College Code: 1706

RBVRR WOMEN'S COLLEGE OF PHARMACY
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(Approved by PCI & Affiliated to Osmania University)
Recognized under Section 2(f) of the UGC Act 1956
EAMCET Code: RBVW PGECET Code: RBVW1
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Environmental and Energy Utilization Policy

1. Introduction: RBVRR Women's College of Pharmacy (RBVRRWCP) acknowledges the crucial significance of environmental sustainability and responsible energy utilization in today's context. As an accountable educational institution, RBVRRWCP pledges to foster a culture of environmental stewardship within its premises and beyond. This policy delineates RBVRRWCP's approach towards environmental and energy management, outlining its initiatives, strategies, and commitments in this sphere.

Background: Per its core values and societal obligations, RBVRR Women's College of Pharmacy (RBVRRWCP) is committed to promoting gender equality, addressing climate change, and advocating environmental sustainability. RBVRRWCP implements various eco-friendly practices, encompassing energy conservation, rainwater harvesting, waste recycling, and carbon neutrality initiatives. The institution also emphasizes inclusivity for differently-abled individuals and upholds human values and professional ethics in all endeavors.

Global Context: Given the prevailing global challenges such as climate change and environmental deterioration, institutions worldwide are increasingly emphasizing sustainability and energy efficiency. From embracing renewable energy solutions to adopting green practices in daily operations, organizations acknowledge the imperative to minimize their environmental footprint and contribute to a sustainable future, RBVRRWCP aligns itself with global trends and best practices in environmental stewardship and energy management.

2. Objectives: The primary goals of this policy are:
- To reduce RBVRRWCP's environmental impact by curbing resource consumption and waste generation.
- To advocate energy efficiency and the utilization of renewable energy sources to mitigate greenhouse gas emissions.
- To enhance awareness among students, faculty, and staff regarding environmental conservation and sustainable energy practices.
- To ensure compliance with pertinent environmental laws, regulations, and standards.

3. Key Principles: In pursuit of these objectives, RBVRRWCP adheres to the following key principles:
- **Conservation:** Endeavoring to conserve natural resources like water, energy, and materials through efficient usage practices, and endorsing recycling and reuse initiatives.
- **Energy Efficiency:** Prioritizing energy-efficient technologies and practices to minimize energy consumption and resultant greenhouse gas emissions.
- **Renewable Energy:** Exploring avenues to integrate renewable energy sources such as solar and wind power to diminish reliance on fossil fuels and promote clean energy generation.

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• **Waste Reduction:** Implementing waste reduction strategies, encompassing waste segregation, recycling programs, and proper disposal practices to minimize solid waste generation and foster a circular economy.
• **Environmental Education:** Infusing environmental education and sustainability principles into the curriculum and extracurricular activities to nurture a culture of environmental stewardship among stakeholders.
• **Continuous Improvement:** Regularly evaluating its environmental and energy performance to identify improvement opportunities and implement measures to attain sustainability objectives.

4. Responsibilities:
• **Management:** Tasked with setting environmental and energy utilization goals, allocating resources for sustainability initiatives, and ensuring compliance with relevant laws and regulations.
• **Faculty and Staff:** Obliged to implement and adhere to RBVRRWCP's environmental and energy utilization policies and procedures, including practicing resource conservation and promoting sustainability awareness.
• **Students:** Encouraged to actively engage in environmental conservation endeavors and embrace sustainable practices both on and off-campus.

5. Implementation: The implementation of this policy falls under the purview of the Environmental and Energy Management Committee, responsible for:
• Formulating and executing action plans to achieve environmental and energy utilization goals.
• Monitoring and assessing RBVRRWCP's environmental and energy performance.
• Offering guidance and assistance to departments and individuals to foster sustainable practices.
• Conducting regular training and awareness programs on environmental conservation and energy efficiency.

6. Review and Revision: This policy undergoes periodic review to ensure its efficacy and relevance in attaining RBVRRWCP's sustainability objectives. Any necessary revisions or updates are carried out in consultation with relevant stakeholders and approved by the management.

7. Conclusion: Through the adoption of this Environmental and Energy Utilization Policy, RBVRRWCP reaffirms its dedication to environmental sustainability and responsible energy utilization. Through collaborative efforts, a greener and more sustainable future can be realized for both the campus and the community.

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Supplementary Details:

- **Quality Audits and Initiatives**: RBVRRWCP will conduct routine quality audits on environment and energy to ensure adherence to established standards and identify areas for enhancement. These audits include:
- **Green Audit/Environment Audit:** RBVRRWCP will assess environmental performance and compliance with environmental regulations.
- **Energy Audit:** The institution will evaluate energy consumption patterns and identify opportunities for energy efficiency enhancements.
- **Clean and Green Campus Initiatives:** The institution will implement measures to enhance the environmental sustainability of campus operations.
- **Beyond the Campus Environmental Promotion and Sustainability Activities**: RBVRRWCP will engage in outreach programs and community initiatives to promote environmental awareness and sustainability beyond campus boundaries.
- **Certificates and External Audit Reports:** RBVRRWCP will maintain certificates from external audit agencies, including reports on initiatives such as Swachh Bharat and Earth Day celebrations, as part of its commitment to transparency and accountability in environmental management.

Conclusion: RBVRRWCP remains steadfast in its commitment to environmental stewardship and energy conservation. By adhering to global best practices, conducting regular audits, and engaging in sustainability initiatives both on and off-campus, RBVRRWCP endeavors to be a trailblazer in promoting environmental sustainability and social responsibility, contributing to a greener, more sustainable future for generations to come.

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Environmental Audit

Water Conservation , Harvesting and Management

Water is an important natural resource and is available naturally depending on the climate and topographic features. All organisms are dependent on water for their living. Although water is available in nature, portable water is not available freely for human consumption. There have been many practices to conserve water so that it can be readily available for human use. It has been noticed that due to unsustainable use of water resources there is contamination and depletion of the ground water and also water which is available in various reservoirs like lakes, ponds, streams etc which is becoming more alarming. Therefore it becomes increasingly important to conserve protect and manage the water resources availability and usage so that it is sustainably used within the college campus. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration.

Per capita water availability of many river basins in India is declining over the years due to sustained population pressure, agriculture and industrial expansion, besides changing climate scenarios.

- **Rainwater harvest**

  Rainwater harvesting is a technique used for collecting, storing and using rainwater for domestic, agricultural or any other uses. The rainwater is collected from various hard surfaces such as rooftops, runoff from catchments, from streams and water conservation through watershed management or other manmade aboveground hard surfaces. It is an age-old system of collection of rainwater for future use. The harvested water can be stored on surface through ponds and tanks or can be recharged to groundwater.

- **Protection of Water from Pollution**

  If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing economic activities, urbanization etc.

- **Rational Use of Groundwater:**

  Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete. Hence, Groundwater exploitation should be only in proportion to its recharging capacity.

- **Increasing Forest Cover:**

  According to hydrological movements, water is received through rainfall every year different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

WATER USES AND MANAGEMENT

A total of 20000 L of water is pumped every day for the College dwellers as well to meet the daily demands of the academic and administrative Departments (Table). The daily use of the water during 2022-23 was approx. 22450 L per day shown in Figure 2&3.

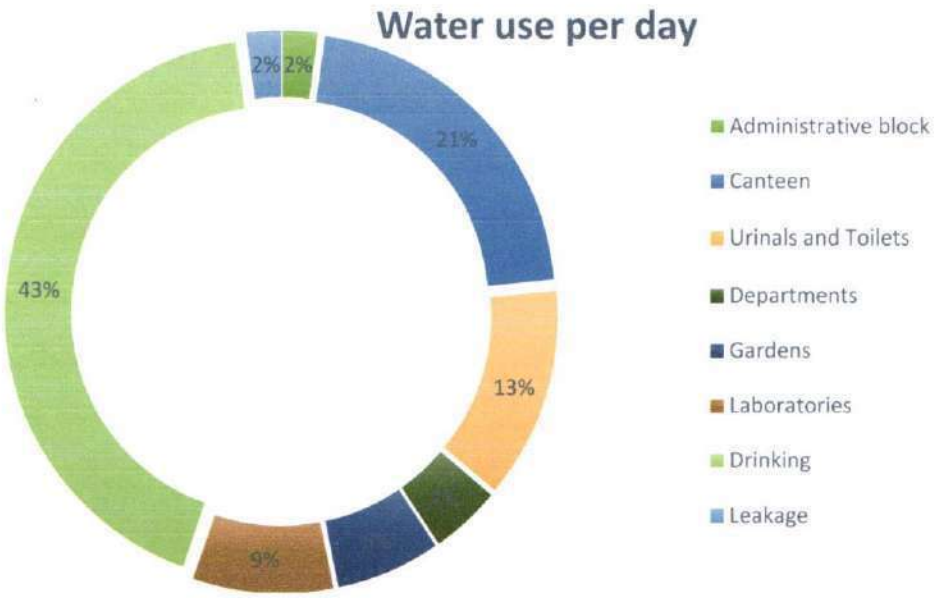

Figure. 2: Daily water Consumption and usage in RBVRRR

Table:1 Source and uses of water in the college campus Source of water

Source and uses of water in the College campus Source of water		
Sl. No	**Parameters**	**Information**
1	No of Wells	1
2	No of the motors used	2
3	Horsepower- motor	3 HP x 2
4	Depth of well- Total	600 m x 1
5	Capacity of Tank(Total)	250000 L
Quantity of water used in different sections of the Campus		
	Sections	**Water use (L/day)**
6	Administrative block	400
7	Canteen	6000
8	Urinals and Toilets	4000
9	Departments	800
10	Gardens	1200
11	Laboratories	1500
12	Drinking	8000
13	Leakage	500
14	Main purposes of water use in the campus	Drinking and cooking purpose Toilets and wash areas Laboratory use Gardening Construction
15	Nos. of water tap	320 nos
16	Water cooler and drinking water filtration facility	5 nos
17	Nos. of urinal and toilets	20
18	Nos. of waterless /bio-toilets	Nil
19	Any water wastage/why?	Yes, leakage from pipes and tanks, leaving of taps open at times
20	Water usage for gardening	1200 Ltr
21	Wastewater sources	leakage from pipes and tanks, Overflowing of tanks from residential qtrs., Toilets, laboratories, hostels
22	Use of wastewater	Nil
23	The fate of wastewater from labs	Discharged into soak pit in case of contamination and natural discharge
24	Any wastewater treatment for lab water	No
25	Whether any green chemistry	No

	method practiced in Labs	
26	Rainwater harvesting	Rain water harvesting is maintain by the water body within the premises which also helps in maintaining the ground water level and there is no reusable rain water which

The stake holders of the BVRRR specially propose to use of grey water which is obtained from the various domestic activities and they re-use the same water for gardening and vegetable fields etc. Also water recycling is done as per the direction of the competent authority in broader scale as and when required. During the rainy season water from the roof tops of the buildings directly fall into the lake through rain water outlets, RCC drains and recharges the ground water table throughout the year

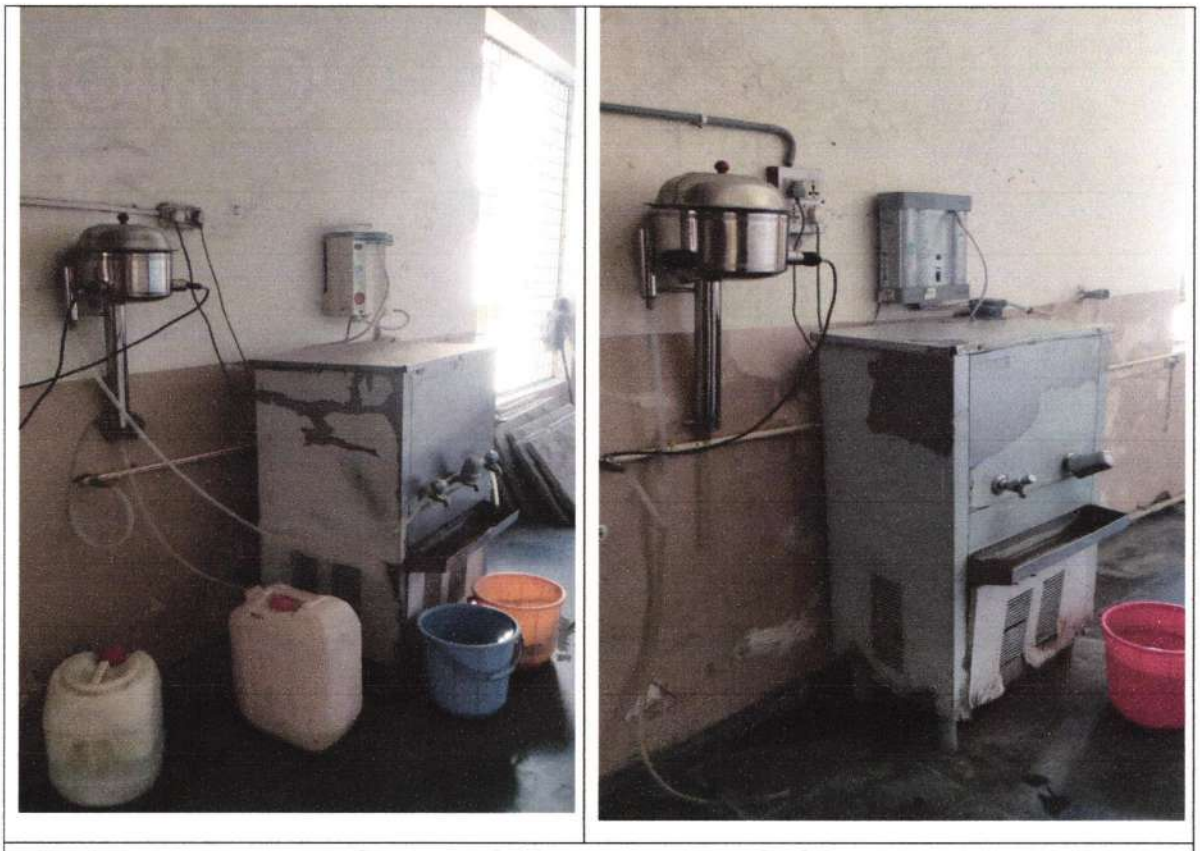

Figure.3 Drinking water in Each Floor

Present Status: Constructed Water harvesting Pits 2 No's across the campus and in the process of constructing water drains and interconnecting the same to water harvesting pits to recharge the ground water.

THE WATER QUALITY IN INSTITUTE

One Bore water and one RO water samples were collected in the In the campus. The results are discussed below and given in Table.2

Observation of Ground Water:

- pH analysis results indicate the pH range 7.0-7.6 Observed with in the acceptable limit of 6.5 to 8.5.
- Total Dissolved Solids in the range of 15-655 mg/L. Observed that all values are in the study area are with in the acceptable limits.
- Calcium is in the range 3-75 mg/L. Observed that all the values are within the acceptable limits.
- Magnesium is in the range is 1.5-38 mg/L. Observed that all the values are within the acceptable limits.
- Chloride concentration in the range is 2.5-169 mg/L Obeserved that all values are in the study area are within the acceptable limits.
- Iron Concentrations below the <0.3 mg/L. Obeserved that all values are in the study area are with in the acceptable limits.

Table: 2: Status of water quality in the Hostels

Type of Sample		Results		IS 10500 (Acceptable Limits)	IS 10500 (Permissible Limits)
Parameters		Tap RO water at Ground water	Tap water at Ground Floor		
TDS	(ppm)	15	655	500	2000
pH Range		7.0	7.6	6.5-8.5	No relaxation
Turbidity	(NTU)	<1.0	<1.0	1	5
Iron	(ppm)	<0.3	<0.3	0.3	No relaxation
Calcium	(ppm)	3	75	75	200
Magnesium	(ppm)	1.5	38	30	100
Chlorides Cl-	(ppm)	2.5	169	250	1000

Water quality results indicate parameters are within the permissible limit, prescribed by IS: 10500 respectively. The results revealed that all the samples have satisfactory Physico-chemical characteristics. The Campus was well maintaining the reduce water wastage practices shows in Fig 3.

Waste Management:

The campus produces and disposes solid waste through its day-to-day operations. There can be difference between individuals, between certain day's activities, and between holidays and work days, as well as between seasons. An average figure per person per day is however worked out by observing their activities for a week by student volunteers at the disposal area through sample survey approach, quantifying the measured wastes and then averaging.

In India, through certain research studies on waste generation in academic campuses from time to time, environmentalists have arrived at some empirical coefficients for assessing GHG emissions from solid wastes. These will be use in evaluating the green auditing data on wastes in RBVRR institute. The wastes generated in the college is systematically collected and disposed off as scientifically as possible. Wet wastes are separated at source itself. For disposal, only competent agencies are approached and materials handed over. As seen in the table, most items are intended to be recycled, reused or processed. Adequate numbers of garbage bins are provided in every room and in every floor in every hostel as well as in the academic area and guest house, and the students are using them as and when required. The practice of burning the paper waste, which is the usual practice needs to be discontinued and better options tried. Using waste paper for creating decorative materials is one option. The present waste generation is represented as **Table.3 and Figure. 4-6**

The following waste is categorizes as:

- **Non Bio Waste** – Plastic Bottles / Waste Paper / Cardboards/ Batteries etc

Non- biodegradable waste, which cannot be decomposed by biological processes is called non- biodegradable waste.

These are of two types –

- **Recyclable:** waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc.
- **Non-recyclable:** waste which do not have economic value of recovery. e.g. Carbon paper, thermo coal, tetra packs etc.

Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non biodegradable waste on the environment and also focus on its safe disposal for sustainable environment.

Table 3. Annual Waste Generation category wise

S. No.	Stake holders	Types of solid waste	Average waste generated Year (Kg)	% of waste
1	ACADEMIC DEPARTMENT	Paper waste	350	7.4
2		Plastic waste	180	3.8
3		Organic Waste	2600	54.9
4		E-waste	50	1.1
5		Bio Medical Waste	25	0.5
6	ADMINISTRATIVE OFFICE	Paper waste	120	2.5
7		Plastic waste	30	0.6
8		Organic Waste	85	1.8
9		E-waste	5	0.1
10	CANTEENS	Paper waste	300	6.3
11		Plastic waste	385	8.1
12		Organic Waste	600	12.7
13		E-waste	2	0.0
TOTAL			**4732 Kg /Year**	

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Email: kiwislabhyd@gmail.com
Ph: 99666 61485 / 040-23816333

TEST REPORT

Report No: KIWIS/W/COM/23/115

Name and address of the client

M/s.RBVRR WOMEN'S COLLEGE OF PHARMACY
3-4-343, Baghlingmpally Cross Rd, Barkatpura,
Hyderabad, Telangana 500027

Date of report	*: 22-02-2023*	*Sample Collected by*	*: Kiwis Eco Laboratories Private Limited*
Date of sampling	*: 13-02-2023*	*Sample Collected in*	*: in Plastic cans*
Sample received on	*: 14-02-2023*	*Sampling Procedure*	*: KIWIS/SOP/ Lab - 258*
Analysis starting date	*: 14-02-2023*	*Sample registration no /Code*	*: W/COM/02/23/244*
Analysis completion date	*: 22-02-2023*	*Sample description*	*: Water Quality Monitoring*
Sub Contract Testing	*: NA*	*Name of the location*	*: Drinking water*

Samples are analyzed "as Received basis"

S.No	Parameter	Unit	Method	Result	IS 10500 (Acceptable Limits)	IS 10500 (Permissible Limits)
1	Color	Hazen	APHA 2120 C	<5.0	5	15
2	Turbidity	NTU	APHA 2130 B	<1.0	1	5
3	pH @ 25.0°C	-	APHA 4500H^+ B	7.3	6.5-8.5	No relaxation
4	Electrical Conductivity	µMho/Cm	APHA 2510 - B	26	Not Specified	Not Specified
5	Total Dissolved solids	mg/L	APHA 2540 C	15	500	2000
6	Alkalinity as $CaCO_3$	mg/L	APHA 2320 B	8.0	200	600
7	Hardness as $CaCO_3$	mg/L	APHA 2340 C	12	200	600
8	Calcium as Ca	mg/L	APHA 3500 Ca B	<5	75	200
9	Magnesium as Mg	mg/L	APHA 3500-Mg B	<2	30	100
10	Chlorides as Cl^-	mg/L	APHA 4500 Cl^- B	<5	250	1000
11	Sulphates as SO_4	mg/L	APHA 4500 SO_4 D	<5	200	400
12	Nitrate as NO_3	mg/L	APHA 4500 NO_3 B	<1.0	45	No relaxation
13	Sodium as Na	mg/L	APHA 3500 Na B	<1.0	Not Specified	Not Specified

Note : This report is subject to the terms and conditions mentioned overleaf

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TEST REPORT

Report No: KIWIS/W/COM/23/115

Samples are analyzed "as Received basis"

S.No	Parameter	Unit	Method	Result	IS 10500 (Acceptable Limits)	IS 10500 (Permissible Limits)
14	Potassium as K	mg/L	APHA 3500 K B	<1.0	Not Specified	Not Specified
15	Fluoride as F	mg/L	APHA 4500F- D	< 0.5	1.0	1.5
16	Iron as Fe	mg/L	APHA 3500 Fe B	< 0.3	1.0	No relaxation
17	Zinc as Zn	mg/L	APHA 3111 B	<0.2	5	15
18	Cyanide as CN^-	mg/L	APHA 4500 CN^- C, E	<0.05	0.05	No relaxation
19	Phenolic Compounds as C_6H_5OH	mg/L	APHA 5530 D (Direct Photometric Method)	<0.001	0.001	0.002
20	Lead as Pb	mg/L	APHA 3111 B	<0.01	0.01	No relaxation
21	Mercury as Hg	mg/L	APHA-3112 Hg B	<0.001	0.001	0.001
22	Manganese as Mn	mg/L	APHA 3111 B	<0.1	0.1	0.3
23	Cadmium as Cd	mg/L	APHA 3111 B	<0.003	0.003	No relaxation
24	Chromium as Cr^{+6}	mg/L	APHA 3500 Cr B	<0.05	0.05	No relaxation
25	Copper as Cu	mg/L	APHA 3111 B	<0.05	0.05	1.5
26	Total Coliform	MPN/ 100ml	APHA 9221B	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample
27	E-Coli	MPN/ 100ml	APHA 9221G	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample

Methods follow: APHA 23rd Edition
NA: Not Applicable

Opinion and interpretation: Nil

- Reports pertained only to the submitted sample
- Test reports shall not be reproduced except in full, without written approval of the laboratory

Checked By

(O.Chowdeswararao)
Sr.Chemist

Authorized Signatory

(Dr.Nalini Vijayalaxmi)
Manager Laboratory

End of the Report

ENVIRONMENTAL AUDIT

Water Conservation , Harvesting and Management

Water is an important natural resource and is available naturally depending on the climate and topographic features. All organisms are dependent on water for their living. Although water is available in nature, portable water is not available freely for human consumption. There have been many practices to conserve water so that it can be readily available for human use. It has been noticed that due to unsustainable use of water resources there is contamination and depletion of the ground water and also water which is available in various reservoirs like lakes, ponds, streams etc which is becoming more alarming. Therefore it becomes increasingly important to conserve protect and manage the water resources availability and usage so that it is sustainably used within the college campus. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration.

Per capita water availability of many river basins in India is declining over the years due to sustained population pressure, agriculture and industrial expansion, besides changing climate scenarios.

- **Rainwater harvest**

  Rainwater harvesting is a technique used for collecting, storing and using rainwater for domestic, agricultural or any other uses. The rainwater is collected from various hard surfaces such as rooftops, runoff from catchments, from streams and water conservation through watershed management or other manmade aboveground hard surfaces. It is an age-old system of collection of rainwater for future use. The harvested water can be stored on surface through ponds and tanks or can be recharged to groundwater.

- **Protection of Water from Pollution**

  If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing economic activities, urbanization etc.

- **Rational Use of Groundwater:**

  Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete. Hence, Groundwater exploitation should be only in proportion to its recharging capacity.

- **Increasing Forest Cover:**

  According to hydrological movements, water is received through rainfall every year different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

WATER USES AND MANAGEMENT

A total of 18000 L of water is pumped every day for the College dwellers as well to meet the daily demands of the academic and administrative Departments (Table 3). The daily use of the water during 2021-22 was approx. 8600 L per day shown in Figure 6&7.

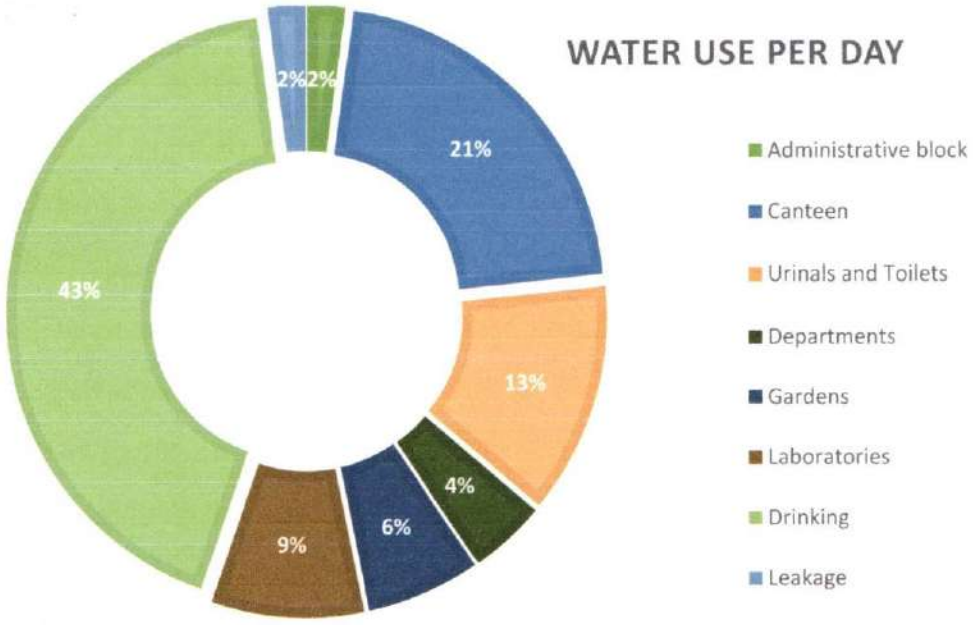

Figure. 2: Daily water Consumption and usage in RBVRRR

Table:1 Source and uses of water in the college campus Source of water

Source and uses of water in the College campus Source of water		
Sl. No	**Parameters**	**Information**
1	No of Wells	1
2	No of the motors used	2
3	Horsepower- motor	3 HP x 2
4	Depth of well- Total	600 m x 1
5	Capacity of Tank(Total)	250000 L
Quantity of water used in different sections of the Campus		
	Sections	**Water use (L/day)**
6	Administrative block	400
7	Canteen	2000
8	Urinals and Toilets	2000
9	Departments	500
10	Gardens	1000
11	Laboratories	1500
12	Drinking	2000
13	Leakage	500
14	Main purposes of water use in the campus	Drinking and cooking purpose Toilets and wash areas Laboratory use Gardening Construction
15	Nos. of water tap	320 nos
16	Water cooler and drinking water filtration facility	5 nos
17	Nos. of urinal and toilets	20
18	Nos. of waterless /bio-toilets	Nil
19	Any water wastage/why?	Yes, leakage from pipes and tanks, leaving of taps open at times
20	Water usage for gardening	1000 Ltr
21	Wastewater sources	leakage from pipes and tanks, Overflowing of tanks from residential qtrs., Toilets, laboratories, hostels
22	Use of wastewater	Nil
23	The fate of wastewater from labs	Discharged into soak pit in case of contamination and natural discharge
24	Any wastewater treatment for lab water	No
25	Whether any green chemistry method practiced in Labs	No

26	Rainwater harvesting	Rain water harvesting is maintain by the water body within the premises which also helps in maintaining the ground water level and there is no reusable rain water which

The stake holders of the BVRRR specially propose to use of grey water which is obtained from the various domestic activities and they re-use the same water for gardening and vegetable fields etc. Also water recycling is done as per the direction of the competent authority in broader scale as and when required. During the rainy season water from the roof tops of the buildings directly fall into the lake through rain water outlets, RCC drains and recharges the ground water table throughout the year

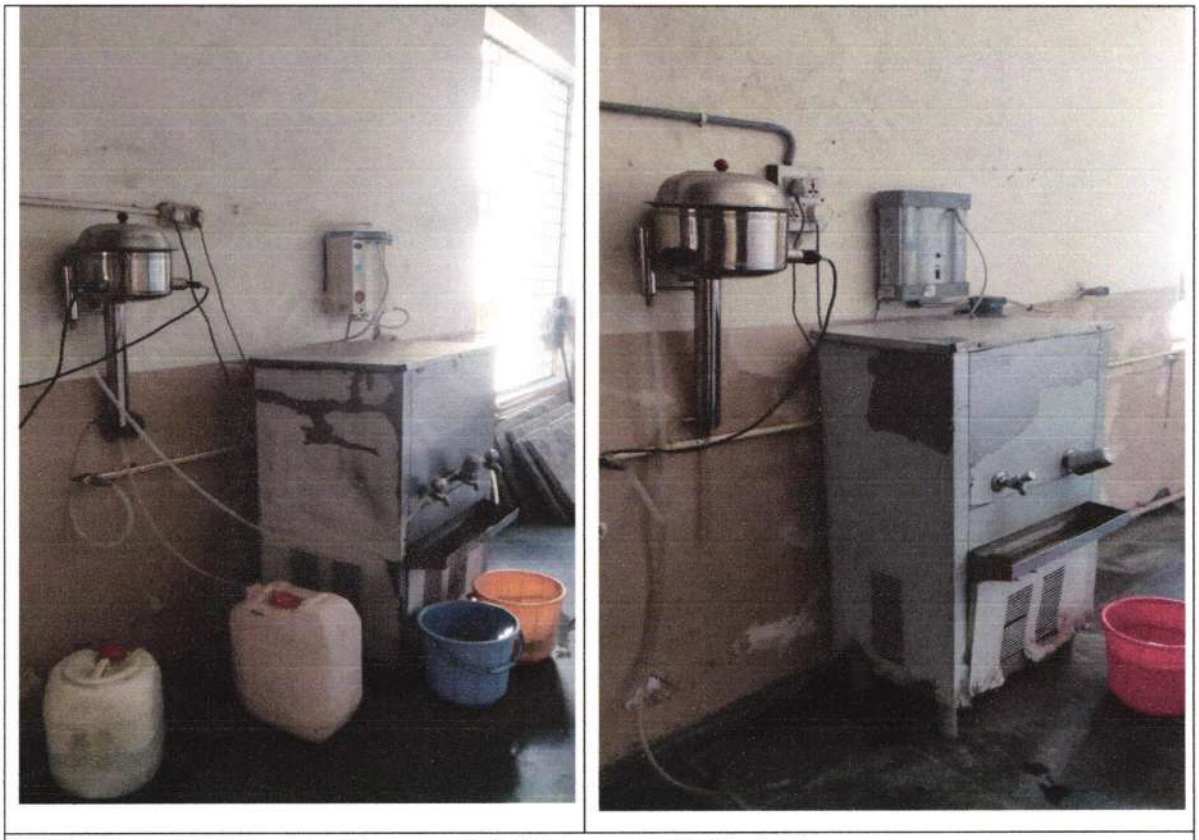

Figure.3 Drinking water in Each Floor

Present Status: Constructed Water harvesting Pits 2 No's across the campus and in the process of constructing water drains and interconnecting the same to water harvesting pits to recharge the ground water.

Waste Management:

The campus produces and disposes solid waste through its day-to-day operations. There can be difference between individuals, between certain day's activities, and between holidays and work days, as well as between seasons. An average figure per person per day is however worked out by observing their activities for a week by student volunteers at the disposal area through sample survey approach, quantifying the measured wastes and then averaging.

In India, through certain research studies on waste generation in academic campuses from time to time, environmentalists have arrived at some empirical coefficients for assessing GHG emissions from solid wastes. These will be use in evaluating the green auditing data on wastes in RBVRR institute. The wastes generated in the college is systematically collected and disposed off as scientifically as possible. Wet wastes are separated at source itself. For disposal, only competent agencies are approached and materials handed over. As seen in the table, most items are intended to be recycled, reused or processed. Adequate numbers of garbage bins are provided in every room and in every floor in every hostel as well as in the academic area and guest house, and the students are using them as and when required. The practice of burning the paper waste, which is the usual practice needs to be discontinued and better options tried. Using waste paper for creating decorative materials is one option. The present waste generation is represented as **Table.2 and Figure.4-5**

The following waste is categorizes as:

- **Non Bio Waste** – Plastic Bottles / Waste Paper / Cardboards/ Batteries etc

Non- biodegradable waste, which cannot be decomposed by biological processes is called non- biodegradable waste.

These are of two types –

- **Recyclable**: waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc.
- **Non-recyclable**: waste which do not have economic value of recovery. e.g. Carbon paper, thermo coal, tetra packs etc.

Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non biodegradable waste on the environment and also focus on its safe disposal for sustainable environment.

Table2. Annual Waste Generation category wise

S. No.	Stake holders	Types of solid waste	Average waste generated Year (Kg)	% of waste
1	ACADEMIC DEPARTMENT	Paper waste	150	8.3
2		Plastic waste	100	5.5
3		Organic Waste	1000	55.3
4		E-waste	10	0.6
5		Bio Medical Waste	20	1.1
6	ADMINISTRATIVE OFFICE	Paper waste	50	2.8
7		Plastic waste	20	1.1
8		Organic Waste	30	1.7
9		E-waste	2	0.1
10	CANTEENS	Paper waste	100	5.5
11		Plastic waste	25	1.4
12		Organic Waste	300	16.6
13		E-waste	2	0.1
TOTAL			**1809 Kg /Year**	

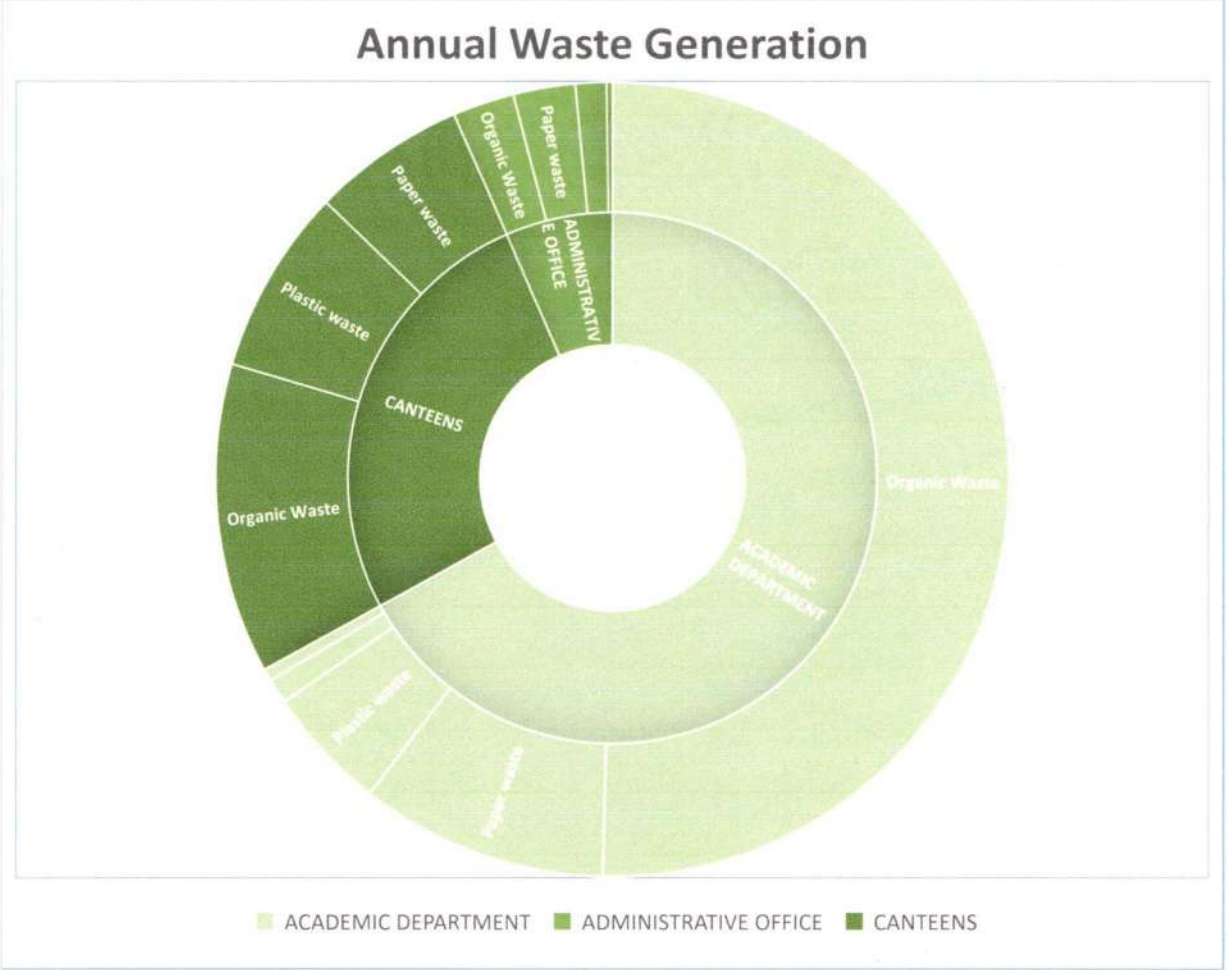

Figure.4 Annual Waste Generation In the RBVRR College of Pharmacy

- **Bio Medical waste:**

  Bio medical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I Category of Waste as **Table 3**

Carbon Footprint

Carbon Footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, optimization, or community. An acceptable definition for carbon foot print is: carbon footprints the total amount of greenhouse gases produced directly and indirectly for supporting human activities, usually expressed in equivalent tons of carbon dioxide (CO_2). The most common greenhouse gases (GHGs) in our environment are carbon dioxide, water vapour, methane nitrous oxide and ozone. The total carbon footprint college as calculated and represented as **Table.4** and International Standards of carbon footprint for various parameters represented as **Table. 5**

The RBVRR has total staff (Teaching + Non Teaching) of 70 members, the Co2 emission

Table:3 Carbon foot Print

Sl. No:	Source	Rate	Quantity x Days/year		Total Quantity	Annual Eqvt. CO_2
1	Electricity use (For India)	0.82 kg/kWh	--		40686KWh	33.3 T CO_2
2	Fossil fuel use	268 g CO2eq/kg	LPG	10	435kg /Year	0.116 T CO_2
3	Bus – students public transport	268 g CO2eq/L	520	160	3350 kg/year	897.8 T CO_2
4	Staff week public transport	268 g CO2eq/L	25	250	187.5 kg/Year	50.3 T CO_2
5	Non Teaching staff public transport	268 g CO2eq/L	45	200	337.5 kg/Year	90.5 T CO_2
6	Cars, Taxis all	230g CO2eq/L	2	150	30 kg/Year	8 .0 T CO_2
						1080.0T CO_2

The per capita carbon footprint for the RBVRR, is 1080 kg (or 0.108 T) of CO_2 equivalent 1080 T /1000 persons].

According to Economic Survey, Govt. of India 2009 - 10, the per capita emission for an Indian was 1.2 ton CO_2 eq. per annum. In the same report, it was projected that this will go up to 2.0 – 2.5 T of CO2 by 2021-22 and to 3.0 – 3.5 T of CO_2 by 2030. For the year 2021-22, the RBVRR, the Carbon Footprint per capita at 0.108 T CO_2 is even less than one-Fourth of the national average. The campus is thus **a Green Campus.**

Carbon Footprint Balance

The remediation gap between the assessed footprint and available remediation is 1080.0–0.6 =1079.4 T CO_2eq for 2021-22. On closer examination, major contributors to it are:- Daily bus journey by around 600 day scholars (897.8 T Co2).

Table: 4 International standard values of Carbon foot Print for various parameters

Carbon Dioxide (CO_2) Factors:	Pounds CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Volume or Mass	Pounds CO_2 Million Btu	Kilograms CO_2 Million Btu
For homes and businesses				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.20	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.30	73.16
Kerosene	21.50/gallon	9.75/gallon	159.40	72.30
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.20	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117.00	53.07
Gasoline	19.60/gallon	8.89/gallon	157.20	71.30
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.70	78.79
Other transportation fuels				
Jet Fuel	21.10/gallon	9.57/gallon	156.30	70.90
Aviation Gas	18.40/gallon	8.35/gallon	152.60	69.20

Water Conservation , Harvesting and Management

Water is an important natural resource and is available naturally depending on the climate and topographic features. All organisms are dependent on water for their living. Although water is available in nature, portable water is not available freely for human consumption. There have been many practices to conserve water so that it can be readily available for human use. It has been noticed that due to unsustainable use of water resources there is contamination and depletion of the ground water and also water which is available in various reservoirs like lakes, ponds, streams etc which is becoming more alarming. Therefore it becomes increasingly important to conserve protect and manage the water resources availability and usage so that it is sustainably used within the college campus. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration.

Per capita water availability of many river basins in India is declining over the years due to sustained population pressure, agriculture and industrial expansion, besides changing climate scenarios.

- **Rainwater harvest**

  Rainwater harvesting is a technique used for collecting, storing and using rainwater for domestic, agricultural or any other uses. The rainwater is collected from various hard surfaces such as rooftops, runoff from catchments, from streams and water conservation through watershed management or other manmade aboveground hard surfaces. It is an age-old system of collection of rainwater for future use. The harvested water can be stored on surface through ponds and tanks or can be recharged to groundwater.

- **Protection of Water from Pollution**

  If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing

economic activities, urbanization etc.

- **Rational Use of Groundwater:**

  Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete. Hence, Groundwater exploitation should be only in proportion to its recharging capacity.

- **Increasing Forest Cover:**

  According to hydrological movements, water is received through rainfall every year different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

WATER USES AND MANAGEMENT

A total of 18000 L of water is pumped every day for the College dwellers as well to meet the daily demands of the academic and administrative Departments (Table 1). The daily use of the water during 2020-21 was approx. 2110 L per day shown in Figure 2&3.

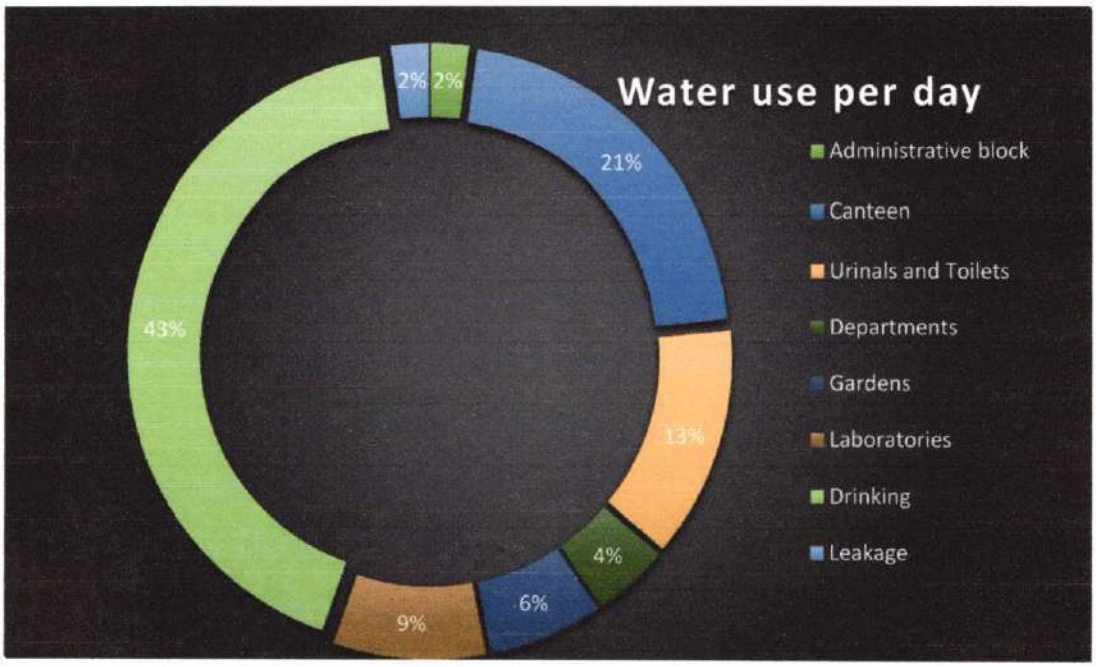

Figure.2: Daily water Consumption and usage in RBVRRR

Table:1 Source and uses of water in the college campus Source of water

Source and uses of water in the College campus Source of water		
Sl. No	**Parameters**	**Information**
1	No of Wells	1
2	No of the motors used	2
3	Horsepower- motor	3 HP x 2
4	Depth of well- Total	600 m x 1
5	Capacity of Tank(Total)	250000 L
Quantity of water used in different sections of the Campus		
	Sections	**Water use (L/day)**
6	Administrative block	100
7	Canteen	100
8	Urinals and Toilets	100
9	Departments	10
10	Gardens	1000
11	Laboratories	100
12	Drinking	500
13	Leakage	500
14	Main purposes of water use in the campus	Drinking and cooking purpose Toilets and wash areas Laboratory use Gardening Construction
15	Nos. of water tap	320 nos
16	Water cooler and drinking water filtration facility	5 nos
17	Nos. of urinal and toilets	20
18	Nos. of waterless /bio-toilets	Nil
19	Any water wastage/why?	Yes, leakage from pipes and tanks, leaving of taps open at times
20	Water usage for gardening	1000 Ltr
21	Wastewater sources	leakage from pipes and tanks, Overflowing of tanks from residential qtrs., Toilets, laboratories, hostels
22	Use of wastewater	Nil
23	The fate of wastewater from labs	Discharged into soak pit in case of contamination and natural discharge
24	Any wastewater treatment for lab water	No
25	Whether any green chemistry method practiced in Labs	No

26	Rainwater harvesting	Rain water harvesting is maintain by the water body within the premises which also helps in maintaining the ground water level and there is no reusable rain water which

The stake holders of the BVRRR specially propose to use of grey water which is obtained from the various domestic activities and they re-use the same water for gardening and vegetable fields etc. Also water recycling is done as per the direction of the competent authority in broader scale as and when required. During the rainy season water from the roof tops of the buildings directly fall into the lake through rain water outlets, RCC drains and recharges the ground water table throughout the year

Figure.3 Drinking water in Each Floor

Present Status: Constructed Water harvesting Pits 2 No's across the campus and in the process of constructing water drains and interconnecting the same to water harvesting pits to recharge the ground water.

Waste Management:

The campus produces and disposes solid waste through its day-to-day operations. There can be difference between individuals, between certain day's activities, and between holidays and work days, as well as between seasons. An average figure per person per day is however worked out by observing their activities for a week by student volunteers at the disposal area through sample survey approach, quantifying the measured wastes and then averaging.

In India, through certain research studies on waste generation in academic campuses from time to time, environmentalists have arrived at some empirical coefficients for assessing GHG emissions from solid wastes. These will be use in evaluating the green auditing data on wastes in RBVRR institute. The wastes generated in the college is systematically collected and disposed off as scientifically as possible. Wet wastes are separated at source itself. For disposal, only competent agencies are approached and materials handed over. As seen in the table, most items are intended to be recycled, reused or processed. Adequate numbers of garbage bins are provided in every room and in every floor in every hostel as well as in the academic area and guest house, and the students are using them as and when required. The practice of burning the paper waste, which is the usual practice needs to be discontinued and better options tried. Using waste paper for creating decorative materials is one option. The present waste generation is represented as **Table.2 and Figure.4-5**

The following waste is categorizes as:

- **Non Bio Waste** – Plastic Bottles / Waste Paper / Cardboards/ Batteries etc

Non- biodegradable waste, which cannot be decomposed by biological processes is called non- biodegradable waste.

These are of two types –

- **Recyclable**: waste having economic values but destined for disposal can be recovered and reused along with their energy value. e g. Plastic, paper, old cloth etc.
- **Non-recyclable**: waste which do not have economic value of recovery. e.g. Carbon paper, thermo coal, tetra packs etc.

Disposal of non-biodegradable waste is a major concern, not just plastic, a variety of waste being accumulated. There are a few ways to help non-biodegradable waste management. The impact of non biodegradable waste on the environment and also focus on its safe disposal for sustainable environment.

Table 2. Annual Waste Generation category wise

S. No.	Stake holders	Types of solid waste	Average waste generated Year (Kg)	% of waste
1	ACADEMIC DEPARTMENT	Paper waste	100	16.8
2		Plastic waste	10	1.7
3		Organic Waste	100	16.8
4		E-waste	1	0.2
5		Bio Medical Waste	20	3.4
6	ADMINISTRATIVE OFFICE	Paper waste	100	16.8
7		Plastic waste	10	1.7
8		Organic Waste	30	5.0
9		E-waste	2	0.3
10	CANTEENS	Paper waste	10	1.7
11		Plastic waste	10	1.7
12		Organic Waste	200	33.6
13		E-waste	2	0.3
TOTAL			**595 Kg /Year**	

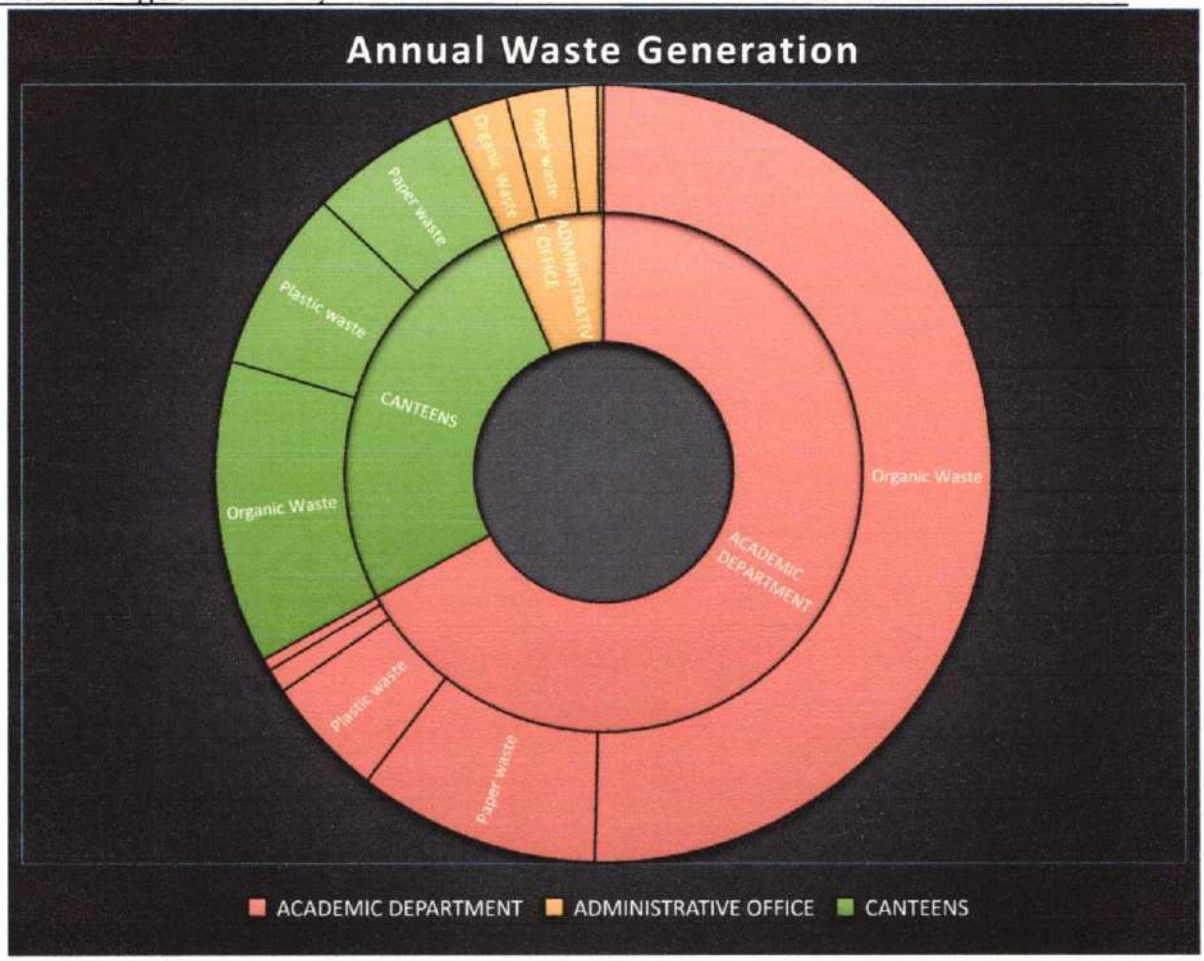

Figure.4 Annual Waste Generation In the RBVRR College of Pharmacy

- **Bio Medical waste:**

  Bio medical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I Category of Waste as **Table 3**

Carbon Footprint

Carbon Footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, optimization, or community. An acceptable definition for carbon foot print is: carbon footprints the total amount of greenhouse gases produced directly and indirectly for supporting human activities, usually expressed in equivalent tons of carbon dioxide (CO_2). The most common greenhouse gases (GHGs) in our environment are carbon dioxide, water vapour, methane nitrous oxide and ozone. The total carbon footprint college as calculated and represented as **Table.4** and International Standards of carbon footprint for various parameters represented as **Table. 5**

The RBVRR has total staff (Teaching + Non Teaching) of 70 members, the Co2 emission

Table:4 Carbon foot Print

Sl. No:	Source	Rate	Quantity x Days/year		Total Quantity	Annual Eqvt. CO_2
1	Electricity use (For India)	0.82 kg/kWh	--		3136KWh	2.6 T CO_2
2	Fossil fuel use	268 g CO2eq/kg	LPG	5	435kg /Year	0.05 T CO_2
3	Bus – students public transport	268 g CO2eq/L	100	100	250 kg/year	67 T CO_2
4	Staff week public transport	268 g CO2eq/L	25	150	56.2 kg/Year	15 T CO_2
5	Non Teaching staff public transport	268 g CO2eq/L	45	150	168 kg/Year	45 T CO_2
6	Cars, Taxis all	230g CO2eq/L	2	100	5 kg/Year	0.6 CO_2
						130.2T CO_2

The per capita carbon footprint for the RBVRR, is 130 kg (or 0.013 T) of CO_2 equivalent 130.2 T /1000 persons].

According to Economic Survey, Govt. of India 2009 - 10, the per capita emission for an Indian was 1.2 ton CO_2 eq. per annum. In the same report, it was projected that this will go up to 2.0 – 2.5 T of CO2 by 2020-21 and to 3.0 – 3.5 T of CO_2 by 2030. For the year 2020-21, the RBVRR, the Carbon Footprint per capita at 0.013 T CO_2 is even less than one-Fourth of the national average. The campus is thus **a Green Campus**.

Carbon Footprint Balance

The remediation gap between the assessed footprint and available remediation is 130.2–3.5 =126.7 T CO_2eq for 2020-21. On closer examination, major contributors to it are:- Daily bus journey by around 600 day scholars (due to covid-19 more no of students attend the classes are online).

Table: 5 International standard values of Carbon foot Print for various parameters

Carbon Dioxide (CO_2) Factors:	Pounds CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Volume or Mass	Pounds CO_2 Million Btu	Kilograms CO_2 Million Btu
For homes and businesses				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.20	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.30	73.16
Kerosene	21.50/gallon	9.75/gallon	159.40	72.30
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.20	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117.00	53.07
Gasoline	19.60/gallon	8.89/gallon	157.20	71.30
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.70	78.79
Other transportation fuels				

Jet Fuel	21.10/gallon	9.57/gallon	156.30	70.90
Aviation Gas	18.40/gallon	8.35/gallon	152.60	69.20
Industrial fuels and others not listed above				
Flared natural gas	120.70/thousand cubic feet	54.75/thousand cubic feet	120.60	54.70
Petroleum coke	32.40/gallon	14.70/gallon	225.10	102.10
Other petroleum & miscellaneous	22.09/gallon	10.02/gallon	160.10	72.62
Nonfuel uses				
Asphalt and Road Oil	26.34/gallon	11.95/gallon	166.70	75.61
Lubricants	23.62/gallon	10.72/gallon	163.60	74.21
Petrochemical Feedstocks	24.74/gallon	11.22/gallon	156.60	71.03

ENVIRONMENTAL AUDIT

Water Conservation , Harvesting and Management

Water is an important natural resource and is available naturally depending on the climate and topographic features. All organisms are dependent on water for their living. Although water is available in nature, portable water is not available freely for human consumption. There have been many practices to conserve water so that it can be readily available for human use. It has been noticed that due to unsustainable use of water resources there is contamination and depletion of the ground water and also water which is available in various reservoirs like lakes, ponds, streams etc which is becoming more alarming. Therefore it becomes increasingly important to conserve protect and manage the water resources availability and usage so that it is sustainably used within the college campus. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration.

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- **Rainwater harvest**

  Rainwater harvesting is a technique used for collecting, storing and using rainwater for domestic, agricultural or any other uses. The rainwater is collected from various hard surfaces such as rooftops, runoff from catchments, from streams and water conservation through watershed management or other manmade aboveground hard surfaces. It is an age-old system of collection of rainwater for future use. The harvested water can be stored on surface through ponds and tanks or can be recharged to groundwater.

- **Protection of Water from Pollution**

  If the total fresh water available on the earth remains pollution free, it is sufficient to meet the drinking water needs of the existing population of the world, unfortunately a large portion of fresh water does not remain fit for use of the living world due to increasing

economic activities, urbanization etc.

- **Rational Use of Groundwater:**

  Groundwater meets 25 per cent of total supply of water in the world, remaining 75 per cent supply is met by surface water sources of rivers, lakes etc. Demand for groundwater goes on increasing in proportion to its available quantity due to which quantity of groundwater goes on decreasing. After exploitation of groundwater, its re-infiltration takes a very long time to complete. Hence, Groundwater exploitation should be only in proportion to its recharging capacity.

- **Increasing Forest Cover:**

  According to hydrological movements, water is received through rainfall every year different quantities on the surface of the earth. This water flows on the surface and reaches the seas. Some part of rainwater is stored in stable water reservoirs (lakes and tanks), whereas some quantity of water infiltrates into the land and takes the form of groundwater.

WATER USES AND MANAGEMENT

A total of 18000 L of water is pumped every day for the College dwellers as well to meet the daily demands of the academic and administrative Departments (Table 1). The daily use of the water during 2019-20 was approx. 2110 L per day shown in **Figure 2&3.**

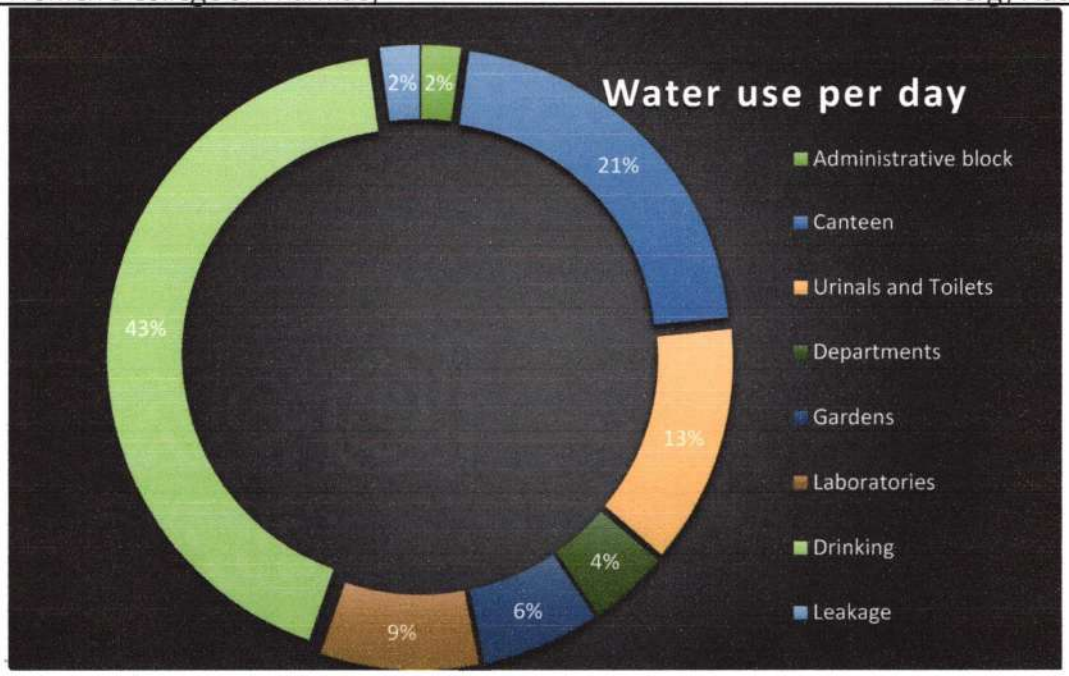

Figure. 2: Daily water Consumption and usage in RBVRRR

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Sl. No	**Parameters**	**Information**
1	No of Wells	1
2	No of the motors used	2
3	Horsepower- motor	3 HP x 2
4	Depth of well- Total	600 m x 1
5	Capacity of Tank(Total)	250000 L
Quantity of water used in different sections of the Campus		
	Sections	**Water use (L/day)**
6	Administrative block	600
7	Canteen	2500
8	Urinals and Toilets	9000
9	Departments	500
10	Gardens	1000
11	Laboratories	1000
12	Drinking	5000
13	Leakage	500
14	Main purposes of water use in the campus	Drinking and cooking purpose Toilets and wash areas Laboratory use Gardening Construction
15	Nos. of water tap	320 nos

16	Water cooler and drinking water filtration facility	5 nos
17	Nos. of urinal and toilets	20
18	Nos. of waterless /bio-toilets	Nil
19	Any water wastage/why?	Yes, leakage from pipes and tanks, leaving of taps open at times
20	Water usage for gardening	1000 Ltr
21	Wastewater sources	leakage from pipes and tanks, Overflowing of tanks from residential qtrs., Toilets, laboratories, hostels
22	Use of wastewater	Nil
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24	Any wastewater treatment for lab water	No
25	Whether any green chemistry method practiced in Labs	No
26	Rainwater harvesting	Rain water harvesting is maintain by the water body within the premises which also helps in maintaining the ground water level and there is no reusable rain water which

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These are of two types –

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S. No.	Stake holders	Types of solid waste	Average waste generated Year (Kg)	% of waste
1	ACADEMIC DEPARTMENT	Paper waste	1000	43.5
2		Plastic waste	25	1.1
3		Organic Waste	300	13.0
4		E-waste	1	0.0
5		Bio Medical Waste	25	1.1
6	ADMINISTRATIVE OFFICE	Paper waste	160	7.0
7		Plastic waste	25	1.1
8		Organic Waste	50	2.2
9		E-waste	2	0.1
10	CANTEENS	Paper waste	100	4.3
11		Plastic waste	10	0.4
12		Organic Waste	600	26.1
13		E-waste	2	0.1
TOTAL			**2300Kg /Year**	

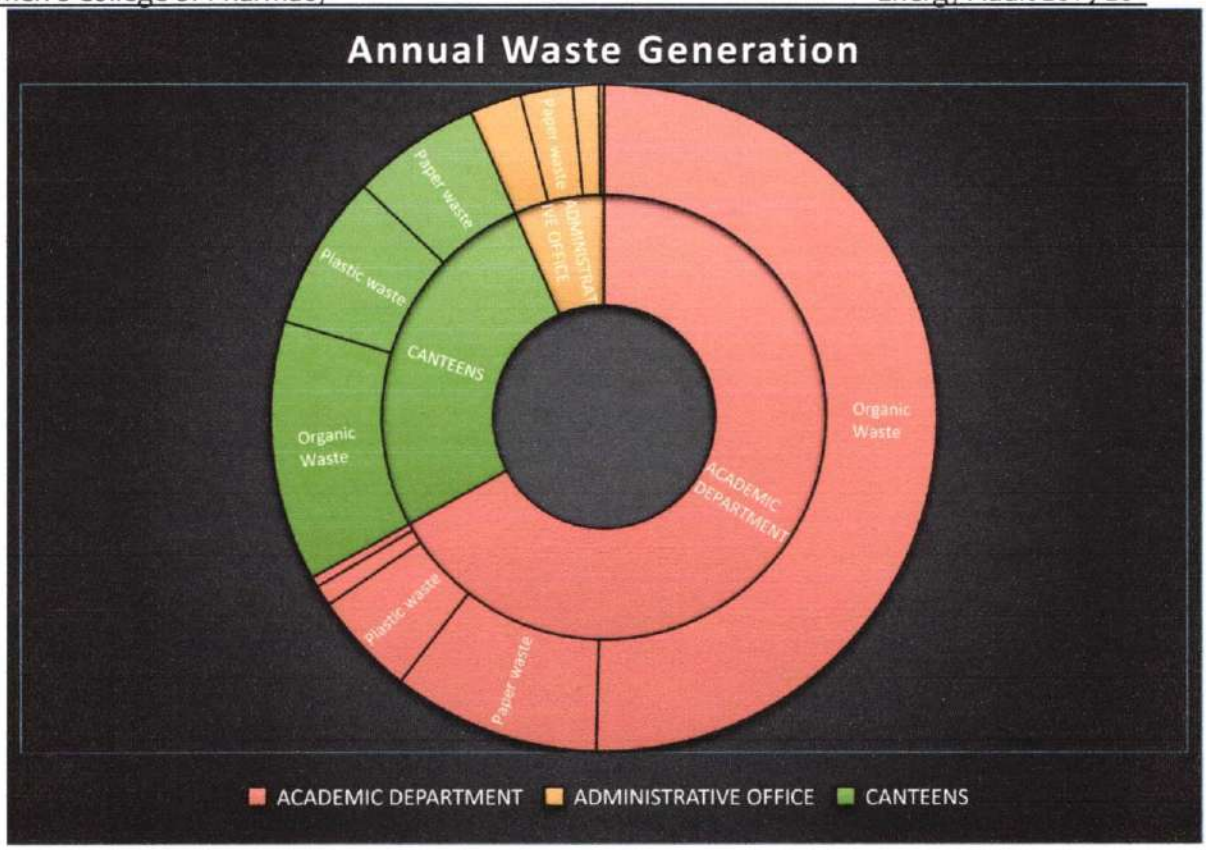

Figure.4 Annual Waste Generation In the RBVRR College of Pharmacy

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  Category of Waste as **Table 3**

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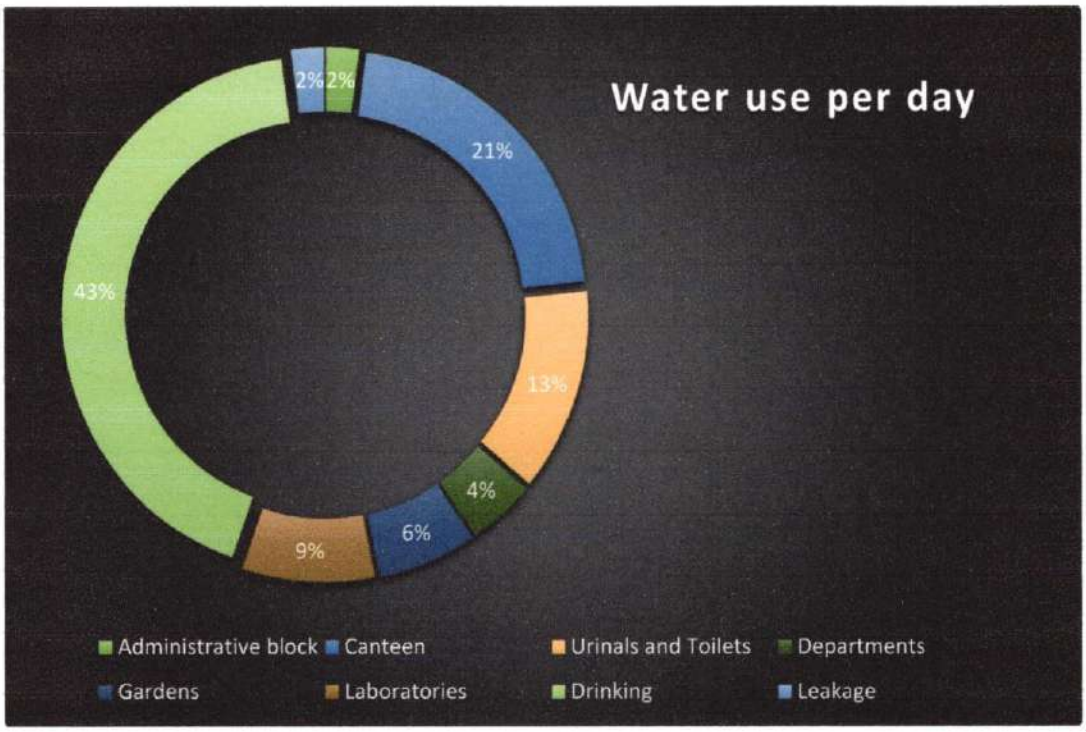
Water Uses and Management

A total of 20000 L of water is pumped every day for the College dwellers as well to meet the daily demands of the academic and administrative Departments (Table 1). The daily use of the water during 2018-19 was approx. 26500 L per day shown in Figure 2&3.



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	Sections	**Water use (L/day)**
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7	Canteen	3500
8	Urinals and Toilets	8000
9	Departments	1500
10	Gardens	1000
11	Laboratories	5000
12	Drinking	6000
13	Leakage	500
14	Main purposes of water use in the campus	Drinking and cooking purpose Toilets and wash areas Laboratory use Gardening Construction
15	Nos. of water tap	320 nos
16	Water cooler and drinking water filtration facility	5 nos
17	Nos. of urinal and toilets	20
18	Nos. of waterless /bio-toilets	Nil
19	Any water wastage/why?	Yes, leakage from pipes and tanks, leaving of taps open at times
20	Water usage for gardening	1000 Ltr
21	Wastewater sources	leakage from pipes and tanks, Overflowing of tanks from residential qtrs., Toilets, laboratories, hostels
22	Use of wastewater	Nil
23	The fate of wastewater from labs	Discharged into soak pit in case of contamination and natural discharge
24	Any wastewater treatment for lab water	No
25	Whether any green chemistry method practiced in Labs	No
26	Rainwater harvesting	Rain water harvesting is maintain by the water body within the premises which also helps in maintaining the ground water level and there is no reusable rain water which

focus on its safe disposal for sustainable environment.

Table 2. Annual Waste Generation category wise

S. No.	Stake holders	Types of solid waste	Average waste generated Year (Kg)	% of waste
1	**ACADEMIC DEPARTMENT**	Paper waste	1200	44.8
2		Plastic waste	25	0.9
3		Organic Waste	500	18.7
4		E-waste	1	0.0
5	**ADMINISTRATIVE OFFICE**	Paper waste	200	7.5
6		Plastic waste	15	0.6
7		Organic Waste	80	3.0
8		E-waste	2	0.1
9	**CANTEENS**	Paper waste	150	5.6
10		Plastic waste	5	0.2
11		Organic Waste	500	18.7
12		E-waste	2	0.1
TOTAL			**2680 Kg /Year**	

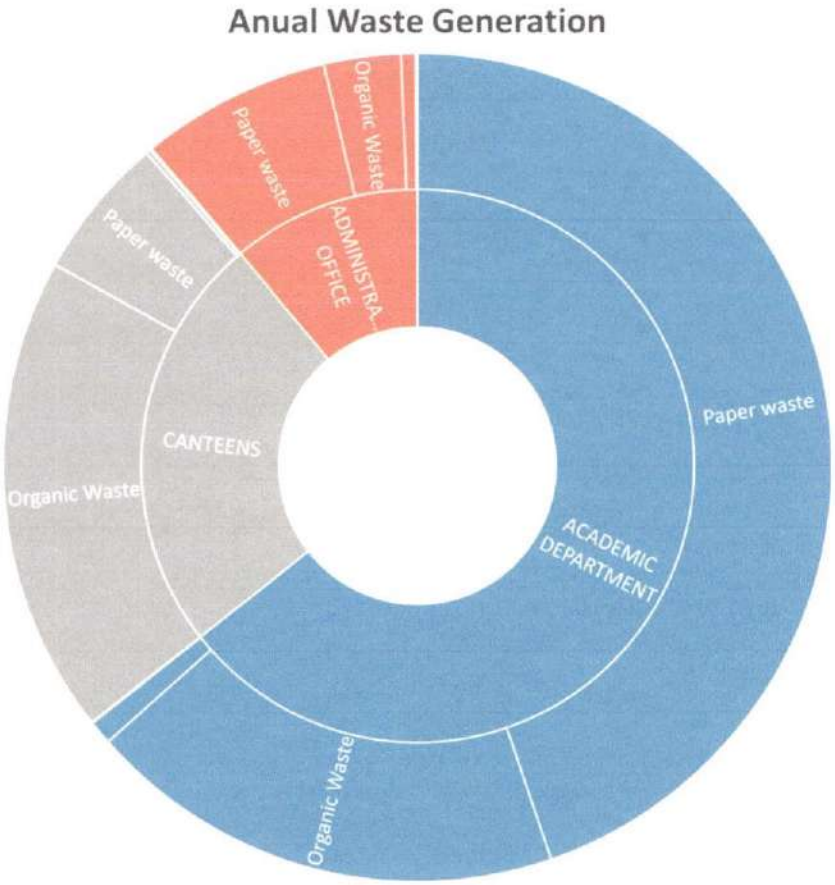

Figure.4 Annual Waste Generation In the RBVRR College of Pharmacy

- **Bio Medical waste:**

  Bio medical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I. Category of Waste as **Table 3. Bio Medical waste is not generated this academic year. In future, the medical lab has established.**

Table :3 Bio Medical waste category wise

Option	Waste Category	Treatment & Disposal
Category No-1	Human Anatomical Waste (human tissues, organs, body parts)	incineration/deep burial
Category No. 2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)	incineration/deep burial
Category No. 3	Microbiology & Biotechnology Waste (wastes from laboratory cultures, stocks or specimens of micro- organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving/micro-waving/incineration
Category No. 4	Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment/autoclaving/microwaving and mutilation/shredding
Category No 5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	incineration@/destruction and drugs disposal in secured landfills
Category No 6	Soiled Waste (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	Incineration/ autoclaving/microwaving
Category No. 7	Solid Waste (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc).	disinfection by chemical treatment/autoclaving/ microwaving and mutilation/ shredding
Category No. 8	Liquid Waste (waste generated from laboratory and washing, cleaning, house- keeping and disinfecting activities).	disinfection by chemical treatment and discharge into drains
Category No. 9	Incineration Ash (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No. 10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)	Chemical discharge into drains for liquids and secured landfill for solids

Carbon Footprint

Carbon Footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, optimization, or community. An acceptable definition for carbon foot print is: carbon footprints the total amount of greenhouse gases produced directly and indirectly for supporting human activities, usually expressed in equivalent tons of carbon dioxide (CO_2). The most common greenhouse gases (GHGs) in our environment are carbon dioxide, water vapour, methane nitrous oxide and ozone. The total carbon footprint college as calculated and represented as **Table.4** and International Standards of carbon footprint for various parameters represented as **Table. 5**

The RBVRR has total staff (Teaching + Non Teaching) of 70 members, the Co2 emission

Table:4 Carbon foot Print

Sl. No:	Source	Rate	Quantity x Days/year		Total Quantity	Annual Eqvt. CO_2
1	Electricity use (For India)	0.82 kg/kWh	–		3030KWh	2.4 T CO_2
2	Fossil fuel use	268 g CO2eq/kg	LPG	40	580 kg /Year	0.15 T CO_2
3	Bus – students public transport	268 g CO2eq/L	580	250	3325 kg/year	971 T CO_2
4	Staff week public transport	268 g CO2eq/L	25	300	225 kg/Year	60.3 T CO_2
5	Non Teaching staff public transport	268 g CO2eq/L	45	300	270 kg/Year	72.3 T CO_2
6	Cars, Taxis all	230g CO2eq/L	2	300	15 kg/Year	4 CO_2
						1110.1T CO_2

The per capita carbon footprint for the RBVRR, is 0.111 kg (or 0.111 T) of CO_2 equivalent 1110.1 T /1000 persons].

According to Economic Survey, Govt. of India 2009 - 10, the per capita emission for an Indian was 1.2 ton CO_2 eq. per annum. In the same report, it was projected that this will go up to 2.0 – 2.5 T of CO2 by 2018-19 and to 3.0 – 3.5 T of CO_2 by 2030. For the year 2018-19, the RBVRR, the Carbon Footprint per capita at 0.111 T CO_2 is even less than one-Fourth of the national average. The campus is thus **a Green Campus**.

Table:5 International standard values of Carbon foot Print for various parameters

Carbon Dioxide (CO_2) Factors:	Pounds CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Volume or Mass	Pounds CO_2 Million Btu	Kilograms CO_2 Million Btu
For homes and businesses				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.20	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.30	73.16
Kerosene	21.50/gallon	9.75/gallon	159.40	72.30
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.20	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117.00	53.07
Gasoline	19.60/gallon	8.89/gallon	157.20	71.30
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.70	78.79
Other transportation fuels				
Jet Fuel	21.10/gallon	9.57/gallon	156.30	70.90
Aviation Gas	18.40/gallon	8.35/gallon	152.60	69.20
Industrial fuels and others not listed above				
Flared natural gas	120.70/thousand cubic feet	54.75/thousand cubic feet	120.60	54.70

Carbon Dioxide (CO_2) Factors:	Pounds CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Volume or Mass	Pounds CO_2 Million Btu	Kilograms CO_2 Million Btu
Special Naphthas (solvents)	20.05/gallon	9.10/gallon	160.50	72.80
Waxes	21.11/gallon	9.57/gallon	160.10	72.62
Coal by type				
Anthracite	5,685.00/short ton	2,578.68/short ton	228.60	103.70
Bituminous	4,931.30/short ton	2,236.80/short ton	205.70	93.30
Subbituminous	3,715.90/short ton	1,685.51/short ton	214.30	97.20
Lignite	2,791.60/short ton	1,266.25/short ton	215.40	97.70
Coke	6,239.68/short ton	2,830.27/short ton	251.60	114.12
Other fuels				
Geothermal (average all generation)	NA	NA	16.99	7.71
Municipal Solid Waste	5,771.00/short ton	2,617.68/short ton	91.90	41.69
Tire-derived fuel	6,160.00/short ton	2,794.13/short ton	189.54	85.97
Waste oil	924.0/barrel	419.12/barrel	210.00	95.25

Source: U.S. Energy Information Administration estimates.
Note: To convert to carbon equivalents multiply by 12/44. Coefficients may vary slightly with estimation method and across time.

Summary

Goals of the College

In the effort to Enhancing an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The college Management is proactively working on the several facets of "Green Campus" including Plantation of more trees, Water Conservation, Efficient water usage by eliminating leaking water taps, Installation of STP, Water Harvesting Pits and interconnecting them to Recharge the Ground Water table. Effective Waste Management which includes Food Waste, Plastic, Paper, carbon footprints etc.

ENERGY AND RENEWABLE ENERGY AUDIT

Energy and Renewable Energy :

India is on a path to rapid energy transition, started at a normal pace in 2008 as part of the then announced Climate Change Action Plan for India, with a target of installing 20,000 MW of renewable energy generation facilities including Solar and Wind electricity by 2022. Prime Minister Shri. Narendra Modi, after taking over reviewed this target and called upon the people of India to target 175,000 MW of renewable by 2022 – composed of 100,000 MW of Solar PV; 60,000 MW of Wind Power; 10,000 MW of Biomass based power and 5,000 MW of Small Hydro Power and all other renewable energy routes. At the historic 21st UNFCCC (UN Framework Convention on Climate Change) held in Paris in December 2015, India declared its INDC (Intended Nationally Determined Contribution) in which these targets are also explicitly stated. Therefore, it is only natural that through a Green Audit, any Higher Education Institution should identify opportunities for developing Renewable Energy (RE) Sources within its own premises.

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Table:1 Total Electrical Energy Consumption as per Utility Bills

TOD -> 2022-23	From Conventional	Solar	Total Amount Paid Rs.
March	5030	0	49710
April	4235	0	47715
May	3859	0	45523
June	4676	0	54557
July	2959	0	35663
August	4087	0	48156
September	3847	0	45309
October	2074	193	23829
November	2670	159	30602
December	3181	102	37052
January	2280	173	26211
February	2553	138	29578
Year Total	**41451**	**765**	**473905**
Minimum	**2074 October 2022**	**0 Mar-Sep 2022**	**23829 October 2022**
Maximum	**4676 June 2022**	**193 October 2022**	**54557 June 2022**

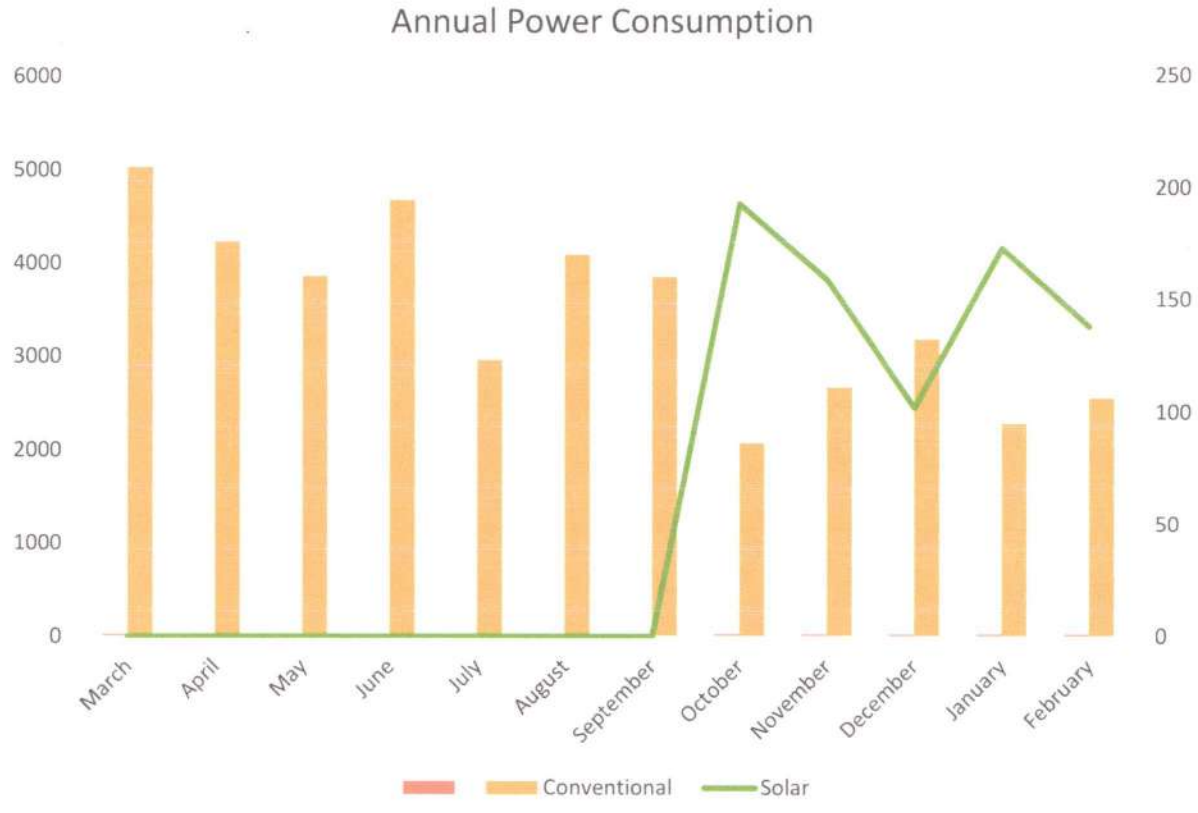

Figure. 2: Share of Solar PV in RBVRR Campus [With 20 kW SPV]

Table 2: Annual Utilization of Electricity

	Annual Utilization			
Academic Year	**Conventional Electricity**	**Solar Electricity Export to the Grid**	**Total Consumption**	**%Solar**
2018-19	30300	7710	22590	25.4
2019-20	38914	6956	31958	21
2020-21	3136	4341	3136	138
2021-22	22249	5022	17227	22.5
2022-23	41451	765	40686	0.1
Average				**52.8%**

For the consumption as in Table 1, the monthly charges are paid. The charge payable for peak time is Rs. 10.70 and the Normal time will be Rs8.90. Along with this 0.06% electricity duty is added up with the unit cost. Total for the year: Rs.473905. The 0.1% solar energy is supplied to against the to the grid and remaining is utilized as from conventional Energy for day to day activities.

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- Reducing your household's carbon footprint
- Reducing our dependence on fossil fuels.

The following housekeeping measures in Energy saving required for achieving the cited gains were introduced during year:

- Displayed stickers to switch off equipment - like Computers, Printers, Photocopiers, etc. when not required also to isolate them from power supply, whenever possible.
- Maintenance schedules for switchboards and distribution boards prepared and followed.
- Log Books for recording energy consumption, extent of power failures and running of standby generators were introduced.

Summary

Goals of the College

In the effort to Enhancing an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The college Management is proactively working on the several facets of "Green Campus" including. Effective utilization of Renewable Energy to mitigate the fossil fuels, etc .

STATEMENT OF ASSURANCE

The Green Audit conducted for the **February 2023** in the college. The Management had taken initiative to carryout the part of Green Audit externally. As mentioned above it is in the process of improving the awareness towards the renewable energy and sustainable development .The conclusions are based on a comparison of the situations as they existed at the time of the audit. The evidences presented are in support of the conclusions.

Audit Framework and detailed findings of the Audit

Objective	Observation/ Present status	Remarks / Recommendation
Renewable Energy – Harness Solar Power , Wind Power etc	A Grid Connected Solar plant is installed with capacity of 20 KW	The Solar PV plant is functional and exporting clean energy to the grid. It is recommended to explore the vacant areas to increase the solar roof top plants to harness more solar energy

ENERGY AND RENEWABLE ENERGY

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The Institute has **20 KW** Solar PV Grid Connected in an area of **200 sft** and there is available area of **350 sft** for further addition of Solar PV plant.

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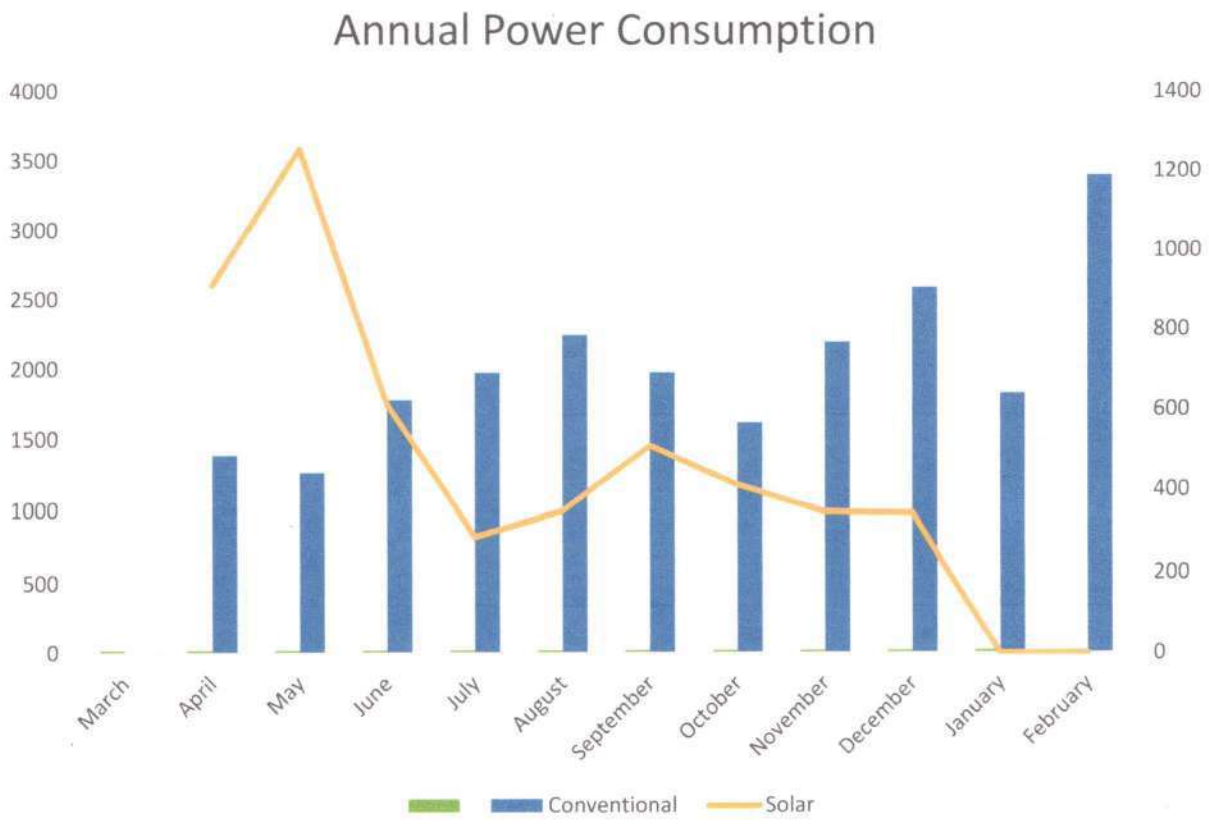
Table:1 Total Electrical Energy Consumption as per Utility Bills

TOD -> 2021-22	From Conventional	Solar	Total Amount Paid Rs.
March			0
April	1386	912	20748
May	1263	1255	2787
June	1779	611	14003
July	1973	286	19301
August	2246	348	21410
September	1976	509	17084
October	1618	412	14500
November	2193	346	21007
December	2589	343	25098
January	1827	0	20598
February	3399	0	36724
Year Total	**22249**	**5022**	**213260**
Minimum	**1263 May 2021**	**0 Jan - Mar 2022**	**23829 October 2022**
Maximum	**3399 February 2022**	**1255 May 2021**	**54557 June 2022**



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2020-21	3136	4341	3136	138
2021-22	22249	5022	17227	22.5
Average				**51.7%**

For the consumption as in Table 1, the monthly charges are paid. The charge payable for peak time is Rs. 10.70 and the Normal time will be Rs8.90. Along with this 0.06% electricity duty is added up with the unit cost. Total for the year: Rs.213260. The 0.05% solar energy is supplied to against the to the grid and remaining is utilized as from conventional Energy for day to day activities.

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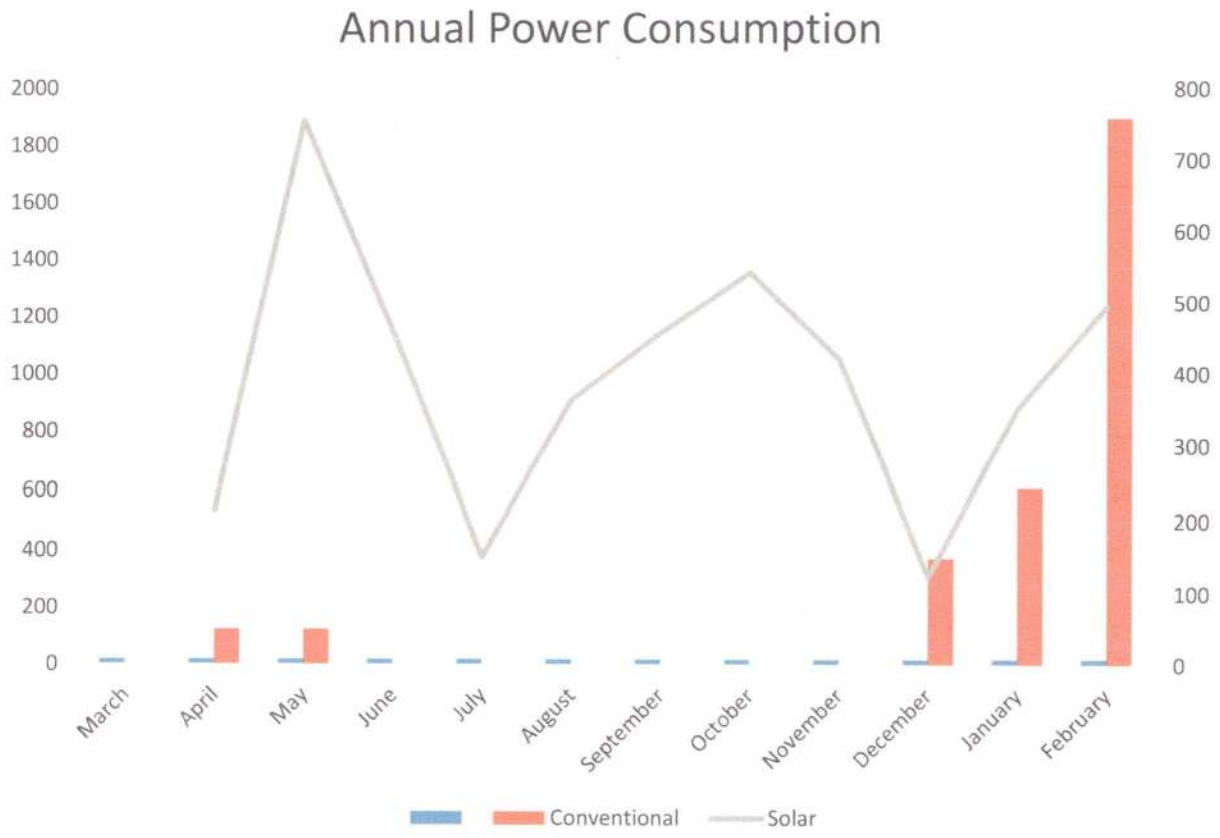
Table:1 Total Electrical Energy Consumption as per Utility Bills

TOD -> 2020-21	From Conventional	Solar	Total Amount Paid Rs.
March			
April	125	215	27037
May	125	756	27037
June	0	459	0
July	0	152	0
August	0	365	0
September	0	458	0
October	0	543	0
November	0	421	0
December	377	125	0
January	611	352	0
February	1898	495	**0**
Year Total	**3136**	**4341**	**54074**
Maximum	**1898 February 2021**	**756 May 2020**	**27037 February 2020**



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2018-19	30300	7710	22590	25.4
2019-20	38914	6956	31958	21.7
2020-21	3136	4341	3136	138
Average				**61.7**

For the consumption as in Table 1, the monthly charges are paid. The charge payable for peak time is Rs. 10.42 and the Normal time will be Rs8.80. Along with this 0.06% electricity duty is added up with the unit cost. Total for the year: Rs.54074. The 138% solar energy is supplied to against the to the grid and remaining is utilized as from conventional Energy. Among all the benefits of solar energy the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the world and is available every day . We can not run out of solar energy as energy source.

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Table:1 Total Electrical Energy Consumption as per Utility Bills

TOD -> 2019-20	From Conventional	Solar	Total Amount Paid Rs.
March	5568	654	51709
April	5048	897	39797
May	2719	1215	18161
June	3492	675	30691
July	2806	285	27699
August	2553	395	24101
September	3646	346	35415
October	2193	451	19954
November	4100	658	39962
December	3527	524	32518
January	3262	856	26573
February			
Year Total	**38914**	**6956**	**346580**
Minimum			
Maximum	**1898 February 2021**	**756 May 2020**	**27037 February 2020**

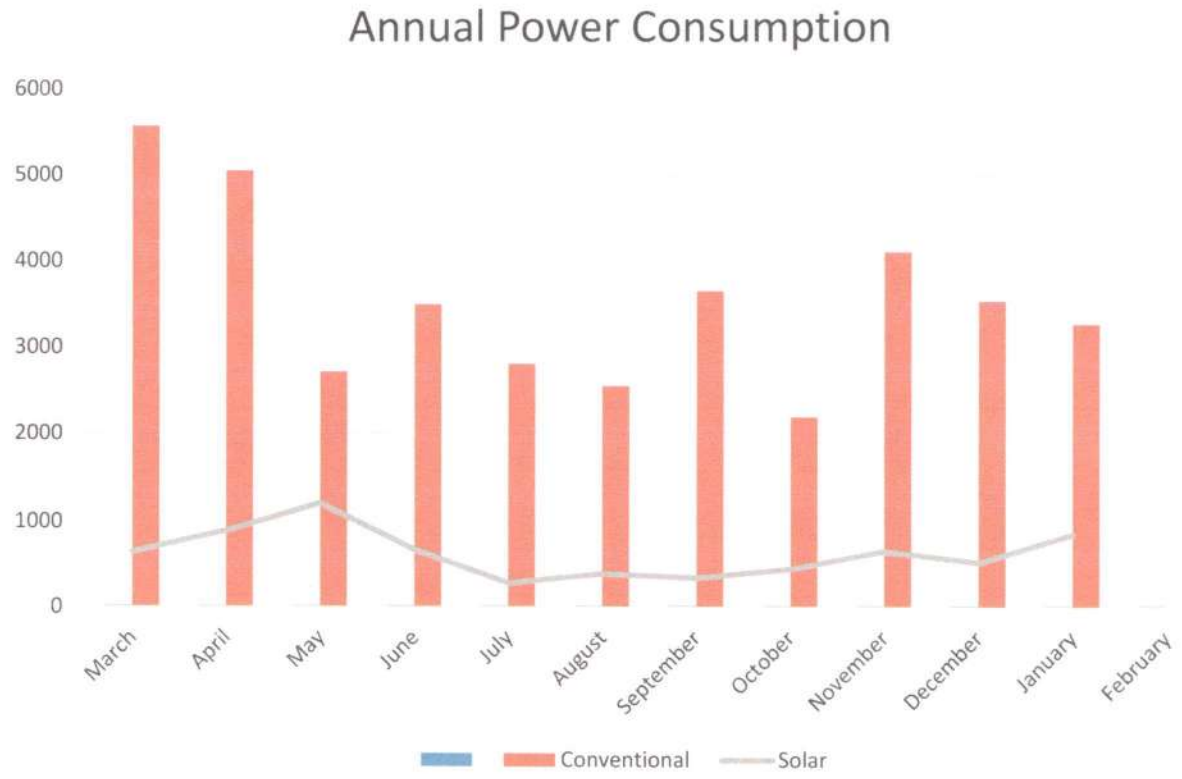

Figure. 2 Share of Solar PV in RBVRR Campus [With 20 kW SPV]

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	Annual Utilization			
Academic Year	**Conventional Electricity**	**Solar Electricity Export to the Grid**	**Total Consumption**	**%Solar**
2018-19	30300	7710	22590	25.4
2019-20	38914	6956	31958	21
Average				**23.2**

For the consumption as in Table 1, the monthly charges are paid. The charge payable for peak time is Rs. 9.70 and the Normal time will be Rs7.90. Along with this 0.06% electricity duty is added up with the unit cost. Total for the year: Rs.346580. The 21% solar energy is supplied to against the to the grid and remaining is utilized as from conventional Energy.

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Present Status: Presently installed 20 KW Grid Connected Solar PV to Harness the Solar Power and further enhancement of solar PV is in the pipe line.

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ENERGY AND RENEWABLE ENERGY

Energy and Renewable Energy :

The Institute has **20 KW** Solar PV Grid Connected in an area of **200 sft** and there is available area of **350 sft** for further addition of Solar PV plant.

The solar system has generated energy, the energy bills will drop. How much we save on bill will be dependent on the size of the solar system and electricity usage. Moreover, not only will you be saving on the electricity bill, there is also a possibility to receive payments for the surplus energy that you export back to the grid. If you generate more electricity than you use (considering that your solar panel system is connected to the grid). The annual energy consumption of the institute represented as **Table.1, 2 and Figure.2 &3**

Table:1 Total Electrical Energy Consumption as per Utility Bills

TOD -> 2018-19	From Conventional	Solar	Total Amount Paid Rs.
March	5568	654	51709
April	5048	897	39797
May	2719	1215	18161
June	3492	675	30691
July	2806	285	27699
August	2553	395	24101
September	3646	346	35415
October	2193	451	19954
November	4100	658	39962
December	3527	524	32518
January	3262	856	26573
February	-	-	-
Year Total	**30300**	**7710**	**251267**
Minimum	**2193 October 2018**	**285 July 2018**	**18161 May 2018**
Maximum	**5568 March 2018**	**1215 May 2018**	**51709 March 2018**

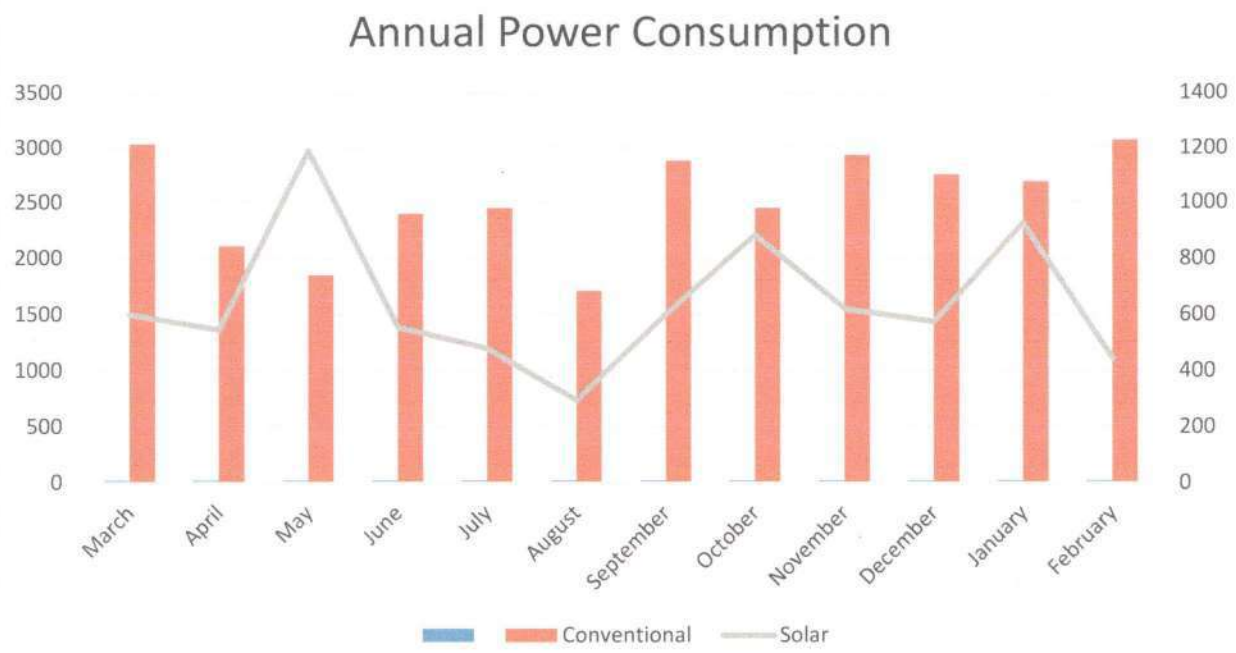

Figure.2: Share of Solar PV in RBVRR Campus [With 20 kW SPV]

Table 2: Annual Utilization of Electricity

	Annual Utilization			
Academic Year	**Conventional Electricity**	**Solar Electricity Export to the Grid**	**Total Consumption**	**%Solar**
2018-19	**30300**	**7710**	**22590**	**25.4**
Average				

For the consumption as in Table 1, the monthly charges are paid. The charge payable for peak time is Rs. 9.70 and the Normal time will be Rs7.90. Along with this 0.06% electricity duty is added up with the unit cost. Total for the year: **Rs.251267.** The excess of 25.4% solar energy is exported to grid and also utilized as from conventional Energy for the regular activities.

Among all the benefits of solar energy the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the world and is available every day . We can not run out of solar energy as energy source.

Some of the key benefits of solar energy on the environment include:

- Using less water-Water is one of our most precious natural resources,
- Reducing air pollution-Help to slow climate change,
- Reducing your household's carbon footprint
- Reducing our dependence on fossil fuels.

The following housekeeping measures in Energy saving required for achieving the cited gains were introduced during year:

- Displayed stickers to switch off equipment - like Computers, Printers, Photocopiers, etc. when not required also to isolate them from power supply, whenever possible.
- Maintenance schedules for switchboards and distribution boards prepared and followed.
- Log Books for recording energy consumption, extent of power failures and running of standby generators were introduced.

Summary

Goals of the College

In the effort to Enhancing an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The college Management is proactively working on the several facets of "Green Campus" including renewable energy and utilization etc.