CAG

Citizen consumer and civic Action Group

VILLAGE ENERGY ASSESSMENT

AUDIT REPORT

Of Energy Use in Kadambathur Panchayat Union, Tiruvallur District

2023

Authors

Dr.R.Sethumadhavan, Ph.D, MBA, Consultant for CAG, Retired Professor from Anna University, Chennai.

Disclaimers: The information in this document has been obtained in good faith from sources that are believed to be reliable, but any potential interpretation of this report as making an allegation against a specific company or companies named would be misleading and incorrect. The authors accept no liability whatsoever for any direct or consequential loss arising from the use of this document or its contents.

ABOUT CAG

CAG is a thirty seven year old non-profit, non-political and professional organisation that works towards protecting citizens' rights in consumer and environmental issues and promoting good governance processes including transparency, accountability and participatory decision-making. We work primarily to protect the interests of consumers and citizens of Chennai though our efforts have had state level and even national level impacts.

CONTENTS

Glossary of Terms

Amp	Ampere
BDO	Block Development Office
CAG	Citizen consumer and civic Action Group
CD	Contract Demand
CL	Connected Load
DEAS	Detailed Energy Assessment Study
DRDA	District Rural Development Agency
EB	Electricity Board
EC	Energy Conservation
EE	Energy Efficient
HH	Households
HP	Horse Power
kL	kilo Litre
kW	kilo Watt
kWh	kiloWatt Hour
kV	kilo Volt
kVA	kilo Volt Ampere
kVAr	kilo Volt Ampere Reactive
L	Litre
LCV	Light Commercial Vehicle

LED	Light Emitting Diode
MD	Maximum Demand
OHT	Over Head Tank
PDS	Public Distribution System
PF	Power Factor
SC	Service Connection
TANGEDCO	Tamil Nadu Generation and Distribution Corporation Limited
V	Volts
VPRC	Village Poverty Reduction Committee
W	Watts

Acknowledgement

We wish to place on record our thanks to the **District Rural Development Agency** (**DRDA**), Tiruvallur district for giving us the opportunity to conduct a **Detailed Energy Assessment Study** (**DEAS**) on the use of energy intensive equipment within the Kadambathur Panchayat, Tiruvallur District, namely, street lighting and water pumping.

This work would not have been possible without the advice and support of Dr.R.Sethumadhavan, Ph.D, MBA, Consultant (CAG) who is the author of this report.

We extend our wholehearted thanks to Shri.Rishabh Kankaliya, IAS, Additional Collector & Project Director, DRDA for permitting us to go ahead with this assignment. Our thanks are due to Shri.Roobesh Kumar, Assistant Director (AD), DRDA who rendered all necessary support towards this project. The unstinted co - operation and encouragement offered by Mr.V.Rajavel, Executive Engineer, DRDA, Tiruvallur helped in completing this assignment successfully.

The President of Kadambathur Panchayat deserves a special thanks for the assistance offered. Mr Prakash, Secretary, Kadambathur Panchayat offered absolute co - operation and support, without which this assignment would not have come to this stage,

The excellent rapport, unstinted cooperation and clear understanding shown by the concerned supporting staff of the Panchayat were of great help to us in conducting and completing this study successfully. We are pleased to place on record our appreciation for the same. The energy / cost conservation schemes identified and proposed in this report - when implemented - are expected to bring in lasting benefits (savings) in terms of energy as well as cost to the Panchayat.

We are privileged to submit this ***"Comprehensive Energy Assessment Report"*** to the **DRDA**, Tiruvallur and request the concerned authorities to take up the energy conservation suggestions for implementation. Any omitted names in the acknowledgement is purely unintentional.

K. Vishnu Mohan Rao, Senior Researcher
G.N. Bharath Ram, Researcher
Prabhuram Subramanian, Researcher

May 2023 **Citizen consumer and civic Action Group (CAG), Chennai**

Executive Summary

A Detailed Energy Assessment Study (DEAS) was undertaken at the Kadambathur Panchayat Union as this is one of a few Panchayats of the Tiruvallur District with a very high cash outflow on electricity charges in relation to its population and land area. The present spending on electricity by this Panchayat is Rs.48 lakhs a year of which Rs.41 lakhs a year (86%) goes towards water pumping alone and the rest (Rs.7 lakhs a year) towards street lighting. As of now, the Panchayat has accrued outstanding payments to about **Rs. 1 crore.**

Observations

There are 10 habitations in this Panchayat with a total population of 23046. The Panchayat has availed 28 TANGEDCO service connections for street lighting and 31 for water pumping. These appear to be quite reasonable. It was realized that the residents were quite comfortable with the water supply and the lighting provisions and are thankful to the Panchayat for this. A number of visits were made to the Panchayat for the sake of field level data collection, interaction with TANGEDCO officials, water pump operators, and the general public. Physical counting and verification was done on street lighting in terms of number of lamp posts and the number of bulbs fitted in each pole. Further, field level electrical measurements were carried out on 28 working service connections (SC)s (water pumps) that included the recording of kW, kVA,V, Amps, power factor etc.

Highlights

1. Street Lights

It was noticed during field level data collection that almost all street lights have been converted into LED, replacing the conventional and less efficient tube lights, and mercury / sodium vapor lamps. This is a commendable initiative taken by the Panchayat to achieve energy efficiency in street lighting. However, it was observed that the LED lamps fitted were of the domestic category; street light fittings are recommended instead. Secondly, it was realized that the kW Demand Contracted [CD] for the street lightings to a major extent were much higher than required. The rationale was missing. Thirdly, it was recorded that the major consumers of electricity were the lights installed on the overhead bridge across the railway tracks for vehicular traffic. These account for 72 % of the total

electricity consumption of street lighting. (Rs. 5 lakhs a year out of a total Rs. 7 lakhs a year is spent on street lighting.)

2. Pumps for Water Supply

Through the field level electrical measurements, it was established that the majority of the pumps (nearly 95%) are of 7.5 hp rating. Thus, it appears that the Panchayat has standardized the pump rating. This is technically a sensible action. Secondly, it was recorded that the contracted demand for the water pumping service connections were quite higher than the motor rating itself. For example, the majority of the service connections have a CD of 9 kW and above while the motor rating is only 5.6 kW. About 15 service connections were in disuse and incur monetary loss by way of payment of fixed charges. It appears that the majority of the pumps / motors have put in more than 10 years of operation and in that process have had their coils rewound many times resulting in operational inefficiency.

Study Outcome

The DEAS conducted has resulted in the identification of nine energy / cost conservation proposals in respect of both street lighting and water pumping. The data collected, analysis made, identification of energy / cost conservation schemes along with their respective techno economic viability are elaborated in Chapters 4 & 5 respectively for street lighting and water pumping. Two major areas have been identified for energy optimization as far as street lightings are concerned, namely, contract demand curtailment and bridge lighting Lux reduction in relation to the traffic volume experienced. The cost saving estimation was Rs**.1,06,080 a year** [which is about **16 %** of the present energy bill of lighting]. The cost required to achieve these is quite meagre (**Rs.1,00,000**) and therefore manageable. On the water pumping front, out of the 28 pumps, the major recommendation made is the replacement of the **aged & coil rewound for 6 pumps,** that consume twice the rated power, with **energy efficient pumps** of appropriate technical specifications. The cost saving is estimated to be not less than **Rs. 2 lakhs a year** and targets 6 % of the energy consumption in water pumping. This can go up when the 22 remaining pumps are also taken up for replacement, especially those pumps that have completed 10 years of service.

Conclusion

The following table sums up the energy conservation proposals identified along with the economics of implementation.

Energy Conservation Proposals Identified: A Summary

No	Proposal Description	Cost Savings Rs / y	Investment Rs	Payback Period months
STREET LIGHTING				
1	Cancellation of unused SC	6,000	-	-
2	Rectification of faulty meters	-	-	-
3	Merger of service connections in identified Locations	2,400	-	-
4	Reduction of CD in selected S Cs	20,400	-	-
WATER PUMPING				
5	Bridge lighting Lux optimization	77,280	1,00,000	16
6	Cancellation of unused SCs	73,200	-	-
7	Improvement of PF in identified Motors	18,554	14,500	9
8	Reduction of CDs in identified SCs	13,200	-	-
9	Installation of EE motors along with CD reduction	1,08,336	3,50,000	39
	Total	**3,19,370**	**4,64,500**	**17**

The overall anticipated cost saving is **Rs. 3.2 lakhs a year** with a one - time investment of **Rs. 4.6 lakhs** which will be earned back in about **17 months**. The schemes recommended are technically sound and easy to implement. Overall cost reduction is pegged at **7%** with the implementation of these simple measures. CAG is willing to technically support the Panchayat in the implementation of schemes recommended above, if requested by the DRDA / Panchayat. We wish the Panchayat success in the implementation of these identified measures.

1 Introduction

CAG envisaged the idea of creating a Village Energy Assessment Tool for Panchayats in Tamil Nadu. The tool is being developed with a view to serve as a ready reckoner for Panchayats focusing on energy utilization wherein leaders or residents can easily understand their village level energy consumption patterns.

The user of the tool is expected to put in some basic data related to the energy consumption pattern of the Panchayat and the tool will provide recommendations aiming energy usage optimization, energy efficiency and renewable energy that will ultimately reduce energy consumption. To attain this objective, it is necessary that the ground level situation is well understood. As a first step, it is mandatory to understand the different types of public amenities which constitute a Panchayat's electricity bill and quantify the same.

Hence , it was decided to do a field (village) level energy assessment study [with specific focus on electricity usage - a costly and widely used commodity] and establish the energy usage scenario. It was anticipated that the DEAS will help a) provide us with raw data towards developing the energy audit tool and b) the Panchayat identify areas for improvement of energy performance and energy conservation.

1.1 Kadambathur Village Panchayat - An overview

Kadambathur village Panchayat is classified as a 1st Grade Village Panchayat and is one of the many village Panchayats that come under the jurisdiction of Kadambathur Panchayat Union, within Tiruvallur District, Tamil Nādu.

Photo : Panchayat Office - Kadambathur Panchayat

CAG team then visited the Kadambathur Panchayat and held initial level of discussions with Panchayat President, Assistant BDO and Mr. Prakash, Panchayat Secretary (refer photographs below).

Photo : CAG team in discussion with Kadambathur Panchayat Officials

Photo : Dr.R.Sethumadhavan (Consultant, CAG) explaining about data requirements to Mr. Prakash, Secretary, Kadambathur Panchayat

Photo : First level discussion between CAG team and Panchayat Officials

No	Item	Value
1	Total household / population	3416 / 23046
2	Male / Female	11798 / 11248
3	No. of Habitations	10
4	Total land area of the Panchayat	6.87 sq km / 1699 acres
5	Built - up area	2.75 sq km / 680 acres
6	Agriculture area	0.70 sq km / 173 acres
7	No of Industries / Companies	Nil
8	Primary school & secondary school	3 & 2
9	Middle school & higher secondary school	1 & 1
10	Anganwadi building	8
11	Public distribution shop	5
12	SHG building	1
13	VPRC building	1
14	Library building	1
15	Panchayat office building	1
16	VAO office	2
17	Veterinary hospital	1
18	Primary health centre	1
19	Agriculture office	1
20	Mahatma Gandhi National Rural Employment Guarantee (MGNREGS) registered family	1474
21	Active workers under MGNREGS	1176
22	Cattle population	2767
23	Ground water table depth in meters	20
24	Type of soil	Sandy

Table 1.1 : Salient Features of Kadambathur Panchayat

Data related to the habitations, population, number of households and streets are given in Table 1.2

No	Habitation	No of HH	Population	No of Streets
1	Kadambathur Colony	286	2369	19
2	Kadambathur Village	454	3409	26
3	Kasavanallathur Colony	659	3692	16
4	Kasavanallathur Village	473	2127	14
5	Venmanambudur Colony	246	1768	8
6	Venmanambudur Village	295	2741	15
7	Ambedkar Nagar	278	2187	9
8	Indira Nagar	317	1395	8
9	Kaliyamman Nagar	189	1952	7
10	MGR Nagar	219	1406	11
Total		**3416**	**23046**	**133**

Table 1.2 : Household (HH) / Street Details of Kadambathur Panchayat

1.2 Background of energy audit study

The major revenue sources for Kadambathur Panchayat are property tax, water tax and building approval plan. In addition, like any other Panchayats, this Panchayat too gets funding from the state as well from the central government to meet its various welfare measures. Part funding is received from the state government to pay for electricity bills. It is understood that the Panchayat has accumulated outstanding electricity bills to the tune of **Rs.1 crore** over the last couple of years, with efforts being taken to bring this burden down to more manageable levels by the Panchayat and DRDA.

The CAG team made a couple of more visits to Kadambathur Panchayat and captured data related to electricity spending by the Panchayat. The EB bill indicated the Panchayat's payments for overhead tank water pumping and street lighting formed the major chunk of the electricity bill.

As a part of DEAS , the CAG team conducted a walk - through audit of street lighting in the Panchayat with a view to ascertain the number of street lights in use in various habitations, the wattages installed , the period of operation in a day etc.

It was established that the Panchayat paid Rs.48 lakhs a year towards electricity charges and that 86 % of it went towards water pumping and remaining 14% for street lighting. Accordingly, a study was designed to focus on the energy consumption pattern of each pump of the 28 SCs by way of recording the field level power measurements .

Photo : Power quality measurements of OHT pumps being carried out by CAG team in Kadambathur Panchayat

Geo - tagging and physical verification of street lightings have also been made as a part of this study. The data analysis and outcome of this DEAS is presented in detail in ensuing chapters 3 & 4 respectively, for street lighting & water pumping.

2 Energy Bill Payment: present scenario

As a standard practice, there are 16 listed public amenities for which a Panchayat bears the EB bill.

No	Public Amenities
1	Primary school
2	Secondary school
3	Primary Health Centre (PHC)
4	Library
5	Industrial Training Institute (ITI)
6	Overhead tank and motor room
7	Street lighting
8	Farmers market
9	Public Distribution System (PDS)
10	Panchayat office
11	Community hall
12	VPRC (Village Poverty Reduction Centre) building
13	SHG Building
14	VAO Office
15	Veterinary hospital
16	Agriculture office

Table 2.1: List of public amenities

However, based on our discussion with the Panchayat secretary and upon scrutinizing the EB bill, it was realized that the Kadambathur Panchayat pays electricity bill only for the 5 amenities mentioned below.

No	Public Amenities
1	Library
2	Overhead tank and motor room
3	Street lighting
4	Panchayat office
5	VPRC (Village Poverty Reduction Centre) building

Table 2.2 : Public amenities whose energy bill payment is done by Kadambathur Panchayat

Despite this, the outstanding energy bill is close to **Rs.100 lakhs**. This is being done due to the limited revenue sources this Panchayat has at its disposal. The other public amenities (Primary, Secondary, Middle & Higher Secondary schools, Primary Health Centers, PDS, Anganwadi etc.) pay the EB bill from their own resources. The major cash outflow of the panchayat is due to the electricity charges of street lighting and water pumping for public utility.

On an average, electricity charges of the panchayat work out to **Rs.48 lakhs a year** of which **Rs**.**7 lakhs a year** (14%) goes for street lighting and **Rs.41 lakhs a year** (86%) water pumping. As far as street lighting is concerned, close to **Rs.5 lakhs a year** is being towards bridge lighting alone - a major energy guzzler, whereas, the 10 habitations put together account for **Rs.2 lakhs a year** only, annually.

On the water supply front, 28 service connections account for **Rs.41 lakhs a year** with pumps of 7.5 hp rating in 30 nos operating for 5 – 6 hours in a day. The per capita water consumption has been computed as 80 litres/day and that appears to be marginally on the higher side. The cost share diagram of the Panchayat with respect to street lighting and water pumping is shown below in figure 2.1

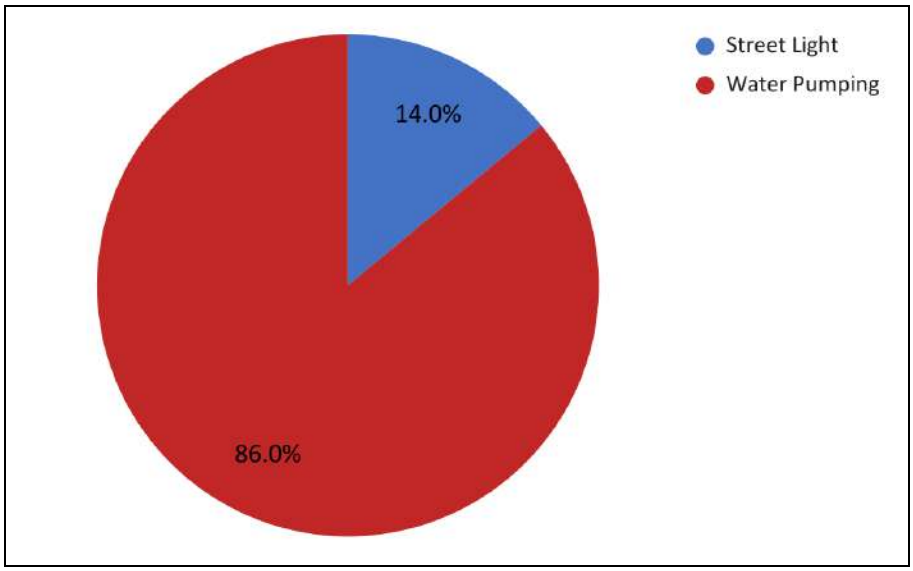

Figure 2.1 : Cost Share Diagram

3 Energy audit & energy conservation measures recommended for street lighting

3.1 Preamble

Kadambathur Panchayat has the following 10 habitations under its jurisdiction:

1. Kadambathur Colony
2. Kadambathur Village
3. Kasavanallathur Colony
4. Kasavanallathur Village
5. Venmanambudur Colony
6. Venmanambudur Village
7. Ambedkar Nagar
8. Indira Nagar
9. Kaliyamman Nagar
10. MGR Nagar

There are 133 streets in these 10 habitations which are provided with street lights in requisite numbers and powered by Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO).

No	Habitations	No of Streets
1	Kadambathur Colony	19
2	Kadambathur Village	26
3	Kasavanallathur Colony	16
4	Kasavanallathur Village	14

5	Venmanambudur Colony	8
6	Venmanambudur Village	15
7	Ambedkar Nagar	9
8	Indira Nagar	8
9	Kaliyamman Nagar	7
10	M G R Nagar	11
Total		**133**

Table 3.1 : Number of Streets : Habitation Wise

The energy bill due to burning of street lights alone comes to **Rs.7 lakhs a year** and the Panchayat foots the bill for this. A data capturing has been done in respect of electricity consumption of each of these habitations towards street lighting. Suggestions have been made for conserving the cost paid towards street lighting to the TANGEDCO, without sacrificing or disturbing the lighting schedule / no of lamps in use / lamp wattage maintenance etc. The outcome is elaborated / analysed and discussed in this chapter.

3.2 Service connection details

The power drawnl for the street lights is through 28 service connections obtained by the Panchayat. The habitation wise break - up of service connections is as below : (Table 3.2)

No	Village	HH	No of Lamp Posts	Connected Load (W)	No of SCs
1	Kadambathur Colony	286	2	250	1
2	Kadambathur Village	454	184	15,780	8
3	Kasavanallathur Colony	659	57	1,200	3
4	Kasavanallathur Village	473	-	-	-
5	Venmanambudur Colony	246	119	2,900	10
6	Venmanambudur Village	295	54	1,080	3
7	Ambedkar Nagar	278	-	-	1
8	Indira Nagar	317	15	300	1
9	Kaliyamman Nagar	189	-	-	-
10	MGR Nagar	219	17	340	1
Total		**3,416**	**448**	**21,850**	**28**

Table 3.2 : General details : Street lighting - habitation wise break - up of service connections

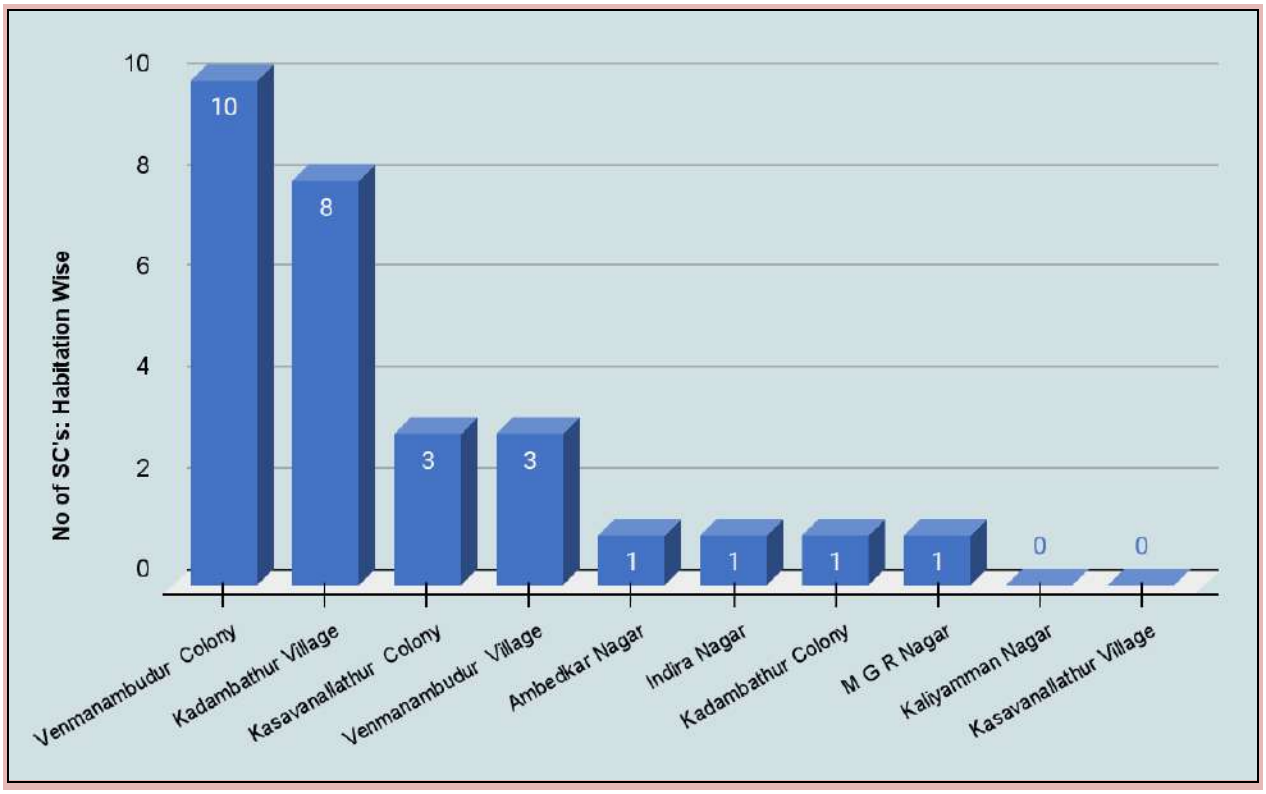

Figure 3.1: Street lights :Service connections, habitation wise: Descending order

3.3 Connected Load(CL) vs Contracted Demand(CD): Split Up

A field survey was undertaken to identify the SCs as well the lamp posts / No. of lamps placed in each service connection. This was then compared with the power demand contracted for each SC. An analysis was carried out to understand / justify the connected load vs contracted demand for each SC in order to validate the rationale of this action. It is obvious that higher the CD/CL ratio, higher will be the fixed charges payable to TANGEDCO.

The recommended CD/CL ratio is that it should be kept at an optimum of 2.0 as a thumb rule to keep fixed charges payment under check**.** This rule has been made use of while analyzing the CD/CL ratio and the outcome is presented in this section.

3.3.1 Kadambathur Colony

No	SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
1	547003980	High Mast	1 x 200 W + 1 x 50 W	250	2000	**8**

3.3.2 Kadambathur Village

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
547001232	Indian Bank	21 x 20 W	420	2000	**4.8**
5470012430	Panchayat Office	4 x 50 W	200	3000	**15.0**
547001192	Mettu St : Murugan House	23 x 20 W	460	2000	**4.3**
547001548	Big St : Eswaran Koil	13 x 20 W	260	4000	**15.4**
547008367	Vidaiyur Main Rd	30 x 20 W	600	2000	**3.3**
5470011020	Wash Room	1 x 40 W	40	1000	**25**
5470013295	Indian Bank : South	46 x 150 W + 1 x 150 W	7050	7000	**1.0**
5470031872	Rajaji Salai : North	44 x 150 W + 1 x 150 W	6750	8000	**1.2**

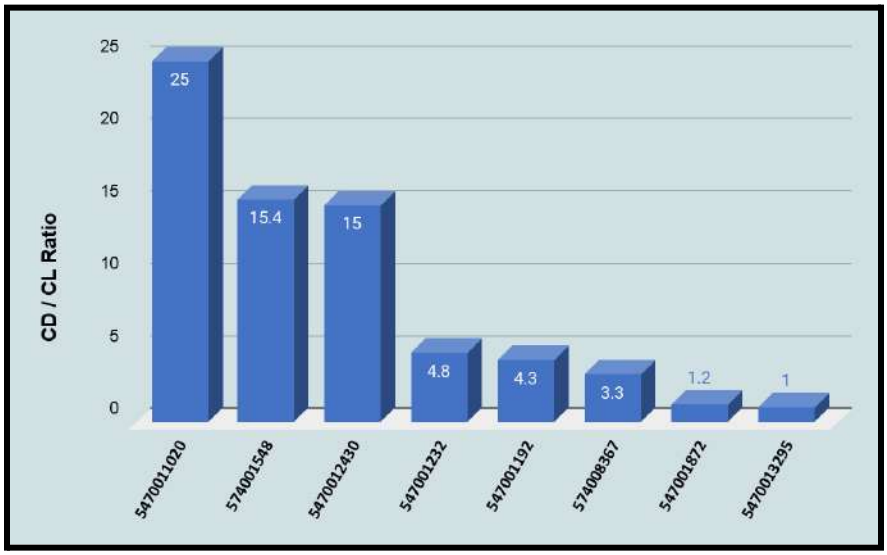

Figure 3.2 : Street Lights : Service connections : CD / CL Ratio

3.3.3 Kasavanallathur Colony

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
547001128	Bus Stand	1 x 48 W + 10 x 20 W	248	2000	**8.0**

547001601	Ganesan Shop	2 x 36 W + 30 x 20 W	672	2000	**3.0**
5470013421	Sundaraganesan Nagar	14 x 20 W	280	1000	**3.6**

3.3.4 Kasavanallathur Village : Nil

3.3.5 Venmanambudur Colony

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
547003146	Vedaiyur Main Rd	11 x 20 W	220	1000	**4.5**
54700355	Near Magalir Building	27 x 20 W	540	5000	**9.3**
547008160	Nr Perumal Koil	15 x 20 W	300	2000	**6.7**
547008691	Sakthi Nagar	6 TL x 40 W	240	1000	**4.2**
547008703	Sakthi Nagar	1 x 40 W TL + 2 x 20 W	80	1000	**12.5**
547008692	Sakthi Nagar	No Lamps	-	1000	**-**
547008724	Sakthi Nagar	2 LED TL x 20 W + 18 x 20 W	400	3000	**7.5**
547008511	Sakthi Nagar	14 x 40 W TL	560	2000	**3.5**
54700343	Bajanai Koil Street	11 x 20 W	220	5000	**22.7**
547008641	Gayathri Nagar	7 x 20 W + 5 TL x 40 W	340	1000	**3.0**

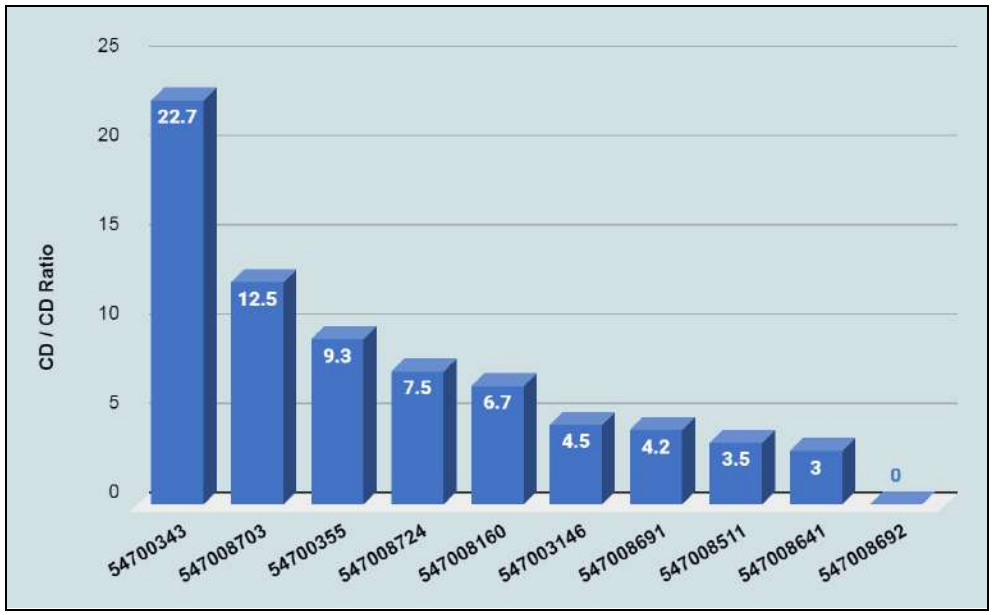

Figure 3.3 : Street lights : Service connections : CD / CL Ratio

3.3.6 Venmanambudur Village

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
547008908	Selliamman Koil St Park	10 x 20 W	200	2000	**10**
547008168	KGR Nagar	22 x 20 W	440	2000	**4.5**
547001156	Kanniamman Nagar	22 x 20 W	440	1000	**2.3**

3.3.7 Ambedkar Nagar

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
547008439	TV Room	No Appliances	-	4000	-

3.3.8 Indira Nagar

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD / CL
547003206	Indira Nagar	15 x 20 W	300	5000	**16.7**

3.3.9 Kaliyamman Nagar : Nil

3.3.10 MGR Nagar

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD / CL
547003401	John Hospital	17 x 20 W	340	1000	**3.0**

3.3.11 Conclusion

A consolidation is made below with respect to CD / CL Ratio for all the 28 SCs of the Panchayat (descending order). It can be seen from the chart depicted below that the CD/CL ratio exceeds 3 in almost all cases barring 6 out of 28 SCs.

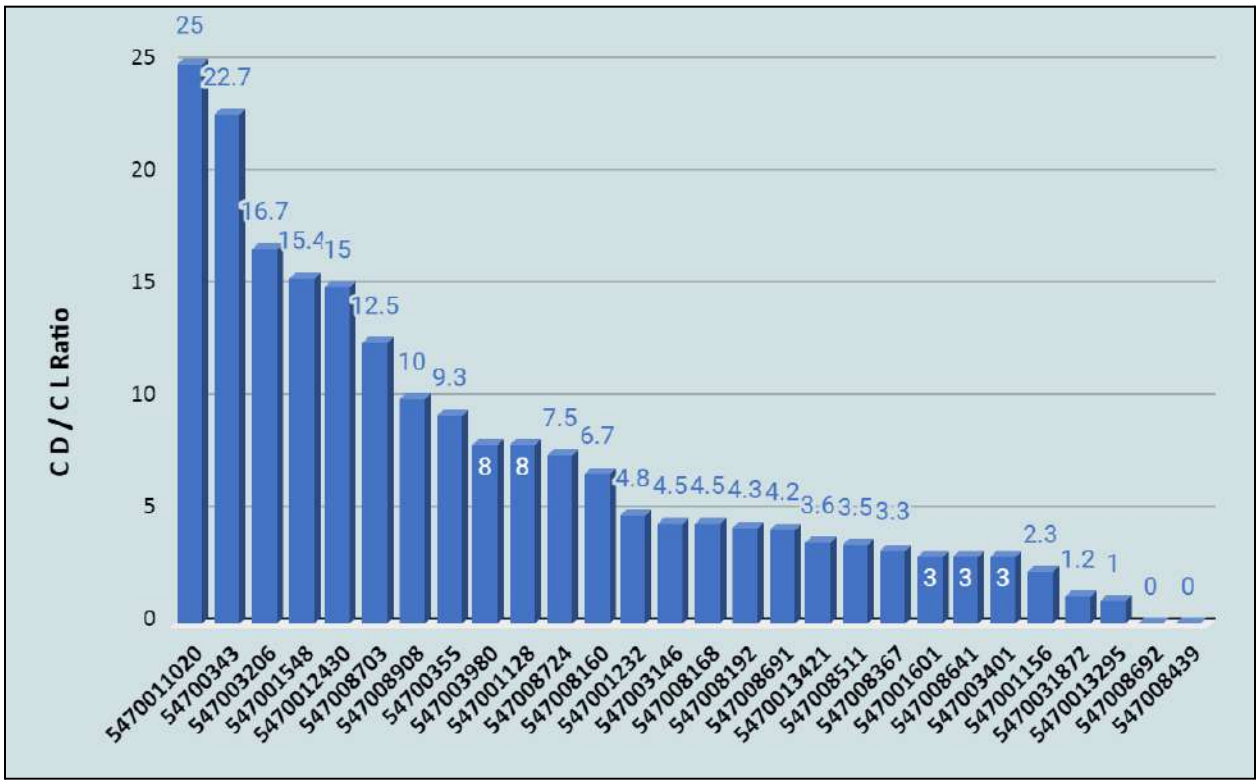

Figure 3.4 : Street lights : Service connections : CD/CL Ratio : A Consolidation

The above data is summed up below in Table 4.3 (descending order) indicating all related details.

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
5470011020	Wash Room	1 x 40 W	40	1000	25

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
54700343	Bajanai Koil St.	11 x 20 W	220	5000	22.7
547003206	Indira Nagar	15 x 20 W	300	5000	16.7
547001548	Big St : Eswaran Koil	13 x 20 W	260	4000	15.4
5470012430	Panchayat Office	4 x 50 W	200	3000	15.0
547008703	Sakthi Nagar	1 x 40 W TL + 2 x 20 W	80	1000	12.5
547008908	Selliamman Koil St Park	10 x 20 W	200	2000	10
54700355	Nr Magalir Building	27 x 20 W	540	5000	9.3
547003980	High Mast	1 x 200 W + 1 x 50 W	250	2000	8
547001128	Bus Stand	1 x 48 W +10 x 20 W	248	2000	8.0
547008724	Sakthi Nagar	2 LED TL x 20W + 18 x 20 W	400	3000	7.5
547008160	Nr Perumal Koil	15 x 20 W	300	2000	6.7
547001232	Indian Bank	21 x 20 W	420	2000	4.8
547003146	Vedaiyur Main Rd	11 x 20 W	220	1000	4.5
547008168	KGR Nagar	22 x 20 W	440	2000	4.5
547001192	Mettu St : Murugan House	23 x 20 W	460	2000	4.3
547008691	Sakthi Nagar	6 TL x 40 W	240	1000	4.2
5470013421	Sundar Ganesan Nagar	14 x 20 W	280	1000	3.6
547008511	Sakthi Nagar	14 x 40 W TL	560	2000	3.5
547008367	Vidaiyur Main Rd	30 x 20 W	600	2000	3.3
547001601	Ganesan Shop	2 x 36 W +30 x 20 W	672	2000	3.0
547008641	Gayathri Nagar	7 x 20 W + 5 TL x 40 W	340	1000	3.0
547003401	John Hospital	17 x 20 W	340	1000	3.0
547001156	Kanniyamman Nagar	22 x 20 W	440	1000	2.3

SC No	Location	No of Lamps & W	CL (W)	CD (W)	Ratio CD/CL
5470031872	Rajaji Salai : North	44 x 150 W & 1 x 150 W	6750	8000	1.2
5470013295	Indian Bank : South	46 x 150 W & 1 x 150 W	7050	7000	1.0
547008692	Sakthi Nagar	No Lamps	-	1000	-
547008439	T V Room	No Appliances	-	4000	-

Table 3.3:Street lights: Service connections : CD / CL Ratio : A consolidation

This informs that the fixed charges incurred is in excess of that needed typically for street lightings.

3.4 Energy charges paid: Split Up

The cost paid towards energy usage for street lighting has been collected and recorded based on the bi - monthly energy meter reading recorded by the TANGEDCO assessor and compared with the data available in the TANGEDCO on - line portal (https://www.tnebltd.gov.in/BillStatus/billstatus.xhtml). The two match up perfectly. The details pertaining to energy consumption & cost incurred are presented below :

3.4.1 Kadambathur Colony

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547003980	High Mast	2	290	400	2320	2720	10.0

3.4.2 Kadambathur Village

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547001232	Indian Bank	2	280	400	2240	2640	9.4
5470012430	Panchayat Office	3	30	600	240	840	28.0

547001192	Mettu St : Murugan House	2	560	400	4480	4880	8.7
547001548	Big St : Eswaran Koil	4	290	800	2320	3120	10.8
547008367	Vidaiyur Main Rd	2	Meter not working	400	-	400	-
5470011020	Wash Room	1	Min	200	-	200	-
5470013295	Indian Bank: South	7	4550	1400	36400	37800	8.3
5470031872	Rajaji Salai: North	8	5080	1600	40640	42240	8.3
Total						**92120**	

3.4.3 Kasavanallathur Colony

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547001128	Bus Stand	2	225	400	1800	2200	9.8
547001601	Ganesan Shop	2	320	400	2560	2960	9.25
5470013421	Sundara Ganesan Nagar	1	90	200	720	920	10.2
Total						**5360**	

3.4.4 Kasavanallathur Village : Nil

3.4.5 Venmanambudur Colony

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547003146	Vedaiyur Main Rd	1	Min	200	-	200	-
54700355	Near Magalir Building	5	Min	1000		1000	-
547008160	Near Perumal Koil	2	110	400	880	1280	11.6
547008691	Sakthi Nagar	1	Min	200	-	200	-
547008703	Sakthi Nagar	1	Min	200	-	200	-
547008692	Sakthi Nagar	1	Min	200	-	200	-
547008724	Sakthi Nagar	1	50	200	400	600	12.0
547008511	Sakthi Nagar	2	Min	400	-	400	-
54700343	Bajanai Koil Street	5	80	1000	640	1640	20.5
547008641	Gayathri Nagar	1	220	200	1760	1960	8.9
Total						**7680**	

3.4.6 Venmanambudur Village

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547008908	Selliamman Koil St Park	2	Min	400	-	400	-
547008168	KGR Nagar	2	Min	400	-	400	-
547001156	Kanniamman Nagar	1	Min	200	-	200	-
Total							**1000**

3.4.7 Ambedkar Nagar

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	

547008439	TV Room	4	-	800	-	800	No appliances

3.4.8 Indira Nagar

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547003206	Indira Nagar	5	Min	1000	-	1000	-

3.4.9 Kaliyamman Nagar : Nil

3.4.10 MGR Nagar

SC No	Location	CD (kW)	Consumption (kWh)	Energy Bill (Rs)			Unit Cost Rs/kWh
				Fixed	Cons	Total	
547003401	John Hospital	1	Min	200	-	200	-

3.5 Energy cost : A consolidation

Based on the data collected from the TANGEDCO / Panchayat Secretary, a consolidation has been made on the overall cost paid by the panchayat on a bi-monthly basis. This is presented below:

No	Habitation	No of SCs	Energy Cost paid Bi monthly	
			Rs	%
1	Kadambathur Colony	1	2720	2.4
2 a	Bridge Lightings	2	80 040	71.7
2 b	Kadambathur Village	6	12 080	10.8
3	Kasavanallathur Colony	3	6080	5.5
4	Kasavanallathur Village	0	0	0
5	Venmanambudur Colony	10	7 680	6.9
6	Venmanambudur Village	3	1 000	0.9
7	Ambedkar Nagar	1	800	0.7
8	Indira Nagar	1	1 000	0.9
9	Kaliyamman Nagar	0	0	0
10	MGR Nagar	1	200	0.2

Total	**28**	**1,11,600**	**100**

Table 3.4 : Energy cost paid : Bi monthly : Habitation wise

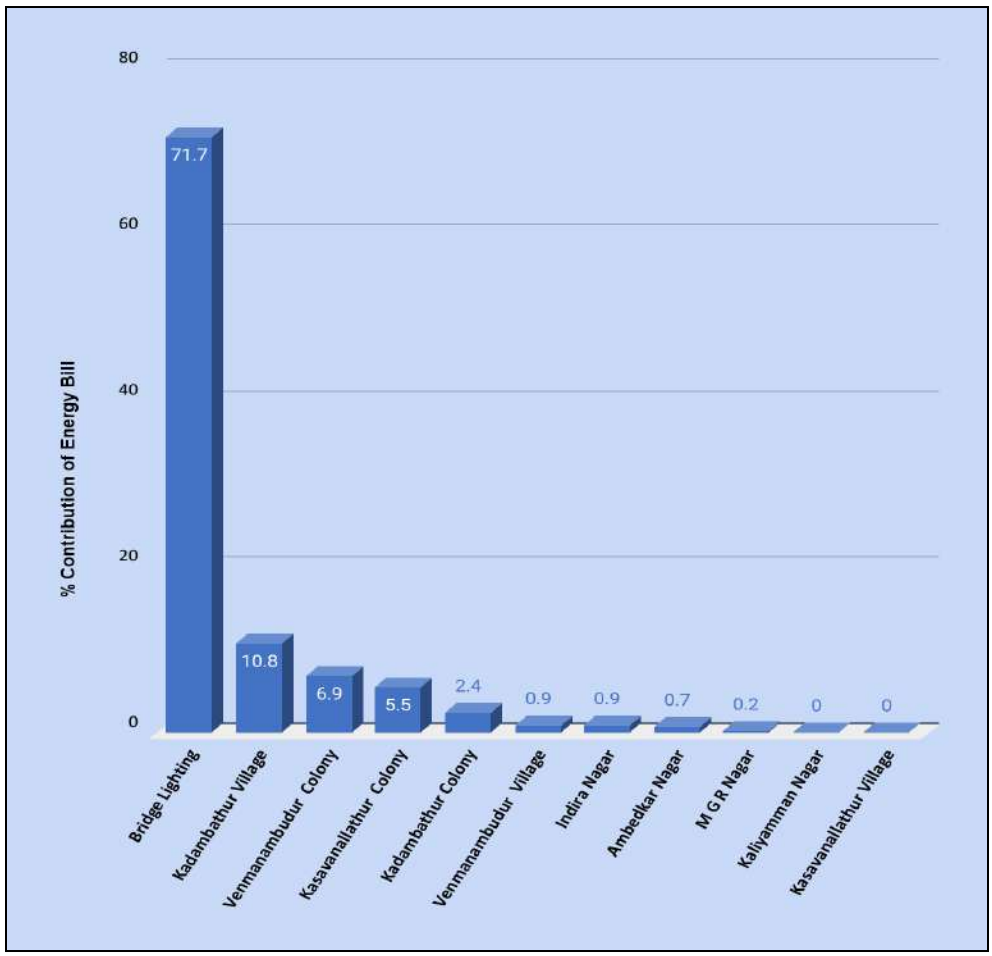

Figure 3.5 : Street Lights : % Contribution on Energy Bill: SC wise

It can be seen from the above chart that the major energy cost outflow is from the service connections of Kadambathur village that accounts for **82.5** % [Bridge lights: 71.7% & Street lights: 10.8%]. The main contributor is the bridge lights {both North & South side} that account for **Rs.80,040** which is **71.7 %** of the total energy bill with regard to street lights of this Panchayat.

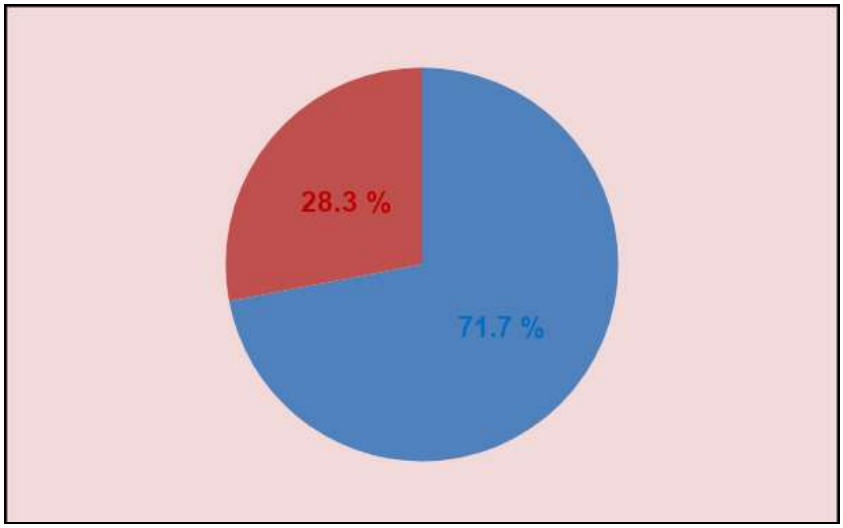

Figure 3.6 : Street lights : % Contribution : Bridge light vs Others

The 10 habitations account for only 28 % of total cost outflow which is reasonable. It was also recorded that minimum charges are paid in certain service connections and attention shall be paid to bridge light service connections and set right at the earliest. Having carried out the above exercise, suggestions - in respect of cost conservation - are presented in ensuing section.

3.6 Energy - cum – Cost Conservation Options

3.6.1 Surrender / Cancellation of identified service connections

3.6.1.1 Observations

The Kadambathur Panchayat has availed 28 service connections for illuminating the street lights alone in the 10 habitations it encompasses. The electricity charges amount to **Rs.1.11 lakh** for 2 month period **[Rs.6.6 lakh a year].** The following 2 service connections have been identified for immediate surrender as these 2 SCs serve no purpose at present.

SC No	Habitation	Location	CD (kW)	Fixed Charges (Rs)	Remarks
5470011020	Kadambathur Village	Wash Room	1	200	It can be merged with the SC of Panchayat Office (PO)

547008439	Ambedkar Nagar	TV Room	4	800	There are no electrical appliances attached.
Total			**5**	**-**	

Table 3.5 : Service connections identified for cancellation

3.6.1.2 Suggestion

The suggestion made here is the surrender of the above 2 SCs forthwith that serve no useful purpose presently

3.6.1.3 Cost Implications

- Cost Savings = (5 kW x Rs.200 / kW/ bi-monthly x 6 times / year) = Rs.6000 a year
- The surrender cost is nil.

Cost savings : Rs.6000/year

3.6.2 Rectification of meters of identified service connections

3.6.2.1 Observations

It was observed during the survey that the meters in a couple of service connections were either faulty / not working / disconnected etc. Faulty / non - working meters could be a drain on the cost as the readings recorded by them could be erroneous. Therefore, as a first step, it is suggested to get these meters back into operation. The meters identified for rectification are as below:

SC No	Habitation	Location	CD kW	Fixed Charge (Rs)	Remarks
547008367	Kadambathur Village	Vedaiyur Main Road Radha Store	2	200	Meter Not Working
547003146	Venmanambudur Colony	Vedaiyur Main Road near Sekar House	1	200	Wire Disconnected
54700355		Near Magalir Building	5	800	No Meter
547008160		Nr Perumal Koil	2	400	Meter Not Working
547008691		Sakthi Nagar	1	200	Meter Not Working
547008511		Sakthi Nagar	2	400	Meter Not Working
547008168	Venmanambudur Village	K G R Nagar	2	400	Meter Burnt
547003401	MGR Nagar	John Hospital	1	200	No Meter

Table 3.6 : Service connections identified for rectification of meters

3.6.2.2 Suggestion

These meters may be rectified at the earliest avoiding thereby possible inappropriate electricity cost payment

3.6.3 Merger of identified service connections

The following identified 2 service connections can be merged into a single service connection and thereby the payment of fixed charges for one SC can be avoided.

No	Service No	Habitation	CL	CD	CD proposed after merger	Reduction
			kW			

1	547001128	Kasavanallathur Colony	0.248	2	2	2
2	547001601		0.672	2		

Table 3.7 : Service connections identified for merger

- Surrender one of SCs and shift the load of this SC to the other.
- Total CD that gets reduced due to merger = 2 kW

$$\text{Cost savings} = \frac{(2\ \text{kW} \times \text{Rs.200 / bi - month} \times 6\ \text{times})}{\text{Year}} = \text{Rs.2000/year}$$

3.6.4 Reduction of contracted demand of the identified service connections

The following 8 service connections have been identified for reduction of contracted demand to start with :

Service No	Habitation	CL	CD	CD/CL Ratio	CD Proposed	Reduction
		kW				
547003 980	Kadambathur Colony	0.25	2	8.0	1	1
547001 232	KadambathurVillage	0.42	2	4.8	1	1
5470012430		0.2	3	37.5	1	2
547001192		0.46	2	4.3	1	1
547001548		0.26	4	15.4	1	3
54700343	Venmanambudur Colony	0.22	5	22.7	1	4
547008908	Venmanambudur Village	0.2	2	10.0	1	1
547003206	Indira Nagar	0.3	5	16.7	1	4
Total			**25**	**-**	**8**	**17**

Table 3.8 : Service connections identified for CD reduction

Total CD suggested for reduction = 17 kW

$$\text{Cost savings} = \frac{(17\ \text{kW} \times \text{Rs.}200 / \text{bi-month} \times 6\ \text{times})}{\text{Year}} = \text{Rs.}20{,}400/\text{year}$$

3.6.5 Bridge Street Lightings : An Analysis & Way Forward

3.6.5.1 Present Scenario

The major consumer of electricity in the Kadambathur Panchayat is the bridge lights that spread on either side of the bridge that crosses the railway track. The bridge lights have **two** service connections , viz.,

1. Southern side of the bridge [identified as Indian Bank side]
2. Northern side of the bridge [identified as Rajaji Salai side]

There are 24 lamps attached to the SC on the Indian Bank (southern) side with a connected load of 7.05 kW. Likewise, 23 lamps are attached to the SC on the Rajaji Salai (northern) side with a connected load of 6.75 kW. The contract demands availed for these **two** service connections are 7 kW & 8 kW respectively.

The connected load & contracted demand of these **two** SCs are as below :

S C No	Identity	No of lamps installed	CL (kW)	CD (kW)
5470013295	Indian Bank : South	46 x 150 W + 1 x 150 W	**7.05**	**7**
5470031872	Rajaji Salai : North	44 x 150 W + 1x 150 W	**6.75**	**8**

Table 3.9 : Connected load & contracted demand recorded

The energy consumption recorded and the bi monthly cost paid are as below :

SC No	Identity	Energy Consumption (kWh)	Cost Paid (Rs)	Unit Cost Rs/kWh
5470013295	Indian Bank : South	4,550	37,800	8.31
5470031872	Rajaji Salai : North	5,080	42,240	8.31

Table 3.10 : Energy consumption and bi-monthly cost paid

The overall cost incurred due to street lighting is about **Rs. 1.1 lakh** per 2 months. **Rs.80,000** (which is 72 % of the total street lighting bills) are consumed by these 2 service connections. The Maximum Demand (MD) recorded bi-monthly for these 2 SCs have been downloaded from the on - line portal and observed to be as shown below in Table 3.11.

SC No	Power kW		MD Recorded in 2022						Present CD	CD/CL
	Rated	Month Avg								
5470013295 (Indian Bank)	7.05	6.4	7	7	6.2	6.3	6.2	6.2	7	1
5470031872 (Rajaji Salai)	6.75	7.1	7.7	7.8	7.8	7.7	7.8	7.8	8	1.2

Table 3.11 : Bi - monthly M D Recorded

The CD allotted appears to be alright since the CD / CL ratio is closer to unity.

3.6.5.2 Observations & Comments

Presently, the bridge lights are glowing to their fullest rated capacity throughout the night time. This happens independent of the traffic volume experienced in the bridge.

From a safety point of view, bridge lights are needed to glow for 12 hours each day to allow plying of vehicular transport.

A timer based **ON – OFF** control system has been installed but it is out of order presently and therefore the switching is done manually daily. In such instances, the possibility of human error is high, with the lights not being switched off when not needed.

Therefore, considering the cost incurred towards the electricity charges to the extent of **Rs.5 lakhs per year,** the following 2 suggestions are made for energy optimization without sacrificing the quality of illumination:

1. Installation of micro - processor enabled **"Chronosense Controller / Dimmer**". It is a control device that will enable energy savings by way of dimming the illumination level during non - heavy traffic periods. The typical lighting schedule can be as below :

    a. Normal level of illumination : 6 pm to 11 pm & 4 am till 6 am = 7 hours

b. Dimmed level of illumination : 11 pm to 4 am = 5 hours

2. Take a study on the number of lamps provided, their wattages, spacing of lamp poles, height of lamp poles and ultimately the Lux level at road surface. It is expected that this study will throw the light on the design considerations of bridge lighting and possibly offer way for optimal use of lighting. (minimum saving of 5 to 8% can be anticipated)

3.6.5.3 Recommendations

The recommendations involve:

1. Rectification of the existing timer based controller enabling auto ON – OFF
2. Installation of chronosense controller for auto dimming of lamps during set period (Dimmer is a stand - alone device demanding nil commissioning & operational cost).
3. Conduct of a detailed technical study on the present bridge illumination scheme

3.6.5.4 Economics

1. Bridge lightings on the southern side [Indian bank] :
   a. Connected load = 7.05 kW
   b. Bi-monthly energy consumption = 4,550 kWh = 2,275 kWh / month
   c. Savings in energy consumption through dimming activity : 16.7%
      {12x100% - (7x100 % + 5x60%)} / {12 x 100 } = 16.7% }
   d. Energy savings possible = [2,275 kWh / m x 16.7%] = 380 kWh / m
2. Bridge lightings on the southern side [Rajaji salai]
   a. Connected Load = 6.75 kW
   b. Bi monthly energy consumption = 5,080 kWh = 2,540 kWh / month
   c. Energy savings possible = [2,540 kWh/m x 16.7%] = 425 kWh/m
   d. Total energy savings anticipated = {380 + 425} = 805 kWh / month

$$\text{Cost savings anticipated} = \frac{(805\ \text{kWh/m} \times 12\ \text{m})}{\text{Year}} \times \text{Rs } 8/\text{ kWh} = \text{Rs. } 77{,}280/\text{ Year}$$

Investment required = Rs 1,00,000

Simple payback period = 8 months

3.7 Consolidation of options suggested

Five options have been recommended to reduce energy / cost incurred. The suggestions made are techno economically viable with minimum investments. The consolidated version of the proposals is presented below in Table 3.12

No	Activity	Savings (Rs/y)	Investment (Rs)	Payback period (Months)
1	Cancellation of unused SC	6,000	-	-
2	Rectification of faulty meters	-	-	-
3	Merger of service connections in identified locations	2,400	-	-
4	Reduction of CD in selected SCs	20,400	-	-
5	Bridge lighting Lux optimization	77,280	1,00,000	16
Total		**1,06,080**	**1,00,000**	**11**

Table 3.12 : Consolidation of proposals suggested

Thus,the estimated cost savings is **Rs.1,06,080 a year** which is about **16%** of the present energy bill of lighting. It is further suggested to use LEDs of street lighting category replacing the present domestic type LED fittings at an appropriate time.

4 Energy audit & energy conservation measures recommended for water pumping

4.1 Preamble

These overhead tanks (OHT) are of different sizes that meet the water requirement of the entire population of this Panchayat. In certain locations, the water is supplied directly through distribution pipelines. .

4.2 Service Connection details

At the outset, 47 service connections were acquired by the Panchayat for the purpose of supplying water to all the 10 habitations. The habitations wise break - up of service connections is as below:

No	Habitation	No of HH	Population	No of SCs
1	Kadambathur Colony	286	2,369	3
2	Kadambathur Village	454	3,409	8
3	Kasavanallathur Colony	659	3,692	8
4	Kasavanallathur Village	473	2,127	4
5	Venmanambudur Colony	246	1,768	9
6	Venmanambudur Village	295	2,741	7
7	Ambedkar Nagar	278	2,187	2
8	Indira Nagar	317	1,395	5
9	Kaliyamman Nagar	189	1,952	1
10	MGR Nagar	219	1,406	0
Total		**3,416**	**23,046**	**47**

Table 4.1 : Break-up of Service Connections : Habitations wise

4.3 Electricity bill paid: Details

The bi-monthly energy consumption and bill amount data of all the 47 service connections were received from the Panchayat official. In addition, it was verified with the TANGEDCO website by the energy auditors and tallied.

Habitation	Energy Consumption kWh / 2 month	Fixed Charges	Energy Charges	Total
		Rs		
Kadambathur Colony	5,740	6,200	45,920	52,120
Kadambathur Village	16,472	15,200	1,31,776	1,46,976
Kasavanallathur Colony	17,302	16,000	1,38,080	1,54,080
Kasavanallathur Village	6,409	5,600	51,032	56,632
Venmanambudur Colony	21,513	19,200	1,72,104	1,91,304
Venmanambudur Village	1,130	4,600	9,040	13,640
Ambedkar Nagar	1,510	2,200	12,080	14,280
Indira Nagar	4,210	5,800	33,680	39,480
Kaliyamman Nagar	Minimum	800	72	872
MGR Nagar	0	0	0	0
Total	**74,286**	**75,600**	**5,93,784**	**6,69,384**

Table 4.2:Electricity charges paid: Bi-monthly: Habitation wise

MGR Nagar has not recorded any energy cost outflow as this habitation does not have a service connection and instead has only OHT that receives water from the service connection from a nearby habitation

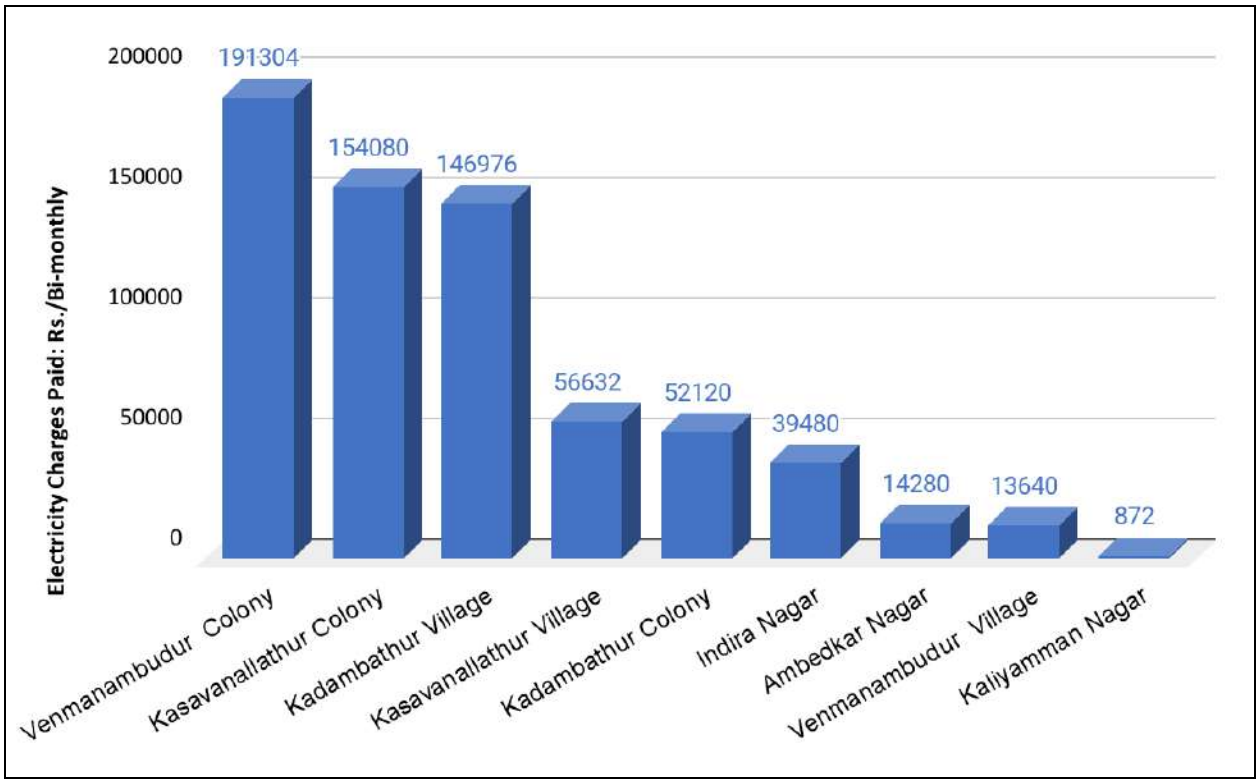

Figure 4.1 : Electricity Charges Paid : Bi monthly : Habitation wise

It can be seen from the above table / chart, the consumption is the highest in the Venmanambudur Colony that has 9 service connections. It is then followed by Kadambathur Colony & Village in that order of consumption. The total energy cost for water pumping alone works out to Rs.6.6 lakhs/2 month (with an energy consumption of 74,286 kWh/2 months), adding close to a sum of **Rs.41 lakhs a year.**

4.4 Service Connection : Present Status

Of the **47** service connections acquired by the Panchayat, only **32** SCs are in operation presently and the rest **15** were not, due to a variety of reasons. The list of 32 working service connections is listed below in Table 4.3

No	S C No	Habitation	Location
1	547003497	Kadambathur Colony	BDO Office
2	547003908		BDO Office
3	547003192		BDO Office
4	547001650		Draupathi Amman Big Street
5	5470012072		Thanikachalam Nagar

No	S C No	Habitation	Location
6	5470011497	Kadambathur Village	Adhikathur Road
7	5470012073		Thanikachalam Nagar
8	5470011268		Bound Street: Near Library
9	5470011118		Gurudev Bhavan
10	5470012554		Vivekananda School
11	5470011312		VAO Office: Library
12	5470011736	Kasavanallathur Colony	Muthamizh Nagar
13	5470012803		Muthamizh Nagar Kalam
14	5470011735		Muthamizh Nagar
15	547001346		Thiruvalluvar Nagar
16	5470012555		Thiruvalluvar Nagar
17	5470011925		Thiruvalluvar Kollapuri
18	5470012804	Kasavanallathur Village	Babu Nagar
19	5470011021		Astalakshmi Street Near Ravi House
20	5470011457		Vethanayagi Ammal Nagar
21	5470031011	Venmanambudur Colony	Mahatma Gandhi Nagar Sudukadu
22	547003660		Mahatma Gandhi Nagar Sudukadu
23	547003212		Mahatma Gandhi Nagar Sudukadu
24	547003496		Mahatma Gandhi Nagar Church
25	547003946		Mahatma Gandhi Nagar Church
26	5470031142		Mahatma Gandhi Nagar Church
27	5470031800		Mahatma Gandhi Nagar Church
28	547008221		Venmanambuthur Arasamaram
29	548001391	Venmanambudur Village	Kanniyamman Nagar
30	548008460		Sri Devi Kuppam Erikarai
31	5470031710	Indira Nagar	Ranganathan Nagar 2nd Street
32	5470031763	Ambedkar Nagar	Surya Nagar

Table 4.3 : List of Service Connections : Working : 32 Nos

Likewise, the list of **15** SCs - that are not working - is presented below (Table 4.4) along with the remarks indicating the reasons.

No	SC No	Habitation	Location	Remarks
1	5470011638	Kasavanallathur Colony	Muthamizh Nagar	Not in use: To be cancelled
2	5470011760		Kasavanallathur Sudukadu	No connection: No water: Cancelled in Apr 23
3	547003694	Kasavanallathur Village	K G R Nagar	Not in use: To be cancelled
4	547003947	Venmanambudur Colony	Mahatma Gandhi Nagar Church	Poor Quality water. Not in use: To be cancelled
5	547008540	Venmanambudur Village	Vidaiyur Main Rd	Not in use: No water source: To be cancelled
6	548008459		Sri Devi Kuppam Erikarai	Not in use: No water source: Cancelled in Apr 23
7	548008555		Sri Devi Kuppam	Not in use: No water source: Cancelled in Apr 23
8	548001156		Kanniyamman Nagar	Not in use: No water source: To be cancelled
9	548008465		Kanniyamman Nagar	Not in use: No water source: Cancelled in Apr 23
10	547003945	Ambedkar Nagar	Senthil Nagar	Not in use: No water source: Cancelled in Apr 23
11	5470031016	Indira Nagar	Police Station	Shifting not needed: No water: To be cancelled
12	5470031044		Ranganathan Nagar Erikarai	Shifting not needed: No water: To be cancelled
13	547003693		Perumal Koil	Not in use: No water source: Cancelled in Apr 23

14	548008461		Sri Devi Kuppam	Not in use: No water source: Cancelled in Apr 23
15	547008516	Kaliyamman Nagar	Gayathri Nagar	Not in use: No water source: To be cancelled

Table 4.4 : List of Service Connections : Not working :15 Nos

Of these 15 SCs, **7** have been cancelled in the month of April 23 based on our study finding. It is further proposed (resolution has been passed already) by the Panchayat to cancel **8** more identified service connections of TANGEDCO.

4.5 Water supply scheme : Installation capacity & pump rating

It was decided to record the installed capacity of Over Head Tanks (OHTs) of this Panchayat - Habitation wise - compare it with the population and provide an analysis. Table 4.5 provides the details of the overhead tank capacity as well the erected capacity of the submerged water pumps in each habitation.

Habitation	**Location**	**SC No**	**Pump Rating (hp)**	**OHT Capacity (kL)**
Kadambathur Colony	BDO Office	547003497	7.5 x 3 Nos	120
		547003908		
		547003192		
Kadambathur Village	Thanikachalam Nagar	5470012072	7.5 x 7 Nos	170
	Draupathi Amman Big Street	547001650		
	Adhikathur Road	5470011497		
	Thanikachalam Nagar	5470012073		
	Bound Street: Near Library	5470011268		
	Gurudev Bhavan	5470011118		
	VIvekananda School	5470012554		

Habitation	Location	SC No	Pump Rating (hp)	OHT Capacity (kL)
	VAO Office: Library	5470011312		
Kasavanallathur Colony	Muthamizh Nagar	5470011736	7.5 x 3 Nos	200
	Muthamizh Nagar Kalam	5470012803		
	Muthamizh Nagar	5470011735		
	Thiruvalluvar Nagar	547001346	12.5 x 1 No	
	Thiruvalluvar Nagar	54 00 2555	7.5 x 2 Nos	
	Thiruvalluvar Kollapuri	5470011925		
Kasavanallathur Village	Babu Nagar	5470012804	7.5 X 3 Nos	30
	Astalakshmi Street Ravi House	5470011021		
	Vedanaygi Ammal Colony	5470011457		
Venmanambudur Colony	Mahatma Gandhi Nagar Sudukadu	5470031011	5 x 1 No	310
	Mahatma Gandhi Nagar Sudukadu	547003660	10 x 1 No	
	Mahatma Gandhi Nagar Sudukadu	547003212	7.5 x 6 Nos	
	Mahatma Gandhi Nagar Church	547003496		
	Mahatma Gandhi Nagar Church	547003946		
	Mahatma Gandhi Nagar Church	5470031142		

Habitation	Location	SC No	Pump Rating (hp)	OHT Capacity (kL)
	Mahatma Gandhi Nagar Church	5470031800		
	Venmanambuthur Arasamaram	547008221		
Venmanambudur Village	Kanniyamman Nagar	548001391	1.5 x 1 No	11
	Sri Devi Kuppam Erikarai	548 008460	7.5 x 1 No	
Indira Nagar	Ranganathan Nagar 2nd St	54 0031710	7.5 x 1 No	60
Ambedkar Nagar	Surya Nagar	5470031763	7.5 x 1 No	10

Table 4.5 : OHT Capacity + Pumps Rating : Installed : Habitation wise

The connected load of 32 service connections is 187 kW. There are 28 numbers of Over Head Tanks installed in this Panchayat with a cumulative water holding capacity of **830 kL**.

4.6 Water consumption data: An analysis

According to the information provided to the study team, the water supply scheme of the Panchayat aims to provide 55 litres/person/day of water, as per the prescribed norms. However, an analysis has been carried out by the study team to arrive at the per capita water consumption by way of understanding the hours of operation of OHT pumps in a day, frequency of operation (no of times in a day), OHT capacity, pump rating, its energy consumption etc.,

Armed with this information, the water consumption of the Panchayat was established as **82.5 litres/person/day**. This appears to be higher than the stipulated norm. It is further estimated that panchayat is spending **Rs.0.44/day/person** for water supply-cum-distribution alone.

4.7 Field study on electrical parameters of pumps/ motors

A field level power analysis study was undertaken on all the 31 (not 32) working motors using the three - phase power analyser, on 18.04.23. The 32nd motor does not function. Hence it is omitted from the study.

The instantaneous measurements captured include

a. Voltage V
b. Current I
c. Apparent Power kVA
d. Power Factor
e. Active Power kW

The data captured using the 3 Φ Power Analyser is tabulated in Table 4.6

Service No	Location	V	A	PF	kW	kVA	kVAr	% kW Loading
547003497	BDO Office	391.7	8.4	0.82	4.4	4.5	3.3	**66.8**
547003908	BDO Office	379.7	8.7	0.80	4.6	9.7	5.3	**69.9**
547003192	BDO Office	386.6	8.5	0.71	3.9	5.8	4.1	**59.2**
5470012072	Thanikachalam Nagar	375.4	8.6	0.92	5.1	5.7	2.1	**77.5**
5470011497	Adhikathur Road	404.1	8.7	0.91	5.8	6.4	2.6	**88.1**
5470012073	Thanikachalam Nagar	375.4	8.4	0.83	4.6	5.6	3.0	**69.9**
5470011268	Bound Street: Nr Library	384.1	8.5	0.93	5.4	5.8	2.0	**82.0**
5470011118	Gurudev Bhavan	376.8	8.1	0.84	4.5	5.3	2.8	**68.4**
5470012554	Vivekananda School	378.3	8.6	0.92	5.3	5.8	2.3	**80.5**
5470011312	VAO Office: Library	376.2	8.6	0.84	4.8	5.7	3.1	**72.9**
5470011736	Muthamizh Nagar	364.1	7.5	0.84	4.0	4.7	2.6	**60.8**

Service No	Location	V	A	PF	kW	kVA	kVAr	% kW Loading
5470012803	Muthamizh Nagar Kalam	431.5	9.0	0.94	6.6	7.0	2.3	**100.3**
5470011735	Muthamizh Nagar	367.3	7.5	0.93	4.4	4.8	1.7	**66.8**
547001346	Thiruvalluvar Nagar	375.6	8.9	0.83	5.1	6.1	3.3	**46.5**
5470012555	Thiruvalluvar Nagar	396.0	8.7	0.86	5.4	6.2	3.1	**82.0**
5470011925	Thiruvalluvar Kollapuri	394.3	8.7	0.87	5.3	6.1	2.9	**80.5**
5470012804	Babu Nagar	388.7	7.8	0.75	3.3	5.3	4.1	**50.1**
5470011021	Astalakshmi Street	400.6	8.4	0.90	5.3	5.9	2.5	**80.5**
5470011457	Vethanayagi Ammal Nagar	380.3	8.3	0.75	4.1	5.6	3.6	**62.3**
547003212	MG Nagar Sudukadu	398.8	8.7	0.82	5.1	6.2	3.4	**77.5**
5470031011	MG Nagar Sudukadu	368.3	8.5	0.77	4.4	5.5	3.3	**100.3**
547003660	MG Nagar Sudukadu	370.0	8.4	0.77	4.2	5.5	3.4	**63.8**
547003496	M G Nagar Church	368.9	8.4	0.74	4.0	5.5	3.7	**60.8**
		364.1	8.6	0.80	4.5	5.6	3.3	**68.4**
547003946	MG Nagar Church	338.7	8.8	0.57	3.0	5.3	3.8	**45.6**
5470031142	MG Nagar Church	355.6	8.5	0.83	4.4	5.3	2.9	**66.8**
5470031800	MG Nagar Church	334.5	8.7	0.83	4.4	5.2	2.8	**66.8**
547008221	V Pudur Arasamaram	376.2	8.4	0.80	4.4	5.6	1.1	**66.8**

Service No	Location	V	A	PF	kW	kVA	kVAr	% kW Loading
548001391	Kannaiamman Nagar	210.9	7.3	0.94	0.7	0.8	0.2	**53.2**
548008460	Sri Devi Kuppam, Erikarai	368.2	8.7	0.86	4.9	5.8	2.9	**74.4**
5470031710	Ranganathan Nagar 2nd St Primary School	364.2	8.6	0.78	4.4	5.6	3.6	**66.8**
		356.9	8.7	0.83	4.5	5.5	3.0	**68.4**
5470031763	Surya Nagar	373.6	8.4	0.73	4.0	5.6	3.8	**60.8**

Table 4.6 : Electrical power measurements carried out : Power Quality Analyser

The kW loading of each motor was recorded and the % loading of kW was established:

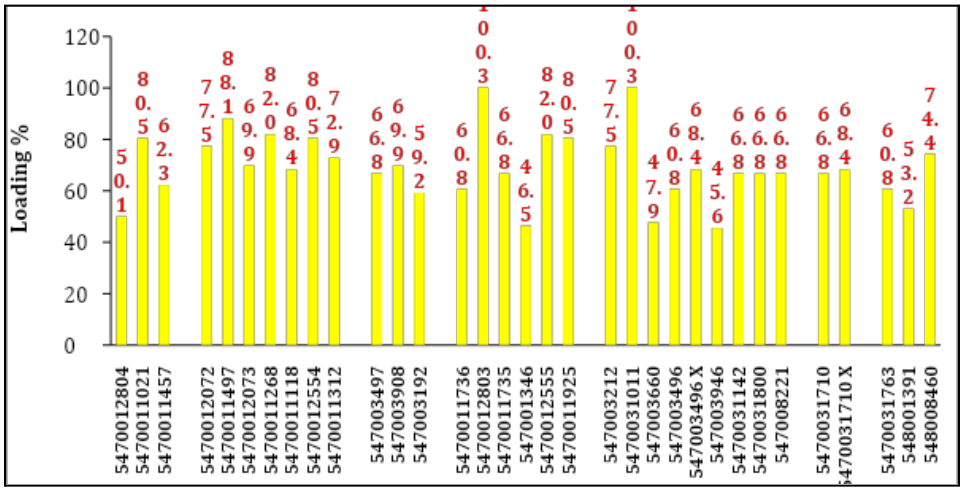

Figure 4.2 : Electrical Measurements Recorded: % kW Loading

4.7.1 Observations

1. The kW measurements recorded were quite reasonable and fell within the prescribed ranges.

2. As such, all the motors seem to have been loaded properly but for 2 motors whose kW (power) loading exceeded 100%.

3. The measured Power Factors were mostly in the range of 0.8 and that must improve.

   [Power factor is the measure of the ratio of the actual power output of the motor to that of the input kVA power drawn. This ratio should be close to 0.90 if not unity]

4. Nine (9) motors were identified with poor power factor. Higher the power factor, higher will be loading and lesser will be the current drawn. This will augur towards longevity of the motor / pump operation.

4.8 Power measurements : A diagnostic analysis : Habitation wise

An analysis has been carried out on the instantaneous power recorded vis-a-vis monthly average power drawn as well the contracted demand recorded**.** This has been done to understand / justify the connected load vs contract demand for each SC in order to validate the rationale of this action. The recommended CD/CL ratio should ideally be less than 3. The instantaneous power measurements carried out indicated the actual power drawl of the motor and was useful in ascertaining the power rating of the pump motor.

4.8.1 Kadambathur Colony

SC No	Pump Motor kW			MD Recorded in 2022						Present CD	CD/ Motor kW	Energy Consumption kWh/2months	EB Bill Rs/2months
	Rated	Measured	Month Avg										
547003497	5.6	4.4	Min	0	0	0	0	0	0	10	1.8	0	2,000
547003908		4.6	9.7	7.9	7.8	7.9	9.5	9.5	9.5	10	1.8	4,400	37,200
547003192		3.9	4.0	10.6	6.6	6.7	7	6.6	7.2	11	2.0	1,340	12,920

1. All the 3 pumps are of 5.6 kW rating (7.5 hp) each and the MD drawn is always in excess of 7 kW as per the MD recorded by the TANGEDCO. The CD is fixed by TANGEDCO based on the highest MD recorded in a bi-monthly cycle and hence the present CD.

2. It is anticipated that the coils of all the 3 motors have been rewound a couple of times which explained the high power drawn & energy consumption.

3. The average power drawn by SC No:547003497 is shown as zero in the year 2022 and found that the meter is not working. Hence, the suggestion would be to rectify the meter and then take a call on the possible CD reduction if at all viable.

4.8.2 Kadambathur Village

SC No	Pump Rated kW			MD Recorded in 2022						Present C D	CD / Motor kW	Energy Consumption kWh/2months	EB Bill Rs/2 months
	Rated	Measured	Month Avg										
5470012072	5.6	5.1	4.0	9	6	6	7.9	7.9	7.7	9	1.6	1,412	13,096
5470011497		5.8	4.7	8	9.4	9	8	8.3	8.3	13	2.3	1,680	16,040
5470012073		4.6	3.2	1	7	9	0.02	0.02	8.7	9	1.6	1,110	10,680
5470011268		5.4	13.1	6	7.8	10	10	9.4	7.3	10	1.8	4,660	39,280
5470011118		4.5	8.2	6	6	6	6	5.7	5.7	9	1.6	2,920	25,160
5470012554		5.3	9.7	8	9	7	7	7.4	8.7	9	1.6	3,440	29,320
5470011312		4.8	3.5	8	9	8	7.7	7.7	7.7	8	1.4	1250	11,600

All the 7 pumps are of 5.6 kW rating (7.5 hp) each but the power drawn goes higher on certain months based on MD recorded by TANGEDCO. The CD is fixed by TANGEDCO based on the highest MD recorded in a bi-monthly cycle and hence the present CD. It is quite likely that the coils of all the motors would have got rewound a couple of times and hence this possible higher power consumption of around 9 kW by all the motors at one time or other. This needs to be set right. The CD fixed for SC 547 001 1497 is way higher and needs to be pruned to 9 kW. This would result in the reduction of fixed charges payable to TANGEDCO.

4.8.3 Kasavanallathur Colony

SC No	Pump Rated kW			MD Recorded in 2022						Present CD	CD / Motor kW	Energy Consumption kWh / 2 months	EB Bill Rs / 2 months
	Rated	Measured	Month Avg										
5470011736	5.6	4.0	5.2	4	4	4	3.1	3.2	4	9	1.6	1,850	16,600
5470012803		6.6	3.7	11	15	11	11.9	12.5	15	15	2.7	1,310	13,480
5470011735		4.4	5.3	1	6	5	4.4	4.7	4.4	5	0.9	1,880	16,200
547001346	9.7	5.1	11.2	10	10	10	10	10.6	10.5	12	1.3	6,450	54,000
5470012555	5.6	5.4	8.1	10	10	10	10	9.7	9.6	10	1.8	2,880	25,040

5470011925		5.3	8.1	9	9	12	12.3	8.9	9	13	2.3	2870	25,560

Five (5) pumps come under this colony jurisdiction and each have a power rating of 5.6 kW and one has a power rating of 9.7 kW. The power drawn goes higher in 4 SCs (Sl Nos: 2,4,5 & 6) as per the MD recorded by TANGEDCO. The CD is fixed by TANGEDCO based on the highest MD recorded in a bi-monthly cycle and hence the present CD. The CD fixed for SC No:5470012803 is way higher at 15 kW and needs to be understood, as the rating of the pump is only 5.6 kW. Likewise, the average power consumption of SC No:547001346 is around 12 kW and has to be probed into. As such, the MDs of SC No:5470011925 is higher and require pruning down. It is quite likely that the coils of the motors would have got rewound a couple of times and hence this higher power consumption. This needs to be understood and set right. Hence, the suggestion would be to identify the motors / pumps that consume higher power and replace them with energy efficient pumps [as these pumps would have been in operation for more than 8 years and demand a CD of only 7 or 8 kW. This would result in the savings of both kWh as well the fixed charges payable.

4.8.4. Kasavanallathur Village

SC No	Pump Rated kW			MD Recorded in 2022						Present CD	CD / Motor kW	Energy Consumption kWh/2 mo	EB Bill Rs/2 mo
	Rated	Measured	Month Avg										
5470012804	5.6	3.3	3.4	4	6	6	4.5	4.1	4.2	8	1.4	1,180	11,040
5470011021		5.3	4.7	7	9	9	12	8.8	8.8	9	1.6	1,659	15,072
5470011457		4.1	10.0	8	6	8	7.9	7.5	7.4	9	1.6	3,540	30,120

All the 3 pumps have a power rating of 5.6 kW each. However, the power drawn goes higher in the SC No: 5470011021 as per the MD recorded by TANGEDCO. The CD is fixed based on the highest MD recorded in a bi-monthly cycle. This SC has a CD of 9 kW. Hence, the suggestion is to replace the pumps of SC No: 5470011021 by EE pumps and opt for a CD of only 7 or 8 kW. This would result in kWh saving and further reduction in the fixed charges payable.

4.8.5 Venmanambudur Colony

SC No	Pump Rated kW			MD Recorded in 2022						Present CD	CD / Motor kW	Energy Consumption kWh/2 mo	EB Bill Rs/ 2 mo
	Rated	Measured	Month Avg										
547003212	5.6	5.1	10.0	9	9.1	9.1	9.1	9.4	9.1	10	1.8	2,820	24,560
5470031011		4.4	6.3	6.4	6.2	6.3	6.4	7.0	6.5	7	1.3	2,270	19,560
547003660	5.6	4.2	6.6	6.8	6.7	6.7	5.8	0.0	0.0	7	1.3	1,070	9,960
547003496	5.6 x 2	4 & 4.5	10.5	12	18	18	14.8	19	14.3	**19**	1.7	4,730	41,640
547003946	5.6	3.0	6.3	9.2	9.3	9.4	9.6	9.5	9.6	**16**	2.9	2,235	21,080
5470031142		4.4	9.4	6.3	6.4	6.4	11.7	7.4	7.4	**12**	2.1	3,458	30,064
5470031800		4.4	8.1	8.1	8.1	8.0	8.9	8.0	8.5	9	1.6	2,970	25,560
547008221		4.4	4.9	6	6	7.4	7.2	7.1	6.1	8	1.4	1,960	17,280

All the pumps have identical power rating of 7.5 kW each. The power drawn is higher in all the SCs [> 6 kW] as per the MD recorded by TANGEDCO. The CD fixed for 3 SC Nos:547003496, 547003946 & 5470031142 (Sl No:4,5&6) are much higher and therefore need to be pruned down by a few kW in each connection. The average monthly power consumption of SC No: 5470031142 is quite high at around 9.4 kW and needs verification. As such, the suggestion made here is to replace the pumps of 3 SC Nos: 547003496, 547003946 & 5470031142 by energy efficient pumps and opt for a CD of only 7 or 8 kW. This would result in both kWh saving and the fixed charges reduction.

4.8.6 Venmanambudur Village, Indira Nagar & Ambedkar Nagar

SC No	Pump Rated kW			MD Recorded in 2022						Present CD	CD / Motor kW	Energy Consumption kWh / 2 mo	EB Bill Rs / 2 mo
	Rated	Measured	Month Avg										
548001391	1.1	0.7	0.5	1	1	1	1	1	1	2	1.8	20	560
548008460	5.6	4.9	2.6	5.8	7.1	7.3	7.6	4	3	8	1.4	1,110	10,480
5470031710	5.6 x 2	4.4 & 4.5	15.0	7.7	15.6	15.8	15.8	5.5	5.1	16	1.4	4,210	36,880
5470031763	5.6	4.0	4.4	5.2	5.3	6.3	6.2	6.2	10.9	7	1.3	1,510	13,480

There is a mini Over Head Tank (OHT) constructed in Venmanambudur Village that has the capacity to hold 1000 liters of water. A 1.5 hp pump supplies water to this OHT. The other 4 pumps have the conventional power rating of 5.6 kW each. The actual power drawn is well within the limit for all these 4 pumps as can be seen in the table above.

The power drawn goes higher in all the SCs as per the MD recorded by TANGEDCO. The CD is fixed by TANGEDCO based on the highest MD recorded in a bi-monthly cycle. Nevertheless, the CD fixed for these 4 SCs seem to be acceptable as the ratios are only marginally higher and therefore can be retained as such. The MD recorded are certainly higher for the motor rating and this needs verification.

4.9 Way forward

Based on the analysis carried out on these 32 SCs, the following measures are recommended for implementation that will reduce the energy consumption to an optimum level.

1. Cancellation / surrender of identified unused service connections
2. Improvement of PF in identified motors through installation of capacitor banks
3. Reduction of contracted demand in identified service connections
4. Installation of energy efficient pumps in selected SCs along with CD reduction

4.9.1 Cancellation of Unused Service Connections

It was already mentioned that there are 15 SCs that are not in use at present [Table 6.4]. The reasons for their disuse are presented as remarks in this table {the most cited reasons are : nil water source, location shift, poor water quality etc.}

Hence, it shall be prudent to cancel these SCs and thereby save on the fixed charges payable to TANGEDCO. The service connections identified for cancellation are as below:

No	SCs Identified	CD Availed (kW)	Billed Amount Paid : Rs / Bi-monthly
1	5470011760	4	800
2	548008459	3	600
3	548008555	2	400

4	548008465	3	600
5	547003693	1	200
6	548008461	3	600
7	547003945	4	800
8	5470011638	12	2400
9	547003694	2	400
10	547003947	8	1600
11	547008540	4	800
12	548001156	1	200
13	547008516	4	800
14	5470031016	5	1000
15	5470031044	4	800

Table 4.7 : Service Connections Identified for Cancellation

4.9.1.1 Economics

No of SCs suggested for cancellation = 15
Total demand reduction possible due to this cancellation = 61 kW
Hence cost savings = (61 kW x Rs.200/kW/bi-month x 6 times/year) = **Rs.73 200 / year**
Investment = Nil
Payback Period = Immediate

4.9.2 Improvement of power factors in identified Motors through installation of capacitor banks

Power factor is defined as the ratio of Actual Power Drawn to the Apparent Power Drawn. This PF shall be close to Unity to achieve an optimum power drawl. However, in reality, due to the motor inductance, it shall not be possible to achieve Unity PF but can try as close to unity as possible. To achieve this higher PF , typically Capacitor Banks are attached in the circuit to compensate for the inductance imposed by the motor operation.

Presently , power measurements have been taken on 31 Motors / SCs and the PF has been measured for each one of the motors. The Power Factors recorded are shown below:

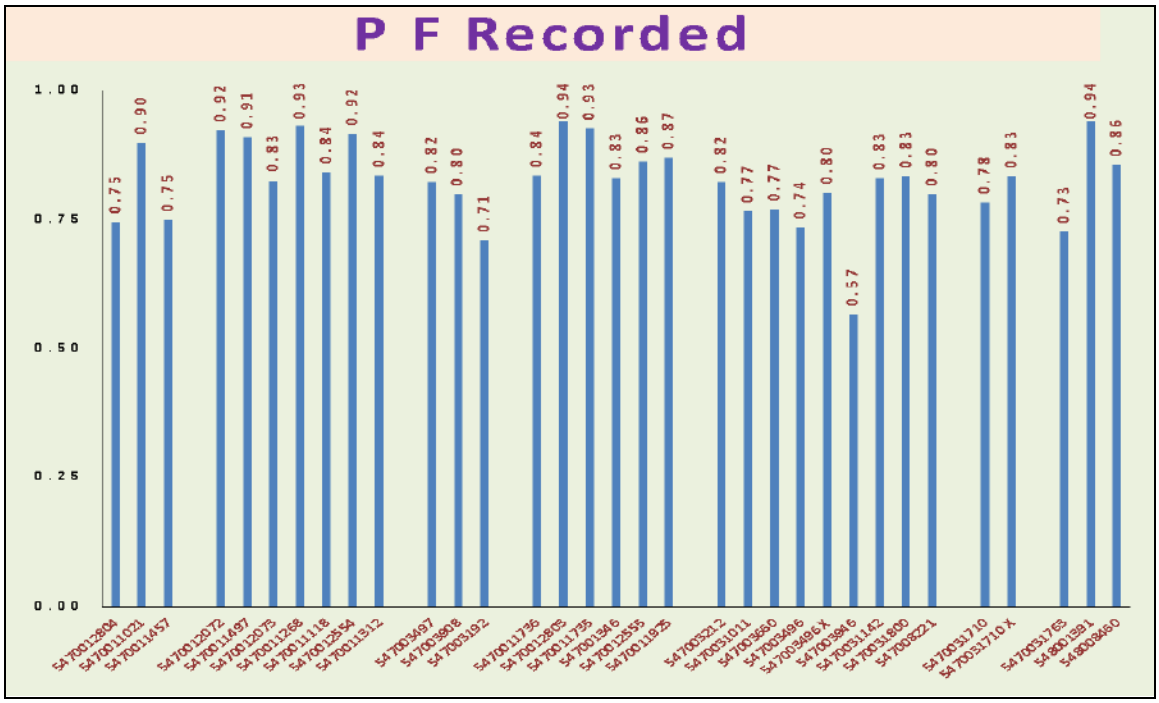

Figure 4.3 : Power Factor (PF) recorded

From the above chart, it can be inferred that several motors have a PF value lying between 0.8 to 0.92 which can be presently accepted considering the age of motors, usage pattern etc. There are 9 motors identified that have recorded low PFs which can be improved to 0.8 and above if not to 0.9 / Unity. Higher the PF, higher will be possible to load the motor on kW and lesser will be the current drawn. This - lesser current drawn phenomena - will extend the motor life. Hence, the suggestion is to enhance the PF through external addition of Capacitor Banks (CB) in requisite ratings that will help in maintaining the reactive power of the motors. Hence, the recommendation is to add Capacitor Banks in requisite rating to below identified SCs / Motors. This shall bring down the energy (kWh) as well the kW enabling thereby cost savings.

No	SCs Identified	Power Factor		Capacitor addition required (kVAr)
		Present	Recommended	
1	5470011497	0.75	0.8	0.5
2	5470011457	0.75	0.8	0.5
3	547003192	0.71	0.8	1.0
4	5470031011	0.77	0.8	0.5

5	547003660	0.77	0.8	0.5
6	5470033496	0.74	0.8	1.0
7	547003946	0.57	0.8	2.5
8	5470031710	0.78	0.8	0.5
9	5470031763	0.73	0.8	1.0

Table 4.8 : Service Connections identified for CB addition

4.9.2.1 Economics

Anticipated Energy Savings = 2,319 kWh/y
Anticipated Cost Savings = (2,319 kWh/y x Rs.8/kWh) = **Rs.18,554/year**
Investment = **Rs.14,500**
Simple Payback Period = **9 months**

4.9.3 Reduction of Contract Demand in identified Service Connections

4 (Four) Service Connections have been identified for the reduction of Contracted Demand from the existing demand levels. The Maximum Demands recorded in these SCs - of late - were much lower than the Contracted Demand availed. The following table provides the details in respect of present Contracted Demand, Maximum Demand reached and the suggest kW surrender.

No	SC Identified	kW		
		Present CD	MD Recorded	Reduction Sought
1	5470011497	13	9	4
2	547003192	9	6	3
3	547003946	9	7	2
4	548008460	8	6	2
Total		**39**	**28**	**11**

Table 4.9 : Service Connections identified for CD reduction

Hence, it is suggested to reduce the present Contracted Demand from 39 kW to 28 kW and thereby save on 11 kW and the corresponding fixed charges payable.

4.9.3.1 Economics

Proposed Demand Reduction = 11 kW

Anticipated Cost Savings = (11 kWx Rs.200/kW/bi month x 6 times/y) = **Rs.13,200/y**
Investment = Nil
Simple Payback Period = Immediate

4.9 Installation of energy efficient pumps and simultaneous reduction of contracted demand for the sake of cost conservation

1. In the present study, the MD recorded for all the 31 operating Pumps / Motors were noted for a period of past one year. This has been compared with the rated HP of the pumps and actual measured power consumption

2. It was realized that the MDs recorded were quite high in 9 (nine) identified Service Connections when compared with the rated power of the motor.

3. The probable reasons for this occurrence could be the age of the motor coupled with coil rewinding (due electrical disturbances as well mechanical faults) and poor maintenance activities.

4. The coil winding is certain to affect the motor performance by a few notches thereby increasing power consumption for the given duty. It is well known that a rewind motor is a drain on energy due to the reduced performance / efficiency.

5. Therefore, installation of Energy Efficient (E E) Motors is suggested replacing the identified high energy consuming motors for the sake of energy savings.

6. Further, lower power drawl of motors will result in less kW input and therefore lesser CD. Thus, CD optimization is also possible when EE motors are installed in addition to consuming lesser kWh.

7. The following 6 (six) identified motors / SCs shall be taken up for replacement with Energy Efficient motors .

4.9.1 Economics

The following table provides the details in respect of savings achievable:

SCs Targeted	Actual Power measured kW	MD kW				Savings bi–monthly kWh
		Recorded past 1 year	Recorded Recent	Proposed	Reduction	
5470011021	5.3	12.0	9	9	0	406
5470012803	6.6	10.7	15	11	4	131
547001346	5.1	10.5	12	11	1	645
5470011925	5.3	12.2	13	9	4	287
5470031142	4.4	11.7	12	9	3	332
5470031763	4.0	10.8	7	7	0	156
Total					**12**	**1957**

Table 4.10 : Service Connections Identified for EE Motor Installation

4.9.2 Economics

Energy savings anticipated = (1,957 kWh/bi-monthly x 6 times/year) = **11,742 kWh/ y**
Cost savings anticipated = (11,742 kWh/year x Rs.8/kWh) = **Rs.93,936/y**
Demand reduction suggested = **12 kW**
Fixed cost savings = (12 kW x Rs.200/kW/bi-monthly x 6 times/y) = **Rs.14 400/y**
Total cost savings = (93,936 + 14,400) = **Rs.1,08,336/y**
Investment = **Rs.3,50,000**
Simple Payback Period = **38 Months**

4.10 Consolidation

The following table provides the consolidated statement in terms of economics of the proposals involved.

No	Proposal Made	Savings Rs/y	Investment Rs	Payback Period Months
1	Cancellation of unused SCs	73,200	-	-
2	Improvement of PF in identified motors	18,554	14,500	9
3	Reduction of CDs in identified SCs	13,200	-	-

4	Installation of EE motors along with CD reduction	1,08,336	3,50,000	39
Total		**2,13,290**	**3,64,500**	**21**

Table 4.11 : Economics of proposals recommended : A consolidation

It can be seen that the proposals made are quite attractive on the economic front and hence shall be taken up for implementation as and when the situation arises.

4.11 Conclusion

1. Pumps are of submersible type with a rated power of 7.5 hp mostly and appear to provide unhindered operation as per the feedback received.

2. There are 15 SCs that have been recommended for cancellation as these that served **NIL** purpose presently.

3. Suggestions have been made for CD reduction / installation of EE pumps/power factor improvement in identified service connections

4. In all 4 recommendations have been made in this chapter and that is expected to bring down the energy bill by **Rs.2.1 lakhs a year** (5.3%). A reasonable reduction from the present energy cost of **Rs.40 lakhs a year**.

5. Per capita energy consumption for water utilization at 80 litres/day/person appears to be acceptable

5 Conclusion

The DEAS carried out in the Panchayat Union of Kadambathur has revealed the existence of reasonable scope for energy conservation in the 2 major energy guzzlers, namely, street lighting and water pumping. Based on our study, **9** energy conservation proposals have been identified (on both street lighting & water pumping) the details of which are summarized below :

No	Proposal Description	Cost savings Rs/y	Investment Rs	Payback Period months
STREET LIGHTING				
1	Cancellation of unused SC	6,000	-	-
2	Rectification of faulty meters	-	-	-
3	Merger of service connections in Identified Locations	2,400	-	-
4	Reduction of CD in selected SCs	20,400	-	-
WATER PUMPING				
5	Bridge lighting Lux optimization	77,280	1,00,000	16
6	Cancellation of unused SCs	73,200	-	-
7	Improvement of PF in identified Motors	18,554	14,500	9
8	Reduction of CDs in identified SCs	13,200	-	-
9	Installation of EE motors along with CD reduction	1,08,336	3,50,000	39

Table 5.1 : Energy Conservation Proposals Identified : A Summary

The overall anticipated cost saving is computed as **Rs. 3.2 lakhs a year** in cost with a one - time investment of **Rs. 3.5 lakhs** which shall get paid back in about **12 months**. This cost savings is about 7 **%** of overall electricity cost paid by the panchayat.

Contact

Citizen consumer and civic Action Group
No.103, First Floor,
Eldams Road, Teynampet,
Chennai - 600018.
Tamil Nadu,
India.

Phone Number
+91-44-2435 4458
+91-44-2435 0387

Email
helpdesk@cag.org.in

WWW.CAG.ORG.IN

CAG
Citizen consumer and civic Action Group