

## Estimation of source wise energy availability and cost

**Preamble:**

1. As elaborated in Chapter-5 "Load Forecast" MESCOM has estimated its energy requirement at generation point for FY23, FY24 and FY25.
2. As PCKL is being allocating the same to ESCOMs, the estimations of MESCOM has been made available to PCKL.
3. PCKL, with reference to the details narrated below, has communicated the source wise energy estimations and cost for MESCOM for the years FY23, FY24 and FY25 which has been depicted in D-1 statement of the petition. Hon'ble Commission is requested to consider the same.

### **A. Availability of energy from Hydel sources and cost as furnished by KPCL:**

**KPCL Hydro Energy Availability:**

KPCL has projected the energy availability from its hydro stations based on average energy generated in last 10 years average inflow with a 1% auxiliary consumption. So arrived quantum is indicated in the below table;

Sl. No.	Source	Energy in MU
1	Sharavathy valley project ( Sharavathy, Linganamakki & Chakra Projects)	4898.32
2	Kali Valley projects ( Nagajari & Supa Projects)	3054.35
3	Varahi Valley projects ( Varahi & Mani Projects)	1008.71
4	Bhadra & Bhadra Right Bank	49.30
5	Ghataprabha (GDPH)	66.03
6	Mallapur & Others	-
7	Kadra Dam	367.59
8	Kodasalli Dam	346.20
9	Gerusoppa/STRP	521.83
10	Almatti Dam Power House	555.69
12	Shiva & Shimsha	275.32
13	Munirabad	79.89
14	MGHE-Jog	365.31
<b>Total KPCL Hydel:</b>		<b>11588.54</b>

**KPCL Hydro Energy Cost:**

KPCL has worked out the tariff based on KERC order dated 03.08.2009 for hydel stations except for Shivasamudram, Shimsha, Munirabad & MGHE. The tariff for the hydel stations is based on the design energy. The over and above the design energy is to be paid at 15 paise per kwh or 3% of the ROE whichever is less. The Hon'ble Commission vide order dated 25.02.2015 determined the tariff for KPCL Hydro Stations of Shiva and Shimsha, Munirabad & MGHE upto 2019. The tariff proposed by KPCL in its email dated 16.11.2021 is considered for above hydro stations. The rate detail furnished by the KPCL is as shown below;

Sl. No.	Source	Design Energy (MU)	Cost FY23 (paise/unit)	Cost FY24 (paise/unit)	Cost FY25 (paise/unit)
1	Sharavathy valley projects	3737	62.85	64.07	62.78
2	Kali Valley projects	2058	96.93	99.07	95.91
3	Varahi Valley projects	848	189.19	189.02	181.39
4	Varahi 3 &4	848	189.19	189.02	181.39
5	Bhadra & Bhadra Right Bank	50	32.25	30.60	30.60
6	Ghataprabha (GDPH)	84	590.70	608.80	602.54
7	Mallapur & Others	-	-	-	-
8	Kadra Dam	419	268.68	273.49	235.83
9	Kodasalli Dam	372	186.80	189.53	162.61
10	Gerusoppa/STRP	442	203.16	205.50	166.82
12	Almatti Dam Power House	384	265.03	264.89	239.86
13	Shiva & Shimsa	252	158.72	160.03	160.03
14	Munirabad	65	116.96	122.33	123.16
15	MGHE-Jog	119	152.60	158.32	150.42

Note: Paise 20 as royalty charges is considered for the actual generation in respect of all Hydro stations except for the Almatti Dam Power House (Paise 100 /unit)

#### **B. Availability of energy from Thermal sources and cost as furnished by KPCL:**

##### **KPCL Thermal Energy Availability:**

KPCL has made available the energy availability from its thermal stations, including RPCL, as indicated in the below table. The projected energy availability is as per the targeted availability defined in the PPA/Regulations wherever applicable and less by applicable auxiliary consumption of each station. The KPCL has expected that Yelahanka Combined Cycle power project will be available in FY23 to FY25.

Sl. No.	Source	Installed Capacity (MW)	FY23 Availability (MU)	FY24 Availability (MU)	FY25 Availability (MU)
1	RTPS I &7	1470	4382	5579	6077
2	RTPS Unit 8	250	1057	1057	1057
3	BTPS Unit I	500	1117	1117	1494
4	BTPS Unit II	500	1134	1308	1494
5	BTPS UNIT-III	700	3248	3248	3648
6	Yelahanka Combined Cycle	370	428	428	428
7	Yermarus TPS - 1 & 2	1600	6522	7445	8398
	<b>Total KPCL Thermal:</b>		<b>17890</b>	<b>20184</b>	<b>22598</b>

##### **KPCL Thermal Energy Cost:**

The tariff rates worked out by KPCL based on various parameters of tariff orders in respect of thermal stations RTPS units 1 to 7, RTPS-8, BTPS unit-I, II & III is considered. The Yelahanka Combined Cycle Power Plant is available for the FY23 onwards and tariff is to be determined by KERC and hence the tariff proposed in its email dated 17.11.2021 is considered. The KERC in its order dated 25.02.2015 determined capacity charges in respect of BTPS unit 2 and RTPS Unit-8 from the date of commission to end of 31.03.2019. Hence, tariff proposed in the letter dated 17.11.2020 by KPCL is considered.

The average variable cost in the months of July-2021, August-2021 and September 2021 is considered for the FY23 and with an escalation 2.5% for FY24 and FY25.

Fixed and variable costs considered for the years FY23, FY24 and FY25 for KPCL thermal stations are as below.

Sl. No.	Source	FY23		FY24		FY25	
		Fixed Cost (Rs.in Cr)	Varibale Cost (Ps/unit)	Fixed Cost (Rs.in Cr)	Varibale Cost (Ps/unit)	Fixed Cost (Rs.in Cr)	Varibale Cost (Ps/unit)
1	RTPS I &7	1071.47	283.17	1103.96	290.25	1136.56	290.25
2	RTPS Unit 8	234.43	283.17	233.91	290.25	232.62	290.25
3	BTPS Unit I	350.03	281.30	355.37	288.33	360.74	288.33
4	BTPS Unit II	447.12	277.73	443.33	284.68	457.52	284.68
5	BTPS UNIT-III	902.05	255.70	868.96	262.09	826.50	262.09
6	Yelahanka Combined Cycle	539.22	320.00	533.20	328.00	525.93	336.00
7	Yermarus TPS - 1 & 2	2230.59	272.00	2137.76	278.80	2052.45	285.60
	<b>Total:</b>	<b>5774.91</b>		<b>5676.49</b>		<b>5592.32</b>	

### C. Availability of energy from CGS Thermal sources and cost:

#### **CGS Thermal Energy Availability:**

ESCOMs have a share in Central Generating station of NTPC, Neyveli Lignite Corporation (NLC), Nuclear power stations and other Joint Venture Projects. The allocation of capacity entitlement from these stations includes both firm and unallocated share. The unallocated share is vary depending upon the allocation issued by Ministry of Power, GoI.

The energy available to ESCOMs depends on the scheduled generation and share in a month and other parameters such as availability and outages forced and planned). The net energy available at ex-bus generation in the LGBR prepared by SRPC (draft) for the year FY23 is considered. Out of the total month wise energy available at Ex-bus, the share of Karnataka including unallocated share for the month of October 2021 is taken to arrive the energy available to Karnataka for FY23 to FY25. In order to arrive at the energy available at Karnataka Periphery, all India Transmission loss for the week from 22.11.2021 to 28.11.2021 as notified by the NLDC is taken. The scheduled energy available at ex-bus, share of Karnataka and net energy available at KPTCL periphery after considering the POC losses is indicated in the below table.

Sl. No.	Source	Scheduled Energy (MU)	Karnataka Share (%)	Karnataka Share (MU)	PoC Loss @3.68%	Energy at KPTCL Periphery
1	RSTP I & II	14775	22.27	3290.24	121.08	3169.16
2	RSTP III	3900	23.24	906.36	33.35	873.01
3	RSTP Talcher	14021	19.60	2748.12	101.13	2646.99
4	Sihhadri Station II	6564	19.94	1308.80	35.21	1273.59
5	Vallur Unit I & II	7423	11.13	826.20	47.69	778.51
6	NLC II Stage-1	4009	23.87	956.79	27.78	929.01
7	NLC II Stage-2	5421	23.91	1296.00	22.58	1273.42
8	NLC Expansion I	2872	26.28	754.76	17.67	737.09
9	New NLC thermal project	2365	7.41	613.63	3.56	610.07
10	NLC expansion Stage II (Unit-1)	6485	25.94	480.25	30.91	449.34
11	NTPL 2 x 500 MW	7093	21.33	1513.06	32.68	1480.39
12	MAPS	1149	8.50	96.75	48.16	48.58
13	Kaiga Unit 1 & 2	2727	30.80	839.92	55.68	784.24
14	Kaiga Unit 3 & 4	2664	33.33	887.91	53.91	834.00

15	Kudumkulam Unit-1	6234	23.50	1464.98	50.72	1414.26
16	Kudumkulam Unit-2	6234	22.11	1378.33	30.40	1347.93
17	Kudgi 3 x 800 MW	15912	56.88	9051.38	333.09	8718.29
18	DVC Mijia (Unit 7 & 8)	5944	20.00	1188.90	43.75	1145.15
19	DVC Koderma (Unit 1 & 2)	5944	25.00	1486.12	54.69	1431.43
<b>Total:</b>		<b>121737</b>		<b>31088.50</b>		<b>29944.44</b>

Due to surplus energy in the State, some of the Inter State Generating Stations are to be backed down and thus energy to be availed during FY23 to FY25 is as below.

Sl. No.	Source	FY23 (MU)	FY24 (MU)	FY25 (MU)
1	RSTP I & II	3169.16	3169.16	3169.16
2	RSTP III	873.01	873.01	873.01
3	RSTP Talcher	2646.99	2646.99	2646.99
4	Sihhadri Station II	1260.63	1260.63	1260.63
5	Vallur Unit I & II & III	1327.61	1327.61	1327.61
6	NLC II Stage-1	921.58	921.58	921.58
7	NLC II Stage-2	1248.31	1248.31	1248.31
8	NLC II Expansion I	726.99	726.99	726.99
9	New NLC thermal project	462.58	462.58	462.58
10	NLC expansion Stage II (Unit-1)	591.05	591.05	591.05
11	NTPL 2 x 500 MW	366.33	366.33	366.33
12	MAPS	93.19	93.19	93.19
13	Kaiga Unit 1 & 2	809.01	809.01	809.01
14	Kaiga Unit 3 & 4	855.24	855.24	855.24
15	Kudumkulam Unit-1	309.39	309.39	309.39
16	Kudumkulam Unit-2	1411.07	1411.07	1411.07
17	Kudgi 3 x 800 MW	2276.77	2276.77	2276.77
18	DVC Mijia (Unit 7 & 8)	407.16	407.16	407.16
19	DVC Koderma (Unit 1 & 2)	1431.43	1431.43	1431.43
<b>Total:</b>		<b>21187.48</b>	<b>21187.48</b>	<b>21187.48</b>

### **CGS Thermal Energy Cost:**

The Tariff in respect of Central Generating Stations like NTPC, NLC and DVC stations for the Control period 2019 to 2024 is yet to be determined by CERC for the stations belonging to Generators. Hence, capacity charges billed by generator to ESCOMs of Karnataka for the year 2021-22 are considered for the FY23, FY24 & FY25. The capacity charge considered are as detailed below.

Sl. No.	Source	Capacity Charges (Rs.in Cr.)	Remarks
1	RSTP I & II	1057.68	As per Bill
2	RSTP III	266.78	As per Bill
3	RSTP Talcher	996.95	As per Bill
4	Sihhadri Station II	1066.71	As per Bill
5	Vallur Unit I & II & III	1858.96	11.07.2017
6	NLC II Stage-1	299.80	12.06.2017
7	NLC II Stage-2	414.29	12.06.2017
8	NLC II Expansion I	276.18	18.10.2016
9	New NLC thermal project	1259.60	29.01.2020
10	NLC expansion Stage II (Unit-1)	728.06	24.07.2017
11	NTPL 2 x 500 MW	1090.17	11.07.2017

12	Kudgi 3 x 800 MW	2795.24	08.01.2020
13	DVC Mijia (Unit 7 & 8)	1019.21	03.10.2016
14	DVC Koderma (Unit 1 & 2)	1175.74	28.02.2017
	<b>Total:</b>	<b>14305.35</b>	

The average variable cost for the month of July-2021, Aug-2021 and Sep-2021 is considered for energy charges for FY23 with an annual escalation of 2.5% for FY24 and FY25.

In respect of MAPS, Kaiga, and Kudamkulam power station the average rate per unit for the months of Aug-2020, Sep-2020 and October -2020 is considered.

Particulars	MAPS	Kaiga Unit 1 to 4	Kudamkulam Unit -1	Kudamkulam Unit -2
Base Price	2.427	3.415	3.545	3.545
Heavy Water adjustment charges	0.003	-0.195	0.381	0.381
Heavy Water lease adjustment charges	-	0.016	-	-
Insurance	0.071	0.158	0.042	0.042
De-commissioning Levy	0.020	0.020	0.020	0.020
Forex Variation Adjustment Charges	0.050	0.050	0.053	0.053
Nuclear Liability & Forex adjustment	-	-	0.050	0.050
Others	-	-	-	-
<b>Total tariff</b>	<b>2.571</b>	<b>3.464</b>	<b>4.091</b>	<b>4.091</b>

The capacity charges (Fixed Cost) and variable cost considered for FY23, FY24 and FY25 are as shown below.

Sl. No.	Source	Capacity Charges for FY23, FY24 & FY25	FY23 Variable Charges (Ps/unit)	FY24 Variable Charges (Ps/unit)	FY25 Variable Charges (Ps/unit)
1	RSTP I & II	235.53	262.97	269.54	269.54
2	RSTP III	62.00	258.57	265.03	265.03
3	RSTP Talcher	195.40	177.23	181.66	181.66
4	Sihhadri Station II	212.69	287.27	294.45	294.45
5	Vallur Unit I & II & III	206.90	304.93	312.56	312.56
6	NLC II Stage-1	71.55	265.04	271.69	271.69
7	NLC II Stage-2	99.04	265.07	271.69	271.69
8	NLC II Expansion I	72.58	240.67	246.68	246.68
9	New NLC thermal project	93.29	218.93	224.41	224.41
10	NLC expansion Stage II (Unit-1)	188.89	255.73	262.13	262.13
11	NTPL 2 x 500 MW	232.54	294.30	301.66	301.66
12	MAPS	-	257.14	263.57	263.57
13	Kaiga Unit 1 & 2	-	346.40	355.06	355.06
14	Kaiga Unit 3 & 4	-	346.40	355.06	355.06
15	Kudumkulam Unit-1	-	409.10	419.33	419.33
16	Kudumkulam Unit-2	-	409.10	419.33	419.33
17	Kudgi 3 x 800 MW	1590.04	341.93	350.48	350.48
18	DVC Mijia (Unit 7 & 8)	203.84	292.00	299.30	306.60
19	DVC Koderma (Unit 1 & 2)	293.93	274.73	281.60	288.47
	<b>Total:</b>	<b>3258.24</b>			

Note: Income tax for the CGS station included in the capacity charges payment on normative basis by grossing up of RoE with effective tax rate of the respective financial year of the generating company. Income tax is included as a part of capacity charges and not payable separately and hence not considered.

#### **D. Availability of energy from NCE sources:**

- (1) The actual generation of NCE projects for the year FY21 has been considered for FY23, FY24 and FY25 including Solar, Co-generation, Bio-mass, Wind Mills and Mini Hydel projects.
- (2) Ministry of power allocated un allocated power of coal based NTPC stations for bundling with solar power in ratio of 1.2 (unallocated power: Solar power) as envisaged under National Solar Mission Phase-II, Batch-II Tranche-I has been surrendered on 15.7.2021.
- (3) Accordingly, NCE energy projected for MESCOM for FY23, FY24 and FY25 is indicated below;

Sl. No.	Source	Availability for FY23, FY24 & FY25
1	Mini Hydel	366.36
2	Wind Mill	259.10
3	Solar	716.97
4	NTPC Bundled Power Coal	36.64
5	NTPC Bundled Power Solar	9.53
6	NTPC Bundled Power Solar - Pavagada	108.94
	<b>Total:</b>	<b>1497.54</b>

The average cost of the year 2020-21 is considered for Hydro , wind, Solar, Co-generation.

#### **E. Availability of energy from major IPP- UPCL:**

The generation of 1200 MW of UPCL Unit -1 & Unit-2 taken at 85% of 90% installed capacity as per PPA/ approval given by Government. Tariff in respect of control period FY20 to FY24 is yet to be determined by CERC and hence the auxiliary consumption of 5.75% as per CERC Regulation 2019 and additional auxiliary consumption 1.2% allowed by CERC vide order dated 20.02.2014 and 10.07.2015 is taken. The capacity charges determined by CERC in the order dated 22.01.2020 applicable for FY19 is considered for FY23, FY24 and FY25. M/s. UPCL has entered into coal supply agreement with PAN Asia Trading PTC Ltd., the cost of the coal (FoB) has quoted by the bidder, the variation link to the CERC Composite Index. The average variable cost for the month of April 2021 to Oct-2021 is considered for FY23, FY24 and FY25.

Station	Energy Availability Considered	Fixed Cost Rs.in Cr.	Variable Cost FY23 (Ps/unit)	Variable Cost FY24 (Ps/unit)	Variable Cost FY25 (Ps/unit)
UPCL	-	1091.48	516.44	516.44	516.44

#### **F. Availability of energy from Jurala Hydro Power Project:**

ESCOMs having a share of 50% from Jurala Priyadarshni Hydro Electric Projects i.e. 117 MW. The net energy exported to Karnataka from Jurala Priyadarshni Hydro Electric Projects for FY21 is considered for FY23, FY24 and FY25. The TSERC vide tariff order dated 6.7.2017 determined the capacity charges for the project for the control period from 1.4.2014 to 31.3.2019. The 50% of the capacity charges applicable for FY19 is considered. The capacity Charges for the next

control period is yet to be determined by TSERC hence capacity charges applicable for the year FY19 is considered for FY23, FY24 and FY25 also.

	April	May	June	July	August	September
Energy in Mus	0	0	0	21.76	49.712	52.304
Amount in Rs Cr	4.89	4.89	4.89	4.89	4.89	4.89

October	November	December	January	February	March	Total
43.264	21.84	0.656	-0.064	-0.08	-0.096	189.296
4.89	4.89	4.89	4.89	4.89	4.89	58.66

#### G. Availability of energy from Thunga Bhadra Hydro Power Project:

The energy from T. B. Dam power is shared between AP/Telangana and Karnataka. The 1/5th share of revenue expenditure and energy has been shared between two states. The actual cost and energy supplied for the FY21 is considered for FY23, FY24 and FY25. The power purchase cost and energy from T. B. Dam has been estimated to 27.05 MUs and Rs.3.04 crore.

	April	May	June	July	August	September
Energy in Mus	-0.08	0.10	-0.15	-0.22	8.32	5.92
Amount in Rs Cr	0.08	0.12	0.06	0.06	0.08	0.08

October	November	December	January	February	March	Total
9.56	2.85	2.38	2.51	3.45	3.55	38.17
0.11	0.65	0.16	0.09	0.21	0.38	2.15

#### H. ABSTRACT of total energy availability for FY23, FY24 and FY25:

Sl. No.	Generating Stations	Availability (MU)	Remarks
1	KPCL Hydro	11588.54	KPCL
	KPCL Thermal:		
2	RTPS -1 & 7	9102.73	KPCL
3	RTPS 8	1624.35	KPCL
	BTPS:		
4	Unit I	3480.07	KPCL
5	Unit II	3042.49	KPCL
6	Unit III	4874.16	KPCL
7	Yelahanka Power project	2495	KPCL
8	Yermarus TPS - 1& 2	10444.08	KPCL
9	CGS	18649.57	LGBR of SRPC for 2022-23
10	Kudigi	8718.29	LGBR of SRPC for 2022-23
11	DVC	2576.58	85% of contracted capacity
12	UPCL	7482.78	90% of 85% installed capacity
13	NCE Projects	20291.49	Actuals of ESCOMs for the FY 2020-21
14	TBHE & Jurala projects	227.467	Actuals of 20-21
	Total	104597.60	104597.60

PCKL has reduced the availability of energy from different sources as the requisitioned quantum by ESCOMs is less than the total availability and arrived the quantum for FY23, FY24 and FY25 as indicated in the below table. Reduction has been done on the basis of Merit Order Dispatch.

Sl. No.	Generating Stations	Availability (MU)		
		FY23	FY24	FY25
1	RTPS 8	1057.06	1057.06	1057.06
2	BTPS Unit-1	1117.55	1117.55	1494.18
3	BTPS Unit-2	1134.95	1308.95	1494.18
4	BTPS Unit-3	3248.15	3248.15	3648.92
5	RTPS Unit1 to 7	4382.31	5579.34	6077.70
6	Yelahanka Power projects	428.46	428.46	428.46
7	Yermarus TPS - 1 & 2	6522.04	7445.24	8398.24
8	Kudigi Units 1,2 &3	2276.77	2276.77	2276.77
9	UPCL	-	-	-
10	NTPL	309.39	309.39	309.39
11	Vallur	366.33	366.33	366.33
12	DVC - Mejia	407.16	407.16	407.16
	<b>Total</b>	<b>21250.16</b>	<b>23544.40</b>	<b>25958.39</b>

**G. PGCIL charges FY23, FY24 and FY25:**

	FY23 (Rs.in Cr)	FY24 (Rs.in Cr)	FY25 (Rs.in Cr)
POC Charges	2674.20	2741.06	2807.91

Allocated to MESCOM @ 7.668% as below;

	FY23 (Rs.in Cr)	FY24 (Rs.in Cr)	FY25 (Rs.in Cr)
MESCOM	205.06	210.19	215.32

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