CII 23RD NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT 2022

Honeywell Technology Solutions Lab Pvt. Ltd
Campus 02
Bellandur - Doddakannelli Rd,
Adarsh Palm Retreat, Bellandur,
Bengaluru. Karnataka 560 103

23rd, 24th & 25th August 2022

Honeywell

MR. SRIDHAR NATARAJAN
- DIRECTOR GRE

MR. SUBRATA BALIARSINGH
- DIRECTOR IFM

MR. C RAVI KUMAR
- OPERATIONS LEADER

MR. VIJAYAKUMAR SHOLAPUR
- FACILITIES & ENERGY LEAD

HONEYWELL INDIA

8
Decade legacy

$1B
Domestic sales and exports

4
Technology development centers
- Bengaluru
- Madurai
- Hyderabad
- Gurugram

3
Manufacturing centers
- Gurugram
- Dehradun
- Pune

20
Facilities in major cities
- Pune
- Bengaluru
- Gurugram
- Chennai
- Dehradun
- Mumbai
- Kolkata
- Madurai
- Hyderabad
- Jamshedpur
- Vadodara

13000
Employees

3000+
Products, solutions, applications engineered in India

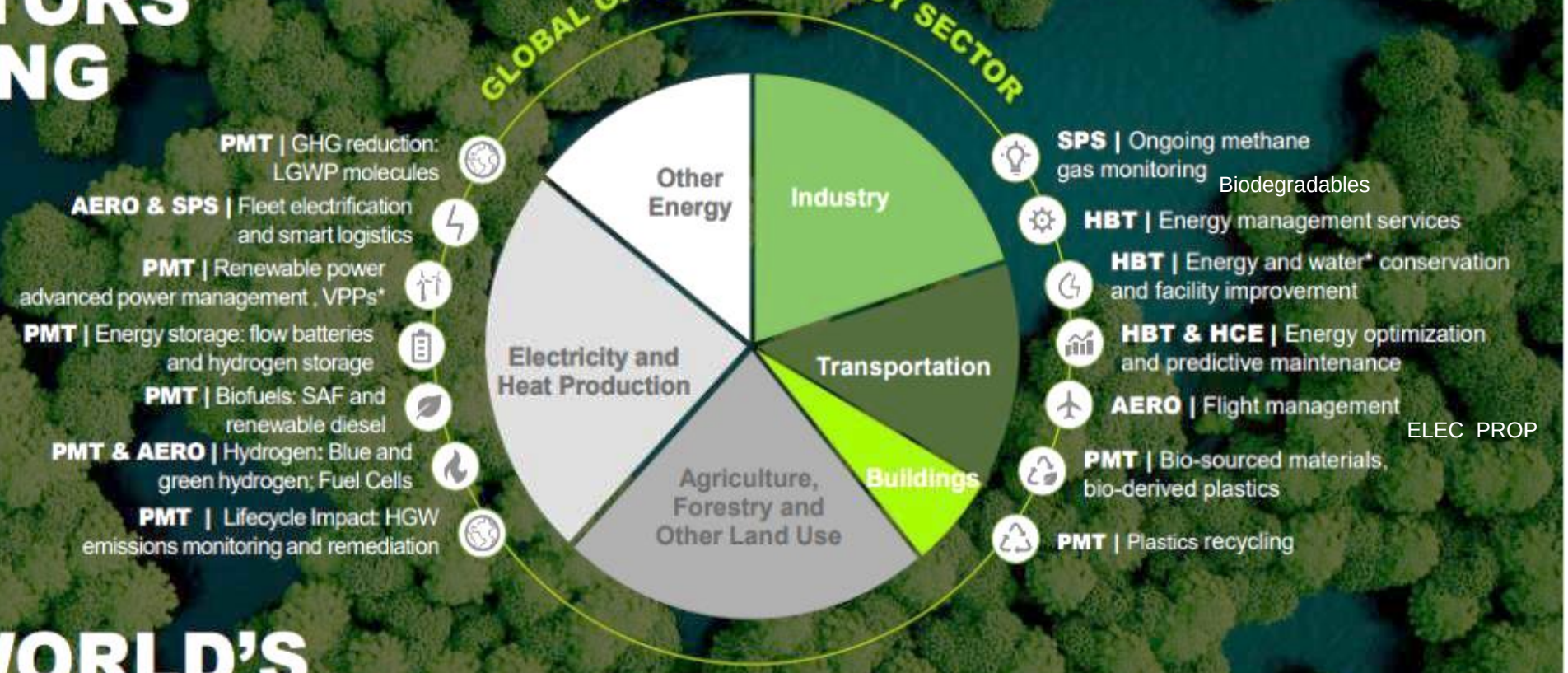
5500
Engineers

HONEYWELL COMMITTED TO BE CARBON NEUTRAL BY 2035

TARGETED SOLUTIONS FOR SECTORS PRODUCING

About 2/3's

OF THE WORLD'S GREENHOUSE GAS EMISSIONS



~ 30% = Agri, Forest, Land use, Others

~70% = Industry, Tpt, Building, Electricity / Heat

SITE INFRA - HTS CAMPUS 02, BANGALORE

- Facility details : Owned
- Year of operation : 2017
- Built up area : 7,86,821 sq.ft
- Towers : Tower 01 & 02
- Tower 01 : GF to 9 floors
- Tower 02 : GF to 4 floors
- Seating Capacity : 3,887
- Sanctioned Demand : 5.10 MVA
- Transformer Capacity : 8.75 MVA
- Diesel Generator Capacity : 11.01 MVA
- UPS Capacity : 4.09 MVA
- Chiller Capacity : 2,000 TR
- Inhouse Solar roof top : 103 kWp

IGBC GREEN RATING
INDIAN GREEN BUILDING COUNCIL
IGBC
GOLD

IGBC PRE - GOLD certified

Annual energy use is 13.34 million kWh with the spend of INR 11.09 crores, including diesel cost in FY 2021 - 22

BUILDING SALIENT FEATURES

SUSTAINABILTY CONCEPTS CONSIDERED IN BUILDING

Priority to passive design to reduce energy demands

1. Compact envelope shape
2. Optimized orientation, Solar protection
3. Under roof thermal insulation
4. Optimized air tightness

Include passive

1. UV protected glazing
2. 70 % access to-day light exposure

Occupant comfort and well being

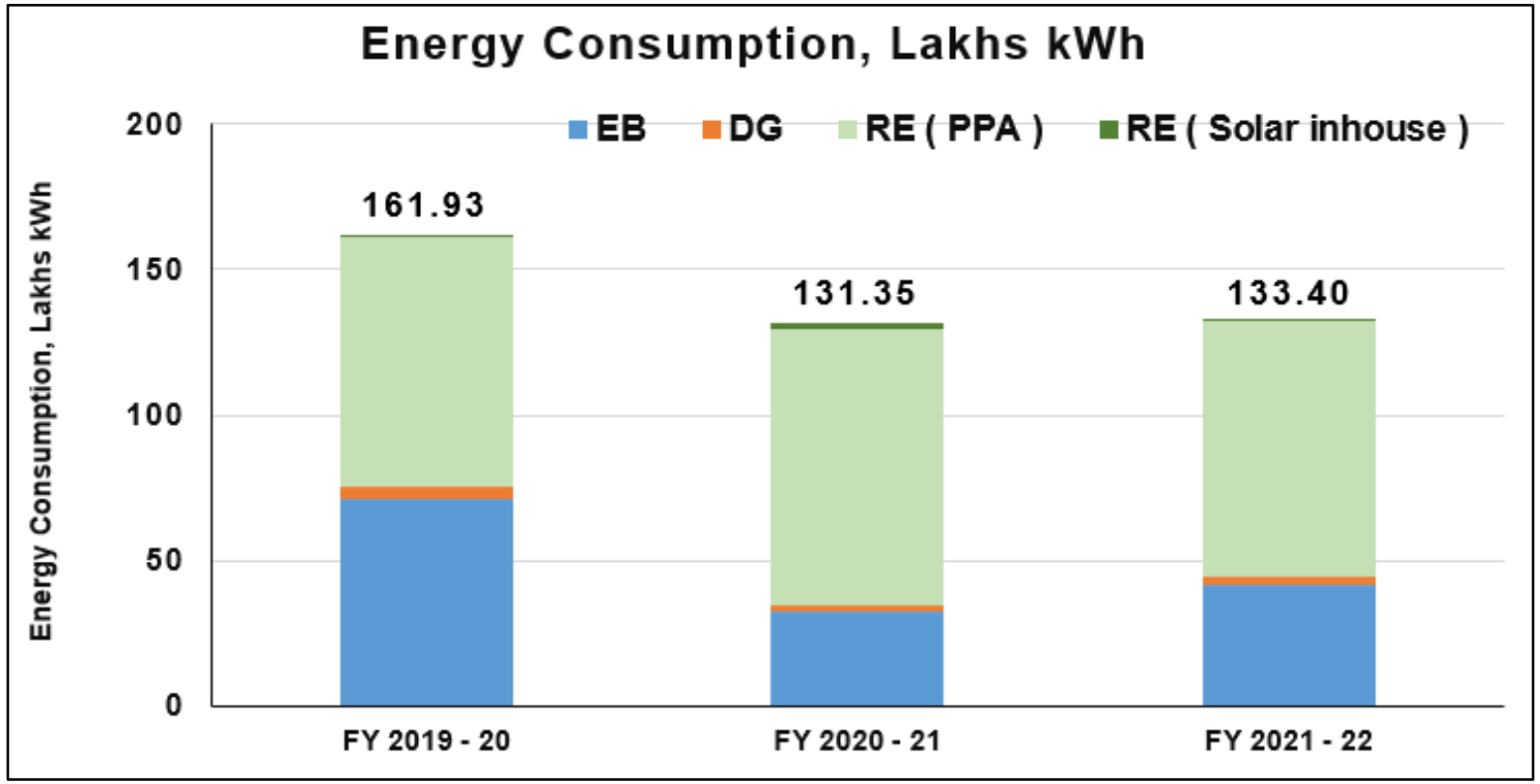
1. Achieving indoor comfort requirements (visual / thermal / acoustic)
2. Maintaining good IAQ (indoor air quality)

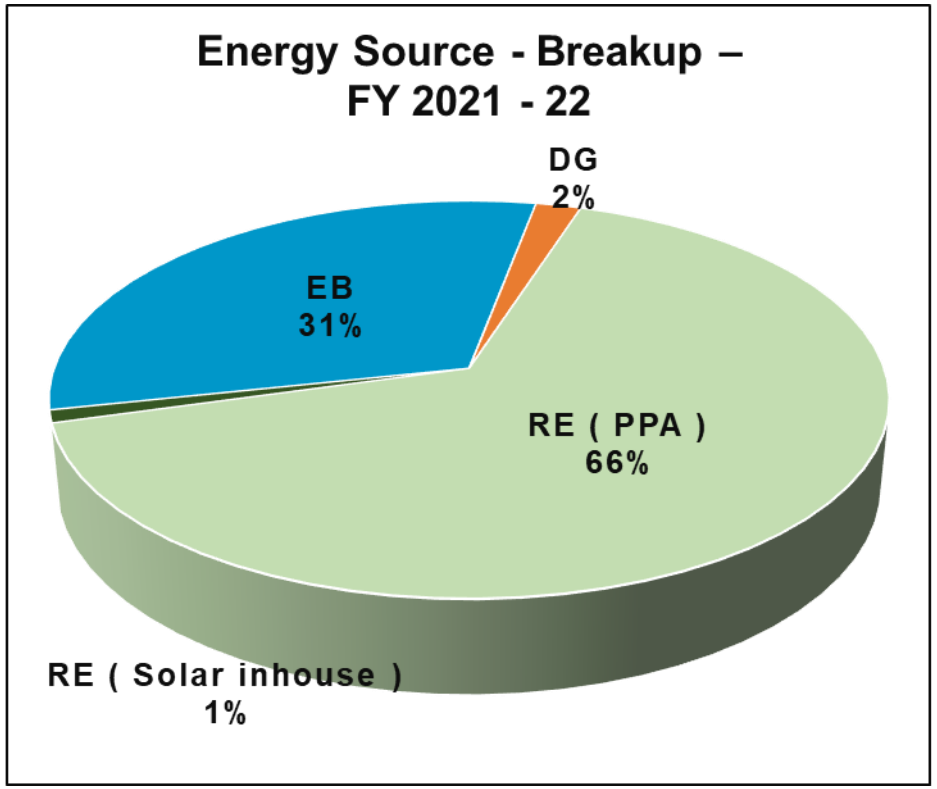
More sustainable elements

1. In-house Solar PV System – 103 kWp

ENERGY CONSUMPTION OVERVIEW IN 2019 - 2022

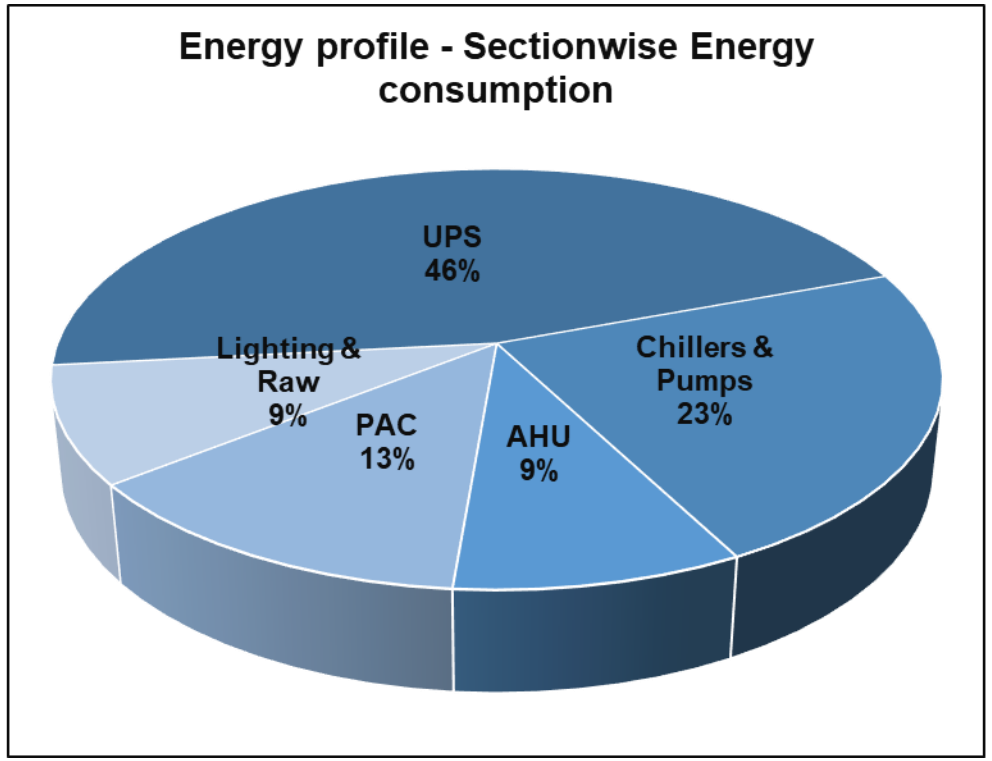
Year	Source of Energy – Energy Consumption, Lakhs kWh				Total Energy Consumption	Energy Cost
	Grid – EB	DG	RE *(PPA - Solar)*	*RE (inhouse – Solar)*	Lakhs kWh	INR
FY 2019 – 20	71.41	4.13	85.80	0.59	161.93	14,19,44,683
FY 2020 – 21	32.71	1.70	95.40	1.53	131.35	10,89,21,437
FY 2021 - 22	41.78	2.70	87.55	1.38	133.40	11,09,45,496





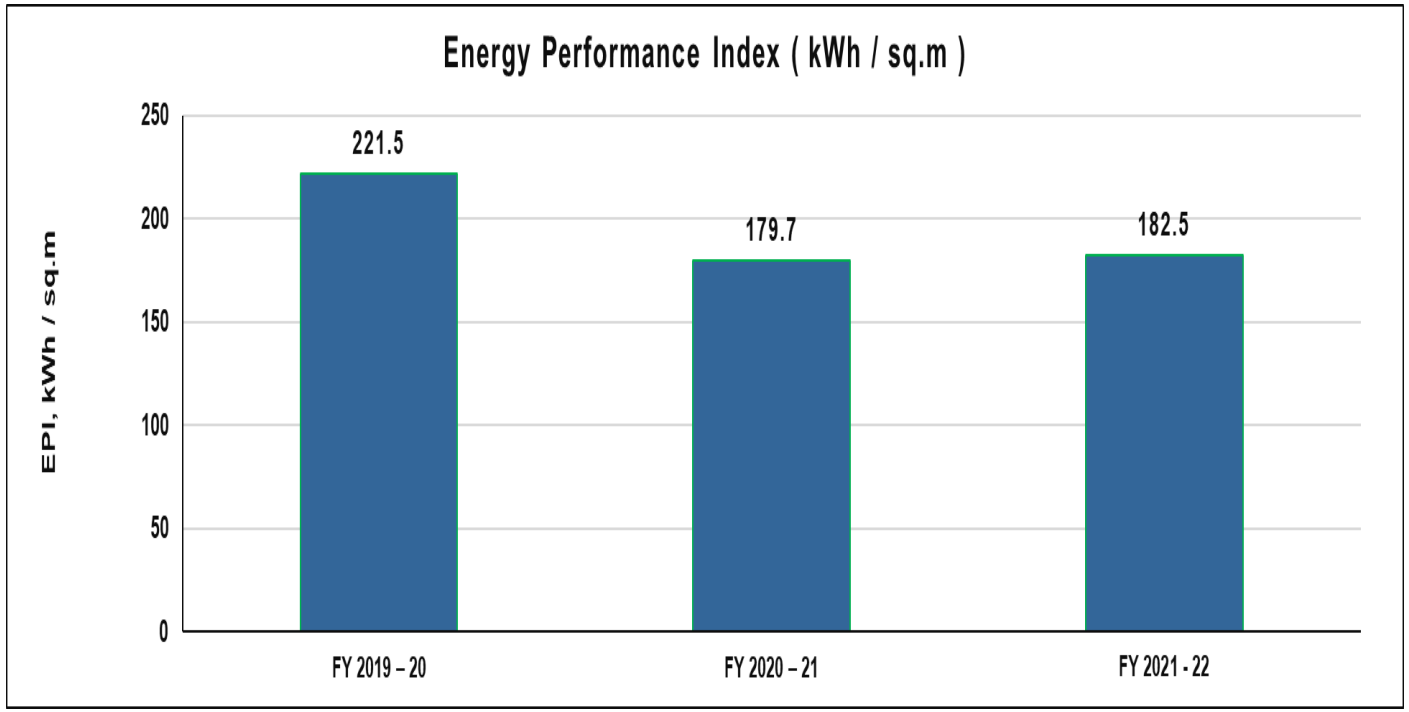
ENERGY CONSUMPTION – UTILITY WISE OVERVIEW

Energy Consumption		
Utility	**Lakhs kWh**	**%**
Chillers & Pumps	30.68	23.0
AHU	12.01	9.0
PAC	17.34	13.0
UPS & Lab	61.37	46.0
Lighting & Raw	12.01	9.0
Total	**133.40**	**100.0**



Specific Energy Consumption 2019 - 2022

Year	Total Energy Consumption		Area	Energy Performance Index	Improvement
	kWh	Lakhs kWh	Sq.m	kWh / Sq.m	%
FY 2019 – 20	161,92,723	161.93	73,098	221.5	Base data
FY 2020 – 21	131,34,875	131.35	73,098	179.7	18.9
FY 2021 - 22	133,40,255	133.40	73,098	182.5	- 1.56



Load addition in 2021 & 2022

375 kW Lab equipment addition in Lab area; which operates for 24 x 7

This additional lab equipment's accounts for 15 Lakhs kWh consumption increase in following years

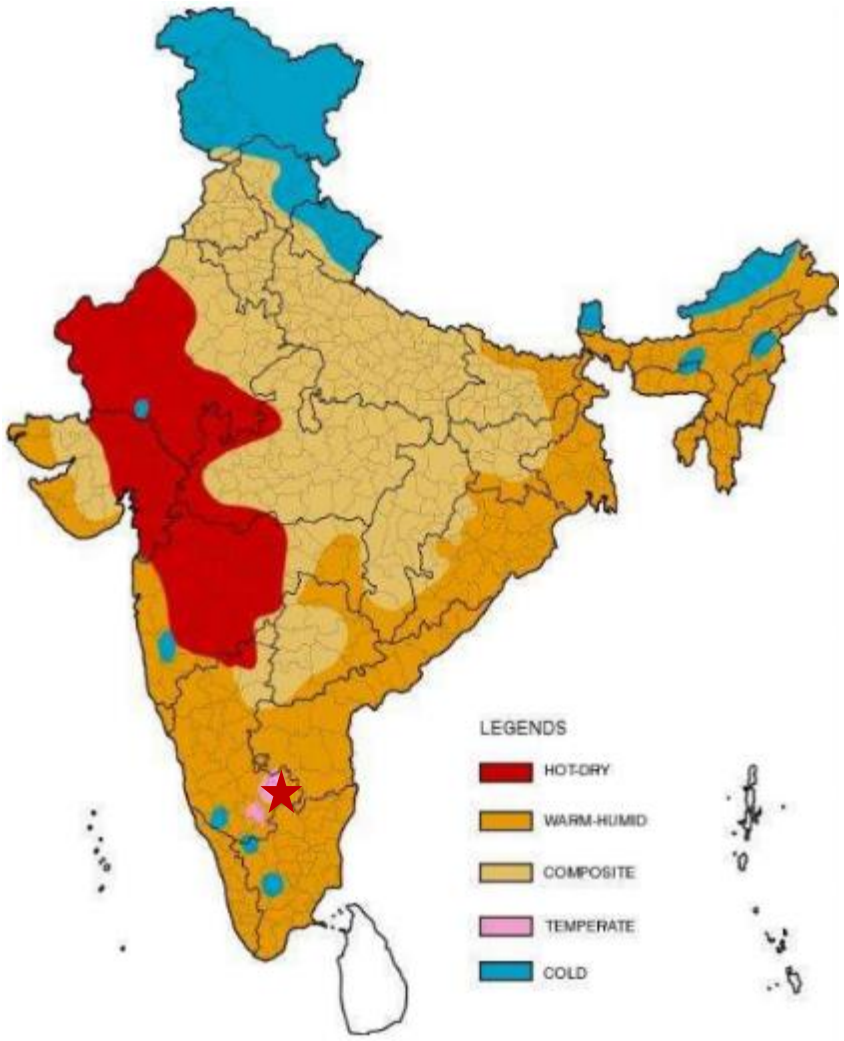
COMPARISON SEC WITH INTERNAL & NATIONAL BENCHMARKING

Internal Benchmarking	Location	Zone	SEC (kWh / m^2 / y)
Honeywell	Campus 02, Bangalore	Composite	182.5
Honeywell	Gurugram campus	Composite	355.8

Benchmarking	Reference	SEC (kWh / m^2 / y)	
		Standard	Actual
National level	Bureau of Energy Efficiency (BEE)	179	**182.5**

Climate Zone	AC	
	< 50.0 %	> 50.0 %
EPI (kWh / m^2 / year)		
Composite	86	**179**
Moderate	94	179
Warm & Humid	101	182
Hot & Dry	90	173

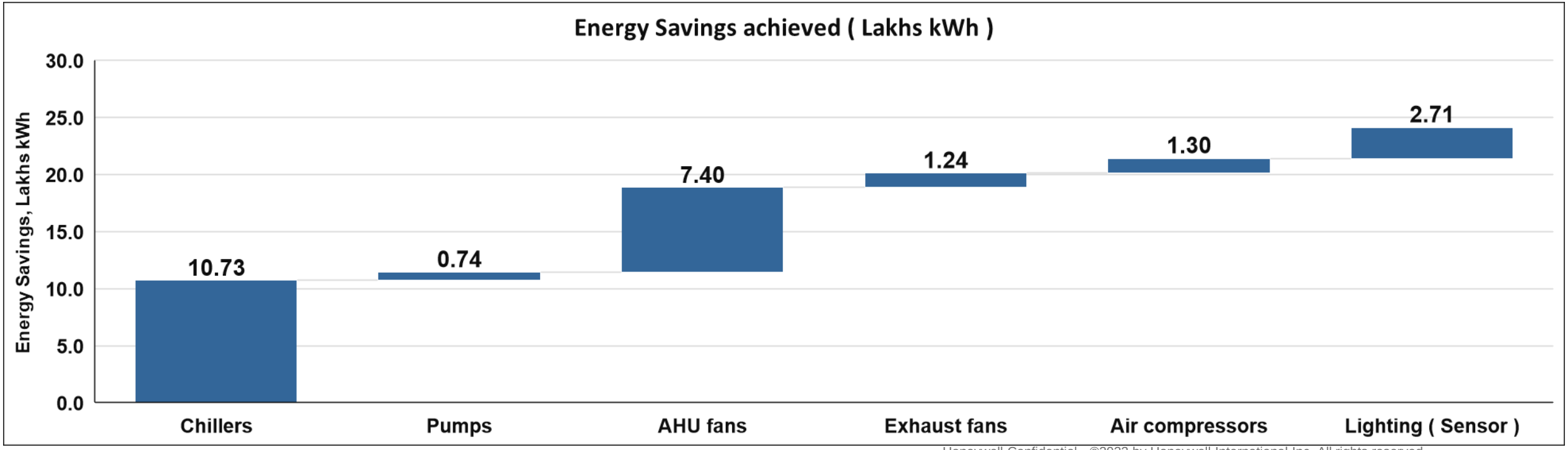
EPI (kWh / m^2 / y)	Star Label
190 – 165	**1 star**
165 – 140	2 star
140 – 115	3 star
115 – 90	4 star
Below 90	5 star



★ *Bangalore*

Energy Saving projects implemented in 2019 - 2022

Year	No. of Energy Saving projects	Investment	Electrical savings	Cost savings	Impact on SEC
		million INR	Lakhs kWh	million INR	%
FY 2019 - 20	04	19.3	13.5	12.4	7.7
FY 2020 – 21	05	18.3	4.6	4.3	3.4
FY 2021 - 22	03	16.4	6.1	5.2	4.4



ENCON PROJECT PLANNED IN FY 2022 - 23

Title of the Project	Annual Electrical savings Million kWh	Annual Cost savings Million INR	Investment Million INR	Status
Bloom Energy (Fuel Cell)	0.33	2.89	53.5	
Replacement of belt driven fans with Energy Efficient EC fans in AHUs and other fans units	0.32	2.65	12.1	WiP
Replacement of existing motors with Energy Efficient motors for Lab Air compressors	0.01	0.08	3.3	WiP

INNOVATIVE PROJECT - HONEYWELL – FORGE

STRATEGIC IMPERATIVES FOR BUILDING PORTFOLIOS

MAXIMIZE ASSET VALUE AND RETURN
Capital planning and just-in-time maintenance for lifecycle optimization

OPERATIONAL EFFICIENCY
Processes continually monitored and optimized

RELIABILITY AND READINESS
Systems available when needed through minimizing failures

SAFETY AND PRODUCTIVITY
Maintaining high safety standards while improving productivity

COMPETITION FOR TENANTS
Increasing the attractiveness of the building to attract and retain tenants

SUSTAINABILITY STRATEGY
Environmental and social responsibility demanded by shareholders and occupants

ADVANCE FAULT DETECTION

PERFORMANCE ANALYTICS
Detect issues before they turn into complaints. Optimize uptime and availability

BENCHMARKING AND COMPARISONS
Understand KPI improvements vs. historical and targeted levels

OPERATIONAL READINESS
Increase confidence that your facility will be optimally working when needed

CONTINUOUS OPTIMIZATION

TARGETED RESPONSE
Understand where to allocate resources to deliver the most beneficial results

TUNING TO ACTUAL USE
Continuous tuning as the building is repurposed and how it is used

BENEFIT FROM GLOBAL EXPERIENCE
Your building benefits from Honeywell's depth of experience

DIGITIZED MAINTENANCE

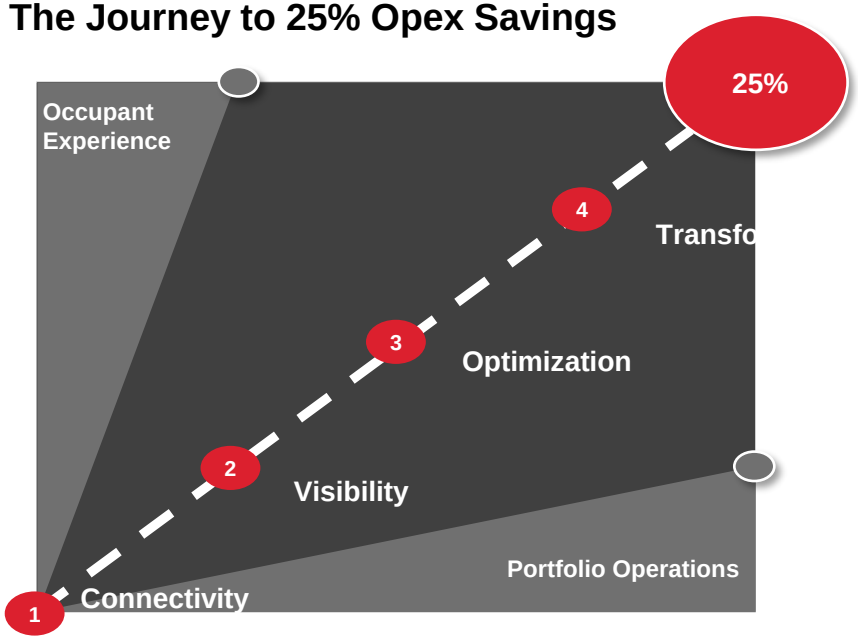
Keep Building More Competitive Through a Honeywell Forge Enabled Service Contract

TO MORE RAPIDLY DELIVER OUTCOMES FROM DATA YOU

NEED ALL THE LINKS IN THE CHAIN

- Connected building assets
- Analytics and Machine Learning
- Efficient workflow process
- Visibility and control
- Knowledgeable field staff

The Journey to 25% Opex Savings



Annual savings = INR 3.0 Lakhs

Innovative projects – SCALE BIO REMOVER SYSTEM

SBR System:

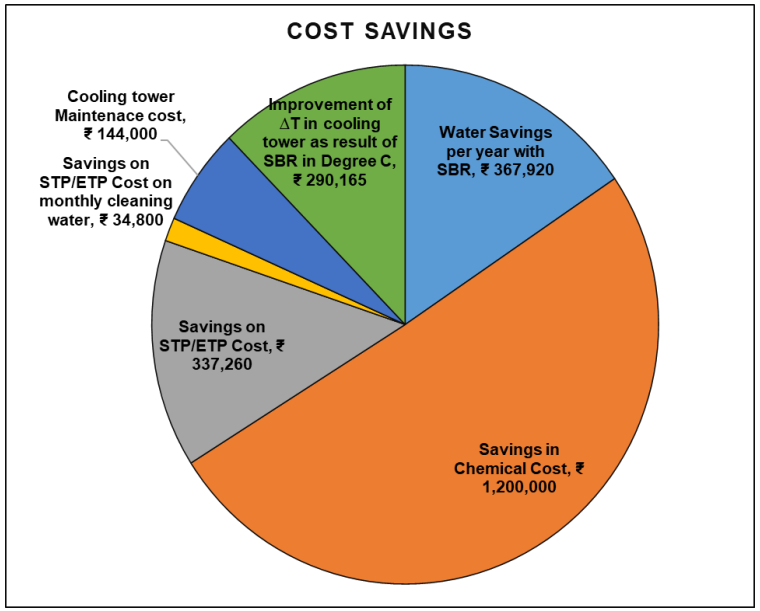
- Non-chemical treatment of cooling tower water - Deploys electrolysis reaction that breaks down and controls the elements that pollute water quality
- The chemical reactions on the cathode provoke the accumulation of scale particles on the cathode surface. The anodes create free radicals and molecules of chlorine, oxygenated water and ozone.
- The derived reactions create molecules of hypochlorite and chlorine. A pH alkaline coating is created, which causes the oxidation of eroded elements and their accumulation as suspended solids, which accumulate on the cathodes and the bottom of the tank.

Benefits

The SBR system maintains Cooling Tower circuits free of incrustations and biological dirt to improve operational efficiency and to provide the following benefits:

- Non-Chemical based and eco friendly
- Saves Electrical Consumption
- Saves Water
- Provides Clean Water
- Saving of Chemical Cost
- Reduces Corrosion

Scale Bio Remover – Non - Chemical based



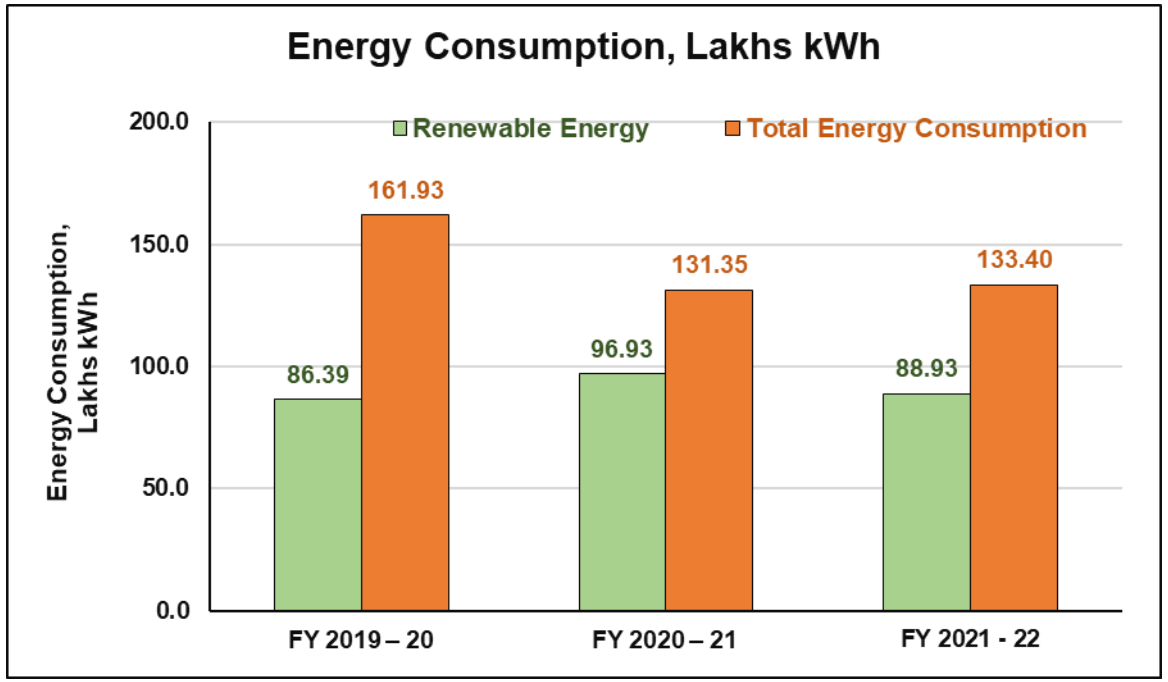
Cost Savings benefits	
	INR
SBR Project cost (Investment)	**43,00,000**
Savings – Cooling Towers	
Blowdown water cost avoidance (104 kL / month)	**1,56,000**
Chemical cost	**11,99,984**
Cooling tower maintenance cost / annum	**1,44,000**
Savings - Chillers	
Energy savings through Chiller Delta T(Chiller plant 1)	**89,855**
Energy savings through Chiller Delta T(Chiller plant 2&3)	**1,34,785**
Total Savings	**17,24,624**
ROI	**2.5**

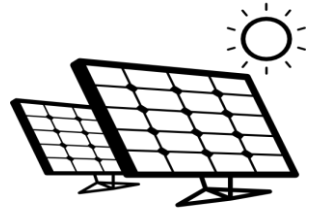
Key points

- 2,74,521 Gallons of water saved annually
- 24,960 kWh of Energy saved annually
- 20.7 Mtons of CO_2 emission reduced annually.

UTILIZATION OF RENEWABLE ENERGY SOURCE

Year	Renewable Energy Source, Lakhs kWh			Total Energy Consumption, Lakhs kWh	% Renewable Energy	CO_2 emission avoided, tons of CO_2
	PPA – Solar	Inhouse Roof top	Sub total			
FY 2019 – 20	85.80	0.59	86.39	161.93	53.3	6,859.4
FY 2020 – 21	95.40	1.53	96.93	131.35	73.8	7,628.4
FY 2021 - 22	87.55	1.38	88.93	133.40	66.7	6,998.8





65.0 %

21,486.5 Tons of CO_2

WASTE MANAGEMENT

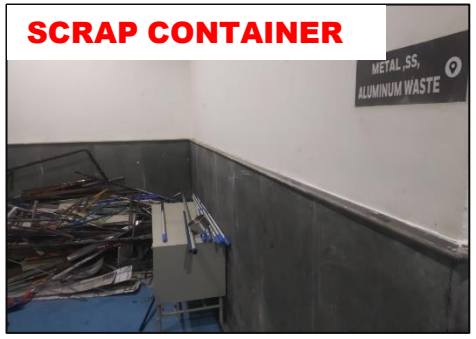
S. No	Type of Waste	Approximate Quantity	Disposal method
1	Food Waste	4,000 kgs / month	Wastes are processed and converted as organic compost, used for inhouse gardening, packed and given to employees for home gardens
2	E-Waste	300 kgs / month	Wastes are collected, segregated and stored at our inhouse E-Waste yard. These wastes are disposed to KSPCB Authorized vendors.
3	Non-Hazardous Waste	2,000 kgs / month	Wastes (Plastic, Wood, Metal, Carton boxes) are collected, segregated and stored at our inhouse Garbage/scrap Yard. These wastes are disposed to BBMP Authorized vendor.
4	Hazardous Waste	760 kgs / Quarter	Wastes are collected, segregated and stored at our inhouse Hazardous storage area. These wastes are disposed KSPCB approved vendor.
5	Battery Waste	169 Nos / annum	Wastes are collected, segregated and stored at our inhouse battery storage area. These wastes are disposed KSPCB approved vendor.


BATTERY WASTE STORAGE

OWC

GARBAGE YARD

HAZARDOUS STORAGE AREA



SCRAP CONTAINER

WATER MANAGEMENT

Installation of water saving aerators in all taps

Implemented year : 2021

- Total Water savings in kL : 2,554 kL / annum
- Estimated Cost Savings in INR : 0.319 M
- Total Investment in INR : 0.175 M
- Estimated ROI : 07 months

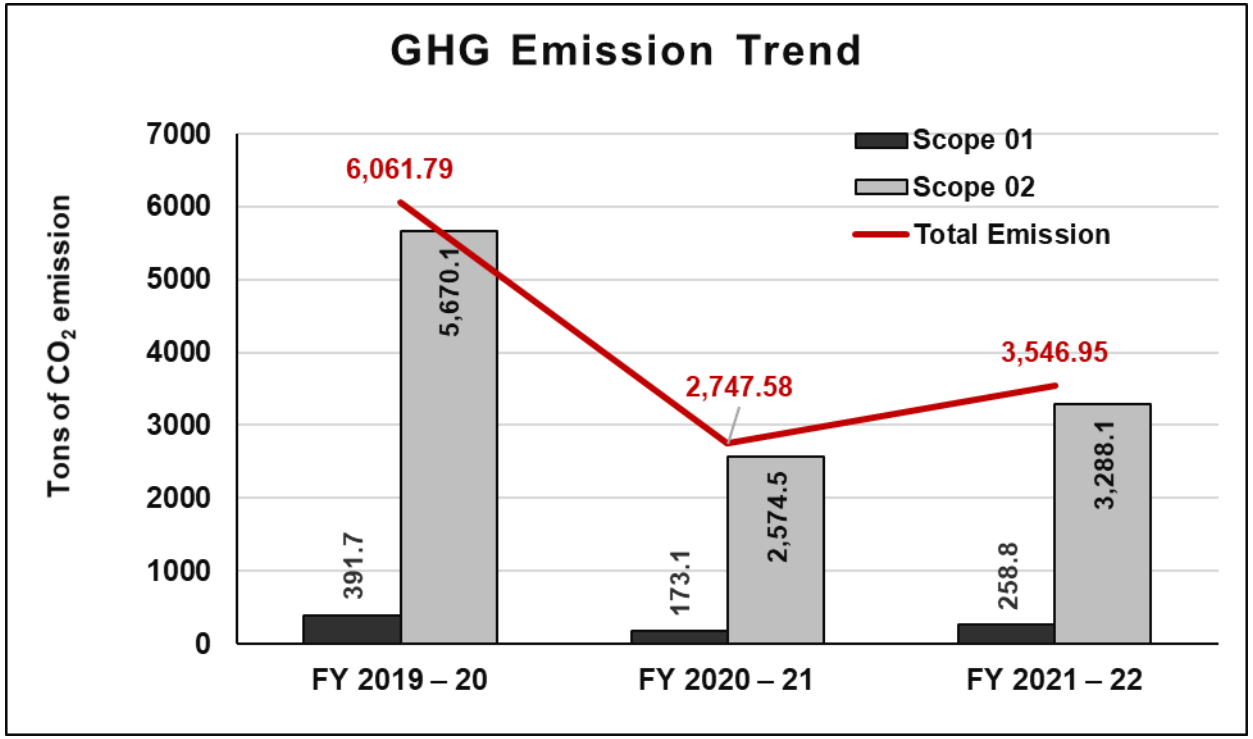
The facility has own STP plant.

The waste-water is treated in STP and reused for gardening and Toilet purpose.

The facility is Zero liquid discharge facility.

GHG EMISSION TREND

CO_2e year	Scope 01	Emission factor CO_2e / unit = 2.69	Scope 02			Total Emission CO_2 in tons
	Fuel consumed in liters	Total GHG emission in TCO_2e	Energy consumption in kWh	Emission factor CO_2e / unit	Total GHG emission in TCO_2e	
FY 2019 – 20	145,598	391.7	71,41,223	0.794	5,670.13	**6,061.79**
FY 2020 – 21	64,346	173.1	32,71,274	0.787	2,574.49	**2,747.58**
FY 2021 – 22	96,210	258.8	41,78,075	0.787	3,288.15	**3,546.95**



DG set operation

- **Optimization in DG set daily test**
  - *Implemented in 2020*
  - *A check frequency test reduced from daily to weekly once.*
  - *Annually 25.0 kL of Diesel consumption reduced.*
  - *Approx. 67.4 Tons of CO_2 emission reduction*

RE purchase

- **RE purchase – PPA - Solar**
  - *On an average 65.0 % energy consumption drawn from RE*
- **21,486.5 Tons of CO_2 off-set**

INDOOR AIR QUALITY - HONEYWELL - HEALTHY BUILDING INITIATIVE

AIR QUALITY IMPROVEMENT AT 9A 4F:

- Installation of EAC (Electronic Air Cleaner) in AHU's in place of MERV 13 Filters
- Introduction of UV Sterilizer Lights for AHU's
- Installation of IAQ sensors to monitor Temperature, Humidity, CO_2, PM 2.5 and TVOC
- Installation of DP sensor in toilets to monitor the negative pressure to understand fresh air circulation to avoid pungent odor in rest rooms
- Deployment of HB Dashboard and integration with EBI
- Installation of UV batten and Upper UV solutions in 9A 4F Rest rooms and 9B 2F respectively
- Installation of VESDA system to monitor the IAQ parameters such as Temperature, Humidity, CO_2 , PM 10, PM 2.5, PM 1.0 and TVOC

UVGI

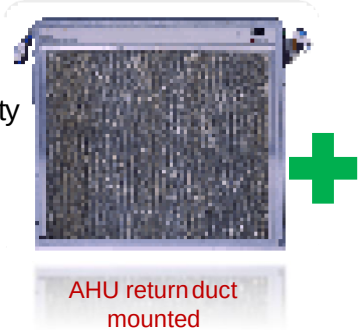
EAC

IAQ SENSOR

DP SENSOR

Filtration & IAQ

- **MERV 14** Filtration
- **UL Listed** for Safety
- BMS compatible



AHU return duct mounted

UV return duct mounted

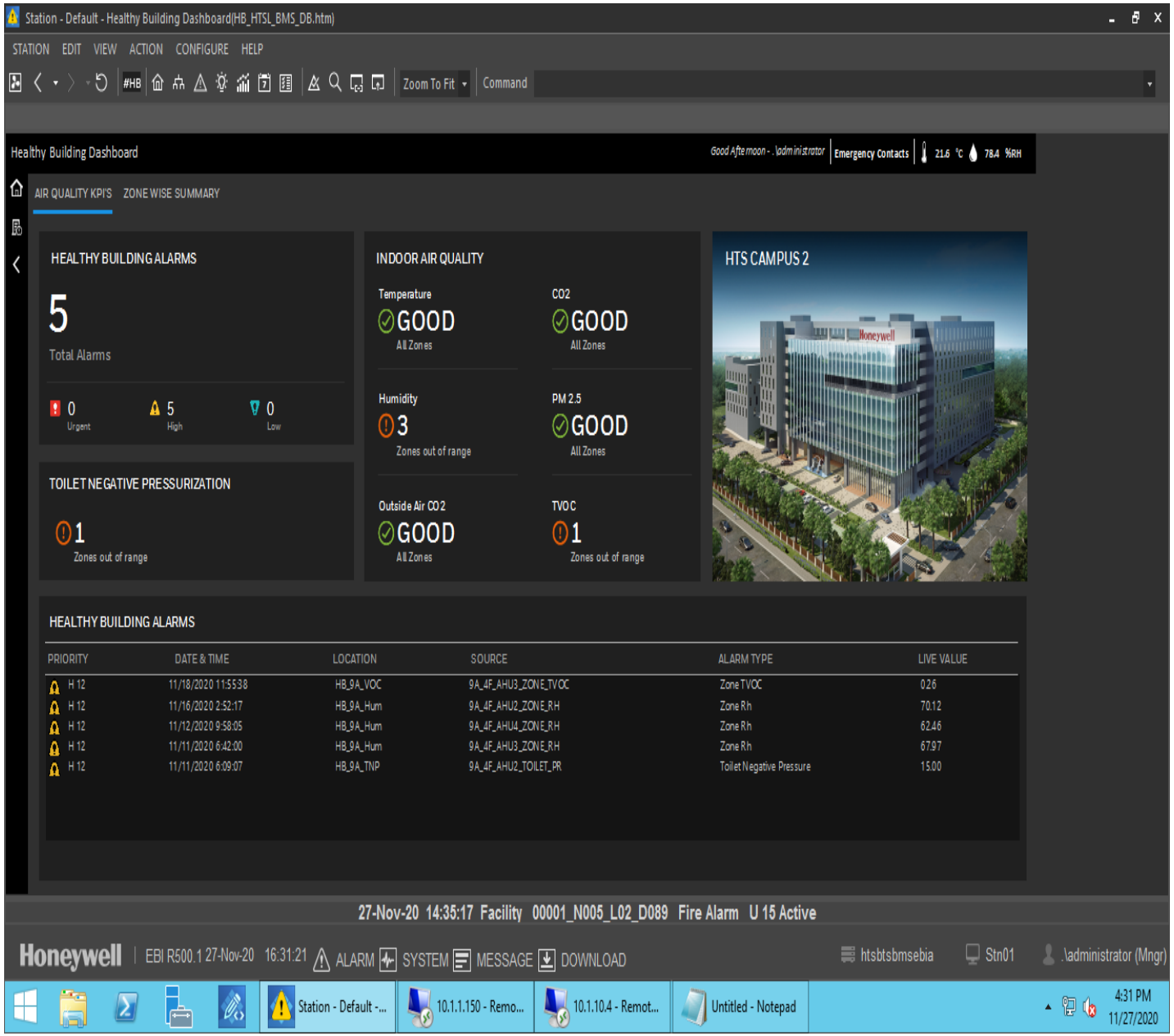
- UV Light with Cumulative Average intensity of **4647 microwatt / cm²**
- Lamp Life of **12000hrs**
- Distributed arrangement for better spread

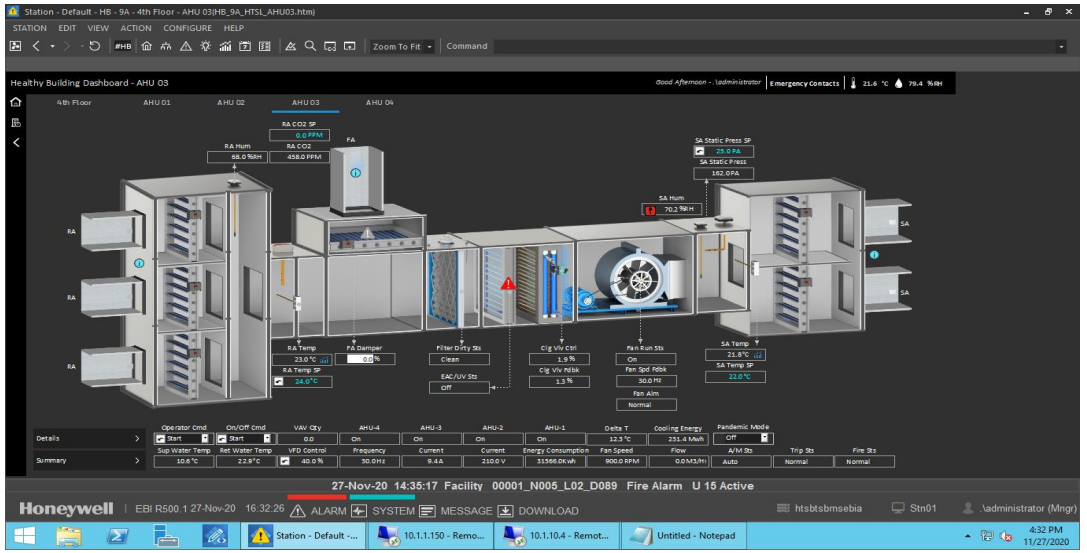
- Low-pressure drop.
- Low operating expenses.
- Approximate 15% of Energy savings observed in HVAC

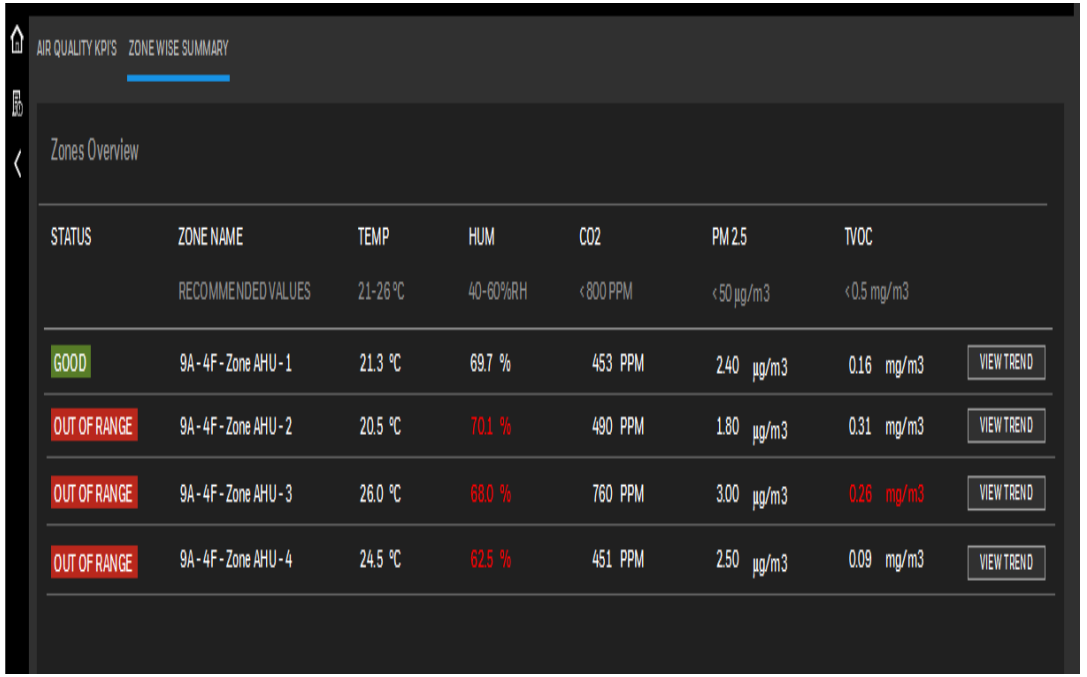
- Dual-stage electrostatic precipitators include two parts: the charging and the collecting sections.
- Since opposite charges attract, the positively-charged contaminants collect on the negatively charged aluminum plates, removing them from the air stream.

Pressure Drop	Media Filter			Honeywell EAC (MERV 14)	
(in mm)	Pre Filter	MERV 13	Total	Pre Filter	EAC
Initial	4	7	11	Not Required	6
Design	10	17	27		
Final	12	22	34		7

HBI – DASHBOARD



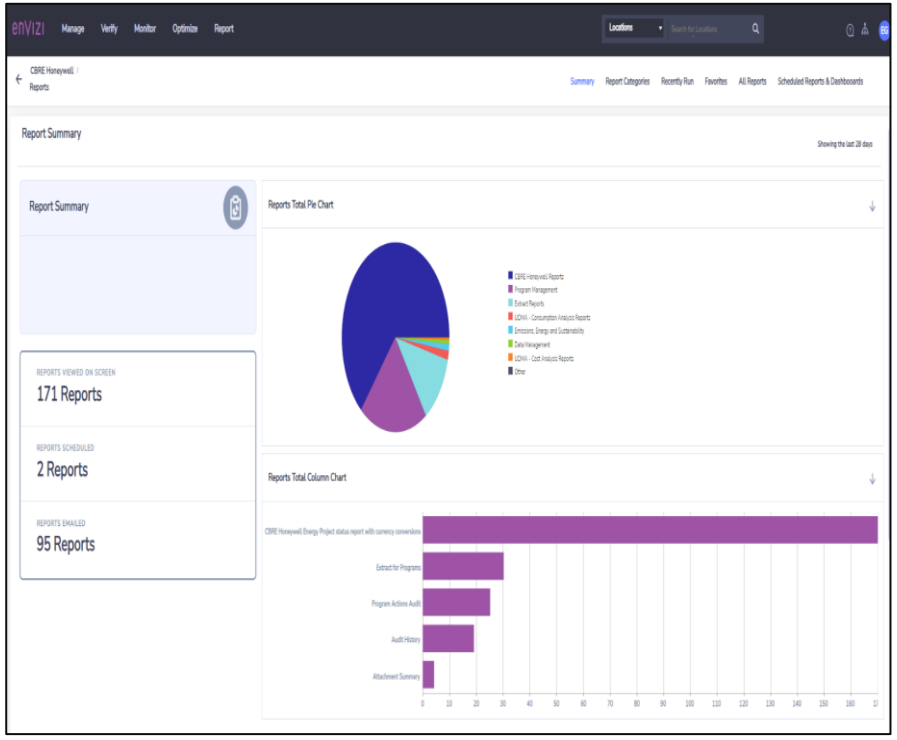




TEAMWORK, EMPLOYEE INVOLVEMENT & MONITORING

Energy Team

- Certified Energy Managers – 2 Nos.
- Weekly and monthly Energy review
- Energy Dashboard
- Dedicated Energy CAPEX budget
- Periodical Energy Training



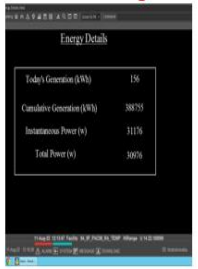
BMS Team :

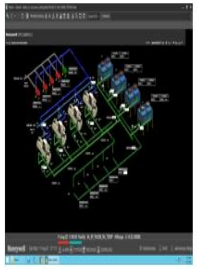
- monitor & control
- scheduling of utilities (Chillers, AHUs)
- monitoring of equipment's

  Viz., Transformer, DG, HVAC, UPS, Energy meters etc.,
- Energy consumption data analysis for critical equipment's

Energy Monitoring – *Daily & monthly*

Solar Energy Monitoring

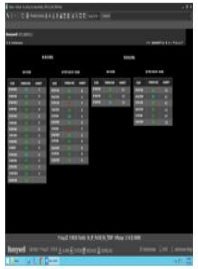




Chiller Plant Room Monitoring

AHU Monitoring

UPS Monitoring



Battery Room Monitoring

KAIZEN

- Reduced the air compressor pressure from 13 kg /cm^2 to 10 kg /cm^2; Energy saving of 88170 kWh / annum
- DG A Check optimization from daily to weekly
- Timer optimization in Lighting sensor

IMPLEMENTATION OF ISO 50001 / IGBC RATING

CII

Confederation of Indian Industry

Indian Green Building Council (IGBC)

hereby certifies that

RMZ Ecoworld Plot C2

Bangalore

has achieved precertification under the IGBC's LEED India for Core & Shell Rating System. Documentation has been submitted for this project, which demonstrates an intent to design and build a high performance building in accordance with IGBC's LEED India Green Building Rating System

IGBC's LEED 2011 for India Pre-certified Gold

April 2016

C N Raghavendran
Chairman, LEED India

Dr Prem C Jain
Chairman, IGBC

S Raghupathy
Executive Director, CII-Godrej GBC

IGBC GREEN RATING
INDIAN GREEN BUILDING COUNCIL
IGBC
GOLD

LEED

&

WELL Certification

aimed for

Bangalore campus 02

by

December 2022

Bangalore Campus 02 - certified by IGBC for GOLD

Honeywell Facility Team

Name	Designation	Email ID
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THANK YOU

Honeywell