23rd National Award for Excellence in Energy Management

2022

23-26 August 2022

AUROBINDO PHARMA LIMITED
UNIT IX, HYDERABAD

S. No.	Name	Designation	Department
01	Mr. Muralidhar Manchiganti	Associate Vice President	Operations
02	Mr. Kamalakar B	Asst. General Manager	Engineering
03	Mr. Ramesh Badeti	Manager	Engineering

Brief Introduction on Company

AUROBINDO

$2.9B Global Revenue

Employees	24k+
Market presence	155+
Mfg. Facilities	29

1 — Inception
Founded in 1986 by Mr. P. V. Ram Prasad Reddy, Mr. K. Nityananda Reddy

2 — IPO
Aurobindo Pharma became a public company in 1992

3 — USFDA
All facilities are USFDA & other regulatory approved

4 — 40+ Billion
Dosage Forms across the World

 # 1
- USFDA cGMP Compliant

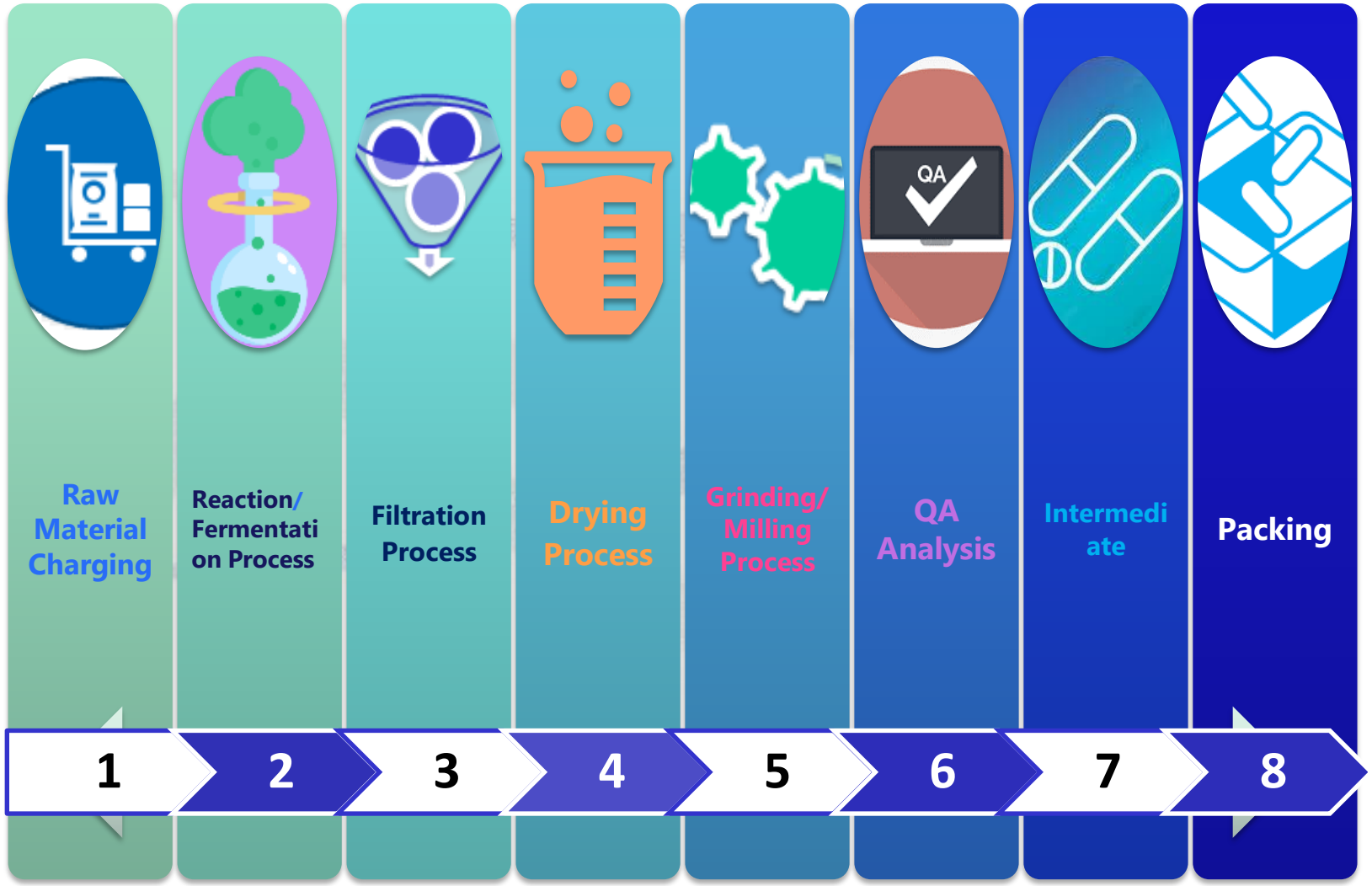
 # 2
- 2nd Largest Pharma by Revenue (India)

 # 10
- Largest by Generic Sales (Globally)

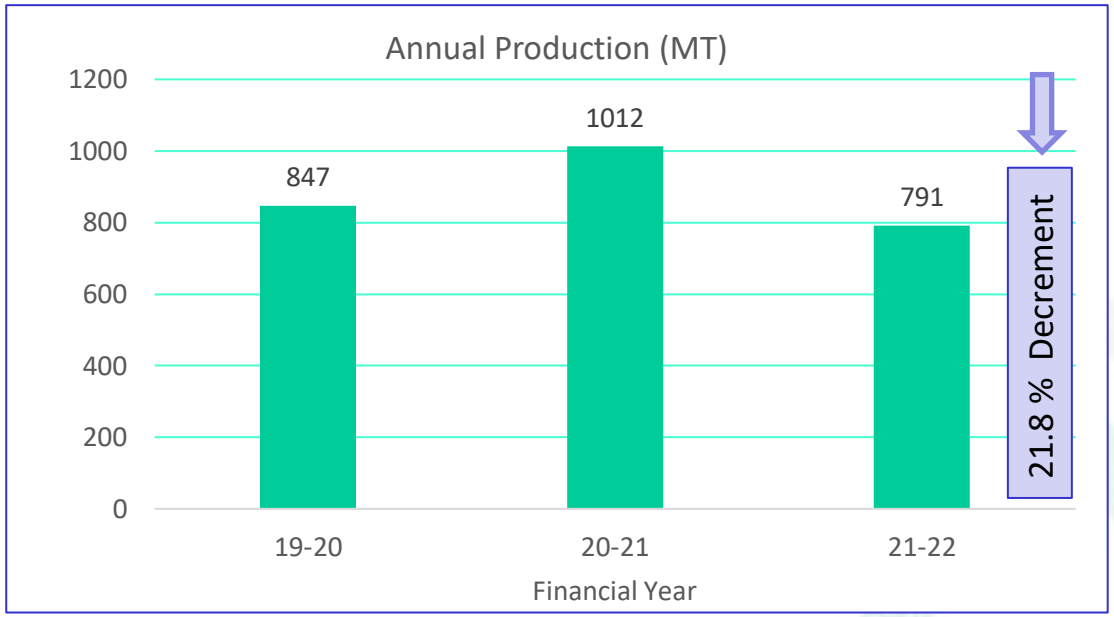
Details of the Products / Processes

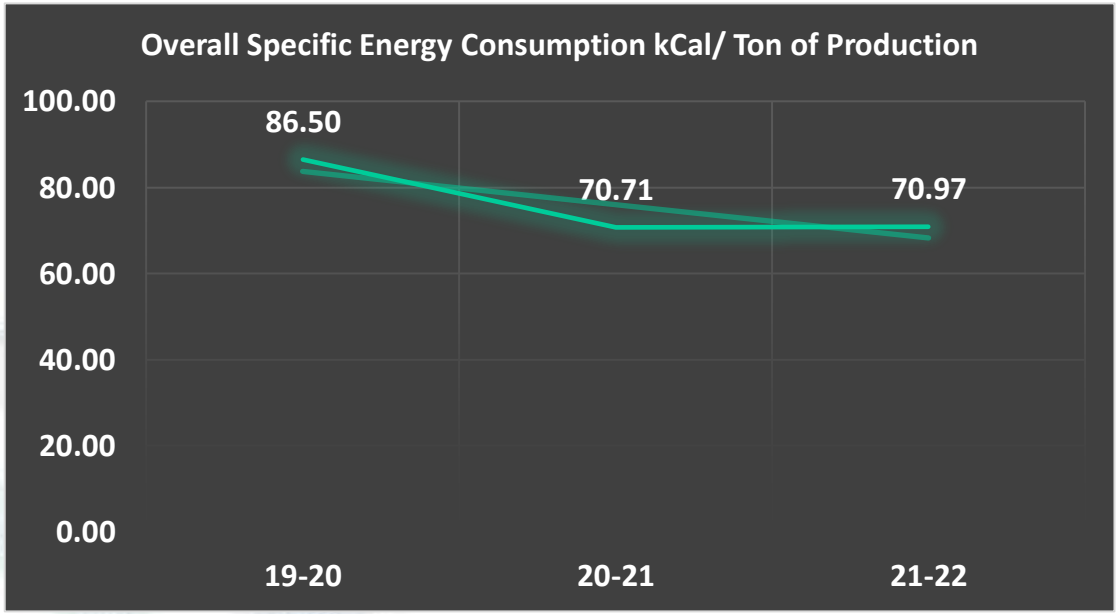
- Sertraline Mandelate
- Polyallylamine Hcl
- Pantoprazole Sodium Sesquihydrate
- Escitalopram Oxalate
- Dolutegravir

Major Products



Energy Consumption Overview Last 3 years





Social Distancing

Masking

Regular Hand Wash

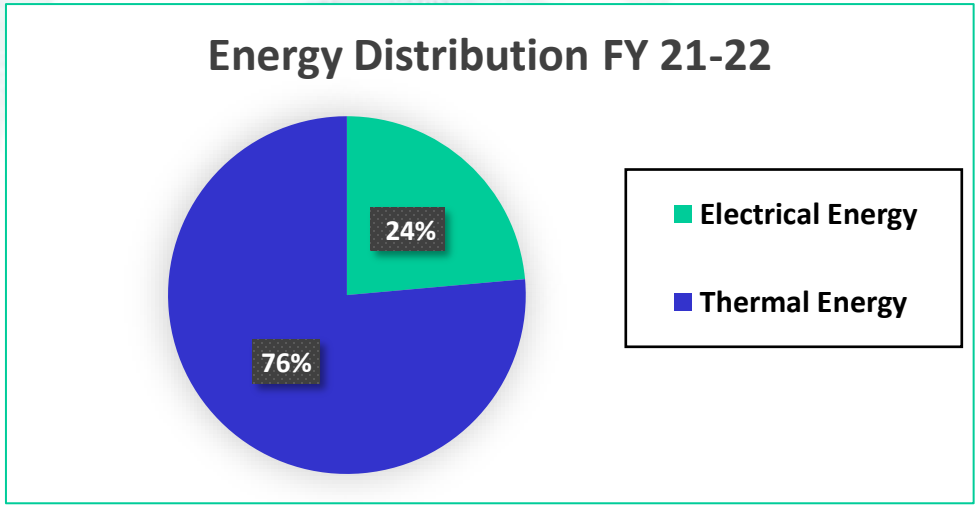
Sanitization

A increase in SEC during the FY 2021-22 was observed due to low production and non-linear nature of consumptions.

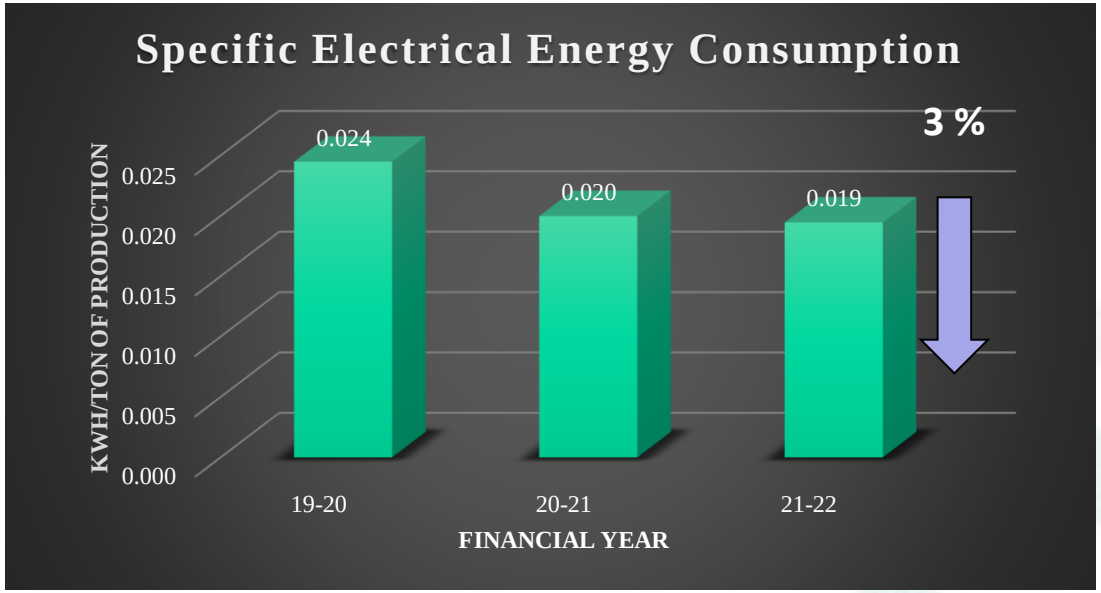
Implementation of energy conservation projects resulted in maintaining the SEC as FY2020-21, even though production in decrease during FY 2021-22 and limited manpower availability during Covid-19 restrictions.

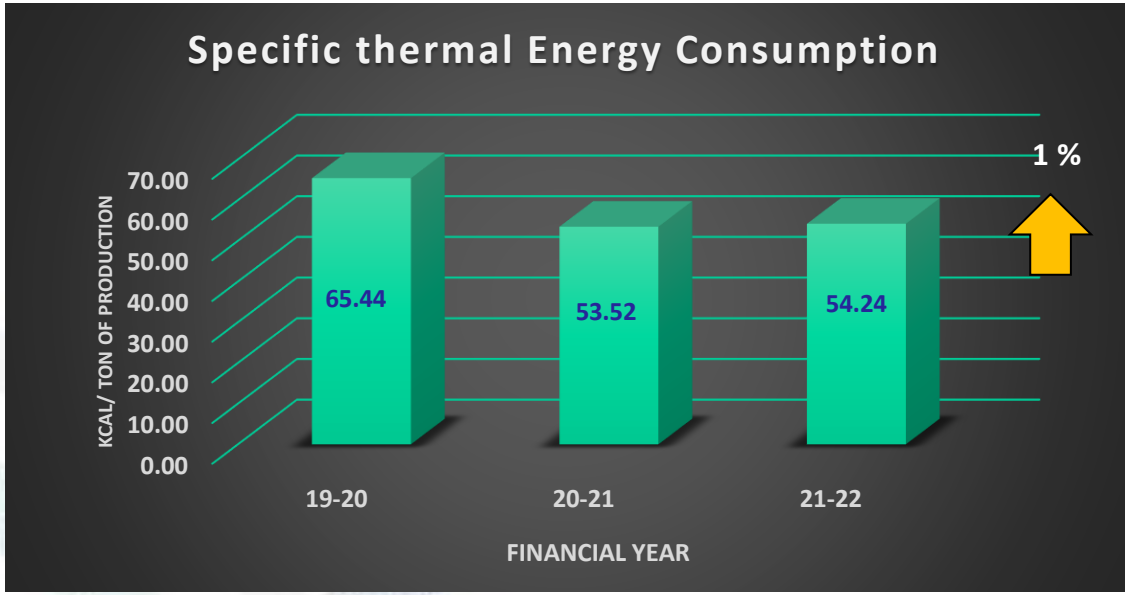
Energy Consumption Overview Last 3 years

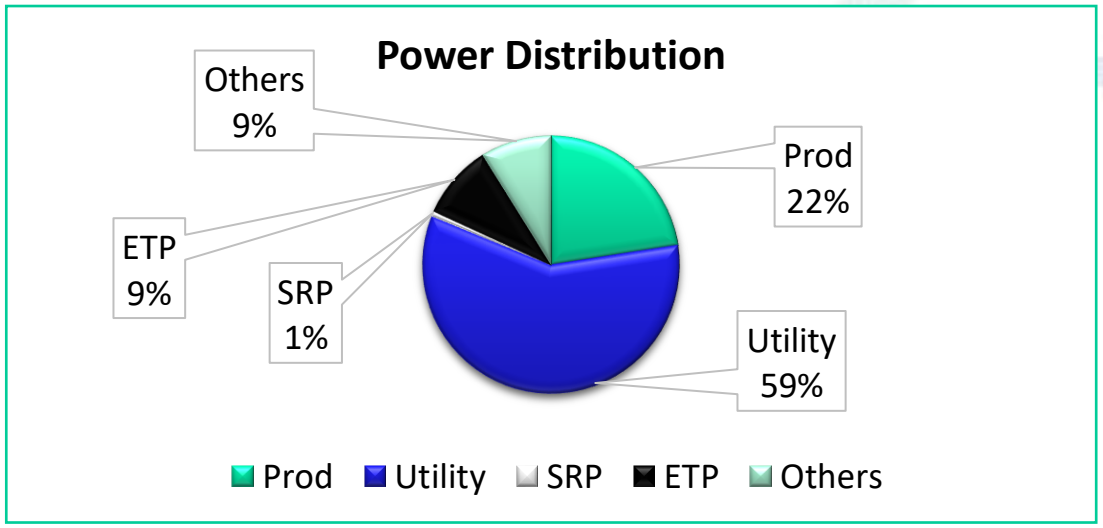
S. No.	Parameters	Unit of Measurement	FY 19-20	FY 20-21	FY 21-22
1	Annual Electrical Energy Consumption	Million kWh/year	20.74	20.24	15.40
2	Annual Electrical Energy Equivalent	Million kCal/year	17845	17414	13242
3	Annual Cost of Electricity Consumed	Million INR	134.89	131.81	107.00
4	Annual Thermal Energy Consumption	Million kCal/Year	55431	54188	42545
5	Annual Cost of Thermal Energy Consumed	Million INR	94.99	98.13	95.00
6	Specific Electrical Energy Consumption	Million kWh/Ton of production	0.0245	0.020	0.019
7	Specific Thermal Energy Consumption	Million KCal/ Ton of Production	65.44	53.52	53.77
8	Overall Specific Energy Consumption	Million KCal/ Ton of Production	86.50	70.71	70.97

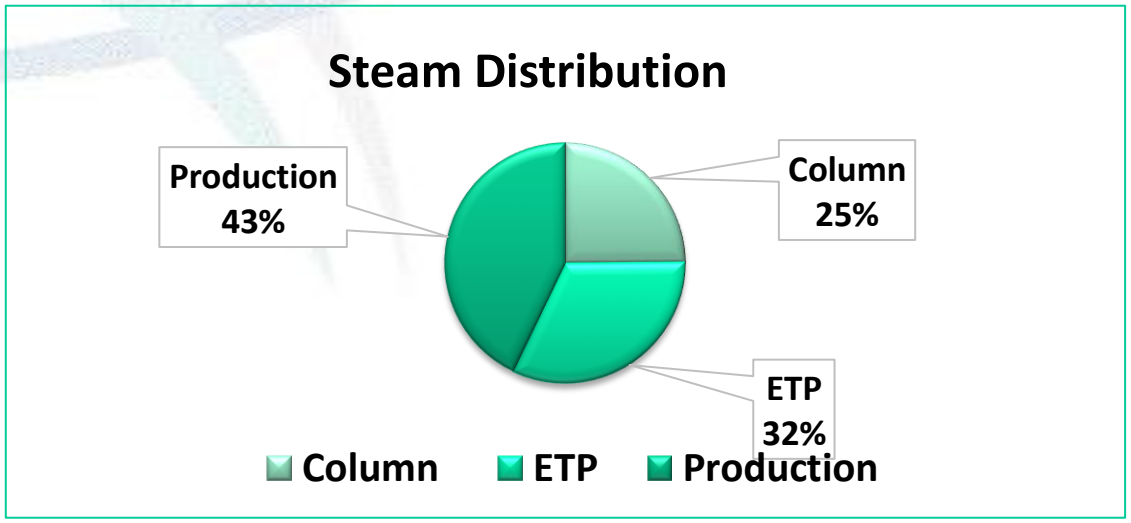


Specific Energy Consumption in last 3 years (FY 2021-22)









Information on Internal Benchmark - Utility

Description	Design Temp (°C)	Design SEC (kW/TR)	Operating SEC (kW/TR)	Target SEC (kW/TR)
Reciprocating Chillers (Water Cooled)	+5	0.86	0.89 - 0.91	0.88
	-15	1.39	1.41 - 1.43	1.40
	-20	1.58	1.60 - 1.62	1.59

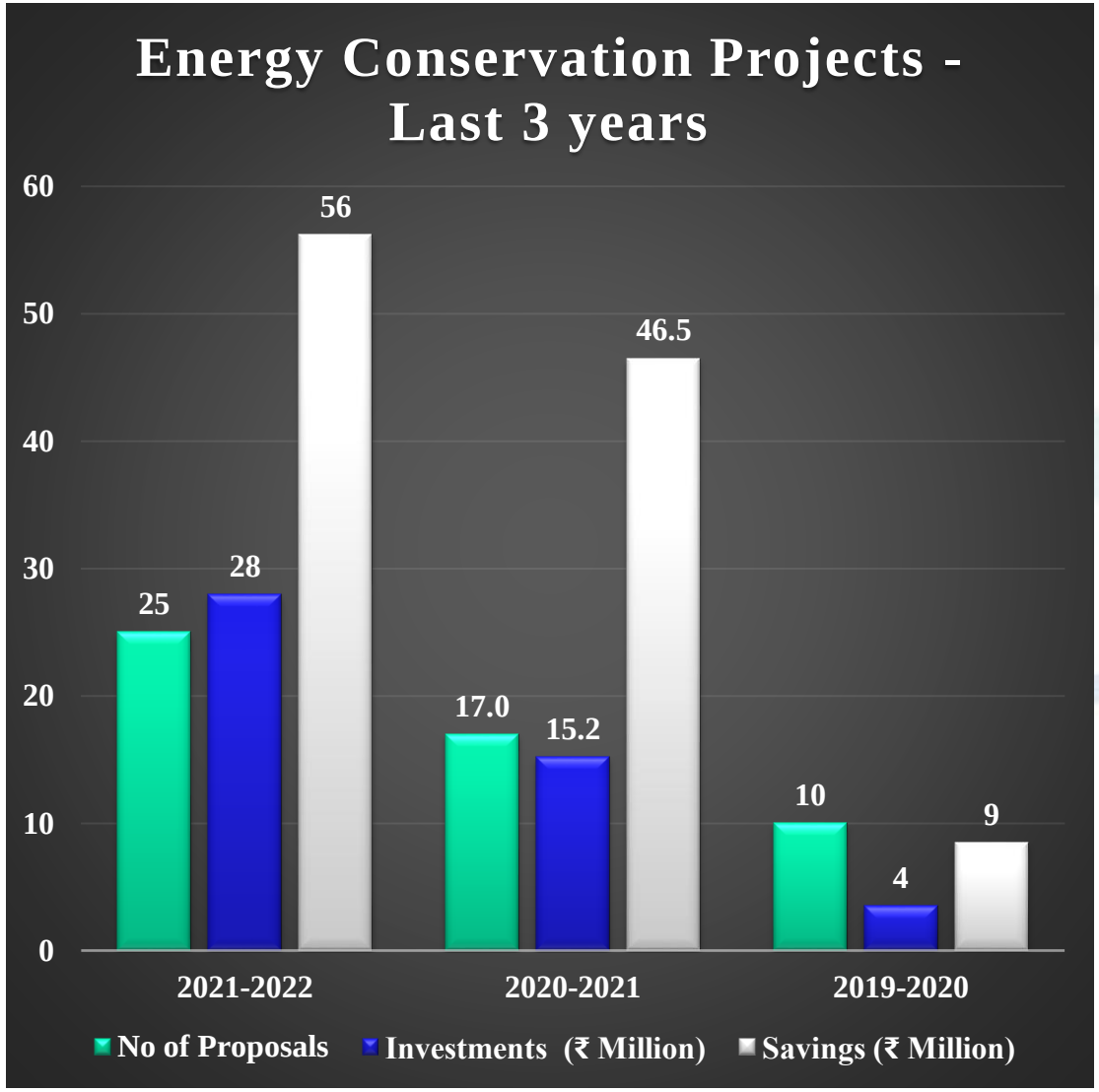
Description	Design SEC (kW/CFM)	Operating SEC (kW/CFM)	Target SEC (kW/CFM)
Air Compressors	**0.16**	**0.20 - 0.23**	**0.18**

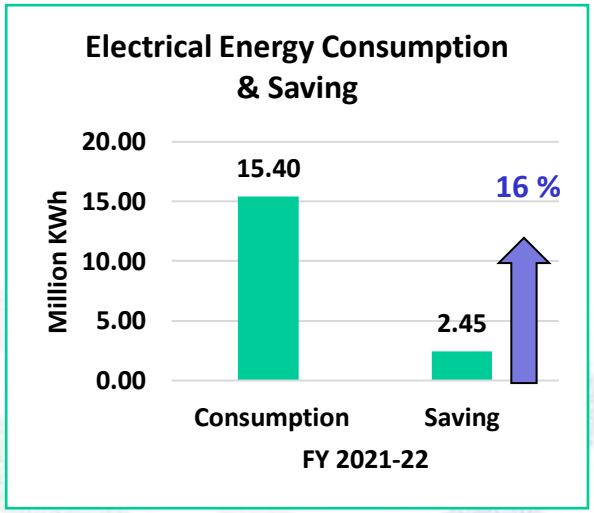
Description	Design SFR (KG/KG)	Operating SFR (KG/KG)	Target SFR (KG/KG)
Boiler	**5.20**	**5.13**	**5.15**

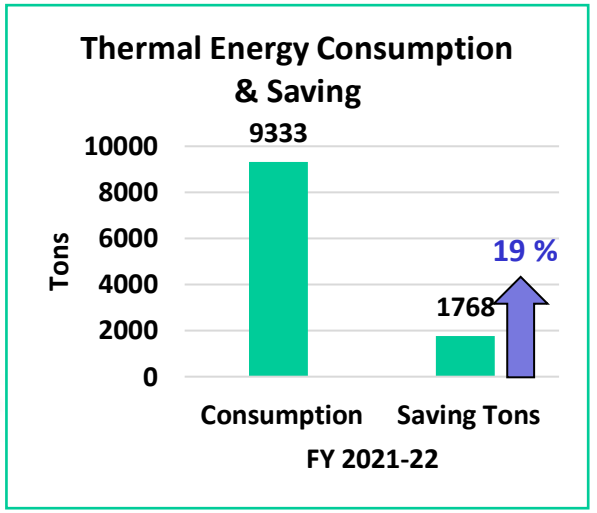
Major Encon Projects in FY 2022-23

S.NO	Title of Project	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)	**Remarks**
1	Standard Efficiency pumps and motors -08No's will be replaced with Higher Energy efficiency pumps and Motors	2.14	2.00	11.2	Capex Approval U/P
2	NPU003 IR vertical air compressor is replaced with New horizontal air-cooled compressor	0.40	1.50	45	Capex Approval U/P
3	Replacement of Liquid Nitrogen by N2 gas system	6.06	8.90	17.6	Capex Approval U/P
4	120HP IE3 Motor for CMU804 , CMU805.-15COMPRESSER	0.15	0.40	32	Capex Approval U/P
5	Auto control of secondary pump with VFD and pressure transmitter	1.18	0.99	10	Capex Approval U/P
6	OFR Technology for CMU702 & CMU804 Refrigeration compressors, Make: Hi-Freeze	1.63	4.65	34.2	Capex Approval U/P
7	Reduction of Power and coal by arranging VFD for ID &FD, Energy efficiency motors and oxygen monitoring	2.10	2.34	13.4	Capex approved, work U/P
8	E Glass Epoxy FRP Blades for Cooling Towers	1.66	3.20	23.1	Capex Approval U/P
	Total	**14.14**	**22.99**	**19.50**	

Energy Saving Projects Implemented in last three years







Summary of Energy Saving Projects Implemented in the Last 3 Years

Year	No of Proposals	Investments (₹ Million)	Savings (₹ Million)
2021-2022	25	27.96	56.2
2020-2021	17	15.22	46.5
2019-2020	10	3.5	8.5

Energy Saving Projects Implemented in last three years

Projects Implemented in FY 21-22				
S. No.	**Project Details**	**Investments (₹ Million)**	**Annual Savings (₹ Million)**	**Payback (Months)**
1	Energy Savings by arresting the leakages in the Flue gas Duct (Reduced load on ID Fan)	0.003	0.1	0.36
2	Implementation of Timer Controls for Vacuum Pumps in process to avoid unnecessary operations	0.04	2.45	0.2
3	Merging of Cooling Towers Loads to operate at Optimum Loads there by Energy Savings through Energy Cell Team Assessment	0.05	0.17	3.53
4	Implementation of No Air Loss Drain Valves for air compressor receivers to avoid loss of compressed air	0.08	0.1	9.6
5	Implementation of Auto Cut off Temperature Sensors for Cooling Tower fans	0.08	4.99	0.19
6	Implementation of Chilled Water Auto Cut off Temperature Sensors for AHU's	0.1	0.49	2.45
7	Energy Savings by arresting the leakages in the Compressed Air Circuit	0.1	1.07	1.12
8	Implementation of Voltage Stabilizer for Lighting Circuit to reduce the Energy Consumption and increase the Lamps life	0.15	0.2	9
9	Installation of VFD for the Process reactor by replacing the gear box to reduce load on motor	0.16	0.1	19.2
10	Replacement of Old Standard Efficiency Boiler Feed Pump with New Premium Efficiency Boiler Feed Pump	0.18	0.26	8.31
11	Reduction of Steam Demand by modifying the Process in SRS Columns to improve the Capacity Utilization and better heat exchange	0.2	0.32	7.5
12	Replacement of optimum size heat exchangers and line modifications in Chilling Plants through Energy Cell Team assessment	0.253	2.47	1.23
13	Increase in heat surface area of Water Pre-heater in flue gas duct to increase heat transfer	0.28	0.57	5.89
14	Reduced Steam Demand in SRS through dedicated columns for process based on Energy Cell Team assessment	0.3	1.07	3.36

Energy Saving Projects Implemented in last three years

Projects Implemented in FY 21-22				
S. No.	**Project Details**	**Investments (₹ Million)**	**Annual Savings (₹ Million)**	**Payback (Months)**
15	Replacement of Old standard efficiency motors with New Premium Energy Efficient Motors	0.4	0.29	16.55
16	Implementation of Flash Vessel at ATFD to improve condensate recovery, re-use of heat	0.4	0.7	6.86
17	Reduced Steam Demand in MEE through CT line modifications for the condenser	0.5	2.76	2.17
18	Energy Savings by implementing Process Automation - introduced FFE System in B MII (Feed pump & Utility Pump)	0.76	0.43	21.21
19	Implementation of VFD's for Variable load Pumps to operate at optimum efficiency	0.81	1.53	6.35
20	Old standard efficiency pumps and motors are replaced with New Energy Efficient Motors and Pumps	1.78	3.63	5.88
21	VAM 601 & 801: "Operational improvement activities a. Refurbishment of heat exchangers b. Pumping and utility piping systems. c. Intensified the cooling tower operations d. Enhanced the performance of refrigeration systems e. Equipment operational improvement activities like comprehensive Planned Preventive Maintenance (PPM) and condition-based monitoring to extend equipment lifespan and prevent degradation"	2.05	6.77	3.63
22	Reduction of Specific Steam Consumption in SRS by increasing the consumption co-efficient	6.19	19.02	3.91
23	New column 800MM dia with Automation	6.9	3.39	24.42
24	Replacement of 400 MM dia SRS Column with 600 MM dia SRS Column to improve heat transfer	6	3.1	23.23
25	Replacement of Cooling Tower Fills to improve the L/G ratio, effectiveness and approach	0.19	0.65	3.51
	Total	**27.96**	**56.6**	**6.0**

#1 OPERATIONAL IMPROVEMENTS

AUROBINDO

Start 01/04/21

Reduced Steam Demand in SRS through dedicated columns for process based

Finish 31/03/22

• Pain Area

- Frequent column change over due to multipurpose distillation facility
- Column Low performance wrt design vs actual

• Solution Implemented

- Fixing column vs Solvent based on design for effective boil up
- Redistillation reduced by making of dedicated **lines** and storage tanks. "

105
Tons of Coal

SAVINGS: ₹ **10.7** *Lakh/Year*

INVESTMENT: ₹ **3.0** *Lakh*

MOTNHS 4.0

2 EFFICIENCY IMPROVEMENTS

AUROBINDO

Start 01/04/21

Energy Efficiency Vertical Inline and Horizontal pump with motors

Finish 31/03/22

Solution Implemented

- Energy Efficiency pumps installed in place of lower efficiency pumps.
- Performance evaluation done and identified the opportunity .

Advantages

- Low maintenance and space.
- Power saving

4.76
Lakh Units/Year

SAVINGS: ₹ **36.3** *Lakh/Year*

INVESTMENT: ₹ **17.8** *Lakh*

MOTNHS 6.0

3 EFFICIENCY IMPROVEMENTS

AUROBINDO

Start
Jan 2022

Integration of Oxygen Analyzer and VFD for at 12TPH and 8TPH boilers

Solution Implemented

- EE Motors arranged for Boiler Blowers.
- VFD & Oxygen analyzer work U/ Installation.

Advantages

- Reduction of Power and Coal consumption.
- Improvement in Boiler Efficiency.

117
Tons of Coal/Year

1.33
Lakhs of Units/Year

SAVINGS: ₹ **19.9** *Lakh/Year*

INVESTMENT: ₹ **23.4** *Lakh*

MOTNHS
14.1

#4 EFFICIENCY IMPROVEMENTS

AUROBINDO

Start 01/03/21

Implementation of Flash Vessel at ATFD and De-aerator at Boiler

Finish 01/09/21

Solution Implemented

- Installed Flash vessel and De-aerator to avoid wastage of flash steam at ATFD
- New lines arranged from ATFD to Boiler

Advantages

- Improve the boiler efficiency
- Increase the feed water temperature

73 *Tons of Coal*

SAVINGS: ₹ **7.0** *Lakh/Year*

INVESTMENT: ₹ **3.74** *Lakh*

MOTNHS **7.0**

#5 OPERATIONAL IMPROVEMENTS

AUROBINDO

Start
01/04/21

Installation of VFD with pressure Transmitter for pumps

Finish
31/03/22

Solution Implemented

- Installed VFD with pressure transmitter for auto control of utility pumps

Advantages

- To control the wastage of power
- Smooth starting of pump and motor
- Reduce the mechanical wear and tear

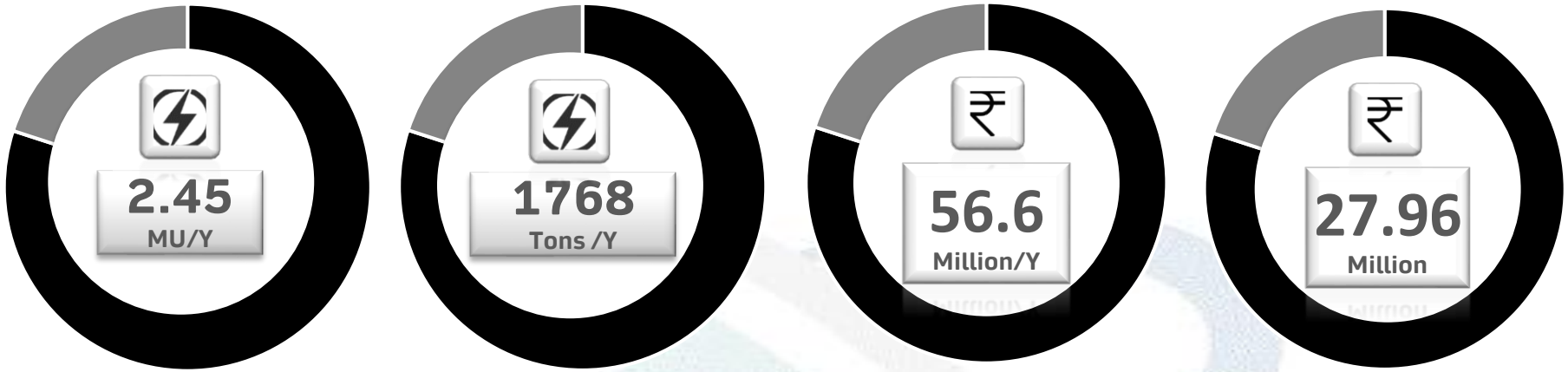
2.01
Lakhs of Units/Year

SAVINGS: ₹ **15.3** *Lakh/Year*

INVESTMENT: ₹ **8.1** *Lakh*

MOTNHS
6.5

Results Achieved FY2021-22



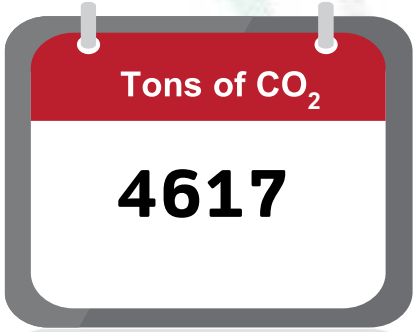
TOTAL ELECTRICAL SAVINGS

TOTAL COAL SAVINGS

TOTAL MONETARY SAVINGS

TOTAL INVESTMENT

PAYBACK PERIOD

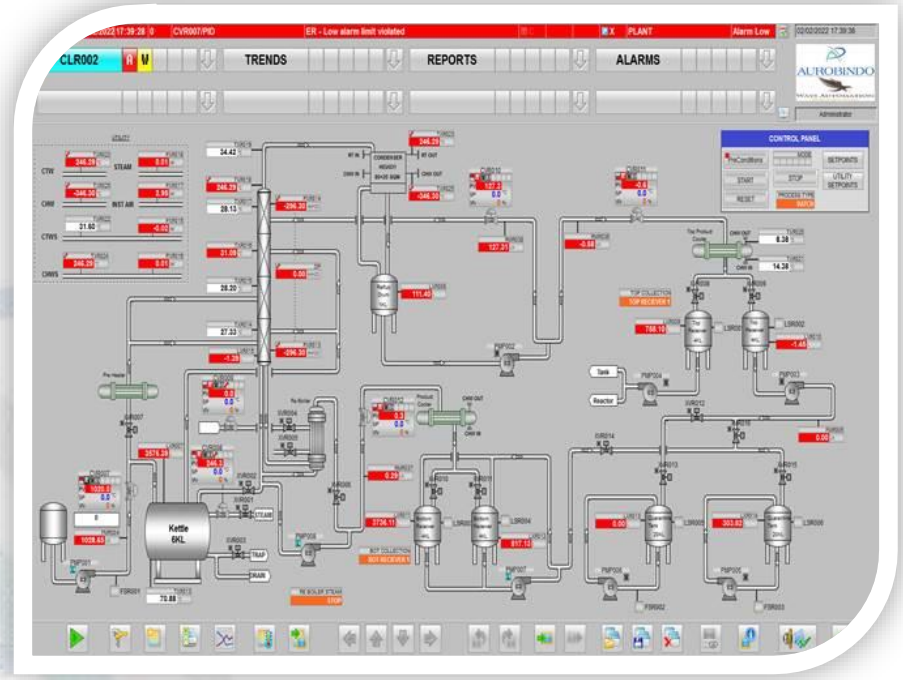


CO_2 REDUCTIONS

Innovative Projects implemented

Start
Sep 2021

I. Column with Automation



Trigger for implementation :

- To reduce the fresh solvent consumption
- To reduce utility consumption
- Precise reflux ratio control there by ensuring quality output and recovery %
- To adhere safe operation, every parameter in place with interlock system.

Indirect Benefits

- Effective start/stop up process will be ensured
- Overflow and wastage of solvents can be controlled

Replicability :

- Yes, huge replication opportunities at columns

Results :

- Monetary Savings = 594 Lakh / Y
- Investment = 333.17 Lakh
- Payback = 7.0 Months

Innovative Projects implemented

Start
April 2021

II. Mobile Solvent Dispensing SKID

Trigger for implementation :

- To Dispense accurate quantity of solvents into reactors from receivers.
- To avoid the operational errors of human.

Replicability :

- Yes, huge replication opportunities
- All process areas
- Taken up for other areas implementation

Utilisation of Renewable Energy sources

INSTALLED CAPACITY

30MW Solar Power Plant Under
Mode : Group Captive Mode
Project Timeline: 2021-22
Project mode : Off Site Generation

LOCATION & DEVELOPER

Ramannapet, Yadadri Bhuvanagiri District, Telangana
M/s NVNR Ramannapet- I & II Power Plant P. Limited
Investment : ₹ 5.382 Cr.

TYPE OF AGREEMENT

Open Access & 25 Years
Starting : July 022
Total 7 Nos units of Aurobindo considered

EXPECTED GENERATION

Total expected generation : 0.83 Cr Units /Year
Approved Capacity : 950 kW EB Load

% SHARE TO UNIT-IX

% Share in Energy Consumption : 28.4%
Allotted Generation: 0.44 Cr Units / Year
CMD allotted from Solar : 500 kW (14.3%) out of 3500 kVA

Waste Utilization and Management

S.No	Type of waste generated	Quantity of waste generated (MT/year)			Disposal method
		2019-20	2020-21	2021-22	
1	Plastic waste (Poly bags)	19.47	18.89	3.12	Disposed Through Authorized Scrap Dealers for Recycling
2	Hazardous Waste	3,338	1,988.5	1,356	TSDF / Landfill

S.No	Particular	2019-20	2020-21	2021-22
1	Name of the Fuel	Hazardous waste (Organic Waste)		
2	Quantity of waste Fuel used (MT/year) - disposed to cement units (Used as alternate fuel)	544.00	593.90	606.00

Waste with heat value is not utilised directly in the plant,

Sending to the Cement industry / Co- Processing units where it is used as an alternate fuel

GHG Inventorisation

1 Sustainability Report

2021-22
Published maiden sustainability report for FY 2020-21

2 Goals & Targets -2025

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

3 FY 2019-22
GHG Emissions

Year	Total Scope 1 emissions (tCO2e)	Total Scope 2 Emissions (tCO2)	Total GHG Emissions (tCO2e)
2019-20	40,857	38,786	79,644
2020-21	37,828	35,059	72,887
2021-22	31,242	34,489	65,731

Green Supply Chain Management

S.No	Projects Implemented	Benefits Achieved	Description
1	Shipper Stuffing Project	Rs 190 Million	▪ Increased loading by 30% to 33% ▪ Extra optimization in container with shipper stuffing, ▪ Saved freight on additional container had it not been shipper stuffed. ▪ It enabled no dependency on the wooden pallets.
2	Double Stacking Injectable Project		▪ Successfully implemented with 50% extra space
3	Paperless / Digital Logistics Execution – OTM Project	Decreased Paper consumption and paper less / Digital transactions	▪ First Pharma company in India to adopt OTM. ▪ Cloud based Solution ▪ Freight Payments linked from OTM to ERP.
4	AIR vs SEA – Mode Control	Decreased Carbon Emissions	▪ Increased Sea transportation over Air transportation by pallet systems. ▪ Decreased air Tonnage from 572 Tonnage to 456 Tonnage
5	GST e-Invoicing	Decreased Paper consumption and paper less / Digital transactions	▪ Invoices are authenticated electronically and hence paperless ▪ Invoice information will be transferred from the portal in real-time. ▪ Govt. Initiatives for ease of doing business of exporters/importers

Energy Management System

Senior Management

Driving Energy Management System	Approval & Budget Sanctions	Allocation of all required resources

Vice president (Corporate Engineering)

Providing Technical Inputs	New and Innovative Energy Conservation Ideas	Review and Submissions to Senior Management

Energy Cell (Corporate)

Energy Assessments with all portable instruments	Review and of Energy Conservation Proposals	Coordinating with all stake Holders for Implementation

Engineering Head (Unit wise)

Support in Energy Assessments (Allocation of all Resources)	Prepare and submission of energy conservation	Seeking approvals at plant level

Energy Team - PoC (Unit Wise)

Daily data monitoring and reporting on energy projects	Participate in Energy Assessments along with Energy Cell	Ground level implementation of energy conservation proposals

Teamwork, Employee Involvement & Daily Monitoring

AUROBINDO

Daily Energy Monitoring System

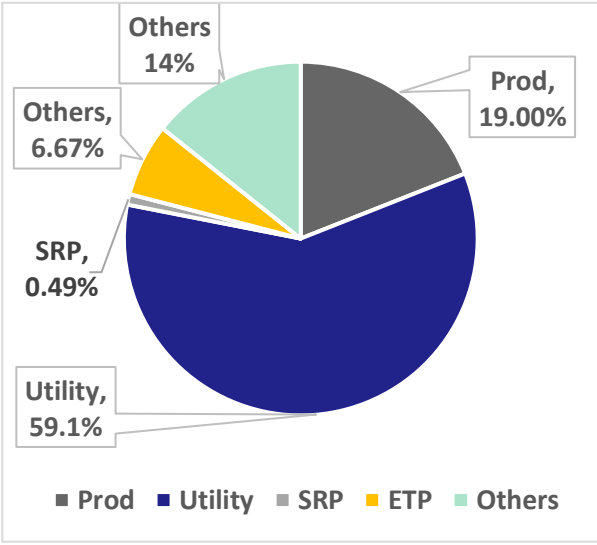
Block wise daily/weekly power Consumption for the month of Apr'22														
S.No	Block	Benchmark(20% reduction on actuals AVG FY2021-22	1	2	3	W1 Ave/Day	4	5	6	7	8	9	10	W2 Ave/Day
1	A blok	602	732	676	708	705	647	694	693	712	705	725	583	680
2	B Block MI	546	875	1008	1061	981	776	1056	882	400	273	238	179	543
3	B Block MII	751	13	38	53	35	36	25	16	26	16	32	63	31
4	B Block MIII	511	101	129	116	115	85	70	65	75	77	63	63	71
5	B Block MIV	150	6	36	11	18	2	1	11	15	12	21	20	12
6	E Block	730	1298	1247	1239	1261	916	835	987	1102	1100	1045	1186	1024
7	F Block	79	39	113	48	67	89	38	38	48	101	81	36	62
8	G Block M I	1256	1708	899	836	1148	821	1029	891	934	872	713	672	847
9	G Block M II	1193	1806	1569	1503	1626	2371	2193	2297	2433	2556	2411	2124	2341
10	H Block	61	85	110	137	111	58	59	117	143	118	122	117	105
11	I Block	318	26	13	1	13	70	49	28	39	48	34	17	41
12	J Block	304	97	46	59	67	100	162	128	187	191	134	79	140
13	K Block	476	343	488	495	442	497	1156	893	718	485	1078	415	749
14	B Block Utilities	7119	5038	3104	3059	3734	3210	3165	3605	2680	1989	1925	1651	2603
15	E & K Block Utilities	2907	3307	3642	3297	3416	3497	2800	3404	3209	3527	3619	3897	3422
16	G Block Utilities	2514	2394	4515	4941	3950	4040	3456	4066	3644	2460	2690	1998	3193
17	I&J Block Utilities	3312	4520	3239	3350	3703	3501	3218	3575	3376	3359	2141	2222	3056
18	K Block Utilities	86	13	124	84	74	103	121	208	184	35	350	177	168
19	Central Utilities	7448	5928	7628	8264	7273	7735	7081	7893	7876	8377	6903	6629	7499
20	SRP	627	131	192	209	177	135	151	352	495	539	491	688	407
21	RO plant	168	239	251	199	230	227	214	213	205	204	202	199	209
22	Others (QC)	832	1483	1587	1481	1517	1435	1671	1603	1373	1397	1245	1361	1441
23	ETP	2609	1242	1875	4168	2429	1921	1175	1177	2642	3854	3558	1654	2283
24	RM Warehouse	1517	1746	1695	2326	1922	1988	2025	2151	2073	2220	1972	2073	2072
25	Lighting	1140	1190	1225	1225	1213	1390	1350	1215	1260	1345	1240	1305	1301
Total Consumption per day		37254	34360	35450	38870	36227	35650	33790	36510	35850	35860	33030	29406	34299
	Percentage %	1154879	99	103	112	105	103	98	106	104	104	96	85	99

DAILY

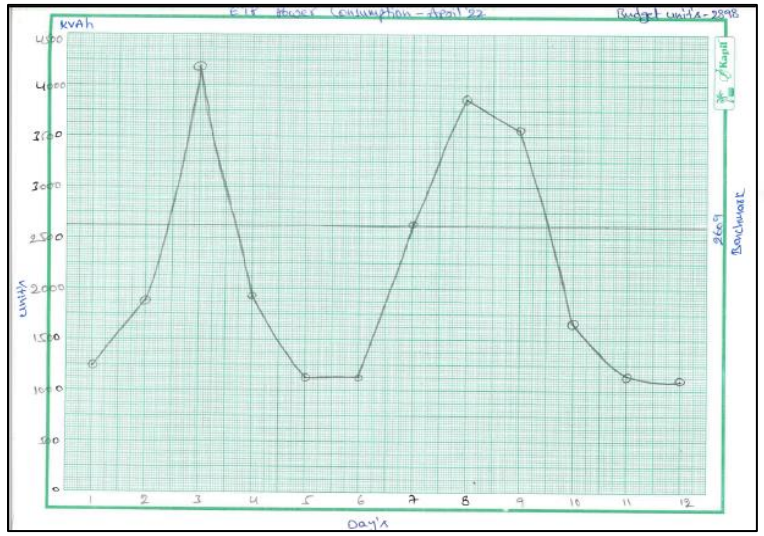
- Performance Reports
- KPIs
- Overall Consumption

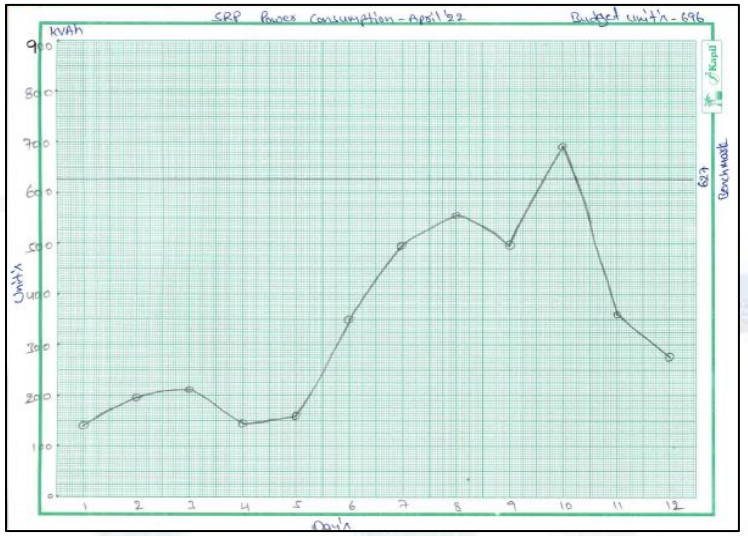
MONTHLY

- Avg. Monthly Report
- Recommendation for any service / Maintenance
- Inter - Unit Comparisons



Teamwork, Employee Involvement & Daily Monitoring





Teamwork

- Implemented Kaizen & 5S programmes by forming teams.
- Awards & appreciations for best programs.
- Higher Management Reviews.

Employee_Involvement

- Organized Energy Conservation Week Celebrations. and involved all employees.
- Energy review and monitoring.

Training Programs

- Given training programs on Root cause analysis. (RCA), and Reliability Maintenance (RM).
- Training on steam / utility systems.

Implemented across all blocks and utility Daily Monitoring, Reporting and Reviewing

Energy Week / Energy Conservation Day Celebrations –

Awareness

Banner Hosting

IDEA Generation

Quiz Competition

Essay Writing

List of Participants

- Painting-67 No's.
- Essay Writing-57 No's.
- Energy Idea-173 No's
- Quiz-85 No's.

Poster Making

All Competitions Winner Award Distribution Competition

UNIT-IX GOT BEST INVOLVEMENT AWARD FROM CII FOR THE YEAR -2021

Energy Audit Instruments

S No	Instruments	Make
1	Power Quality Analysers (2 Nos)	Krykard
2	Flue Gas Analyser	Kane(NEVCO)
3	Thermal Imager	Testo
4	Ultrasonic Flow Meter	Eesiflo
5	Ultra Sonic Thickness Gauge	Eqinox
6	Pitot tube	Nevco
7	Digital Manometer / Pressure meter	Comark
8	Hotwire Anemometer	Testo
9	TDS / pH Meter	Aquisol
10	Stroboscope / Tachometer	Extech
11	Humidity, DBT & WBT Meter	Testo
12	Digital Pressure Guage	Testo
13	Lux Meter	Extech
14	Stop watch	Extech
15	Psling Psychrometer	Dimple

Learnings from CII - last 4 Years

Implementation of OFR Systems – Refrigeration Systems

- Improved reliability & safety in Refrigeration Systems.
- Savings to the tune of 32-48% observed in the existing plants.

Procurement of No Air Loss Drain Valves in Compressed Air Systems

- Avoided loss of compressed air to atmosphere.
- Attractive payback period of 3 months.

Procurement of Vertical Inline Pumps replacements & New projects

- Energy Efficient and reduced power consumption.
- Low foot print , Less maintenance and down time.

Replaced motors of Boiler blowers, utility motors with energy efficient motors.

- Energy Efficient and reduced power consumption.
- Low footprint , Less maintenance and down time.

Awards & Recognitions

CII

Confederation of Indian Industry

22nd National Award for Excellence in Energy Management 2021

This is to certify that

Aurobindo Pharma Limited, Unit 9, Hyderabad

has been recognized as

"Excellent Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 24 - 27 August 2021.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

Excellent Energy Efficient Unit

Awards & Recognitions

1

Operational Excellence

Global Operational Excellence Company of the Year 2022
Global Healthcare Awards

2

Human Resources

HR Innovation & Techfest 2021
Most Collaborative Hiring Team
Innovation in Employee Engagement

3

Environment, Health & Safety

Winner of the Golden Peacock Occupational Health & Safety award 2021 (GPOHSA)

CSR Activities

- 14 Villages Adopted
- 48 Water Drinking Plants
- 350 + Healthcare Programme
- 21 Educational Institutions

Thank You

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