



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by AICTE, PCI, Recognized by the Govt. of A.P. & Affiliated to JNTU-GV, Vizianagaram)

Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.

www.avanthipharma.ac.in, principal@avanthipharma.ac.in

7.1.3: Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

Energy audit

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2023

ENERGY AUDIT REPORT

AVANTHI
INSTITUTE OF
PHARMACEUTICAL
SCIENCES

BY ENVIRO KAMKAR LLP

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ABBREVIATIONS USED

AIPS	Avanthi Institute of Pharmaceutical Sciences
AIET	Avanthi Institute of Engineering and Technology
AES	Avanthi Educational Society.
APSRTC	Andhra Pradesh State Road Transport Corporation
EKL	Enviro Kamka3r LLP
Fig.	Figure
ISO	International Standards Organization
JNTUK	Jawaharlal Nehru Technological University Kakinada
K	Potassium
Kg	Kilo Grams
KL	Kilo litres
KLD	Kilo litres Day
Km	Kilo Meters
HSD	High speed diesel
DG	Diesel Generator
KVAh	Kilo volts amps per hour
KW	Kilo Watts
LPG	Liquefied Petroleum Gas
Lph	Litres per hour
NAAC	National Assessment and Accreditation Council
NBA	National Board of Accreditation

ENERGY AUDIT TEAM



ESTD : 2005



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

ENVIRO KAMKAR LLP

As External Auditor

K.SRINIJA APARNA

K.S.S.KARTHIK

&

As In-house Team

Dr. T. Rushi, Asst. Professor (Department of Pharmacy Practice)

Dr. V.C. Randeep Raj, Asst. Professor (Department of Pharmacy Practice)

Student Members:

Mr. K.Komal Hariramakrishna (B.Pharm. 3rd year)

Ms. Ch. Gowthami (B.Pharm. 3rd year)



Certification & Inspection



ENVIRO KAMKAR LLP

An ISO/IEC 17020: 2012 compliant company

VISAKHAPATNAM – 530 017

This is to certify that a

Energy Audit for

**Avanthi Institute of
Pharmaceutical Sciences**

Cherukupally (V), Bhogapuram (M), Vizianagaram, 531 162,
was conducted to assess the planning, implementation and impacts of the

Energy Management Systems of the Institute

for the year 2022 – 2023
and was awarded with Grade

“A”

On this Day, the February 5th, 2023 at Visakhapatnam.

Certificate No. ENEKL202302




(Ms. K. S. Aparna)

Chief Audit Officer, Enviro Kamkar LLP

1. PREAMBLE

Avanathi Institute of Pharmaceutical Sciences (AIPS), introduced in 2005, has gracefully evolved as a member Institutions of Avanathi Educational Society (AES), at Visakhapatnam, conceived in 1991 by the visionary philanthropist Sri M. Srinivasa Rao. The society has been a steadfast proponent of quality education for over 15 years through AIPS and AIET (Avanathi Institute of Engineering and Technology). Ever since its inception, AIPS has strived to stand as one of the premier institutions in the domain of pharmaceutical sciences, earning recognition from the Indian Pharmaceutical Association (IPA) for its unwavering commitment to excellence.

Mirroring the national goals and missions, AIPS aligns itself with the AES's policy of dedication to make the campus an Green Energy campus. AIPS takes pride in initiating a comprehensive green audit and entrusts it to Enviro Kamkar LLP (EKL), a startup company of environment consultants, groomed and incubated by IIM(B) & NSRCEL. This Energy Audit was first initiated in the AY2021-22, and this will be the **Second** AY's 2022-23 Energy Audit. The audit aims to understand the impacts of the AIPS's efforts in the protection of Nature and Environment, along with the contributions to national SDGs (Sustainable Development Goals).

2. ABOUT AIPS

AES was initiated with a vision to provide fair access to higher education to the students of the North Andhra region. The campus of AIPS was located at Cherukupalli, a semi-urban area situated near Thagarapavalasa, Vizianagaram district, Andhra Pradesh, and is equidistance between the two cities of Visakhapatnam and Vizianagaram. The location was within reach of 2 hrs from most places in the north Andhra region.

AES has a sprawling campus at Cherukupally, and the campus is being shared by AIET and AIPS. Besides academic and administrative blocks, the two institutions share common facilities like, play grounds, a library, and other amenities that were specifically dealt with at relevant places in this report.

AIPS, ever since its inception in the year 2005, was an affiliated institution of Jawaharlal Nehru Technological University Kakinada (JNTU-K), and in the year 2023, the affiliation was transferred to Jawaharlal Nehru Technological University Gurazada Vizianagaram (JNTU GV) following the bifurcation of JNTUK. AIPS has obtained approval for affiliation with and accreditation by the Pharmacy Council of India (PCI), effective from September 20, 2022.

The institute offers four degree programs: (1) B. Pharm with an annual intake of 100 students; (2) M. Pharm in four specializations [Pharmaceutical Analysis; Pharmacology; Pharmaceutics; and

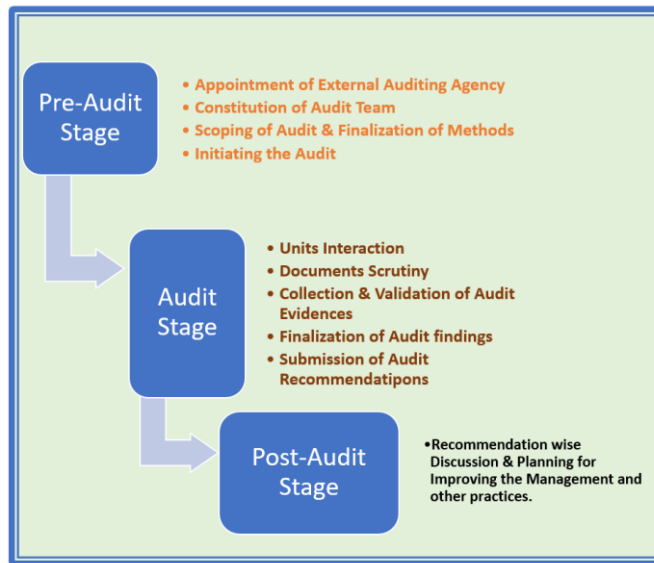
Pharmaceutical Technology] with an annual intake of 15 students per specialization; **(3)** Pharm. D with an annual intake of 30 students; and (4) Pharm D (PB) with 10 seats. The student's mobility from these courses, as was evident from the institution's records was promising and appreciable. The institution includes 14 laboratories equipped with approximately 120 energy-consuming lab instruments.

3. OBJECTIVES, PROCESS AND METHODS :

The energy audit's main goal is to identify and measure how much energy the institution uses and assess the gaps in the usage of energy that are contributing to the wastage of energy, loss of energy efficiency along with the carbon emissions from the energy usage. Additionally, it explores how can the energy be saved and its use efficiency is enhanced. The process also enables the students and staff to explore better ways and contribute for the innovations.

The Energy Audit comprises of three stages, (1) Pre-Audit Stage; (2) Audit Stage, and (3) Post Audit Stage, and the activities in each stage are presented in Figure 1. During the first meeting, the Audit Team has discussed the audit scope, procedures and other protocols and conveyed the information to all the Heads of the different departments and the units of the institution through the principal of the institution, who is also the Chairman of the Audit Team. The Head of the Department of Electrical Engineering has validated the evidences collected for the assessment.

Fig -1 Audit Stages



As a third-party entity, Team Enviro Kamkar, in conjunction with the internal team, initiated the auditing process from January 29, 2024, by initiating collection of Audit evidences from different wings of the institution, validating the evidences, inspecting the documents and facilities. The audit findings were shared with all the unit heads and the management of the institution and reviewed before confirming the audit findings and summary.

4. ENERGY AUDIT

AIPS is committed to exemplifying energy conservation practices as a model institution. Over the recent academic year, the institution has diligently replaced outdated and less efficient energy devices with modern, high-efficiency alternatives. This report specifically addresses the utilization and management of energy within an environmental framework, contributing significantly to the institution's overall environmental management strategy. AIPS meets its electricity needs through three main sources:

High Tension (HT) supply from the Public Distribution Company
High-Speed Diesel (HSD) Generation
Solar Power.

4.1. Consumption of Electricity from HT supply:

The Institute during the audit year (2022 – 2023) has consumed Electricity from the metered connection, **160969 KVAh**, with a monthly mean of 12,192.25 KVAh. The monthly variations were very high and ranged from a low of 9303 KVAh in January 2023 to a high of 18680 KVAh in May 2023. the consumption seems to be low during the winter period, and progressing gradually towards summer months.

The College's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Electronic labs equipment's and Machinery. (5) Refrigerators. During the audit year, the consumption by Laboratory equipment and Refrigerators are high and account for more than a third of the total consumption.

4.2. Electricity generated from Solar Power Systems:

AIPS has an installed capacity of 320 KW power generation through two Roof top solar installations. A total of **17649** Units were generated during the audit year. This is nearly 10% of the consumption of the metered supply. The variability of solar power generation over different months was high and varied from a minimum power generation of 278 kva in June 2022 to a high of 4057 kva in the month of January 2023. However, there is scope for maximizing the solar power generation with due care, by stabilizing the monthly variations.

4.3. Power Generated from DG Sets:

As a stand by to the main power supply, AIPS has a 30 KVA DG set. During the audit year, about 1878 KW were generated from the DG set, consuming 600 litres of Diesel oil. This indicates that the DG set power has costed around Rs. 18/KW.

4.4. Total Power Consumption:

Considering the total electricity consumption from all the three sources together, the total consumption was 168479 KW, with a per capita consumption of

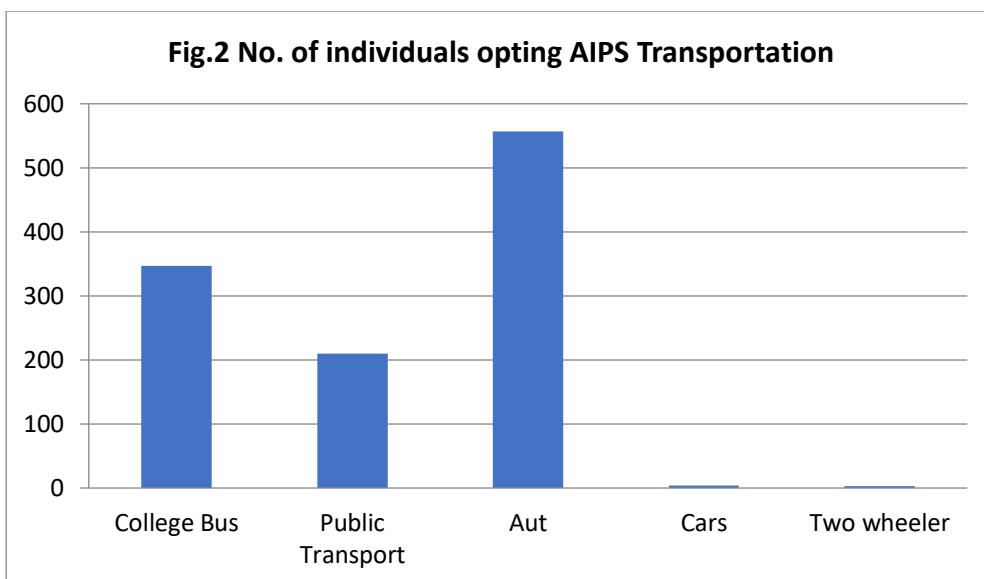
229.2Units/annum, which is relatively high. Besides the above three electric energy needs.

4.5. ENERGY used for Transportation:

The transportation sector stands as the second-largest consumer of energy. Given the absence of residential facilities within the institution, the entire college population, averaging a commuting distance of 70 km, relies on transportation means to reach the campus. Within the AIPS community, 31% opt for the college bus, 19% choose public transportation, 50% utilize auto-rickshaws, a small fraction of less than 5% commute on two-wheelers, and only 4 individuals travel by car.

Following the pattern of the previous year, the transportation sector exhibits similarities with the 2021-2022 period. Consequently, there has been little variation observed in consumption from the transportation sector compared to the previous year.

The college bus fleet consists of 7 buses, each with a fuel capacity of 210 litres. Analyzing the transportation amenities, the college buses collectively consume approximately 52,920 liters annually, with a per capita consumption rate of around 153 litres per annum. Similarly, for the subset of the population relying on public transport and those using personal vehicles, the estimated consumption is tentatively set at 160 liters per capita annually, Therefore, a total of 354 individuals utilize public transportation buses exclusively on the highway. The distribution of the various transportation modes is visually depicted in Figure 2.



Considering the fuel consumption by the AIPS transportation, the per capita fuel consumed by the commuters was estimated at 137 l /head/annum.

4.6. LPG for Energy:

AIPS has an annual consumption of one 14 kg LPG cylinder. While the overall LPG consumption is relatively low, the negligible per capita consumption is primarily attributed to the minimal usage by students and associates in the canteen, which are again shared amenities of sister institutes.

Overall, it can be summarized that the total energy consumption of AIPS for various needs are as stated below:

Electricity: 168479units (KW)

HSD: 600 KL

LPG: 14 kg.

HSD : 11580 L (for Transportation)

4.7. The Carbon Foot Print for Energy Use:

On the whole, during the AY 2022-2023, the AIPS has CO₂ emissions from its energy consumption of xxx tons from use On the whole, during the year 2022-2023, and has CO₂ emission of 158.37 tons from use of electricity, 32.64 tons from HSD Oil consumption, and 10 tons from LPG Use. Thus, from

the three major sources of energy, around xxx tons of CO₂ emissions were estimated Table 6. However, by way of solar power generation of 16.59 tons of CO₂-e could be saved or mitigated. Thereby, the net emissions will be at 206 tons (Table 6).

Carbon Emissions from Energy sources at AIPS during AY 2022 – 2023

No.	Emission Source	Annual Consumption	CO₂ emission Factor (kg/unit)	Total CO₂ emissions (t CO₂e/ann)
1	<i>HT Power</i>	<i>168479 KW</i>	<i>0.94</i>	<i>158.37</i>
2	<i>HS Diesel</i>	<i>12180 litres</i>	<i>2.68</i>	<i>32.64</i>
3	<i>LPG gas</i>	<i>14 kg</i>	<i>2.252</i>	<i>31.53</i>
Total Carbon Emissions				<i>222.54</i>
Emissions Offset through Solar Power				<i>16.590</i>
Net Carbon Emissions				<i>205.95</i>

4.8. Assessment of Energy Efficiency:

In academic year 2022-2023, the organization remains focused on improving environmental initiatives and optimizing energy efficiency. Following the Energy Audit conducted in the previous academic year, several challenges were identified, prompting the need for enhanced monitoring systems to provide a more comprehensive assessment of energy consumption. Efforts are underway to deploy advanced metering technologies and establish robust monitoring protocols to track energy usage more accurately.

Additionally, there is a push to conduct a detailed inventory assessment of energy-based gadgets and establish a comprehensive performance monitoring system. This is aimed at better tracking the performance of energy-consuming devices and identifying opportunities for optimization.

The Energy Audit for the upcoming year will continue to prioritize the assessment of key gadgets used for illumination, ventilation, cooling, and other essential functions, with the goal of identifying areas for efficiency improvements and reducing energy consumption.

Recommendations in the forthcoming report will be categorized into short-term, medium-term, and long-term initiatives, providing the management with a clear roadmap for prioritizing energy-saving projects based on budgetary considerations and expected returns on investment.

The organization is committed to its journey towards a more energy-efficient and sustainable future, with the aim of reducing environmental impact and realizing tangible benefits for the organization and the community.

5. ENERGY AUDIT RECOMMENDATIONS:

The recommendations from the previous academic year (2021-2022) have been carried forward into the current year (2022-2023). Efforts to enhance monitoring systems for a more comprehensive assessment of energy consumption, including the deployment of advanced metering technologies and the establishment of robust monitoring protocols, have continued.

1. It is essential to install an energy meter along current transformers (CTs) for the DG Sets to monitor diesel consumption against energy generation accurately. The meter will measure the output energy for a specific quantity of diesel oil input, allowing for precise evaluation of the DG Set's performance. Regular readings of the energy meter should be taken, and records must be maintained for the total consumption of High-Speed Diesel (HSD) in litres per month, along with the number of hours the generator runs.
2. Swift implementation of the replacement of primary energy gadgets is crucial, promising numerous benefits. This action can result in annual energy savings of nearly 20% and simultaneously reduce the overall carbon footprint by another 20%.
3. The Department of Electrical Engineering plays a pivotal role in guiding the implementation of the audit recommendations. Additionally, they are advised to develop monitoring protocols and bookkeeping procedures for energy efficiency, aligning with the standards set by the Bureau of Energy Efficiency (BEE).

Certificate of Registration

This is to certify that the
Requirements for performing inspection
of

ENVIRO KAMKAR LLP

at

**6-20-24/60, EAST POINT COLONY, VISAKHAPATNAM- 530 017 –
ANDHRA PRADESH, INDIA**

has been independently assessed and is
compliant with the requirements of:

ISO/IEC 17020:2012

For the following scope of activities:

**Environmental Audits, Energy Audits, Green Audits and
Environmental Compliance Assessment.**

Certificate Number: UQ - 2022082258

Validity of this certificate can be verified at www.ukcertifications.org.uk/verify

Date of Initial Registration	23rd August 2022
Date of this Certificate	21st August 2023
2 nd Surveillance Audit Due	22nd August 2024
Certificate Expiry	22nd August 2025


Authorised Signatory



GREEN AUDIT ASSESSMENT & RANKING CRITERION

#	Audit Components	WA	Rec. Score					Max. Score
			A	B	C	D	TOT	
1	Policy and Program development	10	3	2.5	2.5	2	10	10
2	Land use and Land Cover Mgmt.	15	3	2	2	3	10	15
3	Water Management	15	2	3	3	2	10	15
4	Energy Management	15	2	3	3	2	10	15
5	Wastes Management	15	2	3	3	2	10	15
6	Green Initiatives	10	2	3	3	2	10	10
7	Participation Levels	10	2.5	2.5	2.5	2.5	10	10
8	BMPs & Green Skills Development	10	2	2.5	2.5	3	10	10
summary		@	18.5	21.5	21.5	18.5	80	100

- A. Approved Plans for desired out comes: (18.5)
- B. Book Keeping: (21.5)
- C. Periodical Monitoring (21.5)
- D. Out Put levels (18.5)

Category	% Range
AA	➤ 90
A++	80 – 89
A+	70 – 79
A	60 – 69
B+	50 - 59
B	40 - 49
C	< 40

2022

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ESTD : 2005



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(Ms. K. S. Aparna)

Chief Audit Officer, Enviro Kamkar LLP

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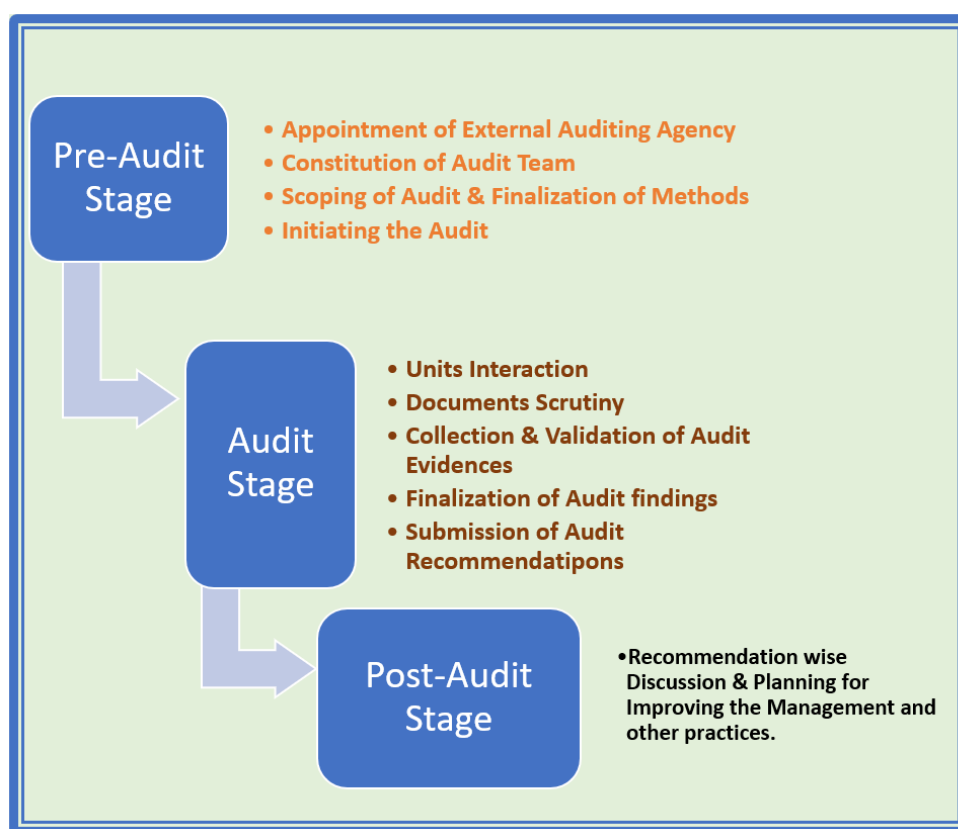
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Fig -1 Audit Stages



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evidences, inspecting the documents and facilities. The audit findings were shared with all the unit heads and the management of the institution and reviewed before confirming the audit findings and summary.

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Conducting its first-ever energy audit, AIPS is committed to exemplifying energy conservation practices as a model institution. Over the recent academic year, the institution has diligently replaced outdated and less efficient energy devices with modern, high-efficiency alternatives. This report specifically addresses the utilization and management of energy within an environmental framework, contributing significantly to the institution's overall environmental management strategy. AIPS meets its electricity needs through three main sources:

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High-Speed Diesel (HSD) Generation

Solar Power.

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The Institute during the audit year (2021 – 2022) has consumed Electricity from the metered connection, **146307 KVAh**, with a monthly mean of 12,192.25 KVAh. The monthly variations were very high and ranged from a low of 3909 KVAh in June 2021 to a high of 21104 KVAh in May 2022. the consumption seems to be low during the June month as that was the post second wave of

covid lockdown, so, most of the theory classes were conducted virtual till the month of July. Slowly the consumption rate got progressed and came down again during winter months which are December January, and February, and again picked up from March.

The College's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Electronic labs equipments and Machinery. (5) Refrigerators. During the audit year, the consumption by Laboratory equipment and Refrigerators are high and account for more than a third of the total consumption.

4.2. Electricity generated from Solar Power Systems:

AIPS has an installed capacity of 320 KW power generation through two Roof top solar installations. A total of **14429** Units were generated during the audit year. This is nearly 10% of the consumption of the metered supply. The variability of solar power generation over different months was high and varied from a minimum power generation of 2 kva in July 2021 to a high of 3910 kva in the month of January 2022. However, there is scope for maximizing the solar power generation with due care, by stabilizing the monthly variations.

4.3. Power Generated from DG Sets:

As a stand by to the main power supply, AIPS has 30 KVA of DG set, during the audit year, about 3,600 KWs were generated from the DG set, consuming 600 litres of Diesel oil. This indicates that the DG set power has costed around Rs. 18/KW.

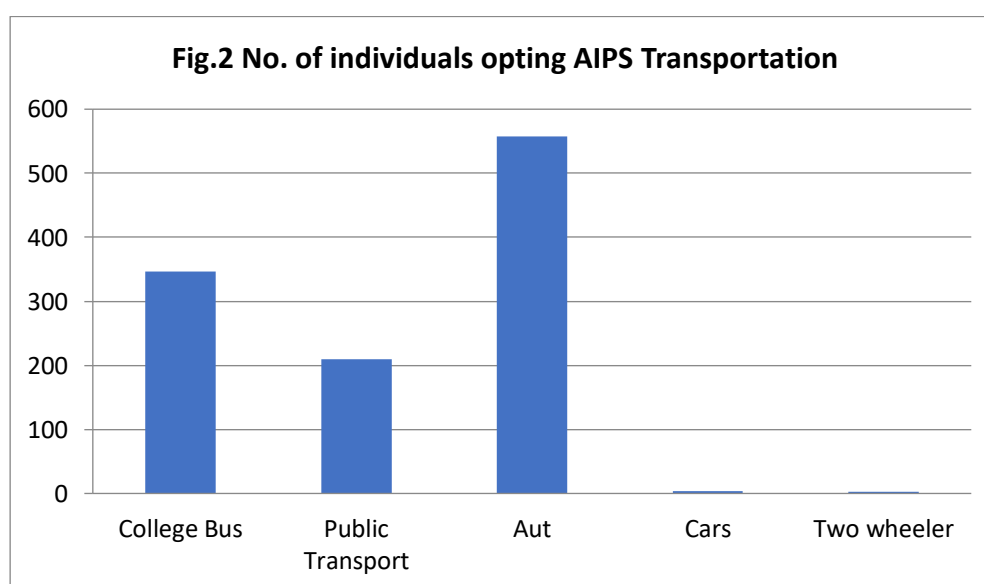
4.4. Total Power Consumption:

Considering the total electricity consumption from all the three sources together, the total consumption was 151,531 KW, with a per capita consumption of **208.7 Units/annum**, which is relatively high. Besides the above three electric energy needs.

4.5. ENERGY used for Transportation:

The transportation sector stands as the second-largest consumer of energy. Given the absence of residential facilities within the institution, the entire college population, averaging a commuting distance of 70 km, relies on transportation means to reach the campus. Within the AIPS community, 31% opt for the college bus, 19% choose public transportation, 50% utilize auto-rickshaws, a small fraction of less than 5% commute on two-wheelers, and only 4 individuals travel by car.

The college bus fleet consists of 7 buses, each with a fuel capacity of 210 litres. Analyzing the transportation amenities, the college buses collectively consume approximately 52,920 liters annually, with a per capita consumption rate of around 153 litres per annum. Similarly, for the subset of the population relying on public transport and those using personal vehicles, the estimated consumption is tentatively set at 160 liters per capita annually, Therefore, a total of 354 individuals utilize public transportation buses exclusively on the highway. The distribution of the various transportation modes is visually depicted in Figure 2.



Considering the fuel consumption by the AIPS transportation, the per capita fuel consumed by the commuters was estimated at 137 l /head/annum.

4.6. LPG for Energy:

AIPS has an annual consumption of one 14kgs LPG cylinder. While the overall LPG consumption is relatively low, the negligible per capita consumption is primarily attributed to the minimal usage by students and associates in the canteen, which are again shared amenities of sister institutes.

Overall, it can be summarized that the total energy consumption of AIPS for various needs are as stated below:

Electricity: 151531 units (KW)

Diesel Oil: 600KL (50L)/ 2 MONTH = 600

LPG: 14 kg.

HSD : 11580 L

4.7. The Carbon Foot Print for Energy Use:

On the whole, during the AY 2021-2022, the AIPS has CO₂ emissions from its energy consumption of 173 tons from use. On the whole, during the year 2021-2022, and has CO₂ emission of 142.4 tons from use of electricity, 31.3 tons from HSD Oil consumption, and 0.031 tons from LPG Use. Thus, from the three major sources of energy, around 173.461 tons of CO₂ emissions were estimated in the given table below. However, by way of solar power generation of 13.563 tons of CO₂-e could be saved or mitigated. Thereby, the net emissions will be at 159.898 tons (Table 1).

Table 1: Carbon Emissions from Energy sources at AIPS during AY 2021 – 2022

No.	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/unit)	Total CO ₂ emissions (t CO ₂ e/ann)
1	HT Power	151531 KW	0.94	142.4
2	HS Diesel	11580 litres	2.68	31.03
3	LPG gas	14 kg	2.252	0.031
Total Carbon Emissions				173.461
Emissions Offset through Solar Power				13.563
Net Carbon Emissions				159.898

4.8. Assessment of Energy Efficiency:

AIPS implemented its environmental policy in the Academic Year 2020-2021. Due to this recent adoption, conducting a thorough Energy Audit with a focus on energy efficiency posed challenges. Gaps in monitoring consumption by facility and source hindered a comprehensive assessment. Additionally, the absence of an earlier inventory of energy-based gadgets and their performance monitoring added to the complexity. Consequently, this year's Energy Audit primarily concentrated on the assessment of key gadgets used for illumination, ventilation, cooling, etc.

In the report, we have divided our recommendations into three categories: short-term, medium-term, and long-term. This way, the management can choose which energy-saving projects to prioritize based on their budget and how quickly they will see a return on their investment.

6. ENERGY AUDIT RECOMMENDATIONS:

1. It is essential to install an energy meter along current transformers (CTs) for the DG Sets to monitor diesel consumption against energy generation accurately. The meter will measure the output energy for a specific quantity of diesel oil input, allowing for precise evaluation of the DG Set's performance. Regular readings of the energy meter should be taken, and records must be maintained for the total consumption of High-Speed Diesel (HSD) in liters per month, along with the number of hours the generator runs.
2. Swift implementation of the replacement of primary energy gadgets is crucial, promising numerous benefits. This action can result in annual energy savings of nearly 20% and simultaneously reduce the overall carbon footprint by another 20%.

3. The Department of Electrical Engineering plays a pivotal role in guiding the implementation of the audit recommendations. Additionally, they are advised to develop monitoring protocols and bookkeeping procedures for energy efficiency, aligning with the standards set by the Bureau of Energy Efficiency (BEE).

Certificate of Registration

This is to certify that the
Requirements for performing inspection
of

ENVIRO KAMKAR LLP

at

**6-20-24/60, EAST POINT COLONY, VISAKHAPATNAM- 530 017 –
ANDHRA PRADESH, INDIA**

has been independently assessed and is
compliant with the requirements of:

ISO/IEC 17020:2012

For the following scope of activities:

**Environmental Audits, Energy Audits, Green Audits and
Environmental Compliance Assessment.**

Certificate Number: UQ - 2022082258

Validity of this certificate can be verified at www.ukcertifications.org.uk/verify

Date of Initial Registration	23rd August 2022
Date of this Certificate	21st August 2023
2 nd Surveillance Audit Due	22nd August 2024
Certificate Expiry	22nd August 2025


Authorised Signatory



GREEN AUDIT ASSESSMENT & RANKING CRITERION

#	Audit Components	WA	Rec. Score					Max. Score
			A	B	C	D	TOT	
1	Policy and Program development	10	3	2.5	2.5	2	10	10
2	Land use and Land Cover Mgmt.	15	3	2	2	3	10	15
3	Water Management	15	2	3	3	2	10	15
4	Energy Management	15	2	3	3	2	10	15
5	Wastes Management	15	2	3	3	2	10	15
6	Green Initiatives	10	2	3	3	2	10	10
7	Participation Levels	10	2.5	2.5	2.5	2.5	10	10
8	BMPs & Green Skills Development	10	2	2.5	2.5	3	10	10
summary		@	18.5	21.5	21.5	18.5	80	100

- A. Approved Plans for desired out comes: (18.5)
- B. Book Keeping: (21.5)
- C. Periodical Monitoring (21.5)
- D. Out Put levels (18.5)

Category	% Range
AA	➤ 90
A++	80 – 89
A+	70 – 79
A	60 – 69
B+	50 - 59
B	40 - 49
C	< 40

ENERGY AUDIT

2020-21

**Avanthi Institute of
Pharmaceutical
Sciences**

10/09/2021



Certificate of Green Audit

It is hereby Certified that
Avanathi Institute of Pharmaceutical sciences
were audited based on
the audit evidences collected and validated by the
Core Audit Team under the supervision of
ENVIRO KAMKAR LLP
as the External Green Auditors
and it is recommended that

GREEN AUDIT GRADE "B"

Be awarded to

For the year 2020 – 2021

On this Day, the November 5th 2021 at Visakhapatnam.

Certificate No. GAEKL202104



(Ms. K. S. Aparna)
Chief Auditor
Enviro Kamkar LLP

ENERGY AUDIT TEAM



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

ENVIRO KAMKAR LLP

Audit Team:

K. Srinija Aparna

K. S. Srinivas Karthik

Y.V. Raghu Ram

as External Auditors

&

Dr. T. Rushi Naidu, Asst. P rofessor, (Department of Pharmacy practice)

Dr.N. R.C Randeep , Asst. Professor,(Department of Pharmacy practice)

Ms. A. Rohitha (Student Member,B.Pharm)

Ms. C .H. Gowthami (Student Member,Pharm.D)

As In house Team

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ABBREVIATIONS USED

AIPS	Avanthi Institute of Pharmaceutical sciences
AICTE	All India Council for Technical Education
APSRTC	Andhra Pradesh State Road Transport Corporation
Pharmacy	Pharmacy
C	Carbon
B.Pharm	Bachelor of pharmacy
M.Pharm	Master of pharmacy
Pharm.D	Doctor of pharmacy
BS & H	Basic Sciences and Humanities
PW	Plastic Waste
Ca	Calcium
CAD	Computer Aided design
CAM	Computer Aided Manufacturing
CO ₃	Carbonates
DO	Dissolved Oxygen
E waste	Electrical & Electronic Waste
EC	Electrical Conductivity
EKL	Enviro Kamka3r LLP
Fig.	Figure
Fe	Ferrous ion
GHRDC	Global Human Resource Development Centre
ha	Hectare
HCO ₃	Bicarbonates
Hp	Horse Power
HSD	High Speed Diesel
HW	Hazardous Waste
ISO	International Standards Organization
JNTUK	Jawaharlal Nehru Technological University Kakinada
K	Potassium
kg	Kilo Grams
KL	Kilo litres
KLD	Kilo litres Day

km	Kilo Meters
Kvah	Kilo volts amps per hour
KW	Kilo Watts
LPG	Liquefied Petroleum Gas
lph	Litres per hour
Mg	Magnesium
MSW	Municipal Solid Waste
Na	Sodium
NAAC	National Assessment and Accreditation Council
NBA	National Board of Accreditation
NCC	National Cadet Corps
NSS	National Service Scheme
pH	Potential of Hydrogen
PW	Plastic Waste
RO	Reverse Osmosis water plant
SO Carbon	Soil Organic Carbon
sq m	Square meter
TA	Total Alkalinity
TDS	Total dissolved solids
TH	Total Hardness
UGC	University Grants Commission

1. PREAMBLE:

Avanthi Institute of Pharmaceutical Sciences (AIPS) is a member institution of the Avanthi Educational Society Founded in 1991, by a visionary philanthropist, Sri M. Srinivasa Rao, who laid the foundation for AIPS in 2005. Through a relentless pursuit of providing quality education, AIPS has been shaping the future generation of pharmacy graduates for over 15 years. The main campus was developed at a semi urban village, ***Cherukupalli***, near Thagarapuvalasa of Vizianagaram district, Andhra Pradesh.

AIPS has always been a pioneer in participating in the national goals and missions and extending them to its students, employees, and neighbors. One such voluntary participatory activity is making the campus ***Green and Environment Friendly***. To monitor this, since this academic year (2020-2021) AIPS's green and environmental activities are being audited by a third party professional, ***Enviro Kamkar LLP*** (EKL), a startup company, groomed by IIM(B) & NSRCEL and has an extensive experience in Green Audit.

This report deals with the first ever annual ***Green Audit*** of AIPS and developed the audit framework for the institution, and related mechanisms, considering the goals of NEP, AICTE and NAAC, besides the norms of the affiliating university, Jawaharlal Nehru Technological University, Kakinada.

2. ABOUT AIPS:

Avanthi Institute of Pharmaceutical Sciences, over the past 15 years, has been providing quality education in pharmacy. The institute was affiliated to **Jawaharlal Nehru Technological University, Kakinada**; was approved by All

India Council for Technical Education (AICTE) and was accredited by the NAAC.

The Location of the AIPS is a sub-urban or semirural environment between Visakhapatnam and Vizianagaram cities (17° 17' 94" 33' 44" N latitudes and 83° 42' 21" - 95" 6" E longitudes) and it offers a wide scope for providing a serene environment far from the urban pollution and busy environment, but yet close to the National highway NH 16 at Cherukupalli, near Thagarapuvalasa of Vizianagaram district, Andhra Pradesh.

The campus was developed in an area of around 2.5 ha with good greenery around it. The institute that was started with three pharmacy programs (B.Pharm, M.Pharm, Pharm.D) with an intake of 170 students, has emerged today as one of the leading institutions in the state today with graduate and five Post-graduate degree programs. Presently, AIPS offers two undergraduate and one post-graduation programs which are mentioned below:

Graduate Programs:

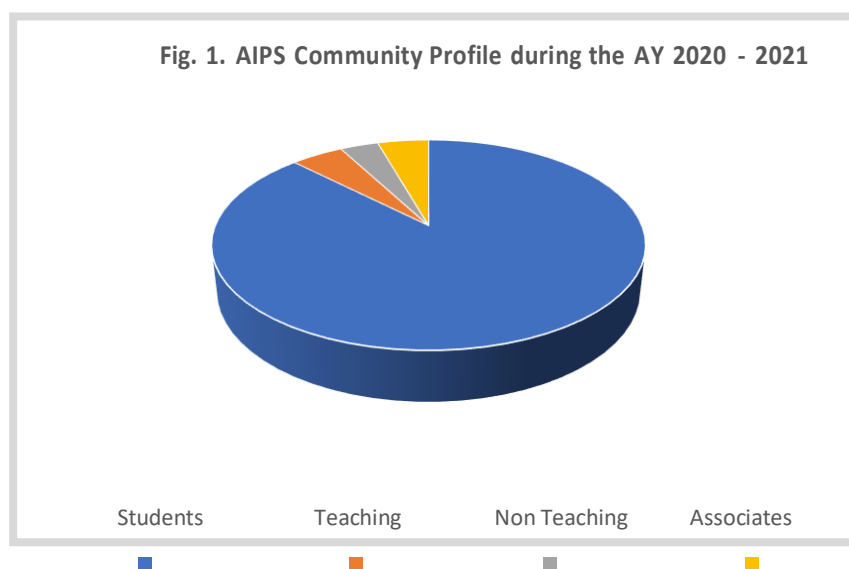
- *Bachelor of Pharmacy*

Post-Graduate Programs:

- *Doctor of Pharmacy*
- *Master of Pharmacy*

AIPS's Career Guidance Centre (CGC) assist the students with information and guidance in choosing the right careers and opportunities, while the institution's Training and Placement Centre (TPC) prepares the students for both on-campus and off-campus placement activities. AIPS identifies the talented students with innovative ideas and grooms them through its Entrepreneurship Development Cell (EDC), and fosters an entrepreneurial mindset among students, empowering them to become successful entrepreneurs. The Industry Institute Interaction Cell (IIC) of the AIPS has established partnerships with 20 esteemed institutions and companies, including, Medline, Aquity, Cromton, Pfizer, apollo, and more.

The **Population** of the AIPS mainly comprises of Students, Teaching Staff, Non-teaching staff and other Associates (suppliers, contractors, etc.) and during the academic year 2020 -2021, the Institution's population was at 710, of which students account for 88.0%, Teaching Staff, Non-teaching staff and other Associates account for 8.2%, 2.9%, and 1.4%, respectively (Fig. 1). Women constitute 67.7 %.



Over 95% of them are day-timers, and therefore, the college population during the Sundays and Holidays, will drastically declines. But, this year owing to the Pandemic, the physical activity of the college was under lock down for most part of the year. All common amenities like Canteen, Auditoriums, Parks and walking tracks were closed and the essential activities were managed with 10% to 50% of the staff, following the Covid-19 norms issued by the government from time to time.

3. **SCOPING OF GREEN AUDIT:**

The scope of a Green Audit encompasses a comprehensive evaluation of various environmental aspects within an educational institution. It goes beyond defining the state of environmental components and extends to comparing the institution's programs and activities over different years, and with peer institutions. The scope includes the following:

a. Environmental Component Assessment: The Green Audit assesses the environmental conditions and impacts of the institution across multiple areas such as energy consumption, waste management, water usage, transportation, and emissions. It examines the institution's practices and activities related to sustainability and resource conservation.

b. Year-to-Year Comparison: The Green Audit enables the institution to analyze its environmental performance over different years. By tracking progress and identifying trends, it helps in understanding the effectiveness of implemented initiatives and in setting targets for future improvements.

c. Peer Institution Comparison: The Green Audit provides a means to benchmark the institution's environmental performance against similar educational institutions. This comparison helps identify areas where the institution can learn from others' best practices, set goals for improvement, and enhance its overall environmental performance.

d. Education and Awareness: The Green Audit serves as an educational tool, raising awareness among students and employees about environmental issues and promoting a culture of sustainability. It helps in instilling environmental responsibility and inspiring individuals to contribute to a positive environmental change.

e. Improvement Prioritization: Through the Green Audit, areas for improvement are identified, allowing the institution to prioritize future projects and initiatives. This enables the institution to allocate resources effectively and implement measures that will have the most significant impact on environmental and economic performance.

Overall, the scope of a Green Audit is designed not only to assess the current state of the environment within the educational institution but also to facilitate continuous improvement, learning from both internal and external comparisons, and fostering a sustainable mindset among the institution's stakeholders.

Goal & Objectives of Green Audit:

The primary goal of green audit is to establish a comprehensive report that provides a baseline assessment of various aspects, including biodiversity, resource utilization, waste management, and sustainable practices. This assessment aims to mitigate resource wastage, enhance resource quality, and promote sustainable practices among the campus community and the wider public. The specific objectives of green auditing encompass the following:

1. Adopt eco-friendly Land use and ensure sustainability;
2. Document Biodiversity of the campus and propose measures to enhance biodiversity with native species;
3. Develop water resources and promote water conservation;
4. Regulate energy consumption, achieve energy efficiency, and promote use of Renewable Energies;
5. Regulate waste generation at source, evolve innovative recycling and reuse and adopt safe disposal methods.
6. To ensure all AIPS members are environment conscious.

By achieving these specific objectives, the green audit aims to contribute to the overall goal of improving the environmental performance of the institution and fostering a culture of sustainability among its stakeholders.

4. GREEN AUDIT: APPROACH

Following extensive deliberations involving the management, staff, and external auditors, M/s. EKR, AIPS conducted its first-ever Green Audit. The audit program was developed to align with the academic year, encompassing the period from June 2020 to May 2021. The entire process was divided into three stages:

- A) Pre-Audit Stage:** Chaired by the Principal of the Institution, the GA Team was formed, comprising five Core Members (three from the institution and two from the third-party consultant organization, EKR). The institutional members engaged department and unit heads from various wings of AIPS, including teaching, administrative, and allied units. During this stage, GA protocols, requirements for collecting audit evidence, and implementation schedules were prepared;
- B) Audit Stage:** This stage involved the day-to-day collection and validation of audit evidence, necessitating systematic record-keeping and database development. Given that this was AIPS's inaugural audit, the core team reviewed procedures and methods on a monthly basis. The validation of GA evidence was streamlined, focusing on key sectors such as land use, water, air quality, greenery, waste generation, and proper disposal. EKR conducted training and awareness programs for students, teaching staff, and supporting staff. By November 19th, 2021, the audit results were analyzed, and the audit report was presented to the Management of AIPS.
- C) Post-Audit Stage:** This stage entails the management's review of the GA report and the issuance of terms of reference to initiate the next year's Green Audit.

In summary, the GA was conducted in three phases and this being the first ever Green Audit for AIPS, several evidences required for the audit were difficultly traced. However, for subsequent audits, the book keeping practices were initiated as proposed by M/s. EKR, ensuring a comprehensive assessment and documentation of the institution's environmental performance.

5. GREEN AUDIT: RESULTS 2020-2021

Land Use & Land Utilization:

The land use status in AIPS demonstrates a commendable green approach, with approximately 29% of the area dedicated to open spaces (Table 1). This indicates a very good land use planning strategy. The per capita open area of approximately 1251m² is also noteworthy, indicating a high level of healthy land allocation. In comparison to other private sector institutions at a similar level, AIPS stands out for its favorable land use practices.

Table 1. Distribution of Land use types in AIPS as on August 2021.

LAND USE	Area (sq m)
Constructed Area	6593.88
Roads, Pavements & Paths	301.44
Play Grounds	2348.24
Under Greens	1000.89
TOTAL LAND AREA	10117.14

The land use in the institute is well-balanced, adhering to the norms for institutions of higher learning. While the Vacant Site area was designated for greening, the total open area, including Roads and Tracks, Playgrounds, and Parking areas, remains exposed to the sky. This design allows for unobstructed wind flow and effective rainwater harvesting through natural percolation.

Biodiversity

In terms of greening, this being the institute's first Green Audit, the assessment focused solely on the Tree Cover, while other vegetation strata, mainly consisting of annuals or ornamental exotics, were not considered. The results indicate that approximately 29% of the Open Areas within the campus are covered with vegetation.

The distribution pattern of vegetation primarily follows the periphery of individual building blocks rather than the campus boundary. The campus, with a boundary length of around 765 m, support several mature trees that for a cover along 22% of the boundary length. Additionally, dense tree cover is also present in the spaces between different building blocks (Fig. 2)

Fig. 2. Satellite Image showing AIPS Boundary and Greenery of the area.



An assessment was conducted to evaluate species diversity, number of trees, and biomass quantities. The results suggest that there is room for vast improvement in terms of diversity and biological productivity to derive from the available land. Nevertheless, the current state of tree species diversity and their enumeration has been documented.

A total of 150 individual trees belonging to 10 tree species were recorded within the AIPS campus (Table 2). Most of these trees are native species of economic significance. The distribution of trees across different girth classes in (Table 3) reveals that 89% of the trees are less than 10 years old, indicating that they were planted after the establishment of the campus.

Table 2 Dominant Flora of AIPS campus:

No.	Family	Species	Habit*	Common/Telugu Name
1	Acanthaceae	Peristrophe paniculata (Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthes aspera L.	H	Uttareni
3	Moraceae	Artocarpus Heterophyllus	T	Panasa/Jackfruit
4	Fabaceae	Saraca Asoca	T	Ashoka trees
5	Anacardiaceae	Mangifera indica	T	Mango
6	Fabaceae	Acacia Aneura	T	Mulaga
7	Euphorbiaceae	Euphorbia hirta L.	H	Nanubalu
8	Fabaceae	Cassia obtusifolia L.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosia purpurea (L.) Pers	H	Vempali

H = Herb

S = Shrub

T – Tree

a) Tree Enumeration:

The enumeration of tree species was conducted, and the detailed results revealed a total of 150 trees of 18 species exist on the campus. Among them, nine species were identified as fruit-bearing trees, constituting 23.53% of the total tree count. A majority of the remaining trees were palms or of ornamental value. Analyzing the age distribution based on the Girth classes (Fig. 3), it was observed that the majority of trees (89%) fell into the two lower age classes, namely A and B.

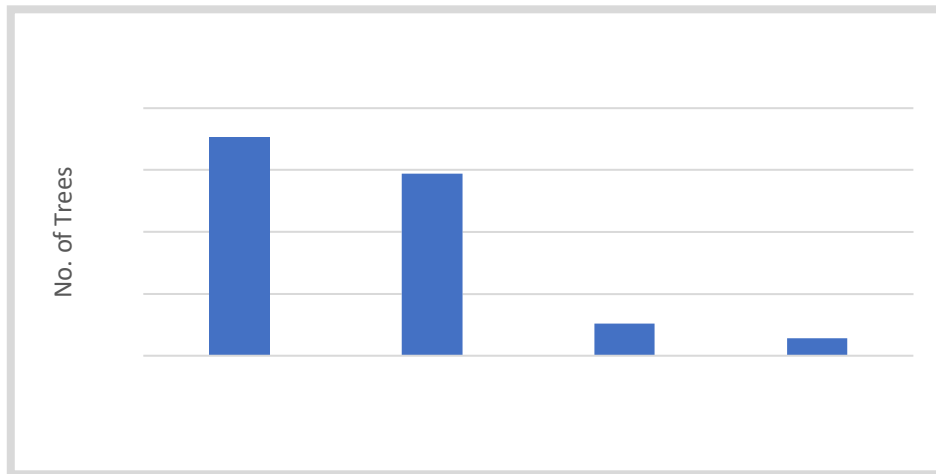


Table 3. Tree species Enumeration and Biomass (Dry Weight)

T No.	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	40.5	7	18	1.491
2	Borassus flabellifer L.	40	9	44	4.572
3	Cocos nucifera L.	31	8	19	1.054
4	Wodyetia bifurcate A.K. Irvine)	38	6	62	3.876
5	Conocarpus Erectus L.	27	7	23	0.847
6	Terminalia catappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28	6	3	0.102
8	Caesalpinia pulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindus indica L.	40	6	22	1.524
10	Tectona grandis L. f	30.5	11	11	0.812
11	Azadirachta indica A. Juss	27	9	13	0.616
12	Ficus religiosa L.	39	7	1	0.077
13	Syzygiumcumini L. Skeels	59	6	12	1.809
14	Neolamarckiacadamba (Roxb.) Bosser	53	8	7	1.135
15	Artocarpus Heterophyllus	37.5	6	4	0.244
16	Acacia Aneura	30.5	6	29	1.168
17	Saraca Asoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					24.067

b) Tree Biomass: Using ecological methods, the woody biomass of the campus trees was estimated, giving particular emphasis to the top nine species with high population numbers. Collectively, all tree strata contributed 24.067 tons of biomass.

c) Carbon Stocks: To estimate carbon stocks within the AIPS campus lands, the tree biomass was utilized in conjunction with standard stock assessment methods. This involved calculating the Above Ground Biomass (AGC) carbon, Below Ground Biomass (BGC) carbon, and Soil Organic Carbon (SOC). Regarding SOC, only the "Vacant Land Site" spanning an area of 41417 m² was considered, as it is expected to sequester SOC in the future. The Biological carbon stock was estimated at 4.55 tons C, while the SOC stocks were estimated at 25.54 tonsC and the total carbon stock was estimated at 26.09 tonsC. There is a significant potential for improvement in these carbon stocks.

d) Associated Fauna: The presence of a diverse range of animal species within the AIPS campus greenery indicates the provision of valuable biodiversity services. This report includes observations and identifications made by students, focusing on avian (bird) species, butterflies, and one species of squirrel. The included species represent those frequently observed within the campus environment (Table 4)

Table 4. List of major faunal species reorder in AIPS Campus

S.no	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Rana spp	Frog
REPTILES			
1	Tree Gecko	Hemidactylus sp	Lizard
2	Wall lizard	Hemidactylus prashadi	Lizard
3	Garden Lizard	Calotes versicolor	Lizard
BIRDS			
1	Red-vented bulbul	Pycnonotus cafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotheres tristis	Diurnal Birds
4	Crow	Corvus corvidae	Diurnal Birds
5	Common Cuckoo	Cuculuc canorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittacula krameria	Diurnal Birds
8	Black Drongo	Dicrurus Macrocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds
10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattus rattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danaus chrysippus	Insects
2	The Gram Blue	Euchrysops snejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumala limniace	Moth

Water Resources Management:

AIPS, with a daily median population of over 677 individuals, including both teaching and non-teaching staff as well as students, has a water demand of approximately 18 KLD (Kilo Liters per Day). To meet this demand, the college relies entirely on groundwater resources. There are two bore wells on campus, each connected to separate overhead tanks located in various academic, administrative, and other utility buildings. Water quality of the AIPS ground waters is presented in Table 5 and conforms mostly with the drinking water standards of IS 5500. The total capacity of (2) overhead water storage facilities is 10 KLD. It is worth noting that during holidays and vacation periods, the water demand reduces by more than 90%. The water quality analysis conducted on the two borewells indicated that one borewell's water quality is mostly similar and meets the standards set by IS 5500 for drinking water use, except for TDS levels.

The institute provides RO treated water for drinking purposes and AIPS has one RO plants with 1000 l/day capacity. The RO plants generate 3 litres of reject water for every 1 litre of water treated. This reject water is collected in a tank and then effectively utilized for the irrigation of gardens and green areas. Usually, the maximum of 3000l/day RO reject waters are generated on peak days, while average was at 1.8 KLD.

As for sewage management, all blocks within the AIPS are equipped with soak pits and septic tanks. Since no activities within the AIPS poses any potential to produce toxic wastes, this system adequately handles sewage disposal. However, it is important to note that in the Wet laboratory, where chemicals are

utilized, the laboratory sinks are directly connected to effluent collecting cans with a capacity of 150 liters. It should be mentioned that due to the labs not being operational this year because of the pandemic, there was minimal generation of lab wastewater. We are presenting the pre-monsoon water analysis.

Table 5. Water Quality of the Ground waters of AIPS – 2021.

No.	Parameter*	BW-1	BW-2	BW-3	BW-4	IS 5500
1	pH	7.2	7	7	7.5	6.5-8.5
2	EC	243.8	247.8	247.5	250	500
3	TDS	412	412	418	412	500
4	TH	212	215	222	221	300
5	Ca	62	60	60	61	75
6	Mg	22	21.4	23	22	30
7	Na	11	14	16	12	200
8	K	8	7	8	8	10
9	Fe	0.05	0.05	0.05	0.1	0.3
10	Cl	100	100	100	100	250
11	PO ₄	1	0.8	0.7	0.7	10
12	NO ₂	0.03	0.03	0.03	0.03	1
13	F	0.4	0.4	0.5	0.4	1.2
14	TA	122.5	128.8	136	139	200
15	CO ₃	36.1	30.2	31.1	30.3	---
16	HCO ₃	229	227	227	223	---
17	DO	3	2.9	2.9	3.1	4.8

* = All parameters are in mg/l, with the exception of pH

The total water consumption of the AIPS can be classified into three use types:

1. Academic and administration
2. Laboratories, Workshops and Utilities
3. Greenery

AIPS has a total of 2 tanks with a capacity of 5000 liters (10,000 liters in total), which are used for daily tapping purposes. Additionally, there are 1 RO plants, each with a capacity of 1000 liters (1000 liters in total). The campus obtains water from 2 bore wells. The academic and administrative areas consume approximately 10 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities require an additional 8 KLD. The gardens and green zones need about 3 KLD of water, of which 2 - 3 KLD is sourced from RO reject waters. Overall, AIPS utilizes 20 KLD of groundwater on all working days. This particular audit year, unusually, is a pandemic year and for most part of the year (approximately for 7 months), the institute has functioned **virtually** utilizing online mode, the water consumption was very minimal.

Energy Resources Management:

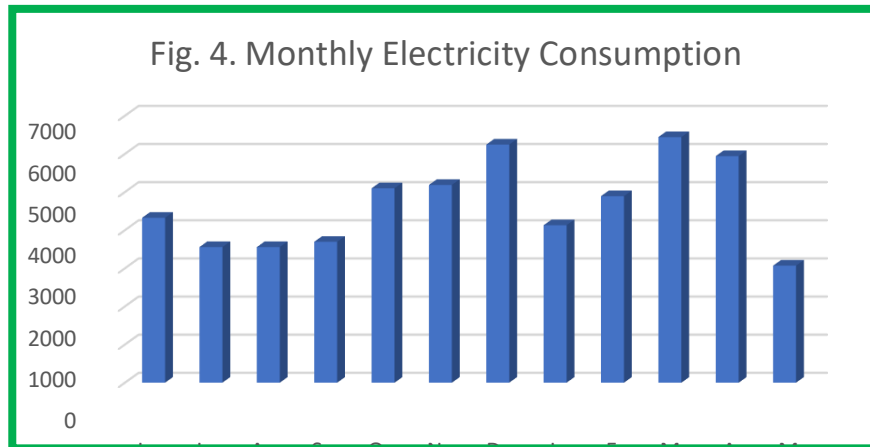
AIPS has a firm commitment towards energy management and aims to become a model institution for energy efficiency. The college has conducted energy audit to assess its energy management practices and efficiency. The findings of this audit, conducted by an accredited consultant, are documented in the energy audit report. This report provides an overview of the institution's energy utilization and management.

AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power.

In addition to electricity, AIPS also relies on significant amounts of LPG for the canteen and laboratories (non-computer). Further, significant quantity of High-Speed Diesel (HSD) is utilized for transportation purposes.

Consumption of Electricity:



During the audit year, the Institute consumed a total of 23,128 Kvah of electricity from the metered connection, with a monthly average of 2,900.33 Kvah. Monthly variations in consumption were significant, ranging from a low of 2,069 Kvah in May 2021 to a high of 6,000 Kvah in March 2021 (Fig. 4). Due to the academic year's lockdown period, there was limited consumption from academic departments. The Institute's Electricity use can be considered under four major Load Sectors:

- (1) Illumination;
- (2) Fans and Ventilations;
- (3) Air Conditioning; and
- (4) Computers, labs, and Machinery.

During the audit year, the use by Air-conditioning sector was the maximum, accounting for 53.20 % of the total load, followed by Computers and Machinery sector accounting for nearly 31.82 % of the total load.

Electricity generated from Solar Power Systems:

The Institute has installed one rooftop power generation systems, each with a capacity of 320 KWP. During the audit year, a total of 24000 Units were generated, which is equivalent to 0.96 times of the metered supply consumption. The monthly data on variations in the generation from each of the 50 KW installations was not available, as such the efficiency of the installation could not be assessed.

Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 32 KVA and 15 KVA respectively. During the audit year, these generators produced approximately 1180 KWs of electricity, consuming 280 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.47/KW. Overall, the total electricity consumption from all three sources, including the DG sets, was 37908 Units. The per capita consumption of electricity was 23.95 Units per annum, which is considered very low for a technical educational institution, however, due to pandemic conditions, this figure do not reflect the true status.

Transportation is a significant sector in terms of energy consumption at AIPS. However, due to the pandemic lockdown, physical classes were not conducted on campus. As a result, the fuel consumption in Institute vehicles, including buses and other private modes of transport, was reduced drastically. Only the fuel consumption for six months, from September 2020 to February 2021, has been considered for analysis.

AIPS has a fleet of 07 buses bringing in nearly 68% of the college population. However, during the pandemic situation, only 3 buses were plying. However, during the non-lockdown period of nearly 18 weeks and 97 working days, all the

buses were used. Data for this period revealed that the average trip length for each bus was at 127 km with an average passenger capacity of 51. The average daily consumption was recorded at 32 liters/bus. Thus, during the 97 day period, a total of 210 liters of HSD was consumed for transporting nearly 405 members to the college and back. This indicates that the members using the AIPS buses had a per capita consumption of 0.238 liters/day.

Among the entire institution population, 27.08% utilize the institution buses, while the remaining chose other modes of transportation. This includes 67.5% using public transportation, 23.33% using autos, 44.1% using their own two-wheelers, and 1% using four-wheelers.

Use of LPG:

AIPS utilizes LPG (liquefied petroleum gas) for various purposes, primarily in the canteen and laboratories (non-computer). The college relies on significant quantities of LPG to meet the cooking and heating needs in these areas. LPG is a convenient and efficient fuel source, providing the necessary energy for cooking and other laboratory applications within the campus. The use of LPG during the pandemic year could not be assessed. Rough estimates stand at 125 kg/annum.

In summary, the energy consumption at AIPS can be categorized as follows:

Electricity: The total consumption:	30128 units.
Electricity by DG Sets:	1180
Total Electricity Consumption:	33908 Units
Solar Power transferred to GRID	35216

Thus, in electricity consumption, AIPS could generate nearly 0.96 times to its HT consumption and producing more clean energy.

However, transportation has become a major contributor for the consumption of HSD and thereby to the pollution loads. The carbon emission from the energy management during the audit year is presented below, which reveals that the net Carbon emissions from the AIPS stand at 59 tC/annum.

Table 6: Carbon Emissions from the Energy management of AIPS during 2020 – 2021.

No.	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	30128 KW	0.94	36760.32	23
2	Diesel Oil	24352 litres	2.68	68143.36	108
3	LPG	115 kg	2.252	211.58	0
TOTAL Carbon emissions					131
Emission Offset through Solar Power					21
NET Carbon emissions					152

Wastes Management:

AIPS has considered all types of waste generated from its units and facilities. The wastes have been broadly classified into four categories in accordance with the Environmental (Protection) Act of 1986:

A. Solid Waste (MSW):

(i) Wet Waste

(ii) Dry Waste

(iii) Sanitary Waste

B. Plastic Wastes (PW)

C. Hazardous Waste (HW):

- (i) Battery Wastes
- (ii) Chemicals and Other H. Wastes

D. E-wastes

To analyze the quantity of different types of wastes generated from various units of the college, a sampling process was conducted on seven random days. This sampling was carried out over two consecutive weeks during non-lockdown period of the year. The results of this assessment are presented in Table 7 below:

Table7. Types of Wastes and waste generation levels at AIPS during non-lockdown times

#	Waste Type	Sources	Qty	Disposal
1	Wet Waste	Dining Halls, Messes & Canteen	3 kg/day	To Compost
2	Paper &Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/AuthorizedCollectors
4	Plastic	All	0.12 kg/day	IC/AuthorizedCollectors

This being the Pandemic year, these waste generation estimates are of low precision, but helps in designing the waste management practices with a good monitoring and verifiable strategy, which were yet to be established.

6. GREEN AUDIT: RECOMMENDATIONS 2020-2021

- 1. The AIPS should create “Environment management cell” involving all unit heads, representatives from different sectors and members from the village committee. This EMC shall develop “Environmental Policy” for AIPS and will be responsible for realizing the policy goals.**
- 2. The environmental management cell shall be responsible for the documentation of all green and environmental activities along with book keeping for natural resources consumption, Energy management, waste generation and disposal, and for all other statute compliances related to environment.**
- 3. Recommended that the college should create awareness among the students, faculty, supporting staff and others who are associated with the college on a regular basis, about the importance of the green audit, Environmental audit, Resources AUDIT, Academic audit and so on and ensure develop procedures to provide satisfactory audit evidences;**
- 4. Recommended to conduct interdepartmental activities on Environment and Sustainable development to promote environmental consciousness among the students, employees, and other stakeholders;**
- 5. Considering the area available to the College, the species diversity can be improved by three to four times and the college should develop a plan for improving the vegetation cover in the coming three to four years.**
- 6. On the resources management, the college should improve upon in all the indicators, and recommended to monitor them every year.**
- 7. The college should enhance the use of the Renewable Energy Sources.**
- 8. Waste Management strategy must be developed and appropriate disposal methods need to be followed.**

Annexure 1



**GOVERNMENT OF INDIA
MINISTRY OF CORPORATE AFFAIRS
Central Registration Centre**

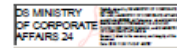
Form 16

**[Refer Rule 11(3) of the Limited Liability Partnership Rules, 2009]
CERTIFICATION OF INCORPORATION**

LLP Identification Number: AAN-5693

It is hereby certified that ENVIRO KAMKAR LLP is incorporated pursuant to section 12(1) of the Limited Liability Partnership Act, 2008.

Given under my hand at Manesar this Twenty sixth day of November Two thousand eighteen.



SATYA PARKASH KUMAR

For and on behalf of the Jurisdictional Registrar of Companies
Registrar of Companies
Central Registration Centre

Disclaimer: This certificate only evidences incorporation of the LLP on the basis of documents and declarations of the applicant(s). This certificate is neither a license nor permission to conduct business or solicit deposits or funds from public. Permission of sector regulator is necessary wherever required. Registration status and other details of the LLP can be verified on www.mca.gov.in

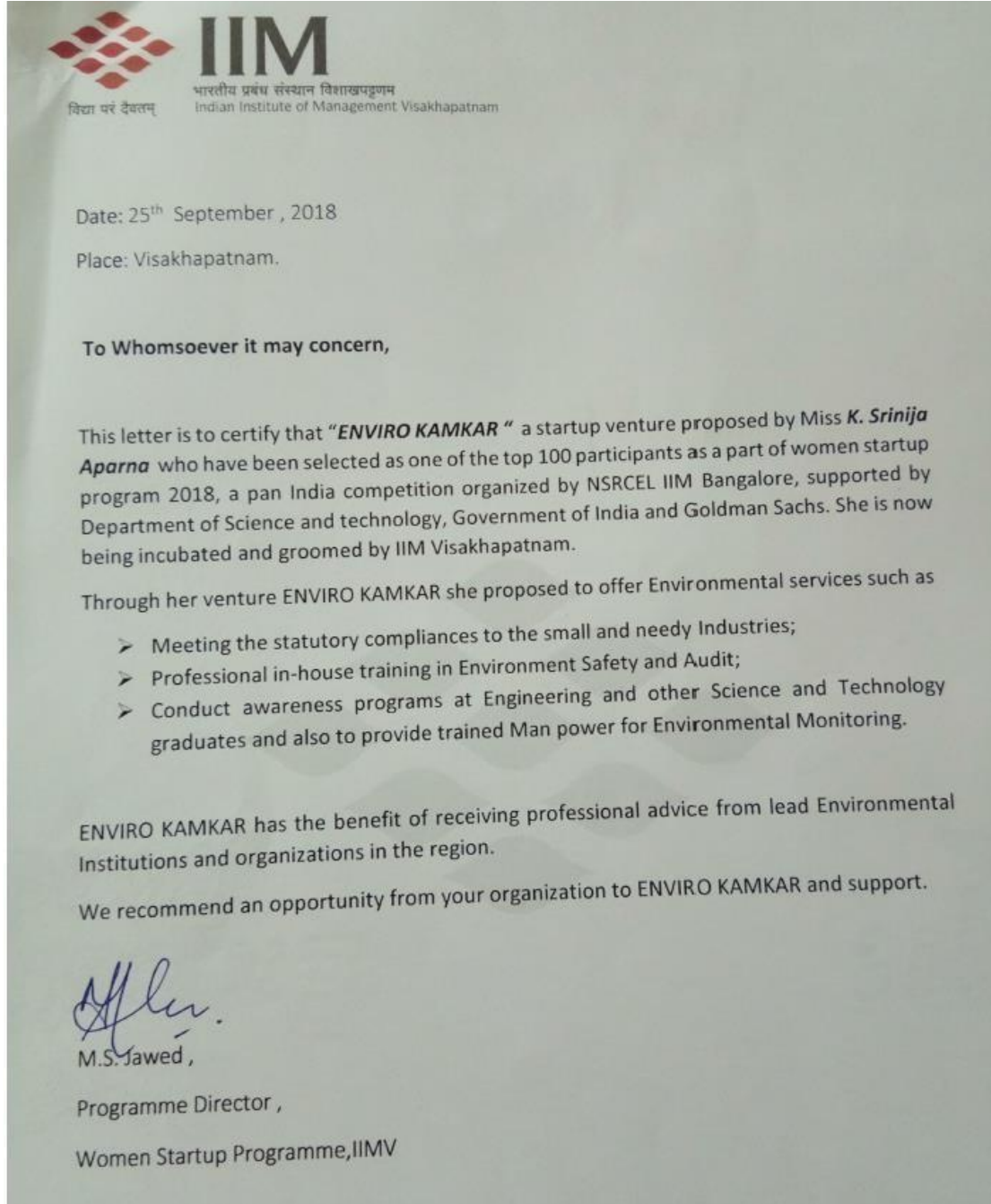
Mailing Address as per record available in Registrar Office:

ENVIRO KAMKAR LLP

Flat No - 402,6-20-24/60, East Point Colony,,Opp. Andhra Bank,,Visakhapatnam,Vishakhapatnam,Andhra Pradesh,530017,India



Annexure 2



Annexure 3



2019-2020
ENERGY
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1. Preamble:

Avanthi Institute of Pharmaceutical Sciences (AIPS), for the past 16 years, is providing quality education in Pharmaceutical Sciences for the north Andhra Pradesh region, meeting the national goals and standards of higher education. As part of the Institute's management principles, it is promoting sustainable practices and environment in all its decision making since the AY 2019-2020.

Based on the Environmental and Green Audit results for the AY 2019-2020, the AIPS Board of management has developed an "Environmental Policy" and adopted the same w. e. f. the AY 2019-2020. The policy focuses on making AIPS as a Green campus with low carbon foot print. Through its various programs and initiatives, AIPS actively engages in green practices, raising awareness about environmental conservation and reducing carbon foot prints. The institute strives to align its activities with environmental standards and actively participates in initiatives aimed at mitigating environmental impacts.

2. About the Institute:

Avanthi Institute of Pharmaceutical Sciences (AIPS) was established in 2005. Over the past 13 years, Avanthi Institute of Pharmaceutical Sciences has been engaged in providing quality education for the future generations of Pharmacists. AIPS was started with Three Pharmacy Programs (B.Pharm, M.Pharm & Pharm.D) with intake 170, today it has emerged as a leading institution in the state with an intake of 828 students with an unparalleled infrastructure and state-of-art facilities, outstanding academic results and achievements in sports and NSS (1 Units) we are positioned as a college of choice for the students to weave their Pharmacy dreams into reality. The institution is permanently affiliated to JNTUK, Kakinada and is now one among the Best Pharmacy colleges in Andhra Pradesh. Our academic excellence has been the cornerstone of our reputation, our students and graduates are recognized and valued for their integrity, commitment, ethical behavior and leadership qualities.



AIPS Main Block

2.1. Campus Population:

The Institution community comprises of 601 students, 56 teaching staff, and 18 non-teaching staff members. Of the total population, students make up 89.03%, while the teaching staff, non-teaching staff and other associates account for 8.29%, 2.6%.

3. Scope of Green Audit:

In line with the commitment to environmental sustainability, the members of Avanthi Institute actively engage in green practices and strive to raise awareness about carbon footprint reduction. The institution ensures that its activities align with environmental standards and actively participates in various initiatives aimed at mitigating environmental impacts. These notable attributes serve as a preamble to the Green Audit Report, highlighting the institution's dedication to sustainable practices and its awareness of global environmental impacts.

The Environmental Policy of **AIPS** serves as a guiding framework for all green initiatives and environmental activities. In addition to evaluating students' performance in environmental-related curricular activities, their engagement in various environmental issues is also assessed. The scope of the Green Audit encompasses the utilization and management of natural resources such as land and water, energy consumption and management, waste generation and management, adherence to green building norms, carbon footprint assessment, and active participation of all members including students, faculty, staff, institution associates, and management.

4. Methods Adopted:

1. The green Audit was planned in three stages
2. **Pre-Audit stage:** Appointment to external Audit Agency, constitution of Audit team, scoping of Audit and finalization of methods
3. **Audit stage:** Units interaction, documents scrutiny, finalization of audit findings
4. **Post audit stage:** Recommendation wise discussion and planning for improving the management and other practices.

Table: AIPS Internal Audit Team

Chairman	Dr. M. B.V. Raju, Principal
Vice Chairman	Dr. V. Uma Shankar, Vice Principal
Faculty Members	Dr. T. Rushi Naidu
	Dr. B. Manoj Kumar
Student Members	Mr. Anwesh Deep Padhy, Pharm D
	Mr. B. Rakesh, Pharm D

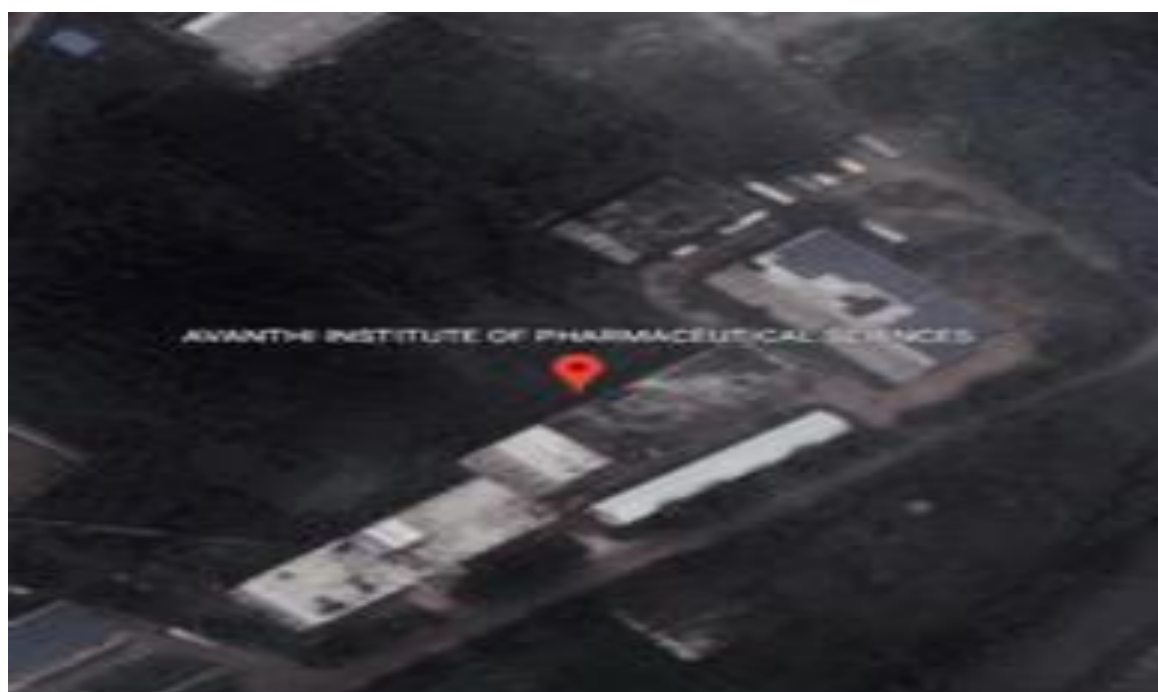
5. Green Audit:

5.1. Land Use and Land Utilization:

Avanthi Institute of Pharmaceutical Sciences is situated on an 2.5-hectare plot in Bhogapuram, near Tagarpuvalasa, Visakhapatnam district. AIPS has taken a prudent approach to land utilization. The campus layout has been designed to optimize land usage, with a significant portion left open for a better environment. Constructed area was limited to 14% of the total land, Roads and Pavements occupied 5%, Play Grounds occupied 22% while the remaining 59% of the area was left for Greens and Greenery which are discrete in distribution. About 24% of the constructed area, has been dedicated to Auditorium, around 14-16% of the land has been allocated for major departments like mechanical and electrical engineering and for laboratories. These labs provide students with hand on learning experiences and equip them with practical skills in their respective fields.

The Pharmacy department building occupies 16% of the land, providing a dedicated space for academic and research activities related to mechanical engineering. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

LAND USE	Area (sq m)
Constructed Area	6593.88
Roads, Pavements & Paths	301.44
Play Grounds	2348.24
Under Greens	1000.89
TOTAL LAND AREA	10117.14



Bird Eye View of AIPS

The Pharmaceutical Department is allotted with 5046 sqft of the land, offering a specialized facility for Pharmacy related programs and research. Finally, the campus boasts a spacious auditorium, utilizing 24% of the land, which serves as a venue for various academic, cultural, and extracurricular events.

Through the well-planned distribution of land, **AIPS** aims to create a conducive and vibrant environment that supports learning, research, and overall student development. This thoughtful distribution ensures a harmonious and efficient campus layout, catering to the diverse needs of the institution.

5.2. Vegetation and Biodiversity:

The campus area of 15876 m² was carefully planned and a significant portion was dedicated to the development of greenery. The green areas account to nearly 59% of the total land area of **AIPS**. This green area nurtures a reasonably good ecosystem and harbours over 35 different species of plants. Amongst these, the campus boasts a prosperous population of over 363 trees of 18 species, with an average tree birth of 20.7 centimetres. Thus, accounting for over 145 trees per hectare of green area which can be considered as **GOOD** tree cover.



Greens of AIPS

5.3. Water Resource Management:

The total water consumption of the AIPS can be classified into **THREE** use categories:

1. Academic and administration
2. Transportation and other utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four borewells existing in the campus, each connected to a separate overhead tank located at

various academic, and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 7 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 3 KLD. All gardens and green zones used about 4 KLD of water, of which 6 KLD is sourced from RO reject waters. Overall, AIPS utilizes 12 KLD of groundwater on all working days. AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are 1 RO plants, each with a capacity of 1000 liters (1000 liters in total). On all Sundays and general holidays, the water consumption was at 2 KLD, which is less than 10% of the consumption during working days.

AIPS has one RO water plants, both RO plants produce 1.5 liters of wastewater for every 0.5 liter of treated water. On working days, approximately 3 KLD (Kilo Liters per Day) of water is rejected by both RO plants. The rejected water is collected in a tank and used for gardens and green areas. The sewage from all blocks is directed to soak pits and septic tanks, as there are no activities that generate toxic wastes. In the Wet laboratory, where chemicals are used, the laboratory sinks are connected to effluent collecting cans with a capacity of 150 liters. Every two months, the effluent water is disposed of through authorized collectors.



Bore Well in front of Pharmacy Department

The Pre-monsoon water quality of the four bore wells being used by AIPS was analyzed for drinking water quality standard IS 5500. The results indicate that the water quality was almost the same in the four sources and also there was no significant change from the water quality of the previous year

5.4. Energy Resource Management:

AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power

Compared to the remaining three sources, the use of LPG was very insignificant. The use of Solar power had a history of three years.

AIPS's Electricity use can be considered under four major Load Sectors:

1. Illumination
2. Fans and Ventilations
3. Air Conditioning
4. Computers, labs, and Machinery.

During the audit year, the Institute consumed a total of 47,445 KVAh of electricity from the metered connection, with a monthly average of 5100 KVAh. Monthly variations in consumption were significant, ranging from a low of 3303 KVAh in October 2018 to a high of 7018 KVAh in March 2020.

5.4.1 Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 110 KW/day, During the audit year, a total of 36,000 KW was generated, which is equivalent to 57.6% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



80 Solar Panels installed on the roof of Block 1

5.4.2. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 30 KVA and 15 KVA, respectively. During the audit year, these generators produced approximately 1240 KWs of electricity, consuming 272 liters of Diesel oil.

5.4.3. Energy for Transportation:

Since AIPS is a non-residential university, all of its members rely on transportation. Therefore, a significant industry requiring high energy consumption is transportation. 40% of AIPS's members have access to transportation owing to the organization's 13 bus fleet. The average trip length for the buses was at 132 km /day, and provides the facility for 890 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 37260 liters.

5.4.4 LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 8 non-domestic cylinders (8 X 19 kg) and 5 domestic cylinders (5 X 14.8 kg). Thus, the estimate was 126 kg.

AIPS's total energy use from different sources and for several purposes during the AY 2019-20 is presented below:

- HT Power from Grid: 47828 KW
- HSD Used: 37732 Liters
- LPG: 126 kg
- Solar Power Generated: 32000 KW

5.5 Solid Waste Management:

One area where AIPS is working to create appropriate models is solid waste management. The AIPS community, in particular students and researchers, are concentrating on efficient waste segregation and measurement after launching Green Audits. All solid waste is categorized for waste management purposes in accordance with the accepted rules. Two categories are initially identified that is Wet waste and Dry waste. Typically, the first group is produced by the canteen, dining halls, waiting rooms, and other public spaces. Bins for

collecting moist garbage were placed in the designated locations.

On the other hand, the second category, Dry Waste was further classified into Five types:

- a) Paper & Board
- b) Plastic
- c) Glass & Metallic
- d) E-Waste
- e) Sanitary Waste.

The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E- Waste.



Collection of E- Waste at AIP



Decomposition of Solid Waste in pits at AIPS

Faculty Members:

- 1 *R. Reddy*
- 2 *B. Narasimha*

[Signature]

PRINCIPAL

**Avanthi Institute of Pharmaceutical Sciences
Cherukupally (V), Bhogapuram Mandal
Vizianagaram Dt., - 531162**

2018-2019

ENERGY

AUDIT

REPORT

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2.1 Campus Population:

The Institution community comprises of 560 students, 56 teaching staff, and 18 non teaching staff members. Of the total population, students make up 88.32%, while the teaching staff, non-teaching staff and other associates account for 8.83%, 2.8%.

3. Scope of Green Audit:

In line with the commitment to environmental sustainability, the members of Avanthi Institute actively engage in green practices and strive to raise awareness about carbon footprint reduction. The institution ensures that its activities align with environmental standards and actively participates in various initiatives aimed at mitigating environmental impacts. These notable attributes serve as a preamble to the Green Audit Report, highlighting the institution's dedication to sustainable practices and its awareness of global environmental impacts.

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4. Methods Adopted:

The green Audit was planned in three stages

1. Pre-Audit stage: Appointment to external Audit Agency, constitution of Audit team, scoping of Audit and finalization of methods
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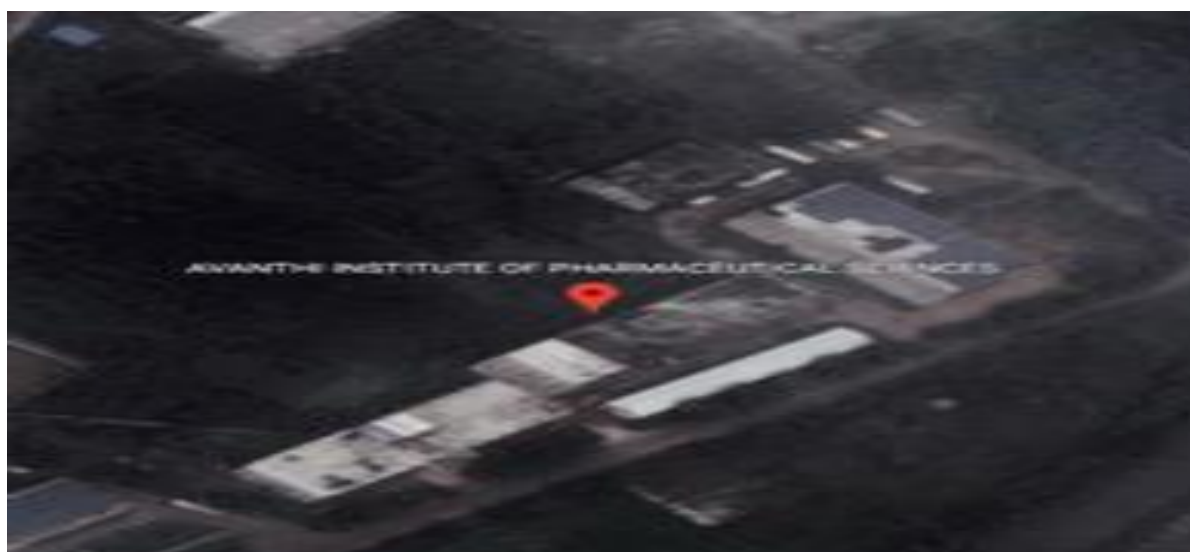
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Student Members	Ms. U. Meghana, Pharm D
	Mr. L. Satish Achari, Pharm D

5. Green Audit:

5.1 Land Use and Land Utilization:

Avanathi Institute of Pharmaceutical Sciences is situated on an 2.5-hectare plot in Bhogapuram, near Tagarpuvalasa, Visakhapatnam district. AIPS has taken a prudent approach to land utilization. The campus layout has been designed to optimize land usage, with a significant portion left open for a better environment. Constructed area was limited to 14% of the total land, Roads and Pavements occupied 5%, Play Grounds occupied 22% while the remaining 59% of the area was left for Greens and Greenery which are discrete in distribution. About 24% of the constructed area, has been dedicated to Auditorium, around 14-16% of the land has been allocated for major departments like pharmacy old and new block and for laboratories. These labs provide students with hand on learning experiences and equip them with practical skills in their respective fields.



Bird Eye View of AIPS

The Pharmacy department building occupies 16% of the land, providing a dedicated space for academic and research activities related to pharmacy. Similarly, the administrative building, known as the pharmacy old block, covers 14% of the land, serving as the central hub for administrative functions and student services.

LAND USE	Area (sq m)
Constructed Area	6593.24
Roads, Pavements & Paths	301
Play Grounds	2348.24
Under Greens	1000.89
TOTAL LAND AREA	10117.14

The Pharmaceutical Department is allotted with 17% of the land, offering a specialized facility for Pharmacy related programs and research. Finally, the campus boasts a spacious auditorium, utilizing 24% of the land, which serves as a venue for various academic, cultural, and extracurricular events.

Through the well-planned distribution of land, **AIPS** aims to create a conducive and vibrant environment that supports learning, research, and overall student development. This thoughtful distribution ensures a harmonious and efficient campus layout, catering to the diverse needs of the institution.

5.2 Vegetation and Biodiversity:

The campus area of 42,492 m² was carefully planned and a significant portion was dedicated to the development of greenery. The green areas account to nearly 59% of the total land area of AIPS. This green area nurtures a reasonably good ecosystem and harbors over 35 different species of plants. Amongst these, the campus boasts a prosperous population of over 363 trees of 18 species, with an average tree girth of 35.7 centimeters. Thus, accounting for over 145 trees per hectare of green area which can be considered as a GOOD tree cover.



Greens of AIPS

5.3 Water Resource Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and other utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four borewells existing in the campus, each connected to a separate overhead tank located at various academic, and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 14 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 8 KLD of water, of which 6 KLD is sourced from RO reject waters. Overall, AIPS utilizes 22 KLD of groundwater on all working days. AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are 2 RO plants, each with a capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.

AIPS has two RO water plants, both RO plants produce 3 liters of wastewater for every 0.5 liter of treated water. On working days, approximately 3 KLD (Kilo Liters per Day) of water is rejected by both RO plants. The rejected water is collected in a tank and used for gardens and green areas. The sewage from all blocks is directed to soak pits and septic tanks, as there are no activities that generate toxic wastes. In the Wet laboratory, where chemicals are used,

the laboratory sinks are connected to effluent collecting cans with a capacity of 150 liters. Every two months, the effluent water is disposed of through authorized collectors.

The Pre-monsoon water quality of the four bore wells being used by AIPS was analyzed for drinking water quality standard IS 5500. The results indicate that the water quality was almost the same in the four sources and also there was no significant change from the water quality of the previous year.

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2. HSD Generation
3. Solar Power

Compared to the remaining three sources, the use of LPG was very insignificant. The use of Solar power had a history of three years.

AIPS's Electricity use can be considered under four major Load Sectors:

1. Illumination
2. Fans and Ventilations
3. Air Conditioning
4. Computers, labs, and Machinery.

During the audit year, the Institute consumed a total of 46,445 KVAh of electricity from the metered connection, with a monthly average of 1100 KVAh. Monthly variations in consumption were significant, ranging from a low of 2303 KVAh in October 2018 to a high of 8018 KVAh in March 2019.

5.4.1 Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 100 KW/day, during the audit year, a total of 34,000 KW was generated, which is equivalent to 57.6% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.

5.4.2. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 22 KVA and 25 KVA, respectively. During the audit year, these generators produced approximately 1240 KWs of electricity, consuming 272 liters of Diesel oil.

5.4.3. Energy for Transportation:

Since AIPS is a non-residential university, all of its members rely on transportation. Therefore, a significant industry requiring high energy consumption is transportation. 40% of AIPS's members have access to transportation owing to the organization's 13 bus fleet. The average trip length for the buses was at 132 km /day, and provides the facility for 890 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 27260 liters.

5.4.4 LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 8 non-domestic cylinders (8 X 19 kg) and 5 domestic cylinders (5 X 14.8 kg). Thus, the estimate was 126 kg.

AIPS's total energy use from different sources and for several purposes during the AY 2018-19 is presented below:

- HT Power from Grid: 42828 KW
- HSD Used: 35732 Liters
- LPG: 126 kg
- Solar Power Generated: 25000 KW

5.5 Solid Waste Management:

One area where AIPS is working to create appropriate models is solid waste management. The AIPS community, in particular students and researchers, are concentrating on efficient waste segregation and measurement after launching Green Audits. All solid waste is categorized for waste management purposes in accordance with the accepted rules. Two categories are initially identified that is Wet waste and Dry waste. Typically, the first group is produced by the canteen, dining halls, waiting rooms, and other public spaces. Bins for collecting moist garbage were placed in the designated locations.

On the other hand, the second category, Dry Waste was further classified into Five types:

- a) Paper & Board
- b) Plastic
- c) Glass & Metallic
- d) E-Waste
- e) Sanitary Waste.

The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E- Waste.

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