KSEB
കേരളത്തിന്റെ ഉജ്ജ്വലം

KERALA STATE ELECTRICITY BOARD LIMITED

(Incorporated under the Indian Companies Act, 1956)
Regd. Office: Vydyuthi Bhavanam, Pattom, Thiruvananthapuram – 695004
OFFICE OF THE ASSISTANT ENGINEER, ELECTRICAL SECTION, COLLEGE
CLUB ROAD, KOCHI Pin:682011, Phone : 0484 2354584, Email : ksebcollege@gmail.com,

DB/CLG/2019-20/Maharajas college/207 Dt.29.11.19

To,

Special Grade Principal
Maharajas college
Ernakulam

Sir,

Sub:- Energy consumption details – forwarding - reg :-

Ref:- 1) Your Ltr.No.A1/rec.Spirit/2019 dtd.27.11.19.

As per reference, the energy consumpion details of Consumer Nos.1155405000093, 1155406000092, 1155407000973, 115409000091, 1155407000095 and 1155402007878 are forwarded herewith.

Yours faithfully,

Assistant Engineer
Electrical Section.
College.

SPECIAL GRADE PRINCIPAL
MAHARAJA'S COLLEGE
ERNAKULAM

MAHARAJA'S COLLEGE ERNAKULAM
COCHIN-682 011

Consumer No.1155405000093

Bill Month	Mphase/ Mload	Special Billing Category	Bill Frequency	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	Consumption
201807	3/10200	Regular Billing Point	Monthly	Import	KWH-All	42677.00 01-06-2018 OK/NA	42677.00 02-07-2018 OK/NA	216
201808	3/10200	Regular Billing Point	Monthly	Import	KWH-All	42677.00 02-07-2018 OK/NA	43324.00 01-08-2018 OK/AA	215
201809	3/10200	Regular Billing Point	Monthly	Import	KWH-All	43324.00 01-08-2018 OK/AA	43324.00 01-09-2018 OK/NA	245
201810	3/10200	Regular Billing Point	Monthly	Import	KWH-All	43324.00 01-09-2018 OK/NA	43813.00 01-10-2018 OK/AA	244
201811	3/10200	Regular Billing Point	Monthly	Import	KWH-All	43813.00 01-10-2018 OK/AA	44045.00 01-11-2018 OK/AA	232
201812	3/10200	Regular Billing Point	Monthly	Import	KWH-All	44045.00 01-11-2018 OK/AA	44292.00 01-12-2018 OK/AA	247
201901	3/10200	Regular Billing Point	Monthly	Import	KWH-All	44292.00 01-12-2018 OK/AA	44512.00 01-01-2019 OK/AA	220
201902	3/10200	Regular Billing Point	Monthly	Import	KWH-All	44512.00 01-01-2019 OK/AA	44687.00 01-02-2019 OK/AA	175
201903	3/10200	Regular Billing Point	Monthly	Import	KWH-All	44687.00 01-02-2019 OK/AA	44687.00 01-03-2019 OK/NA	167
201904	3/10200	Regular Billing Point	Monthly	Import	KWH-All	44687.00 01-03-2019 OK/NA	45020.00 01-04-2019 OK/AA	166
201905	3/10200	Regular Billing Point	Monthly	Import	KWH-All	45020.00 01-04-2019 OK/AA	45020.00 02-05-2019 OK/NA	202
201906	3/10200	Regular Billing Point	Monthly	Import	KWH-All	45020.00 02-05-2019 OK/NA	45424.00 01-06-2019 OK/AA	202

Consumer No.1155406000092

Bill Month	Mphase/ Mload	Special Billing Category	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	MF	Consumption
201807	3/87684	Regular Billing Point	Import	KWH-All	10065.00 01-06-2018 OK/NA	10065.00 02-07-2018 OK/NA	30	8280
201808	3/87684	Regular Billing Point	Import	KWH-All	10065.00 02-07-2018 OK/NA	10893.00 01-08-2018 OK/AA	30	8280
201809	3/87684	Regular Billing Point	Import	KWH-All	10893.00 01-08-2018 OK/AA	10893.00 01-09-2018 OK/NA	30	9270
201810	3/87684	Regular Billing Point	Import	KWH-All	10893.00 01-09-2018 OK/NA	11511.00 01-10-2018 OK/AA	30	9270
201811	3/87684	Regular Billing Point	Import	KWH-All	11511.00 01-10-2018 OK/AA	11816.00 01-11-2018 OK/AA	30	9150
201812	3/87684	Regular Billing Point	Import	KWH-All	11816.00 01-11-2018 OK/AA	12448.00 01-12-2018 OK/AA	30	18960
201901	3/87684	Regular Billing Point	Import	KWH-All	12448.00 01-12-2018 OK/AA	12746.00 01-01-2019 OK/AA	30	8940
201902	3/87684	Regular Billing Point	Import	KWH-All	12746.00 01-01-2019 OK/AA	12795.00 01-02-2019 OK/AA	30	1470
201903	3/87684	Regular Billing Point	Import	KWH-All	12795.00 01-02-2019 OK/AA	12795.00 01-03-2019 OK/NA	30	8790
201904	3/87684	Regular Billing Point	Import	KWH-All	12795.00 01-03-2019 OK/NA	13381.00 01-04-2019 OK/AA	30	8790
201905	3/87684	Regular Billing Point	Import	KWH-All	13381.00 01-04-2019 OK/AA	13381.00 02-05-2019 OK/NA	30	6975
201906	3/87684	Regular Billing Point	Import	KWH-All	13381.00 02-05-2019 OK/NA	13846.00 01-06-2019 OK/AA	30	6975

Consumer No.1155407000973

Bill Month	Mphase/ Mload	Special Billing Category	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	MF	Consumption
201807	3/5000	Regular Billing Point	Import	KWH-All	16056.00 01-06-2018 OK/NA	16056.00 02-07-2018 OK/NA	1	1444
201808	3/5000	Regular Billing Point	Import	KWH-All	16056.00 02-07-2018 OK/NA	20387.00 01-08-2018 OK/AA	1	1443
201809	3/5000	Regular Billing Point	Import	KWH-All	20387.00 01-08-2018 OK/AA	20387.00 01-09-2018 OK/NA	1	1667
201810	3/5000	Regular Billing Point	Import	KWH-All	20387.00 01-09-2018 OK/NA	23720.00 01-10-2018 OK/AA	1	1666
201811	3/5000	Regular Billing Point	Import	KWH-All	23720.00 01-10-2018 OK/AA	25416.00 01-11-2018 OK/AA	1	1696
201812	3/5000	Regular Billing Point	Import	KWH-All	25416.00 01-11-2018 OK/AA	27140.00 01-12-2018 OK/AA	1	1724
201901	3/5000	Regular Billing Point	Import	KWH-All	27140.00 01-12-2018 OK/AA	28370.00 01-01-2019 OK/AA	1	1230
201902	3/5000	Regular Billing Point	Import	KWH-All	28370.00 01-01-2019 OK/AA	30170.00 01-02-2019 OK/AA	1	1800
201903	3/5000	Regular Billing Point	Import	KWH-All	30170.00 01-02-2019 OK/AA	30170.00 01-03-2019 OK/NA	1	2115
201904	3/5000	Regular Billing Point	Import	KWH-All	30170.00 01-03-2019 OK/NA	34400.00 01-04-2019 OK/AA	1	2115
201905	3/5000	Regular Billing Point	Import	KWH-All	34400.00 01-04-2019 OK/AA	36370.00 02-05-2019 OK/AA	1	1970
201906	3/5000	Regular Billing Point	Import	KWH-All	36370.00 02-05-2019 OK/AA	38220.00 01-06-2019 OK/AA	1	1850

Consumer No.1155409000091

Bill Month	Mphase/ Mload	Special Billing Category	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	MF	Consumption
201807	3/6000	Regular Billing Point	Import	KWH-All	22441.00 01-06-2018 OK/NA	24598.00 02-07-2018 OK/AA	1	1078
201808	3/6000	Regular Billing Point	Import	KWH-All	24598.00 02-07-2018 OK/AA	26311.00 01-08-2018 OK/AA	1	1713
201809	3/6000	Regular Billing Point	Import	KWH-All	26311.00 01-08-2018 OK/AA	28236.00 01-09-2018 OK/AA	1	1925
201810	3/6000	Regular Billing Point	Import	KWH-All	28236.00 01-09-2018 OK/AA	30568.00 01-10-2018 OK/AA	1	2332
201811	3/6000	Regular Billing Point	Import	KWH-All	30568.00 01-10-2018 OK/AA	32842.00 01-11-2018 OK/AA	1	2274
201812	3/6000	Regular Billing Point	Import	KWH-All	32842.00 01-11-2018 OK/AA	35006.00 01-12-2018 OK/AA	1	2164
201901	3/6000	Regular Billing Point	Import	KWH-All	35006.00 01-12-2018 OK/AA	36688.00 01-01-2019 OK/AA	1	1682
201902	3/6000	Regular Billing Point	Import	KWH-All	36688.00 01-01-2019 OK/AA	38900.00 01-02-2019 OK/AA	1	2212
201903	3/6000	Regular Billing Point	Import	KWH-All	38900.00 01-02-2019 OK/AA	40650.00 01-03-2019 OK/AA	1	1750
201904	3/6000	Regular Billing Point	Import	KWH-All	40650.00 01-03-2019 OK/AA	42252.00 01-04-2019 OK/AA	1	1602
201905	3/6000	Regular Billing Point	Import	KWH-All	42252.00 01-04-2019 OK/AA	43129.00 02-05-2019 OK/AA	1	877
201906	3/6000	Regular Billing Point	Import	KWH-All	43129.00 02-05-2019 OK/AA	43859.00 01-06-2019 OK/AA	1	730

Assistant Engineer
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Kochi - 682 011

SPECIAL GRADE PRINCIPAL
MAHARAJA'S COLLEGE
ERNAKULAM

Consumer No.1155407000095

Bill Month	Mphase/ Mload	Special Billing Category	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	MF	Consumption
201807	3/5000	Regular Billing Point	Import	KWH-All	4549.00 01-06-2018 OK/NA	4549.00 02-07-2018 OK/NA	1	401
201808	3/5000	Regular Billing Point	Import	KWH-All	4549.00 02-07-2018 OK/NA	4549.00 01-08-2018 OK/NA	1	401
201809	3/5000	Regular Billing Point	Import	KWH-All	4549.00 01-08-2018 OK/NA	6152.00 01-09-2018 OK/AA	1	400
201810	3/5000	Regular Billing Point	Import	KWH-All	6152.00 01-09-2018 OK/AA	6536.00 01-10-2018 OK/AA	1	384
201811	3/5000	Regular Billing Point	Import	KWH-All	6536.00 01-10-2018 OK/AA	6936.00 01-11-2018 OK/AA	1	400
201812	3/5000	Regular Billing Point	Import	KWH-All	6936.00 01-11-2018 OK/AA	6936.00 01-12-2018 OK/NA	1	943
201901	3/5000	Regular Billing Point	Import	KWH-All	6936.00 01-12-2018 OK/NA	8822.00 01-01-2019 OK/AA	1	943
201902	3/5000	Regular Billing Point	Import	KWH-All	8822.00 01-01-2019 OK/AA	9620.00 01-02-2019 OK/AA	1	798
201903	3/5000	Regular Billing Point	Import	KWH-All	9620.00 01-02-2019 OK/AA	10126.00 01-03-2019 OK/AA	1	506
201904	3/5000	Regular Billing Point	Import	KWH-All	10126.00 01-03-2019 OK/AA	10749.00 01-04-2019 OK/AA	1	623
201905	3/5000	Regular Billing Point	Import	KWH-All	10749.00 01-04-2019 OK/AA	10749.00 02-05-2019 OK/NA	1	281
201906	3/5000	Regular Billing Point	Import	KWH-All	10749.00 02-05-2019 OK/NA	10749.00 01-06-2019 OK/NA	1	281

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SPECIAL GRADE PRINCIPAL
MAHARAJA'S COLLEGE
ERNAKULAM

Consumer No.1155402007878

Bill Month	Mphase/ Mload	Special Billing Category	Trading	Power Unit/Zone	IR IR Date Status:Mtr/Rdg	FR FR Date Status:Mtr/Rdg	MF	Consumption
201807	3/9000	Regular Billing Point	Import	KWH-All	26392.00 01-06-2018 OK/NA	29804.00 02-07-2018 OK/AA	1	1138
201808	3/9000	Regular Billing Point	Import	KWH-All	29804.00 02-07-2018 OK/AA	31049.00 01-08-2018 OK/AA	1	1245
201809	3/9000	Regular Billing Point	Import	KWH-All	31049.00 01-08-2018 OK/AA	31049.00 01-09-2018 OK/NA	1	1669
201810	3/9000	Regular Billing Point	Import	KWH-All	31049.00 01-09-2018 OK/NA	34387.00 01-10-2018 OK/AA	1	1669
201811	3/9000	Regular Billing Point	Import	KWH-All	34387.00 01-10-2018 OK/AA	36214.00 01-11-2018 OK/AA	1	1827
201812	3/9000	Regular Billing Point	Import	KWH-All	36214.00 01-11-2018 OK/AA	37436.00 01-12-2018 OK/AA	1	1222
201901	3/9000	Connected Load Change	Import	KWH-All	37436.00 01-12-2018 OK/AA	37651.00 17-12-2018 OK/AA	1	215
201901	3/48122	Meter Change	Import	KWH-All	37651.00 17-12-2018 OK/AA	37651.00 17-12-2018 OK/AA	1	0
201901	3/48122	Regular Billing Point	Import	KWH-All	18109.00 17-12-2018 OK/AA	18109.00 01-01-2019 OK/NA	30	910
201902	3/48122	Regular Billing Point	Import	KWH-All	18109.00 01-01-2019 OK/NA	18200.00 01-02-2019 OK/AA	30	1820
201903	3/48122	Regular Billing Point	Import	KWH-All	18200.00 01-02-2019 OK/AA	18265.00 01-03-2019 OK/AA	30	1950

201904	3/48122	Regular Billing Point	Import	KWH-All	18265.00 01-03-2019 OK/AA	18356.00 01-04-2019 OK/AA	30	2730
201905	3/48122	Regular Billing Point	Import	KWH-All	18356.00 01-04-2019 OK/AA	18440.00 02-05-2019 OK/AA	30	2520
201906	3/48122	Regular Billing Point	Import	KWH-All	18440.00 02-05-2019 OK/AA	18499.00 01-06-2019 OK/AA	30	1770

MAHARAJA'S COLLEGE ERNAKULAM COCHIN-682 011

SPECIAL GRADE PRINCIPAL
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Assistant Engineer
KSEB Electrical Section
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Kochi - 682 011

GREEN AUDIT REPORT

MAHARAJAS COLLEGE

(AUTONOMOUS)

ERNAKULAM

Green Audit Report
Maharajas College (Autonomous)
Report No: EA 559
2019-December

About IRTC

IRTC is a grant-in-aid institution of KSCSTE, Govt. of Kerala and a Core grant supported institution of DST, Govt. of India. They are also supported by, ICSSR, UGC, NABARD, and various government departments and undertakings. They also function as an accredited training center of KILA, IKM, MPEDA, etc. and also as a Project Facilitation Agency for various government undertakings. IRTC has received prestigious **Kerala State Energy Conservation Award, 1999**.

About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala to conduct Mandatory Energy Audits for Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated **OTTOTRACTIONS** by presenting its prestigious **"The Kerala State Energy Conservation Award 2009"** for their contributions in the filed of energy conservation.

Green Audit Team

From IRTC - Ottotractions		
1	Er. Suresh Babu B V,	Accredited Energy Auditor, AEA 33
2	Er. B. Zachariah	Director, Ottotractions
3	Prof. B.M.Musthafa	Head, Energy Division, IRTC
4	Mr. Janardhanan.K.K	Registrar, IRTC
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7	Er. Mohammed Aneez,	Project Engineer, Ottotractions
8	Er. Sruthi B S	Project Engineer, Ottotractions
9	Mr.Indrajith.K.S	Consultant Engineer Electrical, IRTC
From Maharajas		
10	Dr. Jayakumar	Principal
11	Dr. Julie Chandra	Asst Professor
12	Dr.Sunish K S	Asst Professor
13	Dr. Krishnakumar K	HoD, Dept of Botany
14	NSS Volunteers	

Acknowledgment

We were privileged to work together with the administration and staff of Maharajas College, Ernakulam for their timely help extended to complete the audit and bringing out this report. We take this opportunity to thank Dr.Jayakumar, Principal and Prof.P K Ravindran, Chairman Governing Council for entrusting us to undertake this green audit. We thank Dr Julie Chandra C S , Asst Professor in Chemistry, Dr. Sunish K.S Assistant Professor, Zoology, and Dr Krishnakumar K, HoD, Dept of Botany for their timely advises and support during audit. We appreciate the efforts of energetic NSS volunteers of Maharajas College for their active participation in this audit. The PhD scholers of Department of Botony- G. Ashwathy, Athira C U & Abhaya G S deserves special thanks.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of team IRTC - OTTOTRACTIONS for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency

Mr. Janardhanan.K. K
Registrar,
Integrated Rural Technology Centre

Preface

Educational institutions always had an important leadership role in society in demonstrating types of changes that used to occur with respect to the prime issues of the time. All around the world, educational institutions are taking steps to declare themselves the next carbon neutral school as a part of the global trend of becoming sustainable. In 2007, Victoria University School of Architecture and Design declared themselves the first carbon neutral campus in the world through the purchase of carbon credits. This concept is not a sustainable model as it does not guarantee the capture of carbon forever and also it is expensive.

The potential for any academic institution- (may be a school in a remote village or a University in an urban setting) - to become the driver for change is huge. Its role of practicing leadership in its community can be utilized to encourage and influence carbon neutral living.

The biggest factors that contribute towards emission are Energy, Transportation and Waste. Any reduction in the carbon emission by the above sectors, starts with the behavioral changes (Low cost) and/or technological investments (High cost). In order to make these changes, the students are to be educated properly on the concept of carbon neutral campuses and methods to reduce it.

In India, the concept of carbon neutral campuses is gaining momentum. Green Audit in Maharajas Campus measures the amount of Green House Gases (GHG) emissions produced by the school as a result of its operations through an accounting like inventory of all the sources of GHGs and carbon sequestration in the school campus. Based on this, the total carbon footprint is estimated. Measures are recommended to bring down the carbon footprint of the campus and to make it a carbon neutral campus.

B Zachariah

Founder, OTTOTRACTIONS

Contents

1

INTRODUCTION

1.1 Background

All across the developed countries, educational institutions are now moving to a sustainable future by becoming carbon neutral and greener spaces. They are taking responsibility for their environmental impact and are working to neutralize those effects. To become carbon neutral, institutions are working to reduce their emissions of greenhouse gases, cut their use of energy, use energy efficient equipment, use more renewable energy, plant and protect green cover and emphasize the importance of sustainable energy sources. Institutions that have committed to becoming carbon neutral have recognized the threat of global warming and are therefore committing to reverse the trend. Studies on this line has not struck roots in most of the developing countries-especially among students.

The Sustainable Development Goals (SDGs), launched by the United Nations in 2015, are an excellent vehicle for driving this change. They represent an action plan for the planet and society to thrive by 2030. The SDGs provide a window of opportunity for creating multidimensional operational approaches for climate change adaptation. They address poverty, hunger and climate change, among other issues central to human progress and sustainable development, such as gender equality, clean water and sanitation, and responsible consumption and production.

The Green Audit of Maharajas College" aims to assist campus to reduce their carbon footprint and educate tomorrow's leaders about strategies for carbon mitigation using their campuses as model". Also this audit covers institutes responses towards SDGs by covering SDG 3,6,7,11,13,15. The green audit also aims to educate students and teachers on the concept of

carbon footprint and to enable the students to collect data pertaining to the carbon emissions and carbon sequestration in their campus and to calculate the specific carbon footprint of the campus.

The project also suggests plans to make the campus carbon neutral or even carbon negative by implementing carbon mitigation strategies in areas such as,

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration etc.

The major objectives of the audit are:

- To make aware students and teachers on the concept of carbon footprint.
- To calculate the specific carbon footprint of the campus and classify them as carbon negative, neutral or positive.
- To create carbon mitigation plans to reduce their footprint based on the data generated.

1.2. Maharajas College

The **Maharaja's College** located in Kochi (Ernakulam), Kerala. Established in 1875, it is one of the oldest colleges in India. Located in the heart of the city, it is spread over a campus of 25 acres (100,000 m^2) on the banks of Vembanad Lake. Blanketed by tall and rare species of trees, its campus features a mix of old and modern architecture and covers a total area of 19,525 m^2, providing infrastructural facilities for the 19 departments of the college.

This multidisciplinary centre of higher learning had its humble beginnings as a single room English school started by the Royal (Kingdom of Cochin) Shankara Warrier in 1845 "to impart such instruction to the students as would enable them to converse with Englishmen without the aid of an interpreter". The school was upgraded to a college in 1875 and in June 1925 the college acquired its present name. The college provided instruction in Mathematics, Physics, Chemistry, Zoology, History and Economics; it was affiliated with Madras University. At that time there were two hostels and physical education, literary and science associations functioning in full swing. Sir C. V. Raman and Dr S. Radhakrishnan were among the speakers at the Golden Jubilee celebrations in 1925.

The first PG course was started in 1947 in the Department of Chemistry, which already had research facilities holding to M.Sc and Ph.D. Following the integration of Cochin and Travancore states, the college was transferred from Madras to Travancore University in

1949. The student body grew from 500 in 1925 to 2,802 in 1998; the teaching faculty saw a parallel increase from 21 to 195. The government of Kerala recognised it as a Centre of Excellence in the state and the University Grants Commission awarded the College with Potential for Excellence (CPE) status based on the NAAC Accreditation results. In 2014, UGC awarded Autonomous status to the college.

Students	UG	1924
	PG	522
	Total Students	**2446**
Staffs	Teaching	NA
	Non-Teaching	NA
	Total Staffs	**NA**
Total Student Occupancy		**2446**

The college has a student strength of 2446 spread in both campuses. For calculating per capita carbon emission estimation only student strength is taken into account.

2

METHODOLOGY

2.1. Sensitisation

Low Carbon campus initiatives are successful when everyone in the campus is engaged including students, teachers and staff. A team of students, teachers and staff were formed to support the audit. A sensitisation among students and teachers on the concept of carbon footprint was conducted at the beginning of the audit.

During the audit the students of and staffs were sensitised on the project and trained to be a part of the data collection team. This helped in conducting the survey in a participatory mode so that the awareness will penetrate to the grass root level. During the data collection field visit it was stressed that the team will spread these ideas to their homes and friends. This will help in a horizontal and vertical spread of the message to a wider group. It is assumed that through 2446 occupants of these two campuses will reach same number of households. This message will spread to at least 9784 individuals (Assuming that each house has four members).

2.2 Estimation of carbon footprint

A carbon footprint is the amount of greenhouse gases—primarily carbon dioxide—released into the atmosphere by a particular human activity. A carbon footprint can be a broad measure or be applied to the actions of an individual, a family, an event, an organization, or even an entire nation. It is usually measured as tons of CO_2 emitted per year, a number that can be supplemented by tons of CO_2-equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

Global Warming Potential (GWP) is a measure of how much heat a greenhouse gas traps in the atmosphere up to a specific time horizon, relative to carbon dioxide. The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of

different gases. Specifically, it is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (CO_2).

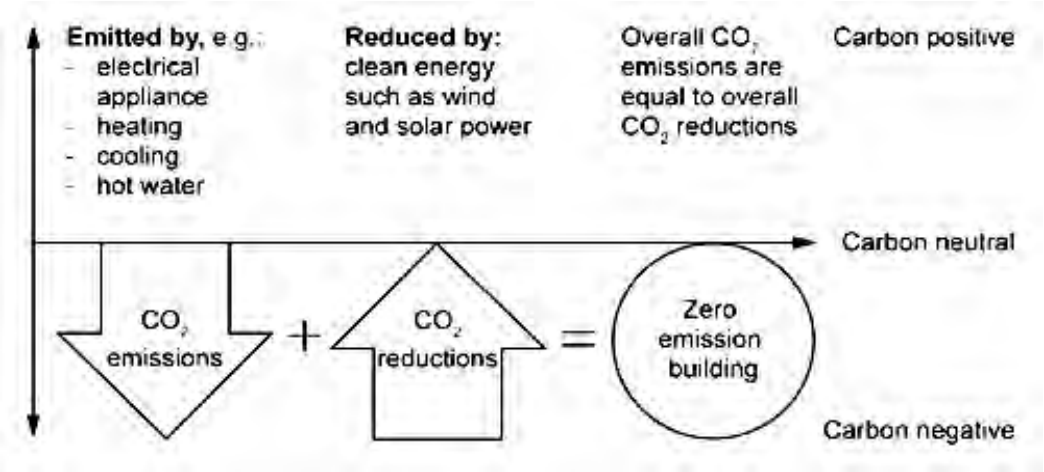
Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO2	variable §	1	1	1
Methane *	CH4	12±3	56	21	6.5
Nitrous oxide	N2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
HFC-41	CH3F	3.7	490	150	45
HFC-43-10mee	C5H2F10	17.1	3000	1300	400
HFC-125	C2HF5	32.6	4600	2800	920
HFC-134	C2H2F4	10.6	2900	1000	310
HFC-134a	CH2FCF3	14.6	3400	1300	420
HFC-152a	C2H4F2	1.5	460	140	42
HFC-143	C2H3F3	3.8	1000	300	94
HFC-143a	C2H3F3	48.3	5000	3800	1400
HFC-227ea	C3HF7	36.5	4300	2900	950
HFC-236fa	C3H2F6	209	5100	6300	4700
HFC-245ca	C3H3F5	6.6	1800	560	170
Sulphur hexafluoride	SF6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100
Perfluorobutane	C4F10	2600	4800	7000	10100
Perfluorocyclobutane	c-C4F8	3200	6000	8700	12700
Perfluoropentane	C5F12	4100	5100	7500	11000
Perfluorohexane	C6F14	3200	5000	7400	10700

The methodology for carbon footprint calculations are still evolving and it is emerging as an important tool for green house management. In the present study carbon emission data from the campus is estimated under four categories viz.

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration

Carbon neutrality refers to achieving net zero GHG emission by balancing the measured amount of carbon released into atmosphere due to human activities, with an equal amount

sequestrated in carbon sinks. It is crucial to restrict atmospheric concentrations of GHGs released from various socio-economic, developmental and life style activities using biological or natural processes. It is recognized that addressing climate change is not as simple as switching to renewable energy or offsetting GHG emissions. Rather, providing an opportunity for innovation in new developmental activities for viable and effective approach to address the problem.



Energy Consumption

In the campus carbon emission from energy consumption is categorised under two headings viz. energy from Electrical and Thermal. As there is no vehicle operates from the campus, energy used for transportation is not considered.

A detailed energy audit is conducted to understand the energy consumption of the campus. Information on total connected loads, their duration of usage and documents like electricity bills are evaluated. Connected loads are calculated by conducting a survey on electrical equipment on each location. Duration of usage was found out by surveying and interviewing the users. The survey of equipment was conducted in a participatory mode.

The fuel consumption of cooking like LPG, biogas and biomass were studied by analysing the annual fuel bills and usage schedules during the study. Discussions were carried out with the concerned persons who actually operate the cooking system.

Waste Generation.

The waste generated from the campus is also responsible for the greenhouse gas emission. So in order to calculate the total carbon foot print of the campus it is necessary to estimate the greenhouse gas emission from the waste generated in the campus by the activity of the students, teachers and staffs.

The calculation of the waste generated has been conducted by keeping buckets for collecting the waste generated in a day. This waste so generated was calculated by weighing it.

Carbon Sequestration

Carbon sequestration is the process involved in the long-term storage of atmospheric carbon dioxide. Trees remove carbon dioxide from the atmosphere through the natural process of photosynthesis and store the carbon in their leaves, branches, stems, bark, and roots.

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Detailed calculations and results are given in the technical supplements of this document.

3

RESULTS AND DISCUSSIONS

CARBON FOOTPRINT ESTIMATION

3.1. ENERGY

a. Electricity

Electricity is purchased from KSEB through 6 numbers of LT connections having a total connected load of 124kW. A 20 kWp & 50kWp Solar Power Plants were installed in the campus (on at roof top of Britto Building and other in Boys Hostel roof top).

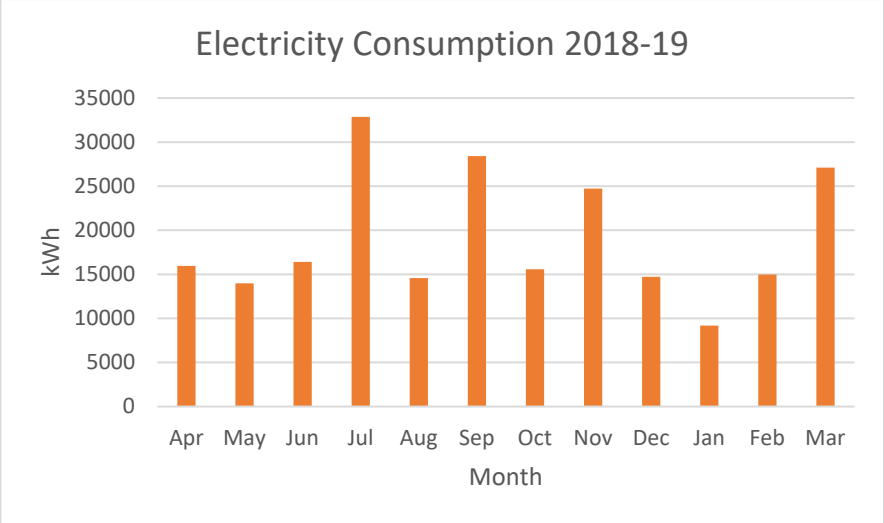
Sl No	Consumer No	Connected Load (kW)
1	1155405000093	**11**
2	1155407000973	**5**
3	1155409000091	**6**
4	1155406000092	**88**
5	1155402007878	**9**
6	1155407000095	**5**

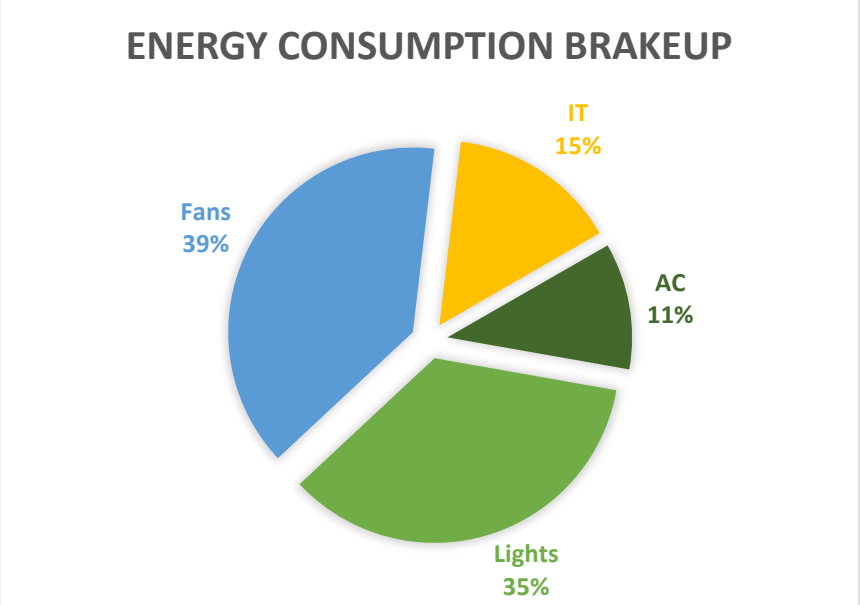
As mentioned above there are six LT connections in use. These connections cater electrical supply to the entire campuses. The audit boundaries of Maharajas uses electricity from these connections.

Electricity Bill Analysis

Maharajas College Ernakulam												
Electricity Bill Analysis 2018-19												
CL(kW)	**11**		**5**		**6**		**88**		**9**		**5**	
Con No	93		973		91		92		7878		95	
Month	kWh	Rs	kWh	Rs	kWh	Rs	kWh	Rs	kWh	Rs	kWh	Rs
Apr	157	1530	3879	19465	1023	7405	8940	66370	1706	12288	256	1810
May	194	1592	1837	12620	1963	12271	7690	55298	1706	28660	587	3816
Jun	194	1760			2157	1571	7690	57710	3412	477	587	4336
Jul	647	2160	4331	17828	1713	12186	24340	69977	1245	9088	587	4344
Aug	194	1737	1444	10392	1925	13822	7698	58362	1706	12436	1603	2199
Sep	489	2393	3333	14638	2332	16829	18540	81133	3338	12032	384	442
Oct	232	2024	1696	12264	2274	16418	9150	69199	1827	12294	400	2748
Nov	247	2117	1724	12474	2164	15639	18960	138655	1222	9120	401	2754
Dec	220	1950	1230	8977	1682	12227	8940	67713	764	8408	1886	11136
Jan	175	1650	1800	12763	2212	15676	1470	14761	2730	15983	798	5606
Feb	235	2010	1592	11310	1750	12457	8940	66382	1950	16002	506	3779
Mar	333	1178	4230	12549	1602	11420	17580	64294	2730	21406	623	4586

The historical electricity consumption for the year 2018-19 are given above. The campus consumed 228478 units of electricity during this period.





b. Thermal Energy

LPG

LPG is used in Kitchen and labs. The annual consumption of LPG is given below.

LPG Consumption (2018-19)	
Particulars	Remarks
No of 18kg Cylinders per month	18
Total LPG Consumption (kg)/yr	324

Biomass

Biomass is used for cooking in the kitchen. The details of consumption in given below.

Biomass Consumption (2018-19)	
Biomass (Ton/Yr)	20

c. Energy Performance Index (EPI)

OTTOTRACTIONS- ENERGY AUDIT		
Energy Performance Index		
	Particulars	Remarks
1	Total Building area(m^2)	20000
2	Total air-conditioned area(m^2)	1000
3	Total air conditioned area %	5%
4	Annual Electricity Consumption (kWh)	228478
8	Annual LPG Consumption in kg	324
9	Annual LPG Consumption in kCal	3888000
10	Annual LPG Consumption in kWh	4521
11	Annual Biomass Consumption in MT	20
12	Annual Biogas Consumption in kCal	50000000
13	Annual Biogas Consumption in kWh	58140
14	Total Energy Consumption (kWh)	291138
15	**Specific Energy Consumption kWh/m^2**	**14.56**

3.2. Waste Generation

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of the campus after the consumption of meals. The degradable waste can be treated in the biogas plant , the biogas generated may be used in the kitchen. A new biogas plant is under commissioning during the audit. There are separate bins provided for segregated waste.

Degradable Waste

Degradable Waste Generation (2018-19)	
Particulars	Remarks
Waste generated in kg per day	7
Waste generated in kg per Yr	1540

Non-Degradable waste

Solid non degradable Waste Generation (2018-19	
Particulars	Maharajas
Non degradable Waste generated per day	1.5
Waste generated in kg per Yr	330

Carbon Emission Profile (2018-19)

Carbon emissions in the campus due to the day to day activities are calculated and is discussed below. The emission factors considered for estimation and its units are given.

Emission Factors		
item	Factor	Unit
LPG	0.0031	tCo2e/kg
Electricity	0.00082	tCo2e/kWh
Diesel	0.0032	tCo2e/kg
Food Waste	0.00063	tCo2e/kg
Paper Waste	0.00056	tCo2e/kg
Plastic Waste	0.00034	tCo2e/kg

Carbon Foot Print			
Sl No	Particulars	Maharajas	Tonne of CO2e
1	Annual Electricity Consumption (kWh)	228478	187.35
2	Annual LPG Consumption in kg	324	1.00
3	Annual Biomass Consumption in MT	20	12.92
4	Food Waste (kg/yr)	1540	0.97
5	Paper Waste (kg/yr)	304	0.17
6	Plastic Waste (kg/yr)	26	0.01
5	Total Carbon Foot Print tCO_2e/yr		202.42

3.4. CARBON SEQUESTRATION

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table 3.18. Detailed table is included in the technical supplement.

No of Trees	188
Total CO2 Mitigated	98.62218

Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree

- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Carbon sequestrated by each species of trees in the campus compound is given in the Table.3.19 Detailed calculation results are listed out in the tables provided in the technical supplements of 'Carbon sequestration'.

Details of the trees having diameter more than 15cm and having heights above 150cm from ground level

Sl. No	Name of tree (common name/ scientific name)	stem diameter (cm)	height of trees(m)	no.of similar trees	total carbon sequestrated	average age (years)
1	*Hymenodictyon orixense*	16.23	6	1	0.0131	20
2	*Premna sp*	17.83	3	1	0.0079	22
3	*Syzygium jambos*	35.01	6	1	0.0609	44
4		14.64	5	1	0.0089	18
5		8.28	6	1	0.0034	10
6	*Ardisia solanacea*	14.64	1	1	0.0018	18
7	*Cassia fistula*	27.69	3	1	0.0190	34
8		16.23	4	1	0.0087	20
9	*Couropita guianensis*	100.27	9	1	0.7489	126
10	*Lagerstroemia speciosa*	44.25	5	1	0.0810	55
11		23.87	6	1	0.0283	30
12		35.33	4	1	0.0413	44
13		35.65	7	1	0.0736	45
14		52.52	8	1	0.1827	66
15		93.90	9	1	0.6569	118
16		61.75	7	1	0.2209	77
17		40.74	4	1	0.0550	51
18		27.06	6	1	0.0364	34

19	*Ficus benghalensis*	91.35	15	1	1.0362	75
20		18.78	13	1	0.0380	23
21		55.07	18	1	0.4518	70
22		19.42	14	1	0.0437	24
23		48.06	18	1	0.3442	60
24		226.64	20	1	8.5030	284
25	*Chrysophyllum cainito*	21.65	8	1	0.0310	27
26		11.46	9	1	0.0098	14
27		47.11	6	1	0.1102	60
28		35.01	5	1	0.0507	44
29	*Samanea saman*	241.92	24	1	11.6258	304
30		103.77	23	1	2.0500	130
31		168.70	25	1	5.8895	212
32		61.12	19	1	0.5874	76
33		218.36	19	1	7.4987	274
34	*Artocarpus hirsutus*	78.94	30	1	1.5474	99
35		8.91	17	1	0.0112	11
36		38.52	19	1	0.2333	48
37		36.29	18	1	0.1962	45
38		19.10	18	1	0.0543	24
39		26.74	18	1	0.1065	33
40		8.28	18	1	0.0102	10
41	*Tamarindus indica*	120.32	15	1	1.7975	151
42		32.15	14	1	0.1198	40
43		38.52	15	1	0.1842	48
44	*Mangifera indica*	19.42	10	1	0.0312	24
45		15.28	13	1	0.0251	19
46		18.46	14	1	0.0395	23
47		11.46	15	1	0.0163	14
48		112.05	15	1	1.5587	140
49		10.19	15	1	0.0129	12
50		16.87	16	1	0.0377	21
51		27.37	14	1	0.0868	34
52	*Leucaena leucocephala*	18.78	2	1	0.0058	23
53	*Swietenia mahagoni*	79.58	6	1	0.3145	100
54		119.05	7	1	0.8212	149
55		76.08	5	1	0.2395	95
56		27.06	7	1	0.0424	34
57		70.98	9	1	0.3753	89
58		83.72	8	1	0.4641	105
59		77.67	14	1	0.6990	97
60		5.73	4	1	0.0011	7
61		91.67	15	1	1.0434	115
62		90.40	18	1	1.2176	113
63		64.94	15	1	0.5235	81

64		71.30	16	1	0.6733	89
65		52.52	15	1	0.3425	66
66		117.14	16	1	1.8172	147
67	*Peltophorum pterocarpum*	40.74	15	1	0.2061	51
68		85.94	16	1	0.9782	108
69		71.30	17	1	0.7154	89
70		92.63	15	1	1.0653	116
71		54.11	16	1	0.3878	68
72		21.65	17	1	0.0659	27
73		57.30	20	1	0.5434	7
74		73.21	17	1	0.7542	92
75		35.97	17	1	0.1820	45
76		66.85	17	1	0.6287	84
77		73.85	17	1	0.7674	92
78		27.37	17	1	0.1054	34
79		43.93	17	1	0.2715	55
80		71.94	17	1	0.7282	90
81		98.68	17	1	1.3701	124
82		18.78	17	1	0.0496	23
83		42.97	17	1	0.2598	54
84		33.42	17	1	0.1572	42
85		40.11	17	1	0.2263	50
86		43.93	17	1	0.2715	55
87		66.85	17	1	0.6287	84
88		24.83	17	1	0.0867	31
89	*Caryota urens*	44.25	7	1	0.1134	55
90		31.19	6	1	0.0483	39
91		33.74	8	1	0.0754	42
92		28.01	7	1	0.0455	35
93		37.88	9	1	0.1069	47
94		36.61	6	1	0.0665	46
95		44.25	10	1	0.1620	55
96	*Ficus religiosa*	125.73	10	1	1.3085	158
97	*Adenanthera pavonia*	35.01	8	1	0.0812	44
98		7.64	9	1	0.0043	9
99		38.20	7	1	0.0845	48
100		29.92	8	1	0.0593	37
101		12.41	8	1	0.0102	15
102		8.59	8	1	0.0049	11
103		12.10	8	1	0.0097	15
104		62.07	7	1	0.2232	78
105	*Cocos nucifera*	59.21	25	1	0.7254	74
106		30.56	22	1	0.1700	38
107	*Vitex negundo*	18.46	3	1	0.0085	23
108		14.64	3	1	0.0053	18

109		28.97	3	1	0.0208	36
110	*Azadiracta indica*	16.55	14	1	0.0317	20
111		14.01	14	1	0.0227	17
112		8.28	14	1	0.0079	10
113		14.64	14	1	0.0248	18
114	*Neolamarckia cadamba*	19.74	20	1	0.0645	24
115		61.12	25	1	0.7729	76
116	*Averrhhoa bilimbi*	14.01	5	1	0.0081	17
117	*Kleinhovia hospita*	26.74	13	1	0.0769	33
118		66.85	19	1	0.7027	84
119		126.69	20	1	2.6569	159
120	*Morus alba*	25.78	1	1	0.0055	32
121	*Phyllanthus emblica*	12.10	5	1	0.0061	15
122		12.73	4	1	0.0054	16
123	*Delonix regia*	40.74	10	1	0.1374	51
124		66.85	9	1	0.3329	84
125		45.52	11	1	0.1886	57
126		57.30	13	1	0.3532	72
127		23.24	12	1	0.0536	29
128	*Spathodea campanulata*	19.74	13	1	0.0419	24
129		59.84	13	1	0.3853	75
130		48.70	13	1	0.2552	61
131		31.19	13	1	0.1047	39
132		85.31	15	1	0.9035	107
133		54.11	13	1	0.3151	68
134	*Terminalia catappa*	19.74	15	1	0.0484	24
135		54.11	15	1	0.3636	68
136		85.31	15	1	0.9035	107
137		48.70	15	1	0.2945	61
138		78.94	15	1	0.7737	99
139		13.69	15	1	0.0233	17
140		66.85	15	1	0.5548	84
141		41.06	15	1	0.2093	51
142		39.79	15	1	0.1966	50
143	*Mimusops elengi*	42.97	8	1	0.1223	54
144		35.65	9	1	0.0947	44
145		55.70	9	1	0.2312	70
146		52.52	9	1	0.2055	66
147		41.06	9	1	0.1256	51
148	*Elaeis guineensis*	98.68	9	1	0.7254	124
149		42.65	10	1	0.1506	53
150		35.01	11	1	0.1116	44
151		58.25	15	1	0.4213	73
152		58.89	11	1	0.3157	74
153		70.98	11	1	0.4588	89

154		35.01	11	1	0.1116	44
155		40.11	11	1	0.1465	50
156	*Casuarina equisetifolia*	123.50	35	1	4.4189	155
157		69.39	30	1	1.1957	87
158		57.30	30	1	0.8152	72
159		62.07	30	1	0.9567	78
160		54.11	30	1	0.7271	68
161		39.79	30	1	0.3931	50
162	*Carissa carandas*	59.52	1	1	0.0293	74
163	*Licuala grandis*	51.57	5	1	0.1100	54
164		24.83	5	1	0.0255	31
165	*Tecoma stans*	6.05	5	1	0.0015	7
166	*Caesalpinia coriaria*	85.94	9	1	0.5502	108
167		42.97	8	1	0.1223	54
168	*Ravenala madagascariensis*	31.19	3	1	0.0242	39
169		32.15	3	1	0.0257	40
170		33.42	3	1	0.0277	42
171		28.01	3	1	0.0195	34
172		35.33	3	1	0.0310	44
173		30.56	3	1	0.0232	38
174	*Pongamia pinnata*	133.69	20	1	2.9588	168
175		22.28	17	1	0.0699	28
176	*Polyalthia longifolia*	18.46	10	1	0.0282	23
177	*Bauhinia purpurea*	18.14	9	1	0.0245	22
178		7.96	9	1	0.0047	10
179		21.33	9	1	0.0339	26
180		15.28	9	1	0.0174	19
181		23.87	9	1	0.0425	30
182	*Acacia mangium*	48.06	6	1	0.1147	60
183	*Ficus mysorensis*	155.97	13	1	2.6177	196
184	*Plumeria rubra*	14.96	5	1	0.0093	18
185	*Tectona grandis*	40.74	5	1	0.0687	51
186	*Elaeocarpus serratus*	15.28	5	1	0.0097	19
187		12.73	5	1	0.0067	16
188	*Alstonia scholaris*	54.11	5	1	0.1212	68
	Total CO2 Mitigated				98.6221779	

3.5. Solar Power Plant

During 2018-19 two solar power plants (20kWp and 50kWp) were installed and a detailed analysis of its yield is done during audit. It is observed that the average generation is 3.50 kWh per kW of solar power plant installed. So, it may be estimated that in 2019-20 the total generation of solar will be around 280.59 tCO_2e.

CO_2 Mitigated through Solar Power Plant Installed during 2018-19	
Capacity of Solar power plant kWp	70
Solar average generation (kWh/kW)	3.5
Solar generation during 2018-19 (mWh)	89.425
Total Carbon mitigated is tCO_2/yr	74.223

3.6. CARBON FOOTPRINT OF THE CAMPUS (2018-19)

Various carbon emitting activities such as consumption of energy, transportation and waste management leads to the total emission of **202.42 tCO_2e** per year by the campus. The total carbon sequestration by trees in the campus compound is **98.62 tCO_2e**. The mitigation through renewable energy is (biomass and solar) is 87.14 tCO_2e/yr.

Thus, the current carbon footprint of the campus will be the difference of total carbon emission and total carbon sequestration/mitigation. the following table shows the carbon footprint level of 2018-19.

tCO_2e to be mitigated for carbon neutral campus			
Amount of carbon emission tCO2e	Amount of carbon sequestration tCO2e	Amount of carbon mitigated through renewable energy tCO2e	To be mitigated tCO2e
202.42	98.62	87.14	16.66

To make the campuses carbon neutral, 16.66 tCO2e has to be mitigated after considering the performance of solar power plant installed in the campus.

Specific CO2 Footprint

Specific Carbon Emission (2018-19)		
1	Total Carbon Foot Print tCO_2e/yr (both campuses)	202.42
2	Carbon Sequestrated tCO_2e/yr	98.62
3	Carbon mitigated tCO_2e/yr	87.14
4	Effective Carbon footprint tCO_2e/yr	16.66
5	Total No of Students	2446
6	Specific Carbon Footprint kg CO_2e/Student/Yr	6.81

The total specific carbon emission is estimated **as 6.81 kg of CO2e per student** for the year 2018-19.

4

Carbon Mitigation Plans

The total emission of the carbon dioxide per student is 248.52 kg per year. Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus. A renewable energy project is already implemented, ie. 250kWp solar power plant which mitigates 280.59 tCO2e in the current year. So the effective specific carbon emission per student is 38.02 kg of CO2 per year only

This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimisation
- Energy efficiency
- Renewable energy

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilisation of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Currently, Maharajas is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimisation can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus can install a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

Renewable Energy

Biogas plants and solar power plants are installed in the campus which helps offsetting the carbon foot print. The details of these projects are given in the concerned chapters.

Carbon Mitigation Plans

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT						
Consolidated Statement of Energy Efficiency Projects						
Maharajas College Ernakulam						
Sl No	Projects	Investment	Cost saving	SPB	Energy saved	
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr	toe/Yr
1	Energy Saving in Lighting by replacing existing 57 No's T5 Lamps to 18W LED Tube in Controller Office	0.257	0.089	34.44	1277	0.11
2	Energy Saving in Lighting by replacing existing 6 No's 60W ICL Lamp to 9W LED Bulb in Controller Office	0.007	0.034	2.52	490	0.04

3	Energy Saving by replacing existing 41 No's in-efficient ceiling fans with Energy Efficient Five star fans in Controller Office	0.615	0.121	61.22	1722	0.15
4	Energy Saving in Split AC's by replacing existing in-efficent 2 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's in Controller Office	1.050	0.129	97.66	1843	0.16
5	Energy Saving in Lighting by replacing existing 58 No's T5 Lamps to 18W LED Tube in Arabic Department	0.261	0.091	34.44	1299	0.11
6	Energy Saving by replacing existing 35 No's in-efficient ceiling fans with Energy Efficient Five star fans in Arabic Department	0.525	0.103	61.22	1470	0.13
7	Energy Saving in Lighting by replacing existing 69 No's T5 Lamps to 18W LED Tube in Hindi Department	0.311	0.108	34.44	1546	0.13
8	Energy Saving by replacing existing 33 No's in-efficient ceiling fans with Energy Efficient Five star fans in Hindi Department	0.495	0.097	61.22	1386	0.12
9	Energy Saving in Lighting by replacing existing 5 No's 15W CFL Lamp to 9W LED Bulb in English Department	0.005	0.003	16.07	48	0.00
10	Energy Saving in Lighting by replacing existing 74 No's T5 Lamps to 18W LED Tube in English Department	0.333	0.116	34.44	1658	0.14
11	Energy Saving by replacing existing 42 No's in-efficient ceiling fans with Energy Efficient Five star fans in English Department	0.630	0.123	61.22	1764	0.15

12	Energy Saving in Lighting by replacing existing 12 No's T12 Lamps to 18W LED Tube in Malayalam Department	0.054	0.050	13.08	708	0.06
13	Energy Saving in Lighting by replacing existing 53 No's T5 Lamps to 18W LED Tube in Malayalam Department	0.239	0.083	34.44	1187	0.10
14	Energy Saving in Lighting by replacing existing 4 No's T8 Lamps to 18W LED Tube Malayalam Department	0.018	0.010	21.92	141	0.01
15	Energy Saving by replacing existing 42 No's in-efficient ceiling fans with Energy Efficient Five star fans in Malayalam Department	0.630	0.123	61.22	1764	0.15
16	Energy Saving in Lighting by replacing existing 37 No's T5 Lamps to 18W LED Tube in Sanskrit Department	0.167	0.058	34.44	829	0.07
17	Energy Saving by replacing existing 22 No's in-efficient ceiling fans with Energy Efficient Five star fans in Sanskrit Department	0.330	0.065	61.22	924	0.08
18	Energy Saving in Lighting by replacing existing 41 No's T5 Lamps to 18W LED Tube in Environmental Chemistry	0.185	0.064	34.44	918	0.08
19	Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Environmental Chemistry	0.004	0.017	2.52	245	0.02
20	Energy Saving by replacing existing 28 No's in-efficient ceiling fans with Energy Efficient Five star fans in Environmental Chemistry	0.420	0.082	61.22	1176	0.10

21	Energy Saving in Lighting by replacing existing 176 No's T5 Lamps to 18W LED Tube in Botany Department	0.792	0.276	34.44	3942	0.34
22	Energy Saving by replacing existing 61 No's in-efficient ceiling fans with Energy Efficient Five star fans in Botany Department	0.915	0.179	61.22	2562	0.22
23	Energy Saving in Split AC's by replacing existing in-efficient 3 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's Botany Department	1.575	0.194	97.66	2765	0.24
24	Energy Saving in Lighting by replacing existing 226 No's T12 Lamps to 18W LED Tube in Chemistry Department	1.017	0.933	13.08	13325	1.15
25	Energy Saving in Lighting by replacing existing 8 No's T8 Lamps to 18W LED Tube Chemistry Department	0.036	0.020	21.92	282	0.02
26	Energy Saving in Lighting by replacing existing 4 No's 60W ICL Lamp to 9W LED Bulb in Chemistry Department	0.005	0.023	2.52	326	0.03
27	Energy Saving by replacing existing 3 No's in-efficient ceiling fans with Energy Efficient Five star fans in Chemistry Department	0.045	0.009	61.22	126	0.01
28	Energy Saving in Lighting by replacing existing 135 No's T5 Lamps to 18W LED Tube in Physics Department	0.608	0.212	34.44	3024	0.26
29	Energy Saving in Lighting by replacing existing 4 No's 60W ICL Lamp to 9W LED Bulb in Physics Department	0.005	0.023	2.52	326	0.03

30	Energy Saving by replacing existing 57 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physics Department	0.855	0.168	61.22	2394	0.21
31	Energy Saving in Split AC's by replacing existing in-efficient 3 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's in Physics Department	1.575	0.194	97.66	2765	0.24
32	Energy Saving in Lighting by replacing existing 115 No's T5 Lamps to 18W LED Tube in Mathematics Department	0.518	0.180	34.44	2576	0.22
33	Energy Saving by replacing existing 51 No's in-efficient ceiling fans with Energy Efficient Five star fans in Mathematics Department	0.765	0.150	61.22	2142	0.18
34	Energy Saving in Lighting by replacing existing 44 No's T5 Lamps to 18W LED Tube in Physics Instrumentation	0.198	0.069	34.44	986	0.08
35	Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Physics Instrumentation	0.004	0.017	2.52	245	0.02
36	Energy Saving by replacing existing 24 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physics Instrumentation	0.360	0.071	61.22	1008	0.09
37	Energy Saving in Lighting by replacing existing 73 No's T5 Lamps to 18W LED Tube in Commerce Department	0.329	0.114	34.44	1635	0.14
38	Energy Saving by replacing existing 38 No's in-efficient ceiling fans with Energy Efficient Five star fans in Commerce Department	0.570	0.112	61.22	1596	0.14

39	Energy Saving in Lighting by replacing existing 60 No's T5 Lamps to 18W LED Tube in Philosophy Department	0.270	0.094	34.44	1344	0.12
40	Energy Saving by replacing existing 30 No's in-efficient ceiling fans with Energy Efficient Five star fans in Philosophy Department	0.450	0.088	61.22	1260	0.11
41	Energy Saving in Lighting by replacing existing 72 No's T5 Lamps to 18W LED Tube in History Department	0.324	0.113	34.44	1613	0.14
42	Energy Saving by replacing existing 30 No's in-efficient ceiling fans with Energy Efficient Five star fans in History Department	0.450	0.088	61.22	1260	0.11
43	Energy Saving in Lighting by replacing existing 80 No's T5 Lamps to 18W LED Tube in Economics Honours	0.360	0.125	34.44	1792	0.15
44	Energy Saving by replacing existing 54 No's in-efficient ceiling fans with Energy Efficient Five star fans in Economics Honours	0.810	0.159	61.22	2268	0.20
45	Energy Saving in Lighting by replacing existing 24 No's T12 Lamps to 18W LED Tube in Islamic History Department	0.108	0.099	13.08	1415	0.12
46	Energy Saving in Lighting by replacing existing 26 No's T5 Lamps to 18W LED Tube in Islamic History Department	0.117	0.041	34.44	582	0.05
47	Energy Saving by replacing existing 34 No's in-efficient ceiling fans with Energy Efficient Five star fans in Islamic History Department	0.510	0.100	61.22	1428	0.12

48	Energy Saving in Lighting by replacing existing 54 No's T5 Lamps to 18W LED Tube in Islamic Political Science Department	0.243	0.085	34.44	1210	0.10
49	Energy Saving by replacing existing 26 No's in-efficient ceiling fans with Energy Efficient Five star fans in Political Science Department	0.390	0.076	61.22	1092	0.09
50	Energy Saving in Lighting by replacing existing 30 No's T5 Lamps to 18W LED Tube in Music Department	0.135	0.047	34.44	672	0.06
51	Energy Saving by replacing existing 11 No's in-efficient ceiling fans with Energy Efficient Five star fans in Music Department	0.165	0.032	61.22	462	0.04
52	Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Music Department	0.004	0.017	2.52	245	0.02
53	Energy Saving in Lighting by replacing existing 13 No's T5 Lamps to 18W LED Tube in Co-operative Society	0.059	0.020	34.44	291	0.03
54	Energy Saving by replacing existing 4 No's in-efficient ceiling fans with Energy Efficient Five star fans in Co-operative Society	0.060	0.012	61.22	168	0.01
55	Energy Saving in Lighting by replacing existing 67 No's T5 Lamps to 18W LED Tube in General Library	0.302	0.105	34.44	1501	0.13
56	Energy Saving by replacing existing 33 No's in-efficient ceiling fans with Energy Efficient Five star fans in General Library	0.495	0.097	61.22	1386	0.12

57	Energy Saving in Lighting by replacing existing 4 No's 15W CFL Lamp to 9W LED Bulb in Auditorium	0.004	0.003	16.07	38	0.00
58	Energy Saving in Lighting by replacing existing 32 No's T5 Lamps to 18W LED Tube in Auditorium	0.144	0.050	34.44	717	0.06
59	Energy Saving by replacing existing 23 No's in-efficient ceiling fans with Energy Efficient Five star fans in Auditorium	0.345	0.068	61.22	966	0.08
60	Energy Saving in Lighting by replacing existing 55 No's T5 Lamps to 18W LED Tube in Economics Model 1	0.248	0.086	34.44	1232	0.11
61	Energy Saving by replacing existing 25 No's in-efficient ceiling fans with Energy Efficient Five star fans in Economics Model 1	0.375	0.074	61.22	1050	0.09
62	Energy Saving in Lighting by replacing existing 25 No's T5 Lamps to 18W LED Tube in Office Room	0.113	0.039	34.44	560	0.05
63	Energy Saving by replacing existing 12 No's in-efficient ceiling fans with Energy Efficient Five star fans in Office Room	0.180	0.035	61.22	504	0.04
64	Energy Saving in Lighting by replacing existing 8 No's T5 Lamps to 18W LED Tube in Principal Room	0.036	0.013	34.44	179	0.02
65	Energy Saving by replacing existing 2 No's in-efficient ceiling fans with Energy Efficient Five star fans in Principal Room	0.030	0.006	61.22	84	0.01
66	Energy Saving in Split AC's by replacing existing in-efficient 1 1.5TR AC with Energy Efficient Five star labelled or Inverter type AC in Principal Room	0.525	0.065	97.66	922	0.08

67	Energy Saving in Lighting by replacing existing 38 No's T5 Lamps to 18W LED Tube in Language Library	0.171	0.060	34.44	851	0.07
68	Energy Saving by replacing existing 9 No's in-efficient ceiling fans with Energy Efficient Five star fans in Language Library	0.135	0.026	61.22	378	0.03
69	Energy Saving in Split AC's by replacing existing in-efficient 1 1.5TR AC with Energy Efficient Five star labelled or Inverter type AC in Language Library	0.525	0.065	97.66	922	0.08
70	Energy Saving in Lighting by replacing existing 5 No's T5 Lamps to 18W LED Tube in Ladies Toilet	0.023	0.008	34.44	112	0.01
71	Energy Saving by replacing existing 2 No's in-efficient ceiling fans with Energy Efficient Five star fans in Ladies Toilet	0.030	0.006	61.22	84	0.01
72	Energy Saving in Lighting by replacing existing 12 No's T5 Lamps to 18W LED Tube in Physical Education Department	0.054	0.019	34.44	269	0.02
73	Energy Saving by replacing existing 3 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physical Education Department	0.045	0.009	61.22	126	0.01
74	Energy Saving in Lighting by replacing existing 81 No's T5 Lamps to 18W LED Tube in Staff Quarters	0.365	0.127	34.44	1814	0.16
75	Energy Saving by replacing existing 52 No's in-efficient ceiling fans with Energy Efficient Five star fans in Staff Quarters	0.780	0.153	61.22	2184	0.19
	Total	**26.079**	**6.818**	**44.78**	**97399**	**8.38**

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.01	
Energy Saving in Lighting by replacing existing 57 No's T5 Lamps to 18W LED Tube in Controller Office	
Existing Scenario	
57 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	57
Total load (kW)	2.28
Annual Energy Consumption (kWh)	3648
Expected Annual Energy saving for replacing all fittings (kWh)	1277
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.089
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.26
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.02	
Energy Saving in Lighting by replacing existing 6 No's 60W ICL Lamp to 9W LED Bulb in Controller Office	
Existing Scenario	
6 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	6
Total load (kW)	0.36
Annual Energy Consumption (kWh)	576
Expected Annual Energy saving for replacing all fittings (kWh)	490
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.01
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.03	
Energy Saving by replacing existing 41 No's in-efficient ceiling fans with Energy Efficient Five star fans in Controller Office	
Existing Scenario	
There are 41 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	41
Total load (kW)	2.87
Annual Energy Consumption (kWh)	5740
Expected Annual Energy saving, for total replacement(kWh)	1722
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.12
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.62
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.04	
Energy Saving in Split AC's by replacing existing in-efficient 2 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's in Controller Office	
Existing Scenario	
There are 2 numbers of 1.5TR Split AC's with 3 star rating are installed in the facility with minimum 8 hrs operation in a day. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replacing the existing Split AC's with five star labelled Inverter Type Split AC's. The five star labelled Inverter type AC's give a savings up to 36% with higher Energy Efficiency Ratio (EER, W/W).	
Financial Analysis	
Annual working hours (hrs)	2000
Total number of AC's installed	2
Total load (kW)	3.20
Annual Energy Consumption (kWh)	5120
Expected Annual Energy saving, for total replacement(kWh)	1843
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.13
Investment required for total replacement (Lakhs Rs)[@35000 Rs per tonnage for five star labelled Inverter type AC]	1.05
Simple Pay Back (in Months)	97.66

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.05	
Energy Saving in Lighting by replacing existing 58 No's T5 Lamps to 18W LED Tube in Arabic Department	
Existing Scenario	
58 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	58
Total load (kW)	2.32
Annual Energy Consumption (kWh)	3712
Expected Annual Energy saving for replacing all fittings (kWh)	1299
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.091
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.26
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.06	
Energy Saving by replacing existing 35 No's in-efficient ceiling fans with Energy Efficient Five star fans in Arabic Department	
Existing Scenario	
There are 35 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	35
Total load (kW)	2.45
Annual Energy Consumption (kWh)	4900
Expected Annual Energy saving, for total replacement(kWh)	1470
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.10
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.53
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.07	
Energy Saving in Lighting by replacing existing 69 No's T5 Lamps to 18W LED Tube in Hindi Department	
Existing Scenario	
69 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	69
Total load (kW)	2.76
Annual Energy Consumption (kWh)	4416
Expected Annual Energy saving for replacing all fittings (kWh)	1546
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.108
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.31
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.08	
Energy Saving by replacing existing 33 No's in-efficient ceiling fans with Energy Efficient Five star fans in Hindi Department	
Existing Scenario	
There are 33 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	33
Total load (kW)	2.31
Annual Energy Consumption (kWh)	4620
Expected Annual Energy saving, for total replacement(kWh)	1386
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.10
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.50
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.09	
Energy Saving in Lighting by replacing existing 5 No's 15W CFL Lamp to 9W LED Bulb in English Department	
Existing Scenario	
5 numbers of 15W CFL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing CFL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	5
Total load (kW)	0.08
Annual Energy Consumption (kWh)	120
Expected Annual Energy saving for replacing all fittings (kWh)	48
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.00
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	16.07

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code EA 559.10	
Energy Saving in Lighting by replacing existing 74 No's T5 Lamps to 18W LED Tube in English Department	
Existing Scenario	
74 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	74
Total load (kW)	2.96
Annual Energy Consumption (kWh)	4736
Expected Annual Energy saving for replacing all fittings (kWh)	1658
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.116
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.33
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.11	
Energy Saving by replacing existing 42 No's in-efficient ceiling fans with Energy Efficient Five star fans in English Department	
Existing Scenario	
There are 42 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	42
Total load (kW)	2.94
Annual Energy Consumption (kWh)	5880
Expected Annual Energy saving, for total replacement(kWh)	1764
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.12
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.63
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.12	
Energy Saving in Lighting by replacing existing 12 No's T12 Lamps to 18W LED Tube in Malayalam Department	
Existing Scenario	
12 numbers of T12 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T12 may be replaced to LED tube of 18 W in phased manner and the savings will be of 67 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	12
Total load (kW)	0.66
Annual Energy Consumption (kWh)	1056
Expected Annual Energy saving for replacing all fittings (kWh)	708
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.05
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.05
Simple Pay Back (in Months)	13.08

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.13	
Energy Saving in Lighting by replacing existing 53 No's T5 Lamps to 18W LED Tube in Malayalam Department	
Existing Scenario	
53 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	53
Total load (kW)	2.12
Annual Energy Consumption (kWh)	3392
Expected Annual Energy saving for replacing all fittings (kWh)	1187
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.083
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.24
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.14	
Energy Saving in Lighting by replacing existing 4 No's T8 Lamps to 18W LED Tube Malayalam Department	
Existing Scenario	
4 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T8 may be replaced to LED tube of 18 W in phased manner and the savings will be of 55 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	4
Total load (kW)	0.16
Annual Energy Consumption (kWh)	256
Expected Annual Energy saving for replacing all fittings (kWh)	141
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.02
Simple Pay Back (in Months)	21.92

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.15	
Energy Saving by replacing existing 42 No's in-efficient ceiling fans with Energy Efficient Five star fans in Malayalam Department	
Existing Scenario	
There are 42 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	42
Total load (kW)	2.94
Annual Energy Consumption (kWh)	5880
Expected Annual Energy saving, for total replacement(kWh)	1764
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.12
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.63
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.16	
Energy Saving in Lighting by replacing existing 37 No's T5 Lamps to 18W LED Tube in Sanskrit Department	
Existing Scenario	
37 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	37
Total load (kW)	1.48
Annual Energy Consumption (kWh)	2368
Expected Annual Energy saving for replacing all fittings (kWh)	829
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.058
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.17
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.17	
Energy Saving by replacing existing 22 No's in-efficient ceiling fans with Energy Efficient Five star fans in Sanskrit Department	
Existing Scenario	
There are 22 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	22
Total load (kW)	1.54
Annual Energy Consumption (kWh)	3080
Expected Annual Energy saving, for total replacement(kWh)	924
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.06
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.33
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.18	
Energy Saving in Lighting by replacing existing 41 No's T5 Lamps to 18W LED Tube in Environmental Chemistry	
Existing Scenario	
41 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	41
Total load (kW)	1.64
Annual Energy Consumption (kWh)	2624
Expected Annual Energy saving for replacing all fittings (kWh)	918
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.064
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.18
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.19	
Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Environmental Chemistry	
Existing Scenario	
3 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	3
Total load (kW)	0.18
Annual Energy Consumption (kWh)	288
Expected Annual Energy saving for replacing all fittings (kWh)	245
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.20	
Energy Saving by replacing existing 28 No's in-efficient ceiling fans with Energy Efficient Five star fans in Environmental Chemistry	
Existing Scenario	
There are 28 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation.During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	28
Total load (kW)	1.96
Annual Energy Consumption (kWh)	3920
Expected Annual Energy saving, for total replacement(kWh)	1176
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.08
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.42
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.21	
Energy Saving in Lighting by replacing existing 176 No's T5 Lamps to 18W LED Tube in Botany Department	
Existing Scenario	
176 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	176
Total load (kW)	7.04
Annual Energy Consumption (kWh)	11264
Expected Annual Energy saving for replacing all fittings (kWh)	3942
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.276
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.79
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.22	
Energy Saving by replacing existing 61 No's in-efficient ceiling fans with Energy Efficient Five star fans in Botany Department	
Existing Scenario	
There are 61 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	61
Total load (kW)	4.27
Annual Energy Consumption (kWh)	8540
Expected Annual Energy saving, for total replacement(kWh)	2562
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.18
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.92
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.23	
Energy Saving in Split AC's by replacing existing in-efficient 3 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's Botany Department	
Existing Scenario	
There are 3 numbers of 1.5TR Split AC's with 3 star rating are installed in the facilty with minimum 8 hrs operation in a day. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replacing the existing Split AC's with five star labelled Inverter type Split AC's. The five star labelled Inverter type AC's give a savings up to 36% with higher Energy Efficiency Ratio (EER, W/W).	
Financial Analysis	
Annual working hours (hrs)	2000
Total number of AC's installed	3
Total load (kW)	4.80
Annual Energy Consumption (kWh)	7680
Expected Annual Energy saving, for total replacement(kWh)	2765
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.19
Investment required for total replacement (Lakhs Rs)[@35000 Rs per tonnage for five star labelled Inverter type AC]	1.58
Simple Pay Back (in Months)	97.66

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.24	
Energy Saving in Lighting by replacing existing 226 No's T12 Lamps to 18W LED Tube in Chemistry Department	
Existing Scenario	
226 numbers of T12 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T12 may be replaced to LED tube of 18 W in phased manner and the savings will be of 67 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	226
Total load (kW)	12.43
Annual Energy Consumption (kWh)	19888
Expected Annual Energy saving for replacing all fittings (kWh)	13325
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.93
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	1.02
Simple Pay Back (in Months)	13.08

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.25	
Energy Saving in Lighting by replacing existing 8 No's T8 Lamps to 18W LED Tube Chemisrty Department	
Existing Scenario	
8 numbers of T8 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T8 may be replaced to LED tube of 18 W in phased manner and the savings will be of 55 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	8
Total load (kW)	0.32
Annual Energy Consumption (kWh)	512
Expected Annual Energy saving for replacing all fittings (kWh)	282
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.04
Simple Pay Back (in Months)	21.92

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.26	
Energy Saving in Lighting by replacing existing 4 No's 60W ICL Lamp to 9W LED Bulb in Chemistry Department	
Existing Scenario	
4 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	4
Total load (kW)	0.24
Annual Energy Consumption (kWh)	384
Expected Annual Energy saving for replacing all fittings (kWh)	326
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.27	
Energy Saving by replacing existing 3 No's in-efficient ceiling fans with Energy Efficient Five star fans in Chemisrty Department	
Existing Scenario	
There are 3 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	3
Total load (kW)	0.21
Annual Energy Consumption (kWh)	420
Expected Annual Energy saving, for total replacement(kWh)	126
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.05
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.28	
Energy Saving in Lighting by replacing existing 135 No's T5 Lamps to 18W LED Tube in Physics Department	
Existing Scenario	
135 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	135
Total load (kW)	5.40
Annual Energy Consumption (kWh)	8640
Expected Annual Energy saving for replacing all fittings (kWh)	3024
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.212
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.61
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.29	
Energy Saving in Lighting by replacing existing 4 No's 60W ICL Lamp to 9W LED Bulb in Physics Department	
Existing Scenario	
4 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	4
Total load (kW)	0.24
Annual Energy Consumption (kWh)	384
Expected Annual Energy saving for replacing all fittings (kWh)	326
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.30	
Energy Saving by replacing existing 57 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physics Department	
Existing Scenario	
There are 57 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	57
Total load (kW)	3.99
Annual Energy Consumption (kWh)	7980
Expected Annual Energy saving, for total replacement(kWh)	2394
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.17
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.86
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.31	
Energy Saving in Split AC's by replacing existing in-efficent 3 No's 1.5TR AC's with Energy Efficient Five star labelled or Inverter type AC's in Physics Department	
Existing Scenario	
There are 3 numbers of 1.5TR Split AC's with 3 star rating are installed in the facilty with minimum 16 hrs operation in a day. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replacing the existing Split AC's with five star labelled Inverter type Split AC's. The five star labelled Inverter type AC's give a savings up to 36% with higher Energy Efficiency Ratio (EER, W/W).	
Financial Analysis	
Annual working hours (hrs)	2000
Total number of AC's installed	3
Total load (kW)	4.80
Annual Energy Consumption (kWh)	7680
Expected Annual Energy saving, for total replacement(kWh)	2765
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.19
Investment required for total replacement (Lakhs Rs)[@35000 Rs per tonnage for five star labelled Inverter type AC]	1.58
Simple Pay Back (in Months)	97.66

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.32	
Energy Saving in Lighting by replacing existing 115 No's T5 Lamps to 18W LED Tube in Mathematics Department	
Existing Scenario	
115 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	115
Total load (kW)	4.60
Annual Energy Consumption (kWh)	7360
Expected Annual Energy saving for replacing all fittings (kWh)	2576
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.180
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.52
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.33	
Energy Saving by replacing existing 51 No's in-efficient ceiling fans with Energy Efficient Five star fans in Mathematics Department	
Existing Scenario	
There are 51 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	51
Total load (kW)	3.57
Annual Energy Consumption (kWh)	7140
Expected Annual Energy saving, for total replacement(kWh)	2142
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.15
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.77
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.34	
Energy Saving in Lighting by replacing existing 44 No's T5 Lamps to 18W LED Tube in Physics Instrumentation	
Existing Scenario	
44 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	44
Total load (kW)	1.76
Annual Energy Consumption (kWh)	2816
Expected Annual Energy saving for replacing all fittings (kWh)	986
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.069
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.20
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.35	
Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Physics Instrumentation	
Existing Scenario	
3 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	3
Total load (kW)	0.18
Annual Energy Consumption (kWh)	288
Expected Annual Energy saving for replacing all fittings (kWh)	245
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.36	
Energy Saving by replacing existing 24 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physics Instrumentation	
Existing Scenario	
There are 24 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	24
Total load (kW)	1.68
Annual Energy Consumption (kWh)	3360
Expected Annual Energy saving, for total replacement(kWh)	1008
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.07
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.36
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.37	
Energy Saving in Lighting by replacing existing 73 No's T5 Lamps to 18W LED Tube in Commerce Department	
Existing Scenario	
73 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	73
Total load (kW)	2.92
Annual Energy Consumption (kWh)	4672
Expected Annual Energy saving for replacing all fittings (kWh)	1635
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.114
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.33
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.38	
Energy Saving by replacing existing 38 No's in-efficient ceiling fans with Energy Efficient Five star fans in Commerce Department	
Existing Scenario	
There are 38 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	38
Total load (kW)	2.66
Annual Energy Consumption (kWh)	5320
Expected Annual Energy saving, for total replacement(kWh)	1596
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.11
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.57
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.39	
Energy Saving in Lighting by replacing existing 60 No's T5 Lamps to 18W LED Tube in Phylosophy Department	
Existing Scenario	
60 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	60
Total load (kW)	2.40
Annual Energy Consumption (kWh)	3840
Expected Annual Energy saving for replacing all fittings (kWh)	1344
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.094
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.27
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.40	
Energy Saving by replacing existing 30 No's in-efficient ceiling fans with Energy Efficient Five star fans in Philosophy Department	
Existing Scenario	
There are 30 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	30
Total load (kW)	2.10
Annual Energy Consumption (kWh)	4200
Expected Annual Energy saving, for total replacement(kWh)	1260
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.09
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.45
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.41	
Energy Saving in Lighting by replacing existing 72 No's T5 Lamps to 18W LED Tube in History Department	
Existing Scenario	
72 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	72
Total load (kW)	2.88
Annual Energy Consumption (kWh)	4608
Expected Annual Energy saving for replacing all fittings (kWh)	1613
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.113
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.32
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.41	
Energy Saving in Lighting by replacing existing 72 No's T5 Lamps to 18W LED Tube in History Department	
Existing Scenario	
72 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	72
Total load (kW)	2.88
Annual Energy Consumption (kWh)	4608
Expected Annual Energy saving for replacing all fittings (kWh)	1613
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.113
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.32
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.43	
Energy Saving in Lighting by replacing existing 80 No's T5 Lamps to 18W LED Tube in Economics Honours	
Existing Scenario	
80 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	80
Total load (kW)	3.20
Annual Energy Consumption (kWh)	5120
Expected Annual Energy saving for replacing all fittings (kWh)	1792
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.125
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.36
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.44	
Energy Saving by replacing existing 54 No's in-efficient ceiling fans with Energy Efficient Five star fans in Economics Honours	
Existing Scenario	
There are 54 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	54
Total load (kW)	3.78
Annual Energy Consumption (kWh)	7560
Expected Annual Energy saving, for total replacement(kWh)	2268
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.16
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.81
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.45	
Energy Saving in Lighting by replacing existing 24 No's T12 Lamps to 18W LED Tube in Islamic History Department	
Existing Scenario	
24 numbers of T12 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T12 may be replaced to LED tube of 18 W in phased manner and the savings will be of 67 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	24
Total load (kW)	1.32
Annual Energy Consumption (kWh)	2112
Expected Annual Energy saving for replacing all fittings (kWh)	1415
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.10
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.11
Simple Pay Back (in Months)	13.08

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.46	
Energy Saving in Lighting by replacing existing 26 No's T5 Lamps to 18W LED Tube in Islamic History Department	
Existing Scenario	
26 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	26
Total load (kW)	1.04
Annual Energy Consumption (kWh)	1664
Expected Annual Energy saving for replacing all fittings (kWh)	582
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.041
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.12
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.47	
Energy Saving by replacing existing 34 No's in-efficient ceiling fans with Energy Efficient Five star fans in Islamic History Department	
Existing Scenario	
There are 34 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	34
Total load (kW)	2.38
Annual Energy Consumption (kWh)	4760
Expected Annual Energy saving, for total replacement(kWh)	1428
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.10
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.51
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.48	
Energy Saving in Lighting by replacing existing 54 No's T5 Lamps to 18W LED Tube in Islamic Political Science Department	
Existing Scenario	
54 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	54
Total load (kW)	2.16
Annual Energy Consumption (kWh)	3456
Expected Annual Energy saving for replacing all fittings (kWh)	1210
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.085
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.24
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.49	
Energy Saving by replacing existing 26 No's in-efficient ceiling fans with Energy Efficient Five star fans in Political Science Department	
Existing Scenario	
There are 26 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation.During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	26
Total load (kW)	1.82
Annual Energy Consumption (kWh)	3640
Expected Annual Energy saving, for total replacement(kWh)	1092
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.08
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.39
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.50	
Energy Saving in Lighting by replacing existing 30 No's T5 Lamps to 18W LED Tube in Music Department	
Existing Scenario	
30 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	30
Total load (kW)	1.20
Annual Energy Consumption (kWh)	1920
Expected Annual Energy saving for replacing all fittings (kWh)	672
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.047
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.14
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.51	
Energy Saving by replacing existing 11 No's in-efficient ceiling fans with Energy Efficient Five star fans in Music Department	
Existing Scenario	
There are 11 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	11
Total load (kW)	0.77
Annual Energy Consumption (kWh)	1540
Expected Annual Energy saving, for total replacement(kWh)	462
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.17
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.52	
Energy Saving in Lighting by replacing existing 3 No's 60W ICL Lamp to 9W LED Bulb in Music Department	
Existing Scenario	
3 numbers of 60W ICL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing ICL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	3
Total load (kW)	0.18
Annual Energy Consumption (kWh)	288
Expected Annual Energy saving for replacing all fittings (kWh)	245
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.02
Investment required for complete replacements [@Rs 120 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	2.52

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.53	
Energy Saving in Lighting by replacing existing 13 No's T5 Lamps to 18W LED Tube in Co-operative Society	
Existing Scenario	
13 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	13
Total load (kW)	0.52
Annual Energy Consumption (kWh)	832
Expected Annual Energy saving for replacing all fittings (kWh)	291
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.020
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.06
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.54	
Energy Saving by replacing existing 4 No's in-efficient ceiling fans with Energy Efficient Five star fans in Co-operative Society	
Existing Scenario	
There are 4 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	4
Total load (kW)	0.28
Annual Energy Consumption (kWh)	560
Expected Annual Energy saving, for total replacement(kWh)	168
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.06
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.55	
Energy Saving in Lighting by replacing existing 67 No's T5 Lamps to 18W LED Tube in General Library	
Existing Scenario	
67 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	67
Total load (kW)	2.68
Annual Energy Consumption (kWh)	4288
Expected Annual Energy saving for replacing all fittings (kWh)	1501
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.105
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.30
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.56	
Energy Saving by replacing existing 33 No's in-efficient ceiling fans with Energy Efficient Five star fans in General Library	
Existing Scenario	
There are 33 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	33
Total load (kW)	2.31
Annual Energy Consumption (kWh)	4620
Expected Annual Energy saving, for total replacement(kWh)	1386
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.10
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.50
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.57	
Energy Saving in Lighting by replacing existing 4 No's 15W CFL Lamp to 9W LED Bulb in Auditorium	
Existing Scenario	
4 numbers of 15W CFL lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing CFL may be replaced to LED bulb of 9W in phased manner and the savings will be of 66% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	4
Total load (kW)	0.06
Annual Energy Consumption (kWh)	96
Expected Annual Energy saving for replacing all fittings (kWh)	38
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.00
Investment required for complete replacements [@Rs 90 per fittings](Lakhs Rs)	0.00
Simple Pay Back (in Months)	16.07

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.58	
Energy Saving in Lighting by replacing existing 32 No's T5 Lamps to 18W LED Tube in Auditorium	
Existing Scenario	
32 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	32
Total load (kW)	1.28
Annual Energy Consumption (kWh)	2048
Expected Annual Energy saving for replacing all fittings (kWh)	717
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.050
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.14
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.59	
Energy Saving by replacing existing 23 No's in-efficient ceiling fans with Energy Efficient Five star fans in Auditorium	
Existing Scenario	
There are 23 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	23
Total load (kW)	1.61
Annual Energy Consumption (kWh)	3220
Expected Annual Energy saving, for total replacement(kWh)	966
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.07
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.35
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.60	
Energy Saving in Lighting by replacing existing 55 No's T5 Lamps to 18W LED Tube in Economics Model 1	
Existing Scenario	
55 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	55
Total load (kW)	2.20
Annual Energy Consumption (kWh)	3520
Expected Annual Energy saving for replacing all fittings (kWh)	1232
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.086
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.25
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.61	
Energy Saving by replacing existing 25 No's in-efficient ceiling fans with Energy Efficient Five star fans in Economics Model 1	
Existing Scenario	
There are 25 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	25
Total load (kW)	1.75
Annual Energy Consumption (kWh)	3500
Expected Annual Energy saving, for total replacement(kWh)	1050
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.07
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.38
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.62	
Energy Saving in Lighting by replacing existing 25 No's T5 Lamps to 18W LED Tube in Office Room	
Existing Scenario	
25 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	25
Total load (kW)	1.00
Annual Energy Consumption (kWh)	1600
Expected Annual Energy saving for replacing all fittings (kWh)	560
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.039
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.11
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.63	
Energy Saving by replacing existing 12 No's in-efficient ceiling fans with Energy Efficient Five star fans in Office Room	
Existing Scenario	
There are 12 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	12
Total load (kW)	0.84
Annual Energy Consumption (kWh)	1680
Expected Annual Energy saving, for total replacement(kWh)	504
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.04
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.18
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.64	
Energy Saving in Lighting by replacing existing 8 No's T5 Lamps to 18W LED Tube in Principal Room	
Existing Scenario	
8 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	8
Total load (kW)	0.32
Annual Energy Consumption (kWh)	512
Expected Annual Energy saving for replacing all fittings (kWh)	179
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.013
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.04
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.65	
Energy Saving by replacing existing 2 No's in-efficient ceiling fans with Energy Efficient Five star fans in Principal Room	
Existing Scenario	
There are 2 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	2
Total load (kW)	0.14
Annual Energy Consumption (kWh)	280
Expected Annual Energy saving, for total replacement(kWh)	84
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.03
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.66	
Energy Saving in Split AC's by replacing existing in-efficient 1 1.5TR AC with Energy Efficient Five star labelled or Inverter type AC in Principal Room	
Existing Scenario	
There is one 1.5TR Split AC's with 3 star rating are installed in the facilty with minimum 8 hrs operation in a day. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replacing the existing Split AC's with five star labelled Inverter type Split AC's. The five star labelled Inverter type AC's give a savings up to 36% with higher Energy Efficiency Ratio (EER, W/W).	
Financial Analysis	
Annual working hours (hrs)	2000
Total number of AC's installed	1
Total load (kW)	1.60
Annual Energy Consumption (kWh)	2560
Expected Annual Energy saving, for total replacement(kWh)	922
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.06
Investment required for total replacement (Lakhs Rs)[@35000 Rs per tonnage for five star labelled Inverter type AC]	0.53
Simple Pay Back (in Months)	97.66

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.67	
Energy Saving in Lighting by replacing existing 38 No's T5 Lamps to 18W LED Tube in Language Library	
Existing Scenario	
38 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	38
Total load (kW)	1.52
Annual Energy Consumption (kWh)	2432
Expected Annual Energy saving for replacing all fittings (kWh)	851
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.060
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.17
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.68	
Energy Saving by replacing existing 9 No's in-efficient ceiling fans with Energy Efficient Five star fans in Language Library	
Existing Scenario	
There are 9 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	9
Total load (kW)	0.63
Annual Energy Consumption (kWh)	1260
Expected Annual Energy saving, for total replacement(kWh)	378
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.03
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.14
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.69	
Energy Saving in Split AC's by replacing existing in-efficient 1 1.5TR AC with Energy Efficient Five star labelled or Inverter type AC in Language Library	
Existing Scenario	
There is one 1.5TR Split AC's with 3 star rating are installed in the facilty with minimum 8 hrs operation in a day. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replacing the existing Split AC's with five star labelled Inverter type Split AC's. The five star labelled Inverter type AC's give a savings up to 36% with higher Energy Efficiency Ratio (EER, W/W).	
Financial Analysis	
Annual working hours (hrs)	2000
Total number of AC's installed	1
Total load (kW)	1.60
Annual Energy Consumption (kWh)	2560
Expected Annual Energy saving, for total replacement(kWh)	922
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.06
Investment required for total replacement (Lakhs Rs)[@35000 Rs per tonnage for five star labelled Inverter type AC]	0.53
Simple Pay Back (in Months)	97.66

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.70	
Energy Saving in Lighting by replacing existing 5 No's T5 Lamps to 18W LED Tube in Ladies Toilet	
Existing Scenario	
5 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	5
Total load (kW)	0.20
Annual Energy Consumption (kWh)	320
Expected Annual Energy saving for replacing all fittings (kWh)	112
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.008
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.02
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.71	
Energy Saving by replacing existing 2 No's in-efficient ceiling fans with Energy Efficient Five star fans in Ladies Toilet	
Existing Scenario	
There are 2 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	2
Total load (kW)	0.14
Annual Energy Consumption (kWh)	280
Expected Annual Energy saving, for total replacement(kWh)	84
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.03
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.72	
Energy Saving in Lighting by replacing existing 12 No's T5 Lamps to 18W LED Tube in Physical Education Department	
Existing Scenario	
12 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	12
Total load (kW)	0.48
Annual Energy Consumption (kWh)	768
Expected Annual Energy saving for replacing all fittings (kWh)	269
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.019
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.05
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.73	
Energy Saving by replacing existing 3 No's in-efficient ceiling fans with Energy Efficient Five star fans in Physical Education Department	
Existing Scenario	
There are 3 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	3
Total load (kW)	0.21
Annual Energy Consumption (kWh)	420
Expected Annual Energy saving, for total replacement(kWh)	126
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.01
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.05
Simple Pay Back (in Months)	61.22

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.74	
Energy Saving in Lighting by replacing existing 81 No's T5 Lamps to 18W LED Tube in Staff Quarters	
Existing Scenario	
81 numbers of T5 lamps were identified during the energy audit field survey in the facility. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
The existing T5 may be replaced to LED tube of 18 W in phased manner and the savings will be of 35 % (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2000
No of fittings	81
Total load (kW)	3.24
Annual Energy Consumption (kWh)	5184
Expected Annual Energy saving for replacing all fittings (kWh)	1814
Cost of Power	7.00
Annual saving in Lakhs Rs (1st year)	0.127
Investment required for complete replacements [@Rs 450 per fittings](Lakhs Rs)	0.36
Simple Pay Back (in Months)	34.44

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal Code 559.75	
Energy Saving by replacing existing 52 No's in-efficient ceiling fans with Energy Efficient Five star fans in Staff Quarters	
Existing Scenario	
There are 52 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. During discussion with staffs it is observed that the average utility of these fittings are of 80%.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2000
Total numbers of ordinary fans	52
Total load (kW)	3.64
Annual Energy Consumption (kWh)	7280
Expected Annual Energy saving, for total replacement(kWh)	2184
Cost of Power (Rs)	7.00
Annual saving in Lakhs Rs (1st year)	0.15
Investment required for a total replacement (Lakhs Rs)[@1500 Rs per Fan with 50W at full speed]	0.78
Simple Pay Back (in Months)	61.22

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CONCLUSION

The carbon emission from different sectors namely, Energy, Transportation and wastes were calculated using standard procedures. Carbon sequestration by the trees present in the campus was also estimated. From these the total carbon footprint of the campus was arrived at.

Net Carbon Emission after implementing Energy Efficiency projects		
1	Total Carbon Foot Print tCO2e/yr	202.42
2	Carbon Sequrested tCO2e/yr	98.62
3	Carbon mitigated Biomass based cooking tCO2e/yr	12.92
4	Carbon mitigated by solar power plant tCO2e/yr	74.22
5	Carbon mitigated by Energy Efficiency (Proposed) tCO2e/yr	71.10
6	Effective Carbon footprint tCO2e/yr	-54.44
7	Total No of Students	2446.00
8	Specific Carbon Footprint kg CO2e/Student/Yr	**-22.26**

From this study it was found that carbon footprint of the campus to be -22.26 $kgCO_2e$/ student/ Year in place of current footprint ie. 6.81 $kgCO_2e$/ student/ Year. This will be achieved after implementing energy efficiency projects. If the energy efficiency projects are implemented the campus will become carbon negative.

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