Saibal Saha

B.C.E. (J.U.), Certified Energy Auditor-BEE
Accredited Professional-IGBC, Certified Trainer-GRIHA

To,

The Development Officer,

Presidency University,

Kolkata.

Kind Attn: Mr. K K Nandi.

Dear Sir,

Subject: Preliminary Green Audit (not excluding Energy & Environment Audit) of Presidency University, Kolkata.

Ref: Your Work Order no. 03/DO/2023-2024, dated: 09.05.2023

I am submitting some preliminary audits of two of your campuses at College Street and Newtown, Rajarhat, Kolkata on basis of your Work Order, site visits, documents received from your end as well as several discussions with the committee and yourself.

For any queries from the committee or the stipulated authority could be explained as per any communication protocol convenient to you.

Thanking you.

Sincerely yours,

30.05.2023

[SAIBAL SAHA]

Development Officer
Presidency University
Kolkata-700073

Director
Internal Quality Assurance Cell (IQAC)
Presidency University
Kolkata-700073

COUNTER SIGNED BY

Registrar
Presidency University
Kolkata - 700 073

Preliminary Audit for implementation of Energy & Environmental Audit

Of

Presidency University

86, 1, College St, Calcutta University, College Square, Kolkata, West Bengal 700073

Submitted by

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saibalsaha2@gmail.com

Also find us in

Acknowledgement

En-Simulated Solutions LLP extends gratitude to Presidency University for extending us the opportunity to conduct the Preliminary Audit for implementation of Energy & Environmental Audit.

We are thankful to the professors & supporting staffs of the college for their transparency & consistent support in sharing relevant information and for providing data about policies and projects along with their other valuable information. This report would have not been possible without their support.

The study team would like to acknowledge the following distinguished personnel's of Presidency University in person for the diligent involvement and cooperation.

1. Dr. Debajyoti Konar - Registrar
2. Prof. Arabinada Nayak – Director IQAC
3. Prof. Sankar Bose – Dean of Science
4. Dr. Prithul Chakraborty – Finance Officer
5. Smt. Pritha Ghosh – Secretary IQAC
6. Dr. Mery Biswas – Assistant Professor, Dept. of Geography
7. Dr. Puja Ray – Assistant Professor, Dept. of Life Sciences
8. Dr. Shiba Shankar Acharya – Assistant Professor, Dept. of Geology
9. Dr. Debajyoti Pramanik – Assistant Professor, Dept. of Chemistry
10. Mr. Kaustav Kanti Nandi – Development Officer

About the Institution

Presidency University has a unique place in history. It was one of the first institutes of Western-type higher education in Asia. In 1817, a group of enlightened Indians and Englishmen set up the Hindoo College. This was taken over the British Government in 1855 as the College of the Bengal Presidency, and placed in 1857 under the newly founded Calcutta University.

Over the next hundred years and more, Presidency College was Bengal's pre-eminent centre of higher learning. Although a Constituent College of Calcutta University, it preserved a tradition of research matched by few universities in India. This gave a unique dimension to its undergraduate teaching.

The formal establishment of Presidency University in July 2010 allows it to refashion its venerable traditions and continuing strengths into a leading institution of the future.

As per National Assessment and Accreditation Council (NAAC) guidelines every accredited institution should establish an Internal Quality Assurance Cell (IQAC) as a post-accreditation quality sustenance measure. Accordingly, the University set up its IQAC to develop a system for conscious, consistent and catalytic improvement in the overall performance of the institution, and to promote measures for institutional functioning towards quality enhancement through internalization of quality culture and institutionalization of best practices.

The executive Committee of the National Assessment and Accreditation Council on the recommendation of the duly appointed Peer Team declared the Presidency University (College Street campus) as Accredited at A grade which was valid up to December 2021.

INTRODUCTION

Energy is critical to organizations, but often represents a significant cost – both to them and the environment.

ISO 50001:2018, Energy management systems – Requirements with guidance for use, is a strategic tool that helps organizations put in place an energy management system and use their energy more efficiently and effectively.

An energy management system helps organizations better manage their energy use, thus improving productivity. It involves developing and implementing an energy policy, setting achievable targets for energy use, and designing action plans to reach them and measure progress. This might include implementing new energy-efficient technologies, reducing energy waste or improving current processes to cut energy costs. ISO 50001 gives organizations a recognized framework for developing an effective energy management system. Like other ISO management system standards, it follows the "Plan-Do-Check-Act" process for continual improvement.

ISO 50001 provides a set of requirements that enable organizations to:

- Develop a policy for more efficient use of energy
- Fix targets and objectives to meet that policy
- Gather data to better understand and make decisions concerning energy use
- Measure the results obtained
- Review the effectiveness of the policy
- Continually improve energy management

ISO 50001 vs. Other Management System Standards:

As a new member of international standards family, ISO 50001 has been developed based on the common elements shared by other major ISO management system standards, ensuring a high level of compatibility with them. It is notably aligned with ISO 9001 quality management system and ISO 14001 environmental management system standards. The comparison table below provides a quick overview on the comparison between the main clauses of ISO 50001, ISO 9001 and ISO 14001.

Content	ISO 50001	ISO 14001	ISO 9001
Core concept for establishing guidelines	Based on energy consumption of the whole organisation, or a particular production process. For compliance with ESOS the ISO 50001 system must cover all the organisation or groups energy consumption.	Based on relevant environmental aspects	Based on clients' quality requirements

Policy	Energy policy illustrates the strategy of the organisation on energy management. The policy provides the framework for setting up associated objectives and targets to enhance energy performance	Environmental policy illustrates how the organisation handles environmental matters, commitment to environmental protection, as well as associated objectives and targets. Typically, the policy will include the organisations commitment to preventing pollution, regulatory compliance and continuous improvement.	Meet the clients' requirements
Strategy	Conducting energy reviews to identify significant energy use activities and set up energy baseline as well as energy performance indicators. Compliance to relevant regulatory requirements and setting up energy objectives, targets and implementation plans.	Compliance to relevant environmental regulatory requirements. Setting up environmental objectives, targets and implementation plans.	Setting up quality objectives, targets and quality management plans.
Baseline	Energy baseline is foundation to establish the system	No such requirement	No such requirement

In summary, the five requirements of ISO 14001 and ISO 50001:

1. Formation of an Environmental Policy and commitment to an EEMS (Energy & Environmental System),
2. Development of a plan for implementation,
3. Implementation and Operation of the EEMS,
4. Monitoring and possible corrective actions,
5. Top management review and continuous improvement.

Basically, the institution must say what the organization is going to do, how they are going to do, who it is going to do and by when it is going to be done.

In the preliminary audit we are supposed to frame the answer of the first question: 'what the organization is going to do'.

ENERGY AUDIT:

Energy Audit is an effective tool in defining and pursuing comprehensive energy management programmes. It has positive approach aiming at continuous improvement in energy utilization in contrast to financial audit which stresses to maintain regularity. Energy audit provides answer to the question – what to do, where to start, at what cost and for what benefits.

Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of the system. It has been established that energy saving of the order of 15 to 30% is possible by optimizing use of energy by better housekeeping, low cost retrofitting measures and use of energy efficient equipment at the time of replacements. Indian industry consumes more energy as compared to its counter parts in the developed countries.

Need/Purpose:

The energy audit provides the vital information base for overall energy conservation programme covering essentially energy utilization analysis and evaluation of energy conservation measures.

It aims at:

- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures of energy conservation and realization of savings.

ENVIRONMENTAL AUDIT

An environmental Audit provides an assessment of the environmental performance of a business or organization. The audit reveals details about the activities of a company and its compliance with environmental regulations. Audit information is presented to the management team and employees.

An environmental audit evaluates and quantifies the environmental performance. It identifies compliance problems or management system implementation issues related to baseline performances of parameters as per the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974. As thermal power is the principal source of energy in our country, The Energy Conservation Act, 2001 is to be an integral part of The Air Act, 1981. Hence energy conservation during functioning of the institute also to be considered during environmental audit.

GREEN AUDIT:

The green audit is a tools that organizations uses to identify their environmental impacts and assess their compliance with applicable laws and regulations, as well as with the expectations of their various stakeholders. It also serves as a means to identify opportunities to enhance work quality, improves employee health, safety and morale, reduce liabilities and achieve other form of business values.

This concept has got its origin in recent past and suddenly got acceleration due to heavy industrial & commercial traffic which ends with unaccountable emission resulting pollution. Due to growth in population, needs has increased.

It is the duty of organizations to carry out the Green Audits of their ongoing processes for various reasons such as; to make sure whether they are performing in accordance with relevant rules and regulations, to improve the procedures and ability of materials, to analyze the potential duties and to determine a way which can lower the cost and add to the revenue. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

Green Audit is assigned to the Criterion 7 of NAAC (National Assessment and Accreditation Council) which is a self-governing organization of India that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of accreditation.

Need/Purpose:

The intention of organizing Green Audit is to upgrade the environment condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, water conservation, sufficient green cover and proper use of day-lighting in indoor environment. Thus it's a tool to turn the infrastructure into a better environmental friendly institute by securing the environment and cut down the threats posed to human health:

- To make sure that rules and regulations are well taken care of.
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost.
- To suggest the best protocols for adding to sustainable development.
- To suggest improvement in the system to promote safe and clean environment.

In the Energy Audit part, we would be analysing the current consumption of energy (principally electricity from grid) and possible means to make it smarter. The basic areas of study would be like these:

- Analysis of electricity bills received from DISCOMs,
- Analysis of existing lighting system, fans and air conditioning systems. Thereby, searching whether there are scopes of any improvements,
- Searching options for installation of occupancy sensors, daylight sensors etc.
- Replacement of old pumps with new ones,
- Options for putting films over the glazing on the East / West façades,
- Options for reducing water consumptions and thereby the operation hours of the pumps,
- Automatic level controller for overhead reservoirs,
- Options for sub-metering for different uses of electricity like interior lighting, exterior lighting, air-conditioning, pumps and lifts.
- Searching for tentative potential for renewable energy installation and use.

In the environmental front, we may look after the following:

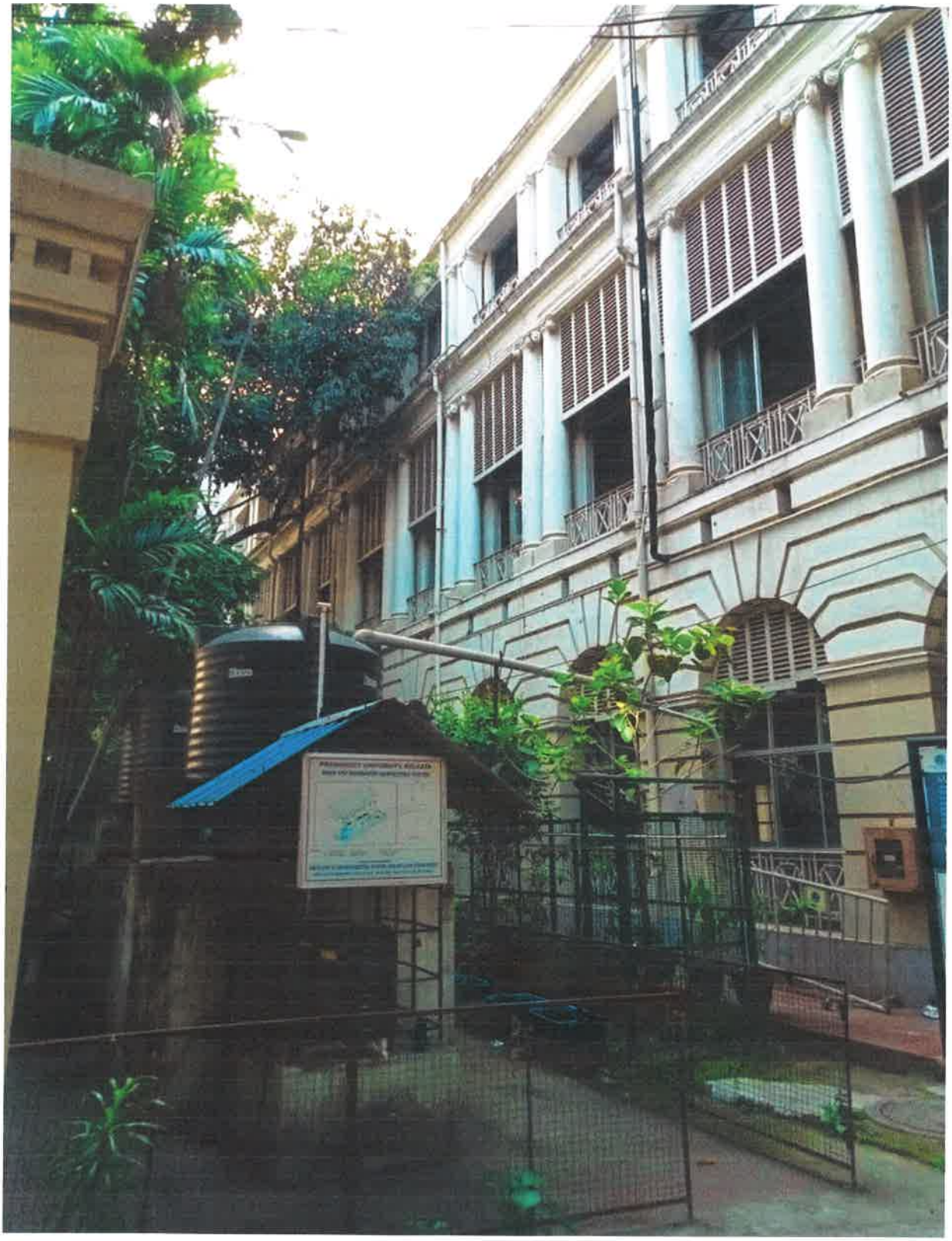
- Options for reducing Heat-Island Effect (both roof and non-roof),
- Options for electric charging facilities for both the 2 & 4 wheelers,
- Universal design options,
- Water efficiency in flow & flush fixtures,
- Rain Water Harvesting systems,
- Water metering,
- Waste management system and provision for organic waste composter,

As per the five requirements of ISO 14001 and ISO 50001:

1. As of now there is no such Environmental policy. However, formulation of the same in currently underway.
2. Development of a plan for implementation is to be done.
3. Implementation and Operation of the EEMS is to be done
4. Monitoring and possible corrective actions – Not applicable at present
5. Top management review and continuous improvement would be done once above actions are completed.

Site Photographs

Rainwater harvesting related pictures



Fire Safety related pictures

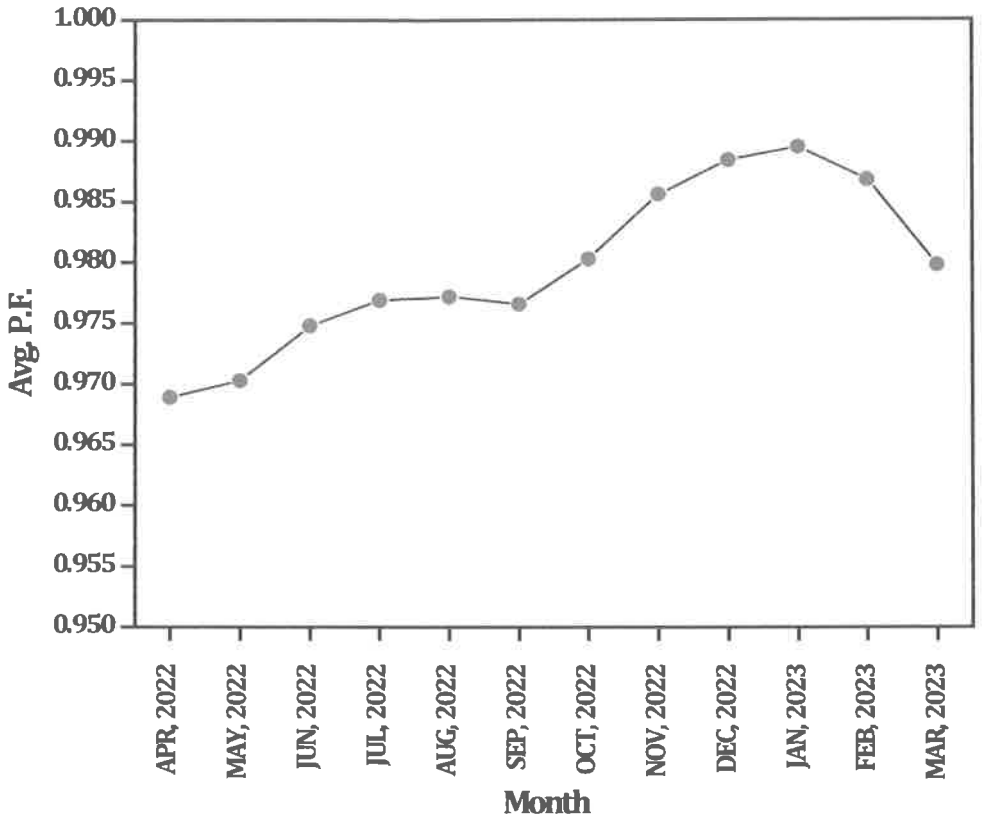
Landscape – Automated water sprinkler systems.

Analysis of electricity bills received from DISCOMs:

Electricity Bill Analysis for the period of April 2022 to March 2023 for Presidency University College Street Campus:

DISCOM: CESC

Month	Avg. P.F.	Avg L.F.	Max Demand (kW)	Max Demand (kVA)	Chargeable Units (kWh)	Unit Charge (Rs/kWh)	Energy Charges	Billing Demand (kVA)	Demand Charge (@ Rs26/kVA)	P.F. Rebate (on EC)	Timely Payment Rebate @1%	Net Energy Charges
APR, 2022	96.89%	17.40%	925.3	960.0	170334	7.42	₹ 12,63,878.28	1600	₹ 41,600.00	₹ 31,596.96	₹ 12,738.81	₹ 12,61,142.51
MAY, 2022	97.03%	15.48%	866.7	912.0	156601	7.42	₹ 11,61,979.42	1600	₹ 41,600.00	₹ 34,859.38	₹ 11,687.20	₹ 11,57,032.84
JUN, 2022	97.48%	16.34%	821.3	856	159954	7.42	₹ 11,86,858.68	1600	₹ 41,600.00	₹ 35,605.76	₹ 11,928.53	₹ 11,80,924.39
JUL, 2022	97.69%	14.10%	733.3	770.7	142581	7.39	₹ 10,53,673.59	1600	₹ 41,600.00	₹ 31,610.21	₹ 10,636.63	₹ 10,53,026.75
AUG, 2022	97.72%	14.44%	709.3	736	146081	7.39	₹ 10,79,538.59	1600	₹ 41,600.00	₹ 32,386.16	₹ 10,887.52	₹ 10,77,864.91
SEP, 2022	97.66%	15.18%	744	776	148593	7.39	₹ 10,98,102.27	1600	₹ 41,600.00	₹ 32,943.07	₹ 11,067.59	₹ 10,95,691.61
OCT, 2022	98.03%	10.42%	714.7	746.7	105414	7.39	₹ 7,79,009.46	1600	₹ 41,600.00	₹ 31,160.38	₹ 7,894.49	₹ 7,81,554.59
NOV, 2022	98.56%	10.47%	581.3	608	102447	7.36	₹ 7,54,009.92	1600	₹ 41,600.00	₹ 30,160.40	₹ 7,654.50	₹ 7,57,795.02
DEC, 2022	98.84%	8.10%	328	338.7	81860	7.36	₹ 6,02,489.60	1600	₹ 41,598.14	₹ 24,099.58	₹ 6,400.00	₹ 6,13,588.16
JAN, 2023	98.95%	7.10%	309.3	333.3	71801	7.36	₹ 5,28,455.36	1600	₹ 41,600.00	₹ 21,138.21	₹ 6,400.00	₹ 5,42,517.15
FEB, 2023	98.68%	9.39%	469.3	477.3	85793	7.36	₹ 6,31,436.48	1600	₹ 41,600.00	₹ 25,257.46	₹ 6,477.79	₹ 6,41,301.23
MAR, 2023	97.98%	12.88%	650.7	677.3	130234	7.42	₹ 9,66,336.28	1600	₹ 41,600.00	₹ 28,990.09	₹ 9,789.46	₹ 9,69,156.73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Avg P.F.
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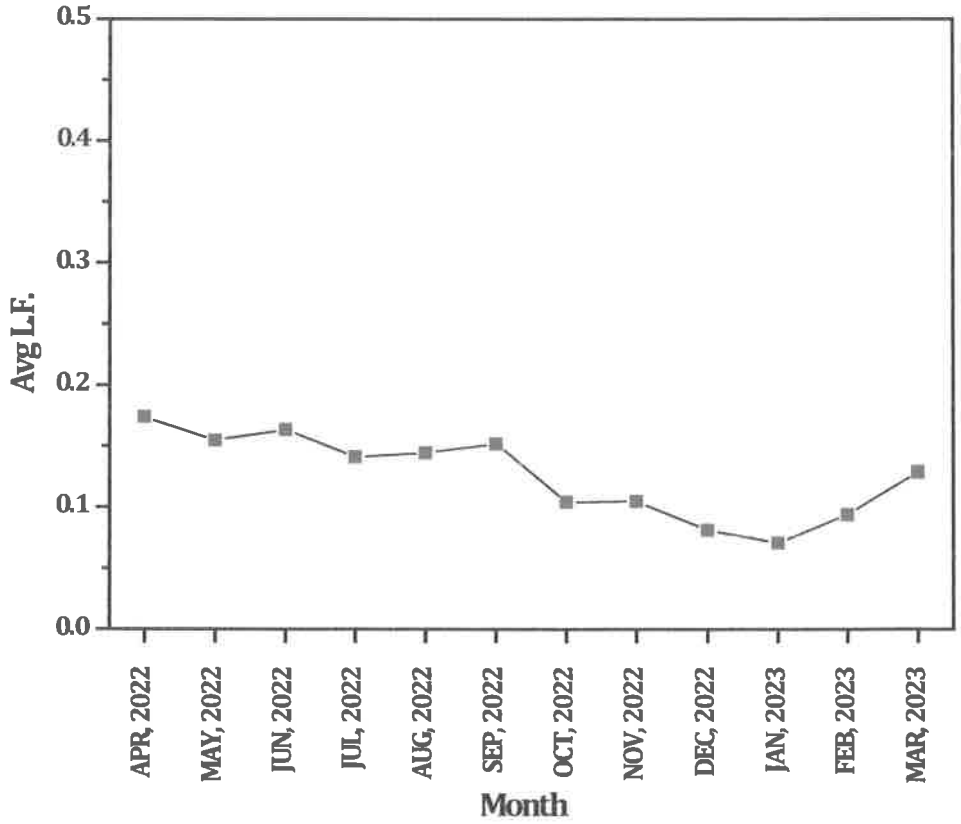
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Avg L.F.
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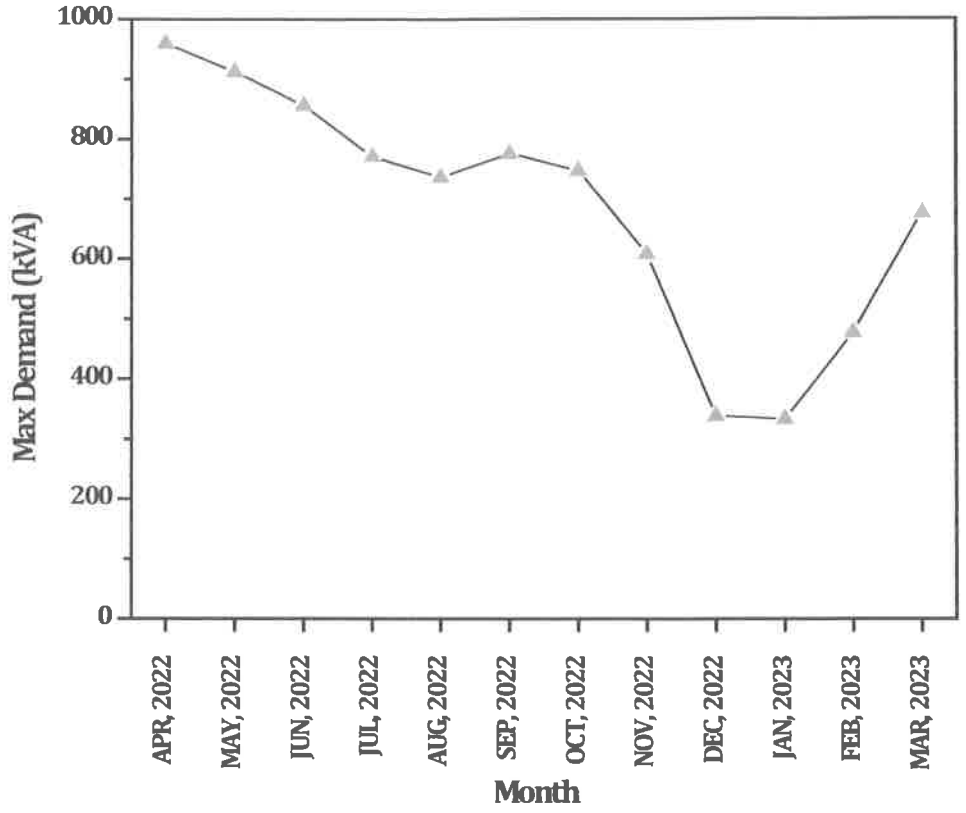
Max Demand (kVA)
1000
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600
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APR, 2022
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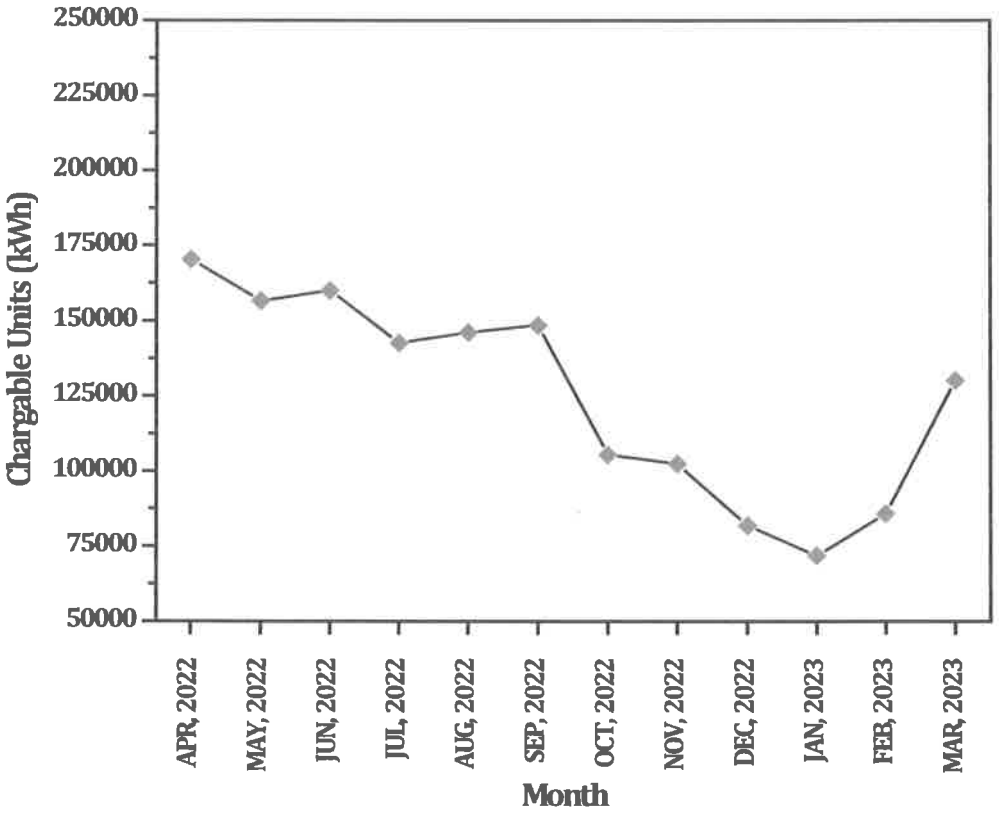
Chargable Units (kWh)
250000
225000
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APR, 2022
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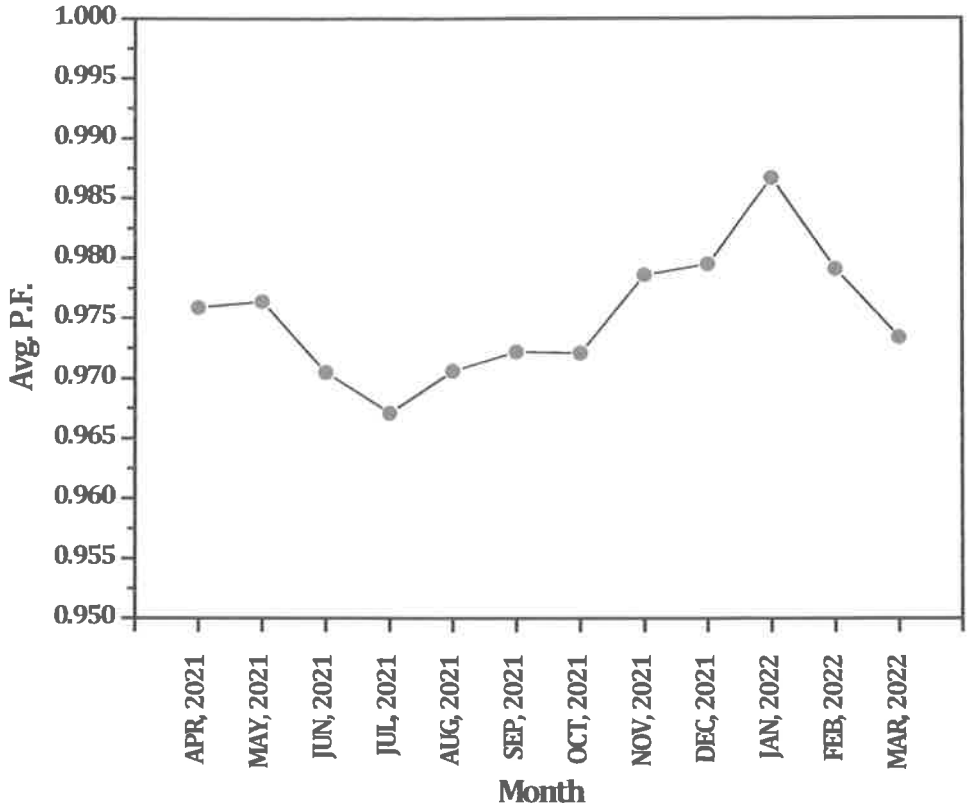
MAR, 2023
Month

Electricity Bill Analysis for the period of April 2021 to March 2022 for Presidency University College Street Campus:

DISCOM: CESC

Month	Avg. P.F.	Avg L.F.	Max Demand (kW)	Max Demand (kVA)	Chargeable Units (kWh)	Unit Charge (Rs/kWh)	Energy Charges	Billing Demand (kVA)	Demand Charge (@ Rs26/kVA)	MCVA (Rs. 0.29/kWh)	P.F. Rebate (on EC)	Timely Payment Rebate @1%	Net Energy Charges
APR, 2021	97.59%	9.22%	426.7	445.3	90280	7.13	₹ 6,43,696.40	1600	₹ 41,600.00	₹ 26,181.20	₹ 19,310.89	₹ 6,659.86	₹ 6,85,506.85
MAY, 2021	97.64%	7.39%	184.0	200.0	74719	7.13	₹ 5,32,746.47	1600	₹ 41,600.00	₹ 21,668.51	₹ 15,982.39	₹ 6,183.31	₹ 5,73,849.28
JUN, 2021	97.05%	7.86%	301.3	330.7	76940	7.13	₹ 5,48,582.20	1600	₹ 41,600.00	₹ 22,312.60	₹ 16,457.47	₹ 6,176.87	₹ 5,89,860.46
JUL, 2021	96.71%	8.11%	304.0	328.0	82027	7.10	₹ 5,82,391.70	1600	₹ 41,600.00	₹ 23,787.83	₹ 14,559.79	₹ 6,162.12	₹ 6,27,057.62
AUG, 2021	97.06%	9.02%	413.3	437.3	91186	7.10	₹ 6,47,420.60	1600	₹ 41,594.41	₹ 26,443.94	₹ 19,422.62	₹ 6,695.92	₹ 6,89,340.41
SEP, 2021	97.22%	9.33%	434.7	469.3	91333	7.10	₹ 6,48,464.30	1600	₹ 41,600.00	₹ 26,486.57	₹ 19,453.93	₹ 6,706.10	₹ 6,90,390.84
OCT, 2021	97.21%	8.25%	373.3	394.7	83400	7.10	₹ 5,92,140.00	1600	₹ 41,600.00	₹ 24,186.00	₹ 17,764.20	₹ 6,159.76	₹ 6,34,002.04
NOV, 2021	97.86%	8.37%	378.7	402.7	81893	7.07	₹ 5,78,983.51	1600	₹ 41,600.00	₹ 23,748.97	₹ 17,369.51	₹ 6,162.51	₹ 6,20,800.46
DEC, 2021	97.95%	7.23%	304.0	328.0	73108	7.07	₹ 5,16,873.56	1600	₹ 41,600.00	₹ 21,201.32	₹ 15,506.21	₹ 6,187.99	₹ 5,57,980.68
JAN, 2022	98.67%	5.34%	154.7	165.3	53959	7.07	₹ 3,81,490.13	1600	₹ 41,600.00	₹ 15,648.11	₹ 15,259.61	₹ 6,243.52	₹ 4,17,235.11
FEB, 2022	97.91%	7.14%	264.0	277.3	65234	7.36	₹ 4,80,122.24	1600	₹ 41,600.00	₹ -	₹ 14,403.67	₹ 6,400.00	₹ 5,00,918.57
MAR, 2022	97.34%	12.21%	744.0	789.3	123521	7.42	₹ 9,16,525.82	1600	₹ 41,600.00	₹ -	₹ 27,495.77	₹ 9,306.30	₹ 9,21,323.75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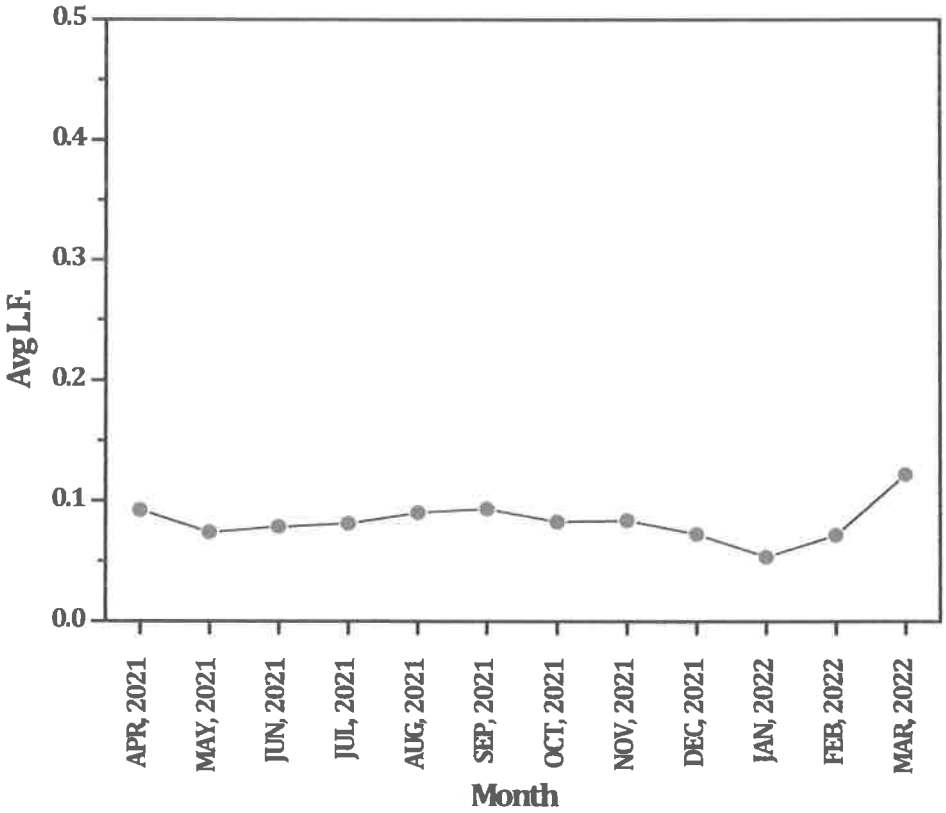
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Avg L.F.
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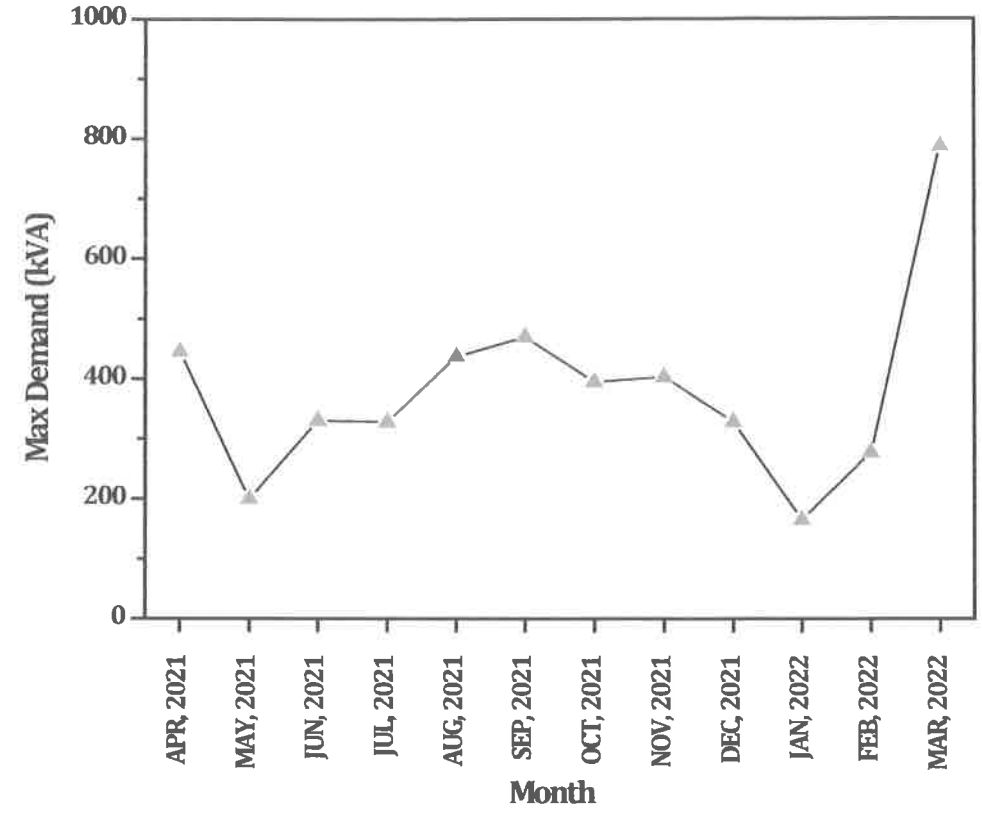
Month


Max Demand (kVA)
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400
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APR, 2021
MAY, 2021
JUN, 2021
JUL, 2021
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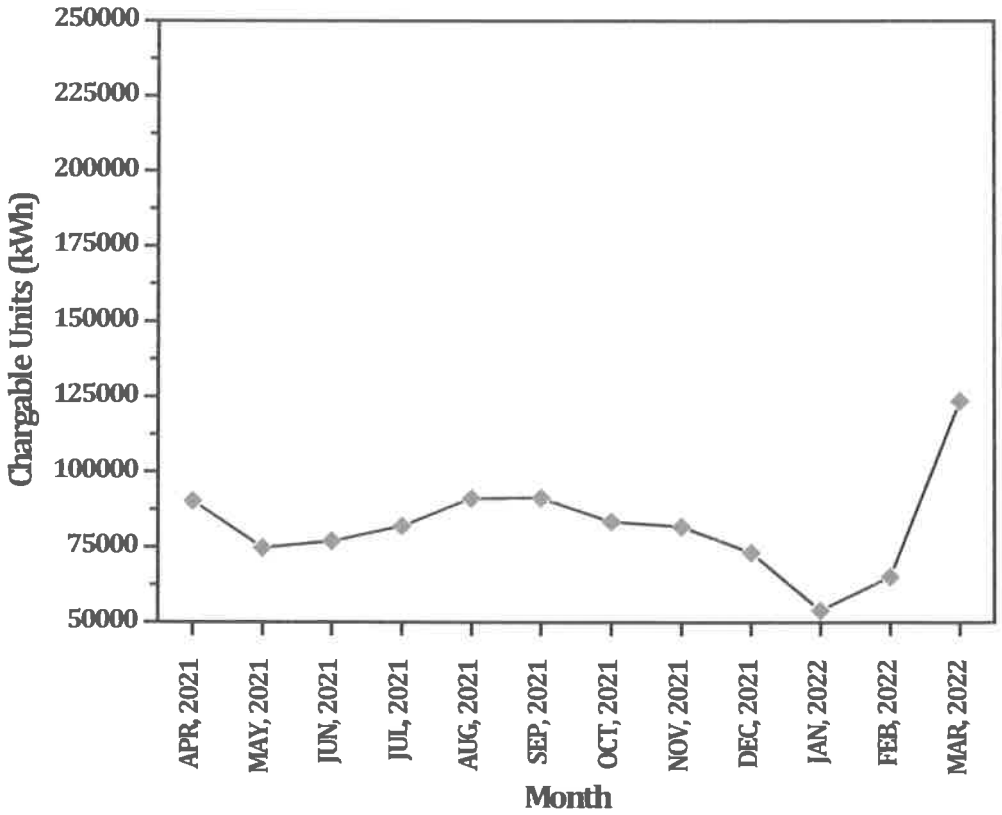
Month


Chargable Units (kWh)
250000
225000
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150000
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APR, 2021
MAY, 2021
JUN, 2021
JUL, 2021
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MAR, 2022
Month

Analysis of existing lighting system, fans and air conditioning systems. Thereby, searching whether there are scopes of any improvements,

During the walkthrough audit it was observed the existing air-conditioning systems installed in the admin building was already optimal. Hence, very little optimizations is possible here.

Most of the lighting systems have already shifted to LED based luminaires.

However, a large number of conventional (induction motor based) fans still exists in the classrooms. These can be replaced by energy efficient Brushless Direct Current Motor or BLDC fans.
Advantage of BLDC fans over conventional fans :-

- Fewer maintenance costs
- Better performance
- Long lasting due to absence of brushes, thereby eliminating the chances of sparks
- Lesser noise
- Greater torque
- Better energy efficiency (as much as 60% less energy consumption as compared to conventional fans.)
- Lesser heat generation.

Searching options for installation of occupancy sensors, daylight sensors etc.

Occupancy sensors and daylight sensors could be installed in the common areas and classrooms to help reduce the energy consumption.

Replacement of old pumps with new ones,

The existing pumps and associated related plumbing line could be thoroughly checked to determine the present health of the pumps (i.e. the operating parameters such as efficiency, head, discharge) and the plumbing lines. Pressure valves and water meters could be installed to help conserve water and detect losses.

Options for putting films over the glazing on the East / West façades,

For admins buildings or buildings where air conditioning systems are installed, heat reflective films could be placed over the glazing to reduce the cooling load.

Options for reducing water consumptions and thereby the operation hours of the pumps, Automatic level controller for overhead reservoirs,

It was observed that pumps are operated on a shift basis (3-shift basis). In addition to this, automatic level controller for overhead reservoirs could be installed

Options for sub-metering for different uses of electricity like interior lighting, exterior lighting, air-conditioning, pumps and lifts.

Sub-metering could be done for different uses of electricity such as interior lighting, exterior lighting, air-conditioning systems, pumps and lifts to help identify the energy consumption pattern of the various equipment and appliances.

Searching for tentative potential for renewable energy installation and use.

Proposal for procurement and installation of roof-top solar panels of capacity 50 kWp have been submitted to Government for approval.

Environmental measures:

- ***Options for reducing Heat-Island Effect (both roof and non-roof),***

Cool roof paints could be applied roofs and cool paints could be applied to exterior wall as well.
External driveways could be painted with low SRI paints.
Parking spaces could have grass pavers

- ***Options for electric charging facilities for both the 2 & 4 wheelers,***

People should be encouraged to use non-fossil fuel based transportation. As such electric charging facilities should be available for both two-wheelers and four-wheelers.

- ***Universal design options,***

Disabled friendly environment should be provided as follows-
Use of ramps, disable friendly washrooms, easy access to lifts, provision for braille facility in lifts etc.

- ***Water efficiency in flow & flush fixtures,***

The existing plumbing fixtures could be exchanged with low-flow fixtures (even if the faucets are introduced with aerators); this has a potential for reduction of atleast 30-40% daily water consummations. This will ultimately result in lower pumping requirements and thereby conserve energy.

- ***Rain Water Harvesting systems,***

Rainwater harvesting system is present in the campus. Three number of rainwater storage tanks of capacity 2000 litres each is present. Two number of filter tank is present is present.

- ***Water metering,***

Water metering could be done to identify the water consumption patterns at various levels and help take necessary measures.

- ***Waste management system and provision for organic waste composter.***

Handling of waste in campuses is extremely difficult as most of the waste generated is not segregated at source and has a high probability of going to land-fills. So a proper solid waste management should be present whereby the wastes could be segregated in three types: Solid Waste, Liquid Waste & E- Waste.

Waste management (or **waste** disposal) includes the activities and actions required to manage **waste** from its inception to its final disposal. This includes the collection, transport, treatment and disposal of **waste**, together with monitoring and regulation of the **waste management** process.

Any type of **biomedical wastes** if generated have to be handled with proper safety procedures and are to be disposed of safely as well.

Organic waste should be segregated and Organic waste composter system should be installed.

30.05.2023

Saibal Saha
BCE (J.U.)
Certified Energy Auditor – BEE & Certified Water Auditor – NPC
Environmental Co-Ordinator (Sector – 38) – NABET/QCI
BEE Empaneled ECBC Expert Professional & Master Trainer
LEED ® Green Associate
Accredited Professional – IGBC, Certified Professional – GRIHA Council

Preliminary Audit for implementation of Energy & Environmental Audit

Of

Presidency University

Plot No. DG/02/02,
Premises No. 14-0358, Action Area-ID
New Town
(Near Biswa Bangla Convention Centre)
Kolkata-700156

Submitted by

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Acknowledgement

En-Simulated Solutions LLP extends gratitude to Presidency University for extending us the opportunity to conduct the Preliminary Audit for implementation of Energy & Environmental Audit.

We are thankful to the professors & supporting staffs of the college for their transparency & consistent support in sharing relevant information and for providing data about policies and projects along with their other valuable information. This report would have not been possible without their support.

The study team would like to acknowledge the following distinguished personnel's of Presidency University in person for the diligent involvement and cooperation.

1. Dr. Debajyoti Konar - Registrar
2. Prof. Arabinada Nayak – Director IQAC
3. Prof. Sankar Bose – Dean of Science
4. Dr. Prithul Chakraborty – Finance Officer
5. Smt. Pritha Ghosh – Secretary IQAC
6. Dr. Mery Biswas – Assistant Professor, Dept. of Geography
7. Dr. Puja Ray – Assistant Professor, Dept. of Life Sciences
8. Dr. Shiba Shankar Acharya – Assistant Professor, Dept. of Geology
9. Dr. Debajyoti Pramanik – Assistant Professor, Dept. of Chemistry
10. Mr. Kaustav Kanti Nandi – Development Officer

About the Institution

Presidency University has a unique place in history. It was one of the first institutes of Western-type higher education in Asia. In 1817, a group of enlightened Indians and Englishmen set up the Hindoo College. This was taken over the British Government in 1855 as the College of the Bengal Presidency, and placed in 1857 under the newly founded Calcutta University.

Over the next hundred years and more, Presidency College was Bengal's pre-eminent centre of higher learning. Although a Constituent College of Calcutta University, it preserved a tradition of research matched by few universities in India. This gave a unique dimension to its undergraduate teaching.

The formal establishment of Presidency University in July 2010 allows it to refashion its venerable traditions and continuing strengths into a leading institution of the future.

As per National Assessment and Accreditation Council (NAAC) guidelines every accredited institution should establish an Internal Quality Assurance Cell (IQAC) as a post-accreditation quality sustenance measure. Accordingly, the University set up its IQAC to develop a system for conscious, consistent and catalytic improvement in the overall performance of the institution, and to promote measures for institutional functioning towards quality enhancement through internalization of quality culture and institutionalization of best practices.

The executive Committee of the National Assessment and Accreditation Council on the recommendation of the duly appointed Peer Team declared the Presidency University (College Street campus) as Accredited at A grade which was valid up to December 2021.

INTRODUCTION

Energy is critical to organizations, but often represents a significant cost – both to them and the environment.

ISO 50001:2018, Energy management systems – Requirements with guidance for use, is a strategic tool that helps organizations put in place an energy management system and use their energy more efficiently and effectively.

An energy management system helps organizations better manage their energy use, thus improving productivity. It involves developing and implementing an energy policy, setting achievable targets for energy use, and designing action plans to reach them and measure progress. This might include implementing new energy-efficient technologies, reducing energy waste or improving current processes to cut energy costs. ISO 50001 gives organizations a recognized framework for developing an effective energy management system. Like other ISO management system standards, it follows the "Plan-Do-Check-Act" process for continual improvement.

ISO 50001 provides a set of requirements that enable organizations to:

- Develop a policy for more efficient use of energy
- Fix targets and objectives to meet that policy
- Gather data to better understand and make decisions concerning energy use
- Measure the results obtained
- Review the effectiveness of the policy
- Continually improve energy management

ISO 50001 vs. Other Management System Standards:

As a new member of international standards family, ISO 50001 has been developed based on the common elements shared by other major ISO management system standards, ensuring a high level of compatibility with them. It is notably aligned with ISO 9001 quality management system and ISO 14001 environmental management system standards. The comparison table below provides a quick overview on the comparison between the main clauses of ISO 50001, ISO 9001 and ISO 14001.

Content	ISO 50001	ISO 14001	ISO 9001
Core concept for establishing guidelines	Based on energy consumption of the whole organisation, or a particular production process. For compliance with ESOS the ISO 50001 system must cover all the organisation or groups energy consumption.	Based on relevant environmental aspects	Based on clients' quality requirements
Policy	Energy policy illustrates the strategy of the organisation on energy management. The policy provides the framework for setting up associated objectives and targets to enhance energy performance	Environmental policy illustrates how the organisation handles environmental matters, commitment to environmental protection, as well as associated objectives and targets. Typically, the policy will include the organisations commitment to preventing pollution, regulatory compliance and continuous improvement.	Meet the clients' requirements
Strategy	Conducting energy reviews to identify significant energy use activities and set up energy baseline as well as energy performance indicators. Compliance to relevant regulatory requirements and setting up energy objectives, targets and implementation plans.	Compliance to relevant environmental regulatory requirements. Setting up environmental objectives, targets and implementation plans.	Setting up quality objectives, targets and quality management plans.
Baseline	Energy baseline is foundation to establish the system	No such requirement	No such requirement

In summary, the five requirements of ISO 14001 and ISO 50001:

1. Formation of an Environmental Policy and commitment to an EEMS (Energy & Environmental System),
2. Development of a plan for implementation,
3. Implementation and Operation of the EEMS,
4. Monitoring and possible corrective actions,
5. Top management review and continuous improvement.

Basically, the institution must say what the organization is going to do, how they are going to do, who it is going to do and by when it is going to be done.

In the preliminary audit we are supposed to frame the answer of the first question: 'what the organization is going to do'.

ENERGY AUDIT:

Energy Audit is an effective tool in defining and pursuing comprehensive energy management programmes. It has positive approach aiming at continuous improvement in energy utilization in contrast to financial audit which stresses to maintain regularity. Energy audit provides answer to the question – what to do, where to start, at what cost and for what benefits.

Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of the system. It has been established that energy saving of the order of 15 to 30% is possible by optimizing use of energy by better housekeeping, low cost retrofitting measures and use of energy efficient equipment at the time of replacements. Indian industry consumes more energy as compared to its counter parts in the developed countries.

Need/Purpose:

The energy audit provides the vital information base for overall energy conservation programme covering essentially energy utilization analysis and evaluation of energy conservation measures.

It aims at:

- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures of energy conservation and realization of savings.

ENVIRONMENTAL AUDIT

An environmental Audit provides an assessment of the environmental performance of a business or organization. The audit reveals details about the activities of a company and its compliance with environmental regulations. Audit information is presented to the management team and employees.

An environmental audit evaluates and quantifies the environmental performance. It identifies compliance problems or management system implementation issues related to baseline performances of parameters as per the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974. As thermal power is the principal source of energy in our country, The Energy Conservation Act, 2001 is to be an integral part of The Air Act, 1981. Hence energy conservation during functioning of the institute also to be considered during environmental audit.

GREEN AUDIT:

The green audit is a tools that organizations uses to identify their environmental impacts and assess their compliance with applicable laws and regulations, as well as with the expectations of their various stakeholders. It also serves as a means to identify opportunities to enhance work quality, improves employee health, safety and morale, reduce liabilities and achieve other form of business values.

This concept has got its origin in recent past and suddenly got acceleration due to heavy industrial & commercial traffic which ends with unaccountable emission resulting pollution. Due to growth in population, needs has increased.

It is the duty of organizations to carry out the Green Audits of their ongoing processes for various reasons such as; to make sure whether they are performing in accordance with relevant rules and regulations, to improve the procedures and ability of materials, to analyze the potential duties and to determine a way which can lower the cost and add to the revenue. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

Green Audit is assigned to the Criterion 7 of NAAC (National Assessment and Accreditation Council) which is a self-governing organization of India that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of accreditation.

Need/Purpose:

The intention of organizing Green Audit is to upgrade the environment condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, water conservation, sufficient green cover and proper use of day-lighting in indoor environment. Thus it's a tool to turn the infrastructure into a better environmental friendly institute by securing the environment and cut down the threats posed to human health:

- To make sure that rules and regulations are well taken care of.
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost.
- To suggest the best protocols for adding to sustainable development.
- To suggest improvement in the system to promote safe and clean environment.

In the Energy Audit part, we would be analysing the current consumption of energy (principally electricity from grid) and possible means to make it smarter. The basic areas of study would be like these:

- Analysis of electricity bills received from DISCOMs,
- Analysis of existing lighting system, fans and air conditioning systems. Thereby, searching whether there are scopes of any improvements,
- Searching options for installation of occupancy sensors, daylight sensors etc.
- Replacement of old pumps with new ones,
- Options for putting films over the glazing on the East / West façades,
- Options for reducing water consumptions and thereby the operation hours of the pumps,
- Automatic level controller for overhead reservoirs,
- Options for sub-metering for different uses of electricity like interior lighting, exterior lighting, air-conditioning, pumps and lifts.
- Searching for tentative potential for renewable energy installation and use.

In the environmental front, we may look after the following:

- Options for reducing Heat-Island Effect (both roof and non-roof),
- Options for electric charging facilities for both the 2 & 4 wheelers,
- Universal design options,
- Water efficiency in flow & flush fixtures,
- Rain Water Harvesting systems,
- Water metering,
- Waste management system and provision for organic waste composter,

As per the five requirements of ISO 14001 and ISO 50001:

1. As of now there is no such Environmental policy. However, formulation of the same in currently underway.
2. Development of a plan for implementation is to be done.
3. Implementation and Operation of the EEMS is to be done
4. Monitoring and possible corrective actions – Not applicable at present
5. Top management review and continuous improvement would be done once above actions are completed.

SITE VISIT PHOTOGRAPHS

Diesel Generator Yard

Fire Station

Landscape related pictures

LED Lighting

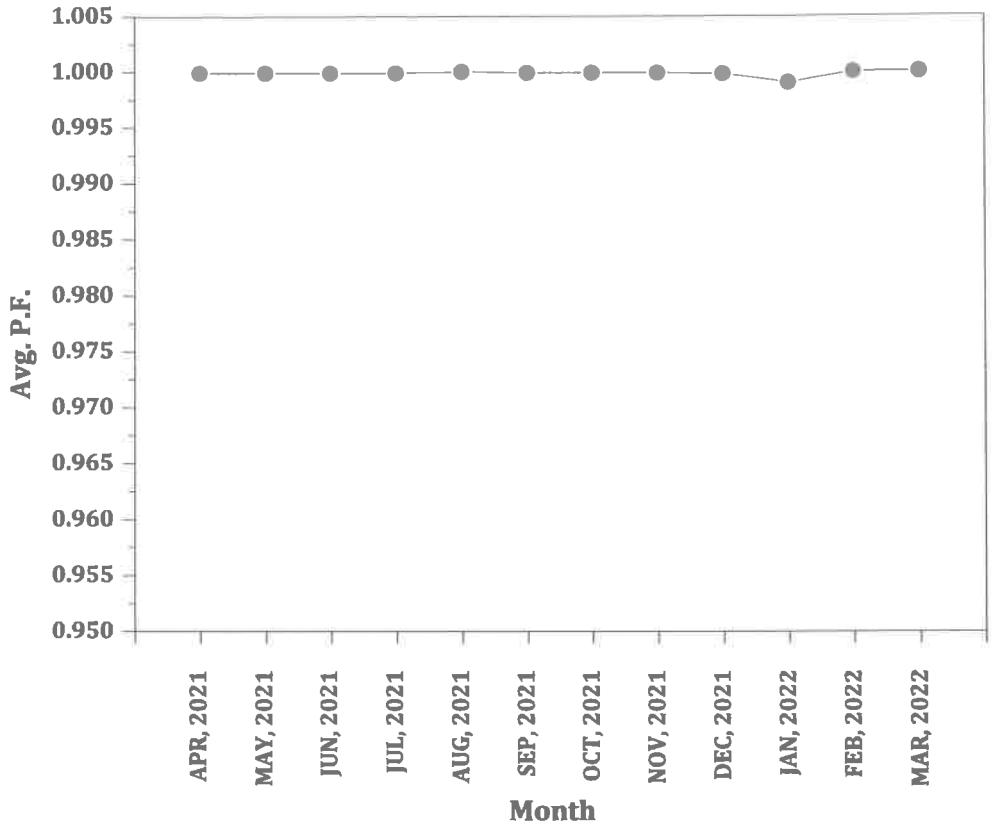
Substation Pictures

Analysis of electricity bills received from DISCOMs:

Electricity Bill Analysis for the period of April 2021 to March 2022 for Presidency University 2nd Campus, New Town, Kolkata:

DISCOM: WBSEDCL

Month	Energy Consumption (kWh)	P.F.	L.F. %	Unit/Rate (Rs.)	Energy Charges (Rs.)	Demand (KVA)	Demand Charge Rate (Rs/KVA/month)	Normal KVA	Demand Charges (Rs.)	LF Reb (-) / Sur(+) Charge (Rs.)	PF Reb (-) / Sur (+) Charge (Rs.) (-5% on EC)	MVCA Charges (Rs. 0.23/kWh)
				Normal	Normal							
APR, 2021	58674.00	0.9999	5.11%	6.91	₹ 4,05,437.34	622	384	1594	612096.00	68455.9	-20271.87	13495.02
MAY, 2021	48402.00	0.9999	4.08%	6.91	₹ 3,34,457.82	470	384	1594	612096.00	74403.3	-16722.89	11132.46
JUN, 2021	50176.00	0.9999	4.37%	6.91/6.89	₹ 3,46,682.70	564	384	1594	612096.00	71001.13	-17334.14	11540.48
JUL, 2021	71852.00	0.9999	6.06%	6.89	₹ 4,95,060.28	590	384	1594	612096.00	67368.22	-24753.01	16525.96
AUG, 2021	91330.00	1.0000	12.04%	6.35	₹ 5,79,945.50	930	384	1020	391680.00	0.00	-28997.28	21005.9
SEP, 2021	75247.00	0.9999	10.25%	6.35	₹ 4,77,818.45	750	384	1020	391680.00	0.00	-23890.92	17306.81
OCT, 2021	68038.00	0.9999	8.97%	6.35/6.33	₹ 4,31,997.40	688	384	1020	391680.00	0.00	-21599.87	15648.74
NOV, 2021	57497.00	0.9999	7.83%	6.33	₹ 3,63,956.01	462	384	1020	391680.00	0.00	-18197.8	13224.31
DEC, 2021	57209.00	0.9998	7.54%	6.33	₹ 3,62,132.97	306	384	1020	391680.00	0.00	-18106.65	13158.07
JAN, 2022	48658.00	0.9990	6.41%	6.33	₹ 3,08,005.14	134	384	1020	391680.00	0.00	-15400.26	11191.34
FEB, 2022	53335.00	1.0000	7.78%	6.33/6.37	₹ 3,37,686.74	304	384	1020	391680.00	0.00	-16884.34	12267.05
MAR, 2022	84062.00	1.0000	11.07%	6.37	₹ 5,35,474.94	622	384	1020	391680.00	0.00	-26773.75	19334.26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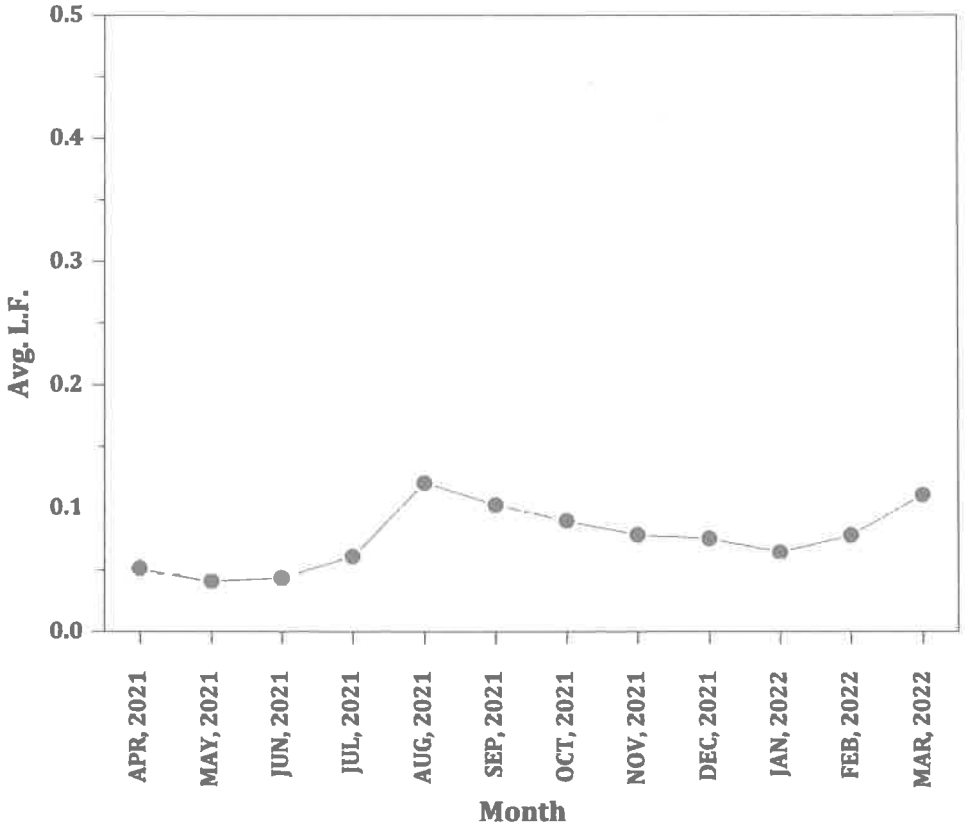
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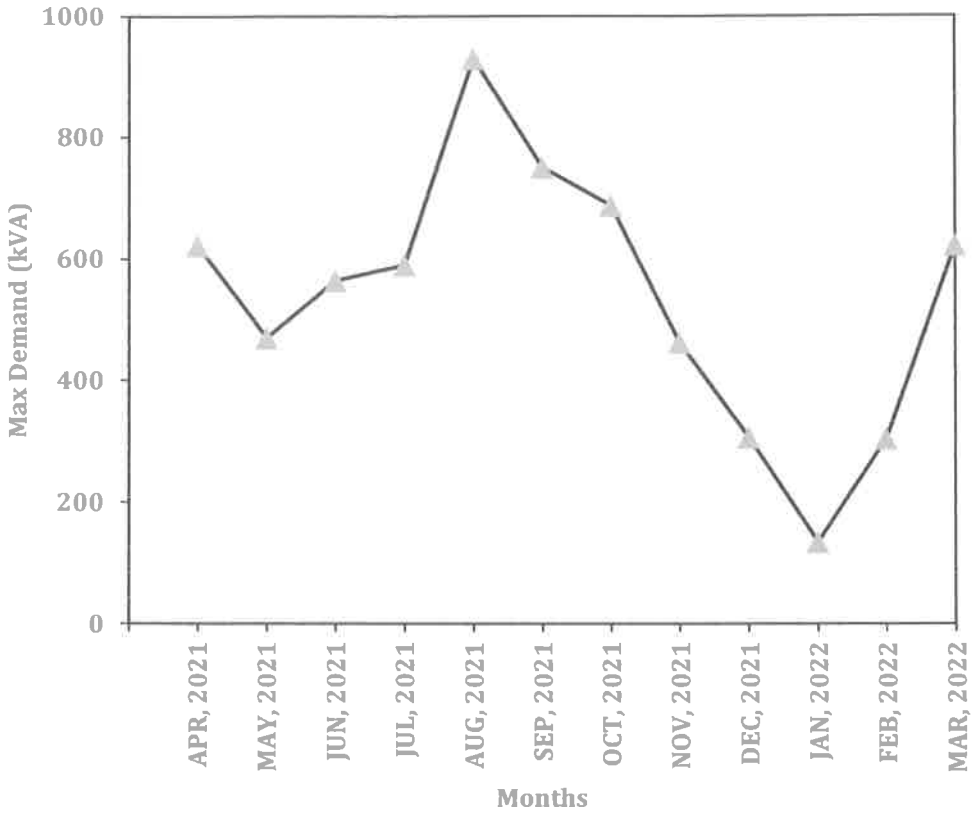
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Max Demand (kVA)
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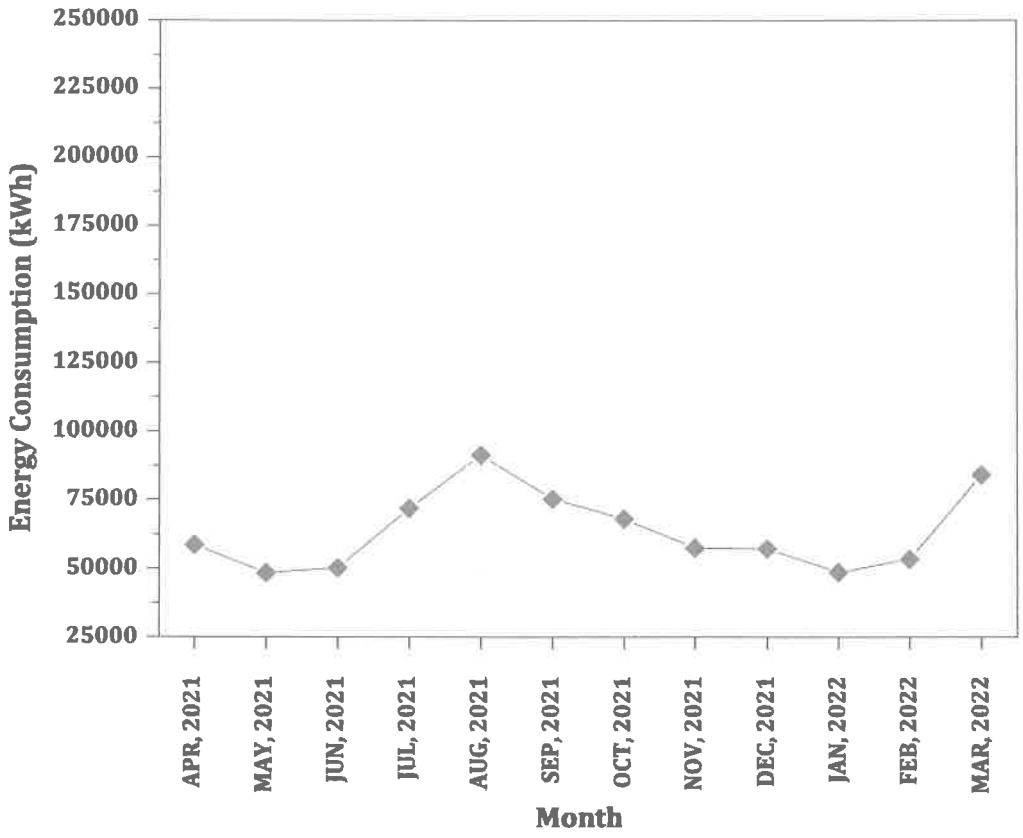
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DEC, 2021
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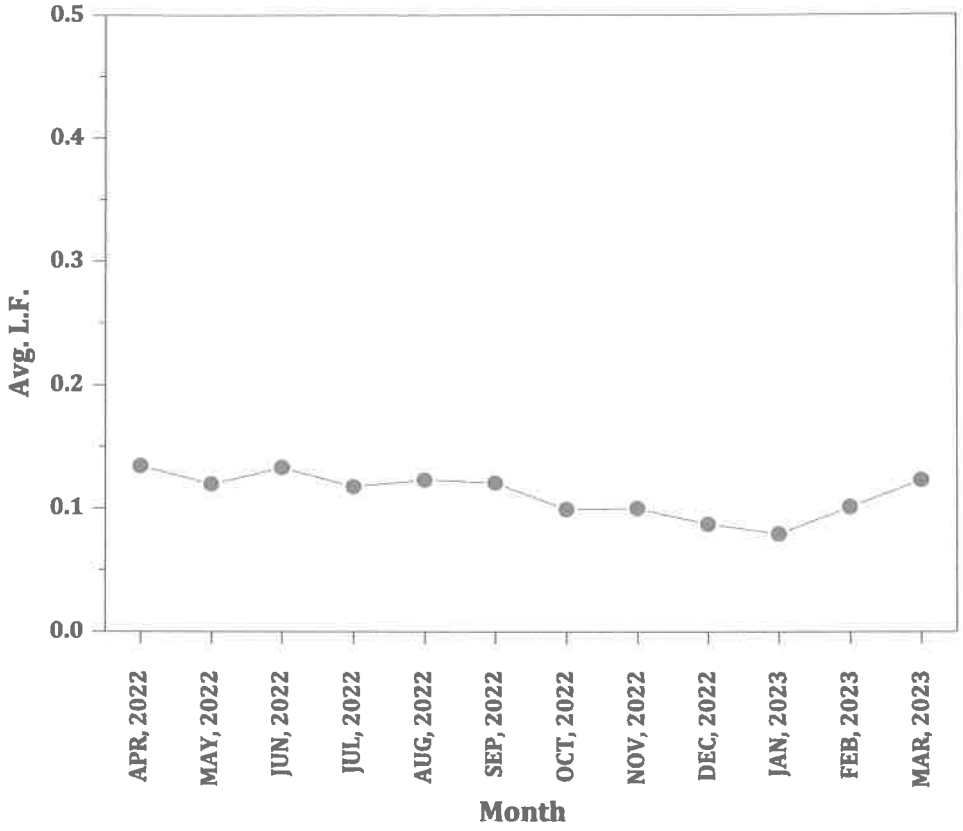
Month

Electricity Bill Analysis for the period of April 2022 to March 2023 for Presidency University 2nd Campus, New Town, Kolkata:

DISCOM: WBSEDCL

Month	Energy Consumption (kWh)	P.F.	L.F. %	Unit/Rate (Rs.)	Energy Charges (Rs.)	Demand (KVA)	Demand Charge Rate (Rs/KVA/month)	Normal KVA	Demand Charges (Rs.)	LF Reb (-) / Sur(+) Charge (Rs.)	PF Reb (-) / Sur(+) Charge (Rs.) (-5% on EC)	MVCA Charges (Rs. 0.23/kWh)
				Normal	Normal							
APR, 2022	98616.00	0.9999	13.43%	6.37	₹ 6,28,183.92	680.00	384	1020	391680.00	0.00	-31409.2	22681.68
MAY, 2022	90654.00	1.0000	11.95%	6.6	₹ 5,98,316.40	444.00	384	1020	391680.00	0.00	-29915.82	0
JUN, 2022	97455.00	0.9997	13.27%	660/658	₹ 6,43,138.03	694.00	384	1020	391680.00	0.00	-32156.9	0
JUL, 2022	88989.00	1.0000	11.73%	6.58	₹ 5,85,547.62	552.00	384	1020	391680.00	0.00	-29277.38	0
AUG, 2022	93157.00	1.0000	12.28%	6.58	₹ 6,12,973.06	470.00	384	1020	391680.00	0.00	-30648.65	0
SEP, 2022	88499.00	0.9995	12.06%	6.58	₹ 5,82,323.42	520.00	384	1020	391680.00	0.00	-29116.17	0
OCT, 2022	75111.00	0.9992	9.91%	6.58/6.56	₹ 4,94,181.92	308.00	384	1020	391680.00	0.00	-24709.1	0
NOV, 2022	73293.00	0.9989	9.99%	6.56	₹ 4,80,802.08	324.00	384	1020	391680.00	0.00	-24040.1	0
DEC, 2022	65905.00	0.9987	8.70%	6.56	₹ 4,32,336.80	226.00	384	1020	391680.00	0.00	-21616.84	0
JAN, 2023	59959.00	0.9989	7.91%	6.56	₹ 3,93,331.04	326.00	384	1020	391680.00	0.00	-19666.55	0
FEB, 2023	62940.00	0.9993	10.11%	6.56/6.60	₹ 4,54,313.32	696.00	384	1020	391680.00	0.00	-22715.67	0
MAR, 2023	93313.00	0.9996	12.30%	6.6	₹ 6,15,865.80	548.00	384	1020	391680.00	0.00	-30793.29	0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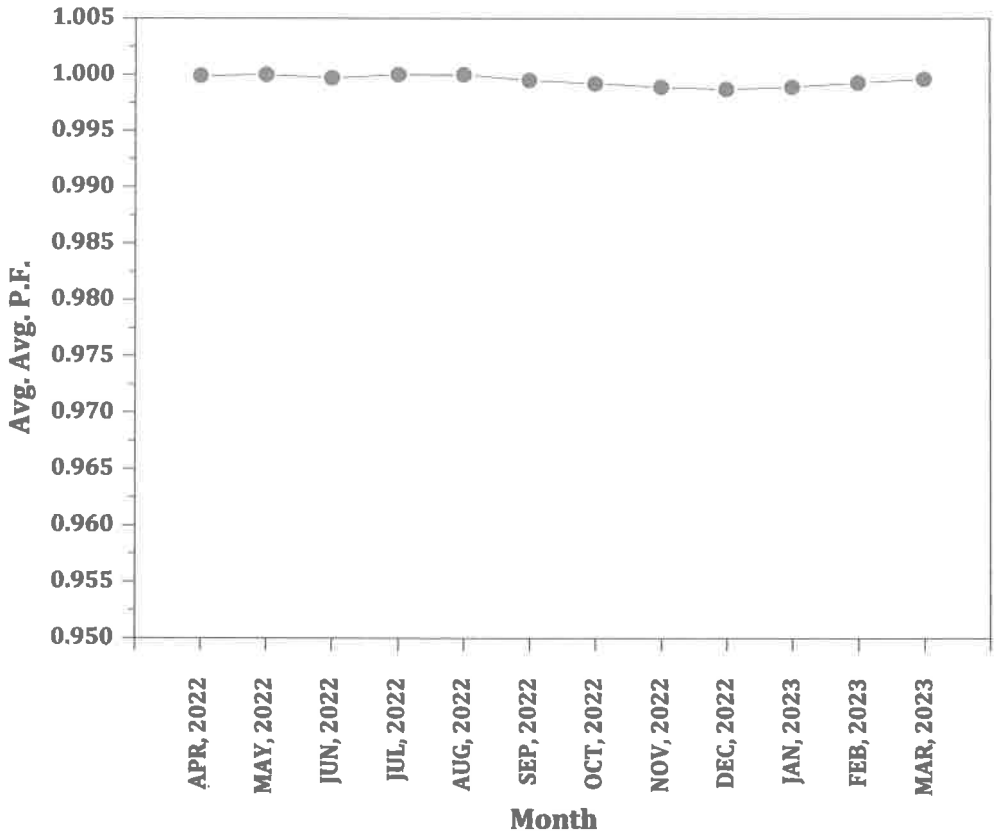
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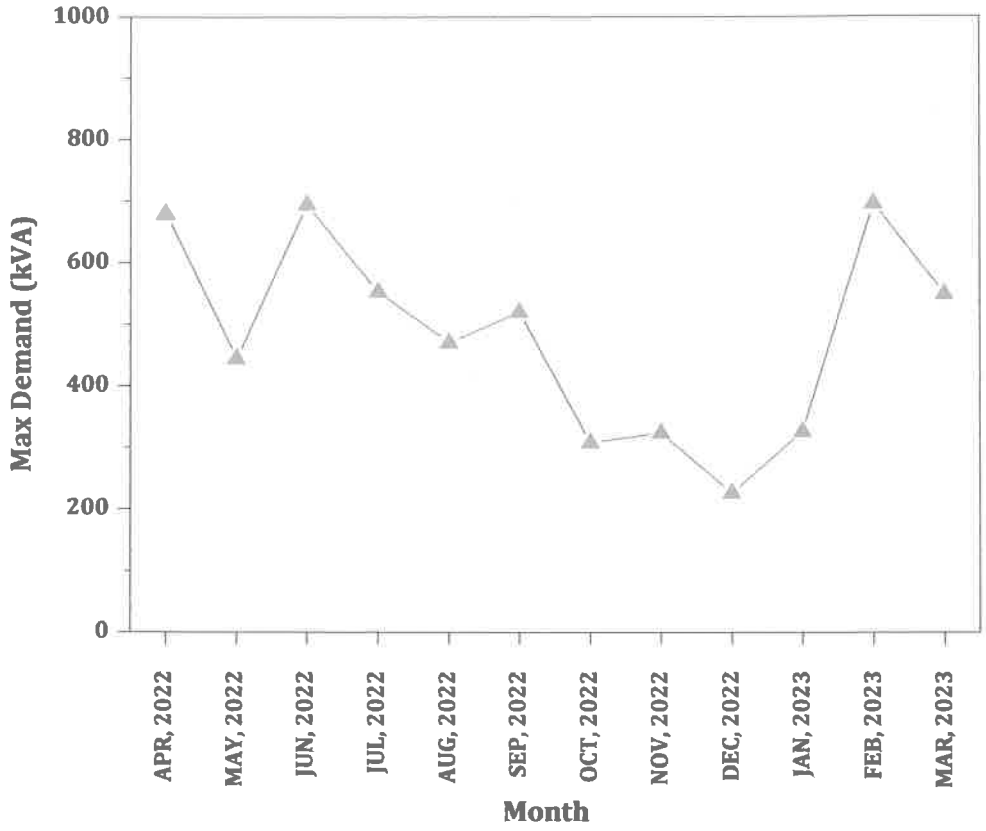
Max Demand (kVA)
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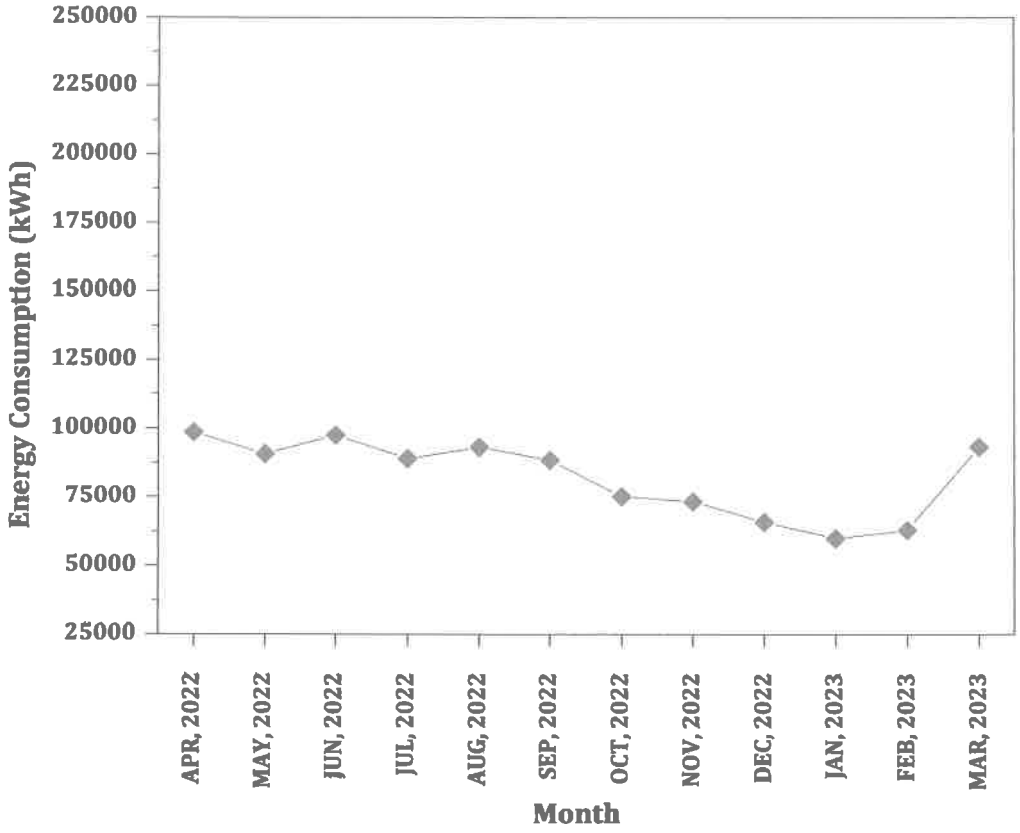
Energy Consumption (kWh)
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MAR, 2023
Month

Analysis of existing lighting system, fans and air conditioning systems. Thereby, searching whether there are scopes of any improvements,

During the walkthrough audit it was observed the existing air-conditioning systems installed in the admin building was already optimal. Hence, very little optimizations is possible here.

Most of the lighting systems have already shifted to LED based luminaires.

However, a large number of conventional (induction motor based) fans still exists in the classroom. These can be replaced by energy efficient Brushless Direct Current Motor or BLDC fans.
Advantage of BLDC fans over conventional fans :-

- Fewer maintenance costs
- Better performance
- Long lasting due to absence of brushes, thereby eliminating the chances of sparks
- Lesser noise
- Greater torque
- Better energy efficiency (as much as 60% less energy consumption as compared to conventional fans.)
- Lesser heat generation.

Searching options for installation of occupancy sensors, daylight sensors etc.

Occupancy sensors and daylight sensors could be installed in the common areas and classrooms to help reduce the energy consumption.

Replacement of old pumps with new ones,

The existing pumps and associated related plumbing line could be thoroughly checked to determine the present health of the pumps (i.e. the operating parameters such as efficiency, head, discharge) and the plumbing lines. Pressure valves and water meters could be installed to help conserve water and detect losses.

Options for putting films over the glazing on the East / West façades,

For admins buildings or buildings where air conditioning systems are installed, heat reflective films could be placed over the glazing to reduce the cooling load.

Options for reducing water consumptions and thereby the operation hours of the pumps, Automatic level controller for overhead reservoirs,

It was observed that pumps are operated on a shift basis (3-shift basis). In addition to this, automatic level controller for overhead reservoirs could be installed

Options for sub-metering for different uses of electricity like interior lighting, exterior lighting, air-conditioning, pumps and lifts.

Sub-metering could be done for different uses of electricity such as interior lighting, exterior lighting, air-conditioning systems, pumps and lifts to help identify the energy consumption pattern of the various equipment and appliances.

Searching for tentative potential for renewable energy installation and use.

Proposal for procurement and installation of solar panels have been submitted to Government for approval.

- ***Waste management system and provision for organic waste composter,***

Handling of waste in campuses is extremely difficult as most of the waste generated is not segregated at source and has a high probability of going to land-fills. So a proper solid waste management should be present whereby the wastes could be segregated in three types: Solid Waste, Liquid Waste & E- Waste.

Waste management (or **waste** disposal) includes the activities and actions required to manage **waste** from its inception to its final disposal. This includes the collection, transport, treatment and disposal of **waste**, together with monitoring and regulation of the **waste management** process.

Any type of **biomedical wastes** if generated have to be handled with proper safety procedures and are to be disposed of safely as well.

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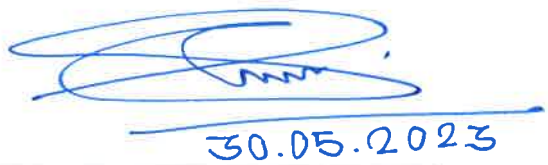

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BCE (J.U.)
Certified Energy Auditor – BEE & Certified Water Auditor – NPC
Environmental Co-Ordinator (Sector – 38) – NABET/QCI
BEE Empaneled ECBC Expert Professional & Master Trainer
LEED ® Green Associate
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