a chance of shoot in demand by 400 MW this year also. Under such conditions, there is a total deficit of 300 MW peak during the next half of financial year and KSEBL is planning to meet the demand through short term market or through day-ahead-markets. Due to the acute coal shortage the spot power price for supply touched almost 10 year high and touched of Rs 17.61 on Indian Energy Exchange.

The petitioner had, vide letter dated 05.10.2018, already brought this matter before the Honorable Commission seeking in principle approval for 150 MW peak power on short term basis for the period from 15.10.2018 to 31.05.2019 through DEEP portal which quantifies to 72.15 MU. Anticipating an average power purchase cost of Rs 5 per unit the total power purchase cost through short term market for remaining part of financial year amounts to Rs 36.08 Cr as shown in the table below.

Table 4.38 : Purchase from short term market			
No	Particulars Purchase	Energy at Kerala periphery (MU)	Amount (Rs Cr)
1	During first part of financial year	157.39	39.58
2	Remaining part of financial year	72.15	36.08
	Total	230.54	75.66

Surplus Energy Sale

Based on the availability and demand there is a surplus availability during certain months of financial year especially during non peak hours. KSEBL has been taking earnest efforts to sell the excess power whenever opportunity is available at optimum cost. KSEBL has entered sale agreement with BSHPL through DEEP portal for sale of 50 MW in June 2018 and 100MW from August 2018 to October 2018 during peak periods and 100 MW during June to October 2018 during off peak period at an average rate of Rs 6.16 per unit. KSEBL had also made arrangements with CSPDCL for sale of power of 200 MW of power from 00.00 hours to 7.00 hours during October @ Rs 4.09 per unit. KSEBL has also made arrangements with CSPDCL for selling 200 MW of power from 6.00 hours to 10.00 hours @ Rs 5.16 per unit and 149 MW of power from 10.00 hrs to 13.00 hrs @ Rs 4.37 per unit during November 2018. In addition to the above, KSEBL has been selling energy at optimum costs through day ahead markets. KSEBL is also planning to sell the surplus energy available for the remaining part of the financial year at an average expected rate of Rs 5 per unit. The details of energy sale is given in the table below

Table 4. 39 : Energy Sale outside the State		
Period	Quantum MU	Amount Rs Cr
April to September (Actuals)	623.53	225.42
October to March (Incl Sh. Term Purchase)	975.10	487.55
Total	1598.63	712.96

Summary of cost of generation and power purchase (2018-19)

The summary of generation and power purchase for the year 2018-19 is as follows

Table 4.40 : Summary of Cost of power procurement for FY-19						
Source	Ex bus Energy (MU)	Energy at periphery (MU)	Fixed Cost (Rs Cr)	Variable Cost (Rs Cr)	Other charges (Rs Cr)	Total Cost (Rs Cr)
Central Gen Stations	10675.96	10255.41	880.86	2775.64		3656.50
IPPs within the State						
Small Hydel	99.74	99.74		36.90		36.90
Wind	107.47	107.47		39.68		39.68
Solar	72.88	72.88		26.74		26.74
Sub Total	280.09	280.09	0.00	103.32	0.00	103.32
Long Term contracts						
Maithon power limited	991.63	960.83	155.10	188.41	0.00	343.51
Maithon power limited	991.63	960.83	155.10	188.41	0.00	343.51
DVC-Mejia TPS	686.96	666.03	101.92	151.76	0.00	253.68
DVC-Reghunathpur TPS	244.94	237.45	58.15	57.88	0.00	116.03
Jindal Power Ltd-Bid I	1,486.29	1,420.67	392.47	170.51	-22.03	540.95
Jindal Power Ltd-Bid II	1,117.19	1,067.86	375.24	133.43	-19.48	489.20
Jindal India Thermal Ltd	695.25	669.93	258.40	71.53	-12.09	317.84
Jhabua Power Ltd-Bid I	733.26	700.19	180.88	131.95	-11.44	301.39
Jhabua Power Ltd-Bid II	625.27	597.06	216.46	108.28	-11.32	313.41
BALCO	748.98	718.46	237.43	81.27	-12.34	306.36
Sub Total	8,321.40	7,999.32	2,131.12	1,283.44	-88.69	3,325.87
RGCCPP			200			200
Short term market etc	236.98	229.54		75.66		75.66
ISTS Transm charges						
CGS				451.93		451.93
Long Term Contracts				120.56		120.56
RGCCPP				8.16		8.16
Sub Total				580.65		580.65
Total Power Purchase	19514.43	18764.36	3211.98	4818.71	-88.69	7942.01

Power Purchase for 2019-20

For financial year 2019-20, the following assumptions / facts are taken for forecasting the availability and cost:

- The calculation of the fixed cost of central generating stations, DVC and Maithon power is arrived by giving a 2 % reduction in annual fixed charges applicable for 2018-19 and variable charge by taking the actual average variable cost for 2017-18.
- In the case of DBFOO, the fixed charges is arrived taking into consideration of inflation and variable charge taken is the actual average variable cost for 2017-18.
- Transmission charges for FY-20 as the same as that for FY-19

Central Generating Stations

The total power allocation from CGS for the State will be 1713.85 MW by end of previous year. It is expected that, the Power from 800 MW Bhavini nuclear power plant will be available from June-2019 onwards. Thus the total capacity of CGS station capacity allocated is given in the Table below:

Table 4.41 : Capacity allocation from CGS				
No	Station	Installed Capacity (MW)	Allocation (%)	Allocation (MW)
1	RSPTS Stage I & II	2100	11.67%	245.07
2	RSTPS Stage III	500	12.20%	61
3	TALCHER - Stage II	2000	21.35%	427
4	Simhadri Exp	1000	8.29%	82.9
5	NLC-II- Stage-1	630	10.00%	63
6	NLC-II- Stage-2	840	10.71%	89.96
7	NLC- Exp- Stage-1	420	15.93%	66.91
8	NLC - II Exp	500	15.93%	79.65
9	MAPS	440	5.23%	23.01
10	KAIGA Stg I	440	8.64%	38.02
11	KAIGA Stg II	440	7.96%	35.02
12	Kudamkulam Unit I	1000	13.91%	139.1
13	Kudamkulam unit II	1000	13.30%	133
14	Vallur JV with	1500	3.33%	49.95
15	NTPL(Tuticorin JV)	1000	7.25%	72.5
16	Kudgi Unit I	800	4.49%	35.92
17	Kudgi Unit II	800	4.49%	35.92
18	Kudgi Unit III	800	4.49%	35.92
19	Bhavini	800	8.6%	43
	Total			1756.85

Energy availability from CGS for the year 2019-20

The energy availability estimated from CGS for the year 2019-20 after making judicious assumptions for PLF and auxiliary consumption considering the operational Norms specified in CERC (Terms and Conditions of Tariff) Regulations, 2014, Operating norms of the CGS as per the invoices raised by these stations and past performance The interstate transmission losses owned by PGCIL for evacuating power from CGS for FY-20 is taken as the same as that of FY-19. In the case of NLC II Expansion Stg-II ,the actual plant load factor is always less and hence the actual PLF of 45 % FY 2018-19 and availability of 50.03% is taken for energy availability and annual capacity charges respectively. The

estimated energy availability from CGS at the generator bus and KSEB periphery after considering the above aspects for the year 2019-20 is given in table below.

Table 4.42 : Energy procurement from CGS (2019-20)								
No	Station	Allocated Capacity (MW)	Aux Consumption (%)	Target PLF (%)	Expected PLF (%)	EX-bus Energy (MU)	ISTS losses (MU)	Net Energy at Kerala periphery (MU)
1	RSPTS Stg I & II	245.07	0.0668	85%	90%	1808.01	63.24	1744.76
2	RSTPS Stage III	61	5.75%	85%	90%	453.27	15.85	437.42
3	TALCHER - Stge II	427	5.75%	85%	90%	3172.90	128.99	3043.91
4	Simhadri Exp	82.9	5.25%	85%	85%	584.87	18.41	566.46
5	NLC-II- Stage-1	63	10.00%	80%	80%	397.35	13.50	383.85
6	NLC-II- Stage-2	89.96	10.00%	80%	80%	567.42	19.28	548.14
7	NLC- Exp- Stage-1	66.91	8.50%	80%	80%	429.02	14.58	414.44
8	NLC - II Exp	79.65	10.00%	75%	45%	282.78	9.61	273.17
9	MAPS	23.01	10.50%		68.50%	123.59	3.94	119.65
10	KAIGA Stg I & II	73.04	10.50%		80%	486.76	17.72	469.05
11	Kudamkulam I & II	272.2	7.80%		70%	1538.37	62.11	1476.26
12	Vallur JV with	49.95	5.75%	85%	85%	347.05	10.06	336.99
13	NTPL(Tuticorin JV)	72.5	7.01%	85%	85%	501.99	20.86	481.13
14	Kudgi Unit I II & III	107.76	7.50%	85%	85%	742.20	25.22	716.98
15	Bhavini	43	10.00%		70%	237.31	7.57	229.75
	Total	1756.952				11672.88	430.94	11241.94

The month wise schedule of Central Generating Stations is attached as **Annexure 4.4**. The fixed charges are computed by giving a 2 % reduction on annual fixed charges applicable for FY-20 and the variable charges are estimated at the actual average variable cost for FY-18. The tariff approved by the Department of Atomic Energy (DAE) for KAIGA APS and MAPS has been adopted for estimating the cost of power from these stations. In addition to the fixed cost and variable energy charges the beneficiary State utilities are liable to pay incentive, income tax, water cess, foreign exchange rate variation etc.

Table 4.43 : Cost of Power Purchase at Gen Ex-bus (2019-20)									
No	Name of CGS	Energy at gen. bus (MU)	External loss (MU)	Net Energy (MU)	Fixed Cost (Rs Cr)	Variable cost (Rs Cr)	Incentives (Rs Cr)	Total cost (Rs Cr)	Av.Rate Gen Bus (Rs)
1	RSPTS Stage I & II	1808.01	63.24	1744.76	121.37	426.76	5.01	553.13	3.06
2	RSTPS Stage III	453.27	15.85	437.42	32.34	104.80	1.26	138.40	3.05
3	TALCHER - Stage II	3172.90	128.99	3043.91	210.74	494.88	8.81	714.44	2.25
4	Simhadri Exp	584.87	18.41	566.46	87.23	166.33		253.55	4.34

5	NLC-II- Stage-1	397.35	13.50	383.85	29.30	117.55		146.85	3.70
6	NLC-II- Stage-2	567.42	19.28	548.14	43.36	168.44		211.80	3.73
7	NLC- Exp- Stg-1	429.02	14.58	414.44	43.12	117.12		160.24	3.74
8	NLC - II Exp	282.78	9.61	273.17	71.78	77.24		149.01	5.27
9	MAPS	123.59	3.94	119.65		34.50		34.50	2.79
10	KAIGA Stg I & II	486.76	17.72	469.05		176.90		176.90	3.63
11	Kudamkulam I & II	1538.37	62.11	1476.26		628.62		628.62	4.09
12	Vallur JV with	347.05	10.06	336.99	60.30	100.33		160.63	4.63
13	NTPL (Tuticorin)	501.99	20.86	481.13	77.46	155.87		233.32	4.65
14	Kudgi I,II & III	742.20	25.22	716.98	115.01	259.43		374.44	5.05
15	Bhavini	237.31	7.57	229.75		96.97		96.97	4.09
	Total	11672.88	430.94	11241.94	891.99	3125.75	15.08	4032.82	3.45

Note : The cost of power purchase as detailed above is exclusive of water cess, duties and other state levies etc, which will be claimed at the time of truing up process.

The transmission charges to be paid for ISTS for 2019-20 are estimated at the same rate taken as for FY-19. The transmission charges for the year 2019-20 are given below.

Table 4.44 : Transmission charges payable to PGCIL (2019-20)					
Source	Allocated capacity (MW)	PoC charges (Rs/MW)	Reliability charges (Rs/MW)	HVDC charges (Rs/MW)	Total Trans charges (Rs Cr)
RSPTS Stage I & II	245.1	176395	28506	18355	65.66
RSTPS Stage III	61.0	176395	28506	18355	16.34
TALCHER - Stage II	427.0	176395	28506	18355	114.40
Simhadri Exp	82.9	176395	28506	18355	22.21
NLC-II- Stage-1	63.0	176395	28506	18355	16.88
NLC-II- Stage-2	90.0	176395	28506	18355	24.10
NLC- Exp- Stage-1	66.9	176395	28506	18355	17.92
NLC - II Exp	79.7	176395	28506	18355	21.34
MAPS	23.0	176395	28506	18355	6.17
KAIGA Stg I	38.0	176395	28506	18355	10.18
KAIGA Stg II	35.0	176395	28506	18355	9.38
Kudamkulam Unit I	139.1	176395	28506	18355	37.27
Kudamkulam unit II	133.0	176395	28506	18355	35.63
Vallur JV with	50.0	176395	28506	18355	13.38
NTPL(Tuticorin JV)	72.5	176395	28506	18355	19.42
Kudgi Unit I	35.9	176395	28506	18355	9.62
Kudgi Unit II	35.9	176395	28506	18355	9.62
Kudgi Unit III	35.9	176395	28506	18355	9.62
Bhavini	43.0	176395	28506	18355	9.60
Total					468.75

Power procurement from renewable energy sources

The non solar and solar renewable obligation purchase target for 2019 -20 is 1285.11 MU and 642.55 MU respectively. A summary of annual energy availability from existing renewable sources and the corresponding cost of power purchase for FY-20 is as follows.

Table 4.45 : Renewable Power Purchase from existing IPPs					
No	Small Hydel	Capacity (MW)	Annual Energy availability(MU)	Per unit cost (Rs/unit)	Total cost (Rs.Cr.)
1	Ullumkal	7	17.79	2.44	4.34
2	Iruttukanam I & II	3+1.5	24.69	2.7	6.67
3	Karikkayam	10.5	37.56	4.16	15.62
4	Meenvallom	3	8.44	4.88	4.12
5	Pathamkayam	8	11.09	5.47	6.06
6	Pambumkayam	0.11	0.09	4.88	0.04
7	Kallar	0.05	0.08	5.47	0.04
	SHP Total	33.16	99.74	3.70	36.9
1	Agali	13.8	29.72	3.14	9.33
2	Koundikkal	4.8	12.56	3.14	3.94
3	Ramakalmedu	14.25	27.87	3.14	8.75
4	Ahalya	8.4	20.98	5.23	10.97
5	INOX	16	16.33	4.09	6.68
	Wind Total	57.25	107.47	3.69	39.67
1	Kasargod solar Park	50	70.08	3.69	25.86
2	Anert,Kuzhalmannam	2	2.8	3.14	0.88
	Sub Total	52	72.88	3.67	26.74
	Grand Total	142.41	280.09	3.69	103.31

Note: Formal PPA has not been signed with ANERT. The Agency has agreed the rate of average pooled Power purchase cost approved for FY 2016-17 and hence the same is taken for cost calculation.

In addition to the existing sources, own hydro generation of 60.25 MU will be added during FY 20 which is detailed in the Chapter 2. KSEBL is planning to meet the RPO obligation fully during 2019-20. KSEBL is taking efforts for entering contracts with generators/traders for procuring the remaining solar power as well as non solar power to meet the obligation. NTPC has offered wind power @ Rs 2.90 per unit and solar power ground mounted and floating @ Rs 3 and 3.5 respectively. NHPC has offered floating solar power @ Rs 3.75 per unit. In addition to this KSEBL is planning to procure renewable power through reverse bid process at an upper ceiling rate of Rs 3.5 per unit. SECI has offered solar power from outside the State @ Rs 3 per unit and solar power (floating) from inside Kerala @ Rs 4 per unit. Hence KSEBL is planning to procure wind power at an expected rate of Rs 2.90 per unit and solar power at an expected rate of Rs 4.00 per unit for meeting the additional RPO requirement. The details of generation/power purchase

from renewable sources for the financial year is enclosed as **Annexure 4.2**. The total power purchase from renewable sources expected is given in table below.

Table 4.46 : Power Purchase from IPPs for FY-20			
Source	Annual energy	Unit Cost	Total amount
	MU	Rs/unit	Rs Cr.
SHP Total(Existing)	99.74	3.70	36.90
Wind Total(Existing)	107.47	3.69	39.67
Solar Total(Existing)	72.88	3.67	26.74
Additional wind power (procurement)	449.99	2.90	130.50
Additional solar power (procurement)	488.80	3.25	158.86
Sub Total	1218.88		392.68

Power Purchase through Long Term contracts

The energy availability at target PLF from power contracted with generators through long term contracts for the financial year 2019-20 is given in the table below:

Table 4.47 : Energy from Long Term Contracts (2019-20)						
No	Trader/Source	contracted capacity (MW)	Auxillary consumption %	PLF (%)	Ex-bus Energy (MU)	Energy at periphery (MU)
1	Maithon power limited	150	6.5	90%	1,105.73	1,070.92
2	Maithon power limited	150	6.5	90%	1,105.73	1,070.92
3	DVC-Mejia TPS	100	5.25	85%	705.50	683.99
4	DVC-Reghunathpur TPS	50	6.5	85%	348.10	337.49
5	Jindal Power Limited	200	5	90%	1,497.96	1,431.81
6	Jindal Power Limited	150	5	90%	1,123.47	1,073.86
7	Jindal India Thermal	100	5	90%	748.98	721.90
8	Jhabua Power Limited	115	5	90%	861.33	822.57
9	Jhabua Power Limited	100	5	90%	748.98	715.28
10	BALCO	100	5	90%	748.98	718.32
	TOTAL	1215			8,994.76	8,647.06

The details of power procurement through long term contracts and the cost of power purchase are given in table below.

Table 4.48 : Power Purchase by Long Term contracts (2019-20)										
No	Trader/Source	Ex-bus Energy	Energy at Kerala periphery	Fixed Charges		Variable Charges per unit	Total Fixed Charges	Total variable charges	Other Charges	Total
		MU	MU	Rs Cr	Rs/unit	Rs/unit	Rs.Cr.	Rs.Cr.	Rs.Cr.	Rs.Cr.
1	Maithon power	1,105.73	1,070.92	151.99		1.90	151.99	210.09		362.08
2	Maithon power	1,105.73	1,070.92	151.99		1.90	151.99	210.09		362.08
3	DVC-Mejia TPS	705.50	683.99	99.88		2.21	99.88	155.85		255.74
4	DVC-R'pur	348.10	337.49	56.98		2.36	56.98	82.26		139.25

5	Jindal Power-Bid I	1,497.96	1,431.81		2.56	1.15	383.48	171.85	-21.87	533.45
6	Jindal Power-B-II	1,123.47	1,073.86		3.28	1.19	368.50	134.18	-24.87	477.81
7	Jindal Thermal	748.98	721.90		3.38	1.03	253.16	77.06	-13.69	316.53
8	Jhabua Power-BI	861.33	822.57		2.06	1.80	177.43	154.99	-9.09	323.34
9	Jhabua Power-BII	748.98	715.28		2.84	1.73	212.71	129.70	-11.47	330.94
10	BALCO	748.98	718.32		3.10	1.09	232.18	81.27	-11.28	302.18
	TOTAL	8,994.76	8,647.06	460.86	17.22	16.36	2,088.31	1,407.36	-92.27	3,403.40

In the case of power purchase through DBFOO contracts the transmission charges and losses at the time of bidding is encapsulated in the bid rate. The difference between transmission charges and transmission losses has to be remitted, which is shown in the column other charges. Monthly Schedule for IPPs for the year 2019-20 is enclosed as **Annexure 4.5**.

Transmission charges for power procurement through long term contracts

The transmission charges of long term contracts except the power contracted through DBFOO basis is given in table below. The transmission charges to be paid for ISTS for 2019-20 are estimated at the same rate taken for FY-19.

Table 4.49 : Transmission charges for Long term contracts					
Trader/Source	Contracted capacity (MW)	PoC charges (Rs/MW)	Reliability charges (Rs / MW)	HVDC Charges (Rs / MW)	Total Transmission charges (Rs Cr)
Maithon power	150	176395	28506	18355	40.19
Maithon power	150	176395	28506	18355	40.19
DVC-Mejia TPS	100	176395	28506	18355	26.79
DVC-Reghunathpur	50	176395	28506	18355	13.40
Total					120.56

Energy procurement from liquid fuel stations (RGCCPP)

As mentioned earlier, energy from liquid station, RGCCPP will not be used for FY 2019-20 also, except for emergency situations. However, the fixed charge commitment of Rs. 200 Cr has to be paid to the generator.

Transmission charges for the year 2019-20

The transmission charges for the year 2018-19 are given in table below.

Table 4.50 : Transmission charges for 2018-19	
Source	Amount Rs Cr
Central Generating Stations	468.75
Long Term Contracts	120.56

RGCCPP	8.16
Total	597.47

Summary of the energy availability from Hydel, CGS, small IPPs, traders/generators

The summary of the month-wise energy availability and demand from Hydel, CGS, traders/generators for financial year 2019-20 is detailed below.

Table 4.51 : Summary of total energy availability for FY-20										
Month	Demand (MU)	Generation (MU)			Aux cons of thermal and wind	Power Purchase (MU)			Total availability (MU)	Difference (MU)
		Hydro	Wind	Solar		IPPs	CGS	LTA		
Apr-18	2363	772.56	0.09	2.79	-0.10	60.72	975.25	734.95	2546.26	183.26
May-18	2330	767.53	0.12	2.79	-0.10	52.40	989.35	759.45	2571.53	241.53
Jun-18	2018	535.27	0.13	2.86	-0.10	87.88	912.75	734.95	2273.74	255.74
Jul-18	2105	518.14	0.17	3.21	-0.10	88.08	889.85	759.45	2258.80	153.80
Aug-18	2151	648.79	0.49	3.21	-0.10	84.26	952.55	596.50	2285.69	134.69
Sep-18	2103	579.05	0.31	3.97	-0.10	71.02	915.35	734.95	2304.55	201.55
Oct-18	2176	641.54	0.31	3.97	-0.10	132.91	963.26	660.06	2401.94	225.94
Nov-18	2144	464.44	0.06	3.97	-0.10	108.45	896.74	704.60	2178.15	34.63
Dec-18	2170	407.65	0.11	3.97	-0.10	114.72	922.65	759.45	2208.45	38.45
Jan-19	2196	457.80	0.10	3.97	-0.10	106.86	914.11	759.45	2242.19	46.19
Feb-19	2142	514.22	0.14	3.97	-0.10	108.51	856.91	683.79	2167.44	25.44
Mar-19	2490	618.76	0.07	3.97	-0.10	116.00	1053.18	759.45	2551.32	61.32
Total	26388	6925.75	2.08	42.61	-1.22	1131.82	11241.94	8647.06	27990.05	1602.53

The summary of the month wise peak demand and power availability for FY 2019-20 is given below.

Table 4.52 : Summary of the total demand and availability for FY-20 (MW)								
Month	Peak Demand	Hydro	IPPs	CGS	LTA	Outages	Total	Surplus(+)/ Deficit(-)
Apr2019	4170	1672	8	1554	1076	131	4178	8
May 2019	4173	1672	8	1534	1076	130	4159	-14
Jun 2019	3683	1561	17	1445	1076	126	3973	289
Jul 2019	3606	1362	36	1400	1076	124	3750	144
Aug 2019	3613	1362	34	1461	841	115	3582	-31
Sep 2019	3788	1362	31	1441	1076	126	3784	-4
Oct 2019	3784	1362	21	1481	936	121	3679	-105
Nov 2019	3898	1431	18	1452	1029	124	3806	-92
Dec 2019	3779	1401	17	1371	1076	122	3743	-36
Jan 2020	3817	1616	8	1463	1076	127	4036	219
Feb 2020	4002	1635	9	1593	1076	133	4179	178
Mar 2020	4141	1733	8	1627	1076	135	4308	167

As said earlier, KSEBL expected a spurt in demand compared to the estimation under normal conditions due to coming elections. Anticipating peak demand of 4400MW during April and May 2019 , KSEBL planned to purchase 150 MW of power during peak from October 2018 to May 2019 . As mentioned earlier, the matter has been brought before the Hon Commission seeking in principle approval. Considering the peak deficit during October to December, 150 MW peak power is to be procured during October to December for meeting the peak deficit during that period. Now, anticipating an average power purchase cost of Rs 5 per unit the total power purchase cost through short term market for the financial year amounts to Rs 45.90 Cr for 91.80 MU.

Surplus Energy Sale

Based on the availability and demand there is a surplus availability of 1925.58 MU for the FY-20. Anticipating energy sales to outside State @ Rs 5 per unit, KSEBL expected additional revenue of Rs 962.74 Cr.

Summary of cost of generation and power purchase for the year 2019-20

Table 4.53 : Summary of Cost of power procurement (2019-20)						
Source	Quantum at ex-bus	Quantum at Kerala periphery	Fixed Cost	Variable Cost	Other charges/ Incentive	Power Purchase Cost
	MU	MU	Rs Cr	Rs Cr	Rs Cr	Rs Cr
Central Gen Stations	11672.88	11241.94	891.99	3125.75	15.08	4032.82
IPPs within State						
Small Hydel	99.74	99.74		36.90		36.90
Wind	557.46	557.46		170.18		170.18
Solar	561.69	561.69		185.60		185.60
Sub Total	1218.88	1218.88		392.68		392.68
Long Term Contracts						
Maithon power	1,105.73	1,070.92	151.99	210.09		362.08
Maithon power	1,105.73	1,070.92	151.99	210.09		362.08
DVC-Mejia TPS	705.50	683.99	99.88	155.85		255.74
DVC-Reghunathpur TPS	348.10	337.49	56.98	82.26		139.25
Jindal Power -Bid I	1,497.96	1,431.81	383.48	171.85	-21.87	533.45
Jindal Power -Bid II	1,123.47	1,073.86	368.50	134.18	-24.87	477.81
Jindal India Thermal	748.98	721.90	253.16	77.06	-13.69	316.53
Jhabua Power -Bid I	861.33	822.57	177.43	154.99	-9.09	323.34
Jhabua Power -Bid II	748.98	715.28	212.71	129.70	-11.47	330.94
BALCO	748.98	718.32	232.18	81.27	-11.28	302.18
Sub Total	8,994.76	8,647.06	2,088.31	1,407.36	-92.27	3,403.40
RGCCPP			200			200
Short term market etc	94.78	91.80		45.90		45.90

Transmission charges payable to PGCIL						
CGS				468.75		468.75
Long Term Contracts				120.56		120.56
RGCCPP				8.16		8.16
Sub Total Trans Charges				597.47		597.47
Total Power Purchase	21981.30	21199.68	3,180.31	5569.16	-77.19	8672.27

Power Purchase for FY-2020-21

The following assumptions / facts are taken for forecasting the availability and cost for FY 2020-21. :

- *The calculation of the fixed cost of central generating stations, DVC and Maithon power is arrived by giving a 2 % reduction in annual fixed charges applicable for 2019-20 and variable charge is arrived by escalating the variable charge of FY 19-20 by 2 %.*
- *In the case of DBFOO, the fixed charges is arrived taking into consideration of inflation and variable charge is arrived by escalating the variable charge of FY 19-20 by 2 %.*
- *Transmission losses & Transmission charges for FY-20 are taken at the same rate as that of previous year.*

Central Generating Stations

The total capacity expected to be available for FY 2020-21 is the same 1756.85 MW for FY 2019-20 **(Table 4.57)**, as no additional central allocation is anticipated during this period.

Energy availability from CGS for the year 2020-21

Since there is no additional allocation of power in this year, the energy availability at the ex-bus generation would be same as that of previous year, 11706.78 MU. However, the energy delivered at Kerala periphery will be 11274.76 MU. This is shown in the Table below: The month wise schedule of Central Generating Stations is attached as **Annexure 4.6**.

Table 4.54: Energy procurement from CGS for FY2020 - 21

No	Station	Capacity (MW)	Allocation (%)	Allocated Capacity (MW)	Aux Consumption (%)	Target PLF (%)	Expected PLF (%)	Exbus Energy (MU)	PGCIL losses (MU)	Energy at periphery (MU)
1	RSPTS Stg I & II	2100	11.67	245.07	6.68%	85%	90%	1808.01	63.24	1744.76
2	RSTPS Stage III	500	12.20	61	5.75%	85%	90%	453.27	15.85	437.42
3	TALCHER - Stg II	2000	21.35	427	5.75%	85%	90%	3172.90	128.99	3043.91
4	Simhadri Exp	1000	8.29	82.9	5.25%	85%	85%	584.87	18.41	566.46
5	NLC-II- Stage-1	630	10.00	63	10.00%	80%	80%	397.35	13.50	383.85
6	NLC-II- Stage-2	840	10.71	89.96	10.00%	80%	80%	567.42	19.28	548.14
7	NLC- Exp- Stge-1	420	15.93	66.91	8.50%	80%	80%	429.02	14.58	414.44
8	NLC - II Exp	500	15.93	79.65	10.00%	75%	45%	282.78	9.61	282.78
9	MAPS	440	5.23	23.01	10.50%		68.5%	123.59	3.94	119.65
10	KAIGA Stg I & II	880	8.30	73.04	10.50%		80%	486.76	17.72	469.05
11	Kudamkulam I&II	2000	13.61	272.2	7.80%		70%	1538.37	62.11	1476.26
12	NTECL,Vallur	1500	3.33	49.95	5.75%	85%	85%	347.05	10.06	336.99
13	NTPL(Tuticorin)	1000	7.25	72.5	7.01%	85%	85%	501.99	20.86	481.13
14	Kudgi Unit I II & III	2400	4.49	107.76	7.50%	85%	85%	742.20	25.22	716.98
15	Bhavini	500	8.60	43	10.00%		70%	271.21	8.65	262.56
	Total	16710		1756.952				11706.78	432.01	11274.76

Cost of power from Central Generating stations

Similar to the methodology adopted for FY 2019-20, the fixed charges for present year are computed by taking a 2 % reduction. The variable charges for 2020-21 are estimated by giving an escalation of 2 % on variable charge of FY-20. Accordingly the cost from CGS are calculated and provided in the Table below:

Table 4.55 : Cost of Power Purchase at Gen Ex-bus (2020-21)

No	Name of CGS	Energy schedule at gen. bus (MU)	External loss (MU)	Net Energy input (MU)	Fixed Cost (Rs Cr)	Variable cost (Rs Cr)	Incentives (Rs Cr)	Total cost (Rs Cr)	Avg. Rate at ex-Bus (Rs / Unit)
1	RSPTS I & II	1808.01	63.24	1744.76	118.94	435.29	5.01	559.24	3.09
2	RSTPS Stage III	453.27	15.85	437.42	31.69	106.90	1.26	139.85	3.09
3	TALCHER - Stg II	3172.90	128.99	3043.91	206.53	504.78	8.81	720.12	2.27
4	Simhadri Exp	584.87	18.41	566.46	85.48	169.65		255.13	4.36
5	NLC-II- Stage-1	397.35	13.50	383.85	28.72	119.90		148.62	3.74
6	NLC-II- Stage-2	567.42	19.28	548.14	42.50	171.81		214.31	3.78
7	NLC- Exp- Stage-1	429.02	14.58	414.44	42.25	119.47		161.72	3.77
8	NLC - II Exp	282.78	9.61	274.01	70.34	78.78		149.12	5.27
9	MAPS	123.59	3.94	119.65	0.00	35.19		35.19	2.85
10	KAIGA Stg I & II	486.76	17.72	469.05	0.00	180.44		180.44	3.71
11	K'kulam I & II	1538.37	62.11	1476.26	0.00	641.19		641.19	4.17

12	Vallur JV	347.05	10.06	336.99	59.09	102.34		161.43	4.65
13	NTPL(Tuticorin)	501.99	20.86	481.13	75.91	158.99		234.89	4.68
14	Kudgi I,II & III	742.20	25.22	716.98	112.71	264.62		377.33	5.08
15	Bhavini	271.21	8.65	262.56	0.00	113.04		113.04	4.17
	Total	11706.78	432.01	11274.76	874.15	3202.39	15.08	4091.62	3.50

Transmission charges payable for ISTS

The transmission charges to be paid for ISTS for 2020-21 are estimated at the same rate as that of previous year.

Table 4.56 : Transmission charges payable to PGCIL (2020-21)					
Source	Allocated capacity	PoC Charges	Reliability support charges	HVDC Charges	Total Transmission charges
	MW	Rs/MW	Rs/MW	Rs/MW	Rs Cr.
RSPTS Stage I & II	245.07	176395	28506	18355	65.66
RSTPS Stage III	61	176395	28506	18355	16.34
TALCHER - Stage II	427	176395	28506	18355	114.40
Simhadri Exp	82.9	176395	28506	18355	22.21
NLC-II- Stage-1	63	176395	28506	18355	16.88
NLC-II- Stage-2	89.964	176395	28506	18355	24.10
NLC- Exp- Stage-1	66.906	176395	28506	18355	17.92
NLC - II Exp	79.65	176395	28506	18355	21.34
MAPS	23.012	176395	28506	18355	6.17
KAIGA Stg I& II	38.016	176395	28506	18355	10.18
KAIGA Stg II	35.024	176395	28506	18355	9.38
Kudamkulam Unit I	139.1	176395	28506	18355	37.27
Kudamkulam unit II	133	176395	28506	18355	35.63
Vallur JV with	49.95	176395	28506	18355	13.38
NTPL(Tuticorin JV)	72.5	176395	28506	18355	19.42
Kudgi Unit I	35.92	176395	28506	18355	9.62
Kudgi Unit II	35.92	176395	28506	18355	9.62
Kudgi Unit III	35.92	176395	28506	18355	9.62
Bhavini	43	176395	28506	18355	11.52
Total					470.66

Power procurement from renewable energy sources

The non solar and solar renewable obligation purchase target for 2020-21 is 1579.98 MU and 921.66 MU respectively. A summary of annual energy availability from

existing renewable sources and the corresponding cost of power purchase for FY-21 is as follows.

Table 4.57 : Renewable Power Purchase from existing IPPs					
No	Small Hydel	Capacity (MW)	Annual Energy availability(MU)	Per unit cost (Rs/unit)	Total cost (Rs Cr)
1	Ullumkal	7	17.79	2.44	4.34
2	Iruttukanam I & II	3+1.5	24.69	2.7	6.67
3	Karikkayam	10.5	37.56	4.16	15.62
4	Meenvallom	3	8.44	4.88	4.12
5	Pathamkayam	8	11.09	5.47	6.06
6	Pambumkayam	0.11	0.09	4.88	0.04
7	Kallar	0.05	0.08	5.47	0.04
	SHP Total	33.16	99.74	3.70	36.9
1	Agali	13.8	29.72	3.14	9.33
2	Koundikkal	4.8	12.56	3.14	3.94
3	Ramakalmedu	14.25	27.87	3.14	8.75
4	Ahalya	8.4	20.98	5.23	10.97
5	INOX	16	16.33	4.09	6.68
	Wind Total	57.25	107.47	3.69	39.67
1	Kasargod solar Park	50	70.08	3.69	25.86
2	Anert,Kuzhalmannam	2	2.8	3.14	0.88
	Sub Total	52	72.88	3.67	26.74
	Grand Total	142.41	280.09	3.69	103.31

Note: Formal PPA has not been signed with ANERT. The Agency has agreed the rate of average pooled Power purchase cost approved for FY 2016-17 and hence the same is taken for cost calculation.

In addition to the existing sources, own hydro generation of 159.43 MU will be added during FY 21 in addition to the 660 MU at present. The details are given in the Chapter 2 of the petition. KSEBL is taking earnest efforts for entering contracts with generators/traders for procuring the remaining solar power as well as non solar power to meet the RPO obligation fully. NTPC has offered wind power @ Rs 2.9 per unit and solar power ground mounted and floating @ Rs 3 and 4 respectively. NHPC has offered floating solar power @ Rs 3.75 per unit. In addition to this KSEBL is planning to procure power through reverse bid process with an upper ceiling rate of Rs 3.5 per unit. SECI has offered solar power from outside the State @ Rs 3 per unit and solar power (floating) from inside Kerala @ Rs 4 per unit. Hence KSEBL is planning to procure additional wind power needed at an expected rate of Rs 2.90 per unit and additional solar power at an expected rate of Rs 3.25 per unit for meeting the additional RPO requirement. The details of generation/power purchase from renewable sources for the financial year is enclosed as **Annexure 4.2**. The total power purchase from renewable Sources expected is given in table below.

Table 4.58 : Power Purchase from IPPs for FY-21			
Source	Annual energy availability	Unit Cost	Total amount
	MU	Rs/unit	Rs Cr.
SHP Total(Existing)	99.74	3.70	36.90
Wind Total(Existing)	107.47	3.69	39.67
Solar Total(Existing)	72.88	3.67	26.74
Additional wind power procurement	645.63	2.90	187.23
Additional solar power procurement			
NTPC Solar Float	13.31	4	4.66
NTPC Solar ground mount	9.07	3.00	2.72
Other purchases expected for meeting RPO through Saura, bidding etc	740.54	3.25	240.67
Total	1688.64	3.19	539.28

Power Purchase through Long Term contracts

The energy availability at target PLF from power contracted with generators through long term contracts for the financial year 2020-21 is as follows. The Monthly Schedule for the year 2020-21 is enclosed as **Annexure 4.7**.

Table 4.59 : Energy availability through long term contracts (2020-21)						
No	Trader/Source	Capacity (MW)	Auxiliary consumption (%)	PLF (%)	Ex-bus Energy (MU)	Energy at periphery (MU)*
1	Maithon power limited	150	6.5	90%	1,105.73	1,070.92
2	Maithon power limited	150	6.5	90%	1,105.73	1,070.92
3	DVC-Mejia TPS	100	5.25	85%	705.50	683.99
4	DVC-Reghunathpur TPS	50	6.5	85%	348.10	337.49
5	Jindal Power Limited	200	5	90%	1,497.96	1,431.81
6	Jindal Power Limited	150	5	90%	1,123.47	1,073.86
7	Jindal India Thermal Ltd	100	5	90%	748.98	721.90
8	Jhabua Power Limited	115	5	90%	861.33	822.57
9	Jhabua Power Limited	100	5	90%	748.98	715.28
10	BALCO	100	5	90%	748.98	718.32
	TOTAL	1215			8,994.76	8,647.06

The fixed charges are arrived taking into consideration of inflation and variable charge taken is estimated by escalating the variable charge for 2019-20 by 2 %. The details of power procurement through long term contracts and the cost of power purchase is given in table below.

Table 4.60 : Power Purchase through Long Term contracts for the year 2020-21

No	Trader/Source	Energy at exbus	Energy at Kerala periphery	Fixed Charges		Variable Charges per unit	Total FC	Total VC	Other Charges	Total
		MU	MU	Rs Cr	Rs/unit	Rs/unit	Rs Cr	Rs Cr	Rs Cr	Rs Cr
1	Maithon power	1,105.73	1,070.92	148.95		1.90	148.95	214.29		363.25
2	Maithon power	1,105.73	1,070.92	148.95		1.90	148.95	214.29		363.25
3	DVC-Mejia	705.50	683.99	97.88		2.21	97.88	158.97		256.86
4	DVC-R'pur	348.10	337.49	55.85		2.36	55.85	83.91		139.75
5	Jindal Power -BI	1,497.96	1,431.81		2.51	1.15	375.99	175.28	-21.73	529.54
6	Jindal Power -BII	1,123.47	1,073.86		3.21	1.19	360.63	136.87	-24.64	472.86
7	Jindal Thermal	748.98	721.90		3.31	1.03	247.91	78.60	-13.55	312.96
8	Jhabua -Bid I	861.33	822.57		2.02	1.80	173.99	158.09	-9.08	323.00
9	Jhabua - Bid II	748.98	715.28		2.78	1.73	208.22	132.29	-11.40	329.11
10	BALCO	748.98	718.32		3.04	1.09	227.69	82.90	-11.16	299.43
	TOTAL	8,994.76	8,647.06	451.64		17.18	2,046.07	1435.50	-91.55	3390.02

In the case of power purchase through DBFOO contracts the transmission charges and losses at the time of bidding is encapsulated in the bid rate. The difference between transmission charges and transmission losses has to be remitted, which is shown in the column other charges.

Transmission charges for power procurement through long term contracts

The transmission charges of long term contracts except the power contracted through DBFOO basis is given in table below. The transmission charges to be paid for ISTS for 2020-21 are estimated at the same rate taken for FY-19.

Table 4.61 : Power Purchase through Long Term contracts (2020-21)					
Trader/Source	Capacity (MW)	PoC Charges (Rs/MW)	Reliability Charges (Rs/ MW)	HVDC Charges (Rs/MW)	Total Transmission charges (Rs Cr)
Maithon power	150	176395	28506	18355	40.19
Maithon power	150	176395	28506	18355	40.19
DVC-Mejia TPS	100	176395	28506	18355	26.79
DVC-Reghunathpur	50	176395	28506	18355	13.40
Total					120.56

The transmission charges to be paid for ISTS for 2020-21 are at the same rate taken for FY-2018-19.

Energy procurement from liquid fuel stations (RGCCPP)

No energy from liquid station RGCCPP will be scheduled for FY 2020-21 except in

emergency situations. However, the fixed charge commitment of Rs. 200 Cr has to be paid.

Summary of the total energy availability

The summary of the month-wise energy availability and demand from Hydel, CGS, traders/ generators for the financial year 2020-21 is given below.

Table 4.62 : Summary of energy availability (2020-21)										
Month	Demand	Generation			Power Purchase			Aux cons	Total	Deficit(-)/ surplus(+)
		Hydro	Wind	Solar	S.IPPs	CGS	LTA			
	MU	MU	MU	MU	MU	MU	MU		MU	MU
Apr	2478.94	597.52	0.09	3.97	136.12	989.00	734.95	0.10	2461.54	-17.40
May	2365.85	548.57	0.12	3.97	134.76	989.35	759.45	0.10	2436.11	70.26
Jun	2099.83	447.37	0.13	3.97	142.19	913.83	734.95	0.10	2242.34	142.50
July	2151.91	468.23	0.17	3.97	145.98	890.97	759.45	0.10	2268.67	116.76
Aug	2301.82	613.27	0.49	3.97	149.28	953.66	695.89	0.10	2416.46	114.64
Sept	2171.00	607.54	0.31	3.97	148.35	905.57	734.95	0.10	2400.59	229.59
Oct	2237.75	568.38	0.31	3.97	147.57	953.35	660.06	0.10	2333.53	95.78
Nov	2214.85	480.11	0.06	3.97	137.69	897.82	704.60	0.10	2224.14	9.30
Dec	2223.21	423.79	0.11	3.97	138.10	911.11	759.45	0.10	2236.43	13.21
Jan	2255.09	560.64	0.10	3.97	134.80	938.90	660.06	0.10	2298.37	43.28
Feb	2174.70	527.16	0.14	3.97	133.67	876.90	683.79	0.10	2225.52	50.82
Ma	2572.58	654.00	0.07	3.97	140.13	1054.29	759.45	0.10	2611.81	39.23
Total	27247.53	6496.58	2.08	47.60	1688.65	11274.75	8647.06	1.22	28155.50	907.97
*of thermal & wind stations										

The summary of the month wise peak demand requirement and availability of power for FY 2020-21 is estimated below.

Table 4.63 : Summary of the total energy availability (2020-21)								
Month	Peak Demand	Hydro	S.IPPs	CGS	LTA	Outages	Total	Deficit(-)/ Surplus(+)
	MW	MW	MW	MW	MW	MW	MW	MW
April	4284.3	1672.0	8.0	1553.7	1076.1	219.4	4168.6	-115.7
May	4341.5	1672.0	8.0	1533.8	1076.1	215.5	4093.6	-256.5
June	3825.2	1561.0	17.0	1444.9	1076.1	199.7	3794.3	-30.9
July	3713.5	1362.0	36.0	1399.9	1076.1	197.7	3755.4	41.8
August	3728.7	1362.0	34.0	1460.6	981.3	186.8	3549.2	-179.5
September	3903.4	1362.0	31.0	1441.4	1076.1	205.5	3904.5	1.1
October	3887.3	1362.0	21.0	1480.6	935.8	194.8	3700.3	-187.0
November	4004.0	1431.0	18.0	1452.2	1029.3	195.6	3715.5	-288.6
December	3857.5	1401.0	17.0	1371.4	1076.1	193.1	3668.0	-189.6
January	3905.6	1616.0	8.0	1463.4	935.8	207.3	3938.7	33.1
February	4099.0	1635.0	9.0	1593.3	1076.1	215.0	4085.0	-14.0
March	4244.8	1733.0	8.0	1627.0	1076.1	223.2	4239.9	-11.1

Thus, there would be a peak demand deficit for FY-21. KSEBL is planning to procure 150 MW peak power for 2020-21 for deficit months through short term market or through day ahead markets for meeting the deficit. Anticipating an average power purchase cost of Rs 5 per unit the total power purchase cost through short term market of financial year amounts to Rs 64.20 Cr for 128.40 MU.

Surplus Energy Sale

The demand and availability forecast show a surplus availability of 1036.37 MU for the FY-21. Anticipating energy sales to outside State @ Rs 5 per unit, KSEBL expected additional revenue of Rs 518.17 Cr.

Summary of cost of generation and power purchase for the year 2020-21

The summary of generation and power purchase is given in table below

Table 4.64 : Summary of Cost of Power Purchase (2020-21)						
Source	Ex-bus Energy (MU)	Energy at Kerala periphery (MU)	Fixed Cost (Rs Cr)	Variable Cost (Rs Cr)	Other charges/ Incentives (Rs Cr)	PP Cost (Rs Cr)
Central Gen Stations	11706.78	11274.76	874.15	3202.39	15.08	4091.62
IPPs (RE)						
Small Hydel	99.74	99.74		36.9		36.9
Wind	753.10	753.10		226.92		226.92
Solar	835.80	835.80		275.46		275.46
Sub Total	1688.64	1688.64		539.28		539.28
Long Term contracts						
Maithon power Ltd	1,105.73	1,070.92	148.95	214.29		363.25
Maithon powerLtd	1,105.73	1,070.92	148.95	214.29		363.25
DVC-Mejia TPS	705.50	683.99	97.88	158.97		256.86
DVC-R'pur TPS	348.10	337.49	55.85	83.91		139.75
Jindal Power Bid I	1,497.96	1,431.81	375.99	175.28	-21.73	529.54
Jindal Power -Bid II	1,123.47	1,073.86	360.63	136.87	-24.64	472.86
Jindal Thermal	748.98	721.90	247.91	78.60	-13.55	312.96
Jhabua Power Bid I	861.33	822.57	173.99	158.09	-9.08	323.00
Jhabua Power -Bid II	748.98	715.28	208.22	132.29	-11.40	329.11
BALCO	748.98	718.32	227.69	82.90	-11.16	299.43
Sub Total	8,994.76	8,647.06	2,046.07	1435.50	-91.55	3390.02
RGCCPP			200			200
Short term market etc	132.56	128.40		64.20		64.20
Transm charges						
CGS				470.67		470.67
Long Term Contracts				120.56		120.56
RGCCPP				8.16		8.16
Sub Total (Tr Charges)				599.39		599.39
Total Power Purchase	22522.75	21738.85	3,120.22	5840.76	-76.47	8884.50

Power Purchase for FY-2021 - 22

The same basic assumptions taken for previous year is also considered for this year.

Central Generating Stations

The total capacity expected for 2021-22 is 1756.85 MW, the same as that of previous two years, and given in **Table 4.16** for FY 2019-20. There is no additional CGS allocations are expected in this year.

Energy availability from CGS for the year 2021-22

The energy availability at the ex-bus generation is the same for previous year. The energy availability and the energy delivered at the State periphery is shown in the Table below:

No	Station	Capacity (MW)	Allocation (%)	Allocated Capacity (MW)	Aux Consumption (%)	Target PLF(%)	Expected PLF (%)	Exbus Energy (MU)	PGCIL losses (MU)	Energy at periphery (MU)
1	RSPTS Stg I & II	2100	11.67	245.07	6.68%	85%	90%	1808.01	63.24	1744.76
2	RSTPS Stage III	500	12.20	61	5.75%	85%	90%	453.27	15.85	437.42
3	TALCHER - Stg II	2000	21.35	427	5.75%	85%	90%	3172.90	128.99	3043.91
4	Simhadri Exp	1000	8.29	82.9	5.25%	85%	85%	584.87	18.41	566.46
5	NLC-II- Stage-1	630	10.00	63	10.00%	80%	80%	397.35	13.50	383.85
6	NLC-II- Stage-2	840	10.71	89.96	10.00%	80%	80%	567.42	19.28	548.14
7	NLC- Exp- Stge-1	420	15.93	66.91	8.50%	80%	80%	429.02	14.58	414.44
8	NLC - II Exp	500	15.93	79.65	10.00%	75%	45%	282.78	9.61	282.78
9	MAPS	440	5.23	23.01	10.50%		68.5%	123.59	3.94	119.65
10	KAIGA I & II	880	8.30	73.04	10.50%		80%	486.76	17.72	469.05
11	K'Kulam I&II	2000	13.61	272.2	7.80%		70%	1538.37	62.11	1476.26
12	NTECL, Vallur	1500	3.33	49.95	5.75%	85%	85%	347.05	10.06	336.99
13	NTPL(Tuticorin)	1000	7.25	72.5	7.01%	85%	85%	501.99	20.86	481.13
14	Kudgi I,II & III	2400	4.49	107.76	7.50%	85%	85%	742.20	25.22	716.98
15	Bhavini	500	8.60	43	10.00%		70%	271.21	8.65	262.56
	Total	16710		1756.952				11706.78	432.01	11274.76

The month - wise schedule of Central Generating Stations is attached as **Annexure 4.8**.

Cost of Central Generating stations

Similar to the previous years the fixed charges are computed by giving a 2 % reduction on annual fixed charges applicable for FY-20 and the variable charges are estimated by giving an escalation of 2% over the charges that from 2020-21. The tariff

approved by the Department of Atomic Energy (DAE) for KAIGA APS and MAPS has been adopted for estimating the cost of power from these stations. In addition to the fixed cost and variable energy charges the beneficiary State utilities are liable to pay incentive, income tax, water cess, foreign exchange rate variation etc.

Table 4.66 : Cost of power from CGS (FY 2021-22)									
No	Name of CGS	Energy scheduled Exbus (MU)	External loss (MU)	Net Energy input (MU)	Fixed Cost (Rs Cr)	Variable cost (Rs Cr)	Incentives (Rs Cr)	Total cost (Rs Cr)	Avg. Rate at exbus (Rs/unit)
1	RSPTS - I & II	1808.01	63.24	1744.76	116.56	444.00	5.01	565.57	3.13
2	RSTPS - III	453.27	15.85	437.42	31.06	109.04	1.26	141.36	3.12
3	TALCHER - II	3172.90	128.99	3043.91	202.40	514.88	8.81	726.08	2.29
4	Simhadri Exp	584.87	18.41	566.46	83.77	173.05		256.82	4.39
5	NLC-II- Stage-1	397.35	13.50	383.85	28.14	122.30		150.44	3.79
6	NLC-II- Stage-2	567.42	19.28	548.14	41.65	175.25		216.89	3.82
7	NLC- Exp- Stg-1	429.02	14.58	414.44	41.41	121.86		163.26	3.81
8	NLC - II Exp	282.78	9.61	273.17	69.38	80.36		149.74	5.30
9	MAPS	123.59	3.94	119.65		35.89		35.89	2.90
10	KAIGA Stg I & II	486.76	17.72	469.05		184.05		184.05	3.78
11	Kudamkulam I & II	1538.37	62.11	1476.26		654.01		654.01	4.25
12	Vallur JV with	347.05	10.06	336.99	57.91	104.39		162.30	4.68
13	NTPL(TuticorinJV)	501.99	20.86	481.13	74.39	162.17		236.55	4.71
14	Kudgi Unit I,II & III	742.20	25.22	716.98	118.88	269.92		388.80	5.24
15	Bhavini	271.21	8.65	262.56		115.30		115.30	4.25
	Total	11706.78	432.02	11274.76	865.55	3266.44	15.08	4147.07	3.54

The cost of power purchase as detailed above is exclusive of water-cess, duties and other state levies etc, which will be claimed at the time of truing up process.

Transmission charges payable for ISTS

The transmission charges to be paid for ISTS for 2021-22 are estimated by escalating transmission charges of FY 2020-21. The transmission charges for the year 2021-22 are given below.

Table 4.67 : Transmission charges payable to PGCIL (2021-22)					
Source	Allocated capacity (MW)	PoC charges (Rs/MW)	Reliability support charges (Rs/MW)	HVDC Charges (Rs/MW)	Total Transmission charges (Rs Cr)
RSPTS Stage I & II	245.07	176395	28506	18355	65.66
RSTPS Stage III	61	176395	28506	18355	16.34
TALCHER - Stage II	427	176395	28506	18355	114.40

Simhadri Exp	82.9	176395	28506	18355	22.21
NLC-II- Stage-1	63	176395	28506	18355	16.88
NLC-II- Stage-2	89.964	176395	28506	18355	24.10
NLC- Exp- Stage-1	66.906	176395	28506	18355	17.92
NLC - II Exp	79.65	176395	28506	18355	21.34
MAPS	23.012	176395	28506	18355	6.17
KAIGA Stg I& II	38.016	176395	28506	18355	10.18
KAIGA Stg II	35.024	176395	28506	18355	9.38
Kudamkulam I	139.1	176395	28506	18355	37.27
Kudamkulam II	133	176395	28506	18355	35.63
Vallur JV with	49.95	176395	28506	18355	13.38
NTPL(Tuticorin JV)	72.5	176395	28506	18355	19.42
Kudgi Unit I	35.92	176395	28506	18355	9.62
Kudgi Unit II	35.92	176395	28506	18355	9.62
Kudgi Unit III	35.92	176395	28506	18355	9.62
Bhavini	43	176395	28506	18355	11.52
Total					470.67

Power procurement from renewable energy sources

The non solar and solar renewable obligation purchase target for 2021-22 is 1915.71 MU and 1261.57 MU respectively. The Power purchase from various existing RE sources estimated for FY 2021-22 is the same as that of the previous year. A summary of annual energy availability from existing renewable sources and the corresponding cost of power purchase for FY-22 are as follows.

Table 4.68 : Renewable Power Purchase from existing IPPs					
No	Small Hydel	Capacity (MW)	Annual Energy availability(MU)	Per unit cost (Rs/unit)	Total cost (Rs.Cr.)
1	Ullumkal	7	17.79	2.44	4.34
2	Iruttukanam I & II	3+1.5	24.69	2.7	6.67
3	Karikkayam	10.5	37.56	4.16	15.62
4	Meenvallom	3	8.44	4.88	4.12
5	Pathamkayam	8	11.09	5.47	6.06
6	Pambumkayam	0.11	0.09	4.88	0.04
7	Kallar	0.05	0.08	5.47	0.04
	SHP Total	33.16	99.74	3.70	36.9
1	Agali	13.8	29.72	3.14	9.33
2	Koundikkal	4.8	12.56	3.14	3.94
3	Ramakkalmedu	14.25	27.87	3.14	8.75
4	Ahalya	8.4	20.98	5.23	10.97
5	INOX	16	16.33	4.09	6.68
	Wind Total	57.25	107.47	3.69	39.67
1	Kasargod solar Park	50	70.08	3.69	25.86
2	Anert,Kuzhalmannam	2	2.8	3.14	0.88
	Sub Total	52	72.88	3.67	26.74
	Grand Total	142.41	280.09	3.69	103.31

Note:- Formal PPA has not been signed with ANERT. The firm has agreed the rate of average pooled Power purchase cost approved for FY 2016-17 and hence the same is taken for cost calculation.

In addition to the existing sources, own hydro generation of 197.92 MU will be added during FY 21 in addition to the 660 MU at present. The details are given in the Chapter 2 of the petition. KSEBL is planning to meet the RPO obligation fully during 2021-22. KSEBL has been taking earnest efforts to make contracts with various generators/traders which were detailed earlier. The details of generation/power purchase from renewable sources for the financial year is enclosed as **Annexure 4.2**. The total power purchase from renewable Sources expected is given in table below.

Table 4.69 : Power Purchase from IPPs (2021-22)			
Source	Annual energy (MU)	Unit Cost (Rs/unit)	Total (Rs Cr)
SHP Total(Existing)	99.74	3.7	36.9
Wind Total(Existing)	107.47	3.69	39.67
Solar Total(Existing)	72.88	3.67	26.74
Additional wind power procurement	854.39	2.9	247.77
Additional solar power procurement			
NTPC Solar float	26.98	3.5	9.44
NTPC Solar ground mount	18.40	3	5.52
NTPC Solar ground mount	16.64	3	4.99
NHPC solar	60.48	3.75	22.68
Other RPO purchases (Saura, bidding etc)	922.05	3	276.62
Total	2179.04	3.08	670.34

Power Purchase through Long Term contracts

The energy availability at target PLF from power contracted with generators through long term contracts for the financial year 2021-22 is given in the table below:

Table 4.70: Energy availability through long term contracts for 2021-22						
No	Trader/Source	Capacity (MW)	Auxiliary consumption (%)	PLF (%)	Exbus Energy (MU)	Energy at periphery (MU)
1	Maithon power	150	6.5	90%	1,105.73	1,070.92
2	Maithon power	150	6.5	90%	1,105.73	1,070.92
3	DVC-Mejia TPS	100	5.25	85%	705.50	684.00
4	DVC-Reghunathpur	50	6.5	85%	348.10	337.49

5	Jindal Power	200	5	90%	1,497.96	1,431.81
6	Jindal Power	150	5	90%	1,123.47	1,073.86
7	Jindal India Thermal	100	5	90%	748.98	721.90
8	Jhabua Power	115	5	90%	861.33	822.57
9	Jhabua Power	100	5	90%	748.98	715.28
10	BALCO	100	5	90%	748.98	718.32
	TOTAL	1215			8,994.76	8,647.07

The details of power procurement through long term contracts and the cost of power purchase is given in table below.

Table 4.71 : Power Purchase through Long Term contracts for the year 2021-22										
No	Trader/Source	Exbus Energy (MU)	Energy at Kerala periphery (MU)	Fixed Charges		Variable Charges (Rs/ Unit)	Total FC (Rs Cr)	Total VC (Rs Cr)	Other Charges (Rs Cr)	Total
1	Maithon power	1,105.73	1,070.92	145.98		1.90	145.98	210.09		356.06
2	Maithon power	1,105.73	1,070.92	145.98		1.90	145.98	210.09		356.06
3	DVC-Mejia TPS	705.51	684.00	95.93		2.21	95.93	155.85		251.78
4	DVC-R'pur	348.1	337.49	54.73		2.36	54.73	82.26		136.99
5	Jindal - Bid I	1,497.96	1,431.81		2.5	1.15	374.49	171.85	-21.57	524.77
6	Jindal - Bid II	1,123.47	1,073.86		3.15	1.19	353.89	134.18	-24.21	463.86
7	Jindal Thermal	748.98	721.90		3.25	1.03	243.42	77.06	-13.33	307.15
8	Jhabua -Bid I	861.33	822.57		1.98	1.80	170.54	154.99	-8.86	316.68
9	Jhabua -Bid II	748.98	715.28		2.78	1.73	208.22	129.70	-11.29	326.62
10	BALCO	748.98	718.32		2.98	1.09	223.20	81.27	-10.90	293.57
	TOTAL	8,994.77	8,647.07	442.61			2,016.36	1407.36	-90.15	3333.56

In the case of power purchase through DBFOO contracts the transmission charges and losses at the time of bidding is encapsulated in the bid rate. The difference between transmission charges and transmission losses has to be remitted, which is shown in the column other charges. The Monthly schedule for the year is enclosed as Annexure 4.9.

Transmission charges for power procurement through long term contracts for FY-22

The transmission charges of the remaining long term contracts other than that contracted through DBFOO basis is given in table below.

Table 4.72 : Long Term Power Purchase (2021-22)					
Trader/Source	Capacity (MW)	PoC charges (Rs/MW)	Reliability charges (Rs/MW)	HVDC charges (Rs/MW)	Total Tr charges (Rs Cr)
Maithon power	150	176395	28506	18355	40.19
Maithon power	150	176395	28506	18355	40.19
DVC-Mejia TPS	100	176395	28506	18355	26.79
DVC-R'pur	50	176395	28506	18355	13.40
Total					120.56

The transmission charges to be paid for ISTS for 2021-22 are estimated are estimated at the same rate as that of 2018-19.

Energy procurement from liquid fuel stations (RGCCPP)

The liquid fuel station RGCCPP has not been scheduled for FY 2021-22 because of high variable cost of generation, but kept as a reserve capacity to be used in cases of emergencies. Thus the fixed charge amounting to Rs 200 Cr per year has to be paid.

Transmission charges for the year 2021-22

Table 4.73 : Transmission charges (2021-22)	
Source	Amount (Rs Cr)
Central Generating Stations	470.67
Long Term Contracts	120.56
RGCCPP	8.16
Total	599.39

Summary of the total energy availability

The summary of the month-wise energy availability and demand from Hydel, CGS, traders/ generators for the financial year 2021-22 is detailed below.

Table 4.74 : Summary of the energy availability (2021-22)

Month	Demand	Generation			Power Purchase			Aux cons *	Total availability	Deficit(-)/ surplus(+)
		Hydro	Wind	Solar	S. IPPs	CGS	LTA			
	MU	MU	MU	MU	MU	MU	MU	MU	MU	MU
Apr	2592.94	625.69	0.09	3.97	184.65	989.00	734.95	-0.10	2538.24	-54.70
May	2431.34	535.17	0.12	3.97	183.30	989.35	759.45	-0.10	2471.25	39.91
June	2207.71	404.78	0.13	3.97	190.72	913.83	734.95	-0.10	2248.29	40.58
July	2239.06	442.00	0.17	3.97	194.52	890.97	759.45	-0.10	2290.97	51.92
Aug	2409.91	591.66	0.49	3.97	197.82	953.66	695.89	-0.10	2443.38	33.48
Sep	2264.01	510.60	0.31	3.97	196.89	905.57	734.95	-0.10	2352.18	88.17
Oct	2310.79	575.97	0.31	3.97	205.23	953.35	660.06	-0.10	2398.78	88.00
Nov	2295.76	453.53	0.06	3.97	195.35	897.82	704.60	-0.10	2255.22	-40.54
Dec	2287.82	438.35	0.11	3.97	195.76	911.11	759.45	-0.10	2308.64	20.82
Jan	2326.29	580.48	0.10	3.97	192.46	938.90	660.06	-0.10	2375.87	49.59
Feb	2270.18	510.91	0.14	3.97	191.33	876.90	683.79	-0.10	2266.93	-3.25
Mar	2659.51	735.83	0.07	3.97	197.79	1054.29	759.45	-0.10	2751.29	91.79
Total	28295.30	6404.97	2.08	47.60	2325.80	11274.75	8647.06	-1.21	28701.05	405.75

**thermal and wind stations*

The summary of the month wise Peak demand and availability for FY 2021-22 is estimated below.

Table 4.75 : Summary of the energy availability (2021-22) (MW)								
Month	Peak Demand	Hydro	IPPs	CGS	LTA	outages	Total	Deficit(-)/ Surplus(+)
Apr2021	4462	1731	8	1554	1095	132	4255	-206
May 2021	4517	1672	8	1534	1095	131	4177	-339
Jun 2021	3972	1422	17	1460	1095	128	3867	-106
Jul 2021	3824	1362	36	1400	1095	125	3768	-56
Aug 2021	3848	1346	34	1496	1000	125	3751	-97
Sept 2021	4022	1561	31	1423	1095	126	3983	-39
Oct 2021	3994	1422	21	1497	955	123	3772	-221
Nov 2021	4113	1393	18	1452	1048	125	3786	-327
Dec 2021	3938	1357	17	1392	1095	124	3736	-202
Jan 2022	3996	1616	8	1427	955	119	3886	-110
Feb 2022	4199	1635	9	1561	1095	133	4167	-32
Mar 2022	4351	1733	8	1627	1095	136	4326	-25

There would be a deficit of 340 MW peak and shortage of 90.82 MU for FY-22. KSEBL is planning to procure 150 MW peak power for FY 2021-22 through short term market or through day-ahead markets for meeting the deficit. Anticipating an average power purchase cost of Rs 5 per unit the total power purchase cost through short term market for the financial year amounts to Rs 109.50 Cr for a quantum of 219 MU.

Sale of Surplus Energy

There will be a surplus availability of 624.75 MU for the year 2021-22. Anticipating Rs 5 per unit for this surplus availability, an additional revenue of Rs 312.38 Cr.

Summary of Power Purchase Cost

A summary of cost of generation and power purchase for the year 2021-22 is given in the table below:

Table 4.76 : Summary of Cost of power procurement for FY-22						
Source	Quantum at exbus	Quantum at Kerala periphery	Fixed Cost	Variable Cost	Other charges/ Incentive	Power Purchase Cost
	MU	MU	Rs.Cr.	Rs.Cr.	Rs. Cr.	Rs.Cr.
Central Gen Stations	11706.77	11274.75	865.55	3266.44	15.08	4147.07
Small IPPs within State(RE)						
Small Hydel	99.74	99.74		36.90		36.90
Wind	1050.35	1050.35		313.12		313.12
Solar	1175.71	1175.71		389.33		389.33
Sub Total	2325.80	2325.80		739.35		739.35
Long Term contracts						
Maithon power limited	1,105.73	1,070.92	145.98	218.58		364.55
Maithon power limited	1,105.73	1,070.92	145.98	218.58		364.55

DVC-Mejia TPS	705.50	683.99	95.93	162.15		258.08
DVC-Reghunathpur TPS	348.10	337.49	54.73	85.59		140.32
Jindal Power Limited-Bid I	1,497.96	1,431.81	374.49	178.79	-21.80	531.48
Jindal Power Limited-Bid II	1,123.47	1,073.86	353.89	139.61	-24.46	469.04
Jindal India Thermal limited	748.98	721.90	243.42	80.17	-13.44	310.15
Jhabua Power Limited-Bid I	861.33	822.57	170.54	161.26	-9.07	322.73
Jhabua Power Limited-Bid II	748.98	715.28	208.22	134.94	-11.50	331.66
BALCO	748.98	718.32	223.20	84.56	-11.04	296.72
Sub Total	8,994.76	8,647.06	2,016.36	1,464.21	-91.31	3,389.27
RGCCPP			200			200
Short term market/exchanges etc	226.12	219.00		109.50		109.50
Transmission charges payable to PGCIL						
CGS				470.67		470.67
Long Term Contracts				120.56		120.56
RGCCPP				8.16		8.16
Sub Total transmission charges				599.39		599.39
Total Power Purchase	23,253.45	22,466.61	3,081.92	6,178.89	-76.23	9,184.58

Thus the total power purchase cost of SBU - D for next control period is summarized in the table below:

Table 4.77 : Total Generation and Power Purchase Cost (2018-22)							
Financial Year	Net Generation	Generation Cost	Purchased Energy*	Purchase Cost	Total		Wt Av cost
	MU	Rs Cr	MU	Rs Cr	MU	Rs Cr	Rs/unit
2018-19	7819.52	522.94	18764.36	7942.01	26583.88	8464.95	3.18
2019-20	6969.23	560.87	21199.68	8,672.27	28168.91	9233.14	3.28
2020-21	6545.04	657.72	21738.85	8,884.51	28283.89	9542.23	3.37
2021-22	6453.43	792.44	22466.61	9,184.58	28920.04	9977.02	3.45
<i>@ Kerala Periphery</i>							

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Intra-State Transmission Charges

The details of Intra State Transmission Charges are explained in Chapter 3 of this petition. A summary of intra-state transmission charges for next control period is given in table below:

Table 4.78 : Intra-State Charges					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Energy injected into the system (MU)	24846.15	26243.43	27247.53	28295.30
2	Percentage of loss (%)	4.05	3.95	3.85	3.75
3	Loss of energy (MU)	1006.269	1042.325	1058.408	1074.192
4	Energy handled (MU) (1-3)	23839.88	25201.11	26189.12	27221.10
5	Cost of Intra State transmission(Rs Cr)	951.08	1106.19	1394.26	1637.13
6	Transmission charges (Rs/unit)	0.40	0.44	0.53	0.60

NLDC/RLDC/SLDC charges

SLDC charges are already included in the Transmission ARR. A provision of Rs 3 Cr is provided towards the NLDC/RLDC charges annually throughout the control period.

Interest and Finance Charges

Interest on Capital liabilities:

The normative Loan for all SBUs as on 01-April-2018 has been calculated in **Table 2.21 in Chapter 2: ARR for SBU-G**. The Interest on normative loan is determined after considering asset addition as well as contribution/ grant anticipated, allowable depreciation etc for each year of the control period. The normative interest thus computed for SBU-D for the control period is furnished in the table below.

Table 4.79 : Interest on capital liabilities (Rs Cr) for SBU-D					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Opening loan	2142.78	4275.39	5451.45	6446.82
2	GFA addition	2620.25	1521.74	1362.97	1270.24
3	Less: Consumer contribution & Grants	377.92	201.69	203.71	205.74
4	Less: Allowable depreciation	109.72	143.99	163.89	181.71
5	Normative loan during the year	2132.61	1176.06	995.37	882.79
6	Closing normative loan	4275.39	5451.45	6446.82	7329.61
7	Average normative loan	3209.08	4863.42	5949.14	6888.21
8	Interest for the year*	304.86	486.34	594.91	688.82

* @ 9.50% for 2018-19 and @10% thereafter.

Interest on Security Deposit

The security deposit as on 31st March 2018 has been Rs 2897.51 Cr. Considering an addition of Rs 300 Cr per annum and at an interest of 6.75%, the interest on security deposit for next control period is given in table below.

Table 4.80 : Interest on Security Deposit (Rs Cr)						
No	Particulars	2017-18	2018-19	2019-20	2020-21	2021-22
1	Opening: SD as on 1 st April	2597.51	2836.96	3086.96	3386.96	3686.96
2	Addition during the FY	239.45	250.00	300.00	300.00	300.00
3	Closing SD as on 31 st March	2836.96	3086.96	3386.96	3686.96	3986.96
4	Average SD during the FY	2717.235	2961.96	3236.96	3536.96	3836.96
5	Average interest rate (%)	6.75	6.75	6.75	6.75	6.75
6	Interest Charges	175.33	199.93	218.49	238.74	258.99

Interest on GPF

The SBU wise Interest on GPF is estimated in **Table 2.24** in *Chapter 2: ARR for SBU-G*. The interest on GPF for SBU-D is reproduced in the table below.

Table 4.80 : SBU wise interest on provident fund (Rs Cr)					
SBU	Employee cost ratio (2017-18)	2018-19	2019-20	2020-21	2021-22
SBU D	83.56	160.19	170.72	181.24	191.77

Interest on Master Trust bonds

SBU wise interest on Master Trust Bond is calculated in **Table 2.25** in *Chapter 2: ARR for SBU-G*. The interest for SBU-D is reproduced in the Table below:

Table 4.82 : SBU wise Interest on Master Trust Bonds (Rs Cr)					
SBU	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU D	83.56	646.45	612.43	578.40	544.38

Interest on Additional Master Trust Bonds

SBU wise interest on Additional Master Trust Bond is calculated in **Table 2.23** in *Chapter 2: ARR for SBU-G*. The interest for SBU-D is reproduced in the Table below:

Table 4.83 : Interest on additional Master Trust Bonds (Rs Cr)					
SBU	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU D	83.56	311.58	311.58	311.58	311.58

Interest on Working Capital

The Normative Working Capital for SBU-D, as per Regulation 32, includes O&M Cost for one month, cost of maintenance spares as one twelfth of average of the book value of stores for that FY, receivables for two months excluding security deposits.

The Interest on Working Capital in this petition is computed at a rate of 10.70% (8.70% as on 1-4-2018 + 2%) as per Regulation 32(2), as discussed in **Chapter-2**. The parameters adopted for computation of Interest on Working capital for the control period are furnished below.

Table 4. 84 : Parameters for Working Capital (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Opening GFA	8390.00	11010.25	12531.99	13894.96
Inventory	485.90	614.98	710.81	801.76
O&M Cost	2241.36	2487.63	2725.56	2958.09
Expected Revenue	12433.68	13143.48	13758.18	14402.37

The Interest on Working Capital projected for the control period 2018-19 to 2021-22 for SBU-D is submitted below:

Table 4.85 : Interest on Working capital (Rs Cr.)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	O&M expenses	186.78	207.30	227.13	246.51
2	Cost of Mace spares	4.86	6.15	7.11	8.02
3	Receivables for two months	2072.28	2190.58	2293.03	2400.395
4	Total Working Capital	2263.92	2404.03	2527.27	2654.92
4	Less: Security Deposits	2836.96	3086.96	3386.96	3686.96
5	Net Working Capital	-573.04	-682.93	-859.69	-1032.04

Since the working Capital requirement is less than the security deposit held at the beginning of the year, no interest is claimed for working capital for the next control period.

Now, the **summary of interest and finance charges** estimated for SBU-D for the control period is submitted below:

Table 4.86 : Summary of Interest & Finance Charges (Rs Cr) for SBU-D					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Interest on capital liabilities	304.86	486.34	594.91	688.82
2	Interest on security Deposit	199.93	218.49	238.74	258.99
3	Interest on GPF	160.19	170.72	181.24	191.77
4	Interest on MT Bonds	646.45	612.43	578.4	544.38
5	Interest on additional Trust Bonds	311.58	311.58	311.58	311.58
6	Interest on working capital	0	0	0	0
7	Total Interest & Finance Charges	1623.01	1799.56	1904.87	1995.54

Operation & Maintenance Expenses

The Tariff regulation allows recovery of employee cost and A&G expenses contained in **operation and maintenance expenses as per norms** specified in Annexure-IX of Tariff Regulations, 2018. This is reproduced in first four rows of the table below. The projected parameters applicable for the control period (previous year values) are shown in next four rows and thereafter estimation of normative employee cost and A&G expenses of SBU-D for the control period is furnished.

Table 4. 87 : Employee Cost and A&G cost projection					
No	Parameters	2018-19	2019-20	2020-21	2021-22
1	consumers (Rs. L/1000)	4.80	5.03	5.27	5.53
2	Dist Transformers (Rs. L/DTr)	0.64	0.67	0.7	0.73
3	Length of HT line (Rs. L/km)	0.79	0.83	0.87	0.91
4	Energy sales (Rs/unit)	0.19	0.20	0.21	0.22
5	No. of consumers	12611100	12957080	13314526	13683932
6	No. of Dist Transformers (Nos)	80064	81537	82897	83950
7	HT Line (Ckt-Km)	66225	69686	72654	74729
8	Energy sales in MU	21647.29	22969.67	23957.26	24991.44
9	Employee, A&G Cost (Rs Cr)	1979.53	2153.38	2342.23	2529.65

Tariff Regulation allows recovery of the remaining component of O&M expenses viz the R& M expenses at 3 % of opening GFA along with pro rata allowance for the asset addition during the year. R&M expenses for the opening GFA for the control period is furnished below:

Table 4.88 : R&M estimation for SBU-D (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Opening GFA	8390.00	11010.25	12531.99	13894.96
2	R&M expenses @ 3%	251.70	330.31	375.96	416.85

The pro rata R&M expenses for the assets addition during the control period is worked out on the basis of the actual plan progress during the year 2017-18. Thus the pro rata monthly addition to GFA is computed and furnished below:

Table 4.89 : Computation of R & M Expenses										
Month	Pro rata addition	GFA Addition				Months	Pro rata R&M expenses			
	%	FY19	FY 20	FY-21	FY-22		FY19	FY 20	FY-21	FY-22
April	4.1	41.38	61.64	55.11	40.77	11	1.14	1.70	1.52	1.12
May	9.19	92.64	138.01	123.38	91.28	10	2.32	3.45	3.08	2.28
June	7.53	75.97	113.19	101.19	74.86	9	1.71	2.55	2.28	1.68
July	3.39	34.16	50.9	45.5	33.67	8	0.68	1.02	0.91	0.67
August	5.59	56.36	83.97	75.06	55.54	7	0.99	1.47	1.31	0.97
September	4.56	45.98	68.5	61.23	45.3	6	0.69	1.03	0.92	0.68
October	3.99	40.23	59.94	53.58	39.64	5	0.50	0.75	0.67	0.50
November	4.27	43.08	64.18	57.38	42.45	4	0.43	0.64	0.57	0.42
December	6.29	63.45	94.52	84.5	62.52	3	0.48	0.71	0.63	0.47
January	12.64	127.47	189.91	169.78	125.61	2	0.64	0.95	0.85	0.63
February	22.41	225.98	336.67	300.98	222.68	1	0.56	0.84	0.75	0.56
March	16.03	1773.55	260.31	235.28	435.92	0	0.00	0.00	0.00	0.00
Total	100	2620.25	1521.74	1362.97	1270.24		10.13	15.10	13.50	9.99

The R&M expenses for the control period are as follows:

Table 4.90 : R&M Cost for SBU-D (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	On opening GFA	251.70	330.31	375.96	416.85
2	On addition during the year	10.13	15.10	13.50	9.99
3	Total	261.83	345.41	389.46	426.84

Thus normative O& M expenses for next control period is given in table below:

Table 4.91 : Normative O&M Cost for SBU-D (Rs Cr)					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Employee & A&G costs	1979.53	2153.38	2342.23	2529.65
2	R&M expenses	261.83	345.41	389.46	426.84
3	Normative O&M expenses	2241.36	2498.79	2731.69	2956.49

However, the O&M Expenses estimation based on past trends is given in the table below:

Table 4.92 : O&M Cost based on past trends (Rs Cr)					
No	Year	2018-19	2019-20	2020-21	2021-22
1	Employee cost	2007.78	2158.07	2320.08	2487.47
2	A&G	336.17	367.02	402.21	445.30
3	R&M	208.94	219.39	230.36	241.87
	O & M Expenses	2552.88	2744.48	2952.65	3174.64

It may kindly be noted that, the O&M expenses as per norms for the control period are below the actual expense projection. This will lead to under recovery of genuine O&M

costs. However, KSEBL is taking earnest efforts to control the O&M expenses to the extent possible. If any variation is found beyond its control then it is humbly requested that the same may be allowed at actual during true up.

Onetime expenses

Hon Commission may please note that in the natural calamity that occurred during the monsoon months, KSEBL had badly suffered by loss and damage to assets and business. Power Distribution in 300 odd Electrical Sections had to be stopped. Electricity Supply from 16158 Distribution Transformers was affected. More than 10,000 Distribution substations had to be switched off to mitigate accidents. Service to 25.60 Lakhs consumers was affected and around 1735 transformers were affected. There were severe damages substations and offices in submerged buildings. Computers and IT infrastructure in these offices needed replacement. The details of which were already submitted before Hon Commission vide affidavit dated 22-Sept-2018. The financial loss incurred by SBU-D for rectification works was around Rs. 242.55 Cr as submitted below.

Table 4.93 : Loss Incurred because of 2018 Flood (RsCr.)			
No.	Description	Quantum	Amount
1	No. of transformers damaged(Nos)	1735	17.35
2	No. of transformers damaged(Nos)	103255	41.30
3	Conductor damaged(km)	5275.80	26.38
2	RMU damaged(Nos)	106	7.42
3	Electrification of households (No. in lakhs)	3	150
	TOTAL		242.25

KSEBL has already issued direction to compile the losses under capital and revenue expenses. It is humbly requested that the damages that occurred in various SBUs of KSEBL due to natural calamity may kindly be treated as 'Force Majeure' event and allowed at the time of truing up for 2018-19, over and above normative expenses. Further during the flood as per the direction of Government, KSEBL has contributed Rs 35 Cr towards flood relief fund. Share of SBU-D towards this fund is Rs. 29.24Cr. Hon Commission may kindly pass this amount at the time of truing up.

Pay Revision Expenses

The pay revision expenses for all SBUs during the control period are calculated and given in **Table 2.16 in Chapter 2: ARR for SBU-G**. The expenses relating to SBU-D is reproduced below:

Table 4.94 : SBU wise Pay revision expenses					
Business Unit	Employee cost ratio	2018-19	2019-20	2020-21	2021-22
SBU-D	83.56	152.28	219.84	237.58	256.28

However, claim in this regard is not made in this petition. Hon Commission may be pleased to true up the actual expenses, after prudence check, at the time of implementation of revision of pay.

Depreciation

Depreciation has been estimated on the basis of the approval granted by the Hon Commission, as per Truing up order for 2015-16. The depreciation approved for 2015-16 roughly works out to the following percentages on the opening GFA.

Table 4.95 : Depreciation approved for FY 2015-16			
Particulars	SBU G	SBU T	SBU D
Average rate of depreciation % (gross)	2.77	3.24	3.86
Less: Claw back	0.00	0.00	2.55
Average rate of depreciation % (net)	2.77	3.24	1.31

In the truing up order for FY 2015-16, Hon Commission disallowed depreciation of assets created out of consumer contribution till 31-10-2013. In this petition, KSEBL has excluded the claim for depreciation of the said asset. The principles for arriving at the depreciation are given in **Table 2.17** in **Chapter 2 : ARR for SBU-G**. The Depreciation on the fixed assets of SBU-D has been calculated at the net average rate of depreciation approved by the Hon Commission. The depreciation in line with Regulation 27 of the Tariff Regulations, 2018 for the control period is given below:

Table 4.96 : Depreciation for SBU-D (Rs Cr)				
Item	2018-19	2019-20	2020-21	2021-22
Opening GFA (excl revaluation)	8390.00	11010.25	12531.99	13894.96
Addition during the year	2620.25	1521.74	1362.97	1270.24
Total	11010.25	12531.99	13894.96	15165.20
Depreciation for the year	323.94	425.10	483.86	536.48
Less: Claw back depreciation	214.22	281.12	319.97	354.77
Net depreciation allowable	109.72	143.99	163.89	181.71

Return on Equity

The SBU wise return on equity is calculated and given in Table 2.30 in Chapter 2. Accordingly, a sum of **Rs. 253.50 Cr** is claimed for SBU D during the control period.

Rate of Carrying Cost

Carrying cost is to be allowed considering the cost of funds actually incurred by the entity for funding the approved revenue gap. The carrying cost for next control period is given in table below

Table 4. 97 : Carrying cost for the accumulated revenue gap					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Opening revenue gap (approved)	5645.26	4838.79	4032.33	3225.86
2	Recovery proposed to be amortized	806.47	806.47	806.47	806.47
3	Balance gap	4838.79	4032.33	3225.86	2419.40
4	Av revenue gap	5242.03	4435.56	3629.10	2822.63
5	Av GPF balance for the year	2282.33	2432.33	2582.33	2732.33
6	Balance	2959.70	2003.23	1046.77	90.30
7	Interest rate	9.50	10.00	10.00	10.00
8	Carrying cost	281.17	200.32	104.68	9.03

Bad Debts to be written off

A provision of Rs 15 Cr is estimated for the next control period. KSEBL humbly requests before the Honourable Commission to allow the same.

Recovery of past approved revenue gap

The approved and un-bridged revenue gap in orders pending recovery as of date, amounts to Rs. 5645.26 Cr. Hon Commission was pleased to approve carrying cost during truing up for 2015-16 and 2016-17. In this regard, It may be noted that :

- (i) In the order dated 17.04.2017, Hon Commission had decided to allow recovery of the entire revenue gap determined till then over a period of 5 years. Accordingly, a sum of Rs.1040.92 Cr was allowed to recover through tariff as per order dated 17.04.2017.
- (ii) However, the un-bridged gap grew thereafter as per various orders detailed below:

Table 4.98 : Un-bridged Revenue Gap			
No	Item	(Rs. Cr)	(Rs. Cr)
1	Total un bridged revenue gap as on 31-03-2011 (as per Table 1.3 of the order dated 14-8-2014 in OP No. 9/2014)	424.11	
2	Revenue gap as per the orders on truing up for the year 2011-12	1386.97	
3	Revenue gap as per the orders on truing up for the year 2012-13	3132.97	
4	Total	4944.05	
5	Less: Recovery permitted for 2017-18	1040.92	3903.13
6	Add: Remand order dtd 09.05.17-2009-10		107.90
7	Add: Remand order dtd 19.05.17-2010-11		204.70
8	True up order 2013-14 dated 20.06.2017		195.50
9	True up order 2015-16 dated 21.08.2018		202.97
10	True up order 2016-17 dated 14.09.2018		1031.06
	Total		5645.26

- (iii) Paragraph 8.2.2 of the National Tariff Policy, 2016 as extracted below, stipulates that the un bridged revenue gap of earlier years are to be bridged in 7 years :

“8.2.2 The facility of a regulatory asset has been adopted by some Regulatory Commissions in the past to limit tariff impact in a particular year. This should be done only as a very rare exception in case of natural calamity or force majeure conditions and subject to the following:

- a. Under business as usual conditions, no creation of Regulatory Assets shall be allowed;*
- b. Recovery of outstanding Regulatory Assets along with carrying cost of Regulatory Assets should be time bound and within a period not exceeding seven years. The State Commission may specify the trajectory for the same.”*

Accordingly KSEBL propose annual recovery of Rs.806.47 Cr (Rs.5645.26 Cr/7years) from 2018-19 onwards so that the existing approved revenue gap can be wiped off over the next 7 years. The amount of past approved gap sought to be amortized during the control period is furnished below:

Table 99 : Amortization of past approved revenue gap (Rs.Cr.)				
	2018-19	2019-20	2020-21	2021-22
Revenue gap Amortized	806.47	806.47	806.47	806.47

Summary of ARR

The Aggregate Revenue Requirement of SBU-D for the control period is summarized and given below:

Table 4.100 : Aggregate Revenue Requirement of SBU-D (Rs Cr.)					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Cost of Generation	522.94	560.87	657.72	792.44
2	Cost of Power Purchase	7942.01	8672.27	8884.51	9184.58
3	Cost of Intra State Transmission	951.47	1106.58	1394.65	1637.52
4	NLDC /RLDC charges	3	3	3	3
5	O&M Expenses	2241.36	2499.00	2731.69	2956.49
6	I&F charges on long-term loans	304.86	486.34	594.91	688.82
7	Interest on Trust Bonds	646.45	612.43	578.40	544.38
8	Interest on additional bonds	311.58	311.58	311.58	311.58
9	Interest on Provident Fund	160.19	170.72	181.24	191.77
10	Interest on Security Deposit	199.93	218.49	238.74	258.99
11	Interest on WC and deposits	0.00	0.00	0.00	0.00
12	Carrying Cost on Gap	281.17	200.32	104.68	9.03
13	Depreciation	109.72	143.99	163.89	181.71
14	One Time expenses	29.24			
15	Bad debts written off	15	15	15	15
16	Recovery of previous gap	806.47	806.47	806.47	806.47
17	Total Revenue Expenditure	14525.39	15807.05	16666.49	17581.79
18	Return on Equity	253.50	253.50	253.50	253.50
19	Tax on RoE	0	0	0	0
20	Aggregate Revenue Requirement	14778.89	16060.35	16919.99	17835.29

Other Income

The other income of SBU-D includes income from sale of scrap, interest on advances made to contractors, interest on staff loans and advances, Rent from buildings etc. The projection of other income of SBU-D for the control period 2018-19 to 2021-22 is summarized below:

Table 4.101 : Other Income (Rs Cr)					
No	Other Income	2018-19	2019-20	2020-21	2021-22
1	Interest on staff loans etc	0.12	0.10	0.09	0.07
2	Income from statutory investments				
3	Income from rent of land etc	3.53	4.06	4.59	5.12
4	Income from sale of scrap	26.82	22.00	24.75	27.51
5	Income from staff welfare activities				
6	Rental from staff quarters	0.23	0.25	0.28	0.31
7	Excess found on physical verification	0.02	0.02	0.02	0.03
8	Interest on investments Etc	2.78	2.78	2.78	2.78
9	Interest on advances suppliers etc	13.67	14.52	15.38	16.23
10	Income from hire charges	0.00	0.00	0.00	0.00
11	Income by ROW for FO Cables etc	37.44	43.05	48.65	54.24
12	Income from advertisements, etc.	0.00	0.00	0.00	0.00

13	Miscellaneous receipts	110.39	118.66	126.33	134.03
14	Commission (Ele duty collection)	8.29	9.54	10.78	12.02
15	Interest on belated payment on bills	19.51	20.01	20.35	20.69
16	Rebate from CGS	135.00	137.00	139.00	141.00
	Total Other Income (Rs Cr.)	357.80	371.99	393.00	414.03

Non Tariff Income

The non tariff income of regulated business includes income other than those obtained from tariff such as income from wheeling, receipts on account of cross-subsidy surcharge and additional surcharge on charges of wheeling, reactive energy charges, meter rent, rental from electric plants or lines, testing fee, late payment surcharge, prompt payment incentives, recovery from theft and pilferage of energy or such other charges.

Table 4.102 : Non-Tariff Income (Rs Cr)					
No	Other Income	2018-19	2019-20	2020-21	2021-22
1	Income from wheeling	0.10	0.10	0.10	0.10
2	Reactive energy charges	50.00	50.00	50.00	50.00
3	Receipts : cross-subsidy surcharge				
4	Receipts on additional surcharge				
5	Meter Rent	94.77	96.37	97.97	99.57
6	Rental from Electrical plants etc				
7	Testing Fee				
8	Late payment from surcharge				
9	Prompt payment incentives				
10	Recovery on Theft and Pilferage	6.20	6.36	6.47	6.58
11	Power factor Penalty	22.68	23.28	23.69	24.08
	Total Non Tariff Income (Rs Cr)	173.75	176.11	178.23	180.33

Net ARR of SBU-D

The net ARR of SBU-D for the control period is submitted below:

Table 4.103 : Aggregate Revenue Requirement of SBU-D (Rs Cr.)					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Gross ARR	14778.89	16060.35	16919.99	17835.29
2	Less Other Income	357.80	371.99	393.00	414.03
3	Less Non Tariff Income	173.75	176.11	178.23	180.33
4	Net ARR	14247.34	15512.25	16348.76	17240.93

EXPECTED REVENUE FROM CHARGES

The revenue from sale of power is estimated based on the prevailing Schedule of Tariff and terms and conditions for retail supply of electricity by KSEBL 17-04-17 and the revised rate of tariff for Bulk Supply ordered on 24-09-2014. The validity of these tariff orders were extended by the Hon Commission on 27-03-2018.

Revenue from tariff for the year 2017-18

The summary of the KSEBL's revenue from sale as per provisional accounts for the year 2017-18 is given in the table below:

Table 4. 104 : Revenue from sale of power for the year 2017-18						
Category	Consumer Strength (31-3-18)		Energy sale (17-18)		Revenue (17-18)	
	(Nos)	%	(MU)	%	(Rs. Cr)	% total
Domestic	9562253	77.89	10574.84	50.64	4316.98	35.96
Commercial	2081567	16.96	3063.48	14.67	2876.69	23.96
Industrial	136964	1.12	1112.33	5.33	809.19	6.74
Agriculture	462763	3.77	346.03	1.66	63.29	0.53
Public Lighting	27131	0.22	373.48	1.79	169.85	1.41
HT & EHT	5620	0.05	4535.98	21.72	3225.37	26.86
Railway Traction	12	0.00	265.80	1.27	160.01	1.33
Bulk Supply	11	0.00	608.77	2.92	384.59	3.20
Total	12276321	100	20880.70	100.00	12005.97	100.00
Misc expenses					0.91	
Sale outside State			117.51		51.18	
Total	12276321		20998.21		12058.06	

The revenue from tariff for the year 2017-18 amounts to Rs 12005.97 Cr corresponding to the sale of 20880.70 MU. The total revenue from sale of power including interstate sales amounts to Rs 12058.06 Cr.

Estimation of revenue from sale of power for the control period

The estimate of the energy sale forecast for the control period is given previously this Chapter. The estimate of the revenue from sale of power for the MYT period for FY-19 to FY-22 is arrived at by taking into consideration of the re-categorization approved by the Honorable Commission vide tariff order dated 17.04.2017.

LT I – Domestic

The percentage slab wise consumer strength and consumption of domestic category for FY 2017-18 taken from billing softwares is given below. This slab wise data is used for arriving the slab wise consumption details of consumers and by applying corresponding energy charges and fixed charges revenue is estimated.

Table 4.105 : Domestic consumers (2016-17)					
consumption	Consumers	consumption	consumption	Consumers	consumption
0-40	0.24 %	0.05 %	0-300	1.38 %	4.01 %
0-50	28.10 %	7.15 %	0-350	0.63 %	2.18 %
51-100	33.47 %	27.05 %	0-400	0.33 %	1.30 %
101-150	22.86 %	29.83 %	0-500	0.30 %	1.41 %
151-200	8.99 %	16.48 %	Above 500	0.27 %	2.43 %
201-250	3.42 %	8.10 %	--	--	--

LT Domestic consumer strength and consumption estimated for the control period is given below.

Table 4.106 : Estimated consumers and consumption for revenue calculation								
Bimonthly consumption (Units)	2018-19		2019-20		2020-21		2021-22	
	Consumer strength (Nos)	Slab wise consumption in MU	Consumer strength (Nos)	Slab wise consumption in MU	Consumer strength (Nos)	Slab wise consumption in MU	Consumer strength (Nos)	Slab wise consumption in MU
NPG	37782	2.64	37782	2.64	37782	2.64	37782	2.64
0-80 (BPL)	23193	5.57	23737	5.87	24293	6.10	24863	6.35
0-100	2707807	775.97	2771308	817.67	2836293	5014.18	2902795	884.98
101-200	3225473	2936.38	3301114	3094.20	3378522	3328.32	3457738	3348.90
201-300	2202669	3237.27	2254324	3411.25	2307186	1532.35	2361282	3692.05
301-400	866743	1788.76	887069	1884.90	907870	534.14	929156	2040.05
401-500	329957	879.69	337695	926.97	345614	134.89	353717	1003.27
501-600	133090	435.41	136211	458.81	139405	477.32	142674	496.58
601-700	61171	237.04	62606	249.78	64074	259.86	65576	270.34
701-800	31510	141.29	32248	148.88	33005	154.89	33778	161.14
801-1000	28686	153.25	29358	161.49	30047	168.00	30751	174.78
Above 1000	25661	263.26	26263	277.41	26878	288.60	27509	300.25
Total	9673742	10856.52	9899716	11439.87	10130968	11901.30	10367622	12381.33

The revenue from sale of power to the consumers for the next control period arrived as per the prevailing Schedule of tariff and terms and conditions of supply wef 18th April 2017 are given below.

Table 4.107 : Revenue projections for the next control period									
No	Category	2018-19		2019-20		2020-21		2021-22	
		Sales	Revenue	Sales	Revenue	Sales	Revenue	Sales	Revenue
		MU	Rs Cr	MU	Rs Cr	MU	Rs Cr	MU	Rs Cr
1	LT I Domestic	10856.52	4481.91	11439.87	4744.32	11901.30	4948.01	12381.33	5160.20
2	LT II Colony	4.90	3.28	5.05	3.38	5.10	3.41	5.15	3.45
3	LT IV A Industrial	1091.53	777.73	1124.95	797.99	1136.20	805.93	1147.56	814.04
4	LT IV B Industrial	9.45	6.56	9.74	6.75	9.83	6.83	9.93	6.89
5	LT V A Agriculture	303.01	71.41	319.14	74.96	327.07	76.88	335.19	78.84
6	LT V B Agriculture	47.00	12.45	49.50	13.10	50.73	13.43	51.99	13.76
7	LT VI A General	207.10	145.97	225.45	158.21	239.29	167.91	253.99	178.18
8	LT VI B General	124.31	98.58	135.32	106.90	143.63	113.45	152.45	120.37
9	LT VI C General	242.82	259.68	264.34	280.95	280.57	298.17	297.80	316.51
10	LT VI D General	22.21	4.00	24.18	4.35	25.67	4.62	27.24	4.90

11	LT VI E General	3.19	1.70	3.47	1.84	3.68	1.96	3.91	2.08
12	LT VI F General	906.39	860.93	986.71	934.56	1047.30	991.89	1111.60	1052.31
13	LT VI G General	72.18	72.95	78.57	78.82	83.39	83.76	88.52	88.87
14	LT VII A Com	1369.82	1338.70	1491.20	1451.60	1582.76	1540.60	1679.94	1633.94
15	LT VII B Coml	200.92	133.59	218.73	144.48	232.16	153.38	246.41	162.80
16	LT VII C Coml	19.28	15.88	20.98	17.22	22.27	18.29	23.64	19.40
17	LT VIII A Pub Ltg	299.13	141.19	317.61	149.91	330.48	155.99	343.88	162.31
18	LT VIII B Pub Ltg	81.71	32.03	86.75	34.01	90.27	35.39	93.93	36.82
19	LT IX AdHoardings	2.01	3.84	2.12	4.01	2.18	4.13	2.25	4.25
	LT Subtotal	15863.49	8462.37	16803.69	9007.36	17513.88	9424.00	18256.70	9859.93
1	HT I A Industrial	2124.95	1406.88	2267.35	1497.13	2370.90	1567.01	2479.19	1640.16
2	HT I B Industrial	12.71	9.73	13.56	10.38	14.18	10.84	14.83	11.39
3	HT II A General	182.24	127.38	197.54	137.42	209.83	146.01	222.89	155.10
4	HT II B General	615.66485	519.99	667.33	562.49	708.87	598.27	752.99	636.80
5	HT III A Agri	7.58	4.08	7.95	4.24	8.18	4.36	8.42	4.48
6	HT III B Agri	2.11	0.95	2.22	0.99	2.28	1.02	2.34	1.07
7	HT IV Commercial	671.26	623.11	727.59	672.57	772.88	714.47	820.98	758.56
8	HT V Domestic	15.41	12.34	16.51	13.27	17.33	14.02	18.20	14.92
	HT Sub Total	3631.92	2704.46	3900.04	2898.50	4104.45	3056.01	4319.83	3222.48
1	EHT 66 KV Indu	355.56	205.23	369.22	213.10	375.75	217.50	382.38	221.99
2	EHT 110KV Indu	748.67	419.58	778.40	435.74	793.12	444.57	808.12	453.59
3	EHT 220 KV Indu	94.83	55.26	101.61	58.89	106.69	61.93	112.02	65.04
4	EHT General A	12.32	7.11	12.89	7.41	13.22	7.60	13.56	7.80
5	EHT General B	58.16	47.93	60.85	49.96	62.40	51.17	63.99	52.31
6	EHT Railway	273.51	167.89	293.05	179.27	307.70	188.24	323.09	197.65
7	KMRL	15.79	9.39	16.92	10.01	17.77	10.52	18.66	11.04
	EHT Sub Total	1558.85	912.39	1632.95	954.38	1676.64	981.53	1721.81	1009.42
1	KPUPL	86.37	54.66	94.20	59.46	100.68	63.50	107.60	67.87
2	CSEZ	55.72	33.96	57.99	35.27	59.15	35.97	60.34	36.69
3	RPL	31.16	16.43	33.47	17.61	35.23	18.53	37.08	19.49
4	Technopark	89.44	53.76	96.57	57.61	102.18	60.67	108.11	63.91
5	Cochin Port trust	35.33	24.02	37.62	25.51	39.25	26.60	40.96	27.76
6	Thrissur Corp	158.31	104.24	168.70	110.80	176.17	115.73	183.98	120.79
7	KDHPL	52.06	27.35	53.86	28.25	54.60	28.66	55.36	29.08
8	MES	73.37	48.48	78.50	51.71	82.32	54.29	86.31	56.84
9	Karnataka	0.81	0.57	0.89	0.62	0.95	0.66	1.02	0.71
10	Infopark	7.64	5.17	8.19	5.52	8.60	5.79	9.03	6.08
11	Smart City	2.81	1.95	3.01	2.09	3.16	2.19	3.32	2.30
	Subtotal	593.03	370.59	632.99	394.43	662.29	412.60	693.10	431.52
	Grand Total	21647.29	12449.82	22969.67	13254.67	23957.26	13874.14	24991.44	14523.36

The detailed split up of the revenue expected from the various tariff categories the control period are given in the format D2.1.

Impact of increase in power factor incentive.

Hon Commission vide order dated 17.04.2017 in the matter of determination of Tariff for the year 2017-18 on suo-moto proceedings has ordered to increase the power factor incentive

from 0.25 % to @ 0.5% of energy charges for each 0.01% unit increase in power factor from 0.9 'for power factor between 0.9 to 1.00' for LT-IV TOD billed consumers and HT & EHT consumers.

It may please be noted that the power factor incentive for the year 2017-18 was Rs 90.21 Cr. against Rs 41.72 Cr for 2016-17. The total Revenue from Tariff is reduced by 4.26 paisa per unit for 2017-18. Till 2016-17, the power factor incentive is accounted in the revenue from Tariff itself. From 2017-18 onward the power factor incentive is accounted in Administration and General Expenses. KSEB is planning to give a separate account for this expense. Hence the total revenue from Tariff is the net of total revenue calculated in table above and power factor incentive. The power factor incentive for the next financial year based on previous year trend and the net revenue for the next control period is estimated as follows:

Table 4.108 : Revenue from sale of power after deducting power factor incentive				
Item	2018-19	2019-20	2010-21	2021-22
Revenue	12449.82	13254.67	13874.14	14523.36
Power factor incentive	97.79	104.21	108.85	113.73
Net Revenue from Tariff	12352.03	13150.46	13765.29	14409.63

Fuel Price Adjustment Charges

Honorable Commission vide order dated 13.08.2018 has allowed KSEBL to recover an amount of Rs 81.65 Cr. as fuel surcharge @ Rs 15 paise per unit from all consumers except domestic consumers with connected load of and below 500 W and monthly consumption of and below 20 units. Thus an amount of Rs 81.65 Cr. will receive as fuel surcharge during the year 2017-18.

Revenue from external sales

KSEBL has been taking earnest efforts to sell the excess power whenever opportunity available at optimum cost. KSEBL has entered sale agreement with BSHPCCL through DEEP portal for sale of 50 MW in June 2018 at Rs. 5.95 per unit and 100MW from August 2018 to September 2018 during peak periods at Rs. 6.00 per unit and 100 MW during October 2018 at Rs. 6.5 per unit during off peak period. KSEBL has already intimated the matter to the Honorable Commission vide petition dated 20.08.2018. KSEBL had also made arrangements with CSPDCL for sale of power of 200 MW of power from 00.00 hours to 7.00 hours during October @ Rs 4.09 per unit. KSEBL has also made arrangements with CSPDCL for selling 200 MW of power from 6.00 hours to 10.00 hours @ Rs 5.16 per unit and 149 MW of power from 10.00 hrs to 13.00 hrs @ Rs 4.37 per unit during November 2018. In addition to the above, KSEBL has been selling energy at optimum costs through day ahead markets. Further KSEBL has been selling energy through day-ahead markets when ever market price is reasonable.

KSEBL has sold 623.53 MU for an amount of Rs 225.42 Cr for the period from April to September 2018 @ Rs 3.61 per unit. For the remaining part of control period KSEBL is assuming an average selling rate of Rs 5 per unit. The details of revenue expected from external sales are given in the table below.

Table 4.109 : Revenue from External Sales				
No	Financial Year	Sale (MU)	Unit Rate (Rs)	Revenue (Rs Cr)
1	2018-19 April-September (Actual)	623.53	3.615	225.42
2	2018-19 October-March (Estimate)	975.1	5.00	487.548
3	2019-20	1925.48	5.00	962.74
4	2020-21	1036.37	5.00	518.19
5	2021-22	624.75	5.00	312.38

Thus the net revenue estimated for the next control period is given in the table below

Table 4.110: Revenue after deducting power factor incentive (Rs Cr)				
Item	2018-19	2019-20	2010-21	2021-22
Revenue	12449.82	13254.67	13874.14	14523.36
Power factor incentive	97.79	104.21	108.85	113.73
Net Revenue from Tariff	12352.03	13150.46	13765.29	14409.63
Fuel Surcharge	81.65			
Revenue from external sales	712.96	962.74	518.19	312.38
Total revenue	13146.64	14113.2	14283.48	14722.01

REVENUE GAP

The net revenue gap, thus calculated, for next control period is given below.

Table 4.111 Revenue Gap (Rs Cr)				
Particulars	2018-19	2019-20	2020-21	2021-22
Net ARR	14247.34	15512.25	16348.76	17240.93
Net Revenue	13146.64	14113.2	14283.48	14722.01
Revenue Gap	1100.70	1399.05	2065.28	2518.92

The calculation of wheeling charges and proposal for bridging the Revenue gap for the control period is given in the next chapter.

Annexure- 4.1				
Renewable Purchase/Generation				
Non Solar	Quantum in MU			
	2018-19	2019-20	2020-21	2021-22
Small hydel Stations				
Own hydel Stations	499.83	560.07	659.26	697.74
Power procurement	99.74	99.74	99.74	99.74
Through Banking arrangement	65.80	65.80	65.80	65.80
Sub Total SHP	665.37	725.61	824.80	863.28
Wind				
Own Generation	1.25	2.04	2.08	2.08
Power procurement(existing)	107.47	107.47	107.47	107.47
Additional power from various sources				
NHPC,Palakkad		15.42	15.42	15.42
Ramakkalmedu(Pvt)		3.85	3.85	3.85
Anert(amakkalmedu)		5.78	5.78	5.78
Malayala manorama		19.27	19.27	19.27
Poovar		1.93	1.93	1.93
Ramakkalmedu(Anert)		23.13	23.13	23.13
Aban group		19.27	19.27	19.27
Power procurement by bidding(SECI)		96.36	96.36	96.36
Power procurement by bidding(KSEB)		96.36	96.36	96.36
Power Procurement for meeting RPO		110.57	290.03	573.02
Sub Total wind	108.72	501.4503	680.9531	963.944
Total non-solar achievement	774.09	1227.06	1505.75	1827.23
Target	921.75	1227.06	1505.75	1827.22
Solar				
Own generation	14.49	42.61	47.60	47.60
Banking arrangements & GBI	38.26	38.26	38.26	38.26
Solar Park	70.08	70.08	70.08	70.08
Anert	2.80	2.80	2.80	2.80
Roof top		13.47	17.46	17.46
Reverse bid		30.24	61.32	61.32
Soura		60.48	122.64	122.64
Soura			60.48	122.64
NTPC Solar Float			13.31	26.98
NTPC Solar ground mount			9.07	18.40
NHPC Solar				16.64
NTPC Solar ground mount				60.48
Other purchases for meeting RPO		355.59	435.34	597.99
Total Solar RPO achievement	125.63	613.53	878.35	1203.29
Target	362.11	613.53	878.35	1203.29

ANNEXURE 4.1 : Monthly energy schedule of Central Generating Stations at ex-bus for the year 2018-19

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
RSPTS Stage I & II	164.64	152.87	141.15	109.26	75.11	163.02	170.15	156.43	161.64	161.64	146.00	161.64	1763.58
RSTPS Stage III	37.56	39.41	39.92	39.91	26.52	41.39	42.77		40.64	40.64	36.70	40.64	426.10
TALCHER - Stage II	272.30	280.22	243.45	175.95	186.12	277.95	284.45	275.27	284.45	284.45	256.92	284.45	3105.98
Simhadri Exp	58.48	34.46	21.07	36.98	19.68	53.73	55.52	53.73	55.52	55.52	50.14	55.52	550.33
NLC-II- Stage-1	36.65	38.41	30.25	24.86	23.82	22.76	30.07	25.86	42.18	42.18	38.10	42.18	397.35
NLC-II- Stage-2	58.86	46.93	41.50	37.64	41.69	37.51	50.00	48.39	50.00	50.00	45.16	50.00	557.67
NLC- Exp- Stage-1	44.13	19.59	30.91	27.29	17.86	21.83	45.55	44.08	45.55	45.55	41.14	45.55	429.02
NLC - II Exp	13.46	16.54	8.64	24.41	12.26	19.22	32.00	30.97	32.00	32.00	29.07	32.00	282.58
MAPS	6.55	6.65	6.43	6.43	6.84	7.42	7.66	7.41	7.66	7.66	6.92	7.66	85.30
KAIGA Stg I& II	48.31	49.55	47.40	46.55	50.80	17.09	38.68	37.43	38.68	38.68	34.93	38.68	486.75
K'kulam I & II	86.05	89.90	90.02	108.27	2.37	0.00	0.00	180.63	186.65	186.65	168.59	186.65	1285.78
Vallur JV with	35.27	28.55	16.32	17.42	9.65	33.56	35.27	33.56	35.27	35.27	31.32	35.27	346.70
NTPL(Tuticorin)	43.15	46.44	38.79	30.34	16.62	48.54	50.16	38.83	28.15	50.16	45.30	50.16	486.64
Kudgi Unit I II & III	52.76	52.32	14.83	8.60	0.00	44.22	42.02	36.60	37.82	63.04	56.94	63.04	472.19
Total	958.16	901.84	770.68	693.91	489.33	788.24	884.30	969.18	1046.20	1093.43	987.25	1093.43	10675.96

Annexure 4.3 : Monthly Schedule of IPPs at ex-bus for 2018-19

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
Maithon power	88.77	93.55	89.82	74.58	76.34	100.98	78.61	95.79	104.35	104.35	94.25	104.35	1105.73
Maithon power	88.77	93.55	89.82	74.58	76.34	100.98	78.61	95.79	104.35	104.35	94.25	104.35	1105.73
DVC-Mejia TPS	60.91	54.23	59.55	39.48	41.07	68.22	0.00	68.22	70.49	70.49	63.67	70.49	666.84
DVC-R'pur TPS	15.57	11.46	5.90	10.72	7.10	33.66	9.04	33.66	34.78	34.78	31.42	34.78	262.88
Jindal Power	116.42	119.03	103.61	109.81	106.64	136.80	122.28	131.61	141.36	141.36	127.68	141.36	1497.96
Jindal Power	87.25	89.22	77.78	82.41	79.95	102.60	91.88	98.55	106.02	106.02	95.76	106.02	1123.47
Jindal Thermal	63.58	58.61	61.24	49.84	24.22	68.40	0.00	68.40	70.68	70.68	63.84	70.68	670.17
Jhabua Power	36.44	54.98	67.48	35.47	35.47	78.66	0.00	78.66	81.28	81.28	73.42	81.28	704.42
Jhabua Power	31.73	47.81	60.58	29.09	18.30	68.40	0.00	68.40	70.68	70.68	63.84	70.68	600.19
BALCO	65.06	67.71	61.76	56.27	69.94	68.40	0.00	68.40	70.68	70.68	63.84	70.68	733.42
Total	654.50	690.14	677.55	562.26	535.38	827.10	380.42	807.47	854.67	854.67	771.96	854.67	8470.80

Annexure : 4.4 : Monthly energy schedule of Central Generating Stations at exbus for the year 2019-20

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
RSPTS Stage I & II	164.66	153.95	125.46	153.95	129.64	164.66	170.15	148.98	129.64	170.15	126.61	170.15	1808.01
RSTPS Stage III	41.39	42.77	41.39		42.77	41.39	42.77	41.39	42.77	42.77	31.05	42.77	453.27
TALCHER - Stage II	289.76	299.42	289.76	224.57	299.42	217.32	224.57	217.32	299.42	273.83	238.09	299.42	3172.90
Simhadri Exp	51.46	53.18	28.28	53.18	29.22	51.46	53.18	51.46	53.18	53.18	48.64	58.44	584.87
NLC-II- Stage-1	27.22	35.86	27.22	35.86	35.86	34.70	28.12	34.70	35.86	35.86	30.25	35.86	397.35
NLC-II- Stage-2	50.72	52.41	38.04	52.41	39.31	50.72	52.41	38.04	39.31	52.41	49.25	52.41	567.42
NLC- Exp- Stage-1	38.35	39.63	38.35	20.50	39.63	38.35	39.63	38.35	39.63	19.93	37.07	39.63	429.02
NLC - II Exp	24.77	25.60	24.77	25.60	15.71	15.20	25.60	24.77	25.60	25.60	23.95	25.60	282.78
MAPS	11.08	11.45	11.08	11.45	11.45	11.08	5.72	11.08	5.72	11.45	10.60	11.45	123.59
KAIGA Stg I& II	33.82	24.32	43.30	44.75	44.75	32.03	44.75	43.30	44.75	44.75	41.51	44.75	486.76
K'kulam - I & II	137.64	142.23	137.64	142.23	142.23	137.64	142.23	137.64	69.52	72.71	134.43	142.23	1538.37
Vallur JV with	20.58	31.90	30.87	31.90	31.90	21.07	31.90	20.58	31.90	31.90	30.62	31.90	347.05
NTPL(Tuticorin)	44.80	46.30	22.11	46.30	46.30	44.80	46.30	44.80	46.30	46.30	21.40	46.30	501.99
Kudgi Unit I II & III	66.24	68.45	66.24	57.04	57.04	55.20	57.04	55.20	57.04	68.45	65.79	68.45	742.20
Bhavini			23.41	24.19	24.19	23.41	24.19	23.41	24.19	24.19	21.98	24.19	237.31
Total	1002.51	1027.46	947.92	923.90	989.40	939.05	988.55	931.04	944.82	973.46	911.24	1093.53	11672.87

Annexure 4.5 : Monthly Schedule of IPPs at ex bus for 2019-20

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
Maithon power	99.31	102.62	99.31	102.62	102.62	99.31		99.31	102.62	102.62	92.73	102.62	1105.73
Maithon power	99.31	102.62	99.31	102.62		99.31	102.62	99.31	102.62	102.62	92.73	102.62	1105.73
DVC-Mejia TPS	63.44	65.56	63.44	65.56		63.44	65.56	63.44	65.56	65.56	58.37	65.56	705.50
DVC-R'pur TPS	31.30	32.35	31.30	32.35	32.35	31.30	32.35		32.35	32.35	27.76	32.35	348.10
Jindal Power	123.12	127.22	123.12	127.22	127.22	123.12	127.22	123.12	127.22	127.22	114.91	127.22	1497.96
Jindal Power	92.34	95.42	92.34	95.42	95.42	92.34	95.42	92.34	95.42	95.42	86.18	95.42	1123.47
Jindal Thermal	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Jhabua Power	70.79	73.15	70.79	73.15	73.15	70.79	73.15	70.79	73.15	73.15	66.07	73.15	861.33
Jhabua Power	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
BALCO	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Total	764.31	789.79	764.31	789.79	621.60	764.31	687.16	733.01	789.79	789.79	711.13	789.79	8994.76

Annexure 4.6 : Monthly energy schedule of Central Generating Stations at exbus for the year 2020-21

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
RSPTS Stage I & II	164.66	153.95	125.46	153.95	129.64	164.66	170.15	148.98	129.64	170.15	126.61	170.15	1808.01
RSTPS Stage III	41.39	42.77	41.39		42.77	41.39	42.77	41.39	42.77	42.77	31.05	42.77	453.27
TALCHER - Stage II	289.76	299.42	289.76	224.57	299.42	217.32	224.57	217.32	299.42	273.83	238.09	299.42	3172.90
Simhadri Exp	51.46	53.18	28.28	53.18	29.22	51.46	53.18	51.46	53.18	53.18	48.64	58.44	584.87
NLC-II- Stage-1	27.22	35.86	27.22	35.86	35.86	34.70	28.12	34.70	35.86	35.86	30.25	35.86	397.35
NLC-II- Stage-2	50.72	52.41	38.04	52.41	39.31	50.72	52.41	38.04	39.31	52.41	49.25	52.41	567.42
NLC- Exp- Stage-1	38.35	39.63	38.35	20.50	39.63	38.35	39.63	38.35	39.63	19.93	37.07	39.63	429.02
NLC - II Exp	24.77	25.60	24.77	25.60	15.71	15.20	25.60	24.77	25.60	25.60	23.95	25.60	282.78
MAPS	11.08	11.45	11.08	11.45	11.45	11.08	5.72	11.08	5.72	11.45	10.60	11.45	123.59
KAIGA Stg I& II	33.82	24.32	43.30	44.75	44.75	32.03	44.75	43.30	44.75	44.75	41.51	44.75	486.76
K'kulam - I & II	137.64	142.23	137.64	142.23	142.23	137.64	142.23	137.64	69.52	72.71	134.43	142.23	1538.37
Vallur JV with	20.58	31.90	30.87	31.90	31.90	21.07	31.90	20.58	31.90	31.90	30.62	31.90	347.05
NTPL(Tuticorin)	44.80	46.30	22.11	46.30	46.30	44.80	46.30	44.80	46.30	46.30	21.40	46.30	501.99
Kudgi Unit I II & III	66.24	68.45	66.24	57.04	57.04	55.20	57.04	55.20	57.04	68.45	65.79	68.45	742.20
Bhavini	24.52		24.52	25.34	25.34	24.52	25.34	24.52	25.34	25.34	21.11	25.34	271.21
Total	1027.03	1027.46	949.03	925.05	990.55	940.16	989.71	932.15	945.97	974.61	910.36	1094.69	11706.77

Annexure 4.7 : Monthly Schedule of IPPs at exbus for 2020-21

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
Maithon power	99.31	102.62	99.31	102.62	102.62	99.31		99.31	102.62	102.62	92.73	102.62	1105.73
Maithon power	99.31	102.62	99.31	102.62	102.62	99.31	102.62	99.31	102.62		92.73	102.62	1105.73
DVC-Mejia TPS	63.44	65.56	63.44	65.56		63.44	65.56	63.44	65.56	65.56	58.37	65.56	705.50
DVC-R'pur TPS	31.30	32.35	31.30	32.35	32.35	31.30	32.35		32.35	32.35	27.76	32.35	348.10
Jindal Power	123.12	127.22	123.12	127.22	127.22	123.12	127.22	123.12	127.22	127.22	114.91	127.22	1497.96
Jindal Power	92.34	95.42	92.34	95.42	95.42	92.34	95.42	92.34	95.42	95.42	86.18	95.42	1123.47
Jindal Thermal	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Jhabua Power	70.79	73.15	70.79	73.15	73.15	70.79	73.15	70.79	73.15	73.15	66.07	73.15	861.33
Jhabua Power	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
BALCO	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Total	764.31	789.79	764.31	789.79	821.60	764.31	687.16	733.01	789.79	789.79	711.13	789.79	8994.76

Annexure 4.8 : Monthly energy schedule of Central Generating Stations at exbus for the year 2021-22

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
RSPTS Stage I & II	164.66	153.95	125.46	153.95	129.64	164.66	170.15	148.98	129.64	170.15	126.61	170.15	1808.01
RSTPS Stage III	41.39	42.77	41.39		42.77	41.39	42.77	41.39	42.77	42.77	31.05	42.77	453.27
TALCHER - Stage II	289.76	299.42	289.76	224.57	299.42	217.32	224.57	217.32	299.42	273.83	238.09	299.42	3172.90
Simhadri Exp	51.46	53.18	28.28	53.18	29.22	51.46	53.18	51.46	53.18	53.18	48.64	58.44	584.87
NLC-II- Stage-1	27.22	35.86	27.22	35.86	35.86	34.70	28.12	34.70	35.86	35.86	30.25	35.86	397.35
NLC-II- Stage-2	50.72	52.41	38.04	52.41	39.31	50.72	52.41	38.04	39.31	52.41	49.25	52.41	567.42
NLC- Exp- Stage-1	38.35	39.63	38.35	20.50	39.63	38.35	39.63	38.35	39.63	19.93	37.07	39.63	429.02
NLC - II Exp	24.77	25.60	24.77	25.60	15.71	15.20	25.60	24.77	25.60	25.60	23.95	25.60	282.78
MAPS	11.08	11.45	11.08	11.45	11.45	11.08	5.72	11.08	5.72	11.45	10.60	11.45	123.59
KAIGA Stg I& II	33.82	24.32	43.30	44.75	44.75	32.03	44.75	43.30	44.75	44.75	41.51	44.75	486.76
K'kulam - I &II	137.64	142.23	137.64	142.23	142.23	137.64	142.23	137.64	69.52	72.71	134.43	142.23	1538.37
Vallur JV with	20.58	31.90	30.87	31.90	31.90	21.07	31.90	20.58	31.90	31.90	30.62	31.90	347.05
NTPL(Tuticorin JV)	44.80	46.30	22.11	46.30	46.30	44.80	46.30	44.80	46.30	46.30	21.40	46.30	501.99
Kudgi Unit I II & III	66.24	68.45	66.24	57.04	57.04	55.20	57.04	55.20	57.04	68.45	65.79	68.45	742.20
Bhavini	24.52		24.52	25.34	25.34	24.52	25.34	24.52	25.34	25.34	21.11	25.34	271.21
Total	1027.03	1027.46	949.03	925.05	990.55	940.16	989.71	932.15	945.97	974.61	910.36	1094.69	11706.77

Annexure 4.9 : Monthly Schedule of IPPs at exbusfor 2021-22

Source	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
Maithon power	99.31	102.62	99.31	102.62	102.62	99.31		99.31	102.62	102.62	92.73	102.62	1105.73
Maithon power	99.31	102.62	99.31	102.62	102.62	99.31	102.62	99.31	102.62		92.73	102.62	1105.73
DVC-Mejia TPS	63.44	65.56	63.44	65.56		63.44	65.56	63.44	65.56	65.56	58.37	65.56	705.50
DVC-R'pur TPS	31.30	32.35	31.30	32.35	32.35	31.30	32.35		32.35	32.35	27.76	32.35	348.10
Jindal Power	123.12	127.22	123.12	127.22	127.22	123.12	127.22	123.12	127.22	127.22	114.91	127.22	1497.96
Jindal Power	92.34	95.42	92.34	95.42	95.42	92.34	95.42	92.34	95.42	95.42	86.18	95.42	1123.47
Jindal Thermal	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Jhabua Power	70.79	73.15	70.79	73.15	73.15	70.79	73.15	70.79	73.15	73.15	66.07	73.15	861.33
Jhabua Power	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
BALCO	61.56	63.61	61.56	63.61	63.61	61.56	63.61	61.56	63.61	63.61	57.46	63.61	748.98
Total	764.31	789.79	764.31	789.79	724.23	764.31	687.16	733.01	789.79	687.16	711.13	789.79	8994.76

Annexure 4.10 : Status of Ongoing Projects (CAP)

R-APDRP WORK

Government of India sanctioned R-APDRP scheme during 2010. In Kerala, 43 schemes were sanctioned under Part A and B. The total outlay for Part A schemes comes to Rs.214.32 Crore towards IT and Rs 83.15 Cr towards SCADA scheme and that for Part B is Rs. 1078.3 Crore.

R – APDRP (Part A) Scheme

Part-A of R-APDRP – IT

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

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

The project stand closed and financial closure is submitted. Release of balance tranche Rs 34.03 Cr is pending from PFC for which letter already issued to Nodal Officer, PFC.

PART A of R-APDRP- SCADA

This scheme envisages the advanced distribution automation, loss reduction and reliability improvement in three cities of Trivandrum, Kochi & Kozhikode. For this scheme, 100 % grant is provided by Government of India. The details of project are as follows:

<i>Implementation Agency</i>	<i>: M/s Schneider Electric India</i>
<i>Total Project cost as Approved by PFC</i>	<i>: Rs. 83.15Cr</i>
<i>Awarded cost to Schneider Electric (SIA)</i>	<i>: Rs. 56.7Cr</i>
<i>Target date of Completion</i>	<i>:30.09.2018</i>

Status: Control Centre Equipments installed at Trivandrum, Ernakulam & Kozhikode and DR Centre have been installed & is operational. Substation RTU installation & LDMS integration works completed. End to end test of 96% substations with control room completed (48/50). Erection works of 96% FRTUs (2750/2865), integration of 78% FRTUs (2225/2865) with RMUs are also completed. FRTU end to end testing is just commenced (16/2865). Tender floated for GIS – SCADA integration interface adaptor in CIM XML format using a middleware solution.

Financial Progress: Out of Rs 27.915 Cr Grant received, Rs. 22 Cr is already spent. An amount of Rs. 17 Cr each will be required for FY 2018-19 and FY 2019-20.

PART-B of R-APDRP Scheme

Part B of the R-APDRP covers system improvement works which aims an achievement of AT&C losses to 15% in town areas and other work which leads to loss reduction in the project area. The total number of schemes sanctioned is 43 out of which 40 are town schemes and 3 are City schemes. The town schemes were executed departmentally and the city schemes were executed on turnkey basis. All the 43 schemes were closed and closure proposal was submitted to PFC. Twenty five percent (25%) of the sanctioned amount will be given by MoP as loan and balance 75% of the outlay is to be raised by the utility as loan or own fund. Up to 50% of the scheme cost will be converted to grant on successful completion of the scheme and reducing the AT&C loss to 15% or below and sustaining it for a period of 5 years. KSEB has availed counterpart loan from M/s REC Ltd. The financial details as on 30.09.2018 and target & achievements are as given below:

Table A : Financial Details as on 31.03.2018					
Scheme	GOI sanction	Amount by PFC (25%)	REC Loan (65.25%)	Total fund received	Total Expenditure
Town & city schemes	1078.3	258.328	648.787	907.115	1115.182

Table B : Town / City schemes Achievement		
Scheme	Target (Rs Cr)	Achievement (Rs Cr)
Towns (40)	530.78	517.193
Cities (3)	547.51	597.989
Total	1078.29	1115.182

Table C : City schemes Achievement (Rs Cr)			
Scheme	Sanctioned Cost	Awarded Cost	Achievement
Thiruvananthapuram	178.77	201.09	187.61
Kochi	207.96	243.97	231.929
Kozhikode	160.78	198.54	178.45
Total	547.51	643.60	597.989

An outlay of Rs **111.21 Cr** is Included in the plan period FY 2018-19 towards R-APDRP Part-B Scheme closure.

DDUGJY Scheme

The Deen Dayal Upadhyaya Gram Jyothi Yojana (DDUGJY), has the broad objective of, providing electricity to all households, AT&C Loss reduction and 24X7 power in rural areas with 60% grant from GoI, 10% KSEB contribution, 30% loan. M/s. Rural Electrification Corporation (REC) is the

Nodal agency. The Project was sanctioned on 05.01.2016 and was to be completed by 04.07.2018. However KSEBL has sought time extension up to 31.12.2018 from MoP. GoI had sanctioned an amount of Rs.485.37 Cr on 14.08.2015 which consists of Rs. 482.96 Cr for works and Rs. 2.41 crore towards Project Management Agency (PMA) charges. An outlay of Rs.242.07 Cr is included in plan for 2018-19. Physical status of the work as on 30-06-2018 is given below.

Table D : DDUGJY Scheme				
No	Item	Unit	Sanction	Progress*
1	33/11 KV New Substations	Nos.	2	1
2	Augmentation - 3/11 KV SS	Nos.	7	3
3	Distribution Transformers (DTRs)	Nos.	581	420
4	LTLine	Ckm	3368.11	2292.35
5	11 KV Line	Ckm	1281.94	759.68
6	33 & 66 KVLine	Ckm	17	0
7	Energy Meter -Consumer	Nos.	1778944	1133096
8	Energy Meter - DTR	Nos.	23655	288
9	Energy Meter - 11 KV Feeder	Nos.	103	0
10	Intensive Electrification of Villages	Nos.	1315	1315
11	SAGY Villages	Nos.	27	10
12	Connection to BPL	Nos.	98527	108622
* up to 30.06.18				

IPDS WORK

The GoI has launched the Integrated Power Development Scheme (IPDS) to extend financial assistance against capital expenditure to address the gaps in sub transmission & distribution network and metering in urban areas by supplementing the resources of DISCOMs/Power Departments. The project was commenced on 15.06.16. The work wise financial outlay for IPDS is given in the table below. The progress of the project as on 30.06.18 is given thereafter.

Table E : IPDS Works proposed			
No	Particulars	Physical	Financial (Rs.Cr.)
1	Service connections (Nos)		
2	11kV lines(ckt km) and UG cables	458.179	74.66
3	LT lines(ckt km)	200.392	9.74
4	LT Augmentation/Reconductoring -(km)	2046.193	50.76
5	Distribution transformers (No:s)	809	25.3
6	Distribution transformers Enhancement (Nos)	382	10.476
7	Transformer faulty replacement		
8	Installment of street lights(No:s)		

9	Faulty meters replacement -Electronic (No:s)	344882	21.73
10	Faulty meters replacement -mechanical (No:s)		
11	Mechanical meter replacement (No:)		
12	LT Reconductoring (ckt km)		
13	HT Reconductoring (ckt km)	148.63	5.04
14	Others (Solar RT, HVDS, Trans works etc.)		309.61
	Total		507.32

Table F : IPDS Works Progress (as on 01.10.2018)

No.	Particular	Unit	Revised Qty	Phy Achvt	Revised Cost (Rs. Lac)	Fin Ach (Total)
A	New Substation:	Nos	3	*	2962.42	433.93
B	Additional Transformer	Nos.	1	0	246.84	0
C	Transformer capacity enht	Nos.	14	6	1493.45	404.662
D	R&M of Substations	Nos.	95	12.65	2432.82	313.58
E	New 33 KV new OH feeder	km	26.87	2.773	974.09	71.37
F	66 KV TL Reconductoring	km	27.70	14.38	749.70	209.09
G	33 kV Line Bay Extension	Nos	6.00	0	253.00	12.04
H	11 kV Line New / Bifurcation	km	326.69	89.867	2131.29	586.28
I	11 kV Line : Augmntn/Recond	km	184.97	44.48	625.91	148.52
J	AB Cable (HT & LT)	km	1152.393	26.006	17889.30	385.06
K	11 kV UG Cable	km	192.19	13.725	6006.61	428.96
L	11 KV Bay Extension	km	0	0	0.00	0.00
M	Distribution Transformer	Nos.	829	177	2588.52	543.69
N	LT SS Capacity enht	Nos.	384	167	1052.46	448.73
O	LT Line : New / Bifurcation	km	218.015	19.051	1056.76	89.54
P	LT Line : Augmntn/Recond	km	2416.49	604.64	6185.32	1720.17
R	HVDS	Nos.	107	0	106.70	0.00
S	Metering	Nos.	655401	304757	7955.14	2991.81
T	Provisioning of solar panel	kWp	5465	3810	3825.5	2667
U	RMU, Auto enclosure, FPI etc	E	58	0	278.45	0
V	Others (Rs lakhs)				392.56	30.009
	GRAND TOTAL				59207.00	11484.43
% overall Progress						19.40%

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CHAPTER – 5

SUMMARY OF ARR & ERC FOR 2018-19 TO 2021-22

The Aggregate Revenue Requirement and Expected Revenue from Charges (ARR & ERC) projected for the control period has been described in detail in the previous chapters 2, 3 & 4. The following table summarizes the various items of expenditure and revenue requirement for the control period.

Table 5.1 : Aggregate Revenue Requirement of KSEBL (Rs Cr)					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Cost of Generation	522.94	560.87	657.72	792.44
2	Cost of Power Purchase	7942.01	8672.27	8884.51	9184.58
3	Cost of Intra State Transmission	951.47	1106.58	1394.65	1637.52
4	NLDC /RLDC charges	3	3	3	3
5	O&M Expenses	2241.36	2498.79	2731.69	2956.49
6	I&F charges on long-term loans	304.86	486.34	594.91	688.82
7	Interest on Trust Bonds	646.45	612.43	578.40	544.38
8	Interest on additional bonds	311.58	311.58	311.58	311.58
9	Interest on Provident Fund	160.19	170.72	181.24	191.77
10	Interest on Security Deposit	199.93	218.49	238.74	258.99
11	Interest on WC and deposits	0.00	0.00	0.00	0.00
12	Carrying Cost on Gap	281.17	200.32	104.68	9.03
13	Depreciation	109.72	143.99	163.89	181.71
14	One Time expenses	29.24			
15	Bad debts written off	15	15	15	15
16	Recovery of previous gap	806.47	806.47	806.47	806.47
17	Total Revenue Expenditure	14525.39	15806.85	16666.49	17581.79
18	Return on Equity	253.50	253.50	253.50	253.50
19	Tax on RoE	0	0	0	0
20	Aggregate Revenue Requirement	1478.89	16060.35	16919.99	17835.29

The net ARR of KSEBL for the control period is submitted below:

Table 5.2 : Aggregate Revenue Requirement of SBU-D (Rs Cr)					
No	Particulars	2018-19	2019-20	2020-21	2021-22
1	Gross ARR	14778.89	16060.35	16919.99	17835.29
2	Less Other Income	357.80	371.99	393.00	414.03
3	Less Non Tariff Income	173.75	176.11	178.23	180.33
4	Net ARR	14247.34	15512.25	16348.76	17240.93

The net revenue estimated for the next control period is given in the table below

Table 5.3 : Net Revenue (Rs Cr)				
Item	2018-19	2019-20	2010-21	2021-22
Revenue	12449.82	13254.67	13874.14	14523.36
Power factor incentive	97.79	104.21	108.85	113.73
Net Revenue from Tariff	12352.03	13150.46	13765.29	14409.63
Fuel Surcharge	81.65			
Revenue from external sales	712.96	962.74	518.19	312.38
Total revenue	13146.64	14113.2	14283.48	14722.01

REVENUE GAP

The net revenue gap, thus calculated, for next control period is given below.

Table 5.4 : Revenue Gap (Rs Cr)				
Particulars	2018-19	2019-20	2020-21	2021-22
Net ARR	14247.34	15512.25	16348.76	17240.93
Net Revenue	13146.64	14113.2	14283.48	14722.01
Revenue Gap	1100.70	1399.05	2065.28	2518.92

The estimate of sales, losses, energy requirement, various expenses, revenue and revenue gap for the control period have been made taking into consideration of past trends as well as the present trend up to September-2018. KSEBL humbly submit the proposals for bridging the revenue gap in the next chapter. KSEBL may request before the Hon Commission to approve the estimated revenue gap for the control period 2018-19 to 2021-22 as detailed in this petition.

It is earnestly submitted before the Hon Commission that, KSEBL has exercised due diligence possible in estimation of ARR, ERC petition. Care has also been taken to minimise the impact of tariff revision to all consumers especially certain deserving weaker sections of the society without much burden on the finances of the organisation. KSEBL has submitted the relevant information related to the claims made in this petition in the body text of the petition, annexure and formats provided therein. However, It is appealed that should the commission require any additional related information on these aspects, KSEBL may please be given the opportunity to submit such information before the Hon Commission.

KSEBL is constantly pursuing its visions to become the best power utility in India so as to provide quality electricity to customers adequately, safely, sustainably at affordable cost. The Petitioner, therefore, seeks the support of the Hon Commission in fulfilling its endeavour to achieve the mission and vision.

CHAPTER - 6

PROPOSALS TO BRIDGE THE REVENUE GAP FOR THE CONTROL PERIOD 2018-19 TO 2021-22

Introduction

The ARR and ERC for the three SBUs of KSEBL is provided in the previous chapters of this petition. A gist of the same is given in the table below.

Table 6.1: Net ARR and Revenue Gap				
Year	2018-19	2019-20	2020-21	2021-22
Net ARR (Rs. Cr.)	13534.39	14549.51	15830.57	16928.55
Revenue Gap (Rs. Cr.)	1100.77	1399.05	2065.28	2518.92

This revenue gap is inclusive of recovery of approved past revenue gap including its carrying cost as below:

Table 6.2 : Carrying cost for past revenue gap (Rs Cr)		
Year	Portion of past gap	Carrying cost
2018-19	806.47	281.17
2019-20	806.47	200.32
2020-21	806.47	104.68
2021-22	806.47	9.03

In the present proposal, it is proposed to mobilize an amount of Rs.1101.72 crore through revision of retail tariff on the basis of sales projection for the first year 2018-19. The said revised tariff is proposed to continue through 2019-20 also. Subsequently, in the third year (2020-21) a further revision for recovering an amount of Rs.700.44 Cr is also proposed which would remain applicable for the year 2021-22 also.

Basis of the tariff proposal

Now this tariff proposal is being submitted in accordance with provisions of:

1. The Electricity Act 2003
2. Tariff policy 2016
3. KSERC (Terms and Conditions of Determination for determination of Tariff) Regulations 2018

4. KSERC (Principles for determination of road map for cross-subsidy reduction for Distribution licensees) Regulation 2012, as extended vide notification dated 19.12.2017
5. Various Judgments of Hon APTEL

As per the provisions of the Electricity Act 2003 the tariff should be in such a way that it progressively reflects the cost of supply. Moreover, the tariff shall be different for different categories of consumers depending upon the load factor, power factor, voltage, total consumption, time of consumption and the purpose of usage.

The Tariff Policy recommends that tariff should be in such a manner that the tariffs of subsidizing and subsidized categories shall be within + / - 20 % of the average cost of supply. It also stipulates that the minimum tariff shall be at least 50% of the average cost of supply.

Hon Commission had notified 'Kerala State Electricity Regulatory Commission (Principles for determination of roadmap for cross-subsidy reduction for Distribution Licensees) Regulations, 2012' on 20th November, 2012. This regulation specified the Principles for determination of cross subsidy reduction and the roadmap for adoption of cross subsidy reduction and was valid for a period of 60 months or such extended time. Since the intended road map could not be achieved within the stipulated time without involving any tariff shock to the consumers Hon Commission as per notification dated 19.12.2017 extended the validity of the above regulations for further period of 48 months from 20.11.2017.

Regulation 84(5) of the Tariff Regulations 2018 envisages determination of tariff based on the average cost of supply. This Hon Commission has included provision for determining voltage wise cost of supply also, as per Regulation 84 (9).

In the suo-moto order dated 17.04.2017 this Hon Commission had calculated the voltage wise cost of supply at different voltage levels based on the principle suggested by Hon APTEL. At the same time, the Hon Commission fixed the tariff of different categories of consumers based on the Average Cost of Supply in accordance with the prevailing regulations.

Meanwhile, the Ministry of Power, Government of India initiated steps for simplification of tariff structures and rationalization of tariff by constituting two separate committees for these purposes. These committees submitted their reports in June 2017 and October 2017 respectively. The Committee on rationalization of electricity tariff in its report submitted in October 2017 has recommended that utilities should ensure two-part tariff structure with demand and energy charges in all categories to charge all consumers for both demand and consumption. It is also recommended to determine the fixed and variable charges separately. All the fixed costs of the ARR will form basis for fixed charges and the variable component of power purchase, the basis for variable charge. The committee has also recommended simplification of tariff structure and reduction of cross subsidies to a

minimum level. It further discourages inter class cross subsidy, but promotes intra class cross subsidy for ensuring progressivity.

The Committee has recommended that utilities should ensure to progressively reduce cross-subsidies for all categories in order to establish fairness and non-discrimination in tariffs. A roadmap for achieving the following coverage levels may be designed.

Table 6.3: Recommended cost coverage	
Category	Target cost-coverage levels (% of CoS)
Domestic	80%-100%
Agriculture	80%-100%
Industry	100% - 120%
Commercial	100% - 120%
Institutional	100% - 120%

In respect of fixed charge recovery, the committee has recommended that:

“Revenue stability for utilities should be ensured through higher fixed cost recovery from fixed/demand charges. Following ratios of revenue from fixed/demand charges to fixed costs may be targeted to achieve for the rationalization exercise”.

Table 4: Recommendation on Fixed Charge	
Category	Fixed/Demand Charge revenue to fixed costs ratio
Domestic	25 - 50%
Agriculture	25 - 50%
Industry	75 - 100 %
Commercial	75 - 100 %

It has further recommended that:

“Progressivity among tariffs to be ensured by having telescopic tariff slabs which encourages efficient consumption and at the same time promotes intra category cross subsidy by way of charging higher tariff for higher consumption to subsidise the lower consumption consumers”.

Implementation of recommendations would require a complete recasting of the entire tariff structure. Since the entire recommendations can be implemented only in a phased manner to avoid tariff shocks among domestic and agricultural consumer categories, this proposal envisages a gradual shift to the recommended tariff structure, complying with the provisions of KSERC (Principles for determination of road map for cross-subsidy reduction for Distribution licensees) Regulation 2012.

Average Cost of Supply

The Average Cost of Supply (ACoS) for the control period worked out is given in the table below:

Table 6.5 : Average Cost of Supply					
No	Item	2018-19	2019-20	2020-21	2021-22
1	Projected Net ARR – Rs. Cr.	13534.39	14549.51	15830.57	16928.55
2	Projected sales within the state – MU	21648.91	23249.09	23927.29	25571.88
3	Average Cost of Supply – Rs/kWh	6.25	6.28	6.62	6.62

An analysis of Revenue *at existing tariff* from various categories and deviation from ACoS is given in Table below. This shows that tariff of majority of the consumer categories are falling within the recommended band of 80% to 100% of the ACoS. In certain cases the average tariff is above 120% of tariff, but the cross subsidy level is coming down from 2017-18. Considering that LT III B & LT IX tariffs are still much above the recommended band, no tariff revision is proposed for such tariff categories.

Table 6.6 : Realization at present tariff (2018-19)						
No	Category	Sales (MU)	Revenue* (Rs Cr)	Average tariff (Rs/kWh)	Deviation from present ACoS (Rs.5.26)	Deviation from proposed ACoS (Rs 6.25)
I	LT Category					
1	LT I Domestic	10856.52	4481.91	4.13	78.49	66.05
2	LT II Colony	4.99	3.28	6.57	124.87	105.09
3	LT III Temp connection	1.49	2.69	18.05	343.23	288.86
3	LT IV A Industrial	1091.53	777.73	7.13	135.46	114.00
4	LT IV B Industrial	9.45	6.56	6.95	132.09	111.17
5	LT V A Agriculture	303.01	71.41	2.36	44.80	37.70
6	LT V B Agriculture	47.00	12.45	2.65	50.36	42.38
7	LT VI A General	207.10	145.97	7.05	134.00	112.77
8	LT VI B General	124.31	98.58	7.93	150.77	126.88
9	LT VI C General	242.82	259.68	10.69	203.31	171.11
10	LT VI D General	22.21	4.00	1.80	34.22	28.80
11	LT VI E General	3.19	1.70	5.34	101.49	85.41
12	LT VI F General	906.39	860.93	9.50	180.58	151.98
13	LT VI G General	72.18	72.95	10.11	192.15	161.71
14	LT VII A Commercial	1369.81	1338.70	9.77	185.79	156.36
15	LT VII B Commercial	200.92	133.59	6.65	126.40	106.38
16	LT VII C Commercial	19.28	15.88	8.24	156.66	131.85
17	LT VIII A Pub Lighting	299.13	141.19	4.72	89.73	75.52
18	LT VIII B Public Lighting	81.71	32.03	3.92	74.52	62.72
19	LT IX Adv & Hoardings	2.05	3.89	18.98	360.75	303.61
	LT Subtotal	15865.11	8465.12	5.34		85.37
*at present tariff						

Table 5.6 Continued...						
No	Category	Sales (MU)	Revenue* (Rs Cr)	Average tariff (Rs/kWh)	Deviation from present ACoS (Rs.5.26)	Deviation from ACoS (%)
II	HT category					
1	HT I A Industrial	2124.95	1406.88	6.62	125.87	105.93
2	HT I B Industrial	12.71	9.73	7.66	145.60	122.54
3	HT II A General	182.24	127.38	6.99	132.89	111.84
4	HT II B General	615.66	519.99	8.45	160.57	135.14
5	HT III A Agriculture	7.58	4.08	5.38	102.26	86.06
6	HT III B Agriculture	2.11	0.95	4.50	85.53	71.98
7	HT IV Commercial	671.26	623.11	9.28	176.48	148.52
8	HT V Domestic	15.41	12.34	8.01	152.26	128.14
II a	Bulk Licensees HT					
1	KDHPCL	52.06	27.35	5.25	99.89	84.07
2	MES	73.37	48.48	6.61	125.60	105.71
3	Karnataka	0.81	0.57	6.98	132.78	111.75
4	Smart City	2.81	1.95	6.96	132.26	111.31
	HT Sub Total	3760.98	2782.82	7.40		118.39
III	EHT Category					
1	EHT 66 kV Industrial	355.56	205.23	5.77	109.73	92.35
2	EHT 110 kV Industrial	748.67	419.58	5.60	106.55	89.67
3	EHT 220 kV Industrial	94.83	55.26	5.83	110.79	93.24
4	EHT General A	12.32	7.11	5.77	109.66	92.29
5	EHT General B	58.16	47.93	8.24	156.69	131.87
6	EHT Railway Traction	273.51	167.89	6.14	116.70	98.21
7	KMRL	15.79	9.39	5.95	113.05	95.14
III a	Bulk Licensees EHT					
1	KPUPL	86.37	54.66	6.33	120.30	101.25
2	CSEZ	55.72	33.96	6.10	115.88	97.52
3	RPL	31.16	16.43	5.27	100.22	84.34
4	Technopark	89.44	53.76	6.01	114.26	96.16
5	Cochin Port trust	35.33	24.02	6.80	129.28	108.80
6	Thrissur Corporation	158.31	104.24	6.58	125.18	105.35
7	Infopark	7.64	5.17	6.77	128.65	108.27
	EHT Subtotal	2022.82	1204.63	5.96	120.30	101.25
IV	Grand Total	21648.91	12452.56	5.75		
	*at present tariff					

Analysis of fixed and variable cost realization

The Table below shows analysis of present energy charge as well as fixed charge realization from various categories. It may be noted that realization of fixed charges from tariff is only 13.95% on an average.

Table 6.7 : Revenue from fixed & variable charges at present tariff					
Category	Energy sale	Energy charge	Fixed charge	Total Revenue	FC realization
	MU	Rs Cr	Rs Cr	Rs Cr	%
LT Category					
LT I Domestic	10856.52	4105.58	375.93	4481.52	8.39

LT II	4.90	3.27	0.01	3.28	0.22
LT III	1.49	2.65	0.03	2.69	1.24
LT IV A Industry	1091.53	600.34	177.39	777.73	22.81
LT IV B Industry	9.45	5.67	0.90	6.56	13.64
LT V A Agriculture	303.01	60.60	10.70	71.30	15.01
LT V B Agriculture	47.00	11.75	0.80	12.55	6.37
LT VI General A	207.10	120.97	25.00	145.97	17.13
LT VI General B	124.31	83.64	14.94	98.58	15.15
LT VI General C	242.82	197.54	62.14	259.68	23.93
LT VI General D	22.21	4.00	0.00	4.00	0.00
LT VI General E	3.19	1.35	0.35	1.70	20.60
LT VI General F	906.39	765.61	95.33	860.93	11.07
LT VI General G	72.18	51.68	21.27	72.95	29.16
LT VII Commercial A	1369.82	1110.29	228.41	1338.70	17.06
LT VII Commercial B	200.92	105.77	27.82	133.59	20.82
LT VII Commercial C	19.28	13.60	2.28	15.88	14.37
LT VIII A	299.13	141.19	0.00	141.19	0.00
LT VIII B	81.71	32.03	2.03	34.06	5.96
LT IX	2.01	2.52	1.24	3.76	33.06
Total	15864.97	7420.05	1046.56	8466.61	12.36
HT Category					
HT I A Industry	2124.95	1151.03	255.85	1406.88	18.19
HT I B Industry	12.71	2.12	7.61	9.73	78.18
HT II A General	182.24	99.78	27.61	127.39	21.67
HT II B General	615.66	437.98	82.00	519.99	15.77
HT III A Agriculture	7.58	2.09	1.99	4.08	48.77
HT III B Agriculture	2.11	0.69	0.26	0.95	27.28
HT IV Commercial	671.26	490.70	132.41	623.11	21.25
HT V Domestic	15.41	8.70	3.63	12.33	29.43
Total	3631.92	2193.10	511.36	2704.47	18.91
EHT Category					
EHT general A	12.32	6.23	0.87	7.10	12.25
EHT general B	58.16	39.10	8.83	47.93	18.42
EHT 66 kV Industry	355.56	175.53	29.69	205.22	14.47
EHT 110 kV Industry	748.67	367.74	51.84	419.58	12.36
EHT 220 kV Industry	94.83	43.87	11.39	55.26	20.61
EHT 110 kV Railway	273.51	139.49	28.40	167.89	16.92
KMRL	15.79	7.58	1.81	9.39	19.27
Total	1558.85	779.55	132.83	912.38	14.56
Bulk licensees HT	128.24	66.99	11.20	78.19	14.32
Bulk licensees other state HT	0.81	0.46	0.11	0.57	19.43
Bulk licensees EHT	463.97	257.16	35.08	292.23	12.00
Total	593.03	324.60	46.39	370.99	12.50
Grand Total	21648.77	10717.31	1737.14	12454.45	13.95
Percentage realization		86.05	13.95		

Whereas, the fixed cost component of the ARR of KSEBL is about 73% as shown below:

Table 6.8 : Fixed and Variable cost components of ARR (2017-18)		
No.	Item	2017-18
1	ARR of SBU - Generation	677.48
2	ARR of SBU - Transmission	905.20
3	Power Purchase cost – fixed charge	4183.42
4	Interest & finance charges	998.68
5	Depreciation	58.12
6	O&M expenses	1440.36
7	RoE	68.64
	Total fixed costs	8331.90
1	Energy charge portion of power purchase cost	3155.92
2	Total ARR	11487.82
3	Fixed cost component of ARR	72.53 %
4	Variable charge component of ARR	27.47%

To level this disparity in fixed costs incurred by KSEBL and that recovered through fixed charges from consumers, a gradual increase in fixed charges are suggested. To begin with, it is proposed to increase the fixed charge recovery to a maximum of 40% only.

Computation of Voltage wise Cost of Supply

Hon APTEL had suggested a method for calculation of Voltage wise cost of supply (VCoS). The VCoS is calculated based on the energy required at various voltage levels. Losses at various voltage levels for FY 2017-18 values are given below:

Table 6.9: LT Loss Calculation (2017-18)		
No.	Item	Quantity
1	Energy input at the system periphery (MU)	24351.32
2	Loss at EHT level	4.27%
3	Energy available at the end of EHT system (MU)	23311.52
4	Usage at EHT level by consumers (MU)	1759.09
5	Balance available at HT input (MU)	21552.43
6	Loss in HT system	5.5%
7	Energy available at end of HT system (MU)	20367.05
8	Usage by HT consumers (MU)	3651.48
9	Balance available at LT input (MU)	16715.57
10	Energy sales at LT (MU)	15470.15
11	Loss in LT system	7.45 %

The table below shows the calculation of cost of supply at different voltage levels.

Table 6.10 : Voltage Wise Cost of Supply						
No	Item	Unit	EHT	HT	LT	Total
1	Energy sale at voltage levels	MU	2022.82	3760.98	15865.11	21648.91
2	Dist loss at voltage levels	%	4.05	5.50	7.45	
3	Dist Loss	MU	81.92	200.68	2113.60	2314.28
4	Energy input at voltage levels	MU	2108.21	3979.87	17142.20	23230.28
8	Total cost (apportioned)	Rs Cr	1228.28	2318.75	9987.36	13534.39
5	Total Variable Power Purchase cost	Rs Cr	382.78	722.60	3112.42	4217.80
6	Total Fixed cost component	Rs Cr				9316.59
7	Demand/Connected load	MVA/MW	483.69	1106.47	20372.02	
8	Connected load at LT (excl domestic)	MW			4837.86	
8	MW required (MVA x 0.9)	MW	435.32	995.82	2138.26	
9	Input MW required (MW/loss)	MW	453.70	1098.26	2548.04	4100.00
10	FC apportioned on input basis	Rs Cr	1102.80	2669.54	6193.54	9965.88
11	FC proposed for LT I domestic	Rs Cr			500.00	
12	Balance amount	Rs Cr	1102.80	2669.54	5693.54	9465.88
13	FC for others per KVA / KW	Rs	1899.98	2010.56	980.73	
14	VCoS per unit (based on sale)	Rs/ kWh	6.07	6.17	6.30	6.25

Revision of tariff of various categories

Revision in tariff to different categories is proposed based on the following objectives:

- Recovery of fixed charge shall be 40% of realisation of respective category wherever possible.
- Proposed revision will not result in increase in cross subsidy amount for those categories falling above 120% of ACoS.
- Tariff revision does not cause huge increase to any category of tariff.

LT – I Domestic category

Tariff of LT domestic category is below 80% of Cost of Supply. A reasonable revision is suggested within this category of Consumers. However, no change in tariff or conditions is suggested for non paying group. Similarly no tariff revision is proposed for the next slab for BPL consumers considering their low purchasing power.

Average tariff of this category is Rs 4.13 per unit which is about 65.56 % of the cost of supply. Tariff Policy recommends at least 80% of cost of supply. A reasonable revision is proposed for this category in a manner to avoid a tariff shock. The existing and proposed energy and fixed charges are given in the tables below.

Table 6.11 : LT I - Domestic - Energy charges at existing tariff (2018-19)								
Type of Slab	Monthly consumption slab	Consumers		Consumption		Energy Charge		Revenue
		Nos.	% of total	MU	% of total	Present Rate Rs/unit	Effective rate Rs/unit	Rs. Cr.
--	NPG	37782	0.39	2.64	0.02	0	0.00	0.00
--	0 to 40 (BPL)	23193	0.24	5.57	0.05	1.5	1.50	0.83

Telescopic	0 to 50	2707807	27.99	775.97	7.15	2.9	2.90	225.03
	51-100	3225473	33.34	2936.38	27.05	3.4	3.07	901.61
	101-150	2202669	22.77	3237.27	29.82	4.5	3.40	1099.94
	151-200	866743	8.96	1788.76	16.48	6.1	3.92	701.11
	201-250	329957	3.41	879.69	8.1	7.3	4.53	398.67
Non - telescopic	0-300	133090	1.38	435.41	4.01	5.5	5.50	239.47
	0-350	61171	0.63	237.04	2.18	6.2	6.20	146.97
	0-400	31510	0.33	141.29	1.3	6.5	6.50	91.84
	0-500	28686	0.30	153.25	1.41	6.7	6.70	102.68
	>500	25661	0.27	263.26	2.42	7.5	7.50	197.45
		9673742	100	10856.52	100			4105.58

Table 6.12 : LT I - Domestic - Proposed Energy Charge (2018-19)								
Type of Slab	Monthly consumption slab	Consumers		Consumption		Energy charge		Revenue
		Nos.	% of total	MU	% of total	Proposed Rate Rs/unit	Effective rate Rs/unit	Rs. Cr.
	NPG	37782	0.39	2.64	0.02	0	0	0.00
	0 to 40 (BPL)	23193	0.24	5.57	0.05	1.50	1.50	0.83
Telescopic	0 to 50	2707807	27.99	775.97	7.15	3.50	3.50	271.59
	51-100	3225473	33.34	2936.38	27.05	4.20	3.74	1097.81
	101-150	2202669	22.77	3237.27	29.82	5.20	4.10	1326.55
	151-200	866743	8.96	1788.76	16.48	5.80	4.49	803.46
	201-250	329957	3.41	879.69	8.1	6.50	4.86	427.28
Non telescopic	0-300	133090	1.38	435.41	4.01	5.95	5.95	259.07
	0-350	61171	0.63	237.04	2.18	6.30	6.30	149.34
	0-400	31510	0.33	141.29	1.3	6.45	6.45	91.13
	0-500	28686	0.30	153.25	1.41	6.65	6.65	101.91
	>500	25661	0.27	263.26	2.42	6.90	6.90	181.65
		9673742	100	10856.52	100			4710.61
Additional Revenue due to revision of Energy charges =								605.03

The Fixed Charge for this category is proposed as follows:

Table 6.13 : LT I - Domestic - Proposed Fixed charge (2018-19)						
Category	Conspn slab	Number	Present rate Rs/cons/month	Revenue Rs Cr.	Proposed rate Rs/cons/month	Revenue Rs. Cr.
Single phase	0 to 150	7917965	30	285.05	35	332.55
	151 & above	1196927	30	43.09	75	107.72
Three phase	0 to 150	217984	80	20.93	90	23.54
	151 & above	279891	80	26.87	130	43.66
				375.93		507.48
Additional revenue						131.55
<i>Note: No fixed charge for BPL consumers (connected load up to 1000 watts)</i>						

KSEBL proposes to expand the conditions specified in the ruling tariff order (17.04.2017), to include in the 0-40 units slab, those consumers, If a family member of such

BPL consumer is (a) cancer patient or (b) permanently disabled due to polio and such diseases or road accidents. The connected load limit of such consumers will also be raised 2000 watts.

It is further proposed that BPL category consumers affected by flood will be exempted from payment of electricity charges for a maximum period of 6 months from the reinstating of supply after flood.

The proposed Tariff for other categories are given in the following paragraphs and tables.

LT II Colonies

Table 6.14 : LT II Colonies

Present charges		Proposed charges	
Fixed charge	Energy charge	Fixed charge	Energy charge
Rs. 30 per month per domestic connection	As applicable to the respective industry or plantation or organization which maintains the colony	Rs 70 per month per connection for single phase connections	As applicable to the respective industry or plantation or organization which maintains the colony
		Rs 120 per month per connection for three phase connections	

LT III Temporary connections (LT III A)

Table 6.15 : LT III A Temporary Connections

Present Energy charge	Proposed Energy charge
Rs 14.00 / kWh OR Daily minimum of Rs.140/kW or part thereof of the connected load, whichever is higher	Rs 15.00 / kWh OR Daily minimum of Rs.175/kW or part thereof of the connected load, whichever is higher

LT III Temporary extensions (LT III B)

No revision is proposed in this category.

LT IV A to VI E

Table 6.16 : LT IV A to VI E

Slab	Consumers	Consumption MU	Connected Load / Demand MW/MVA	Existing Tariff			Proposed tariff			Increase Rs. Cr.
				Energy Charge Rs/kWh	Fixed Charge pm Rs/kW or kVA	Revenue Rs. Cr	Energy Charge Rs/kWh	Fixed Charge pm Rs/kW or Rs/kVA	Revenue Rs. Cr	
1	2	3	4	5	6	7	8	9	10	11
LT IV A										
<10 kW	99359	175.56	536.21	5.50	100	108.48	4.90	200	109.87	48.27
10 - 20 kW	17057	103.21	282.30	5.50	75	82.17	4.90	100	84.45	
>20 kW	19045	812.77	778.08	5.50	150	587.08	4.90	250	631.68	

Total	135460	1091.53	1596.60			777.73			826.00		
LT IV B											
<10 kW	1695	2.92	4.40	6.00	100	1.96	5.50	200	2.01	0.61	
10 - 20 kW	106	1.46	1.71	6.00	60	1.00	5.50	140	1.09		
>20 kW	121	5.06	3.80	6.00	125	3.61	5.50	280	4.06		
Total	1922	9.45	9.91			6.56			7.17		
LT V											
LT V A	444249	303.01	1125.38	2.00	8	71.41	2.4	10	86.23	14.82	
LT V B	19161	47.00	72.87	2.50	8	12.45	2.70	10	13.56	1.11	
LT VI A											
< 500 units	119282	118.81	322.81	5.50	50	84.71	4.75	110	99.04	12.71	
> 500	4862	88.29	93.91	6.30	50	61.26	5.35	110	59.63		
Total	124144	207.10	416.71			145.97			158.68		
LT VI B											
< 500 units	41215	48.18	113.81	6.30	70	39.91	5.15	140	43.93	-0.12	
> 500	3694	76.13	64.00	7.00	70	58.66	5.75	140	54.53		
Total	44909	124.31	177.81			98.58			98.46		
LT VI C											
< 500 units	31553	59.09	109.94	7.00	180	65.11	5.80	310	75.17	-0.80	
> 500	9627	183.74	177.74	8.50	180	194.57	6.40	310	183.71		
Total	41181	242.82	287.69			259.68			258.88		
LT VI D											
< 500 units	28884	22.21	34.76	1.80	0	4.00	2.00	0	4.44		
LT VI E											
Single Phase											
1 to 50	8222	1.29	5.23	3.10	30	0.69	3.10	35	0.74	0.083	
51 to 100	669	0.59	0.71	4.10	30	0.23	4.70	35	0.24		
101 to 200	276	0.47	0.33	4.80	30	0.19	4.90	35	0.21		
Above 200	75	0.29	0.11	6.50	30	0.19	6.50	35	0.19		
Three Phase											
1 to 50	51	0.01	0.26	3.10	80	0.008	3.10	90	0.009		
51 to 100	31	0.04	0.17	4.10	80	0.017	4.70	90	0.019		
101 to 200	38	0.08	0.25	4.80	80	0.04	4.90	90	0.04		
Above 200	61	0.42	0.52	6.50	80	0.28	6.50	90	0.28		
Total	9422	3.19	7.58			1.649			1.732		

Revision of tariff of categories from LT VI F to LT VII C

In the case of LT VI F, VI G and VII categories fixed charges are now being levied on per kW per month basis. Specifically in the case of LT VI F and VII A the connected load variation is notable among various consumption slabs. Therefore the present demarcation pattern of fixed charges, ie for single phase and three phases only does not provide progressivity in recovery of fixed charges. Hence it is proposed to levy fixed charges based on a kW slab basis as below.

Table 6.17 : LT VI F, G and VII	
Connected load slab	Fixed charge, Rs/ kW or part /month
0 to 5 kW	100
5 to 10 kW	180
10 to 20 kW	430
Above 20 kW	600

Table 6.18 : Proposed Fixed Charge for LT VI (F, G) and VII (A, B, C)						
Connected load slab	Consumers	Connected Load (Watts)	Fixed Charge (Rs /kW pm)	New Revenue (Rs Cr)	Present Rate Revenue (Rs Cr)	Change (Rs Cr)
LT VI F						
0 to 5 kW	391947	471693807	100	56.60		
5 to 10 kW	9624	72176775	180	15.59		
10 to 20 kW	8838	139528414	430	72.00		
> 20 kW	6786	204701005	600	147.38		
Total	417196	888100000		291.57	94.87	196.70
LT VI G						
0 to 5 kW	10839	16564045	100	1.99		
5 to 10 kW	2396	14981169	180	3.24		
10 to 20 kW	861	10672336	430	5.51		
> 20 kW	1318	48509155	600	34.93		
Total	15414	90726705		45.66	20.75	24.90
LT VII A						
0 to 5 kW	805846	1021143660	100	122.54		
5 to 10 kW	46219	346005208	180	74.74		
10 to 20 kW	12814	197021242	430	101.66		
> 20 kW	8104	333386151	600	240.04		
Total	872982	1897556261		538.98	216.94	322.03
LT VII B						
0 to 5 kW	579540	200359649	100	69.54		
5 to 10 kW						
10 to 20 kW						
> 20 kW						
Total	579540	200359649		69.54	27.82	41.73
LT VII C						
0 to 5 kW	216	661444	100	0.08		
5 to 10 kW	254	1956751	180	0.42		
10 to 20 kW	146	2230002	430	1.15		
> 20 kW	219	13694308	600	9.86		
Total	835	18542504		11.51	2.00	9.51

Table 6.19 : Proposed Energy Charge for LT VI (F,G)

Slab (P M)	Consumes	Consumption MU	Conn Load MW	Old EC Rs/kWh	Old FC Rs	Revenue from EC Rs. Cr.	Total Revenue (Rs Cr)	New EC (Rs/kWh)	New Revenue from EC (Rs Cr)	** Total Revenue (EC+FC) Rs. Cr.	Increase Rs. Cr.	
1	2	3	4	5	6		7	8	9	10		
LT VI F (Single Phase)												
0 to 100	344000	83.85	400.49	5.80	60	48.63	77.47	4.00	33.54		-0.56	
0 to 200	32982	52.69	40.62	6.50	60	34.25	37.18	4.70	24.77			
0 to 300	6587	18.74	9.53	7.20	60	13.49	14.18	5.45	10.21			
0 to 500	3433	15.42	5.64	7.80	60	12.03	12.44	6.35	9.79			
> 500	1052	9.60	2.22	9.00	60	8.64	8.80	6.70	6.43			
Three Phase												
0 to 100	5654	2.24	40.54	5.80	120	1.30	7.14	4.00	0.90			
0 to 200	2166	4.68	18.56	6.50	120	3.04	5.71	4.70	2.20			
0 to 300	1538	6.21	15.78	7.20	120	4.47	6.74	5.45	3.38			
0 to 500	2223	15.96	27.07	7.80	120	12.45	16.34	6.35	10.13			
> 500	17561	697.00	327.66	9.00	120	627.30	674.49	6.70	466.99			
Total	417196	906.39	888.10			765.61	860.48		568.35	859.92		
LT VI G (Single Phase)												
0 to 500	10162	9.47	17.06	5.50	60	5.21	6.44	2.80	2.65		-0.82	
0 to 1000	135	0.85	0.474	6.50	60	0.55	0.58	3.20	0.27			
0 to 2000	6	0.05	0.024	7.50	60	0.04	0.04	3.70	0.02			
>2000	1	0.01	0.0025	8.50	60	0.01	0.01	4.30	0.00			
Three Phase												
0 to 500	3289	10.48	39.42	5.50	180	5.76	14.28	2.80	2.93			
0 to 1000	963	10.86	16.54	6.50	180	7.06	10.63	3.20	3.48			
0 to 2000	484	13.40	13.94	7.50	180	10.05	13.06	3.70	4.96			
>2000	373	27.06	20.33	8.50	180	23.00	27.39	4.30	11.63			
Total	15414	72.18	90.73			51.68	72.43		25.95	71.61		
** Total revenue includes fixed charges from Table 5.18												

	Table 6.20 : Proposed Energy Charge for LT VII (A,B,C) and LT VIII (B)										
Slab (P M)	Consumers	Consumption MU	Conn Load MW	Old EC Rs/kWh	Old FC Rs	Revenue from EC Rs Cr.	Total Revenue (Rs Cr)	New EC (Rs)	New Revenue from EC (Rs Cr)	** Total Revenue (Rs Cr)	Increase Rs. Cr.
LT VII A (Single Phase)											
0 to 100	618047	189.14	876.42	6.00	60	113.49	176.59	4.00	75.66		-0.20
0 to 200	98731	165.04	188.65	6.70	60	110.58	124.16	4.80	79.22		
0 to 300	36137	101.91	80.13	7.40	60	75.42	81.19	5.30	54.01		
0 to 500	24590	104.85	62.07	8.00	60	83.88	88.35	5.70	59.77		
> 500	10304	80.66	31.35	9.30	60	75.01	77.27	6.65	53.64		
LT VII A (Three Phase)											
0 to 100	22847	10.22	164.60	6.00	120	6.13	29.84	4.00	4.09		
0 to 200	11447	23.56	91.90	6.70	120	15.79	29.02	4.80	11.31		
0 to 300	8710	30.93	76.77	7.40	120	22.89	33.95	5.30	16.40		
0 to 500	13584	76.94	120.50	8.00	120	61.55	78.90	5.70	43.86		
> 500	28585	586.55	433.47	9.30	120	545.49	607.91	6.65	390.05		
Total	872982	1369.82	2125.86			1110.23	1327.17		788.00	1326.98	
LT VII B											
0 to 100	545985	139.40	545.99	5.00	40	69.70	95.91	3.20	44.61		9.53
0 to 200	28522	44.82	28.52	5.70	40	25.55	26.92	4.60	20.62		
0 to 300	5031	16.70	5.03	6.30	40	10.52	10.76	5.00	8.35		
Total	579538	200.92	579.54			105.77	133.59		73.58	143.12	
LT VII C											
0 to 1000	641	3.36	7.36	5.90	90	1.98	2.78	2.10	0.71		-0.04
above 1000	194	15.92	11.18	7.30	90	11.62	12.83	2.10	3.34		
Total	835	19.28	18.54			13.60	15.60	4.05	11.51	15.56	
** Total revenue includes fixed charges from Table 5.18											
LT VIII B											
Slab (P M)	Consumers	Consumption MU	Conn Load MW	Old EC	Old FC	Total Revenue (Rs Cr)	New EC (Rs)	New FC (Rs)	Revenue (Rs Cr)	Increase Rs. Cr.	
	26485	81.71	42.24	3.90	40	33.14	4.5	60	38.67	5.54	
Total						33.14			38.67		

Table 6.21 : LT VIII (A) Un-metered Street Lights							
Type of lamp	Watts	Existing Tariff			Proposed Tariff		
		Rs/lamp/month			Rs/lamp/month		
		Burning hours per day			Burning hours per day		
		4	6	12	4	6	12
Ordinary	40	22	33	66	25	38	76
Ordinary	60	33	50	102	39	59	117
Ordinary	100	55	84	167	64	96	192
Fluo tube	40	22	33	66	25	38	76
Fluo tube	80	44	66	134	51	77	154
Floodlight	1000	559	838	1677	643	964	1929
MV lamp	80	51	70	143	55	82	164
MV lamp	125	75	112	222	85	128	255

MV lamp	160	96	143	286	110	164	329
MV lamp	250	149	222	447	171	257	514
MV lamp	400	239	356	714	274	411	821
SV lamp	70	42	64	125	48	72	144
SV lamp	80	48	70	143	55	82	164
SV lamp	100	59	89	178	68	102	205
SV lamp	125	75	112	222	85	128	255
SV lamp	150	89	134	267	102	154	307
SV lamp	250	149	222	447	171	257	514
CFL	11	5	8	16	6	9	18
CFL	15	7	11	22	8	13	25
CFL	18	9	13	26	10	15	30
CFL	22	11	16	32	12	18	37
CFL	30	15	22	44	17	25	51
CFL	36	17	26	53	20	30	61
CFL	44	21	32	64	25	37	74
CFL	72	35	53	105	40	60	121
CFL	144	70	105	210	81	121	242
LED	12	3	4	9	5	7	14
LED	18	4	7	14	7	11	21
LED	20	5	7	15	8	11	23
LED	24	6	9	20	10	15	30
LED	30	7	11	25	13	19	38
LED	40	10	15	30	15	23	45
LED	45	11	16	35	18	26	53
MV lamp *	1200			2160			2808
SV lamp *	250			450			585
<i>*On Semi High Mast burnt for only 12 hours per day</i>							
Additional Revenue = Rs. 11.43 Cr.							

LT IX Display lightings and hoardings:

No revision of tariff is proposed for this category.

HT and EHT categories

Table 6.22 : Proposed Tariff to HT Category						
Item	Unit	Present tariff		Proposed Tariff		Change
	MVA/MU	FC/EC	Revenue	FC/EC	Revenue	Rs Cr
HT-I (A) Industrial						
Contract demand (MVA)	710.69	300	255.85	600	511.70	109.35
Energy Charge		5.50		4.80		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	1219.42	5.50	670.68	4.80	585.32	
(b) Peak time - Zone B (150%)	258.96	8.25	213.64	7.2	186.45	
(c) Off-peak time - Zone C (75 %)	646.58	4.125	266.71	3.6	232.77	
Total	2124.95		1406.88		1516.24	
HT –I (B) IT ENABLED SERVICES						
Contract demand (MVA)	5.90	300	2.12	450	3.19	0.0125
Energy Charge		5.80		5.00		
Annual Energy con (MU)						
(a) Normal time- Zone A (100%)	8.30	5.80	4.82	5.00	4.15	
(b) Peak time - Zone B (150%)	2.02	8.7	1.75	7.5	1.51	
(c) Off-peak time - Zone C (75 %)	2.39	4.35	1.04	3.75	0.90	
Total	12.71		9.73		9.75	
HT II(A) GENERAL						
Contract demand (MVA)	65.73	350	27.61	800	63.11	13.32
Energy Charge		5.40		4.20		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	113.23	5.40	61.14	4.20	47.56	
(b) Peak time - Zone B (150%)	26.38	8.1	21.36	6.3	16.62	
(c) Off-peak time - Zone C (75 %)	42.64	4.05	17.27	3.15	13.43	
Total	182.24		127.38		140.71	
HT II(B)GENERAL						
Contract demand (MVA)	170.84	400	82.00	800	164.01	-0.29
Energy Charge						
upto 30000 units		6.2		4.8		
above 30000 units		7.2		5.9		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)						
upto 30000 units	64.75	6.20	40.15	4.80	31.08	
above 30000 units	287.80	7.20	207.21	5.90	169.80	
(b) Peak time - Zone B (150%)						
upto 30000 units	18.21	9.3	16.93	7.2	13.11	
above 30000 units	80.93	10.8	87.40	8.85	71.62	
(c) Off-peak time - Zone C (75 %)						
upto 30000 units	30.12	4.65	14.01	3.6	10.84	
above 30000 units	133.86	5.4	72.29	4.425	59.23	
Total	615.66		519.99		519.69	
HT III(A) AGRICULTURE						
Contract demand (MVA)	9.74	170	1.99	180	2.10	0.19

Energy Charge		2.80		2.90		
Annual Energy Cons(MU)						
(a) Normal time- Zone A (100%)	6.88	2.80	1.93	2.90	2.00	
(b) Peak time - Zone B (150%)	0.07	4.2	0.03	4.35	0.03	
(c) Off-peak time - Zone C (75 %)	0.62	2.1	0.13	2.175	0.13	
Total	7.58		4.08		4.27	
HT III (B) AGRICULTURE						
Contract demand (MVA)	1.26	170	0.26	180	0.27	0.04
Energy Charge		3.30		3.40		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	1.11	3.30	0.37	3.40	0.38	
(b) Peak time - Zone B (150%)	0.32	4.95	0.16	5.1	0.16	
(c) Off-peak time - Zone C (75 %)	0.68	2.475	0.17	2.55	0.17	
Total	2.11		0.95		0.99	
HT IV COMMERCIAL						
Contract demand (MVA)	275.86	400	132.41	745	246.62	-0.60
Energy Charge						
upto 30000 units		6.3		5.00		
above 30000 units		7.3		5.50		
Annual Energy Cons(MU)						
(a) Normal time- Zone A (100%)						
upto 30000 units	142.10	6.30	89.52	5.00	71.05	
above 30000 units	268.36	7.30	195.91	5.50	147.60	
(b) Peak time - Zone B (150%)						
upto 30000 units	45.97	9.45	43.44	7.5	34.48	
above 30000 units	86.82	10.95	95.07	8.25	71.63	
(c) Off-peak time - Zone C (75 %)						
upto 30000 units	44.31	4.725	20.94	3.75	16.62	
above 30000 units	83.69	5.475	45.82	4.125	34.52	
Total	671.26		623.11		622.51	
HT-V(Domestic)						
Contract demand (MVA)	8.65	350	3.63	475	4.93	-0.44
Energy Charge		5.50		4.40		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	7.81	5.50	4.30	4.40	3.44	
(b) Peak time - Zone B (150%)	3.09	8.25	2.55	6.6	2.04	
(c) Off-peak time - Zone C (75 %)	4.50	4.125	1.86	3.3	1.49	
Total	15.41		12.34		11.90	

Table 6.23 : Proposed Tariff to EHT Category

Item	Unit	Present tariff		Proposed Tariff		Change
	MVA/MU	FC/EC	Revenue	FC/EC	Revenue	Rs Cr
EHT 66 kV						
Contract demand (MVA)	82.48	300	29.69	850	84.13	30.81
Energy Charge		5.20		4.50		
Annual Energy Cons(MU)						
(a) Normal time- Zone A (100%)	174.47	5.20	90.72	4.50	78.51	
(b) Peak time - Zone B (150%)	36.37	7.8	28.37	6.75	24.55	
(c) Off-peak time - Zone C (75 %)	144.72	3.9	56.44	3.375	48.84	
Total	355.56		205.23		236.04	
EHT 110 kV						
Contract demand (MVA)	148.96	290	51.84	825	147.47	45.16

Energy Charge		5.10		4.40		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	369.98	5.10	188.69	4.40	162.79	
(b) Peak time - Zone B (150%)	89.42	7.65	68.40	6.6	59.02	
(c) Off-peak time - Zone C (75 %)	289.27	3.825	110.65	3.3	95.46	
Total	748.67		419.58		464.74	
EHT 220kV						
Contract demand (MVA)	33.91	280	11.39	700	28.49	
Energy Charge		4.70		3.80		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	45.90	4.70	21.57	3.80	17.44	
(b) Peak time - Zone B (150%)	14.32	7.05	10.10	5.70	8.16	
(c) Off-peak time - Zone C (75 %)	34.62	3.525	12.20	2.85	9.87	
Total	94.83		55.26		63.96	8.69
EHT Commercial						
Contract demand (MVA)		400		850		No consumer in this category
Energy Charge						
Upto 60,000 units		6.10		4.60		
above 60,000 units		7.10		4.90		
EHT General-A						
Contract demand (MVA)	2.43	300	0.87	850	2.48	1.23
Energy Charge		5.00		4.70		
Annual Energy Cons(MU)						
(a) Normal time- Zone A (100%)	6.99	5.00	3.49	4.70	3.28	
(b) Peak time - Zone B (150%)	1.97	7.5	1.48	7.05	1.39	
(c) Off-peak time - Zone C (75 %)	3.36	3.75	1.26	3.525	1.19	
Total	12.32		7.11		8.34	
EHT General-B						
Contract demand (MVA)	19.89	370	8.83	850	20.29	-0.04
Energy Charge (upto 60000)		5.80		4.30		
(above 60000)		6.8		4.8		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)						
Upto 60,000 units	0.00	5.80	0.00	4.30	0.00	
above 60,000 units	30.52	6.8	20.75	4.8	14.65	
(b) Peak time - Zone B (150%)						
Upto 60,000 units	0.00	8.7	0.00	6.45		
above 60,000 units	8.33	10.2	8.50	7.2	6.00	
(c) Off-peak time - Zone C (75 %)						
Upto 60,000 units	0.00	4.35	0.00	3.225		
above 60,000 units	19.30	5.1	9.84	3.6	6.95	
Total	58.16		47.93		47.89	
Railway Traction 110 kV						
Contract demand (MVA)	94.66	250	28.40	650	73.84	23.56
Energy Charge		5.10		4.30		
Annual Energy Con (MU)/ amount (Rs Cr)	273.51	5.10	139.49	4.30	117.61	
Total			167.89		191.45	
KMRL 110 kV						
Contract demand (MVA)	6.04	250	1.81	650	4.71	8.90
Energy Charge		4.80		3.80		
Annual Energy Cons (MU)/ amount in (Rs Cr)	15.79		7.58	6.00	6.00	
Total			9.39		10.71	

Table 6.24 : Proposed Bulk Supply tariff to other licensees (2018-19)

Licensee	Consumption (MU)	Demand (MVA)	Existing tariff			Proposed tariff			Change (Rs Cr)
			EC (Rs)	DC (Rs)	Revenue (Rs Cr)	EC (Rs)	DC (Rs)	Revenue (Rs Cr)	
KPUPL	86.37	17.47	5.60	300	54.66	5.10	800	60.82	6.16
CSEZ	55.72	10.76	5.40	300	33.96	5.00	800	38.19	4.23
RPL	31.16	6.24	4.55	300	16.43	3.90	800	18.15	1.72
Technopark	89.44	20.13	5.20	300	53.76	4.80	800	62.26	8.50
CPT	35.33	7.85	6.00	300	24.02	5.60	800	27.32	3.30
TSR Corp	158.31	32.30	5.85	300	104.24	5.10	800	111.75	7.51
Info Park	7.64	2.69	5.50	300	5.17	4.90	800	6.33	1.16
Sub total	463.97	97.44			292.23			324.80	32.57
KDHPCL	52.06	9.46	4.60	300	27.35	4.00	850	30.47	3.12
MES	73.37	17.59	5.60	350	48.48	5.00	850	54.63	6.15
Smartcity	2.81	1.14	5.50	300	1.95	4.30	850	2.37	0.42
Karnataka	0.81	0.27	5.60	350	0.57	4.50	850	0.64	0.07
Sub total	129.06	28.46			78.36			88.12	9.76
Grand total	593.03	125.90			370.59			412.92	42.33

**

Summary of the additional revenue expected through the proposed Tariff

Table 6.25: Summary of Proposed Tariff for 2018-19				
No	Category	Revenue at Present tariff (Rs Cr)	Revenue at proposed tariff (Rs Cr)	Increase (Rs Cr)
1	LT-I Domestic	4481.52	5218.10	736.58
2	LT-IV (A)	777.73	820.54	42.81
3	LT-IV(B)	6.56	7.12	0.55
4	LT-VA	71.41	86.23	14.82
5	LT VB	12.45	13.56	1.11
6	LT VIA	145.97	156.45	10.48
7	LT VIB	98.58	98.46	-0.12
8	LT VI C	259.68	258.88	-0.80
9	LT VI D	4.00	4.44	0.44
10	LT VI E	1.65	1.73	0.08
11	LT VI F	860.48	859.92	-0.56
12	LT VI G	72.43	71.61	-0.83
13	LT-VII(A)	1327.17	1326.98	-0.20
14	LT-VII(B)	133.59	143.12	9.53
15	LT-VII(C)	15.60	15.56	-0.04
16	LT-VIII A	141.19	152.62	11.43
17	LT VIII B	33.14	38.67	5.54
18	HT1 (A)	1406.88	1516.24	109.35
19	HT-1(B)	9.73	9.68	-0.06
20	HT-II A	127.38	137.01	9.63
21	HT II B	519.99	519.69	-0.29
22	HT-III(A)	4.08	4.27	0.19
23	HT-III(B)	0.95	0.99	0.04
24	HT-IV	623.11	622.51	-0.60
25	HT-V	12.34	11.90	-0.44
26	EHT 66 kV Industrial	205.23	236.04	30.81
27	EHT-110 kV Industrial	419.58	464.74	45.16
28	EHT- 220 kV Industrial	55.26	63.96	8.69
29	EHT- General A	7.11	8.34	1.23
30	EHT - General B	47.93	47.89	-0.04
31	Railway traction	167.89	191.45	23.56
32	KMRL	9.39	10.71	1.32
33	Licensees	370.59	412.91	42.33
	Total	12430.59	13532.30	1101.72

Tariff Revision Proposal for 2019-20

On analysis of revenue recovery through tariff for the year 2019-20 it is revealed that the amount that can be recovered comes to Rs. 14,501.47 Crore at the projected consumption pattern and proposed revised rates. Net ARR for the year 2019-20 is estimated as Rs. 14,549.51 Crore. This will result in a deficit of Rs. 48.04 crore, increasing the outstanding revenue gap. However, KSEBL is not proposing any further revision of tariff for the year 2019-20 as the proposed revised tariff will be coming into force by the end of 2018-19 only.

Table 6.26 : Revenue at revised tariff in FY 2019-20			
No	Category	Sales (MU)	Revenue (Rs Cr)
I	LT Category		
1	LT I Domestic	11439.87	5511.29
2	LT II Colony	5.05	3.38
3	LT IV A Industrial	1124.95	839.80
4	LT IV B Industrial	9.74	7.31
5	LT V A Agriculture	319.14	87.72
6	LT V B Agriculture	49.50	14.09
7	LT VI A General	225.45	168.78
8	LT VI B General	135.32	106.35
9	LT VI C General	264.34	278.83
10	LT VI D General	24.18	4.84
11	LT VI E General	3.47	1.93
12	LT VI F General	986.71	997.05
13	LT VI G General	78.57	87.22
14	LT VII A Commercial	1491.20	1497.53
15	LT VII B Commercial	218.73	153.35
16	LT VII C Commercial	20.98	18.05
17	LT VIII A Public Lighting	317.61	158.81
18	LT VIII B Public Lighting	86.75	39.04
19	LT IX Advertisements and Hoardings	2.12	4.01
	LT Subtotal	16803.69	9979.35
II	HT category		
1	HT I A Industrial	2267.35	1609.79
2	HT I B Industrial	13.56	10.31
3	HT II A General	197.54	147.01
4	HT II B General	667.33	562.87
5	HT III A Agriculture	7.95	4.44
6	HT III B Agriculture	2.22	1.03
7	HT IV Commercial	727.59	668.44
8	HT V Domestic	16.51	12.82
	HT Sub Total	3900.04	3016.70
III	EHT Category		
1	EHT 66 kV Industrial	369.22	245.08
2	EHT 110 kV Industrial	778.40	481.76
3	EHT 220 kV Industrial	101.61	67.91

4	EHT General A	12.89	8.66
5	EHT General B	60.85	49.60
6	EHT Railway Traction	293.05	203.54
7	KMRL	16.92	11.34
8	Sub Total	1632.95	1067.88
IV	Bulk Licensees		
1	KPUPL	94.20	65.92
2	CSEZ	57.99	39.53
3	RPL	33.47	19.41
4	Technopark	96.57	66.06
5	Cochin Port trust	37.62	28.90
6	Thrissur Corporation	168.70	118.34
7	KDHPCL	53.86	31.39
8	MES	78.50	58.06
9	Karnataka	0.89	0.69
10	Infopark	8.19	6.72
11	Smart City	3.01	2.52
	Subtotal	632.99	437.53
	Grand Total	22969.67	14501.47

Proposal for 2020-21

Following table shows the revenue from tariff for the year 2020-21 on the projected consumption at the revised tariff.

Expected Revenue from tariff for the year 2020-21

Table 6.27 : Realization at present tariff for 2020-21			
No	Category	Sales in MU	Revenue in present tariff Rs. Crore
I	LT Category		
1	LT I Domestic	11901.30	5738.51
2	LT II Colony	4.99	3.28
3	LT III Temporary connections	1.49	2.69
3	LT IV A Industrial	1136.20	893.81
4	LT IV B Industrial	9.83	7.72
5	LT V A Agriculture	327.07	92.82
6	LT V B Agriculture	50.73	14.63
7	LT VI A General	239.29	179.11
8	LT VI B General	143.63	112.86
9	LT VI C General	280.57	295.89
10	LT VI D General	25.67	5.13
11	LT VI E General	3.68	1.99
12	LT VI F General	1047.30	984.79
13	LT VI G General	83.39	86.04
14	LT VII A Commercial	1582.76	1588.00
15	LT VII B Commercial	232.16	162.70
16	LT VII C Commercial	22.27	19.03
17	LT VIII A Public Lighting	330.48	149.57
18	LT VIII B Public Lighting	90.27	42.63
19	LT IX Ads and Hoardings	2.05	3.89
	LT Subtotal	17515.14	10385.08
II	HT category		
1	HT I A Industrial	2370.90	1686.32
2	HT I B Industrial	14.18	10.77
3	HT II A General	209.83	156.25
4	HT II B General	708.87	600.09
5	HT III A Agriculture	8.18	4.56
6	HT III B Agriculture	2.28	1.06
7	HT IV Commercial	772.88	709.45
8	HT V Domestic	17.33	13.57
II a	Bulk Licensees HT		
1	KDHPCL	54.60	31.88
2	MES	82.32	61.04
3	Karnataka	0.95	0.74
4	Smart City	3.16	2.65
	HT Sub Total	4245.48	3278.38
III	EHT Category		
1	EHT 66 kV Industrial	375.75	251.19
2	EHT 110 kV Industrial	793.12	492.55
3	EHT 220 kV Industrial	106.69	71.03
4	EHT General A	13.22	8.86
5	EHT General B	62.40	50.73
6	EHT Railway Traction	307.70	213.72

7	KMRL	17.77	6.75
III a	Bulk Licensees EHT		
1	KPUPL	100.68	70.34
2	CSEZ	59.15	40.32
3	RPL	35.23	20.41
4	Technopark	102.18	69.15
5	Cochin Port trust	39.25	30.11
6	Thrissur Corporation	176.17	123.64
7	Infopark	8.60	7.05
	EHT Subtotal	2197.90	1455.86
	Grand Total	23958.52	15119.32

Thus the revenue for the year 2020-21 is Rs. 15119.32 Cr. The net ARR for the year is estimated as Rs. 15830.57 crore. This would further increase the revenue gap by Rs. 711.25 crore. In order to mitigate further deterioration of the financial position of the utility it is proposed to revise the tariff for various categories for the year 2020-21 in such a manner to recover an amount of Rs. 700.44 crore details of which are submitted below.

Tariff revision proposal for the year 2020-21

LT I - Domestic category

Table 6.28 : LT I - Domestic - Energy charges at existing tariff (2020-21)

Type Slab	Monthly slab	Consumers		Consumption		Energy charge		Revenue (Rs Cr)
		Nos.	% of total	MU	% of total	Present Rate Rs/unit	Effective rate Rs/unit	
--	NPG	37782	0.37	2.64	0.02	0	0.00	0.00
--	0 to 40 (BPL)	24293	0.24	6.10	0.05	1.50	1.50	0.92
Telescopic	0 to 50	2836293	28.00	850.66	7.15	3.50	3.50	297.73
	51-100	3378522	33.35	3219.03	27.05	4.20	3.76	1210.10
	101-150	2307186	22.77	3548.88	29.82	5.20	4.15	1471.65
	151-200	907870	8.96	1960.94	16.48	5.80	4.55	892.22
	201-250	345614	3.41	964.37	8.10	6.50	4.93	475.46
Non telescopic	0-300	139405	1.38	477.32	4.01	5.95	5.95	284.00
	0-350	64074	0.63	259.86	2.18	6.30	6.30	163.71
	0-400	33005	0.33	154.89	1.30	6.45	6.45	99.90
	0-500	30047	0.30	168.00	1.41	6.65	6.65	111.72
	>500	26878	0.27	288.60	2.42	6.90	6.90	199.14
Total		10130968	100.00	11901.30	100.00			5206.55

Proposed Energy Charges for LT I

Table 6.29 : LT I - Domestic - Proposed energy charge revision for 2020-21

Type slab	Monthly slab	Consumers		Consumption		Energy charge		Revenue Rs. Cr.
		Nos.	% of total	MU	% of total	Proposed Rate Rs/unit	Effective rate Rs/unit	
	NPG	37782	0.37	2.64	0.02	0.00	0	0.00
	0 to 40 (BPL)	24293	0.24	6.10	0.05	1.50	1.50	0.92
Telescopic	0 to 50	2836293	28.00	850.66	7.15	3.45	3.45	293.48
	51-100	3378522	33.35	3219.03	27.05	4.70	3.91	1259.56
	101-150	2307186	22.77	3548.88	29.82	5.45	4.38	1553.45
	151-200	907870	8.96	1960.94	16.48	5.85	4.75	931.98
	201-250	345614	3.41	964.37	8.10	6.50	5.09	491.01
Non telescopic	0-300	139405	1.38	477.32	4.01	6.10	6.10	291.16
	0-350	64074	0.63	259.86	2.18	6.35	6.35	165.01
	0-400	33005	0.33	154.89	1.30	6.45	6.45	99.90
	0-500	30047	0.30	168.00	1.41	6.70	6.70	112.56
	>500	26878	0.27	288.60	2.42	6.90	6.90	199.14
		10130968	100.00	11901.30	100.00			5398.18
Additional Revenue due to revision of Energy charges =								191.62

Proposed fixed charges for LT I

Table 6.30 : LT I - Domestic - Proposed Fixed Charge (2020-21)						
Category	Slab	Number	Present rate Rs/cons/month	Revenue Rs Cr.	Proposed rate Rs/cons/month	Revenue Rs. Cr.
Single phase	0 to 150	8293672	35	348.33	50	497.62
	151 & above	1253721	75	112.83	100	150.45
Three phase	0 to 150	228328	90	24.66	120	32.88
	151 & above	293172	130	45.73	160	56.29
				531.56		737.23
Additional revenue						205.67

Total additional revenue from LT I Domestic category = Rs. 397.29 crore

LT II Colonies

Table 6.31 : Proposed Charges for LT II Colonies			
Existing charges		Proposed charges	
Fixed charge	Energy charge	Fixed charge	Energy charge
Rs 70 per month per connection for single phase	As applicable to the respective industry or plantation or organization which maintains the colony	Rs 90 for single phase	As applicable to the respective industry or plantation or organization which maintains the colony
Rs 120 per month per connection for three phase		Rs 140 for three phase	

Categories from LT IV A to LT VI E

Table 6.32 : LT IV (A) to VI (E)										
Slab	Consumers	Consumption MU	Connected Load/ Demand MW/MVA	Existing Tariff			Proposed tariff			Increase Rs. Cr.
				Energy Charge Rs/kWh	Fixed Charge/month Rs/kW or Rs/kVA	Revenue Rs. Cr	Energy Charge Rs/kWh	Fixed Charge/month Rs/kW or Rs/kVA	Revenue Rs. Cr	
LT IV A – Industrial										
<10 kW	100576	182.74	553.12	4.85	200	112.77	4.4	250	110.58	7.27
10 - 20 kW	17266	107.43	288.68	4.85	100	86.75	4.4	120	88.84	
>20 kW	19278	846.02	946.58	4.85	250	694.29	4.4	290	701.66	
Total	137120	1136.20	1788.38			893.81			901.08	
LT IV B - IT and IT enabled services										
<10 kW	1716	3.04	4.54	5.45	200	2.07	4.9	250	2.00	0.04
10 - 20 kW	108	1.52	1.76	5.45	140	1.13	4.9	200	1.17	
>20 kW	122	5.27	4.91	5.45	280	4.52	4.9	340	4.58	
Total	1945	9.83	11.21			7.72			7.76	
LT V A – Agriculture										
	446736	327.07	1193.91	2.40	10	92.82	2.4	15	99.99	7.16
LT V B – Agriculture										
	19268	50.73	77.31	2.70	10	14.63	2.70	15	15.09	0.46

LT VI A – General											
< 500 units	131925	137.28	363.23	4.60	110	111.09	4.60	135	121.99	11.01	
> 500	5377	102.02	105.67	5.30	110	68.02	5.00	135	68.13		
Total		239.29	468.90			179.11			190.12		
LT VI B – General											
< 500 units	45584	55.67	128.06	5.15	140	50.18	4.90	160	51.87	1.21	
> 500	4085	87.96	72.02	5.75	140	62.68	5.50	160	62.21		
Total		143.63	200.08			112.86			114.07		
LT VI C – General											
< 500 units	34898	68.27	123.71	5.80	310	85.62	5.80	310	85.62	0.00	
> 500	10648	212.30	200.00	6.40	310	210.27	6.40	310	210.27		
Total		280.57	323.72			295.89			295.89		
LT VI D – General											
< 500 units	31945	25.67	38.89	2.00	0	5.13	2.10	0	5.39	0.26	
LT VI E - General (Single Phase)											
1 to 50	9093	1.49	5.88	3.10	35	0.84	3.10	40	0.90	0.0637	
51 to 100	740	0.69	0.79	4.70	35	0.28	4.70	40	0.29		
101 to 200	305	0.54	0.37	4.90	35	0.24	4.90	40	0.24		
Above 200	82	0.34	0.13	6.50	35	0.22	6.50	40	0.22		
LT VI E - General (Three Phase)											
1 to 50	57	0.01	0.29	3.10	90	0.010	3.10	100	0.010		
51 to 100	34	0.05	0.19	4.70	90	0.022	4.70	100	0.022		
101 to 200	42	0.09	0.28	4.90	90	0.04	4.90	100	0.04		
Above 200	67	0.48	0.59	6.50	90	0.32	6.50	100	0.32		
Total	10421	3.68	8.52			1.987			2.050		

Proposal for fixed charge revision for LT VI F, VI G LT VII categories

Table 6.33 : Fixed Charge for LT VI F, VI G LT VII	
Connected load slab	Fixed charge Rs/ kW or part thereof/month
0 to 5 kW	110
5 to 10 kW	210
10 to 20 kW	440
Above 20 kW	610

Table 6.34 : Proposed Fixed Charges for LT VI F, VI G, VII A, VII B, VII C (2020-21)							
Slab	Consumers	Connected load Watts	Present rate Rs/kW	Revenue Rs. Cr.	Proposed rate Rs/kW	Revenue Rs. Cr.	Increase Rs Cr
LT VI F							
0 to 5 kW	391947	530770401	100	63.69	110	70.06	6.37
5 to 10 kW	9624	81216448	180	17.54	210	20.47	2.92
10 to 20 kW	8838	157003444	430	81.01	440	82.90	1.88
> 20 kW	6786	230338481	600	165.84	610	168.61	2.76
Total	417196	999328774		328.09		342.03	13.94
LT VI G							
0 to 5 kW	10839	22144010	100	2.66	110	2.92	0.27
5 to 10 kW	2396	20027907	180	4.33	210	5.05	0.72

10 to 20 kW	861	14267548	430	7.36	440	7.53	0.17
> 20 kW	1318	64850535	600	46.69	610	47.47	0.78
Total	15414	121290000		61.04		62.97	1.94
LT VIIA							
0 to 5 kW	805846	1283597964	100	154.03	110	169.43	15.40
5 to 10 kW	46219	434935453	180	93.95	210	109.60	15.66
10 to 20 kW	12814	247659634	430	127.79	440	130.76	2.97
> 20 kW	8104	419073047	600	301.73	610	306.76	5.03
Total	872982	2385266098		677.50		716.56	39.06
LT VII B							
0 to 5 kW	579540	640969090	100	76.92	110	84.61	7.69
5 to 10 kW			180		210		0.00
10 to 20 kW			430		440		0.00
> 20 kW			600		610		0.00
Total	579540	640969090		76.92			7.69
LT VIIC							
0 to 5 kW	216	824375	100	0.10	110	0.11	0.01
5 to 10 kW	254	2438749	180	0.53	210	0.61	0.09
10 to 20 kW	146	2779309	430	1.43	440	1.47	0.03
> 20 kW	219	17067568	600	12.29	610	12.49	0.20
Total	835	23110000		14.35		14.68	0.34

Table 6.35 : Proposed Energy Charges for LT VI F, VI G, VII A, VII B, VII C (2020-21)

Slab	Consumers	Consumption (MU)	Conn Load/ Demand MW/MVA	Existing Tariff			Proposed tariff			Increase Rs. Cr.
				Energy Charge Rs/kWh	Fixed Charge Rs. Cr.	Total Revenue Rs. Cr	Energy Charge Rs/kWh	Fixed Charge Rs. Cr.	Total Revenue Rs. Cr	
LT VI F - General (Single Phase)										
1 to 100	380464	96.88	450.65	4.00		38.75	3.80		36.82	-0.17
1 to 200	36478	60.89	45.7	4.70		28.62	4.60		28.01	
1 to 300	7285	21.65	10.72	5.45		11.8	5.00		10.83	
1 to 500	3797	17.82	6.35	6.35		11.32	5.80		10.34	
> 500	1164	11.1	2.5	6.70		7.43	6.60		7.32	
Three Phase										
1 to 100	6253	2.59	45.62	4.00		1.03	3.80		0.98	
1 to 200	2396	5.4	20.88	4.70		2.54	4.60		2.49	
1 to 300	1701	7.17	17.76	5.45		3.91	5.00		3.59	
1 to 500	2459	18.44	30.46	6.35		11.71	5.80		10.69	
>500	19423	805.35	368.69	6.70		539.59	6.60		531.53	
Total	461419	1047.3	999.33		328.09	984.79		342.03	984.63	
LT VI G - General (Single Phase)										
Up to 500	11239	23.19	66.96	2.80		6.49	2.50		5.8	-0.12
501 - 1000	149	1.55	3.12	3.20		0.5	3.10		0.48	
1001 -2000	7	0.07	0.14	3.70		0.03	3.60		0.03	
>2000	1	0.01	0.02	4.30		0.01	4.20		0	
Three Phase										
Up to 500	3638	37.71	75.96	2.80		10.56	2.50		9.43	
501 to 1000	1065	11.04	22.25	3.20		3.53	3.10		3.42	
1001 to 2000	535	5.55	11.17	3.70		2.05	3.60		2	
Above 2000	413	4.28	8.62	4.30		1.84	4.20		1.8	

Total	17047	83.39	121.29		61.04	86.04		62.97	85.93	
LT VII A Single Phase										
0 to 100	682475	218.55	983.36	4.00		87.42	3.75		81.95	-0.58
0 to 200	109024	190.7	211.67	4.80		91.53	4.50		85.81	
0 to 300	39904	117.76	89.91	5.30		62.41	4.90		57.7	
0 to 500	27153	121.15	69.64	5.70		69.06	5.55		67.24	
Above 500	11378	93.2	35.17	6.65		61.98	6.50		60.58	
Three Phase										
0 to 100	25229	11.81	184.68	4.00		4.72	3.75		4.43	
0 to 200	12640	27.23	103.12	4.80		13.07	4.50		12.25	
0 to 300	9618	35.74	86.14	5.30		18.94	4.70		16.8	
0 to 500	15000	88.9	135.2	5.70		50.67	4.90		43.56	
Above 500	31565	677.73	486.37	6.65		450.69	6.50		440.52	
Total	963986	1582.76	2385.27		677.5	1588		716.56	1587.42	
LT VII B										
0 to 100	603859	155.73	603.86	3.20		49.83	3.10		48.28	4.04
0 to 200	31546	56.66	31.55	4.60		26.06	4.30		24.36	
0 to 300	5564	19.76	5.56	5.00		9.88	4.80		9.49	
Total	640969	232.16	640.97		76.92	162.7		84.61	166.74	
LT VII C										
0 to 1000	708	3.32	9.18	2.10		0.7	1.90		0.63	-0.11
above 1000	215	18.95	13.93	2.10		3.98	1.90		3.6	
Total	923	22.27	23.11		14.35	19.03		14.68	18.92	
LT VIII B	27891	90.27	43.85	4.50	60	42.63	4.90	80	46.91	4.28

Table 6.36 : Proposed Tariff for LT VIII A (2020-21)								
No.	Type of lamp	Watts	Existing Tariff			Proposed Tariff		
			Rs/lamp/month			Rs/lamp/month		
			Burning hours per day			Burning hours per day		
			4	6	12	4	6	12
1	Ordinary	40	25	38	76	53	79	159
2	Ordinary	60	39	59	117	84	126	252
3	Ordinary	100	64	96	192	135	203	406
4	Fluo tube	40	25	38	76	53	79	159
	Fluo tube	80	51	77	154	109	163	326
5	Floodlight	1000	643	964	1929	1364	2046	4092
6	MV lamp	80	55	82	164	124	185	371
7	MV lamp	125	85	128	255	191	286	573
8	MV lamp	160	110	164	329	248	372	744
9	MV lamp	250	171	257	514	388	581	1163
10	MV lamp	400	274	411	821	618	927	1854
11	SV lamp	70	48	72	144	108	163	325
12	SV lamp	80	55	82	164	124	185	371
13	SV lamp	100	68	102	205	154	231	462
14	SV lamp	125	85	128	255	191	286	573
15	SV lamp	150	102	154	307	230	346	691
16	SV lamp	250	171	257	514	388	581	1163
17	CFL	11	6	9	18	11	17	33
18	CFL	15	8	13	25	15	23	46
19	CFL	18	10	15	30	18	27	55
20	CFL	22	12	18	37	23	34	68
21	CFL	30	17	25	51	32	47	95
22	CFL	36	20	30	61	38	57	114

23	CFL	44	25	37	74	45	68	136
	CFL	72	40	60	121	74	112	223
24	CFL	144	81	121	242	149	223	446
25	LED	12	5	7	14	6	9	17
26	LED	18	7	11	21	9	13	27
27	LED	20	8	11	23	9	14	28
28	LED	24	10	15	30	14	21	41
29	LED	30	13	19	38	17	26	52
30	LED	40	15	23	45	19	28	56
31	LED	45	18	26	53	23	34	68
32	MV *	1200			2808	2409	3614	7228
33	SV lamp *	250			585	502	753	1506
<i>*on semi high mast only for 12 hrs burning per day</i>								

Additional Revenue = Rs.40.39 Cr.

HT and EHT Categories

Table 6.37 : Proposed Charges for HT Categories						
Item	Unit	Existing tariff		Proposed Tariff		Revenue Change
	MVA/MU	FC/EC	Revenue	FC/EC	Revenue	Rs Cr
HT-I (A) Industrial						
Contract demand (MVA)	785.43	600	565.51	750	706.89	141.38
Energy Charge		4.80		4.80		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)	1360.56	4.80	653.07	4.80	653.07	
(b) Peak time - Zone B (150%)	288.93	7.2	208.03	7.2	208.03	
(c) Off-peak time - Zone C (75 %)	721.41	3.6	259.71	3.6	259.71	
Total	2370.90		1686.32		1827.69	
HT-I (B) IT enabled services						
Contract demand (MVA)	6.53	440	3.45	550	4.31	0.50
Energy Charge		5.00		4.75		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)	9.27	5.00	4.63	4.75	4.40	
(b) Peak time - Zone B (150%)	2.25	7.5	1.69	7.125	1.60	
(c) Off-peak time - Zone C (75 %)	2.67	3.75	1.00	3.5625	0.95	
Total	14.18		10.77		11.27	
HT II(A)GENERAL						
Contract demand (MVA)	74.11	800	71.15	850	75.60	8.70
Energy Charge		4.00		4.20		
Annual Energy cons (MU)						
(a) Normal time- Zone A (100%)	130.37	4.00	52.15	4.20	54.76	
(b) Peak time - Zone B (150%)	30.37	6	18.22	6.3	19.13	
(c) Off-peak time Zone C (75 %)	49.09	3	14.73	3.15	15.46	
Total	209.83		156.25		164.95	
HT II(B)GENERAL						
Contract demand (MVA)	201.79	800	193.72	800	193.72	0.00
Energy Charge						
upto 30000 units		4.8		4.8		
above 30000 units		5.9		5.9		

(a) Normal time- Zone A (100%)						
upto 30000 units	90.79	4.80	43.58	4.80	43.58	
above 30000 units	315.13	5.90	185.93	5.90	185.93	
(b) Peak time - Zone B (150%)						
upto 30000 units	25.53	7.2	18.38	7.2	18.38	
above 30000 units	88.61	8.85	78.42	8.85	78.42	
(c) Off-peak time - Zone C (75 %)						
upto 30000 units	42.23	3.6	15.20	3.6	15.20	
above 30000 units	146.57	4.425	64.86	4.425	64.86	
Total	708.87		600.09		600.09	
HT III(A) AGRICULTURE						
Contract demand (MVA)	10.21	180	2.21	200	2.45	
Energy Charge		2.90		3.10		
(a) Normal time- Zone A (100%)	7.43	2.90	2.16	3.10	2.30	
(b) Peak time - Zone B (150%)	0.18	4.35	0.08	4.65	0.08	
(c) Off-peak time - Zone C (75 %)	0.57	2.175	0.12	2.325	0.13	
Total	8.18		4.56		4.97	0.41
HT III (B) AGRICULTURE						
Contract demand (MVA)	1.58	180	0.34	200	0.38	
Energy Charge		3.40		3.60		
(a) Normal time- Zone A (100%)	1.20	3.40	0.41	3.60	0.43	
(b) Peak time - Zone B (150%)	0.14	5.1	0.07	5.4	0.08	
(c) Off-peak time - Zone C (75 %)	0.94	2.55	0.24	2.7	0.25	
Total	2.28		1.06		1.14	0.08
HT IV COMMERCIAL						
Contract demand (MVA)	308.07	745	275.41	745	275.41	
Energy Charge						
upto 30000 units		5		5.00		
above 30000 units		5.5		5.50		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)						
upto 30000 units	163.61	5.00	81.80	5.00	81.80	
above 30000 units	308.99	5.50	169.94	5.50	169.94	
(b) Peak time - Zone B (150%)						
upto 30000 units	54.00	7.5	40.50	7.5	40.50	
above 30000 units	101.99	8.25	84.14	8.25	84.14	
(c) Off-peak time - Zone C (75 %)						
upto 30000 units	49.95	3.75	18.73	3.75	18.73	
above 30000 units	94.34	4.125	38.91	4.125	38.91	
Total	772.88		709.45		709.45	0.00
HT-V(Domestic)						
Contract demand (MVA)	10.06	475	5.74	500	6.04	
Energy Charge		4.40		4.50		
Annual Energy consumptn (MU)						
(a) Normal time- Zone A (100%)	8.79	4.40	3.87	4.50	3.96	
(b) Peak time - Zone B (150%)	3.47	6.6	2.29	6.75	2.35	
(c) Off-peak time - Zone C (75 %)	5.06	3.3	1.67	3.375	1.71	
Total	17.33		13.57		14.05	0.48

Table 6.38 : Proposed Tariff for EHT Categories						
EHT 66 kV						
Contract demand (MVA)	88.88	850	90.66	1000	106.66	16.00
Energy Charge		4.50		4.50		
Annual Energy Cons (MU)						
(a) Normal time- Zone A (100%)	184.37	4.50	82.97	4.50	82.97	
(b) Peak time - Zone B (150%)	38.44	6.75	25.94	6.75	25.94	
(c) Off-peak time - Zone C (75 %)	152.94	3.375	51.62	3.375	51.62	
Total	375.75		251.19		267.19	
EHT 110 kV						
Contract demand (MVA)	158.03	825	156.45	950	180.15	23.70
Energy Charge		4.40		4.40		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)	391.95	4.40	172.46	4.40	172.46	
(b) Peak time - Zone B (150%)	94.73	6.6	62.52	6.6	62.52	
(c) Off-peak time - Zone C (75 %)	306.45	3.3	101.13	3.3	101.13	
Total	793.12		492.55		516.26	
EHT 220kV						
Contract demand (MVA)	36.87	700	30.97	850	37.61	6.64
Energy Charge		3.80		3.80		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)	51.63	3.80	19.62	3.80	19.62	
(b) Peak time - Zone B (150%)	16.64	5.7	9.49	5.70	9.49	
(c) Off-peak time - Zone C (75 %)	38.41	2.85	10.95	2.85	10.95	
Total	106.69		71.03		77.66	
EHT Commercial						
Contract demand (MVA)		400		850		No consumer in this category
Energy Charge						
Upto 60,000 units		6.10		4.60		
above 60,000 units		7.10		4.90		
EHT General-A						
Contract demand (MVA)	2.52	850	2.57	950	2.88	0.04
Energy Charge		4.70		4.50		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)	7.50	4.70	3.52	4.50	3.37	
(b) Peak time - Zone B (150%)	2.12	7.05	1.49	6.75	1.43	
(c) Off-peak time - Zone C (75 %)	3.61	3.525	1.27	3.375	1.22	
Total	13.22		8.86		8.90	
EHT General-B						
Contract demand (MVA)	20.67	850	21.09	950	23.57	0.32
Energy Charge		4.30		4.30		
		4.8		4.45		
Annual Energy consumption (MU)						
(a) Normal time- Zone A (100%)						
Upto 60,000 units	0.00	4.30	0.00	4.30	0.00	
above 60,000 units	32.62	4.8	15.66	4.45	14.52	
(b) Peak time - Zone B (150%)						
Upto 60,000 units	0.00	6.45	0.00	6.45		
above 60,000 units	9.07	7.2	6.53	6.675	6.05	
(c) Off-peak time-Zone C (75 %)						
Upto 60,000 units	0.00	3.225	0.00	3.225		

above 60,000 units	20.71	3.6	7.46	3.3375	6.91	
Total	62.40		50.73		51.05	
Railway Traction 110 kV						
Contract demand (MVA)	104.37	650	81.41	750	93.93	
Energy Charge		4.30		4.30		
Annual Energy consumption (MU)/ amount in Rs Cr	307.70	4.30	132.31		132.31	
Total			213.72		226.24	12.52
KMRL 110 kV						
Contract demand (MVA)	6.65	650	5.19	750	5.99	
Energy Charge		3.80		3.80		
Annual Energy consumption (MU)/ amount in Rs Cr	17.77	3.80	6.75		6.75	
Total			11.94		12.74	0.80

Revision of Bulk Supply tariff to other licensees

Table 6.39 : Bulk Supply Tariff									
Licensee	Consumption MU	Demand MVA	Existing tariff			Proposed tariff			Increase Rs Cr
			EC	DC	Revenue Rs Cr	EC	DC	Revenue Rs Cr	
KPUPL	100.68	19.79	5.10	800	70.34	5.10	900	72.71	2.37
CSEZ	59.15	11.20	5.00	800	40.32	5.00	900	41.67	1.34
RPL	35.23	6.95	3.90	800	20.41	3.90	900	21.24	0.83
Technopark	102.18	20.94	4.80	800	69.15	4.80	900	71.66	2.51
CPT	39.25	8.47	5.60	800	30.11	5.60	900	31.13	1.02
TSR Corp	176.17	35.20	5.10	800	123.64	5.10	900	127.87	4.22
Info Park	8.60	2.96	4.90	800	7.05	4.90	900	7.41	0.35
Sub total	521.26	105.50			361.02			373.68	12.66
KDHPCL	54.60	9.84	4.00	850	31.88	4.00	950	33.06	1.18
MES	82.32	19.50	5.00	850	61.04	5.00	950	63.38	2.34
Smartcity	3.16	1.26	4.30	850	2.65	4.30	950	2.80	0.15
Karnataka	0.95	0.31	4.50	850	0.74	4.50	950	0.78	0.04
Sub total	141.03	28.46			96.31			100.02	3.71
Grand total	662.29	133.96			457.34			473.71	16.37

Summary of the additional revenue expected through the proposed revision.

KSEBL targets to mobilize additional revenue amounting to Rs 700.44 crore through the tariff revision proposals detailed in the preceding paragraphs. The summary of the additional revenue expected from each category of consumers is detailed below. ARR for the year is Rs.15830.57 crore. Realisation at the proposed tariff comes to Rs.15841.67 crore.

Table 6.40 : Tariff revision proposal (2020-21)				
No	Category	Revenue at ruling tariff (Rs Cr)	Revenue at proposed tariff (Rs Cr)	Increase (Rs Cr)
1	LT-I Domestic	5738.12	6135.41	397.30
2	LT-IV (A)	893.81	901.08	7.27
3	LT-IV(B)	7.72	7.76	0.04
4	LT-VA	92.82	99.99	7.16
5	LT VB	14.63	15.09	0.46
6	LT VIA	179.11	190.12	11.01
7	LT VIB	112.86	114.07	1.21
8	LT VI C	295.89	295.89	0.00
9	LT VI D	5.13	5.39	0.26
10	LT VI E	1.99	2.05	0.06
11	LT VI F	984.79	984.63	-0.17
12	LT VI G	86.04	85.93	-0.12
13	LT-VII(A)	1588.00	1587.42	-0.58
14	LT-VII(B)	162.70	166.74	4.04
15	LT-VII(C)	19.03	18.92	-0.11
16	LT-VIII A	149.57	189.96	40.39
17	LT VIII B	42.63	46.91	4.28
18	HT1 (A)	1686.32	1827.69	141.38
19	HT-1(B)	10.77	11.27	0.50
20	HT-II A	156.25	164.95	8.70
21	HT II B	600.09	600.09	0.00
22	HT-III(A)	4.56	4.97	0.41
23	HT-III(B)	1.06	1.14	0.08
24	HT-IV	709.45	709.45	0.00
25	HT-V	13.57	14.05	0.48
26	EHT 66 kV Industrial	251.19	267.19	16.00
27	EHT-110 kV Indl	492.55	516.26	23.70
28	EHT- 220 kV Indl	71.03	77.66	6.64
29	EHT- General A	8.86	8.90	0.04
30	EHT - General B	50.73	51.05	0.32
31	Railway traction	213.72	226.24	12.52
32	KMRL	11.94	12.74	0.80
33	Licensees	457.34	473.71	16.37
	Total	15114.25	15814.69	700.44

Realization for the year 2021-22 at the revised tariff

Table 6.41 : Revenue Realization (FY 2021-22)			
No	Category	Sales MU	Revenue Rs. Cr.
I	LT Category		
1	LT I Domestic	12381.33	6398.74
2	LT II Colony	5.15	3.45
3	LT IV A Industrial	1147.56	856.59
4	LT IV B Industrial	9.93	7.44
5	LT V A Agriculture	335.19	92.25
6	LT V B Agriculture	51.99	14.80
7	LT VI A General	253.99	201.51
8	LT VI B General	152.45	120.97
9	LT VI C General	297.80	314.06
10	LT VI D General	27.24	5.72
11	LT VI E General	3.91	2.24
12	LT VI F General	1111.60	1043.07
13	LT VI G General	88.52	93.42
14	LT VII A Commercial	1679.94	1688.88
15	LT VII B Commercial	246.41	176.67
16	LT VII C Commercial	23.64	19.96
17	LT VIII A Public Lighting	343.88	197.73
18	LT VIII B Public Lighting	93.93	46.02
19	LT IX Ads & Hoardings	2.25	4.25
	LT Subtotal	18256.70	11287.79
II	HT category		
1	HT I A Industrial	2479.19	1890.71
2	HT I B Industrial	14.83	11.87
3	HT II A General	222.89	175.23
4	HT II B General	752.99	622.31
5	HT III A Agriculture	8.42	5.11
6	HT III B Agriculture	2.34	1.19
7	HT IV Commercial	820.98	752.43
8	HT V Domestic	18.20	15.03
	HT Sub Total	4319.83	3473.88
III	EHT Category		
1	EHT 66 kV Industrial	382.38	274.09
2	EHT 110 kV Industrial	808.12	528.02
3	EHT 220 kV Industrial	112.02	81.15
4	EHT General A	13.56	9.12
5	EHT General B	63.99	52.14
6	EHT Railway Traction	323.09	237.55
7	KMRL	18.66	13.35
	Sub Total	1721.81	1195.41
IV	Bulk Licensees		
1	KPUPL	107.60	77.72
2	CSEZ	60.34	42.50
3	RPL	37.08	22.32
4	Technopark	108.11	74.96
5	Cochin Port trust	40.96	32.47
6	Thrissur Corporation	183.98	133.32

7	KDHPCL	55.36	33.59
8	MES	86.31	66.25
9	Karnataka	1.02	0.83
10	Infopark	9.03	7.77
	Smart City	3.32	2.94
	Subtotal	693.10	494.69
	Grand Total	24991.44	16451.77

Thus the realisation from tariff comes to Rs. 16451.77 crore against a net ARR of Rs.16880.63 crore.

Therefore, it is earnestly appealed that Hon Commission may kindly approve the tariff proposed above.

Other charges

Transmission charges

SBU-T handles the energy flow to the entire consumers of SBU-D as well as open access consumers. The projection of the energy input to the Transmission network, energy handled, transmission losses and the transmission charges estimated for the control period 2018-19 to 2021-22 are submitted below. Transmission charges in Rs/MW/day are calculated assuming a system load factor of 72%.

Table 6.42 : Transmission Charges			
No	Item	2018-19	2020-21
1	Energy injected into the system (MU)	24846.15	27247.53
2	Percentage of loss (%)	4.05	3.85
3	Loss of energy (MU)	1006.27	1049.03
4	Energy handled (MU) (1-3)	23839.88	26198.50
5	ARR of Transmission Business unit (Rs Cr)	951.08	1394.26
6	Transmission Charges (Rs./unit)	0.40	0.53
7	Peak demand projection	4040	4384
8	Transmission Charges - STOA (Rs/MW/day)	8958	12102
9	Transmission Charges (Rs/MW/month or part thereof) - LTA and MTOA	272471	368095
10	SLDC ARR (Rs Cr)(With O&M, IWC & RoE alone)	17.84	21.93
11	SLDC charges for LTA (Rs/MW/month)	5111	5791
12	SLDC charges for STOA (Rs/MW/day)	168	190

Wheeling charges

SBU-D handles the entire distribution network of Kerala. Projection of the energy input to the Distribution network, energy handled, losses and the wheeling charges estimated for the control period are submitted below:

Table 6.43 : Wheeling charge for the control period		
Particulars	2018-19	2020-21
Energy injected into the system (MU)	24846.15	24846.15
Percentage of loss (%)	4.05	3.85
Loss of energy (MU)	1006.27	1049.03
Energy handled (MU)	23839.88	26198.50
Sale of energy at 66 KV system and above	2023.64	2198.85
Less auxiliary consumption of substation	15.58	17.18
Energy transmitted to HT system	21800.66	23982.47
HT loss	5.35%	5.00%
Energy handled at HT level (MU)	20634.33	22783.34
Distribution ARR (excl Gen, PP, Trn & carrying cost)	3743.29	4501.71
Distribution ARR (at HT level) (25 % of Dist ARR)	935.82	1125.43
Wheeling Charges	0.45	0.49

Cross subsidy surcharge

The cross subsidy surcharge is calculated as per Annexure XI of Tariff Regulations, 2018. The loss in the transmission system, HT level, transmission charges, wheeling charges estimated for next control period is given in table below

Table 6.44 : Parameters for determination of Cross Subsidy Surcharge			
No	Particulars	2018-19	2020-21
1	Transmission loss (%)	4.05	3.85
2	Loss at HT level (%)	5.35	5.00
3	Weighted average loss in the system for providing supply at HT level (%)	9.18	8.66
4	Aggregate Transmission Charges(Rs/unit)	0.40	0.53
5	Aggregate wheeling Charges(Rs/unit)	0.45	0.55
6	Regulatory Asset(Rs/unit)	0.13	0.044

Based on the above, the cross subsidy surcharge applicable to the consumers of SBU-D of KSEB Ltd or of other licensees, for the next control period estimated as follows.

Table 6.45 : Cross Subsidy Surcharge (2018- 2019)								
Category	T = Avg tariff (Rs/unit)	C= Avg. cost of PP (Rs/unit)	L = T& D Loss (%)	D = Trans & wheeling charges (Rs/unit)	R= carrying cost (Rs /Unit)	Surcharge as per formula (Rs/unit)	Surcharge limit (20% avg. tariff) (Rs/unit)	Cross subsidy surcharge (Rs/unit)
HT-I(A)	7.14	3.18	9.18	0.85	0.13	2.65	1.43	1.43
HT-I(B)	7.61	3.18	9.18	0.85	0.13	3.13	1.52	1.52
HT-II(A)	7.52	3.18	9.18	0.85	0.13	3.04	1.50	1.50
HT-II (B)	8.44	3.18	9.18	0.85	0.13	3.96	1.69	1.69
HT-III(A)	5.63	3.18	9.18	0.85	0.13	1.15	1.13	1.13
HT-III(B)	4.67	3.18	9.18	0.85	0.13	0.19	0.93	0.19
HT-IV	9.27	3.18	9.18	0.85	0.13	4.79	1.85	1.85
HT-V	7.72	3.18	9.18	0.85	0.13	3.24	1.54	1.54
EHT 66 kV	4.73	3.18	4.05	0.40	0.13	0.89	0.95	0.89
EHT 110kV	6.21	3.18	4.05	0.40	0.13	2.36	1.24	1.24
EHT 220 kV	6.01	3.18	4.05	0.40	0.13	2.16	1.20	1.20
EHT-General A	6.76	3.18	4.05	0.40	0.13	2.92	1.35	1.35
EHT-General B	8.23	3.18	4.05	0.40	0.13	4.39	1.65	1.65

Table 6.46 : Cross Subsidy Surcharge (2020-21)								
Category	T = Avg tariff	C= Avg. cost of PP	L = T& D Loss	D = Trans & wheeling charges	R= carrying cost	Surcharge as per formula	Surcharge limit (20% avg. tariff)	Cross subsidy surcharge
	(Rs/unit)	(Rs/unit)	(%)	(Rs/unit)	(Rs /Unit)	(Rs/unit)	(Rs/unit)	(Rs/unit)
HT-I(A)	7.71	3.37	8.66	1.02	0.04	2.96	1.54	1.54
HT-I(B)	8.20	3.37	8.66	1.02	0.04	3.45	1.64	1.64
HT-II(A)	7.86	3.37	8.66	1.02	0.04	3.11	1.57	1.57
HT-II (B)	8.47	3.37	8.66	1.02	0.04	3.72	1.69	1.69
HT-III(A)	6.08	3.37	8.66	1.02	0.04	1.33	1.22	1.22
HT-III(B)	5.00	3.37	8.66	1.02	0.04	0.25	1.00	0.25
HT-IV	9.18	3.37	8.66	1.02	0.04	4.43	1.84	1.84
HT-V	8.11	3.37	8.66	1.02	0.04	3.36	1.62	1.62
EHT-I	7.11	3.37	3.85	0.53	0.04	3.04	1.42	1.42
EHT-II	6.51	3.37	3.85	0.53	0.04	2.43	1.30	1.30
EHT-III	7.28	3.37	3.85	0.53	0.04	3.20	1.46	1.46
EHT-General A	6.73	3.37	3.85	0.53	0.04	2.65	1.35	1.35
EHT-General B	8.18	3.37	3.85	0.53	0.04	4.11	1.64	1.64

At present two types of cross subsidy surcharge are prevailing in the State .

1. Cross subsidy surcharge for consumers who opt out of the system as per the formula in the National Tariff Policy 2016
2. Lower cross subsidy surcharge for embedded open access consumers arrived by adopting energy charges alone as average tariff (T) in cross subsidy surcharge formulation instead of effective tariff which consists of both demand charges as well as energy charges

As per National tariff policy 2016, the component (T) in cross subsidy surcharge formulation is the tariff payable by relevant category. The prevalent tariff determined by the State Commission comprises of two components viz demand charges and energy charges. Thus as per the formula for cross subsidy surcharge stipulated in Tariff Policy, the tariff 'T' should be inclusive of both 'demand charge' and 'energy charge'. There is no provision in the Tariff Policy to calculate cross subsidy surcharge based on only 'energy charge'. Further as per the Tariff Policy, the tariff 'T' has to be differentiated based on the consumer category and not on the basis of whether the consumer is 'embedded' or not.

There is no stipulation in the Tariff Policy that demand charge of a consumer will compensate a DISCOM for loss of cross subsidy. Determination of Cross subsidy surcharge for an embedded open access consumer by considering only energy charge as Tariff is against the very concept of 'cross subsidy surcharge' for open access.

The demand charges/ fixed charges are integral part of total tariff. As per the requirement of the National Tariff Policy, computation of average tariff for a particular category of consumers can be arrived only after recognising the total expected revenue which includes the fixed charges as well as variable charges. If fixed charges are not considered in the computation of the expected revenue,

it will increase the gap between ARR and revenue and thus lead to tariff hike.

As per KSERC Tariff Regulations, 2018 tariff means the schedule of charges for generation, transmission, wheeling or supply of electricity together with the terms and conditions for application thereof. ie; the component (T) includes both demand charges and energy charges .

Honorable APTEL vide order dated Appeal No. 178 or 2011 decided vide judgment dated 02.12.2013 titled Reliance Industries Ltd v/s Maharashtra Electricity Regulatory Commission has clearly specified that Tariff of subsidizing consumers is generally in two parts i.e. fixed charges and energy charges and therefore, the term tariff is the effective tariff for that category of consumers. The relevant portion is extracted hereunder:-

"8. We shall now take up each of the above issues one by one. Before we attempt to address each of the above issues, it would be profitable to explain the steps that are required to be taken to fix the Tariff and CSS. These are:

- *Since category wise sale of power has already estimated, expected revenue from such sale is estimated from current tariff. Let it be 'RCT' (Revenue from current tariff).*
- *Difference between ARR and RCT is the gap in revenue.*
- *The GAP so arrived at is filled up by redesigning the category wise tariff.*
- *CSS is the difference between the tariff for category of consumer and the cost of supply. CSS is determined by using the figures of Tariff (T) for the year in question and cost of power purchase (C) in that year.*
- *Tariff of subsidizing consumers is generally in two parts i. e. fixed charges and energy charges. Therefore, the term tariff is the effective tariff for that category of consumers.*
- *Since fixed charges remain constant irrespective of consumption by the consumer, the effective tariff varies and gets reduced with increase in consumption as can be seen from following illustration:.....*
- *Effective tariff shown in last col: is also known as Average Billing Rate (ABR) for that particular consumer. ABR for a consumer category is determined by dividing total expected revenue from the category by total expected sale to that category (Tribunal's judgment dated 30.5.2011 in appeal No. 102 of 2010 and Batch-Odisha case). Mathematically, it can be represented as:*

ABR of a category of consumer = Total Expected Revenue from a category/Total Sale of power to that category."

This clearly specifies that average tariff includes both demand charges and energy charges.

Honourable APTEL vide judgment dated 26.05.2017 on Appeal No. 181 of 2015 explained and settled that in the National Tariff Policy formula, "T" is the Tariff payable by relevant category of consumers which has two components viz. Fixed/ Demand charge and Energy charge

"The Cross Subsidy Surcharge is the difference between the tariff for category of consumer and the cost of supply. CSS is determined by using the figures of Tariff (T) for the relevant category of consumer for the year in question -----

19. In the National Tariff Policy formula, "T" is the Tariff payable by relevant category of consumers. The Tariff has two components viz. Fixed/ Demand charge and Energy charge and hence, for the purpose of calculating cross- subsidy surcharge, the State Commission has

considered Average Billing Rate in Rs/ KWh for the respective category as “T” as it reflects the effective combination of fixed/demand and energy charges payable by that category of consumers. We are in agreement with the formulation of the State Commission for using Average Billing Rate for a consumer category to be used while determining Cross Subsidy Surcharge.

20. On examining the submissions made by State Commission regarding computation of CSS and the relevant findings in its Impugned Order, we have found that the value of “T” and “C” as used by State Commission in its Impugned Order is in line with the formulation specified in the National Tariff Policy and the cross subsidy surcharge specified by State Commission as Rs. 1.51 per unit for EHT category and Rs. 1.41 per unit for HT category is in order.

21. Since we have found that the Cross Subsidy Surcharge has been determined by the State Commission as per the formula stipulated in the National Tariff Policy using the factors “T” and “C” appropriately, hence we do not find any error in determination of the CSS by the State Commission in its Impugned Order. “

Thus from the above aspects it is clear that the component T in cross subsidy surcharge formula is the average Tariff of fixed and energy charges. The decision of the Commission in the suo-motu tariff order to exclude the demand charge from the tariff ‘T’ in the surcharge formula, while computing the cross subsidy surcharge (CSS) for embedded open access consumers is against the fundamental definition of ‘tariff’, surcharge formula specified in the Tariff Policy 2016 and the Regulations framed by the Commission itself i.e. KSERC Tariff Amendment Regulations, 2016 and KSERC Tariff Regulations 2018. Hence KSEBL humbly requests before the Hon Commission to kindly revisit the decision of approving separate cross subsidy surcharges for embedded open access consumers and approve the cross subsidy surcharge as given in table 4.X above for all consumers who are availing open access.

Low Voltage Supply Surcharge

Consumers with connected load or contract demand above 100 kVA shall avail supply at HT level. However certain consumers, who should avail HT level supply as per regulation 8 of Supply Code 2014, are availing supply at LT level for convenience. As per Regulation 9 of Supply code 2014 such consumers have to pay low voltage surcharge at the rate of difference between the fixed charges of HT and LT of relevant categories in LT and HT.

Table 6.47: Low Voltage Supply Surcharge		
Particulars	Low voltage surcharge (Rs/kVA/month)	
	2018-19	2020-21
Defaulting consumer under LT IVA	400	545
Defaulting consumer under LT IVB	250	280
Defaulting consumer under LT VI A	690	715
Defaulting consumer under LT VI B	660	690
Defaulting consumer under LT VI C	490	490
Defaulting consumer under LT VI F	475	460
Defaulting consumer under LT VII A	415	400
Defaulting consumer under LT VII C	415	400

Meter rent

No change is proposed in the meter rent.

Power Factor incentive and penalty

Hon Commission vide order dated 17.04.2017 in the matter of determination of Tariff for the year 2017-18 on suomotu proceedings has ordered to increase the power factor incentive from .25 % to @ 0.5% of energy charges for each 0.01% unit increase in power factor from 0.9 'for power factor between 0.9 to 1.00' in the case of LT IV ToD billed consumers and HT & EHT consumers.

The power factor incentive scheme was in vogue for the past 12 years and the penalty for low power factor is not sufficient to motivate such consumers to improve power factor. At the time the power factor incentive/ penalty was implemented in the Board, there was no specific grid standards followed with respect to the power factor. As per the Commission order dated 14.01.2005 only the same was fixed as 0.9 for the HT & EHT consumers. Now, many regulations have been issued by various apex bodies regarding the grid discipline to be followed by the utilities. The relevant rules and regulations issued in this behalf are extracted below.

As per CEA (Technical Standards for Connectivity to the Grid Regulations, 2007) Part IV para 2 'Reactive Power- The distribution licensees shall provide adequate reactive compensation to compensate the inductive reactive power requirement in their system so that they do not depend upon the grid for reactive power support. The power factor of the distribution system and bulk consumer shall not be less than 0.95.

Further the second proviso to Regulation 65 of KSERC Tariff Regulations, 2018 stipulated that the maximum reactive energy drawal at each interchange point shall be limited, corresponding to the power factor of 0.95.

In view of the above standards specified in the regulations, it is not justifiable to maintain the standard power factor for consumers lower than a value of 0.95.

Power factor incentive is given by the licensee and bulk consumers to the consumer to maintain the system at proper power factor and it is the duty of licensee to maintain a power factor of 0.95 as per CEA regulations. Hence it is requested to maintain the base power factor at 0.95 and the consumers need to be incentivized/penalized in such a manner to maintain the power factor above 0.95. Moreover, the quality of the equipments available in the market has improved a lot during the years thereby providing higher power factor on their use. Hence, the incentive given to the consumers from 0.9 to 0.95 has to be eliminated and considering the fact the one fourth of the consumers are still paying penalty, the penal amount has to be increased.

Further, it is observed that many states including the Tamil Nadu and Karnataka is not providing incentive to the consumers for power factor, whereas they charge only penalty from the consumers for having low power factor below 0.9. The TNERC has gone to the extent of amending its own regulation of providing incentive/ penalty on power factor vide Notification No. TNERC/TR/5/2-11 dated 13.03.2014 to claiming penalty only.

Tamilnad Electricity Regulatory Commission has introduced power factor incentive in 2003-04 as a measure to create awareness among consumers. Tamilnad has withdrawn power factor incentives vide Supply Code Amendment Code 2010 notified vide Notification No. TNERC/SC/7-21 dated 25-10-2010. In the Explanatory Memorandum TNERC (Copy

enclosed Sseperately) has specifically pointed out that:

“by maintaining a high power factor a consumer could save his electricity charges considerably by way of reducing demand charges . By way of lower demand charges, a consumer can recover his installation cost within a few months. After this short payback period the consumer is continuously benefitted by the lower demand charges.

In the above circumstances, the Commission considers that any further incentive provided to the consumer by the TNEB would be a bonus for the consumer. The incentive being paid as power factor incentive, if used directly by TNEB by installing additional capacitors, it will benefit all the consumers. Therefore the Commission finds no reason to extend the benefit of higher power factor incentive to limited consumers and therefore the Commission decides to withdraw the incentive component for power factor improvement with effect from 01-08-2010 as stipulated in tariff order No.3 of 2010 dated 31.07.2010.”

TNERC has continued the decision of withdrawal of power factor incentive in the Tariff Order of Tamilnad dated 11-08-2017. This clearly shows that there is no need for providing power factor incentives for high power factor since the consumer is also responsible for maintaining a power factor nearer to unity in the load end and also the consumers are getting the payback within few months by way of reduced demand charges. Hence incentivizing consumers for improving power factor is giving double benefit to them at the cost of common consumers ie too for the duty that has to be done by them.

By increasing the incentive for power factor from 0.25 to 0.5% of energy charges, the annual commitment for providing power factor incentive paid for the year 2017-18 is Rs 90.21 Cr per annum against Rs 41.72 Cr. for the year 2016-17. Since all the expenses approved by Commission is a pass-through to tariff the common consumer has to bear the burden of these incentives. It is not at all justifiable to give undue benefits to a group of consumers for exercising their responsibility at the cost of common consumers. Financial loss incurred by utility on implementing the power factor incentive and penalty as directed by the Commission, is as stated below.

Table 6.48 : Power factor incentive and penalty from 2010-11 to 2017-18			
Year	Incentive (Rs Cr)	Penalty (Rs Cr)	Net Amount (Rs Cr)
2010-11	10.60	7.15	3.47
2011-12	11.38	7.40	3.98
2012-13	21.719	9.48	12.24
2013-14	31.22	10.42	20.8
2014-15	35.91	11.50	24.4
2015-16	37.79	11.65	26.15
2016-17	41.72	12.53	29.20
2017-18	90.21	17.59	72.62

Further it may be noted that the power factor incentive approved by the Commission @ 0.5 % of the energy charges is on a higher side as compared to the benefits to the system due to improvement of power factor. By improving power factor by 0.01 KSEBL is saving Rs 0.035 per unit. But the power factor incentive provided corresponding to 0.01 improvements in power factor for 1 unit is as follows.

Table 6.49 : Calculation of Utility Savings by unit improvement in PF		
Reactive Energy	kVAh	1
Active Energy @ unity power factor	Kwh	1
Active Energy @ 0.99 power factor	kWh	0.99
Savings in energy by improving power factor by 0.01	kWh	0.01
PP cost Savings by improving PF by 0.01@ Rs 3.53 per unit	Rs	0.0353

Table 6.60 : Incentive Provided for 0.1 PF improvement						
Category	Tariff	Zone 1	Zone 2	Zone 3	Average	Incentive
	Rs /unit	Rs	Rs	Rs	Rs	%
EHT 66 KV	5.2	0.03	0.04	0.02	0.03	0.80
EHT 110	5.1	0.03	0.04	0.02	0.03	0.78
EHT 220	4.7	0.02	0.04	0.02	0.03	0.72
EHT Gen A	5.0	0.03	0.04	0.02	0.03	0.77
EHT Gen B	5.8	0.03	0.04	0.02	0.03	0.89
HT IA	5.5	0.03	0.04	0.02	0.03	0.84
HT IB	5.8	0.03	0.04	0.02	0.03	0.89
HT IIA	5.4	0.03	0.04	0.02	0.03	0.83
HT II B						
Up to 30,000 u	6.2	0.03	0.05	0.02	0.03	0.95
Above 30,000 u	7.2	0.04	0.05	0.03	0.04	1.10
HT III A	2.8	0.01	0.02	0.01	0.02	0.43
HT III B	3.3	0.02	0.02	0.01	0.02	0.51
HT IV						
Upto 30,000 u	6.3	0.03	0.05	0.02	0.03	0.97
above30,000 u	7.3	0.04	0.05	0.03	0.04	1.12
HT V	5.5	0.03	0.04	0.02	0.03	0.84

It can be seen that the power factor incentive provided @ 0.5 % is higher during peak and normal period in most cases as compared to the benefit to the system due to improvement in power factor. Normally incentive is given @ 30% of the benefits and here in most cases more than 90% of the savings is passed on to the corresponding consumers. Thus the power factor incentive provided to the consumer @ 0.5% of energy charges is very high and needs revision.

It may please be noted that the power factor incentive is paid to the consumers for reducing the reactive energy drawn by the consumers itself. That is, they are being paid incentives at the cost of all consumers for the damages made to the system by them. It is high time to withdraw the power factor incentive. It is requested that the minimum power factor to be maintained by consumer be fixed at 0.95 in tune with the existing statutes.

It is suggested that the incentive /disincentive for improving power factor be reduced to the level in Tariff Order OP No 9 of 2014 of Hon Commission dated 14-8-2014 and gradually reduced and eliminated by the next control period as follows:

Power Factor Range	Incentive (2018-19)	Incentive (2020-21)
Power Factor between 0.95 and 1.00	0.25% energy charges for each 0.01 unit increase in power factor from 0.95	0.12% energy charges for each 0.01 unit increase in power factor from 0.95
Power Factor Range	Disincentive	Disincentive
Power Factor below 0.95	1.25% energy charges for each 0.01 unit fall in power factor from 0.95	1.5 % energy charges for each 0.01 unit fall in power factor from 0.95

Therefore in respect of power factor incentive and disincentive, KSEBL humbly requests the Honorable Commission that -

1. The minimum power factor to be maintained by consumer be fixed as 0.95 as per statutes and provided in the Tariff Regulation,2018
2. The rate of incentive for power factor improvement be fixed as 0.25% of energy charges for each 0.01 unit increase in power factor for 2018-19 and 2019-20 and fixed as 0.12% for FY 2020-22 for eliminating incentive by next control period.
3. Fix the penalty for power factor maintained below 0.95 at 1.25% for each 0.01 unit fall in power factor from 0.95 for the period FY 2018-19 and 2019-20 and 1.5% for the period FY 2020-22.

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