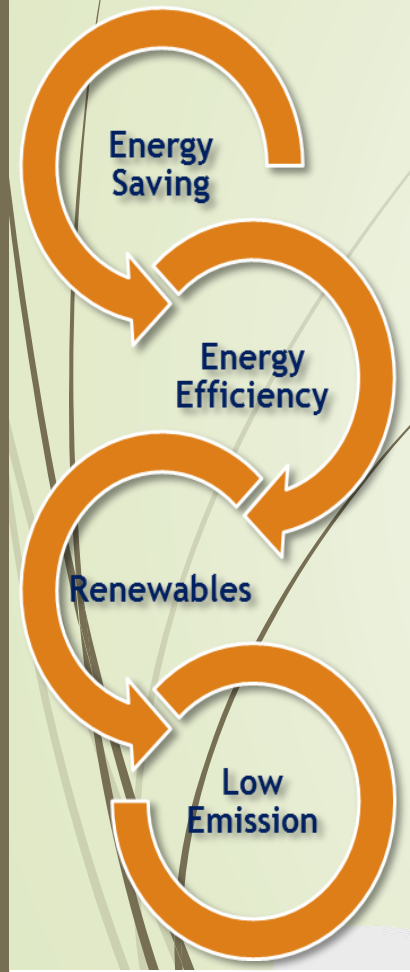
Best Energy Efficient Practices

"Implemented and Inspiration for horizontal deployment"



Presentation By

Vardhmān

Vardhman Fabrics, Budhni

(A Unit of Vardhman Textile Pvt. Ltd.)

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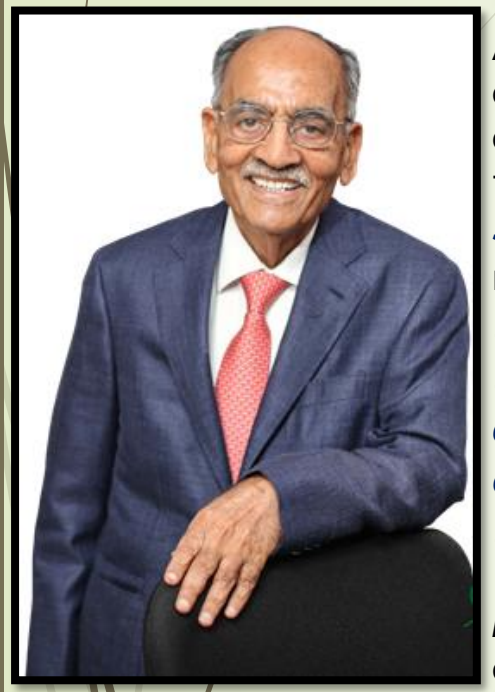
Message From Higher Management

Message from the Chairman's Desk on *Sustainability*



S.P. Oswal

Chairman & Managing Director Vardhman Group

At Vardhman, it has been our consistent endeavor, for over five decades, to enhance the positive impacts of our textile operations as much as possible. ***Sustainability*** is not a fad for us, rather it ***is an ongoing journey towards holistic excellence, and the sustainability mind-set is deeply embedded across our organization, from boardroom to shop floor***

Marching towards the future, it is evident that true sustainability can be achieved only through a collaborative approach. Following this philosophy, we continuously engage with our vendors, customers and brands to help them achieve their sustainability goals

Message from the Vice Chairman's Desk on *Sustainability*

Suchita Oswal Jain

Vice Chairman& Joint Managing Director Vardhman Group

While the sustainability ethos has been integral to Vardhman's DNA since its inception, with the introduction of our new integrated framework - 'PRO', we have set higher sustainability benchmarks, and now hold ourselves to even more stringent standards of environment management, resource conservation, community care and corporate governance.

Helping us in our endeavor of instilling long- term sustainability, is the trust and confidence we have earned over the years from our business partners and local communities. ***We are of the firm belief that it is only through partnerships and collaborations that true sustainability can be achieved.***

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Vardhman Fabrics ; Plant Overview

VARDHMAN FABRICS, BUDNI

Journey of Vardhman Group

1st Spinning Unit
1965

Sewing Thread

Alloy Steel
1986

1992

1982

2007

Fabric Processing
2000

Weaving

1999

Acrylic Fibre

Garment
2011

Composite Unit-Budhni

2013

Glorious 50 Years

2016

180M meters processed fabric

1 M Spindles

2015

Printing

2019

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Energy Conservation Cell

Quote From Unit Head

Our top management firmly believe that energy conservation is not only to increase the profit margin but it is our social responsibility to conserve the energy resources for our future and contribute in climate change by reducing carbon emission.

T.C. Gupta (Plant Head)

Energy Management Officials

Contact Person

Team Leader : Mr. M. P. Khante
(Sr. Vice President-V. Fabrics, Budhni)

Email ID;
mahendrakhante@vardhman.com
Contact No. : 7869999151

Vardhman's Growing Steps Towards Energy Conservation

Major Project

- ❑ Energy Save through Compressed Air Optimization
- ❑ Energy Saving Through E Glass Insulation
- ❑ Energy Saving Through Boiler Air Nozzle Replacement
- ❑ Unique Power Saving System in H Plant
- ❑ Rice Husk Feeding As Biofuel
- ❑ Turbo Blower For AERATION in ETP

Energy Efficient Machine Technology

- ❑ Super Premium Efficiency (IE4) in TFO machine
- ❑ Salt less Dyeing machine
- ❑ Rotary Heat Exchanger
- ❑ Condensate Recovery through Flash Jet Pump Technology
- ❑ Air Cooled Thermic Fluid Recirculation Pump
- ❑ Rotary Drum Filter
- ❑ Drum Washer Technology

Renewable Energy Installation

- ❑ 7.5 MW Ground Mounted Solar Power Plant
- ❑ 1.6 MW Roof Top Solar Power Plant
- ❑ Solar Kitchen (41280 Kcal/Hr)
- ❑ Bio Gas Plant (150 Kg/day)
- ❑ Solar Water Heater (1000 Lt)

Major Project 1 : Compressed Air Optimization

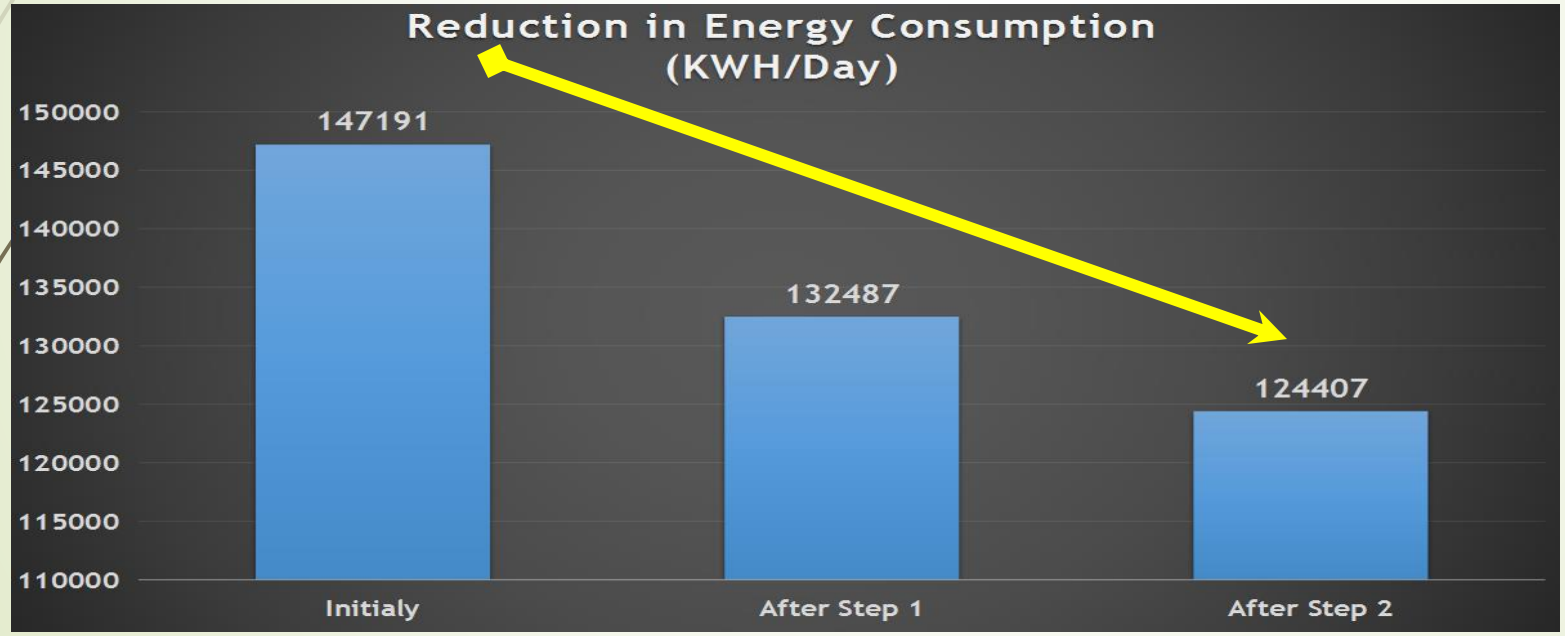
Optimization

STEP1

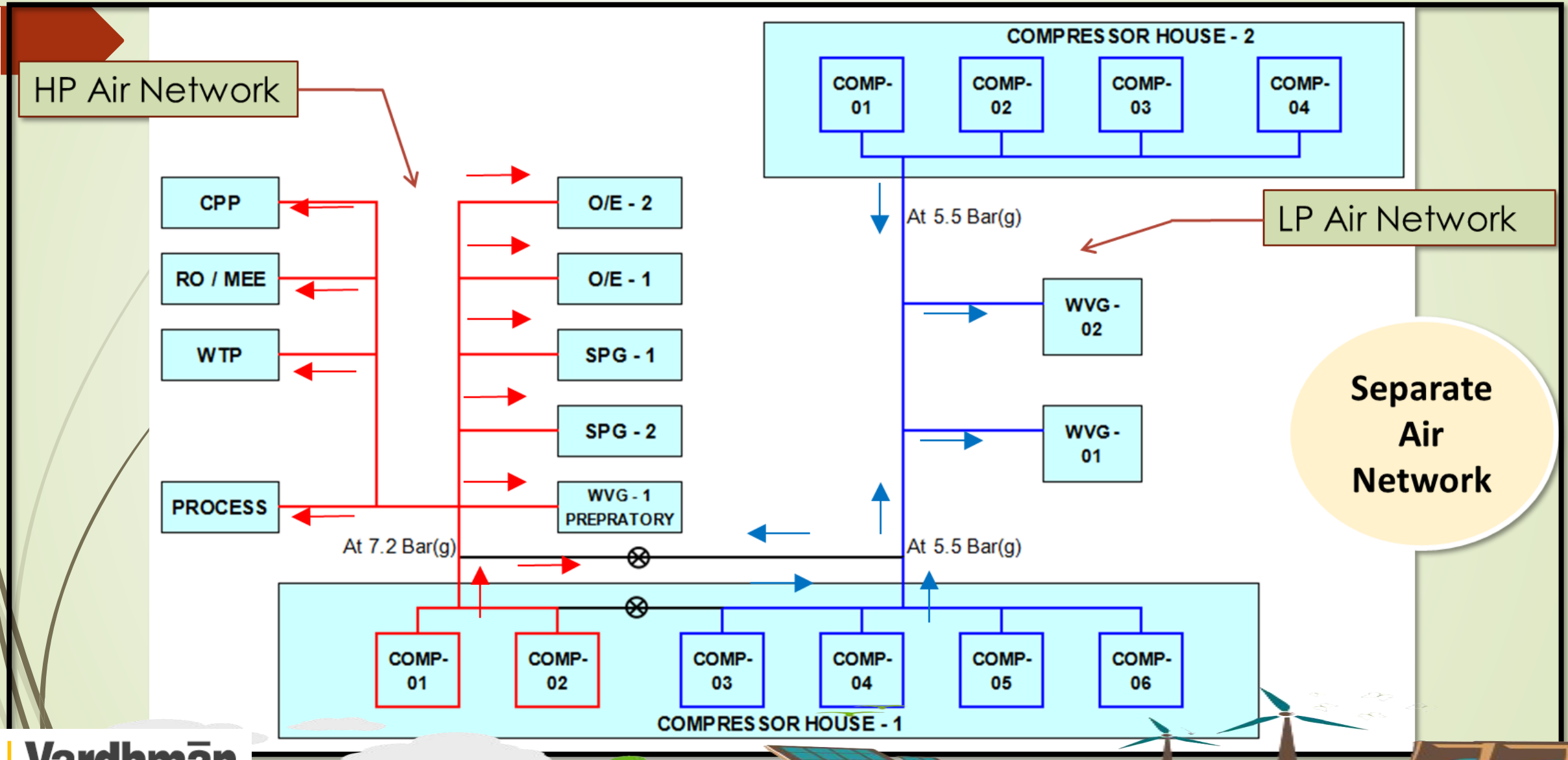
- Reduction of Compressor discharge pressure from 7.2 Bar(g) to 5.5 Bar (g) and separated the High Pressure & Low Pressure network.

STEP2

- Later Replaced with New Energy Efficient Compressor at Design pressure of 6.0 Bar(g).

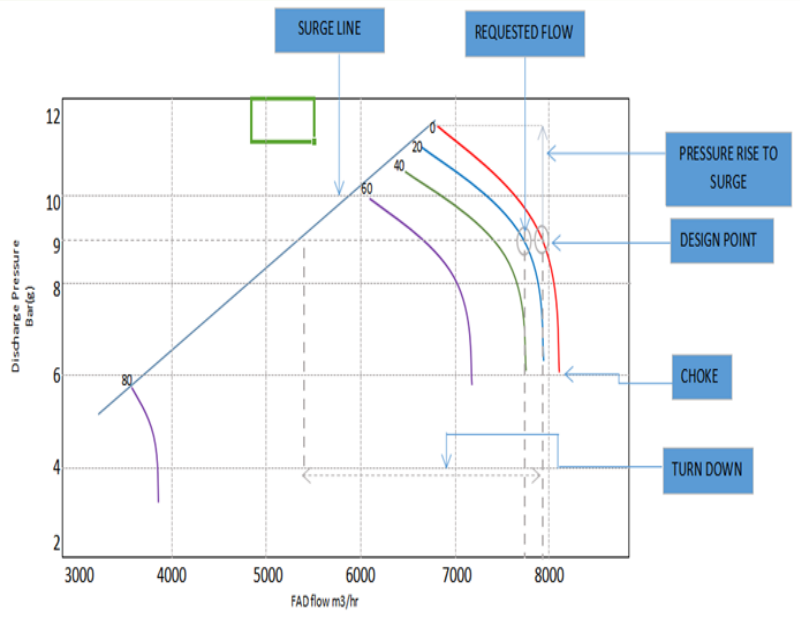


Compressed Air Distribution System - After Step-I



Execution of Strategies & Activities : Step-II

To shift the compressor (Generation point) duty point as per our requirement.



Compressor Performance Graph

OEM suggested not to reduce the pressure as compressor will get choked

Further, OEM suggested that duty point can be achieved by modification in impeller

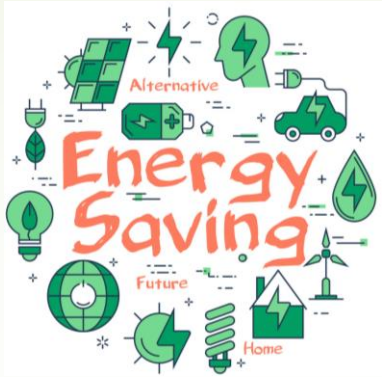
Cost of modification of existing compressor was same as new compressor with lower specific consumption

Discussion with OEM to run compressor on required duty point

Replacement of existing Centrifugal Compressor of 8.0 Bar(g) by New Energy Efficient Compressor at Design pressure of 6.0 Bar(g).

Approached managemener for new compressor and got approval.

Major Project 1 : Result



82.70 Lacs kWh/Yr

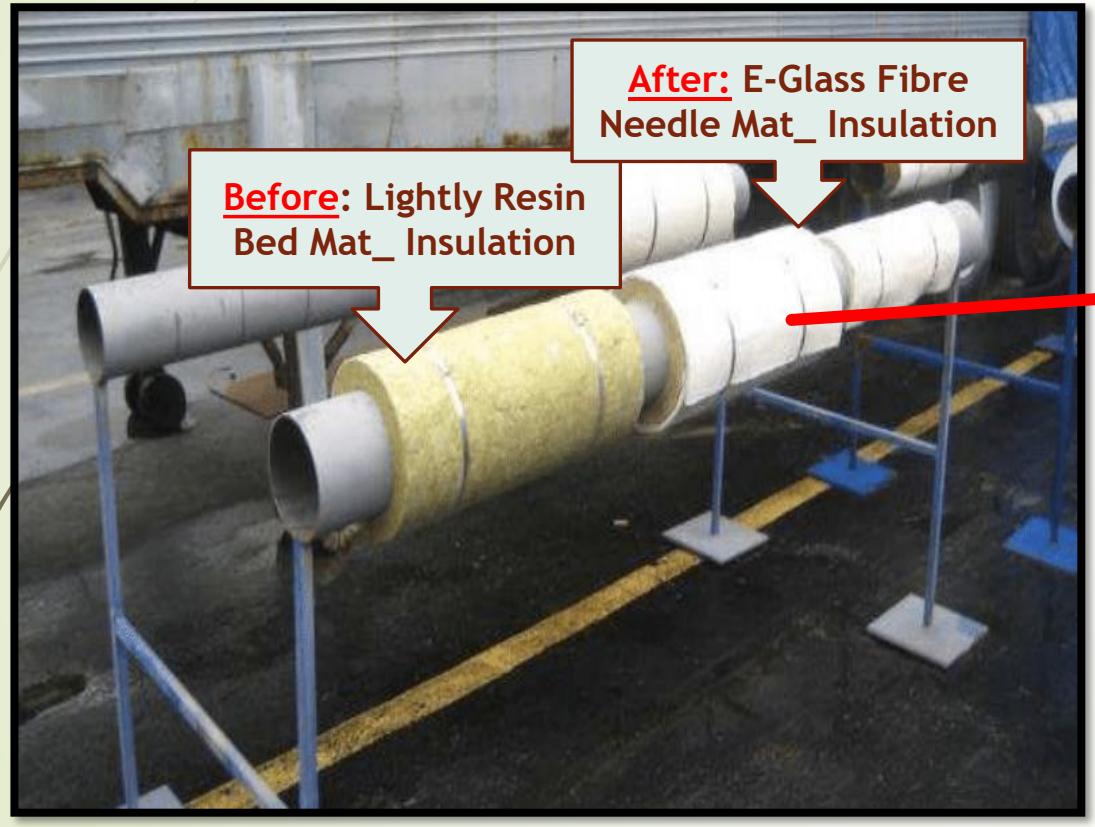
Emission Reduced
By 6946 MT/Year

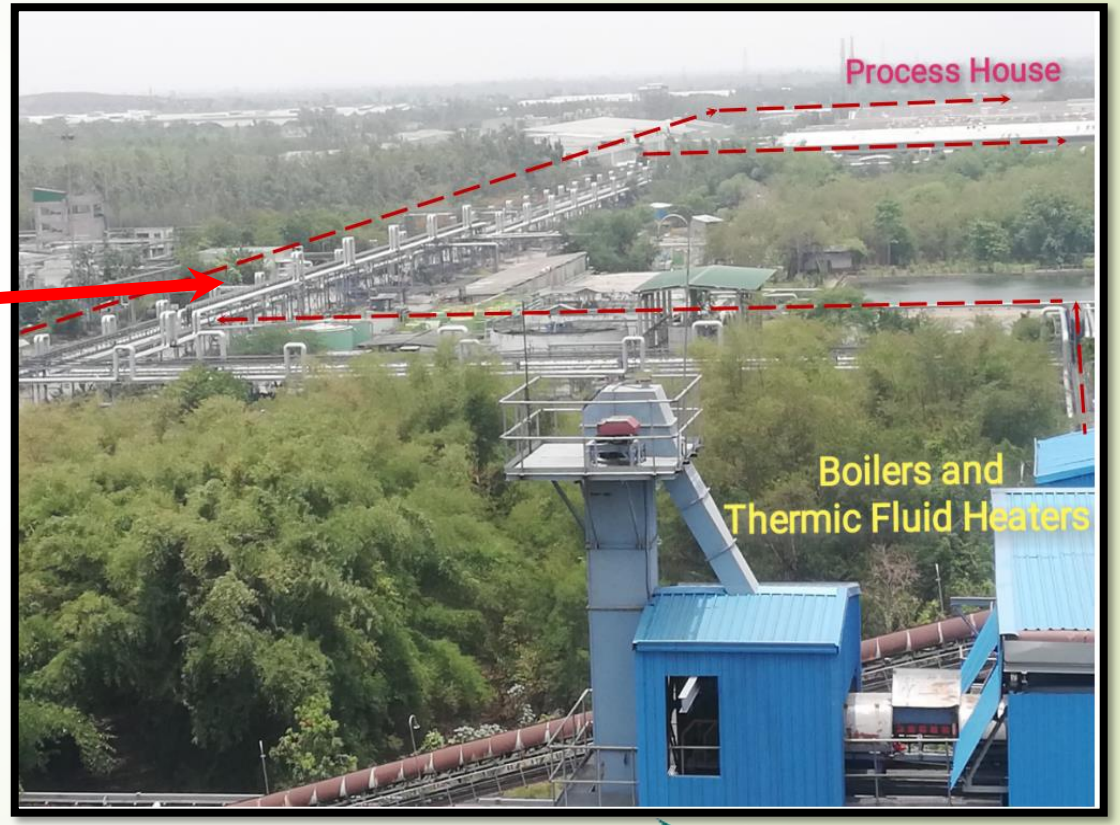
COST SAVINGS

INR 5.95 Cr./Yr

Major Project 2 ; Use of E-Glass Insulation

E-Glass Insulation is used in place of conventional LRB insulation, to reduce heat loss due to Convection and Radiation, and to save energy in the form of coal, Saving of 20 % heat by using the E -Insulation material. Reduction of coal consumption for steam generation by 650 MT/year & for thermic oil heating by 1887 MT/year





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Major Project 2 : Results

Light Bonded Resin_
Insulation Mat

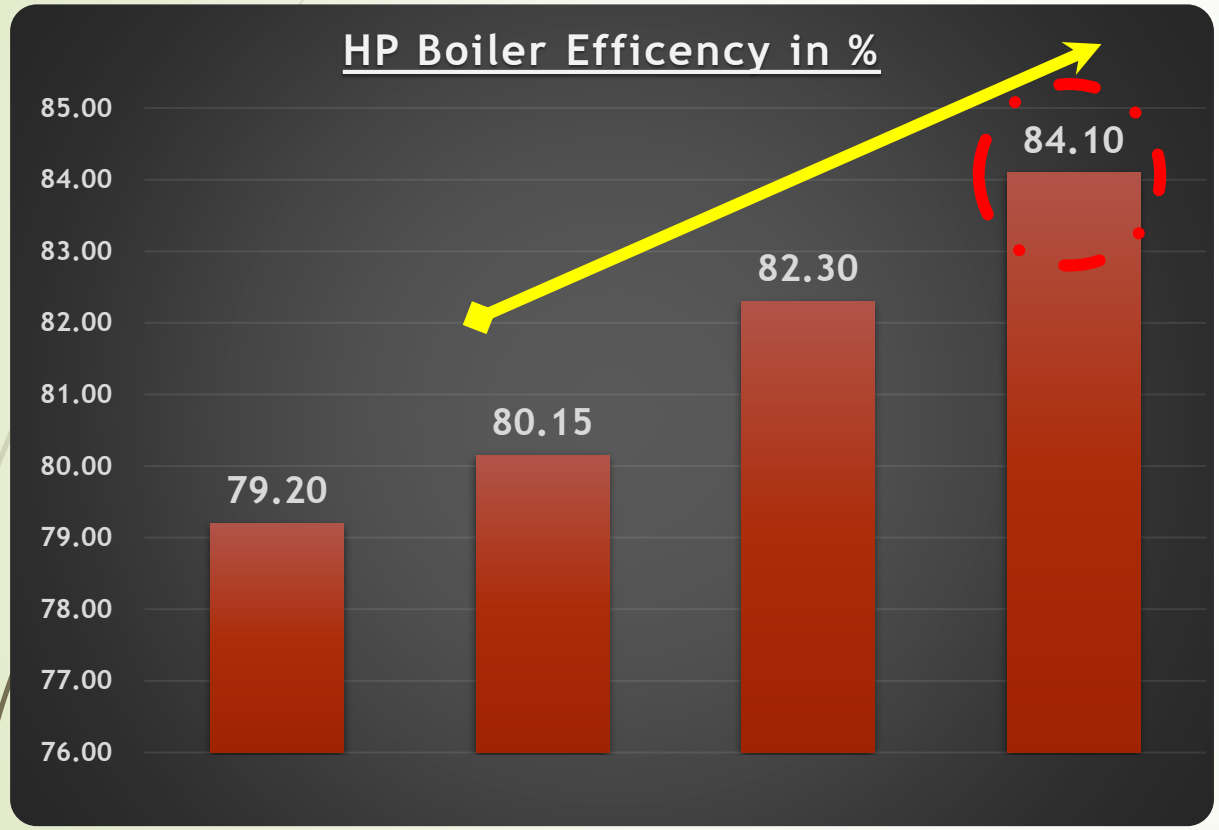
E Glass Needle Mat_
Insulation Pad

Emission Reduced By 2841 MT/Year

COST SAVINGS **INR 1.48 Cr./Yr**

Major Project 3 : Efficiency Improvement of HP Boiler

Replacement of boiler air nozzles with appropriate size, results in optimized air usage. Boiler Efficiency increase from 79.20 % to 84.10 %



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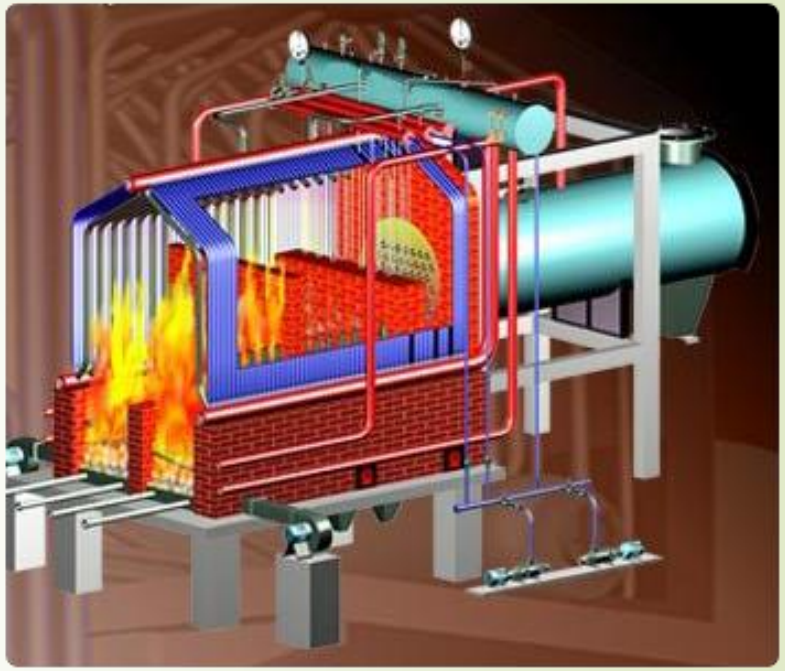
Major Project 3 : Results

Coal Saving 3701 MT



Emission Reduced
By 1369 MT/Year

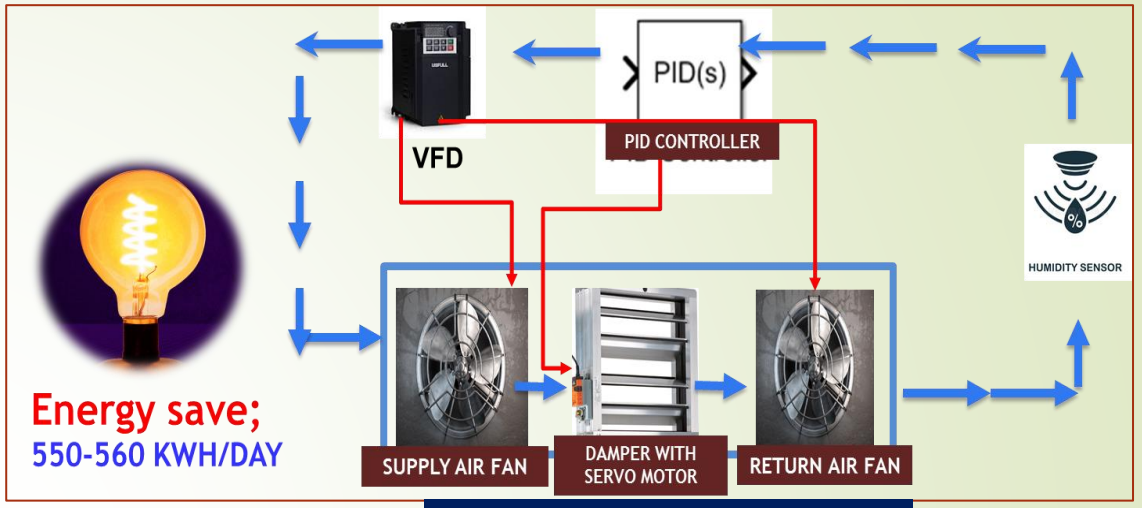
COST SAVINGS

INR 1.25 Cr./Yr

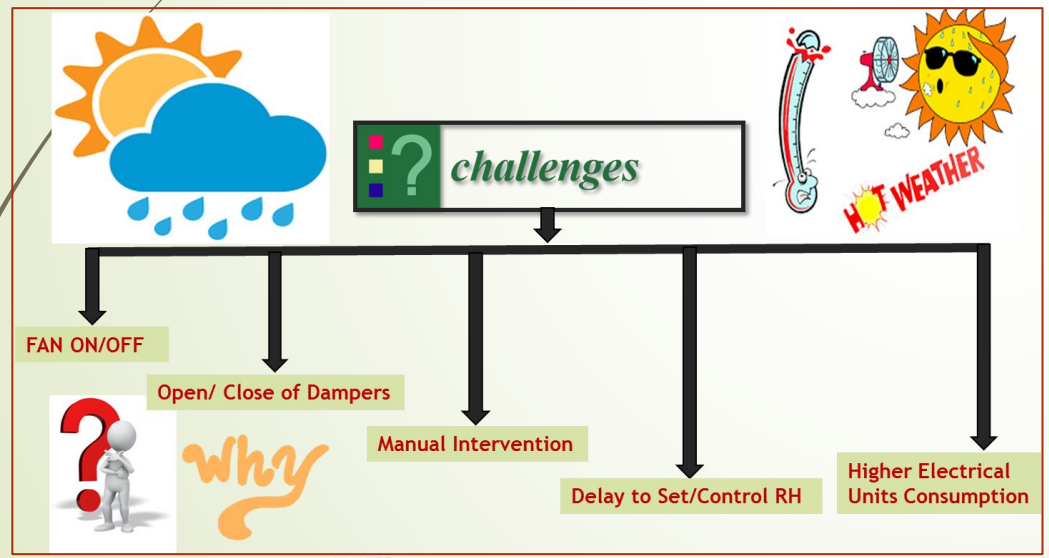
Major Project 4 : Unique Power Saving System For Humidity Plant

A very innovative idea developed by team of "Unique Power Saving System" which has been extremely successful concept towards energy conservation and optimization of the Plant performance.

Developed with an innovation in Electrical Automation scheme, which ensure Fan speed regulation reference to RH. Instead of complete ON/OFF of Fans.



Implemented Scheme



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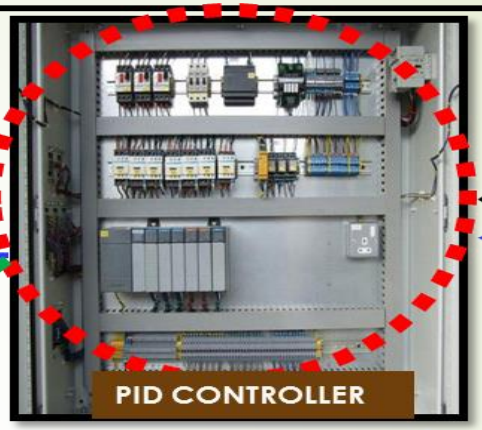
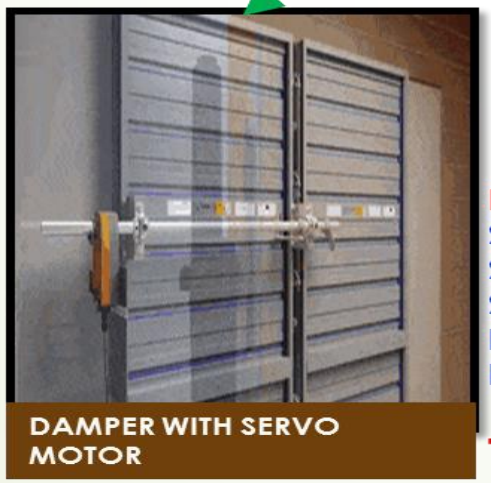
Methodology: Close Loop System for Humidity Control

PID GIVE CALCULATED ANALOG O/P WITH REFRENCE TO THE SET POINT AND ACTUAL RUNNING HUMIDITY IN PLANT



VFD REGULATE THE SPEED OF REFRENCE FAN ACCORDING TO PID O/P

RH SENSOR MEASURE THE HUMDITY AND GIVE SIGNAL TO PID CONTROLLER



AIR SUPPLY TO PLANT THROUGH DUCT

ENERGY CONSUMPTION

SUPPLY AIR FAN 1 : 4.7 KWH
SUPPLY AIR FAN 2 : 6.26 KWH
SUPPLY AIR FAN 3 : 8.14 KWH
RETURN AIR FAN 1 : 16.28 KWH
RETURN AIR FAN 2 : 16.23 KWH

TOTAL =52.01 KWH

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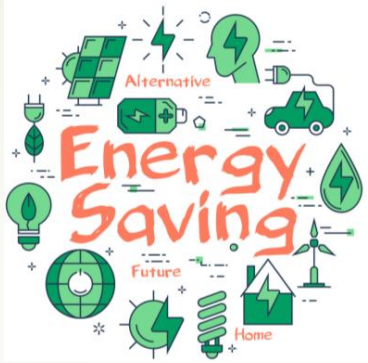
Major Project 4 : Results



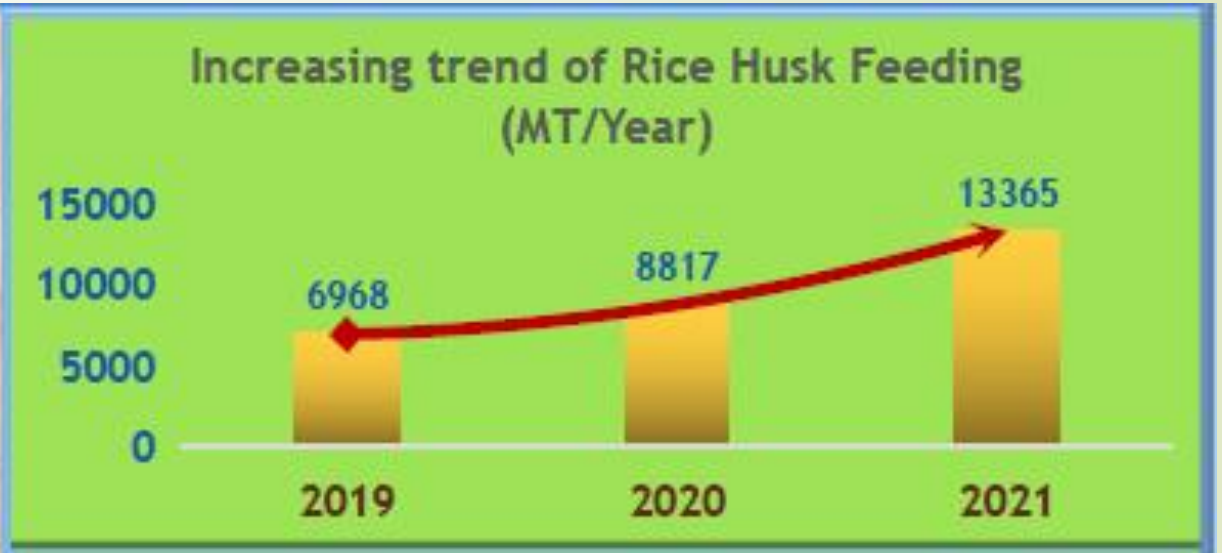
44.25 Lacs kWh/Yr

Emission Reduced By 3717 MT/Year

COST SAVINGS

INR 3.20 Cr./Yr

Major Project 5 : Use of Rice Husk instead of Coal



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Major Project 6 : TURBO BLOWER FOR AERATION IN ETP

We have installed state of the art technology ETP & RO plant (Italian Make)

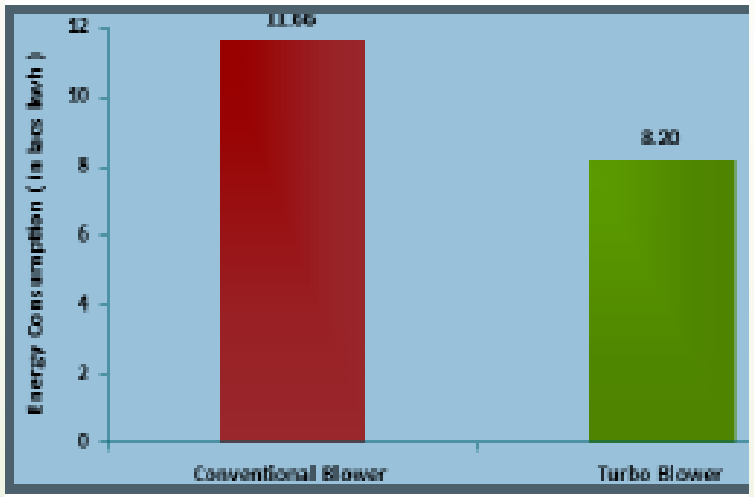
ETP Plant require blowers to provide air for oxidation to bacteria present in Effluent. Presently positive displacement & centrifugal blowers are commonly used for this purpose almost in every industries , which are not very energy efficient and produce sound pollution also.

VFB adopted latest technology of energy efficient , high speed blowers called Turbo Blower. Turbo blower utilizes a permanent magnet motor integrated into the rotor and air foil bearing to run it on high speed up to 50000 rpm. In compared to normal blower losses are very low in turbo blower hence overall efficiency received up to 70% as comparison to conventional blower with efficiency of 35-45%.

Advantages over normal blowers: Quiet operation due to low sound, no lubrication system i.e. maintenance free, High energy efficient, Cost effective for 100 HP+ applications.


LOBE BLOWER


Turbo Blower Installed at VFB



Improvement of 25-30 % Energy Saving

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Energy Efficient Machine Technology

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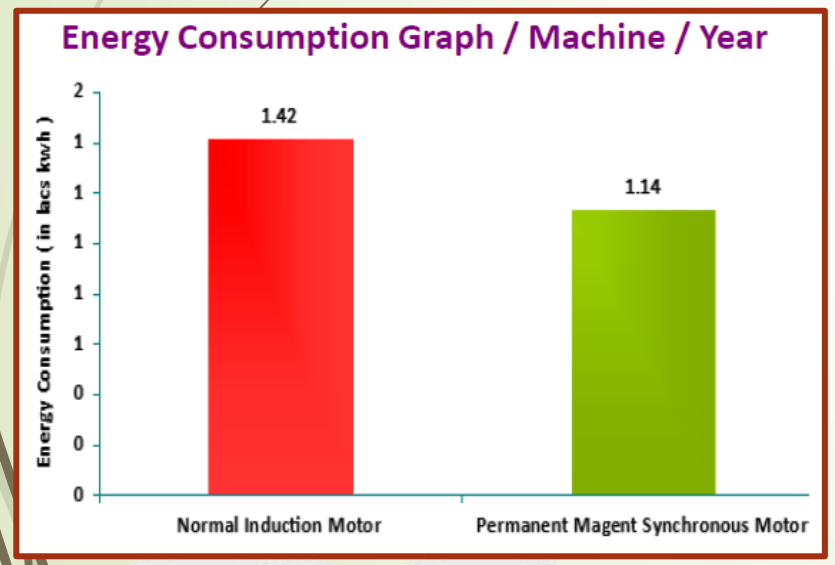
Major Project 7: Super Premium Efficiency(IE4) MOTOR IN TFO MACHINE



- In industries, those machines required high starting torque initially to overcome initial moment of inertia have a practice to use high capacity motor & in normal running that motor runs on lower load. Above scenario are widely used in all types of industries. In this application, because of higher capacity motor additional energy loss has to bear permanently.
- As a proactive organization , Vardhman has tied up with Bharat Bijlee (motor manufacturer) and developed Permanent Magnet Synchronous Motor (IE4) for such type of application. After successful trial we started to replaced the normal induction motor and the same can be horizontally implemented other similar applications.
- Measures used to improve the efficiency are following;
  - Stator & Rotor Stamping : Improved Slot design, Slot Combination and optimum ID/OD ratio, Better quality Lamination for Low watt loss, Thin Lamination, More steel for core by using longer core lengths & More copper for the conductor.
  - Change in Fan : Fan and fan cover designed for maximum cooling , Smaller Fans- Takes less power & Lower Temperature rise(60 ºC)
  - Use of Magnets in rotors : Loss less excitation, Nickel Plated magnets to avoid corrosion problems and High Temp magnets selected
  - Process Improvement: Grinding process implemented for Rotors & VPI / DC Wire Done for all winding

Improvement of 19% Energy saving

Major Project 8 : Salt Less Dyeing Machine

E-Control Machine

- ✓ Generally in fabrics processing Conventional salt dyeing process is used for fabrics dyeing. Being a pro-active organization Vardhman has adopted salt less dyeing machine (E-Control) which has zero salt consumption and reduce the load in ETP and reduction in overall salt consumption .
- ✓ This is an economical dyeing technology and work on principle of precise chemical dosing.
- ✓ Advantages over conventional salt dyeing machine, are lower chemical cost, lower water & utility consumption, lower cycle time & higher productivity,

1.5 % Efficiency Gain

Major Project 9: Rotary Heat Exchanger

- Presently shell & tube heat exchanger are normally used in Pre- Treatment Range(PTR) machine in Fabrics processing, to heat up the fresh water. Vardhman's sustainable approach leads us to adopt latest Rotary Heat Exchanger in place of typical shell & tube heat exchanger.

- Based on principle of rotating thermal exchanging shaft & are designed to heat up fresh water and simultaneously cool down dirty effluent temperature.

- Advantages over conventional heat exchanger are, they have higher heat energy exchange efficiency due to higher surface area, approx. 3 MT of steam saving in single machine & save approx. 15 KLD of DM water.

Improvement of 25-35 % in overall efficiency

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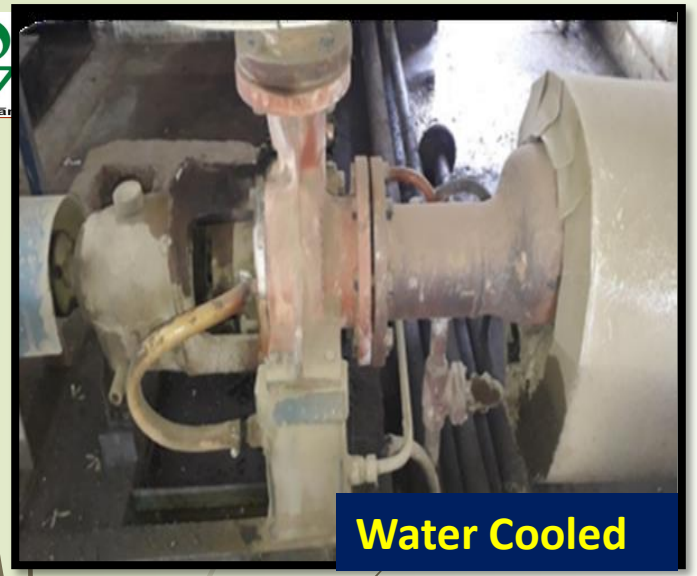
Major Project 10 : Condensate Recovery through Flash Jet Pump Technology

- Initially basic principle of physics of Gravity flow is widely used to recover steam condensate in all process industries. Recently VFB adopted flash jet pump technology to enhance the recovery .
- Overhead pipeline are placed through Flash Jet Pump instead of under ground pipeline in case of conventional system.
- Advantages over gravity flow system are , improved condensate & flash steam recovery and lower maintenance cost due to no underground pipelines.

IMPROVEMENT BY 40% IN CONDENSATE RECOVERY

Major Project 11 : Air Cooled Thermic Fluid Recirculation Pump


Water Cooled


Air Cooled

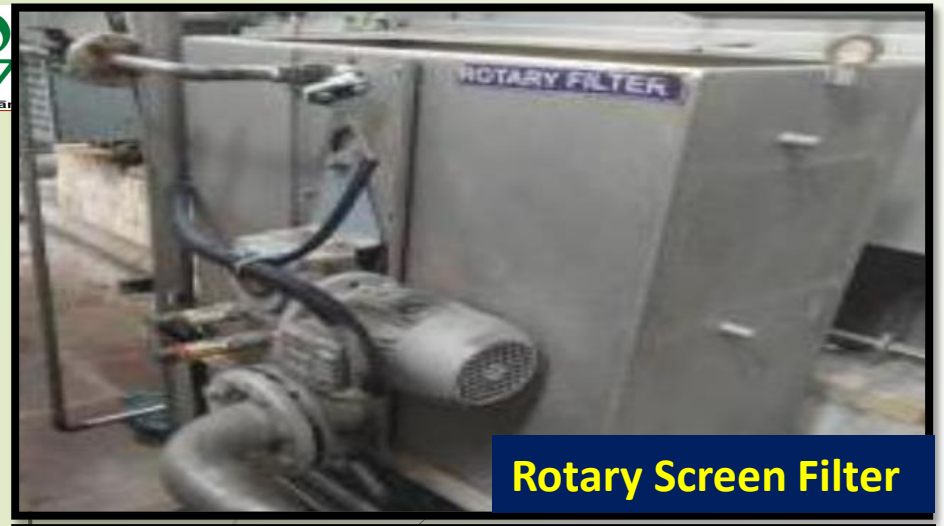
- Thermic fluid is used in process machinery for heating purpose. Thermic fluid pump is used to transfer oil to machines. Generally these pumps have seal & required water for seal cooling.

- In VFB, recently we adopted latest technology Air Cooled pump instead of water cooled.

- Advantages over water cooled pumps are, reduction of soft water consumption by 100 KL per day per pump and indirect efficiency gain of 2.5% in soft water generation .

2.5% Efficiency Gain

Major Project 12 : Rotary Drum Filter



Rotary Screen Filter


Rotary Drum Filter

- Commonly Rotary screen filter are used for removal of fluff in washing compartment of fabric processing machine. Our innovative approach towards process, lead us to adoption of Rotary Drum Filter in place of common screen filter which micro filter the extremely small particle.

- They have self cleaning rotating filter mesh and required no extra water for cleaning as filtered water is re-used for mesh cleaning, resulted in higher efficiency over the conventional filters.

- Advantages of these filters are less water consumption due to better washing efficiency in Peach wash machine & approx Saving of 15 % of soft water consumption due to reuse of filtrate water.

15% Reduction in Soft Water Consumption

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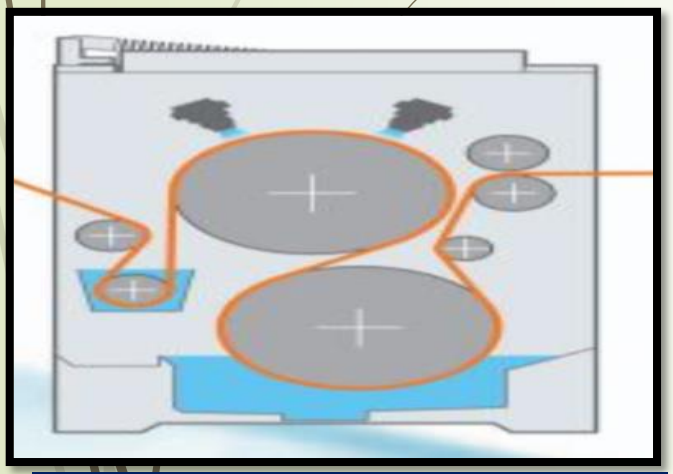
Major Project 13 : Drum Washer Technology

Normal Washer



High Efficiency Drum Washing Compartments

PEACH WASH MACHINE :

- Commonly normal washers with guide rollers (up & down) are widely practiced in fabrics processing machines.
- VFB leading from the front recently installed Higher efficiency drum washer based on front & back washing principle.
- Advantages over normal washers are having high washing efficiency, low water & energy consumption and fabric supports reduces curling.

5% Reduction in Soft Water Consumption

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Renewable Energy Sources Installation

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Major Project 14 : Installation of Renewable Energy Sources

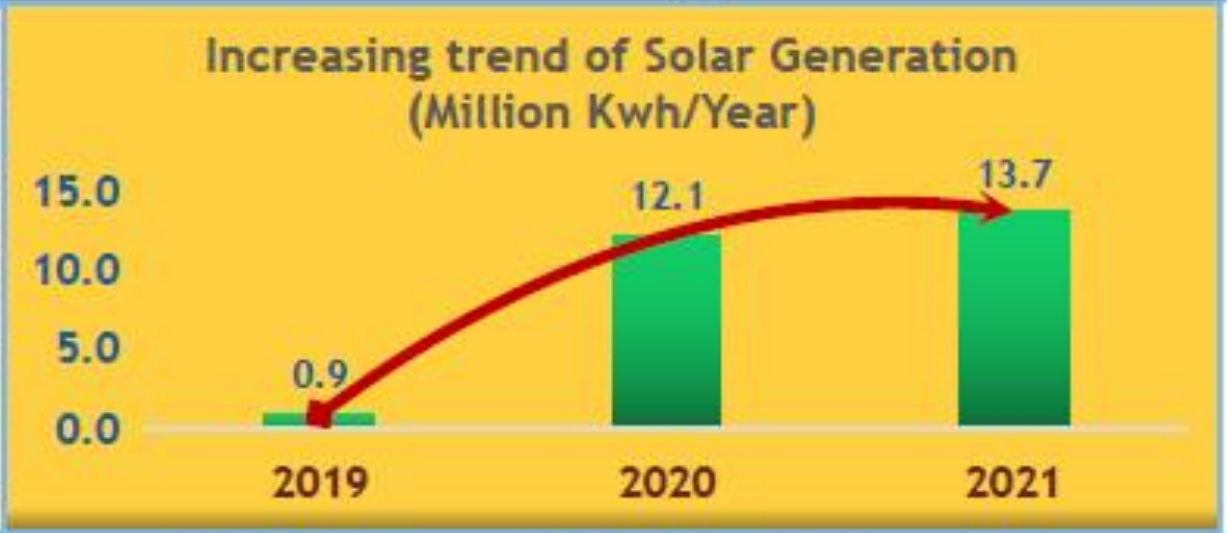
Ground Mounted Solar Power Plant

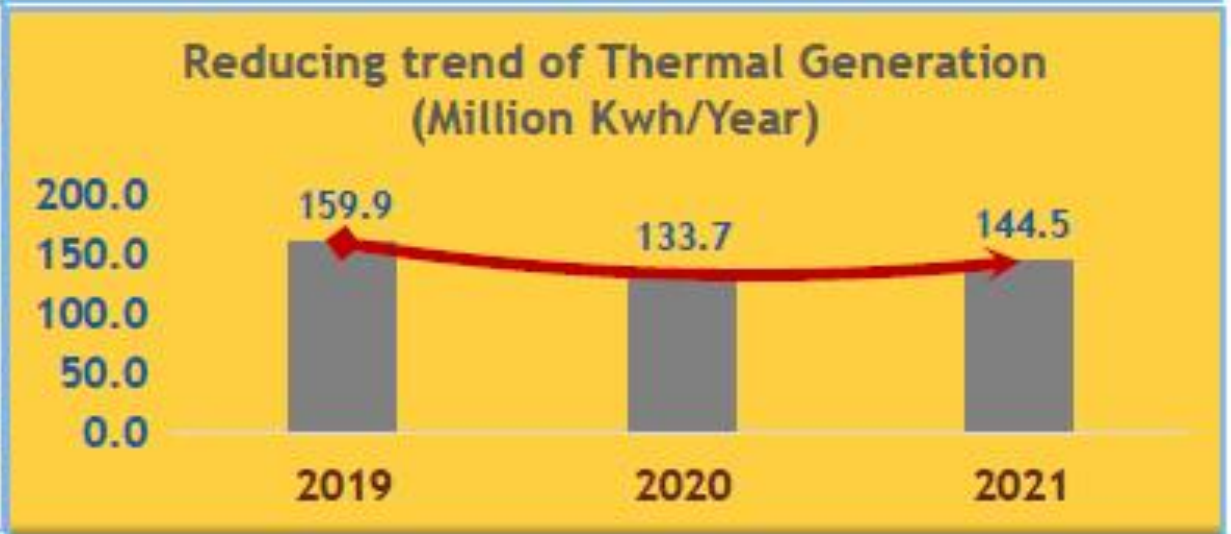
- Capacity :-7.5 MW/ 9MWp Ground Solar power Plant
- Total Area - 36 Acres
- Investment - 32.5 Crore

Roof Top Solar Power Plant

- Capacity :- 1.6 MW/ 1.8 MWp Roof Solar power Plant
- Investment - 6.5 Crore

Trend Solar Generation Vs. Thermal Generation





Installation of Renewable Energy Sources

Solar Kitchen

- Capacity : 41280 KCal/hr
- Investment: 31.60 Lakhs

Biogas Plant

- Capacity : 150 Kg/day
- Investment: 70 Lakhs

Solar Water Heater

- Capacity :- 1000 Litre
- Investment: 1.5 Lakhs

Energy Saving Project through Up gradation of Technology

- Selection of Low Losses Transformer Less than IS Standard. In India transformer are manufactured under the guideline of CBIP manuals. VF team selected low losses approx.. 10Nos. transformer having load losses 20KW against 22 KW & no load losses 2 KW against 2.4 KW.

- Selection and Installation of LED Lights in our New Projects 125 Watt x 75 No's in place of 250Watt Doom fitting.

- Selection of ECO T5 modular, 25 watts Tube light rod in place of convention 36W, 28W tube light, At present LED low watts tube fitting available in market. VFB installed approx. 7618 Nos. fitting.

- Selection of LED Street Light Fittings against convention fitting 87 WATT x95 No's installed in plant premises.

- Installation of Energy Efficient Motor (Efficiency -IE3) in place of Conventional motor of 15, 22, 37, 55, 110, KW. Vardhman Fabrics purchased the Premium efficiency class motor in totality of 2800 KW.

- Selection of drives for Humidification Plant for optimum utilization.

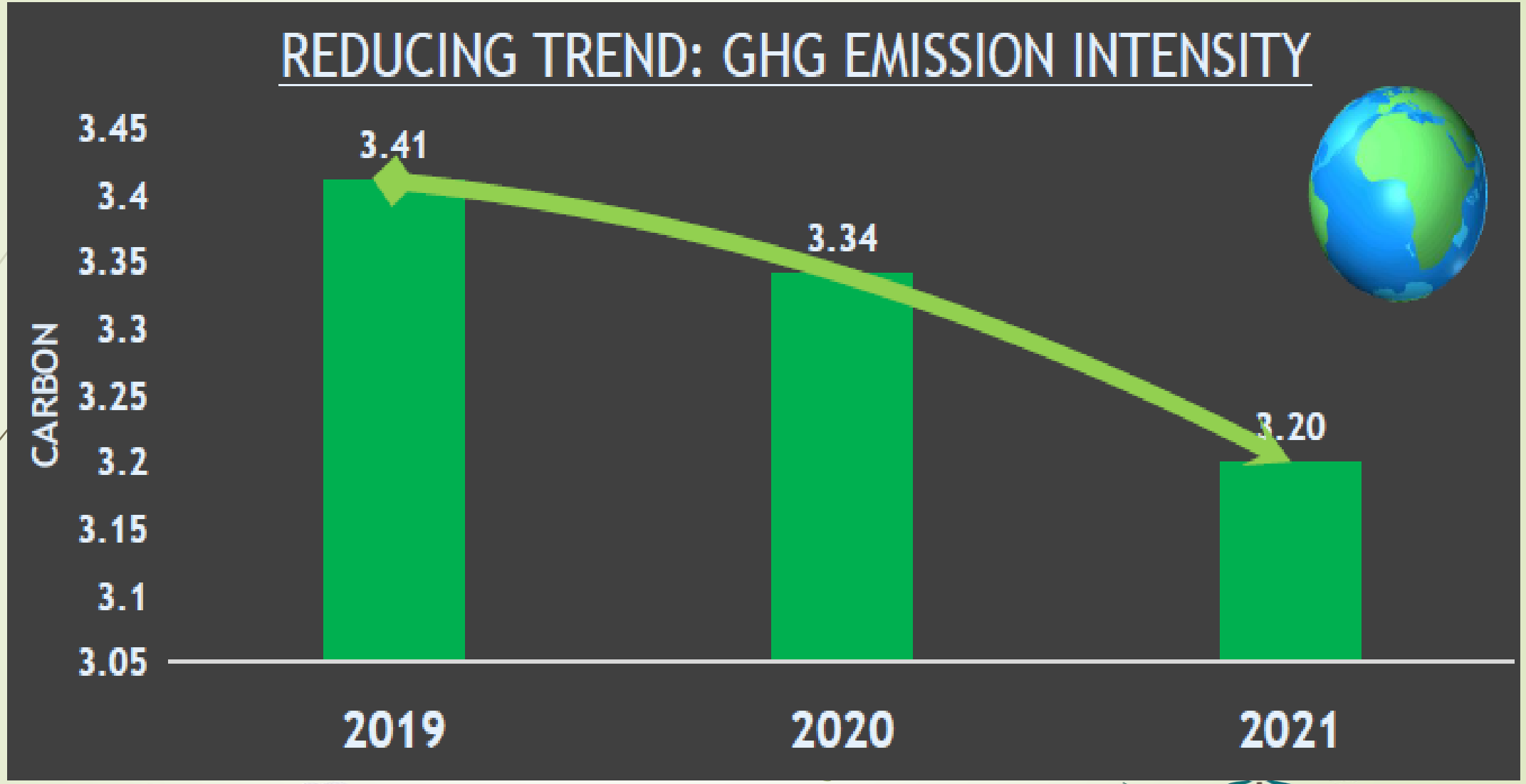
- Proper location of Sub Station in Campus and Cable Sizing selection resulting in reduction of fixed losses. During the designing stage of power distribution network, selected the optimum distances between source and load and therefore length of cable reduced.

- Low consumption and energy efficient machines selection in project.

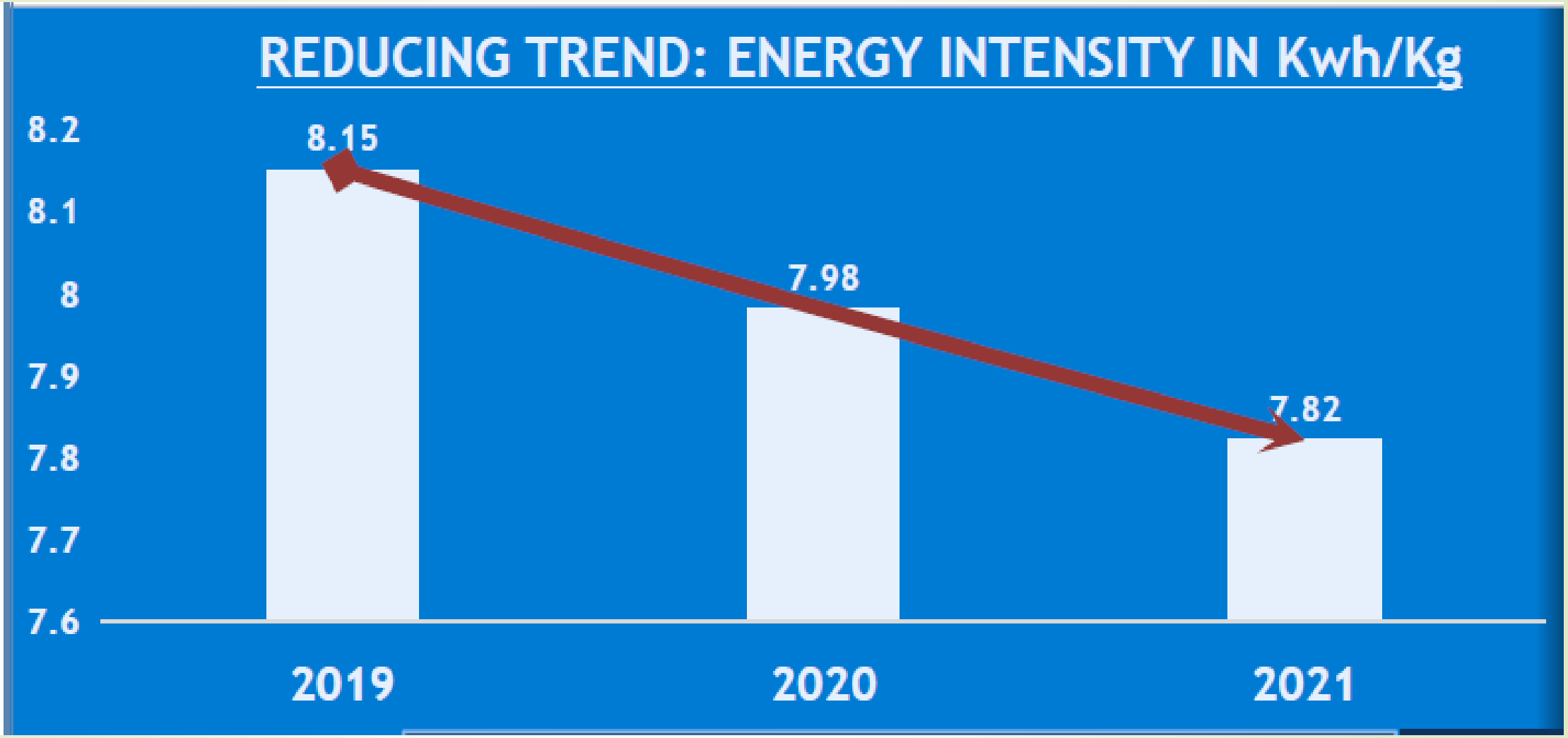
Energy Saving Project through Up gradation of Technology

- Selection of Oil Compressor (455KW) VFD Type for Optimize working of HT Compressors.
- Installation of APFC 11845 KVAR panel in Wvg-2, Open End-2,Spg-2,Chiller, Process House.
- Automation of Bobbin automatic transport system (for 20 ring frames & 07 speed frames) for unit-2 to improve utilization of machine.
- Installation of premier ultimo - individual spindle monitoring
- Automation of Sizing kitchen automation .
- Optimization working of Humidification plants (Spinning, Open end, Weaving) and hence save 499KW/ Hrs.
- Installation of Energy Efficient Flow maker(Energy Efficient) at ETP plant.
- Installation of Solar steam Cooking system suitable for 700 Persons.
- Audit conducted for Compressor Air System (10MW Inst.) and perform action accordingly.
- Audit conducted for Steam & Condensate System from ARMSTRONG.

Carbon Footprint Reduction



Energy Intensity



AWARDS & RECOGNITION

- Accredited with ISO 14001:2015 and ISO 45001:2018
- Vardhman Fabrics conferred with National level “Best Achiever Award” in PAT (Perform Achieve and Trade) Cycle I Winner in Best Energy efficient Initiatives.
- Awards under Sustainable Journey in PAT Cycle II_ENHANCING Industrial Energy Efficiency.
- Winner under the DCs Under PAT Sector Specific Circle Competition (11 Sector)
- 6th Outstanding Achievement Award 2019-20 under the category Large Enterprises of the Year by Federation of MP Chambers of Commerce & Industry in Presence of MP Governor Mr. Mangubhai Patel.
- 2nd Prize in"9th edition of FICCI Water Awards 2021".
- Recognized as "Noteworthy Water Efficient Unit" in the "15th CII National Award for Excellence in Water Management within the fence" category on 7th Nov. 2021
- Unit felicitated with Excellent performance in the Sustainable chemical & Waste Water Management Programme “ by Apparel Impact Institute.
- Awarded with Vishwakarma Rashtriya Puraskar by the Government of India (Ministry of Labour & Employment) for his suggestion to promote Industrial Efficiency.

Best Achiever Awards under the PAT CYCLE I

Vardhman Fabrics conferred with National level "Best Achiever Award" in PAT (Perform Achieve and Trade) Cycle I for energy Conservation at Vigyan Bhavan, New Delhi on Energy Conservation Day 14th Dec 2017.

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Awards under Sustainable Journey in PAT Cycle II_ENHANCING INDUSTRIAL ENERGY EFFICIENCY

❖Vardhman Fabrics Budhni, has been Awarded with 11034 ESCerts .

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5th Edition of CII_ National Energy Efficiency Circle Competition 2021

Category ; DCs Under PAT Sector Specific Circle Competition (11 Sector)

Certificate of Award

This is to certify that
Vardhaman Fabrics, Sehore
has participated and awarded as Winner,
under DCs Under PAT Sector Specific Circle
Competition (11Sector)
Category in the
5th Edition of CII National Energy Efficiency Circle
Competition held on 16-18 June 2021.

Mr Shreekant Somany
Chairman,
CII – Centre of Excellence for
Competitiveness for SMEs

Dr Sudhir Kapoor
Chief Jury,
CII National Energy Efficiency
Circle Competition

Mr Pikender Pal Singh
Executive Director
Confederation of Indian Industry

Date: 18-06-2021

CII
Confederation of Indian Industry

5th Edition of CII National
Energy Efficiency Circle
Competition

Certificate No. EC21/A38

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Vardhman Fabrics Budhni Awarded with the 6th Outstanding Achievement Award under the category Large Enterprises of the Year by Federation of MP Chambers of Commerce & Industry in Presence of MP Governor Mr. Mangubhai Patel.

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Vardhman Fabrics Budhni, also won 2nd Prize in"9th edition of FICCI Water Awards 2021".

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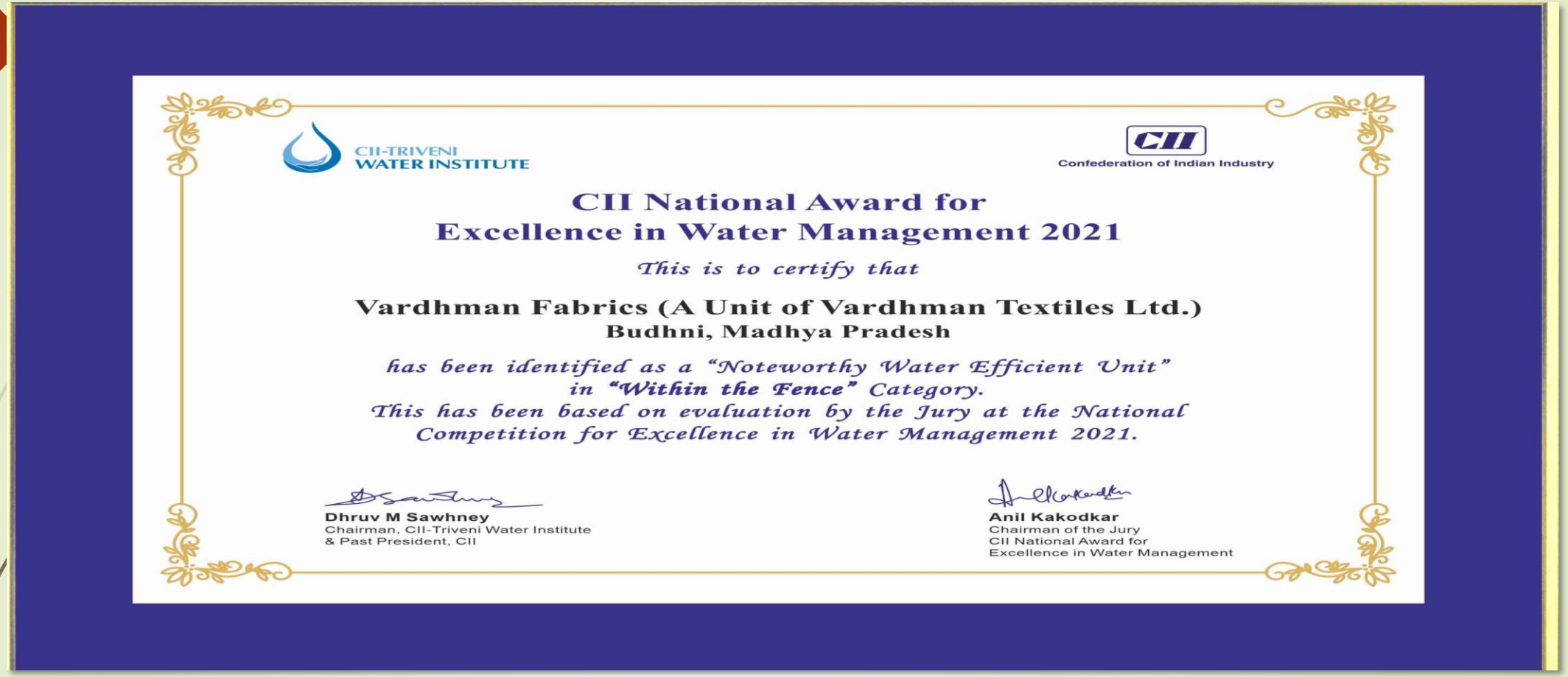
5th Edition of CII_ National Energy Efficiency Circle Competition 2021



CII-TRIVENI WATER INSTITUTE

Confederation of Indian Industry

CII National Award for Excellence in Water Management 2021

This is to certify that

Vardhman Fabrics (A Unit of Vardhman Textiles Ltd.)
Budhni, Madhya Pradesh

has been identified as a "Noteworthy Water Efficient Unit" in "Within the Fence" Category. This has been based on evaluation by the Jury at the National Competition for Excellence in Water Management 2021.

Dhruv M Sawhney
Chairman, CII-Triveni Water Institute
& Past President, CII

Anil Kakodkar
Chairman of the Jury
CII National Award for
Excellence in Water Management

Vardhman Fabrics Budhni, (A Unit of Vardhman Textile Ltd.) has been recognized as ***"Noteworthy Water Efficient Unit"*** **in the "15th CII National Award for Excellence in Water Management within the fence"** category on 7th Nov. 2021

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Vardhman Fabrics Budhni, unit felicitated with Excellent performance in the Sustainable chemical & Waste Water Management Programme " by Apparel Impact Institute.

The Programme was named as Clean by Design sponsored by GAP & supported by STS blu win.

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Shri Ganga Prasad Gupta from Vardhman Fabrics has been awarded with Vishwakarma Rashtriya Puraskar by the Government of India (Ministry of Labour & Employment) for his suggestion to promote Industrial Efficiency.

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Visit of TERI & ECC Japan Delegates to VFB for Energy Manual Preparation for Indian Industries

Vardhman

Vardhman Fabrics, Budni

WELCOMES

The Delegation
From
Energy Conservation Center, Japan
(Ministry of Economics Trade & Industry)
&
Bureau of Energy Efficiency, India
(Ministry of Power, Govt. of India)
&
The Energy & Resources Institute, India

Energy Manual Preparation for Indian Industries
Model Unit - Vardhman Fabrics, Budni

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VARDHMAN CONTRIBUTION TO NATIONAL ENERGY SAVING MISSION

UK Workshop for Energy Conservation & Knowledge Exchange between India & UK.
Mr. T.C. Gupta, Unit Head, VFB also took part in the Conference.

Workshop on Energy Conservation Manual & guidelines held at **Japan Energy Conservation Centre, Japan.** Participants from central M/O Energy Trade &

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Best Poster On Energy Efficient Practices category

Confederation of Indian Industry

Certificate of Achievement

This is to certify that the poster submitted by

Vardhman Fabrics, Budni

has been chosen as the

'Best Poster'

in the E-Poster Competition under the Category

'Creating awareness on Energy Efficiency & Energy Conservation'

This acknowledgement is based on the evaluation by the panel of Judges at 'EnerCon 2020' held during 7 – 12 December, 2020.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII – Godrej GBC

Awarded for Best Poster category
By Confederation Of Indian Industry

Poster Design
& Submitted by VFB

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Energy Conservation Week Organized to make People Awareness

Energy Conservation Week Celebrated in VFB

Suggestion Scheme for Energy Saving

Tree Plantation & Motivation Speech

Quiz Competition & Prize Distribution

Painting & Participation By Colony Kids

Essay Competition on Energy Conservation

Road Show for Awareness & Slogans

Painting Design on Energy Saving & Awareness

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Thank You !!

Conserve Energy Save Tomorrow