23nd National Award for 2022

Excellence in Energy Management

23 - 26 August 2022

AUROBINDO PHARMA LIMITED
UNIT V ,
HYDERABAD

Sr. No	Name	Designation	Mobile Number	Email address
01	Mr. Abhijit Achutarao Joshi	Asst. General Manager (E&U)	8008502815	AbhijitAchutarao.Joshi@Aurobindo.com
02	Mr. Atchuta Rama Rao Allavarapu	Senior Manager (Electrical)	9666997734	AtchutaRamaRao.Allavarapu@aurobindo.com
03	Mr. Ram Mohan Reddy Nimma	Assistant Manager (E&U)	9581568966	RamMohanReddy.Nimma@Aurobindo.com

Brief Introduction on Company/Unit

$2.9 B
Global Revenue

Employees 24k+

Market presence 155+

Mfg. Facilities 29

IPO
Aurobindo Pharma became a public company in 1992

Inception
Founded in 1986 by Mr. P. V. Ramprasad Reddy, Mr. K. Nityananda Reddy

USFDA
All facilities are USFDA & other regulatory approved

40+ Billion
Dosage Forms across the world

01 **#1**
Largest generics company in the US (by Rx dispensed)

02 **#2**
2nd Largest pharma by revenue (India)

03 **#10**
Generics companies in six out of nine countries in Europe@

8.64 Lakhs
Lives impacted through CSR interventions

R&D Capabilities
5 in India and 4 in the US
1,500+ Scientists and analysts globally

Facility & Major Equipment of Unit-V

AUROBINDO

Unit-V

Facility

Total Factory area	87134 m² (21.5 Acrs.)	
Build up Area (m²)	37885	44%
Roads (m²)	12507	14%
Green Belt area (m²)	26330	30%
Open area (m²)	10412	12%

Process Equipment

- Reactors: 110 No's
- Centrifuges : 20No's
- ANFD : 7 No's
- Lyophilizer : 7 No's

Utility Equipment

- FBC boiler : 24 & 12 TPH
- Air Compressors : 2015 CFM
- Chillers(+5°C) : 2544 TR
- Chillers (-20°C) : 250 TR
- Chillers (-35°C) : 320 TR
- Cooling towers : 10150 TR

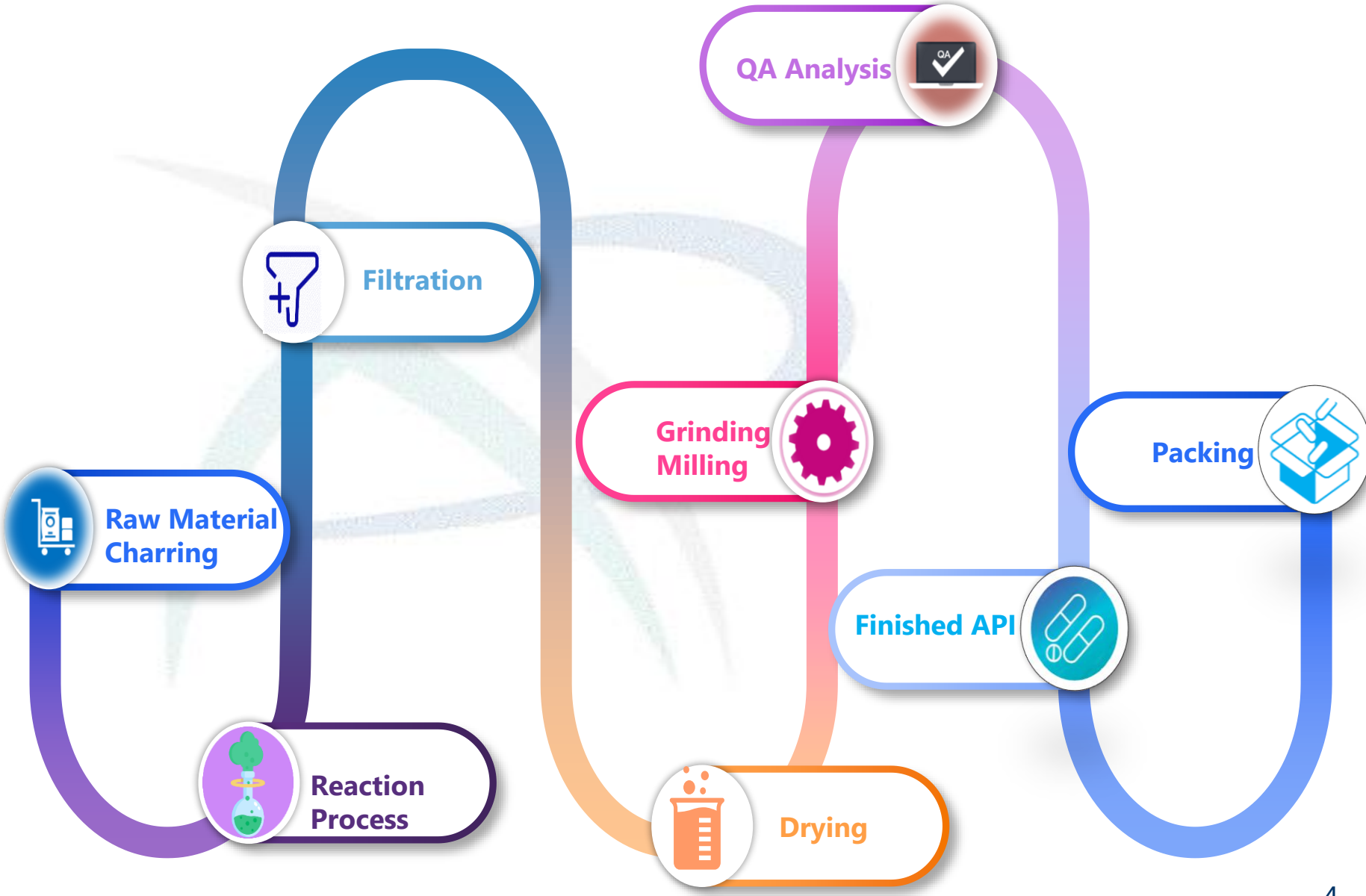
Electrical

- CMD : 7000 KVA
- HT Connected : 21657.53 HP + 1580.4KW
- Transformers : 8 No's (13.45 MVA)
- DG system : 13 No's (11010KVA)

Details of the Products / Processes

- Amoxicillin Trihydrate
- Piperacillin and Tazobactam
- Ampicillin Trihydrate
- Ampicillin Sodium Sterile

Major products :



Energy Consumption Overview – Last 4 Years

PRODUCTION

YEAR	VALUE (MT)
FY 2018-19	2,124
FY 2019-20	2,000
FY 2020-21	1,708
FY 2021-22	1,300

SPECIFIC ENERGY

YEAR	VALUE (m kcal/MT)
FY 2018-19	61.2
FY 2019-20	66.9
FY 2020-21	78.1
FY 2021-22	80.9

Production

23.9%

YEAR	VALUE (m kcal)
FY 2018-19	91,404
FY 2019-20	93,723
FY 2020-21	94,211
FY 2021-22	72,560

THERMAL ENERGY

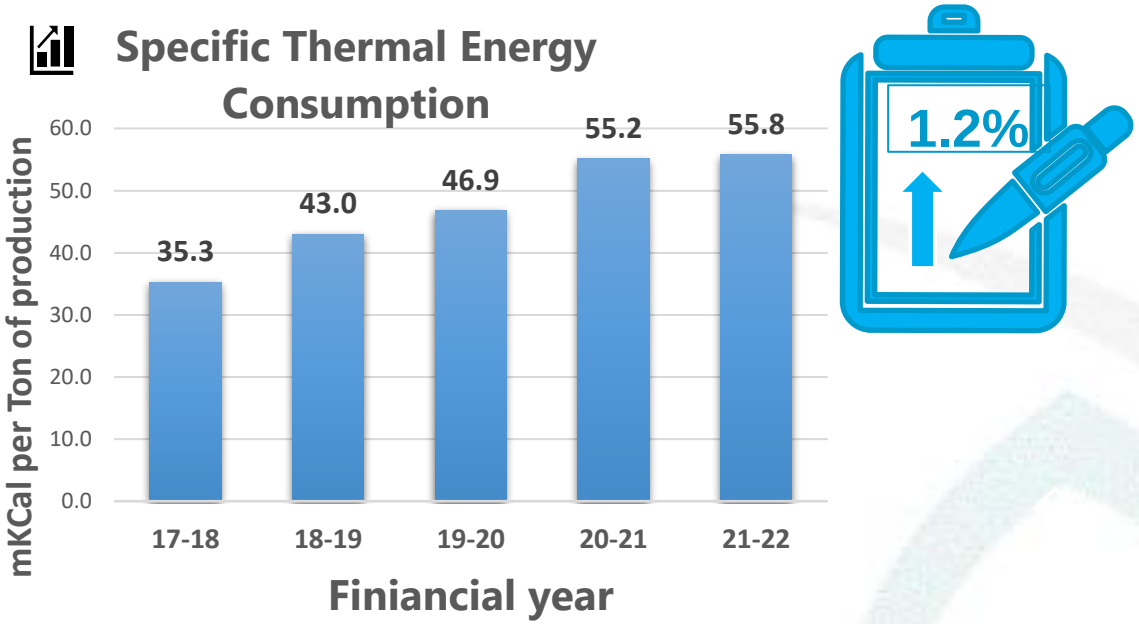
YEAR	VALUE (m kWh)
FY 2018-19	44.9
FY 2019-20	46.6
FY 2020-21	45.5
FY 2021-22	38.0

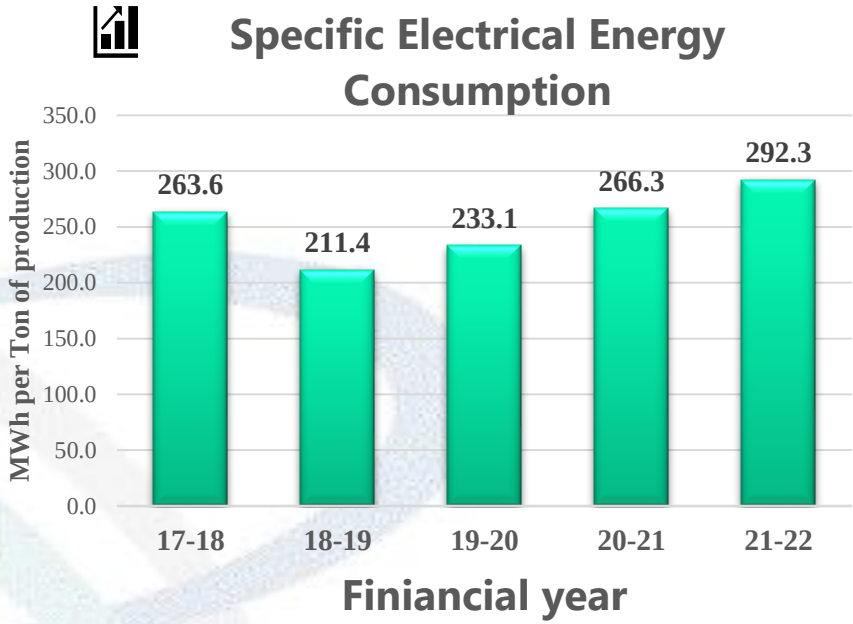
ELECTRICAL ENERGY

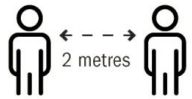
Specific Energy

3.7%

Specific Energy Consumption Overview – Last 5 Years







Social Distancing

Masking

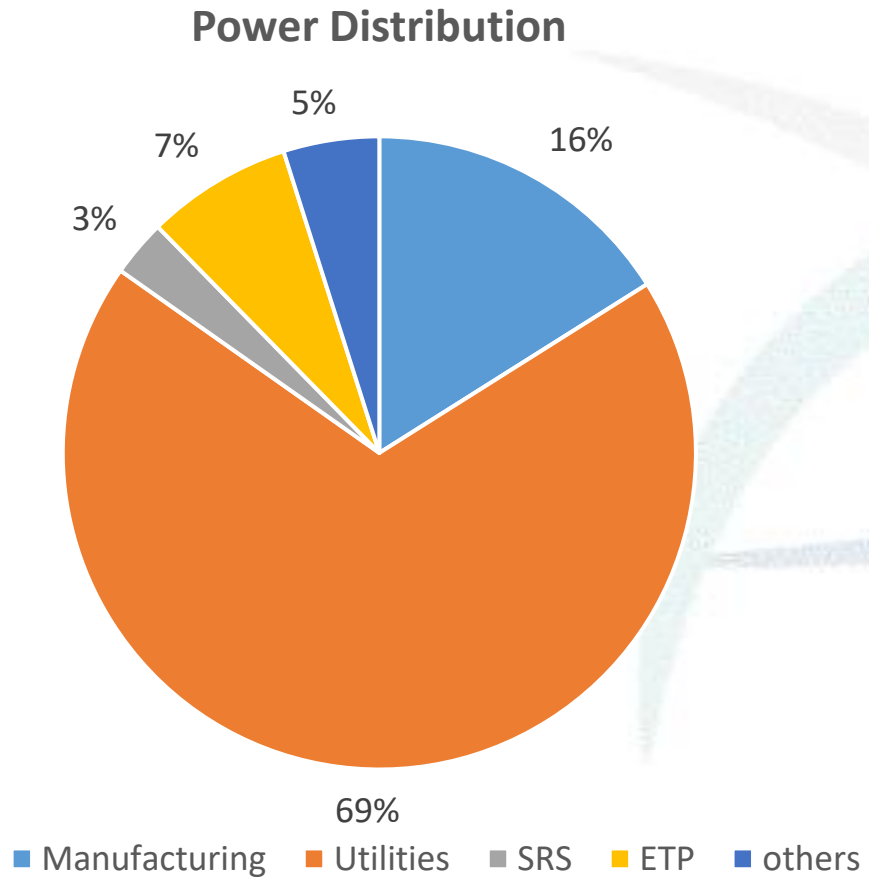
Hand Wash

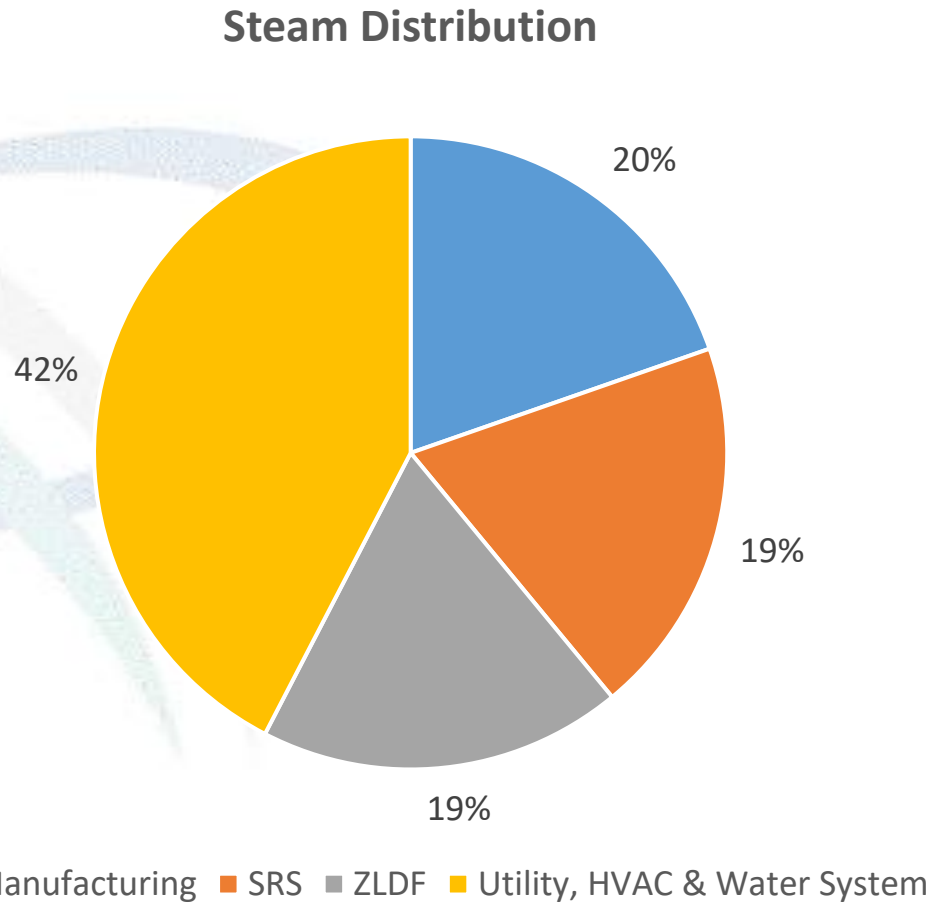
Sanitization

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

Implementation of various energy conservation activities contributed reduction of 15.3 % in overall SEC of the Plant

Energy Distribution between different streams





Information on Internal benchmark - Utility

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Refrigeration Plants :

Description	Design Temp (oC)	Design SEC (kW/TR)	Operating SEC (kW/TR)	Target SEC (kW/TR)
Reciprocating Chillers (Water Cooled)	+5	0.86	0.91-1.1	0.87
	-20	1.59	1.65-1.72	1.60
	-30	1.83	2.1-2.5	1.9
	-35	1.95	2.52-2.71	2.0
Screw Chillers (Water Cooled)	+5	0.63	0.65 – 0.70	0.65
Screw Chillers (Air Cooled)	+5	1.10	1.20 – 1.28	1.15

Description	Design SEC (kW/CFM)	Operating SEC (kW/CFM)	Target SEC (kW/CFM)
Air Compressors	0.16	0.22-0.29	0.18

Description	Design SFR (KG/KG)	Operating SFR (KG/KG)	Target SFR (KG/KG)
Boiler	4.5	4.8	4.55

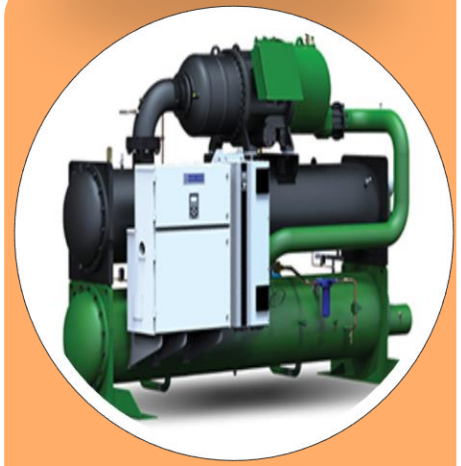
Major Encon Projects Planned in FY 2022-23

Adiabatic Cooling System for Air Cooled Chillers

Investment	:	₹ 3.14 million
Savings	:	₹ 1.4 million
Payback	:	28 Months

E Glass Epoxy FRP Blades for Cooling Towers

Investment	:	₹ 3.7 million
Savings	:	₹ 2.7 million
Payback	:	17 Months



405TR WC Screw Chiller by Replacing Reciprocating Chiller

Investment	:	₹ 8.25 million
Savings	:	₹ 8.74 million
Payback	:	11 Months

Vertical Inline Energy Efficiency Pumps by Replacing Energy Intensive Pumps

Investment	:	₹ 1.55 million
Savings	:	₹ 4.22 million
Payback	:	4 Months

ENCON Projects Planned in FY 2022-2023

AUROBINDO

S No	Project Details	Proposed Investment (₹ Million)	Expected Monetary Savings/ Annum (₹ Million)	Payback (Months)
1	By Installing 405TR water cooled chiller witch SEC is 0.65 Kw/TR & planning to stop H-Block 400TR air cooled chiller witch SEC is 1.20 Kw/TR.	8.25	8.74	11
2	Cooling tower CT fan blade replaced with E Glass Epoxy FRP blades, in place of aluminum blades, Qty : 09 No's	3.70	2.67	17
3	Solvent Monitoring and Dispensing System at Plot No 68 for 16 tanks	3.50	1.13	37
4	Installation of Adiabatic Cooling System for air cooled chillers X 04 No's (177TR X 02 No's, 400 TR X 01 No's & 100TR X 01 No's) for reducing specific energy consumption	3.14	1.37	12
5	Replace the C-Block HVAC secondary, H-Block primary & secondary pumps with energy efficient pumps	1.80	1.16	19
6	Pumps which are having flexible loads (Connected to multiple equipment's) to be installed with VFD with PID (Pressure vs. RPM) Controller.	1.55	4.22	4
7	Install VFDs for secondary pumps to regulate the flow and three-way valve actuators in AHUs to avoid the valve control for reducing the secondary pump consumption.	1.55	2.88	6
8	In line Automatic Tube Cleaning System for 02 No's of 400 TR Water cooled chillers to supply the uninterrupted chilled (+5) water supply to C-Block, A&B block HVAC & process requirements	1.30	1.06	15
9	VFD installation for part loaded air compressors for reducing energy consumption	0.55	1.31	5
10	Installation of Dehumidifier for PQC Emerging Systems for reducing the Energy & Coal Consumptions	0.44	0.70	8
11	Installation of Compact Module Thermodynamic Steam trap for avoiding the steam losses in Boiler Main distribution line (Boiler to MEE)	0.32	0.89	4
12	Installation of Automatic Pump Trap (APT) - 40NB for condensate Stall Prevention on Stripper	0.23	0.60	5
		26.33	**26.73**	**12**

Energy Saving projects implemented in last 3 Years

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2019-20

10 No's

Investments(₹ Million)	: 11.6
Electrical (Million kWh)	: 0.85
Thermal (Million kcal)	: 4856
Monetary Savings (₹ Million)	: 12.6
Impact on SEC (%)	: 4.2%

2020-21

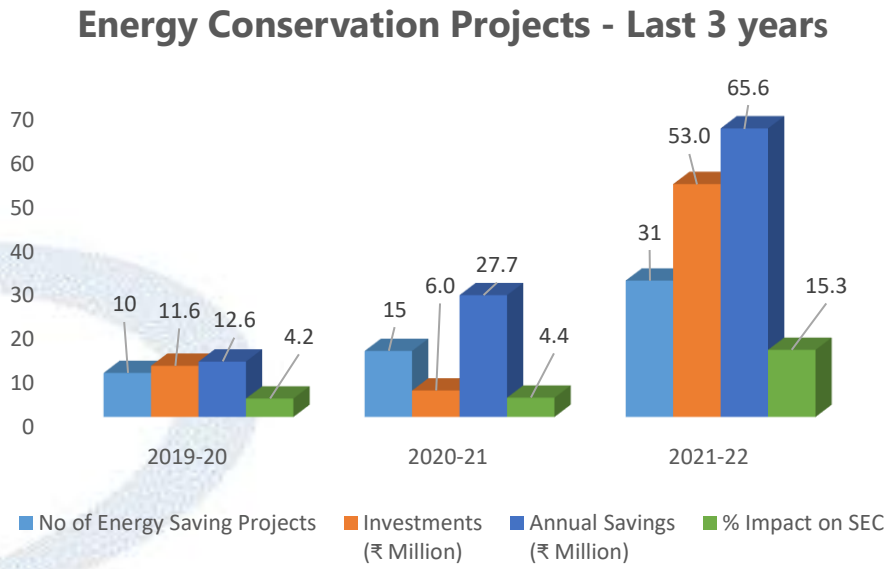
15 No's

Investments(₹ Million)	: 6.0
Electrical (Million kWh)	: 3.54
Thermal (Million kcal)	: 2782
Monetary Savings (₹ Million)	: 27.7
Impact on SEC (%)	: 4.4%

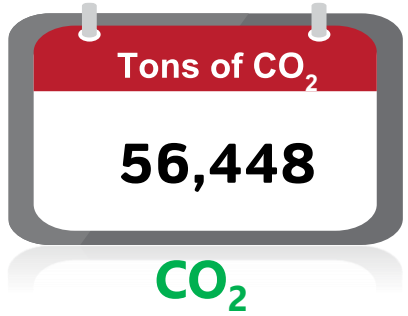
2021-22

31 No's

Investments(₹ Million)	: 53
Electrical (Million kWh)	: 6.44
Thermal (Million kcal)	: 10516
Monetary Savings (₹ Million)	: 65.6
Impact on SEC (%)	: 15.3%



FY 2021-22



CO_2 EMISSION REDUCTIONS

Major Encon Projects Implemented – High Investment - FY 21-22

405 TR Screw Chiller

- Replaced existing reciprocating chiller & aged VAM system
- Compared cost per TR generation
- Ranking of technologies
- Energy Savings : 16.09 Lakh Units,
  Investment : ₹ 8.2 million
  Payback : 10 months

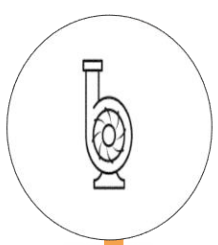
19 Nos Vertical Inline Pumps

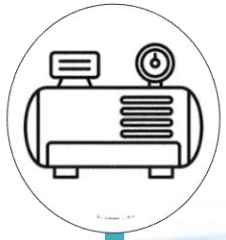
- Performance evaluation done and identified the opportunity
- Energy Savings : 6.57 Lakh Units,
  Investment : ₹ 3.8 million
  Payback : 11 months
- Low maintenance & Space
- Challenges : Expert for maintenance
- Secondary pumps under process of implementation

700 TR Wooden Cooling Tower

- Existing FRP CT Low performance & High maintenance
- Energy Savings : 1.52 Lakh Units,
  Investment : ₹ 1.4 million
  Payback : 16 months
- In addition to savings in CT, got performance improvement in associated chiller system

Major Encon Projects – Medium / Low Investment - FY 21-22





01 Pumps

Performance Improvement

- Impeller Trimming
- VFD with PID
- Auto Level Cutoff
- Swapping of pumps

02 Chillers

Load Optimizations

- Shifting of load from low efficient chillers to highly efficient Chillers.
- Regular assessments and monitoring & replacements

03 Air Compressors

Operation controls

- No Air Loss Drain Valves
- Reducing the Pressure Settings
- Arresting Air Leakages

04 Process & Others

Technology

- Dry Screw Vacuum Pumps
- EE High Pressure Pumps

ENCON PROJECT'S IMPLEMENTED FY 21-2022

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S.NO	Title of Project	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Aged & non performing +5°C 500 TR VAM is replaced with new energy efficient water-cooled screw type refrigeration system.	18.00	8.3	5.53
2	Energy intensive & Aged ammonia refrigeration plant is replaced with most efficient 405TR Water cooled chiller for D&F Block HVAC systems.	10.80	8.20	9.11
3	Improved the Operating Efficiencies of Chilling plants and associated systems by regular energy assessments and corrective measures taken like descaling, refrigerant charging, flow corrections and CT water maintaining.	10.59	0.50	0.57
4	Installed 18 No's of Vertical Inline energy efficient pumps along with IE3 motors by replacing old energy intensive pumps & standard motors	4.47	3.84	10.30
5	Installed Adiabatic Cooling System for 250TR air cooled chiller for reducing the specific Energy Consumption by lowering condenser temperature	3.17	0.60	2.27
6	Installed Utility Automation System for C-Block (Single fluid heating & cooling system) for improving the efficiency of operations and Utilities consumptions	2.26	6.43	34.08
7	Semi-Automation of AHU Manifolds: Temperature / RH controller with Temp, RH sensor & controllers its enclosure cabling and necessary accessories connecting pipe fittings for All Grade B AHU's of Sterile areas - GMP deviations related to Temp & RH clean rooms are reducing.	2.18	3.20	17.59
8	Aged & energy intensive Air Washer units replaced with new energy efficient air washer units for AB Blocks.	1.41	6.44	54.80
9	Avoided the part load operations of Chilling Plants in D&F Blocks by integrating the Chilling plants and avoided the operation of 180 TR Chilling plant.	1.38	0.01	0.09
10	Installed Utility automation System for H-block (Single fluid heating & cooling system) for improving the efficiency of operations and Utilities consumptions	1.24	3.15	30.35
11	Installed VFD with PID (Pressure vs. RPM) Controller for 02 No's of Secondary Pumps having loads variations for conservation of energy	1.08	0.33	3.63
12	New wooden type Cooling Tower (700 TR) is installed by dismantling existing old Cooling Tower for C Block for improving the efficiency of Chilling Plants	1.02	1.35	15.88
13	Stopped the operation of very old Energy Intensive Chiller by replacing with Efficient Chilling Plant arranged through internal shifting.	0.97	0.50	6.21
14	For SRS Block Re-boiler (DIE002) replaced with new due to existing Re-Boiler is non-performing & aged.	0.94	1.49	19.07
15	Boiler Feed water pumps are studied & replaced with correct size & efficient pumps	0.83	0.45	6.49
16	Old & non performing condensers are replaced with 2 Nos. Graphite Condensers for improving the heat transfer efficiency.	0.64	1.58	29.65
17	Installed Energy Efficient ETP RO & MEE Plant Feed pumps by replacing the existing low energy efficient pumps	0.63	0.60	11.45
18	Energy Efficient Vertical Inline Split Coupled pump with IE3 motor for MEE cooling tower	0.60	0.46	9.20
19	Installed Energy Efficient Dry Screw Vacuum Pump for C-Block by replacing the existing old pump.	0.57	1.42	30.07
20	Non performing & high energy consuming old air compressor replaced with new energy efficient Air Compressor for Boiler	0.51	0.96	22.86
21	Old & energy intensive Split AC's replaced with 5 star BEE rated Split AC's for Admin Block for conservation of Energy.	0.37	0.28	9.07
22	Replaced Existing ETP pump with EE efficient Vertical Inline pump in the MEE to optimized flow / head to reduce power Consumption & to improve Efficiency.	0.34	0.42	14.73
23	C-Block AHUs Semi Automation-Three way valves along with temperature controllers installed for 3 AHU's & savings till date Installed Three way valves Semi Automation systems with temperature controllers for 03 AHU's for reducing the energy consumption in HVAC systems.	0.28	0.30	13.00
24	Installed 12 No's of No Air Loss Auto Drain Valves for Compressed Air Systems in place of conventional air traps for reducing compressed air loss.	0.25	0.06	2.89
25	Improved the performance of pump by replacing impeller, casing & shaft and avoided the operation of 2nd pump in the system.	0.22	0.02	1.09
26	Installation of 80 KVA UPS for stopping DG while sensitive batches like Ampicillin Anhydrous and Amoxicillin Tri hydrate. Note: Due to sensitivity of above batches, we are running DG to handle the any unscheduled power failure/ fluctuations.	0.22	0.87	47.92
27	Installed energy efficient E-Glass epoxy coated fans for Cooling towers by replacing the existing Aluminum blades	0.21	0.29	16.58
28	Installed Energy Efficient High Pressure Pumps for RO water system for reducing the energy consumption	0.17	0.64	46.27
29	In Boiler Area 6 to 7 times rewonded motors (IE1) of PA Fan & feed pump are replaced with IE3 motors. Achieved savings per hour is 4.5 KW Replaced existing rewound motors with Energy Efficient motors in the Boiler Area Feed pump and Fans for reduction of energy consumption.	0.14	0.21	17.89
30	Installed Auto level cut-off systems for Condensate pumps are operating continuously & manual stoppage is eliminated	0.09	0.03	3.35
31	Installed 02 No's No Air Loss Auto drain valves for Air Dryers for avoiding the Compressed Air loss	0.03	0.03	9.86
	Aggregate Savings	**65.6**	**52.9**	**16.2**

Innovative Projects - I

Replacement of CT Fans with E Glass Epoxy Coated Fans

Fan Diameter
Air Velocity & Flow
Power Consumption

Energy Savings: 18-27 %
Payback : < 1.2 Years

Feasibility

Survey on available technologies

Freezing

Trial

Installed Epoxy fan with same o/p of Air flow

Results

Potential : Highly replicable
Approved Capex for all CTs

Innovative Projects - II

Adiabatic Cooling Systems

Problem Statement:

- Compressors trips due to high ambient temperature in summer
- Low Performance & Temperature issues in the process

Salient Features:

- Pre-cooled air enables the condenser reject more heat
- Reduces head pressures and lowers compression ratios

High replication, at approval stage for other chillers (05 No's)

Payback less than 1 Year

Improves compressor life

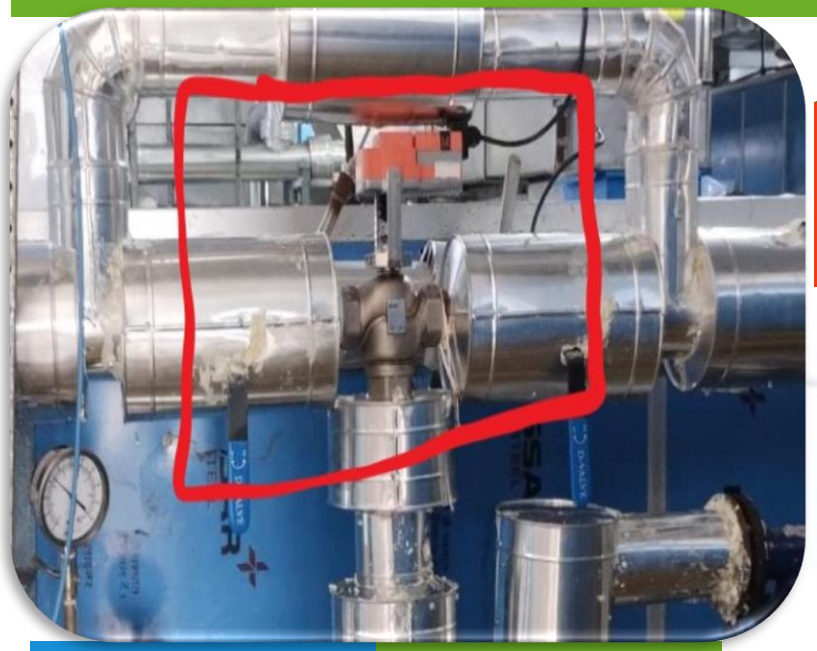
Capacity augment of the chillers

Substantial energy saving up to 20.1%

Potential : Highly replicable Capex under process for other Chillers

Innovative Projects -III

Semi-Automation of AHU Manifolds: Temperature / RH controller



Cold Rooms

Temperature & RH Excursions

Errors due to manual operations

High / Low Temperature
High / Low RH

Semi Automation/ Three Way Valves

Cut off Chilled water / steam supply as per the requirement

Precise Control

± 2 oC - Temperature
± 2 % - RH Control

6-8 % Savings
High Replication

Payback
< 1.5 Years

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 : 3.2 Cr Units /Year
Approved Capacity : 3750 kW EB Load

% Share to Unit-V

CMD allotted from Solar : 1500 kW (21.4%) out of 7000 kVA
Allotted Generation: 1.28 Cr Units / Year
% Share in Energy Consumption : 30.5%
.

Waste utilization and management

Waste Management

- Waste having heat value (FY 21-22, 691 MT)
  - 77 MT → Cooling Tower Fills, Mixed spent carbon
  - 614 MT → Lq. Organic waste, Used filter pads, Thermacoal
- Recycling (FY 21-22, 4.15 MT)
  - 3.92 MT → Used oil, LED bulbs, Batteries
  - 0.23 MT → Power cables, Wires, Contactors, Relays
- Land filling/ Incineration (FY 21-22, 1102.7 MT)
  - 1077 MT → Evaporation Salt, ETP Sludge
  - 25.7 MT → Bio-medical waste

CONTINUE → Co-fuel for cement units

CONTINUE → Through authorized scrap agencies

CONTINUE → Through authorized agency

END (Incineration)

Sustainability / GHG Inventorization

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 (tCO2e)	Scope 2 Emissions (tCO2e)	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

01 – 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.

02 – Paperless / Digital Logistics

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

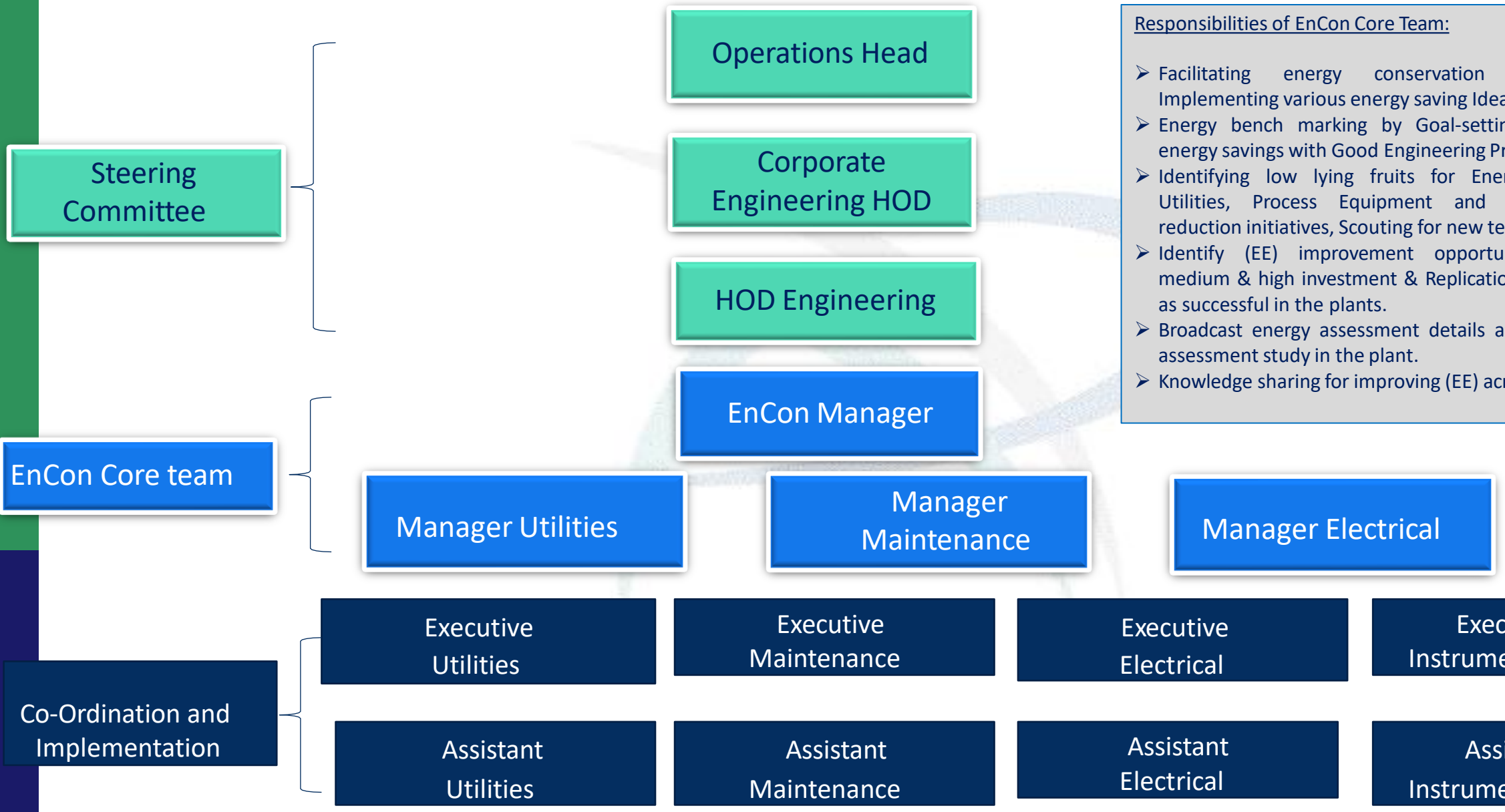
03 – AIR vs SEA – Mode Control

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

04 – GST – e Invoicing

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

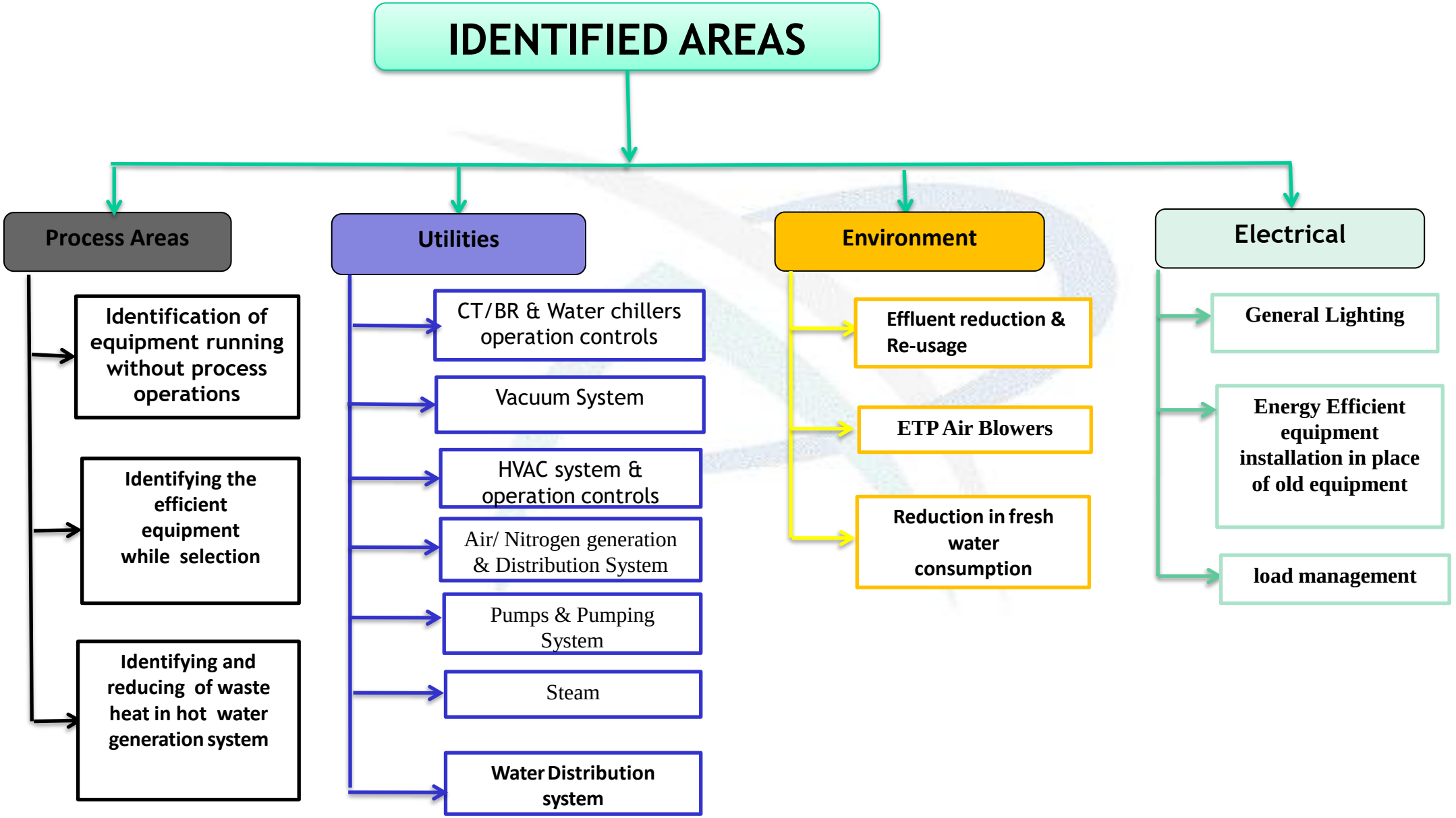
Energy Management Team



Responsibilities of EnCon Core Team:

- Facilitating energy conservation by identifying, Implementing various energy saving Ideas /Options.
- Energy bench marking by Goal-setting, Monitoring of energy savings with Good Engineering Practice.
- Identifying low lying fruits for Energy Excellence in Utilities, Process Equipment and Carbon footprint reduction initiatives, Scouting for new technologies.
- Identify (EE) improvement opportunities with Low, medium & high investment & Replication of (EE) Projects as successful in the plants.
- Broadcast energy assessment details as per the energy assessment study in the plant.
- Knowledge sharing for improving (EE) across API group.

Energy Management Key Focused Areas



Projects Implemented Through Kaizen

1. Continuous monitoring & Maintaining the condenser & CT's in optimal range.
2. Diverting the CT water blow down to LTDS treatment stream which are previously connected to HTDS treatment stream.
3. For Air Dryers conventional moisture traps are replaced with No Air Loss auto drain valves.
4. Avoided the part load operations of Chilling Plants in D&F Blocks by integrating the Chilling plants and avoided the operation of one 180 TR Chilling plant.
5. Improved the performance of pump by replacing impeller, casing & shaft and avoided the operation of 2nd pump in the system.
6. Semi Automation-Three way valves along with temperature controllers installed for 3 AHU's
7. Installed Auto level cut-off systems for Condensate pumps are operating continuously & manual stoppage is eliminated

Recognition & appreciation of Best ENCON & Kaizan measures

Teamwork, Employee Involvement & Monitoring

Teamwork

- Implemented Kaizen & 5S programmes by forming teams
- Awards & appreciations for best programmes

Employee Involvement

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

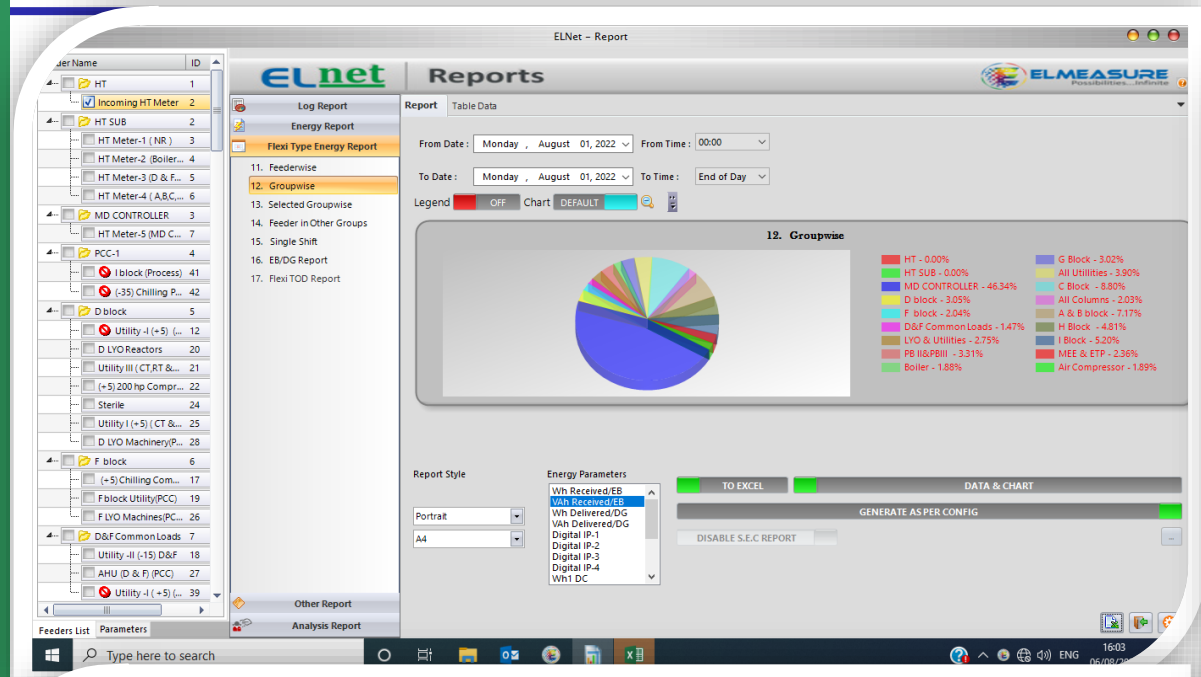
Training Programmes

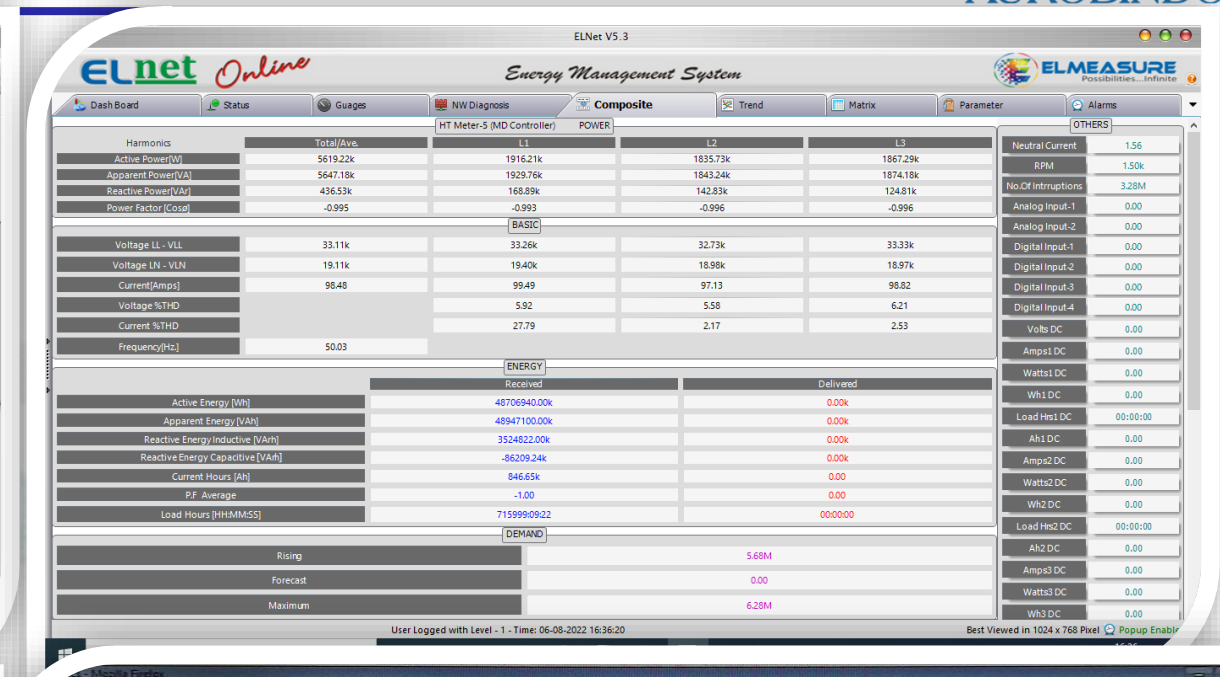
- Given training programmes on Root cause analysis (RCA), and Reliability Maintenance (RM)
- Training on steam / utility systems
- Training on Energy conservation to related Employees in every month by Energy Manager

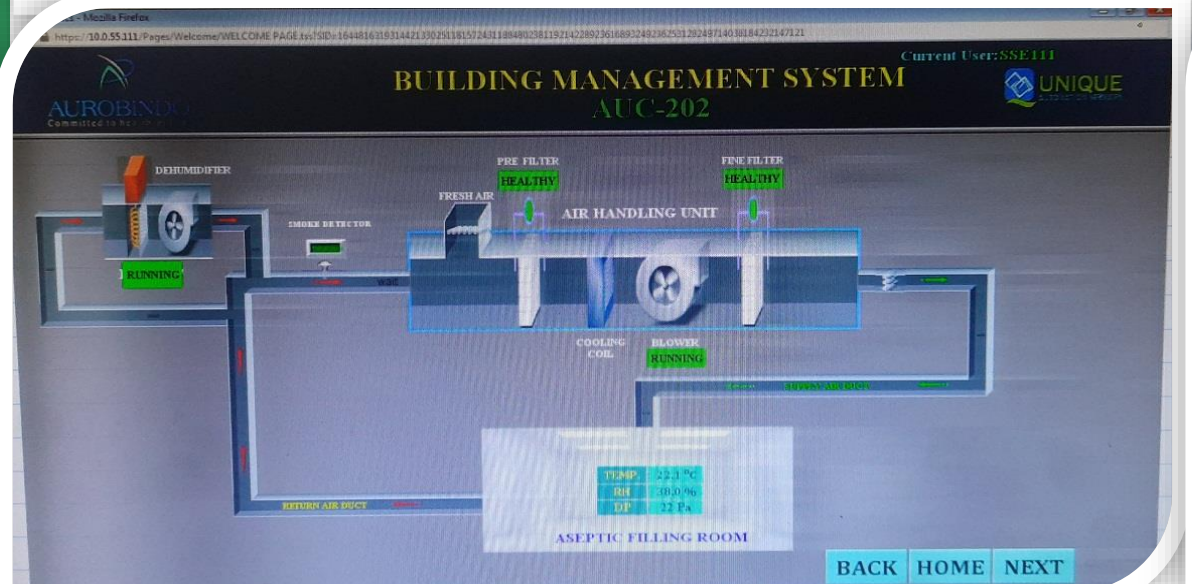
Monitoring

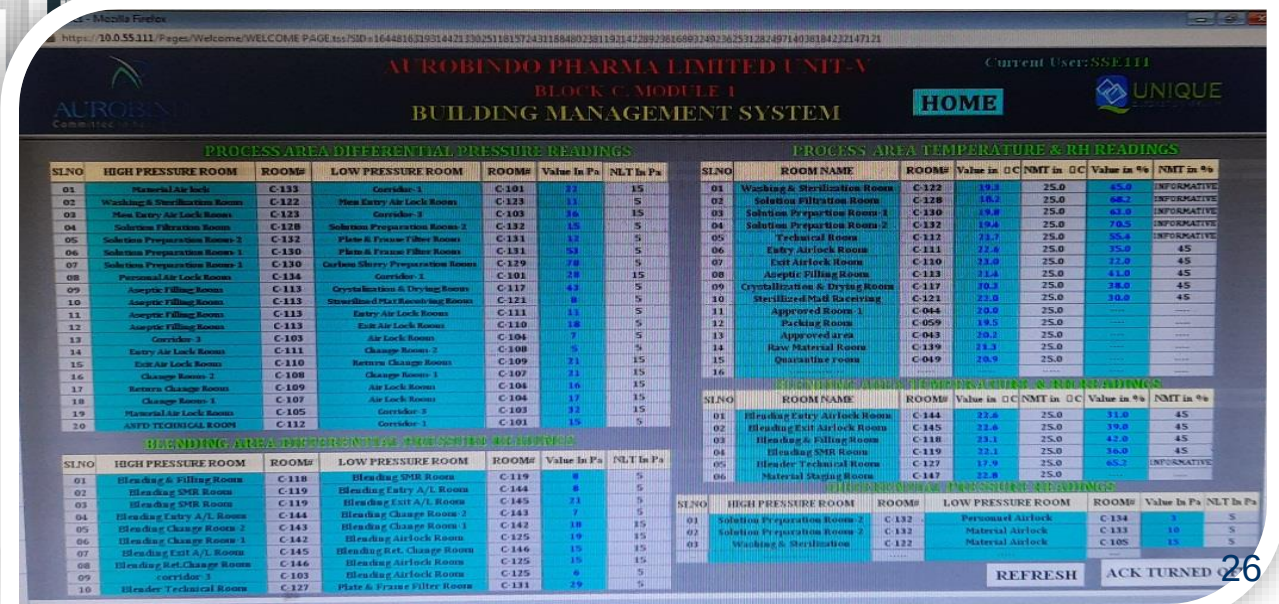
- Daily / weekly monitoring of Energy Consumption areas / major equipment.
- Review of KPIs, Performances in the MRM by the plant heads.

Daily Monitoring & Reporting System









Learnings from CII - last 4 Years

AUROBINDO

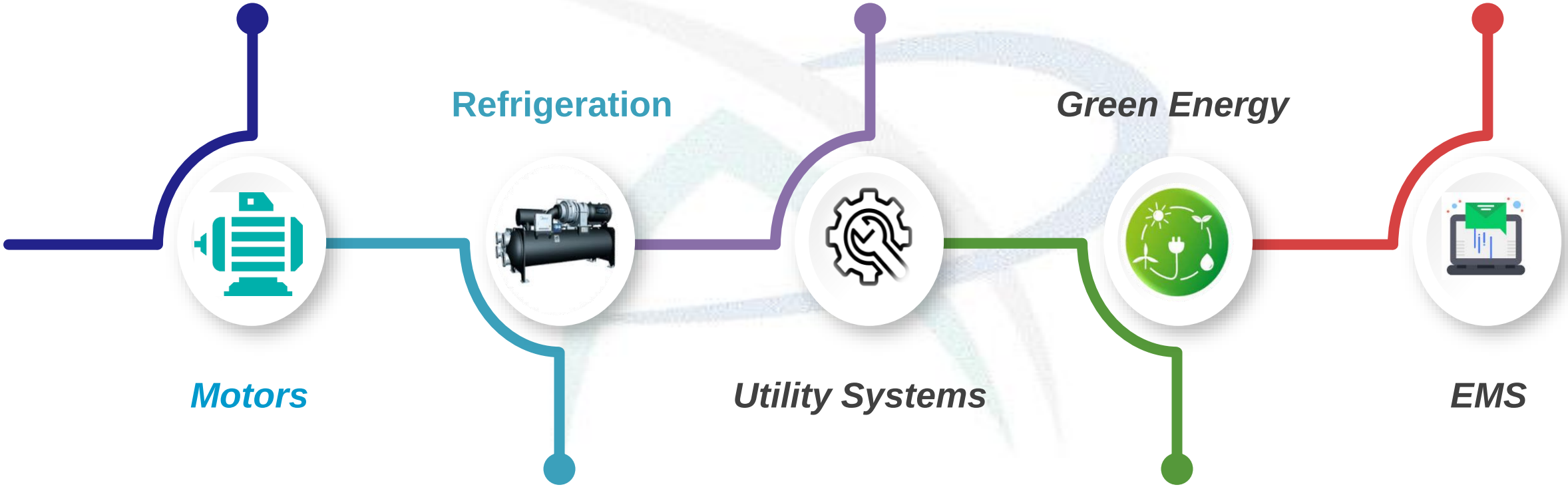
Energy efficient motors
Replaced motors of Boiler blowers, utility motors with energy efficient motors

Air Compressors
Installed No Air Loss Drain (NAD) valves form M/s Godrej

Online Monitoring
This is a sample text, place your own text here

Refrigeration

Green Energy



Motors

Utility Systems

EMS

Chillers
Phased manner replacement of Chillers with Energy Efficient Chillers

Renewable Energy
Installed 30 MW Group Captive Solar Plant near Yadadri, Telangana

Energy Week / Energy Conservation Day Celebrations –

Awareness

100+ Participants participated from all departments like Production, Engineering & EHS, SRS and TSD etc.

Winner

Awarded best opportunity assessment award from Corporate Energy cell and L&D team

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

Best Energy Assessment Award

Winner of the Best Energy Assessment award 2021 in Energy Conservation Week competitions held intra -units of APL.

CSR Activities

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

Thank You

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