AUROBINDO
Committed to healthier life!

23rd NATIONAL AWARD 2022

EXCELLENCE IN ENERGY MANAGEMENT

TEAM MEMBERS

MEERA SHARIF SHAIK, SENIOR GENERAL MANAGER

RAMA SESHU VARA PRASAD GEDALA, SENIOR MANAGER

VENU GOPAL YALA, ASSISTANT GENERAL MANAGER

AUROBINDO PHARMA LIMITED

UNIT XI , SRIKAKULAM

www.aurobindo.com

AUROBINDO PHARMA LIMITED

Chairman & MD: K.Nityananda Reddy

Founded: 1986

USFDA cGMP compliant

2nd Largest pharma by revenue (India)

10th largest by generic sales (globally)

MISSION & VISION

Aurobindo's mission is to become the most valued Pharma partner to the World Pharma fraternity by continuously researching, developing and manufacturing a wide range of pharmaceutical products that comply with the highest regulatory standards

" To become a leading and an admired global pharma company, ranked in the top 25 by 2030"

STATISTICS

Employees Worldwide	**24000+**
Market Presence	**155+**
Mfg. Facilities	**29**
Dosage Forms	**40+ Billion**

ROBUST R & D

One of the largest R&D facilities in India, Aurobindo Pharma has five research center's spread over 16,000 square meters. It also has 3 R&D center's in USA. The company employs over 1700+ scientists & analysts in-house expertise in product development.

OUR EVOLUTION

- *Successful innovation in process chemistry*
- *Cost competitive manufacturing*
- *Large diversified product portfolio*
- *Global leadership in anti-infective*
- *Largest generic portfolio in Antiretroviral drugs(ARVs)*

CORE STRENGTHS

- *Scale, Diversity and Leadership*
- *Operational Excellence*
- *Service Delivery*
- *Patient Focus*

AUROBINDO PHARMA LIMITED

UNIT-XI
PYDIBHIMAVARAM

REGULATORY AUDIT / CERTIFICATION

CDSCO
DRUG CONTROL ADMINISTRATION
ANVISA-BRAZIL
COFEPRIS-MEXICO
EDQM & ANSM FRANCE
FDA-Korea
MHRA-UK
PMDA
TGA – Australia
WHO – Geneva
USFDA

OVERVIEW

- *Multi product facility spread over 161 acres*
- *Site distinguished in to Phase-I, Phase-II, Phase-III & Intermediates section*
- *43 API Modules*
- *Purified water plants with closed loop circulation*
- *Waste water treatment facility*
- *Power Plant with Back-up power*

STATISTICS

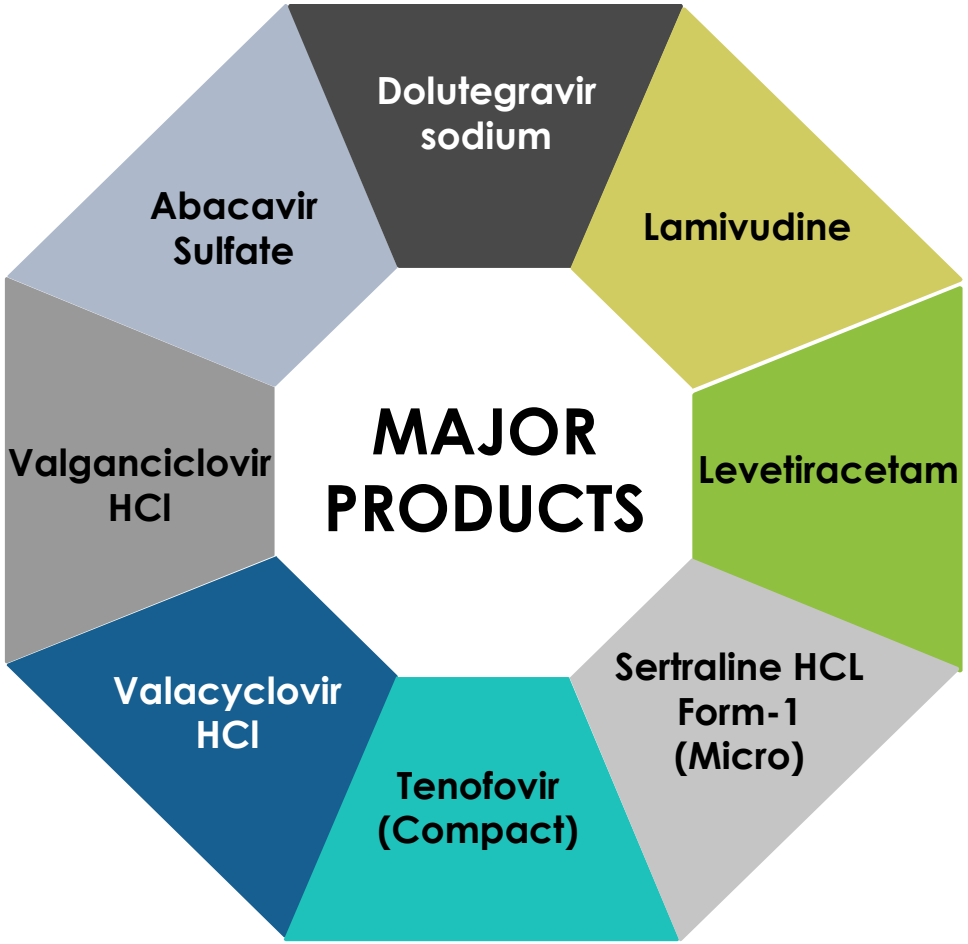
Total Employees	2305+
APL Facility	25 Blocks
No. of Products Mfg.	92+

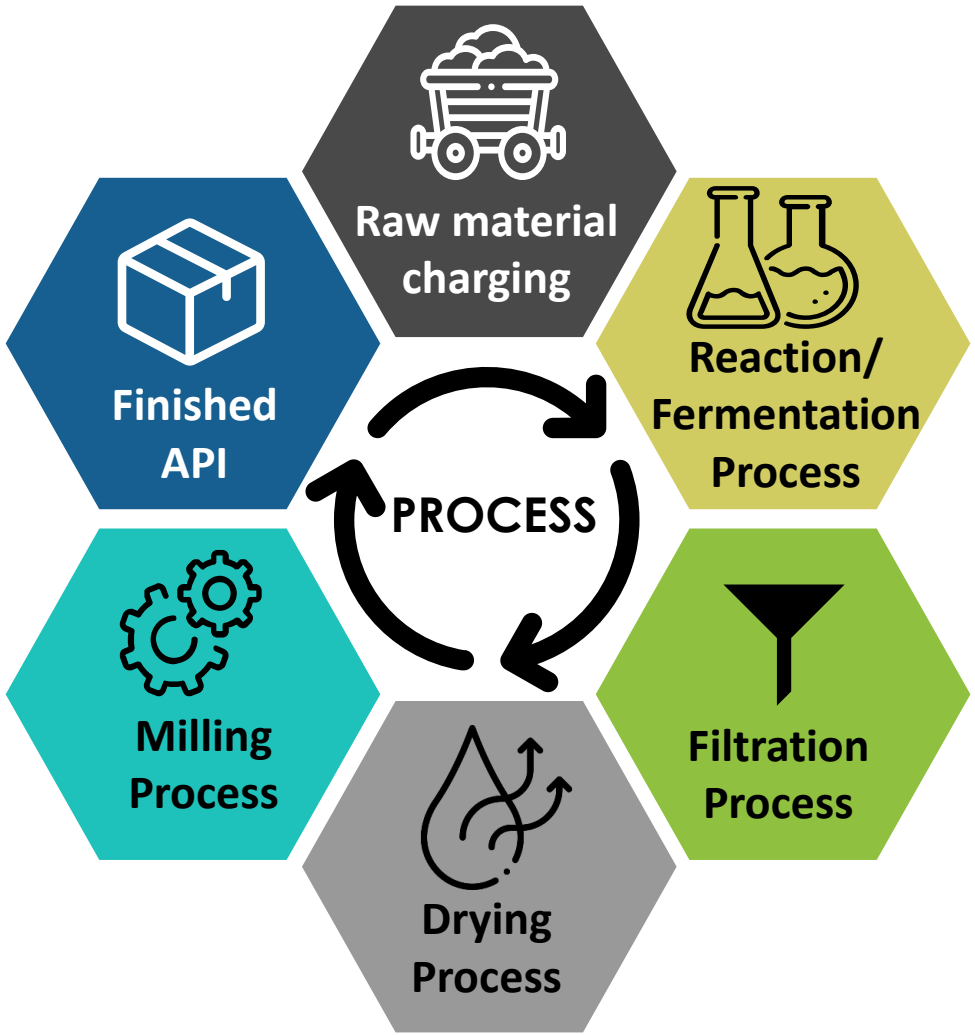
INDEPENDENT AREAS

- *Warehouses*
- *Manufacturing Blocks*
- *Quality Assurance*
- *Quality Control*
- *Purified Water System*
- *Utilities*

UTILITY	CAPACITY
Power	▪ *Captive Power generation ~9 MW* ▪ *Andhra Pradesh Power Transmission Corporation with CMD- 23MW* ▪ *DG Sets 13 MW*
Steam	*80 TPH Installed capacity*
Refrigeration load	*12035 Tr*
Nitrogen	*~1400 nm^3 / Hr*
Air Compressor	*~6486 CFM*

Details of the Products / Processes



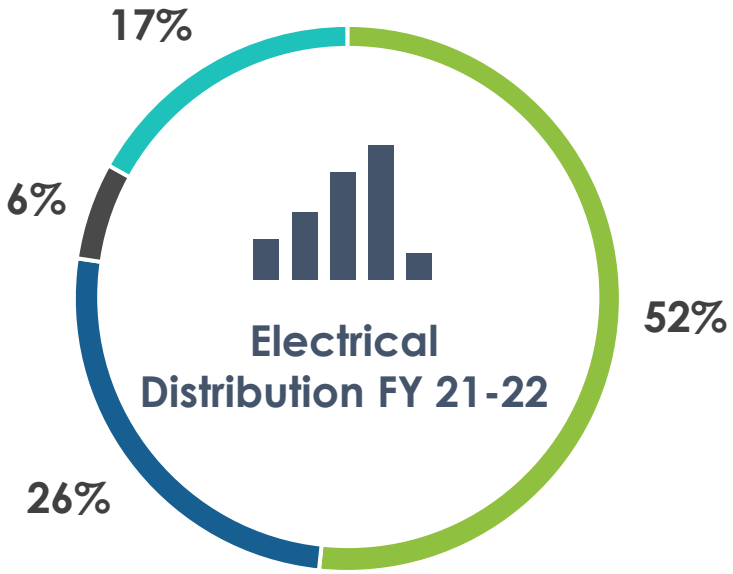


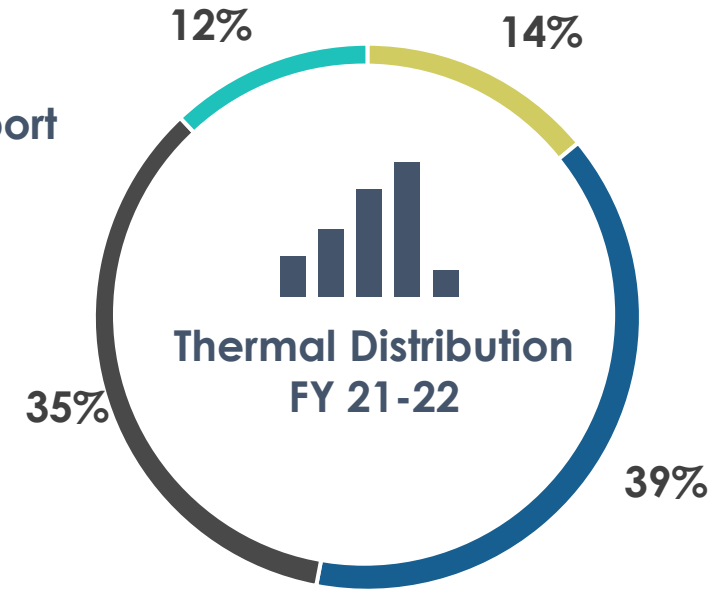
Energy Consumption Overview

S No	Parameters	Units	FY 19-20	FY 20-21	FY 21-22
1	Annual Electrical Energy Consumption	million kWh/year	130.67	132.52	121.92
2	Annual Electrical Energy Equivalent	Million kcal/year	112376.2	113967.2	104851.2
3	Annual Thermal Energy Consumption	Million kcal/Year	294398.71	271850.26	245210.0
4	Overall Energy Consumption	Million kcal/year	406774.91	385817.46	350061.2
5	Annual Production	MT/Year	3998	4481	2291
6	Specific Electrical Energy Consumption	kWh/Ton of production	0.0326	0.0295	0.053
7	Specific Thermal Energy Consumption	kCal/ Ton of Production	73.636	60.667	107.03
8	Overall Specific Energy Consumption	kCal/ Ton of Production	101.744	86.10	152.79

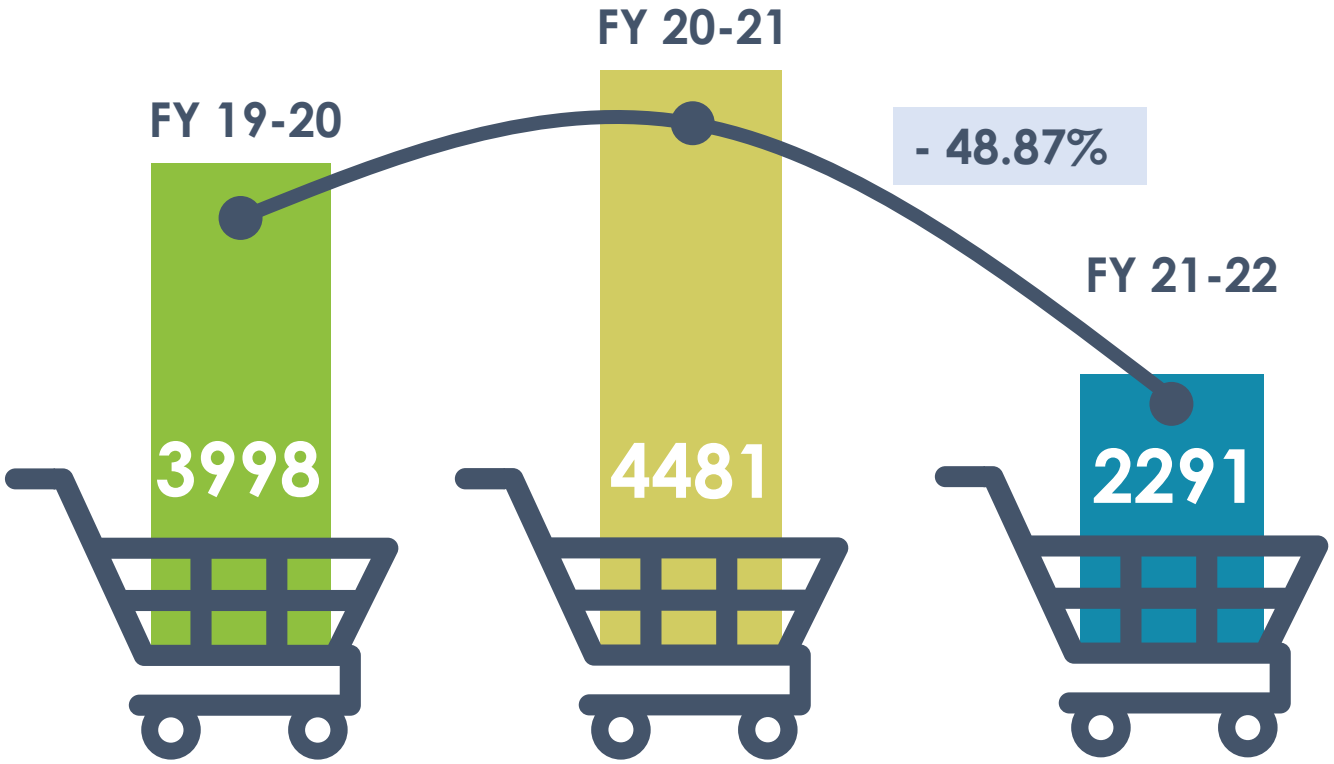
29.95% - Electrical Energy mkcal/year

70.04% - Thermal Energy mkcal/year





Production & Specific Energy Consumption in last 3 years (FY 2019-22)

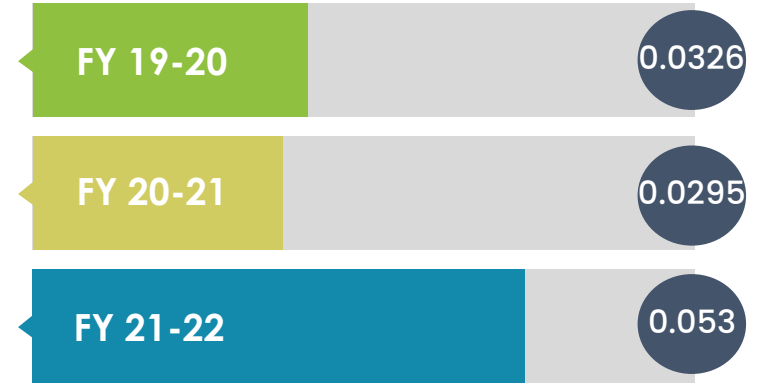


Production in metric tons

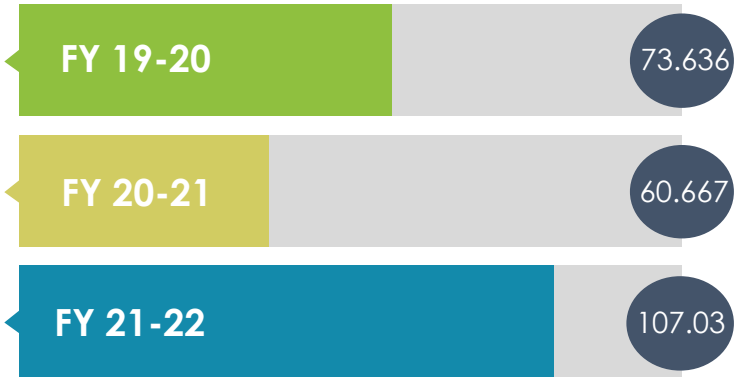
+ 79.66% STEC
+ 76.42% SEEC

The increment of SEC from FY 20-21 to FY 21-22 was due to low production volumes

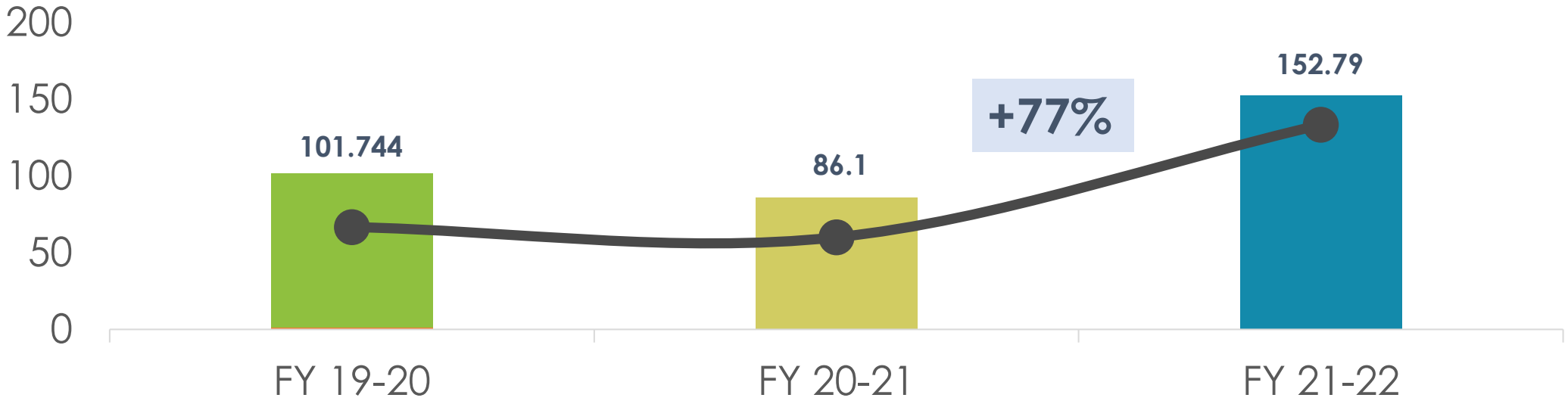
Specific Thermal Energy Consumption Kcal/Ton of Production



Specific Electrical Energy Consumption KWH/Ton of Production



Overall Specific Energy Consumption in last 3 years (FY 2019-22)



Overall Specific Energy Consumption kCal/Ton of Production

The increase of OSEC was due to the low home production volumes. Though the production volumes are low, the entire occupancy of plant was bind with multiple facilities & products mapping which enhances the energy consumption. With multiple energy saving opportunities through process innovations, energy projects and operational excellence thereby achieved lower OSEC than actual

Information on Internal Benchmark - Electrical

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Energy Consumption Benchmarking

	FY 2021-22	FY 2022-23
	Actuals Units/Day	Benchmark Units/Day
Mfg. Facility-I	66,237	62,925
Mfg. Facility –II	80,529	76,503
Mfg. Facility – III	92,709	88,073
Mfg. Facility - INT	93,060	88,408

Remarks on Benchmark

- FY 2022-23 targeted benchmark was based on FY 2021-22 actuals energy consumption targeting reduction by 5% units consumption.
- We can achieve the targeted benchmark by effective implementation of energy saving activities, operation excellence and with continuous monitoring of load demand

Way Forward Activities to reach Benchmark

- Replacement of inefficient chillers with higher efficiency Chillers.
- Identified higher rated motors which are IE2 type and proposing for replacement with IE3.
- Replacement of conventional lights to LED lights.
- Assessing Nitrogen compressors for leaks and to optimise regenerating time based on pressure.
- Replacement with E Glass Epoxy FRP Blades for Cooling Towers
- Installation of VFDs to higher HP motors at Utility compressors secondary distribution pumps, at AHU's and at power plant

Information on Internal benchmark - Utility

	Reciprocating Chillers			Screw Chillers	
Design Temp (oC)	+5	-20	-30	+5	Design Temp (oC)
Design SEC (kW/TR)	0.86	1.59	1.83	0.63	Design SEC (kW/TR)
Operating SEC (kW/TR)	0.91 - 1.1	1.65 - 1.72	2.1 – 2.5	0.68 – 0.82	Operating SEC (kW/TR)
Target SEC (kW/TR)	0.87	1.60	1.9	0.65	Target SEC (kW/TR)

	Air Compressors	Boilers	
Design SEC (kW/CFM)	0.16	4.4	Design SFR (KG/KG)
Operating SEC (kW/CFM)	0.22 – 0.29	3.8 – 4.0	Operating SFR (KG/KG)
Target SEC (kW/CFM)	0.18	4.2	Target SFR (KG/KG)

Periodical assessments of utility equips by Engg. Team and audits by energy cell, the target values are being set thereby achieving the targets with continuous monitoring and eliminating Operational losses

Major Encon Projects in FY 2022-2023

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300TR Screw Chiller by Replacing Reciprocating Chiller

INVESTMENT : 17.80 Million
SAVINGS : 29.60 Million
PAY BACK : 13 Months

Replacement conventional lamps with LED lamps

INVESTMENT : 2.54 Million
SAVINGS : 8.67 Million
PAY BACK : 14 Months

E Glass Epoxy FRP Blades for Cooling Towers

INVESTMENT : 0.28 Million
SAVINGS : 0.10 Million
PAY BACK : 33 Months

VFD's for feed water pump & CT pump at power plant

INVESTMENT : 0.3 Million
SAVINGS : 2.41 Million
PAY BACK : 1.49 Months

Energy Saving projects implemented in last three years

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12 No. — **FY 2019-20**

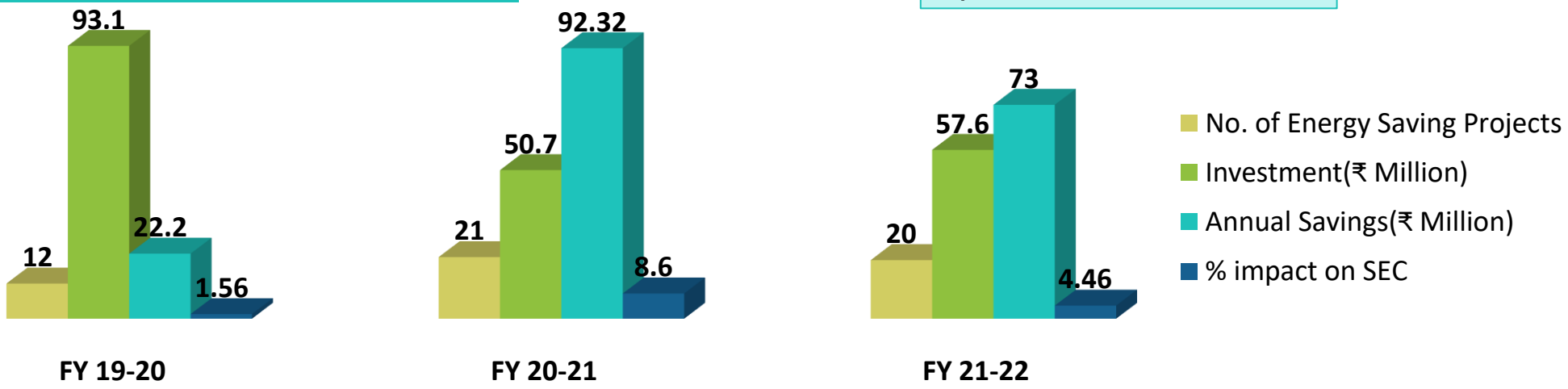
Investments(₹ Million)	: 93.1
Electrical (₹ Million kWh)	: 2.586
Thermal (₹ Million kcal)	: 4.2
Monetary Savings (₹ Million)	: 22.2
Impact on SEC (%)	: 1.56%

21 No. — **FY 2020-21**

Investments(₹ Million)	: 50.7
Electrical (₹ Million kWh)	: 15.93
Thermal (₹ Million kcal)	: 22.54
Monetary Savings (₹ Million)	: 92.32
Impact on SEC (%)	: 8.6%

20 No. — **FY 2021-22**

Investments(₹ Million)	: 57.6
Electrical (₹ Million kWh)	: 11.75
Thermal (₹ Million kcal)	: 121.4
Monetary Savings (₹ Million)	: 73.0
Impact on SEC (%)	: 4.46%



Energy Saving projects implemented in last three years – High Investment

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Replacement of reciprocating ammonia based +5 chillers with 250 TR screw compressor chillers at D & E utilities utilized for process and HVAC
Investment: 49 Million **Savings:** 16.5 Million

Optimized the overall utilities consumption by 15% compared to FY-2020-21 with continuous monitoring and excellence in handling
Investment: 1 Million **Savings:** 19.23 Million

Energy optimization by replacement of 160W ML lamps with 40W, 30W, 27W LED lights at entire plant
Investment: 2.17 Million **Savings:** 18.52 Million

Installed Oxygen analyzer in boiler to monitor and control the oxygen % during coal combustion. This will further reduce the Loss of ignition in the coal reducing unburnt coal.
Investment: 0.65 Million **Savings:** 1.03 Million

To optimum QC block cooling systems(DX units) by temp. controllers, eliminating lab rooms cooling losses to reduce energy consumption by 10%
Investment: 1.5 Million **Savings:** 1.49 Million

Energy optimization by installation of Sequential Timer Logic for reduction in running hours of AHUs
Investment: 0.5 Million **Savings:** 1.94 Million

Energy Saving projects implemented in last three years – Low Investment

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To optimum the +5°C chiller primary pumps operation by enhancement of flow rate & head with improved Impeller size from 165mm to 178mm

Savings: 0.67 Million **Payback:**1.79 Months

Optimized the utilization of CMU61 chiller by diverting the load to Main utility chillers with unification of chiller inlet/outlet's

Savings: 1.94 Million **Payback:** 3.09 Months

Optimization of running hours of RT pumps by arranging interlock from +5°C chiller (CMU090)to related CT water circulation pumps through Chiller PLC.

Savings: 0.81 Million **Payback:** 0.74 Months

Optimization of energy consumption by installation of transparent roof sheets for day light utilization

Savings: 0.56 Million **Payback:**10.7 Months

Extraction of heat from rejected condensate water from blocks(Phase-2) to enhance the temperature of boiler feed water(DM water) by using heat exchangers

Savings: 1.42 Million **Payback:** 4.2 Months

Energy optimization by installing variable frequency drives for process reactors-5No's and centrifuges -5No's

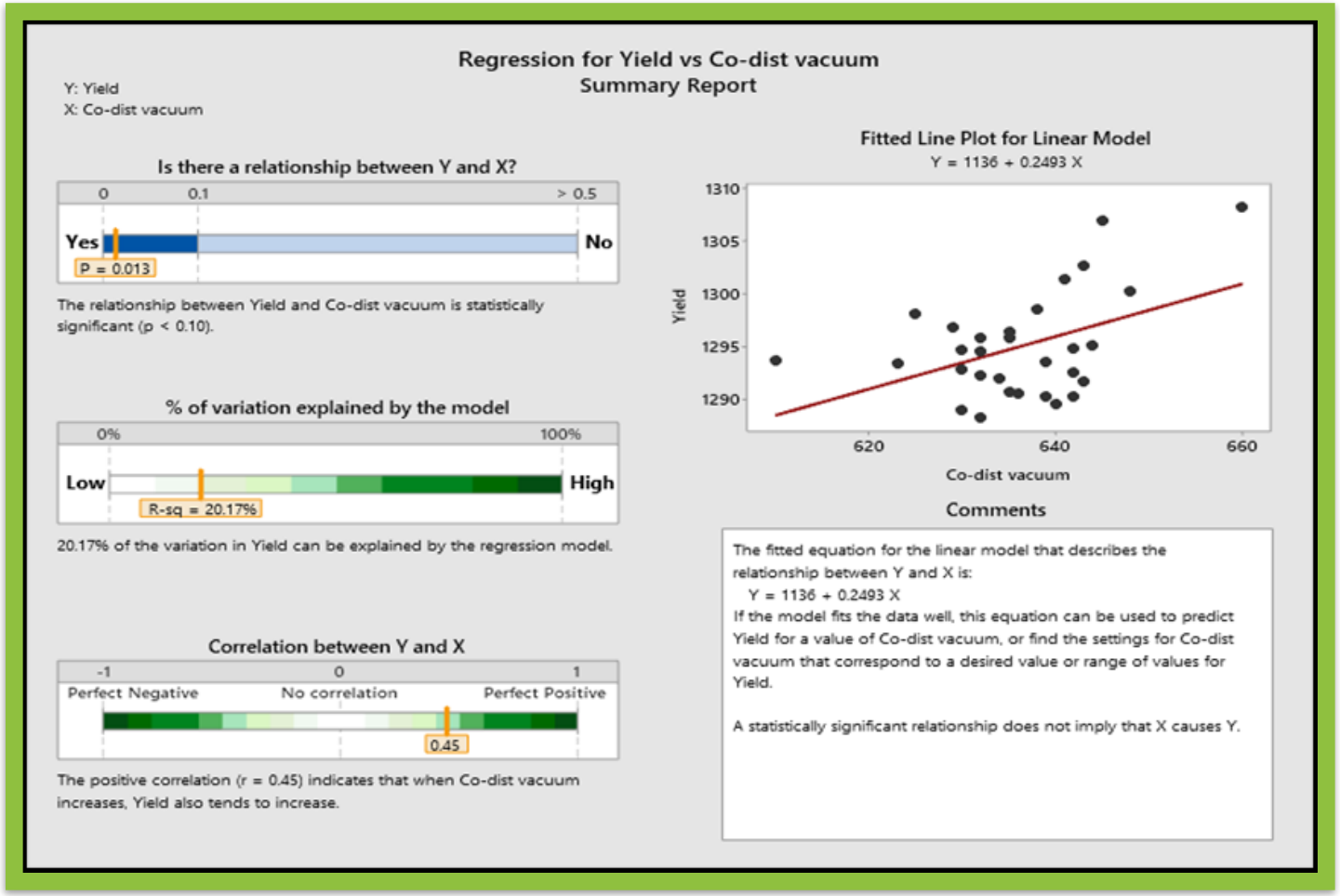
Savings: 0.99 Million **Payback:** 4.85 Months

Innovative Projects implemented

01

TITLE: Enhancement of recovery of EA & MDC in Levetiracetam API process

Reduction of Vacuum pump frequency which optimized the vapor losses and enhanced MDC & EA recovery percentage which optimized Power consumption



Triggering Factor

After analyzing the material balance and mass balance study, losses are identified in evaporation

Actions Taken

- Reduction of Vacuum pump speed by using variable frequency drive.

Benefits

- By reducing Vacuum pump frequency EA and MDC recovery increased.
- Reactors running hours reduced to 24 hrs. from 36 hrs.
- Power consumption reduced by 61,083 units/ Annum
- SRS-T pump stopped permanently.

Innovative Projects implemented

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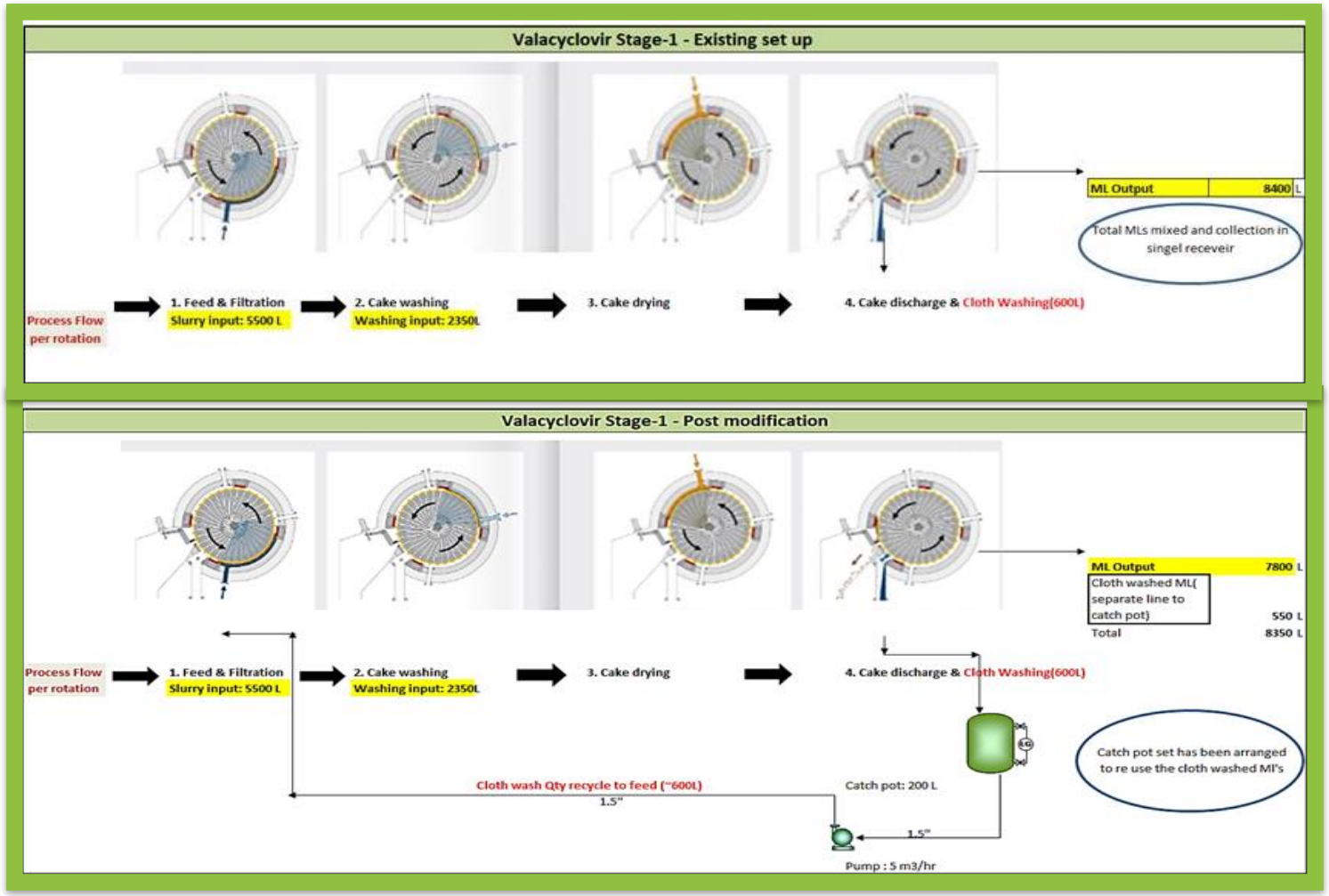
02

TITLE: Enhancement of Valacyclovir Stage-I yield

Achieving target capacity with yield improvement within planned batches with reuse of cloth washing mother liquor from rotary pressure filter



Triggering Factor

After analyzing the material balance and mass balance study, losses are identified in cloth washing stream

Actions Taken

Arrangement of Catch pot and pump which allows to back feed into process flow

Benefits

- Achieving target capacity within planned batches, which helps in reduce equipment running hours and 20,252 units saved per Annum
- Cost savings per year is ~20.87Cr

Innovative Projects implemented

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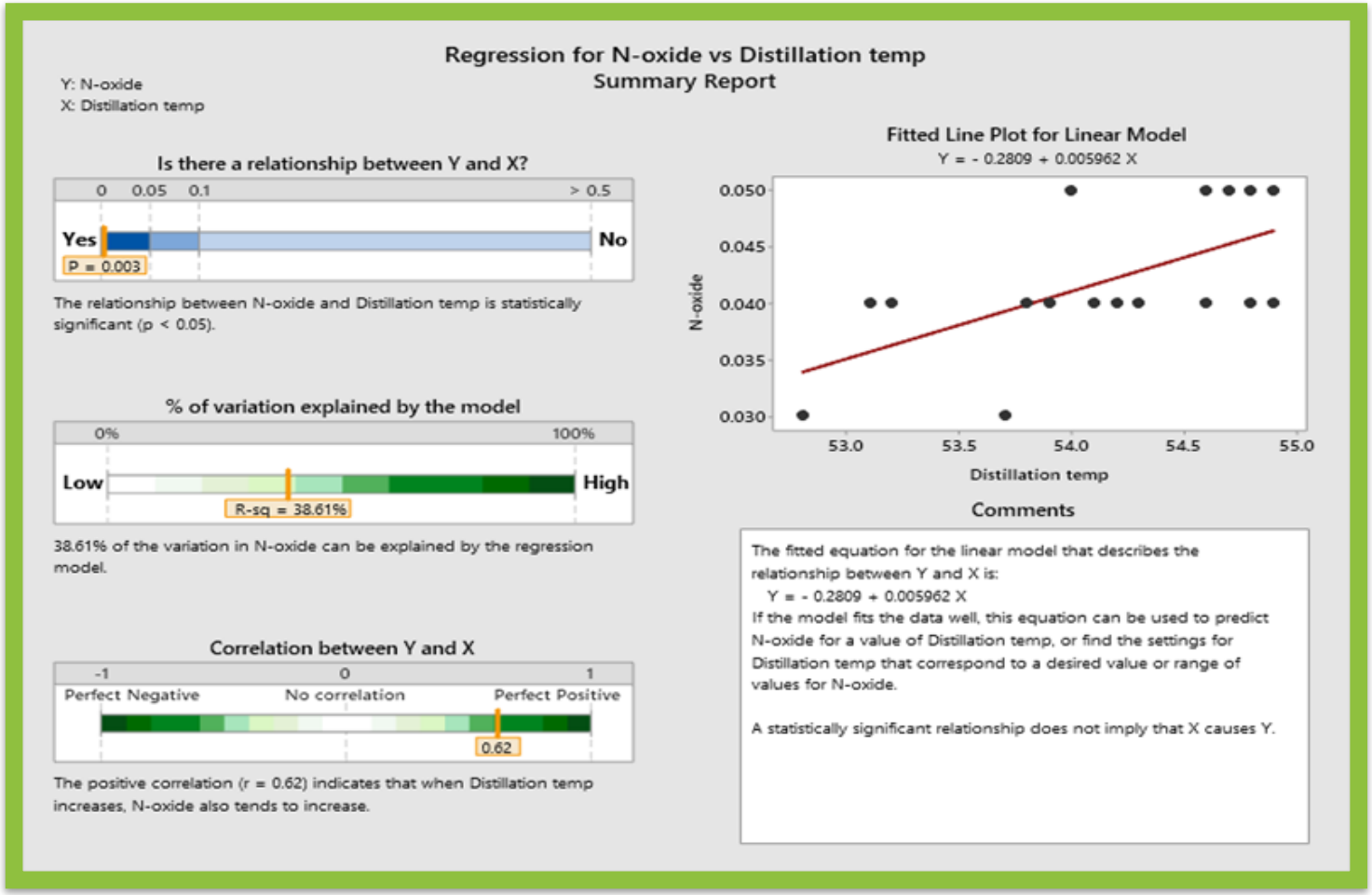
03

TITLE: Optimization of reprocess cycle and equipment running hours

Reduction of N-Oxide impurity in Galanthamine API will help in reduction of reprocess cycle duration and also reduce equipment running time resulting in intangible benefits



Triggering Factor

As per protocol study N-Oxide impurity tends to increase as temperature increases during THF vacuum distillation where the vacuum leaks tends to temperature enhancement

Actions Taken

Vacuum leak test to be done before distillation

Benefits

- Cost saving per batch is 10.80 Lakh
- Additional purification duration and running hours of equipment is saved thereby units saved by 40,265 per Annum

Utilisation of Renewable Energy sources

Installed 30 MW Solar Power Plant

YEAR	Technology (electrical)	Type of Energy	Onsite/ Offsite	Installed Capacity (MW)	Generation (million kWh)	% of overall electrical energy
FY 19-20	Solar PV	Solar	Offsite	24	39.97	30.58
FY 20-21	Solar PV	Solar	Offsite	30	44.20	33.35
FY 21-22	Solar PV	Solar	Offsite	30	43.24	35.46

Installed Capacity

30MW Solar Power Plant Under
Mode : Group Captive Mode
Project mode : Off Site Generation

Location & Developer

Varisam village, Pydibhimavaram,
Ranasthalam, Srikakulam.
M/s Aurobindo Ltd
Investment : ₹ 120 Cr.

Type of Agreement

Open Access : 5 Years
Starting : May 2017
Total 2 Nos units of Aurobindo considered

Generation

Total generation : 4.3 Cr Units /Year
Allocation Capacity : 6.75 MW/hour

% Share to Unit-XI

CMD allotted from Solar : 5.04 MW/hour (75%)
Allotted Generation: 3.22 Cr Units / Year
% Share in Energy Consumption : 30%

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Waste utilization and management

S No	Type of waste generated	Quantity of waste generated (MT/year)			Disposal method
		2021-22	2020-21	2019-20	
1	Plastic waste (Poly bags)	129	134	138	Disposed through authorized scrap dealers for recycling
2	Bio-medical waste	5	5	0.18	Incineration / Landfill
3	Hazardous waste	1,398	2,220	2,544	TSDF / Landfill

Year	Type of Waste	Quantity	GCV mkcal/kg	Waste as percentage of Fuel
2019-20	Hazardous waste (Organic Waste) from Pharma industry	4626	23130	-
2020-21	Hazardous waste (Organic Waste) from Pharma industry	4067	20335	-
2021-22	Hazardous waste (Organic Waste) from Pharma industry	2858	14290	-

Waste with heat value is not utilised directly in the plant where it is being sent to the Cement industry / Co-Processing units where it is used as an alternate fuel

The Bio-medical waste is being sent to the M/s Rainbow where it is used as an alternate fuel

Waste utilization and management

600 KLD Stripper, MEE followed by ATFD

Evaporation system for High strength effluent Treatment

Existing 300 KLD is not sufficient to treat the entire quantity. Hence additional to the existing system 600 KLD Evaporation system is Proposed to treat the Remaining 503 KL of HTDS wastewater.

BIO ETP System for Low Strength Effluent treatment-1

- 2400 KL Anoxic tank required as 1894 KLD LTDS treatment facility Anoxic tank not available due to this Ammoniacal nitrogen getting 200PPM
- 2 no's Guard Pounds 3000 KL capacity tanks were proposed.

BIO ETP System for Low Strength Effluent treatment-2

Existing 2*1350 KLD Equalization tanks RCC walls and acid proof brick lining tiles got damaged, Hence instead of rectifying the tanks it is recommended to construct 1500 KL above ground tank as per PCB guidelines

Investment for the project: 430 Millions

Utility wastewater treatment

500 KLD De-silica plant proposed with pretreatment facility due to RO membranes frequently getting choked due to scaling formation which leading to reduction of RO life span.

Sustainability / GHG Inventorisation

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01 Sustainability Report

2020-21

Published maiden sustainability report for FY 2020-21

02 Goals & Targets -2025

2025

- 20% Renewable Energy Share (Power to Power)
- 12.5 % Reduction in Emissions
- 35% water conservation / restoration
- 60% coprocessing of hazardous waste
- 100% reuse & recycling nonhazardous waste
- 25% hours of learning per employee

03 GHG Emissions

FY 2019- 22

FY	Scope 1 emissions	Scope 2 emissions	Total GHG Emissions (tCO2e)
2019-20	1,07,417	79,063	1,86,480
2020-21	1,03,177	1,02,850	2,06,027
2021-22	1,23,519	1,08,090	2,31,609

Green Supply Chain Management

1 **Single Stuffing/ Double Stacking Project**

- Achieved benefits of Rs 190 Million
- Increased loading by 30% by optimizing with shipper stuffing,
- Saved freight on additional container with 50% extra space
- Enabled no dependency on the wooden pallets.

2 **Paperless / Digital Logistics**

- First Pharma company in India to adopt OTM.
- Cloud based Solution
- Freight Payments linked from OTM to ERP.

3 **AIR vs SEA – Mode Control**

- Increased Sea transportation over Air transportation by pallet systems.
- Decreased air Tonnage from 572 Tonnage to 456 Tonnage

4 **GST – e Invoicing**

- Decreased Paper consumption and paper less / Digital transactions
- Invoice information will be transferred from the portal in real-time.

Teamwork, Employee Involvement & Monitoring

- Discussion on DMAIC projects for capacity improvement, Process consistency, Impurity reduction.
- DMAIC ignited our innovations and to achieve improvements in process

- Discussion on energy saving activities.
- Finding path to reach internal benchmarks.
- Daily report on energy consumption and identifying the losses and initiating actions

Daily Energy meetings

Virtual Training on six sigma

Monthly LDM Review

Energy Week Celebrations

- Energy Conservation week celebrations involving every department to motivate Energy saving importance and enhancing the involvement in energy saving activities

- Discussion on Kaizen improvements
- Discussion on new initiatives
- Monthly LDM winner is awarded with trophy
- LDM enhanced the huge impact on Energy saving activities.

Teamwork, Employee Involvement & Monitoring

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Talent Development Programme

Kaizen Award Winning Programme

Energy Conservation Programme

Summary of KAIZENS implemented 2021-22

S No	Initiative department	Initiatives	Completed	To be completed	Investment (in Lakhs)	Savings /Annum Rs.(in Lakhs)	ROI in months
1	Manufacturing	12	12	0	23.45	117.26	5
2	Engg. & Utility	72	72	0	5.6	23.71	4.2
Total		**84**	**84**	**0**	**29.05**	**140.97**	**9.2**

The Kaizens implemented include process improvements, energy conservations and safety and cost saving.

Teamwork, Employee Involvement & 5S Implementation

Energy Management System-Procedure

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01 PLAN

- Policy & Manual
- Resources allocation
- Assessment
- Set activity wise baseline

02 DO

- Training
- Awareness
- Energy Assessments
- Design &
- Implementation

03 CHECK

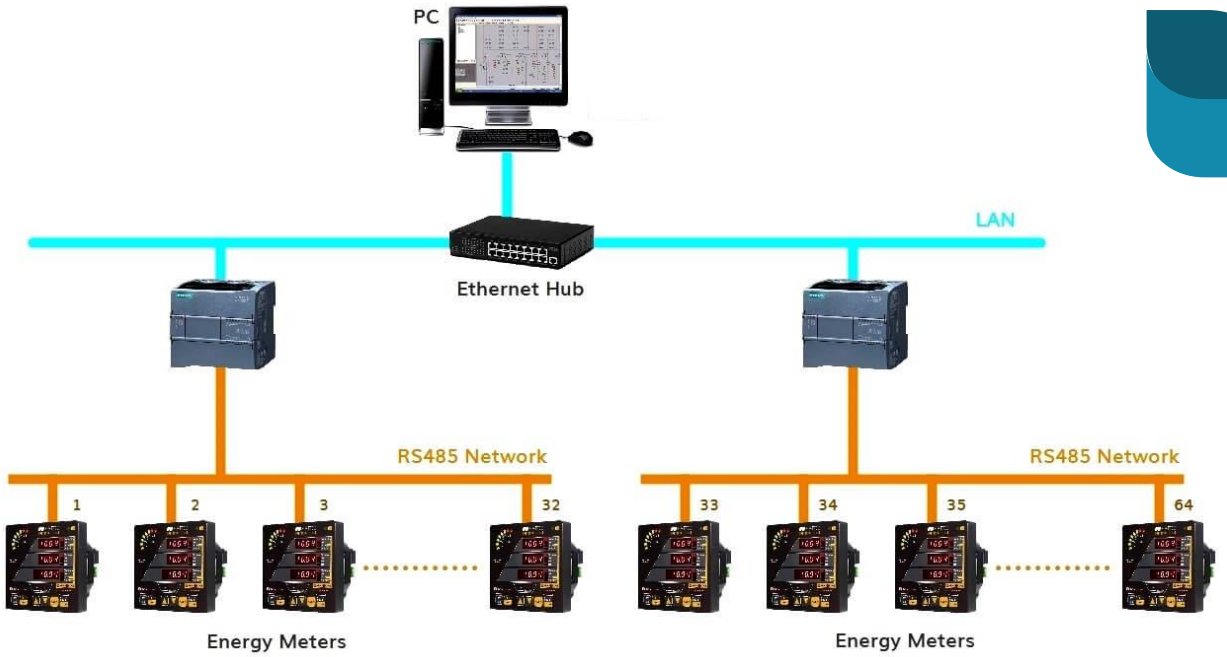
- Monitoring
- Measurement
- Corrective actions
- Energy audits

04 ACT

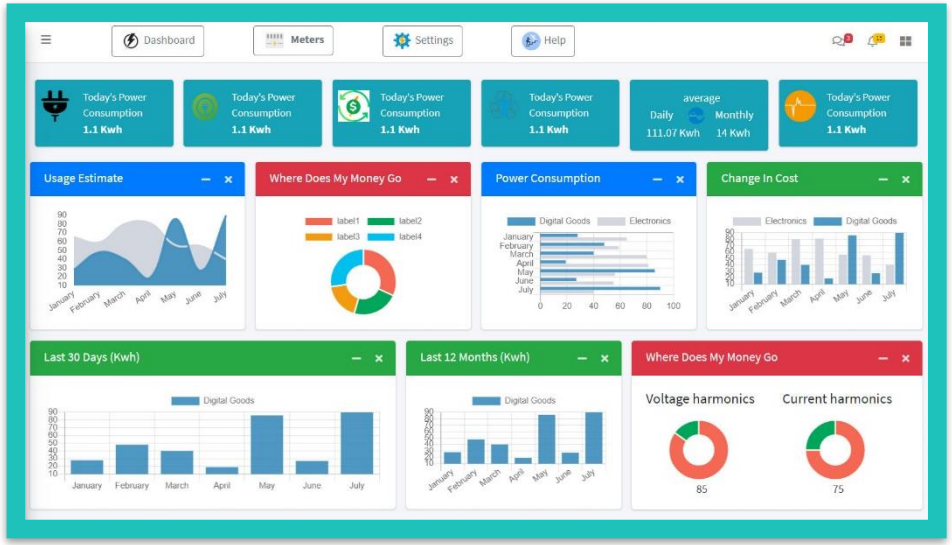
- System Performance
- Management review

We are in the process of ISO 50001 implementation at our Unit for which we have approached CII and received proposal.

Energy Management System



- Energy Monitoring Systems Implemented across all Power Control Centres – 400 No's - Daily Monitoring, Reporting and Reviewing
- Review meeting on day-to-day energy consumption and benchmarking targets.
- Enabled us to focus on our daily losses and peak load areas and made us to focus on areas concerned for optimization of energy.
- Carrying yearly calibrations to all energy meters to stay accurate



Learning from past CII award programs

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SCREW CHILLERS

Phased manner replacement of Chillers with Energy Efficient Chillers

EMS

continuous monitoring, reporting and reviewing of power consumption all over the plant

E-GLASS FRP BLADES

The efficiency of fans increases to 85-92% compared to the traditional fans

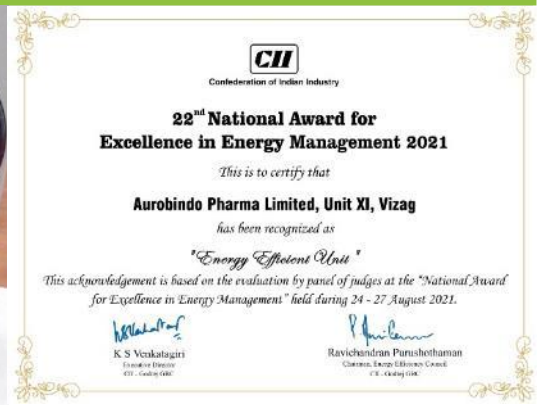
AC SAVER

Microprocessor based controller measures and controls the compressors & reduces the loading.

Awards & Certifications

Best Energy Conservation project

CII Energy Efficient Unit Award



Certification ISO 14001:2015

Best LDM Award

CSR Activities

0.75 Tones Capacity of Oxygen Plant to MB Hospital

1500 Sanitizer Bottles to entire Sklm police department

24 Oxygen Concentrators & 10,000 Hand Sanitizer Bottles

RO Water plant for fisheries families

Toilets blocks for Girls & Boys to Government school

Provisions distributed to fire mishap families

10 No's of Tri-Motor Bikes to the 10 Specially Challenged Persons

25 bags bleaching Powder packets for 40 Panchayats

1000 (100 ml Bottles) Betadine Gargle syrups (Prevention of COVID – 19 solution)

AUROBINDO

THANK YOU

Sr. No	Name	Designation	Mobile Number	Email address
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03	VENU GOPAL YALA	ASSISTANT GENERAL MANAGER	7036942220	Venugopal.Yala@aurobindo.com