VASANTDADA SUGAR INSTITUTE

MANJARI BK, TALUKA HAVELI, DISTRICT PUNE-412 307

https://www.vsisugar.com

Criterion 7 - Institutional Values and Best Practices

7.1 Institutional Values and Social Responsibilities

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

i. **Green audit/ Environment Audit**
ii. **Energy audit**

Audit reports of Green audit, Environment Audit and Energy

Year 2021-22

ENERGY AUDIT REPORT

of

VASANDADA SUGAR INSTITUTE,

Manjari Budruk, Taluka: Haveli, District: Pune 412 307

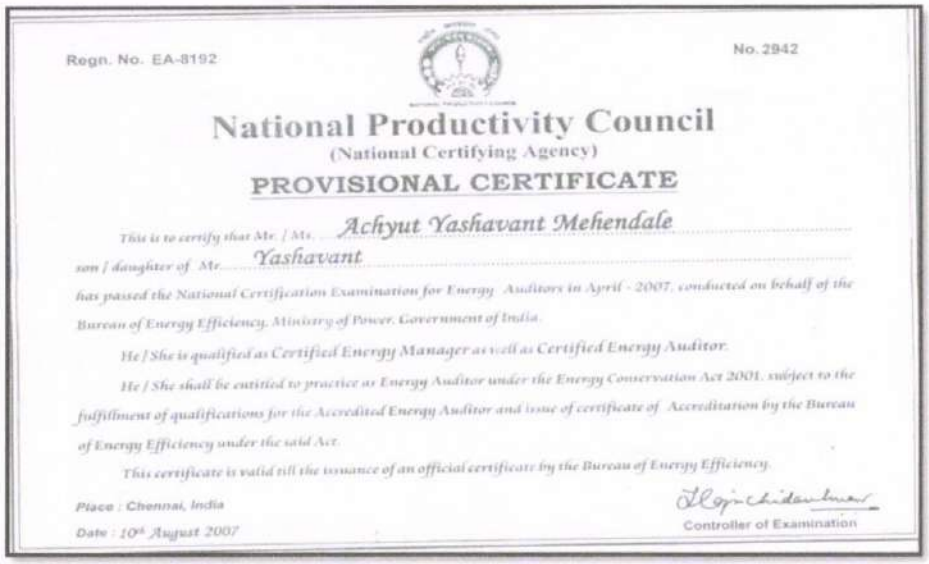
Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

REGISTRATION CERTIFICATES



Regn. No. EA-8192 No. 2942

National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Achyut Yashavant Mehendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 10th August 2007

Controller of Examination

BEE AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: ceo@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with *MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)* under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

MEDA EMPANELMENT CERTIFICATE

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/VSI/21-22/01 Date: 19/7/2022

CERTIFICATE

This is to certify that we have conducted an Energy Audit at Vasantdada Sugar Institute, Manjari Budruk, Taluka: Haveli, District: Pune 412 307, in the Year 2021-22.

The Institute has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 800 kWp Roof Top Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Vasantdada Sugar Institute, Manjari Budruk, Taluka: Haveli, District: Pune, for awarding us the assignment of Energy Audit of their Campus for the Year: 2021-22.

We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Vasantdada Sugar Institute Manjari Budruk, Taluka: Haveli, District: Pune consumes Energy in the form of **Electrical Energy; us**ed for various Electrical Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	Energy Generated, kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	518712	1117386	431339	1204759	1084.28
2	Maximum	52435	110487	52612	110310	99.28
3	Minimum	33302	73643	22792	84153	75.74
4	Average	43226	93115.5	35944.9	100396.58	90.36

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **800 kWp** Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The Institute has installed **800 kWp** Roof Top Solar PV Plant
- Energy purchased from MSEDCL in 2021-22 is **518712 kWh**
- Energy generated by Solar PV Plant in 2021-22 is **1117386 kWh**
- Energy exported to MSEDCL in 20221-22 is **431339 kWh**
- Total Energy Consumption in 2021-22 is **1204759 kWh**
- % of Renewable Energy to Annual Energy Demand in 2021-22 is **92.75 %**

5. Usage of LED Lighting:

- The Total LED Lighting Load is **75.13 kW.**
- The Total Lighting Load is **97.43 kW.**
- The % of LEDs to Total Lighting Load is **77.11 %.**

6. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2 into atmosphere

7. Reference:

- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

AC	:	Air conditioner
MSEDCL	:	Maharashtra Electricity Distribution Company Limited
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Alternate/Renewable Energy
5. To study usage of LED Lighting

1.2 Table No1: General Details of Institute:

No	Head	Particulars
1	Name	Vasantdada Sugar Institute
2	Address	Manjari Budruk, Taluka: Haveli, District: Pune 412 207
3	Year of Establishment	1975

1.3 Google Earth Location Image:

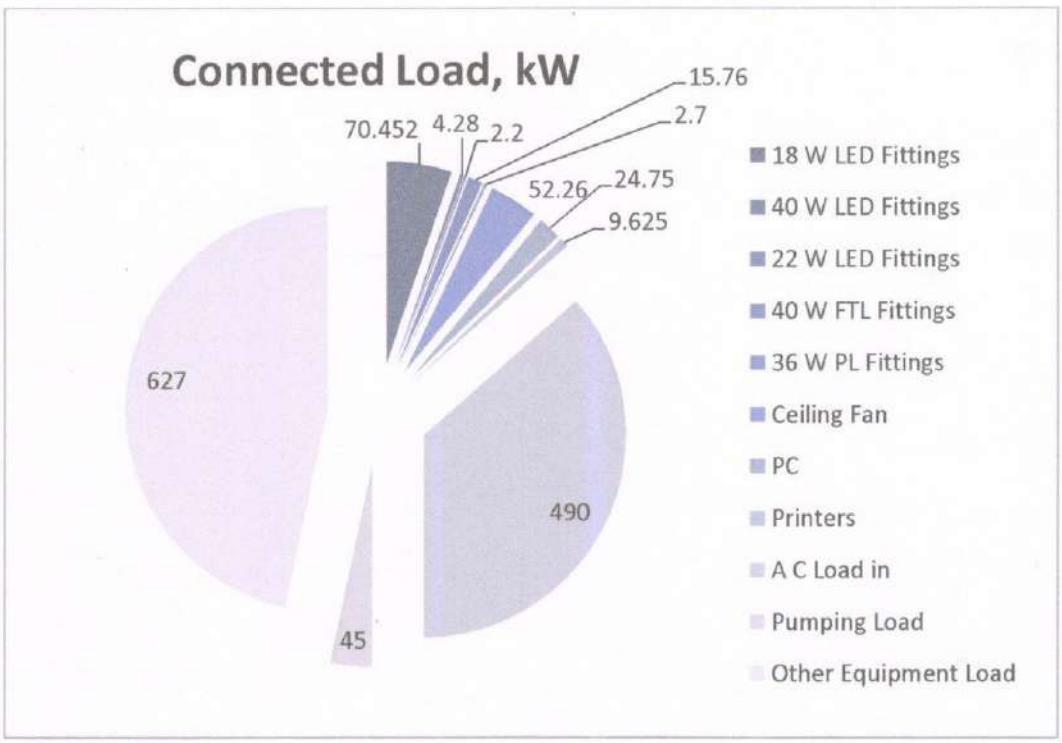
CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	18 W LED Fittings	3814	18	68.652
2	40 W LED Fittings	107	40	4.28
3	22 W LED Fittings	100	22	2.2
4	40 W FTL Fittings	490	40	19.6
5	36 W PL Fittings	75	36	2.7
6	Ceiling Fan	800	65	52
7	PC	165	150	24.75
8	Printers	54	175	9.45
9	A C Load in	490000	1	490
10	Pumping Load	45000	1	45
11	Other Equipment Load	627000	1	627
12	**Total**			**1345.63**

Chart No 1: Details of Connected Load:



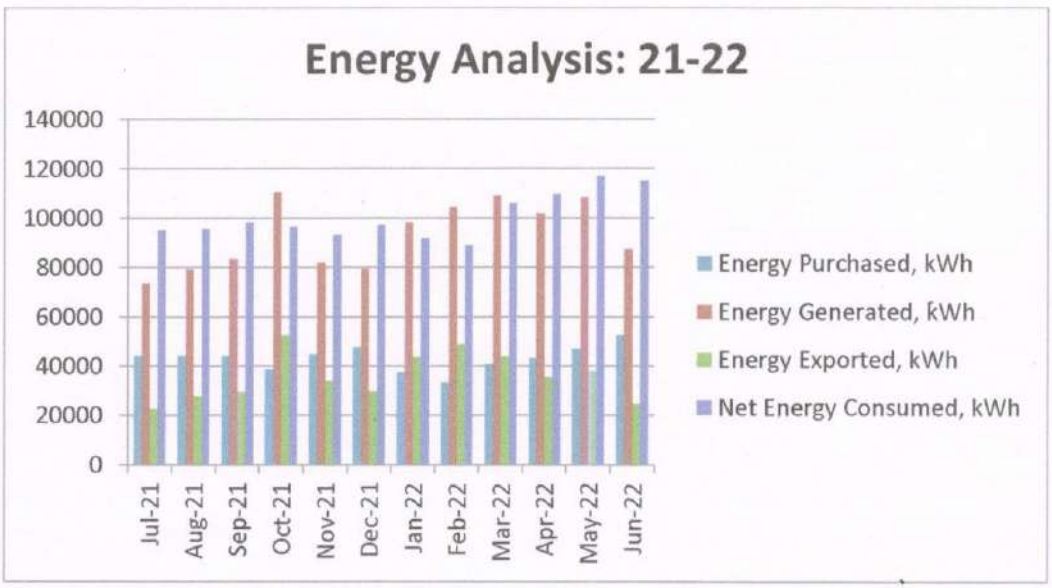
CHAPTER-III
STUDY OF ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption

Table No 3: Electrical Energy Purchase Analysis- 2021-22:

No	Month	Energy Purchased, kWh=(A)	Energy Generated, kWh=(B)	Energy Exported, kWh=(C)	Net Energy Consumed, kWh, D=A+B-C
1	Jul-21	44337	73643	22792	95188
2	Aug-21	44256	79078	27649	95685
3	Sep-21	44353	83440	29523	98270
4	Oct-21	38681	110487	52612	96556
5	Nov-21	44871	82126	33960	93037
6	Dec-21	47708	79288	29788	97208
7	Jan-22	37479	98178	43758	91899
8	Feb-22	33302	104524	48929	88897
9	Mar-22	40804	109087	43970	105921
10	Apr-22	43317	101863	35532	109648
11	May-22	47169	108245	38160	117254
12	Jun-22	52435	87427	24666	115196
13	Total	518712	1117386	431339	1204759
14	Maximum	52435	110487	52612	110310
15	Minimum	33302	73643	22792	84153
16	Average	43226	93115.5	35944.9	100396.58

Chart No 2: To study the variation of Month wise Energy Analysis, kWh:



CHAPTER-IV
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 4: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh=(A)	Energy Generated, kWh=(B)	Energy Exported, kWh=(C)	Net Energy Consumed, kWh, D=A+B-C
1	Jul-21	44337	73643	22792	95188
2	Aug-21	44256	79078	27649	95685
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4	Oct-21	38681	110487	52612	96556
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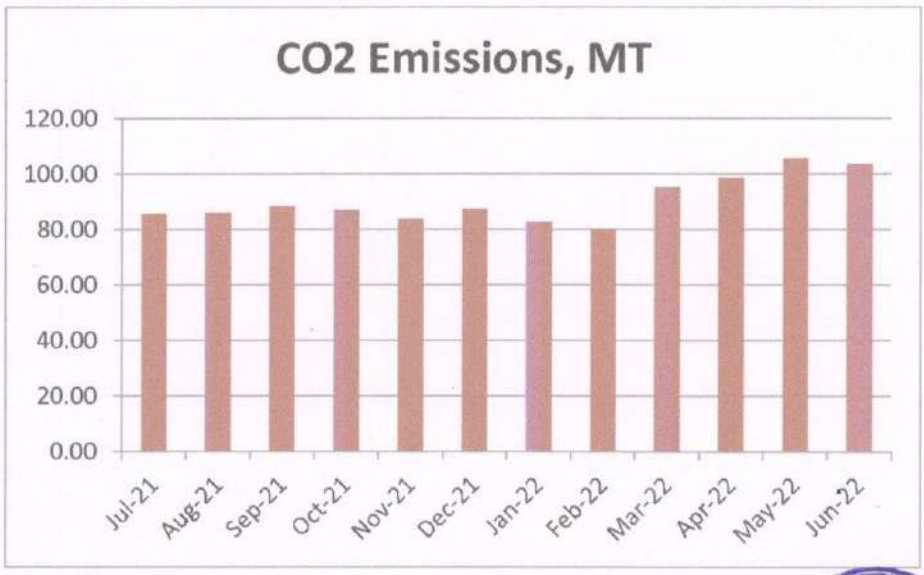
14	Maximum	52435	110487	52612	110310
15	Minimum	33302	73643	22792	84153
16	Average	43226	93115.5	35944.9	100396.58

Chart No 3: Representation of Month wise CO_2 emissions:



CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **800 kWp.**

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the Institute.

Table No 5: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Annual Energy Purchased in 2021-22	518712	kWh/Annum
2	Solar Energy Generated in 2021-22	1117386	kWh
3	Energy Exported in 2021-22	431339	kWh
4	Net Energy Consumed = **(1) + (2) – (3)**	**1204759**	kWh
5	% of Alternate Energy to Annual Energy Requirement = **(2)*100/(4)**	**92.75**	**%**

Photograph of Roof Top Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In the following Table, we present the percentage of Total Lighting load met by LED lights.

Table No 6: Computation of Percent Usage of LEDs to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 18 W LED Fittings	3814	Nos
2	Load of 18 W LED fitting	18	W/unit
3	Total Load of 18 W LED Fittings	**68.652**	kW
4	No of 22 W LED Fittings	100	Nos
5	Load of 22 W LED fitting	22	W/unit
6	Total Load of 22 W LED Fittings	**2.2**	kW
7	No of 40 W LED Fittings	107	Nos
8	Load of 40 W LED fitting	40	W/unit
9	Total Load of 40 W LED Fittings	**4.28**	kW
10	No of 40 W FTL Fittings	490	Nos
11	Load of 40 W FTL fitting	40	W/unit
12	Total Load of 40 W FTL Fittings	**19.6**	kW
13	No of 36 W PL Fittings	75	Nos
14	Load of 36 W PL fitting	36	W/unit
15	Total Load of 36 W PL Fittings	**2.7**	kW
16	Total LED Lighting Load=3+6+9	**75.13**	kW
17	Total Lighting Load=3+6+9+12+15	**97.43**	kW
18	% of LED to Total Lighting Load=**16*100/17**	**77.11**	%

ENVIRONMENTAL AUDIT REPORT

of

VASANDADA SUGAR INSTITUTE,

Manjari Budruk, Taluka: Haveli, District: Pune 412 307

VSI

संशोधनेन संवृद्धिः

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

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Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

EEN/2022-23/CR-43/1709 10th May, 2022

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Near Muktangan English School,
Parvati, Pune - 411 009.

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Registration Number : *MEDA/EEN/2022-23/Class A/EA-32.*

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- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

BEE AUDITOR CERTIFICATE

MEDA EMPANELMENT CERTIFICATE

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 22/786

Deepak Sood
Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/VSI/21-22/03 Date: 19/7/2022

CERTIFICATE

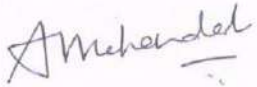
This is to certify that we have conducted Environmental Audit at Vasantdada Sugar Institute, Manjari Budruk, Taluka: Haveli, District: Pune 412 307, in the Year 2021-22.

The Institute has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 800 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Bio Composting Unit, for conversion of Organic Waste
- Provision of Septic Tanks for Liquid Waste Management
- Implementation of Rain Water Management Project
- Internal Tree Plantation
- Creation of awareness about Ban on Single Use Plastic by Display of Posters

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Energy Efficient, Green and Environment Friendly.

For Engress Services,



A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

INDEX

ACKNOWLEDGEMENT

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We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Vasantdada Sugar Institute Manjari Budruk, Taluka: Haveli, District: Pune, consumes Energy in the form of **Electrical Energy; used** for various Electrical Equipment.

2. Pollution caused due to Institute Activities:

- **Air pollution:** Mainly CO_2 on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste, Recyclable Waste and Human Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO_2 Emissions:

No	Parameter /Value	Energy Purchased, kWh	Energy Generated, kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	518712	1117386	431339	1204759	1084.28
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3	Minimum	33302	73643	22792	84153	75.74
4	Average	43226	93115.5	35944.9	100396.58	90.36

4. Projects implemented for Environmental Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **800 kWp** Roof Top Solar PV Plant

5. Usage of Renewable Energy & Reduction in CO_2 Emissions:

- The Institute has installed **800 kWp** Roof Top Solar PV Plant
- Energy generated by Solar PV Plant in 2021-22 is **1117386 kWh**
- Reduction in CO_2 Emissions by usage of Solar Energy in 2021-22 is **1005.65 MT.**

6. Indoor Air Quality:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	97	58	74
2	Minimum	89	52	69

7. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.5	52	169	44.3
2	Minimum	27.3	50	109	41.9

8. Waste Management:

8.1 Segregation of Waste at Source:

The waste is segregated at the source. There are Waste Collection Bins at various locations, to collect the Waste.

8.2 Organic Waste Management:

The Institute has a Bio Composting Unit, for conversion of Organic Waste into Bio Compost.

8.3 Liquid Waste Management:

The Institute has installed Septic Tanks and the tanks are cleaned periodically.

9. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an Open well and is further used for watering the farm.

10. Environment Friendly Initiatives:

- Tree Plantation and Well maintained Garden.
- Creation of Awareness in respect of Ban on Single Use of Plastic.

11. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2 into atmosphere

12. References:

- For CO_2 Emission computation: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Standards: www.cpcb.com

ABBREVIATIONS

kWh	:	kilo-Watt Hour
Qty	:	Quantity
MT	:	Metric Ton
CO_2	:	Carbon Di Oxide
LPD	:	Liters per Day
AQI	:	Air Quality Index
PM2.5	:	Particulate Matter of Size 2.5 microns
PM 10	:	Particulate Matter of Size 10 microns
CPCB	:	Central Pollution Control Board
ISHARE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1.1. Important Definitions:

1.1.1Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Audit Methodology:

1. Study of present Resource Consumption & CO_2 Emissions
2. Study of CO_2 emission Reduction
3. Study of Indoor Air Quality
4. Study of Indoor Comfort Conditions
5. Study of Waste Management
6. Study of Rain Water Management
7. Study of Environmental Friendly Initiatives.

1.3 Google Earth Location Image:

1.3 General Details of Institute: Table No: 4:

No	Head	Particulars
1	Name	Vasantdada Sugar Institute
2	Address	Manjari Budruk, Taluka: Haveli, District: Pune 412 207
3	Year of Establishment	1975

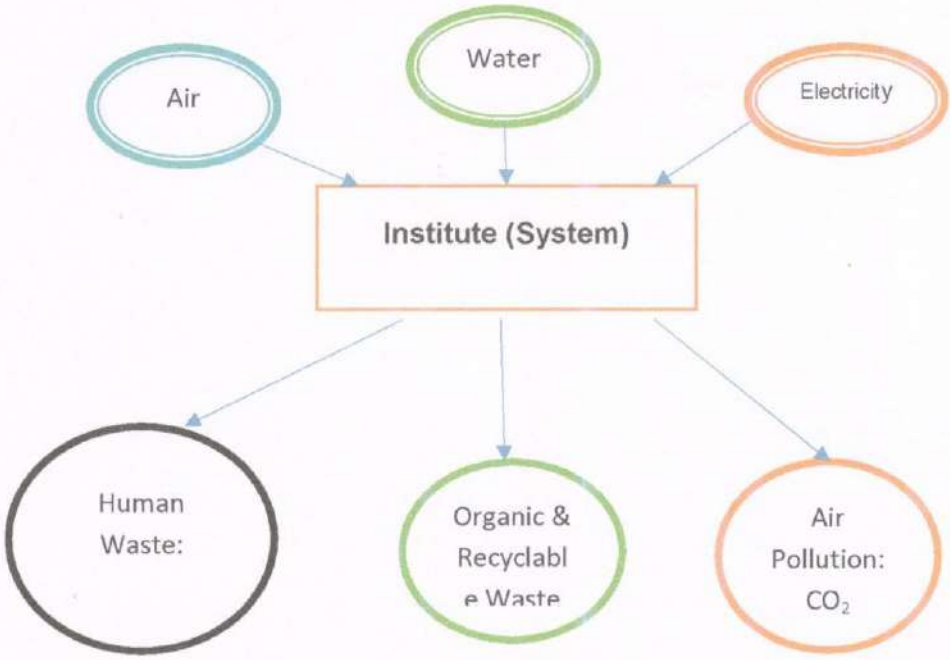
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.

Chart No 1: Representation of Institute as System:



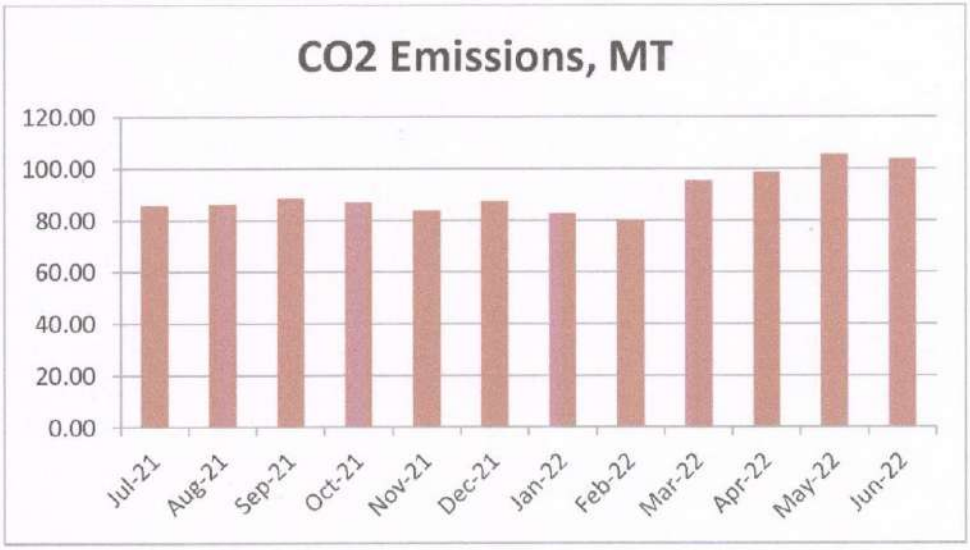
A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. Here we compute the emissions of Carbon-Di-Oxide, by usage of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy is **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 5: Study of Energy Purchased & CO_2 Emission: 2021-22:

No	Month	Energy Purchased, kWh=(A)	Energy Generated, kWh=(B)	Energy Exported, kWh=(C)	Net Energy Consumed, kWh, D=A+B-C
1	Jul-21	44337	73643	22792	95188
2	Aug-21	44256	79078	27649	95685
3	Sep-21	44353	83440	29523	98270
4	Oct-21	38681	110487	52612	96556
5	Nov-21	44871	82126	33960	93037
6	Dec-21	47708	79288	29788	97208

7	Jan-22	37479	98178	43758	91899
8	Feb-22	33302	104524	48929	88897
9	Mar-22	40804	109087	43970	105921
10	Apr-22	43317	101863	35532	109648
11	May-22	47169	108245	38160	117254
12	Jun-22	52435	87427	24666	115196
13	Total	518712	1117386	431339	1204759
14	Maximum	52435	110487	52612	110310
15	Minimum	33302	73643	22792	84153
16	Average	43226	93115.5	35944.9	100396.58

Chart No 2: Representation of Month wise CO_2 emissions:



CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **800 kWp**
We now calculate the reduction in CO_2 Emission due to Solar PV Plant.

Table No 6: Computation of Reduction in CO_2 Emission:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	800	kWp
2	Annual Solar Energy Generated in 2021-22	1117386	kWh
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO_2
4	**Annual Reduction in CO_2 Emission = (2) * (3) /1000**	**1005.65**	**MT**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's liveability.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population.

We present herewith following important Parameters, AQI- Air Quality Index, PM 2.5- Particulate Matter of Size 2.5 micron and PM 10- Particulate Matter of Size 10 micron

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Dispatch Section	95	57	73
2	Alcohol Tech Lab	93	56	73
3	Sugar Tech Dept	89	52	70
4	Tissue Culture	94	56	73
5	Seminar Hall	96	56	69
6	Registrar Office	97	58	74
	Maximum	**97**	**58**	**74**
	Minimum	**89**	**52**	**69**

CHAPTER V
STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit.

The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 8: Study of Indoor Comfort Parameters:

No	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
1	Dispatch Section	27.4	50	110	41.9
2	Alcohol Tech Lab	27.4	50	114	42.6
3	Sugar Tech Dept	27.5	51	109	44
4	Tissue Culture	27.3	50	169	44.3
5	Seminar Hall	27.5	52	136	42.6
6	Registrar Office	27.4	52	117	43
	Maximum	**27.5**	**52**	**169**	**44.3**
	Minimum	**27.3**	**50**	**109**	**41.9**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Institute has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

6.2 Organic Waste Management:

The Institute has a Bio Composting Unit, for conversion of Organic Waste into Bio Compost.

Photograph of Bio Composting Unit:

6.3 Liquid Waste Management:

The Institute has installed Septic Tanks and the tanks are cleaned periodically.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an open well and is used for watering the farm.

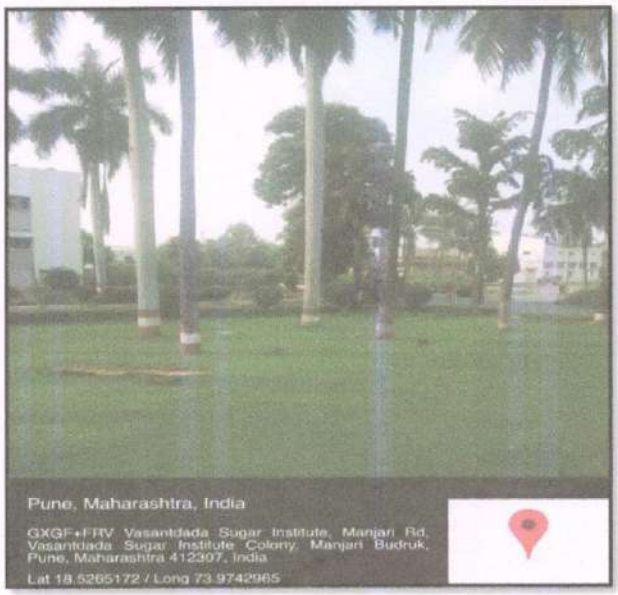
Photograph of Rain Water Carrying Pipe:

CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY PRACTICES

8.1Tree Plantation in the Campus:

The Institute has landscaped Lawn and well maintained Tree Plantation in the campus.

Photograph of Lawn and Tree Plantation:



8.2 Creation of Awareness about Ban on Single Use of Plastic:

The Institute has displayed Posters on Ban on Single Use of Plastic.

Photograph of Poster on Ban on Single Use of Plastic:

ANNEXURE-I:
INDOOR AIR QUALITY, NOISE & INDOOR COMFORT PARAMETER STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

3. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%

GREEN AUDIT REPORT

of

VASANDADA SUGAR INSTITUTE,

Manjari Budruk, Taluka: Haveli, District: Pune 412 307

VSI

संशोधनेन संवृद्धिः

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

REGISTRATION CERTIFICATES

Regn. No. EA-8192 No. 2942

National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Achyut Yashavant Mehendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors in April - 2002, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 10th August 2007

Controller of Examination

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: ener@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with *MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)* under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Vaibhavee, 25, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune - 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (TC)

BEE AUDITOR CERTIFICATE

MEDA EMPANELMENT CERTIFICATE

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the

Green and Eco-friendly Movement Certified Professional Test (GEM CP)

with

"Excellent Performance"

on

06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 22/788

Deepak Sood
Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/VSI/21-22/02 Date: 19/7/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at Vasantdada Sugar Institute, Manjari Budruk, Taluka: Haveli, District: Pune 412 307, in the Year 2021-22.

The Institute has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 800 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Provision of Bio Composting Unit, for conversion of Organic Waste
- Provision of Septic Tanks for Liquid Waste Management
- Implementation of Rain Water Management Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of awareness about Ban on Single Use Plastic by Display of Posters

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Vasantdada Sugar Institute, Manjari Budruk, Taluka: Haveli, District: Pune 412 307, for awarding us the assignment of Green Audit of their Campus for the Year: 2021-22.

We are thankful to all the staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Vasantdada Sugar Institute Manjari Budruk, Taluka: Haveli, District: Pune, consumes Energy in the form of **Electrical Energy; used** for various Electrical Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Purchased, kWh	Energy Generated, kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	518712	1117386	431339	1204759	1084.28
2	Maximum	52435	110487	52612	110310	99.28
3	Minimum	33302	73643	22792	84153	75.74
4	Average	43226	93115.5	35944.9	100396.58	90.36

3. Various Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **800 kWp** Roof Top Solar PV Plant

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The Institute has installed **800 kWp** Roof Top Solar PV Plant
- Energy generated by Solar PV Plant in 2021-22 is **1117386 kWh**
- Reduction in CO_2 Emissions by usage of Solar Energy in 2021-22 is **1005.65 MT.**

5. Waste Management:

5.1 Segregation of Waste at Source:

The waste is segregated at the source. There are Waste Collection Bins at various locations, to collect the Waste.

5.2 Organic Waste Management:

The Institute has a Bio Composting Unit, for conversion of Organic Waste into Bio Compost.

5.3 Liquid Waste Management:

The Institute has installed Septic Tanks and the tanks are cleaned periodically.

6. Rain Water Management:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an Open well and is further used for watering the farm.

7. Green & Sustainable Practices:

- Well maintained internal road
- Well maintained Garden.
- Provision of Ramp for Divyangajan
- Creation of Awareness in respect of Ban on Single Use of Plastic.

8. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2 into atmosphere

9. Reference:

- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study present level of Energy Consumption
2. To Study the present CO_2 emissions
3. To study Scope for usage of Renewable Energy
4. To study Waste Management:
5. To study Rain Water Management
6. To study Green & Sustainable Practices.

1.2 Table No 1: General Details of Institute:

No	Head	Particulars
1	Name	Vasantdada Sugar Institute
2	Address	Manjari Budruk, Taluka: Haveli, District: Pune 412 207
3	Year of Establishment	1975

1.3 Google Earth Location Image:

CHAPTER-II
STUDY OF ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Energy Consumption

Table No 2: Electrical Energy Purchase Analysis- 2021-22:

No	Month	Energy Purchased, kWh=(A)	Energy Generated, kWh=(B)	Energy Exported, kWh=(C)	Net Energy Consumed, kWh, D=A+B-C
1	Jul-21	44337	73643	22792	95188
2	Aug-21	44256	79078	27649	95685
3	Sep-21	44353	83440	29523	98270
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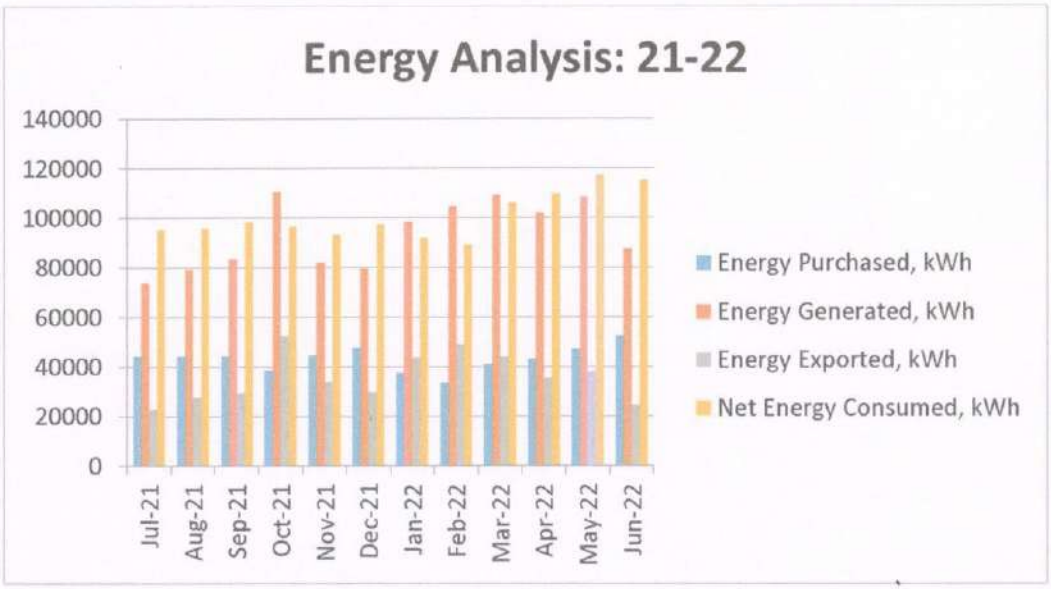
15	Minimum	33302	73643	22792	84153
16	Average	43226	93115.5	35944.9	100396.58

Chart No 1: To study the variation of Month wise Energy Purchased, kWh:



CHAPTER-III
STUDY OF CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions:**

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 3: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh=(A)	Energy Generated, kWh=(B)	Energy Exported, kWh=(C)	Net Energy Consumed, kWh, D=A+B-C
1	Jul-21	44337	73643	22792	95188
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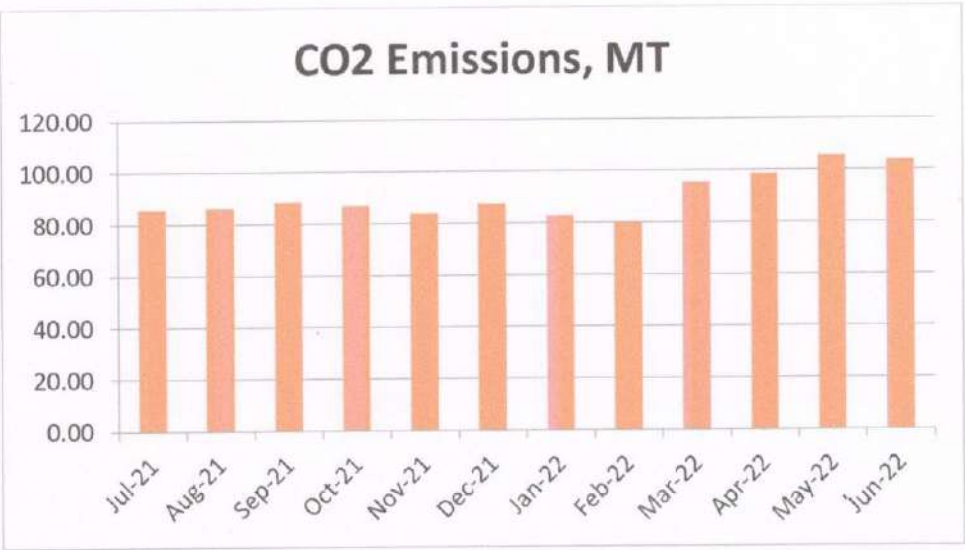

CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **800 kWp**
We now calculate the reduction in CO_2 Emission due to Solar PV Plant.

Table No 4: Computation of Reduction in CO_2 Emission:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	800	kWp
2	Annual Solar Energy Generated in 2021-22	1117386	kWh
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO_2
4	**Annual Reduction in CO_2 Emission = (2) * (3) /1000**	**1005.65**	**MT**

Photograph of Roof Top Solar PV Plant:

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STUDY OF WASTE MANAGEMENT

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Photograph of Waste Collection Bin:

5.2 Organic Waste Management:

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The Institute has installed Septic Tanks and the tanks are cleaned periodically.

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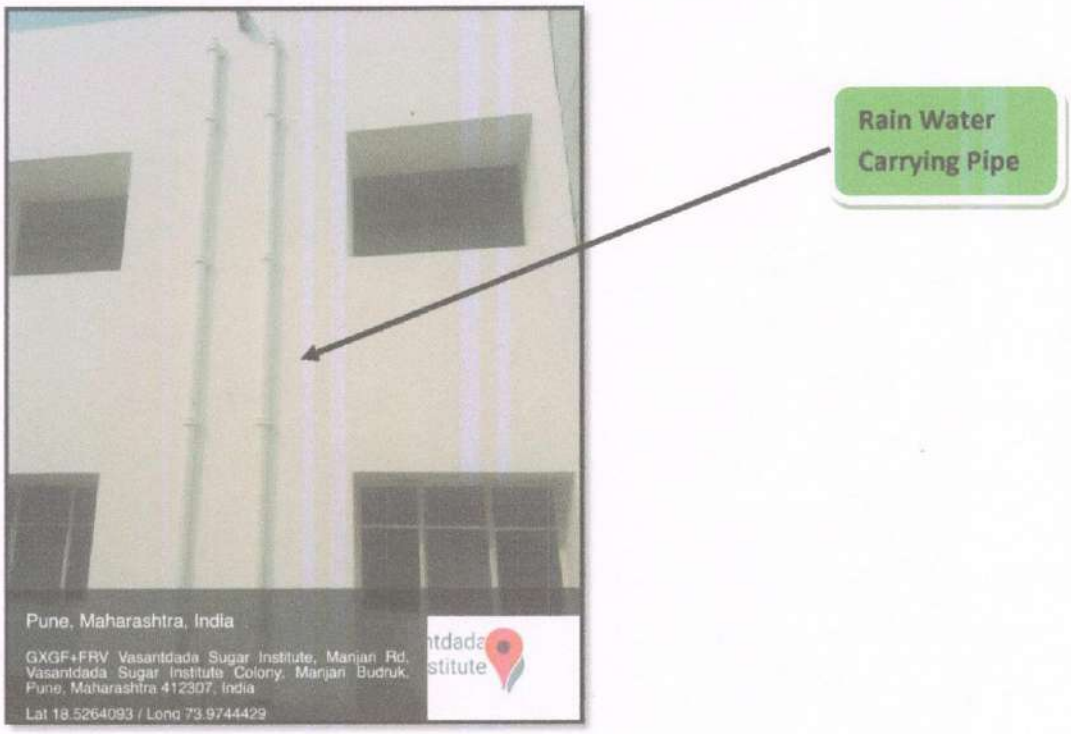
STUDY OF RAIN WATER MANAGEMENT

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an open well and is used for watering the farm.

Photograph of Rain Water Carrying Pipe:



CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Internal Road:

The Institute has well maintained internal road to facilitate the easy movement of the students within the campus.

Photograph of Internal Road:

7.2 Tree Plantation:

The Institute has Tree Plantation in the campus.

Photograph of Internal Lawn and Tree Plantation:

7.3 Provision of Ramp for Divyangajan:

The Institute has made provision of Ramp for easy movement of Divyangajan.

Photograph of Ramp:

7.4 Creation of Awareness about Ban on Single Use of Plastic:

The Institute has displayed Posters on Ban on Single Use of Plastic.

Photograph of Poster on Ban on Single Use of Plastic: