

CHAPTER-4

LOAD FORECAST & SALES FORECAST

Introduction:

Bangalore Electricity Supply Company Limited (BESCOM) has completed its 16 years of experience in the area of Distribution Business in the State of Karnataka. Presently, BESCOM area of operation includes 8 districts of Karnataka. Viz., Bangalore Urban, Bangalore Rural, Ramanagara, Chikkaballapur, Kolar, Tumkur, Davanagere and Chitradurga.

The Commission has issued guidelines for preparation of Load Forecast, Power Procurement Plan & Power Procurement procedure through regulations:

- KERC (Conditions of Licence for ESCOMs) Regulations, 2004 dated 28.04.2004
- KERC (Load Forecast) Regulations, 2009 dated 02.04.2009

The Commission vide the above Load Forecast regulations has directed the Distribution Licensees to follow the Forecast methodology adopted by CEA from time to time, so as to have a consistent methodology. Further, it is also stated that the forecast as per the latest available EPS (Electric Power Survey of India), under fulfillment of CEA's obligation under Section 73(a) of Electricity Act, 2003 would be the reference point.

The latest available CEA forecast is 19th EPS.

Energy /Demand requirement of BESCOM constitutes approximately 50% of the Karnataka State Energy/Demand requirement. Bangalore urban alone constitutes 50% of Energy/Demand requirement of BESCOM. Hence, Bangalore Urban alone constitutes 25% of the total State Energy /Demand requirement.

BESCOM in its Tariff filing for the 4th control period i.e., FY-17 to FY-19, had projected the energy forecast up to 2021 under different scenarios.

The Karnataka Electricity Regulatory Commission in its letter no. KERC/B/02/18/720, dated 06.08.2018 has stated that the 5th Control period is for a span of 3 years from FY-20 to FY-22.

Demand forecasting of electricity is an important activity for distribution companies to know the description of electricity demand in future.

To make more accurate forecasts, we need to combine historical review with statistical/probability based modeling for categories such as irrigation pump sets and Bhagya Jyothi installations. Though BESCOM has historical details from FY-03

onwards, it is felt that the past years growth scenarios will be more accurate to project for future years. The thought of considering limited historical data is due to the fact that the power sector has evolved over the recent years, initiating new regulations for increasing competitiveness in the market and also increasing the energy generation through renewable source of energy. Hence, actuals of FY-09 to FY-19 figures are considered. Actuals with respect to Projection under different scenarios are verified and necessary corrections are proposed for the next control period i.e., FY-20 to FY-22.

The actuals are compared to the following projection scenarios and necessary corrections are proposed.

1. Per capita consumption
2. 19th draft EPS
3. Circle wise energy sales
4. Area Load Dispatch Centre based projections
5. Compounded Annual Growth Rate (CAGR)

Sales Projection for 5th Control Period

Since FY-18 figures are presently finalized the same is considered. Half yearly sales of FY-19 (upto September 18) are reckoned and the sales doubled for arriving at the full year figures for FY-19, which works out to 27,235 MU. The sales of 27,235 MU for FY-19 indicate a percentage growth of 4.9% over FY-18.

The sales under BJ/KJ and IP set computed based on average /specific consumption. The same is illustrated during each category wise briefing. With these changes the year wise CAGRs are worked.

CAGR upto 10 years are computed, maximum, minimum & average CAGR are calculated. Using an empirical formula growth rates are arrived as shown in the table below.

Table 4.1

Tariff category	CAGR 10yrs	CAGR 9yrs	CAGR 8yrs	CAGR 7yrs	CAGR 6yrs	CAGR 5yrs	CAGR 4yrs	CAGR 3yrs	CAGR 2yrs	CAGR 1yr	Max	Min	Avg	Formula
LT-1	7%	8%	19%	22%	23%	34%	42%	56%	101%	19%	101%	7%	28%	37%
LT-2(a)	7%	7%	8%	7%	6%	6%	6%	5%	5%	3%	8%	3%	6%	6%
LT-2(b)	7%	8%	8%	8%	3%	7%	8%	6%	8%	6%	8%	3%	7%	7%

The sales for 5th Control period has been finalized with certain correction factors as detailed below:

1. Actual category wise sales of FY-18 is considered for projections.
2. Half yearly sales i.e. cumulative DCB of Sept -18 is considered.
3. In respect of BJ/KJ, no new schemes are announced by GoK. Hence the consumption of FY19 is retained for the future years.
4. The half yearly sales and consumers of FY-19 are considered and average monthly consumption/IP is computed as 544 units/IP/month. The monthly average consumption is less than the approved monthly specific consumption of 670 units/IP/month. The reduction in IP sales for FY-19 is attributed to good monsoons. Hence, an approximate average monthly consumption of 550 units/IP is considered and consumption for FY-19 is computed as 5940.31 MU's. Predicting monsoons from FY-20 is difficult. Hence, an average of 7200 units/IP/annum specific consumption is considered for estimating the future sales. BESCOM has considered an increase of 25,000 consumers for each year of the control period.
5. In respect of LT-4b, the growth rate is negative. Hence, the sale for FY-19 is retained for all the years of projection. The sale under this category is very miniscule and there is less impact on the total annual sales from this category.
6. HT-2b sales are computed based on the half yearly sales of FY-19. The sales are showing an increasing trend. But in the past years there was a decreasing trend. The empirical formula is also showing 0% growth. Hence, the sales of FY-19 is retained each year of the 5th control period.
7. For HT-3(b) one year growth is considered.
8. In respect of HT 4, the growth rate is negative. Hence, no growth rate is considered, FY-19 sales are retained for each year of the control period.

The sales calculations for FY-20, FY-21 and FY-22 are shown in the table below:

Table 4.2

Tariff category	FY-18	FY-19 (Apr-Sept)Actuals	FY-19 Estimations	FY-20 Estimations	FY-21 Estimations	FY-22 Estimations
LT-1	183.65	109.72	219.43	219.43	219.43	219.43
LT-2(a)	6616.53	3538.95	7077.89	7492.41	7931.19	8395.68
LT-2(b)	49.29	25.64	51.29	54.72	58.39	62.30
LT-3	2005.97	1054.74	2109.48	2266.32	2434.83	2615.86

LT-4(a)	6289.04	2894.09	5940.31	6660.3	6840.3	7020.3
LT-4(b)	0.95	0.96	1.93	1.93	1.93	1.93
LT-4(c)	4.52	2.34	4.69	4.74	4.78	4.83
LT-5	1185.41	626.05	1252.09	1278.47	1305.41	1332.92
LT-6 WS	813.85	564.95	1129.90	1352.55	1619.08	1938.12
LT-6 SL	455.98	243.25	486.51	520.32	556.49	595.17
LT-7	157.12	69.33	138.66	141.02	143.42	145.85
LT Total	17762.30	9130.03	18412.19	19992.26	21115.29	22332.43
HT-1	679.43	356.92	713.84	736.03	758.92	782.51
HT-2(a)	4470.59	2420.98	4841.97	4866.56	4891.27	4916.11
HT-2(b)	2562.32	1371.15	2742.30	2742.30	2742.30	2742.30
HT-2(c)	312.39	170.55	341.10	380.51	424.48	473.53
HT-3(a)	26.05	13.22	26.44	34.61	45.30	59.30
HT3 (b)	0.71	0.51	1.01	1.45	2.07	2.97
HT-4	68.85	35.19	70.38	70.38	70.38	70.38
HT-5	84.62	42.94	85.88	87.67	89.50	91.36
HT TOTAL	8204.96	4411.46	8822.91	8919.51	9024.22	9138.46
TOTAL	25967.26	13541.49	27235.10	28911.76	30139.51	31470.89

Consumer Projection:

The cumulative DCB of BESCOM upto Sept-18 depicts 11506688 consumers. The difference of consumers between DCBs of FY -18 and Sept-18 shows that 2.62 lakh consumers are added during the six months period. The consumer for FY-19 is computed by adding the difference of the consumers between Sept-18 and FY-18 to the total consumers upto Sept-18.

The CAGR for 5 years, 4 years, 3 years, 2 years and 1 year is computed as shown in the table below.

Table 4.3

Sl. No	Consumer Category	As on 31/03/17	As on 31/03/18	AS on 31/09/18	As on 31/03/19	One year growth rate	CAGR 5 years	CAGR 4 years	CAGR 3 years	CAGR 2 years	CAGR 1 year
1	LT 1(a)	803689	843579	844643	844643	0.1%	2.9%	2.4%	3.0%	2.5%	0.1%
2	LT2 (a)	7152843	7492893	7675710	7858527	4.9%	5.3%	5.4%	5.0%	4.8%	4.9%
3	LT2 (b)	11215	11627	11815	12003	3.2%	4.4%	4.5%	2.2%	3.5%	3.2%
4	LT3	993075	1046526	1069407	1092288	4.4%	5.8%	6.0%	5.0%	4.9%	4.4%
5	LT4 (a)	841228	872229	886138	900047	3.2%	5.4%	4.0%	3.6%	3.4%	3.2%
6	LT4 (b)	365	454	310	454	0.0%	-2.3%	-8.2%	15.0%	11.5%	0.0%
7	LT4©	1452	1550	1595	1640	5.8%	7.4%	5.7%	4.9%	6.3%	5.8%
8	LT5	194622	202044	205671	209298	3.6%	4.3%	4.5%	3.4%	3.7%	3.6%
9	LT6 WS	67451	74873	77149	79425	6.1%	8.7%	8.1%	8.8%	8.5%	6.1%
10	LT6 SL	60976	63273	63952	64631	2.1%	3.5%	3.0%	2.6%	3.0%	2.1%
11	LT7	555272	620792	654735	688678	10.9%	20.9%	18.5%	12.4%	11.4%	10.9%
	LT TOTAL	10682188	11229840	11491125	11751634	4.6%	5.8%	5.6%	5.1%	4.9%	4.6%
12	HT1	203	236	236	236	0.0%	8.1%	6.1%	6.2%	7.8%	0.0%

13	HT2 (a)	6303	6643	6846	7049	6.1%	7.1%	6.8%	3.9%	5.8%	6.1%
14	HT2 (b)	5709	6153	6432	6711	9.1%	7.7%	8.2%	4.8%	8.4%	9.1%
15	HT2 (c)	606	676	715	754	11.5%	22.1%	18.7%	12.3%	11.5%	11.5%
16	HT3 (a)	27	31	35	39	25.8%	14.3%	9.6%	19.2%	20.2%	25.8%
17	HT3 (b)	11	13	13	13	0.0%	34.1%	59.7%	5.7%	8.7%	0.0%
18	HT4	223	219	222	225	2.7%	3.1%	0.9%	-6.1%	0.4%	2.7%
19	HT5	759	949	1064	1179	24.2%		41.2%	35.4%	24.6%	24.2%
	HT TOTAL	13841	14920	15563	16206	8.6%	9.5%	9.2%	6.0%	8.2%	8.6%
	TOTAL	10696029	11244760	11506688	11767840	4.7%	5.8%	5.7%	5.1%	4.9%	4.7%

BESCOM has considered 3 year CAGR for its future consumer projections with certain deviation in a certain category of consumers. For HT-4, 1 year CAGR is considered.

Consumers Projections for 5th Control period i.e. FY-20 to FY-22 are depicted in the table below.

Table 4.4

Sl. No.	Consumer Category	As on 31/03/2020	As on 31/03/2021	As on 31/03/2022
1	LT 1(a)	844643	844643	844643
2	LT2 (a)	8247927	8656621	9085567
3	LT2 (b)	12268	12539	12816
4	LT3	1146477	1203354	1263052
5	LT4 (a)	925047	950047	975047
6	LT4 (c)	454	454	454
7	LT4 (d)	1720	1804	1893
8	LT5	216365	223671	231223
9	LT6 WS	86416	94021	102297
10	LT6 SL	66313	68038	69808
11	LT7	773985	869858	977607
	LT TOTAL	12321613	12925050	13564407
12	HT1	251	266	283
13	HT2 (a)	7323	7608	7905
14	HT2 (b)	7035	7374	7729
15	HT2 (c)	846	950	1067
16	HT3 (a)	47	55	66
17	HT3 (b)	14	15	15
18	HT4	231	237	244
19	HT5	1596	2161	2926
	HT TOTAL	17343	18667	20235
	TOTAL	12338956	12943717	13584642

The tariff category wise details are stated below:

1. LT-1 Installations:

Growth of consumers and consumption:

Table 4.5

PARTICULARS	FY-20	FY-21	FY-22
Consumers (No's)	844643	844643	844643
Consumption	219.43	219.43	219.43

The number of installations based on DCB figures for Sept-18(First Half year figures of FY-19) is 844643. Same numbers of consumers are retained for FY-19, FY-20, FY-21 and FY-22.

The energy sales for Sept-18(First Half year figure of FY-19) are 109.72 MU based on actual. For the FY-19 energy consumption 219.43 is calculated based on the half yearly figures. Since, BESCOM has not proposed any increase in consumers under this tariff, the sales under this tariff is also retained as 219.43 for each year of the 5th control period as shown in the table.

However, if the Government introduces any new schemes during the Control Period, the same will be brought to the kind notice of the Hon'ble Commission during Annual Performance Review.

2. LT-2a Installations:

Growth of consumers and consumption:

Table 4.6

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	8247927	8656621	9085567
Consumption	7492.41	7931.19	8395.68

The number of installations based on DCB figures for Sept-18 is 7675710. For FY-19, 7858527 consumers are calculated based on difference of Sept-18 (First Half year figure FY-19) and FY-18 figures added to Sept-18 (First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of **5%**.

The energy sales for Sept -18 under this category is 3538.95 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 6% is reckoned to arrive at the consumption.

3. LT-2b Installations:

Growth of consumers and consumption:

Table 4.7

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	12268	12539	12816
Consumption	54.72	58.39	62.30

The number of installations based on DCB figures for Sept-18 is 11815. For FY-19, 12003 consumers are calculated based on difference of Sept-18 (First Half year figure of FY-19) and FY-18 figures added to Sept-18 (First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 2.2%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 25.64 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 7% is reckoned to arrive at the consumption.

4. LT-3 Installations

Growth of consumers and consumption:

Table 4.8

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	1146477	1203354	1263052
Consumption	2266.32	2434.83	2615.86

The number of installations based on DCB figures for Sept-18 is 1069407. For FY-19, 1092288 consumers are computed based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 5%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 1054.74 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 7% is reckoned to arrive at the consumption.

5. LT-4b Installations:

Growth of consumers and consumption:

Table 4.9

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	454	454	454
Consumption	1.93	1.93	1.93

The number of installations based on DCB figures for FY-18 is 454. Same consumers are retained for FY-19, FY-20, FY-21 & FY-22.

The energy sales for Sept-18(First Half Year figure of FY-19) under this category is 0.96 based on actual. For FY-19 consumption is doubled based on half yearly figures.

For FY-20, FY-21 & FY-22 empirical formula growth rate is -29%. Hence, no growth is considered in this category and the sale of FY-19 is retained for FY20, FY-21 and FY-22.

6. LT-4c Installations

Growth of consumers and consumption:

Table 4.10

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	1720	1804	1893
Consumption	4.74	4.78	4.83

The number of installations based on DCB figures for Sept-18 is 1595. For FY-19, 1640 consumers are calculated based on difference of Sept-18 (First Half year figure of FY-19) and FY-18 figures added to Sept-18 (First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 4.96%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category 2.34 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 1% is reckoned to arrive at the consumption.

7. LT-5 Installations

Growth of consumers and consumption:

Table 4.11

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	216365	223671	231223
Consumption	1278.47	1305.41	1332.92

The number of installations based on DCB figures for Sept-18 is 205671. For FY-19, 209298 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 3.4%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 626.05 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 2% is reckoned to arrive at the consumption.

8. LT-6 Water supply Installations

Growth of consumers and consumption:

Table 4.12

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	86416	94021	102297
Consumption	1352.55	1619.08	1938.12

The number of installations based on DCB figures for Sept-18 is 77149. For FY-19, 79425 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 8.8%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 564.95 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 20% is reckoned to arrive at the consumption.

9. LT-6 Street light Installations

Growth of consumers and consumption:

Table 4.13

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	66313	68038	69808
Consumption	520.32	556.49	595.17

The number of installations based on DCB figures for Sept-18 is 63952. For FY-19, 64631 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of Fy-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 2.6%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 243.25 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 7% is reckoned to arrive at the consumption.

10. LT-7 Installations

Growth of consumers and consumption:

Table 4.14

PARTICULARS	FY-20	FY-21	FY-22
Consumers (No.s)	773985	869858	977607
Consumption	141.02	143.42	145.85

The number of installations based on DCB figures for Sept-18 is 654735(First Half Year Figure of FY-19). For FY-19, 688678 consumers are calculated based on

difference of Sept-18(Half year figure) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 12.4%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 69.33 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 2% is reckoned to arrive at the consumption.

11. HT-1 Installations

Growth of consumers and consumption:

Table 4.15

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	251	266	283
Consumption	736.03	758.92	782.51

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 236. For FY-19, 236 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 6.2%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 356.92 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 3% is reckoned to arrive at the consumption.

12. HT-2a Installations

Growth of consumers and consumption:

Table 4.16

PARTICULARS	FY-20	FY-21	FY-22
Consumers (No.s)	7323	7608	7905
Consumption	4866.56	4891.27	4916.11

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 6846. For FY-19, 7049 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 3.9%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 2420.98 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 1% is reckoned to arrive at the consumption.

13. HT-2b Installations

Growth of consumers and consumption:

Table 4.17

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	7035	7374	7729
Consumption	2742.30	2742.30	2742.30

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 6432. For FY-19, 6711 consumers are calculated based on difference

of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 4.8%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 1371.15 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22 same consumption is retained 2742.30 as there is no growth.

14. HT-2c Installations

Growth of consumers and consumption:

Table 4.18

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	846	950	1067
Consumption	380.51	424.48	473.53

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 715. For FY-19, 754 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 12.3%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 170.55 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 12% is reckoned to arrive at the consumption.

15. HT 3a Installations

Growth of consumers and consumption:

Table 4.19

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	47	55	66
Consumption	34.61	45.30	59.30

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 35. For FY-19, 39 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 19.2%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 13.22 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 31% is reckoned to arrive at the consumption.

16. HT 3b Installations

Growth of consumers and consumption:

Table 4.20

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	14	15	15
Consumption	1.45	2.07	2.97

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 13. For FY-19, 13 consumers are calculated based on difference of

Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 5.7%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 0.51 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, one year growth rate FY-19 over FY-18 43% is considered, as formula growth rate is on higher side. The sales under this category is very miniscule and there is less impact on total annual sales.

17. HT-4 Installations

Growth of consumers and consumption:

Table 4.21

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	231	237	244
Consumption	70.38	70.38	70.38

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 222. For FY-19, 225 consumers are calculated based on difference of Sept-18(First Half year figure of Fy-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The 3 year CAGR growth rate is -6%.So, the year-end figure for FY-20, FY-21 and FY-22 are computed based on one year CAGR growth rate 2.7%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 35.19 based on actual. For FY-19 consumption is doubled based on half yearly figures. Empirical formula growth rate is -13%. So, for FY-20, FY-21 and FY-22, FY-19 consumption 70.38 MU is considered.

18. HT-5 Installations

Growth of consumers and consumption:

Table 4.22

PARTICULARS	FY-20	FY-21	FY-22
Consumers (Nos)	1596	2161	2926
Consumption	87.67	89.50	91.36

The number of installations based on DCB figures for Sept-18(First Half Year Figure of FY-19) is 1064. For FY-19, 1179 consumers are calculated based on difference of Sept-18(First Half year figure of FY-19) and FY-18 figures added to Sept-18(First Half year figure of FY-19) consumers. The year-end figure for FY-20, FY-21 and FY-22 are based on 3 year CAGR growth rate of 35.4%.

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 42.94 based on actual. For FY-19 consumption is doubled based on half yearly figures. For FY-20, FY-21 and FY-22, using an empirical formula growth rate at 2% is reckoned to arrive at the consumption.

19. LT-4 Agriculture Installations:

Government of Karnataka in its circular No EN 41 VSC 2014 P1, dtd: 14.07.2014 has stated that an approximate 50,000 unauthorized IP applications per year are registered in the State. Further, it is stated that the occurrence of unauthorized pump set is a continuous phenomenon as a major rural population of Karnataka depends on agriculture for employment. In order to end the menace of unauthorized IP sets, the said IP sets are treated in par with new IP connections. Guidelines to service irrigation pump sets irrespective of its area i.e. dark/grey area are issued in this circular.

The agricultural consumers for FY-18 are 872229 and Sept-18 DCB figures are 886138. This shows that 13909 installations are added for a period of six months. For FY-19, 900047 Consumers are calculated based on difference of Sept-18 (First Half Year Figure of FY-19) and FY-18 figures added to Sept 18 (First Half Year Figure of FY-19)

Consumers. For FY-20, FY-21 and FY-22 25,000 installations per annum is reckoned. The details are shown in the table below.

Table 4.23

Details	FY-19	FY-20	FY-21	FY-22
No of Consumers	900047	925047	950047	975047

Consumption:

The energy sales for Sept -18 (First Half year figure of FY-19) under this category is 2894.09 based on actual. FY17 there was unusual condition and specific consumption had increased. Hence, Commission approved specific consumption of 7340.76 units/IP/annum based on half year consumption for FY-18. The half yearly sales and consumers of FY-19 are considered and average monthly consumption/IP is computed as 544 units/IP/month. The monthly average consumption is less than the approved monthly specific consumption of 670 units/IP/month. The reduction in IP sales for FY-19 is attributed to good monsoons. Hence, an approximate average monthly consumption of 550 units/IP is considered and consumption for FY-19 is computed as 5940.31 MU's. Predicting monsoons from FY-20 is difficult hence an average of 7200 units/IP/annum specific consumption is considered for estimating the future sales.

Table 4.24

Details	FY-19	FY-20	FY-21	FY-22
Specific Consumption units/installation/annum	6704	7299	7296	7294
Consumption(in MU)	5940.31	6660.3	6840.3	7020.3

The total sales, energy requirement at IF point and energy requirement at generation point for FY-19 and for the 5th control period is shown in the table below:

The average and peak load requirement is computed with actual data. An average of 74% is reckoned to arrive at the peak load requirement.

Table 4.25

Particulars	FY-19	FY-20	FY-21	FY-22
Total energy sales projected in MU	27235	28912	30140	31471
Sales growth rate projected in MU		6.16%	4.25%	4.42%
Distribution Loss In %	12.5	12.4	12.3	12.2
Energy at IF Points in MU	31125.83	33004.3	34366.6	35843.84
Transmission Loss in %	3.08	3.19	3.17	3.15
Energy at Gen. Points in MU	32114.97	34091.83	35491.68	37009.64
Energy Input growth rate in percentage		6.16%	4.11%	4.28%
Average MW Requirement	3666	3892	4052	4225
Peak MW requirement at LF of 74%	4954	5259	5475	5709