



***FORTIS HOSPITAL MOHALI, A MULTY SPECILITY HOSPITAL***

***CII 22<sup>nd</sup> National Award for Excellence in Energy Management-2021***

***Presented By: - Mr Neeraj Tandon  
Chief Engineer***



# BUILDING DETAILS



<b>Total Plot Area</b>	<b>8.22acre</b>
<b>Builtup area</b>	<b>50336sqm</b>
<b>No of Beds</b>	<b>448</b>
<b>Operation Theatres</b>	<b>16</b>
<b>Incoming Electrical</b>	<b>2 Sources 11KVA</b>
<b>Generators</b>	<b>1250KVA *3nos</b>
<b>Transformer</b>	<b>2000KVA*4nos</b>
<b>Chiller Plant</b>	<b>433TR*2nos</b>
<b>UPS</b>	<b>200KVA *3nos(UPS are in parallel load with ATS), 120KVA *3Nos.</b>
<b>Fuel</b>	<b>PNG from AGL, HSD</b>

➤ *Fortis Hospital Mohali Establishes in 2001, Approx 2000 sqf/cardiac ICU bed instead of the normal 800-900 sqf/in Indian healthcare Hospital set on sprawling 8.22 acres, with built up area of 50336 square meters.*

➤ *FHM is a 360(448) bedded, JCI and NABH certified multi specialty tertiary care hospital,*

➤ *Fortis Hospital, Mohali has won several awards, including; Best Design Award from American Institute of Architects, 1999*

## **Number of Buildings: 4**

- IPD Block (A block)
- OPD Block (B block)
- Rehabilitation Centre
- Fortis Cancer Institute

# NATURAL ENERGY USAGE FOR LIGHTING

## Fortis Hospital Mohali

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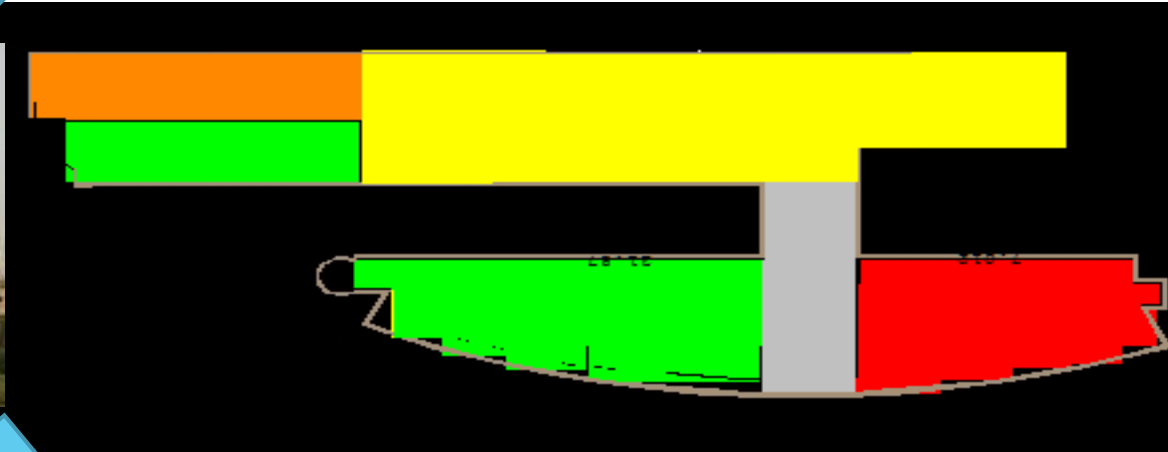
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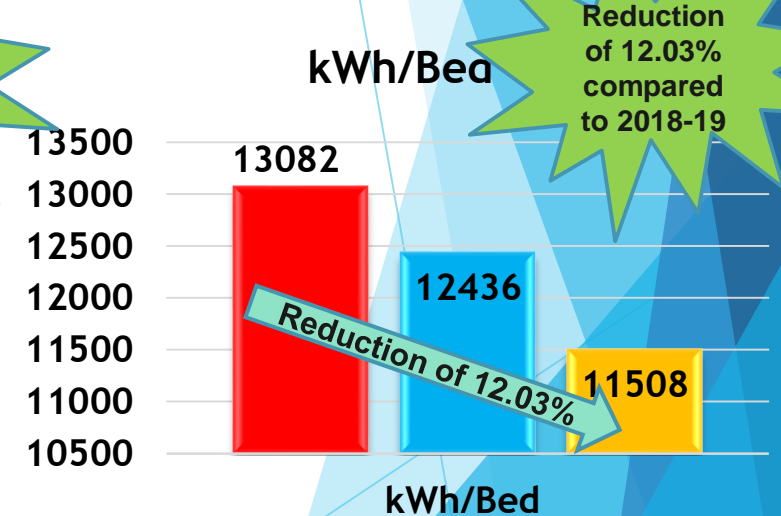
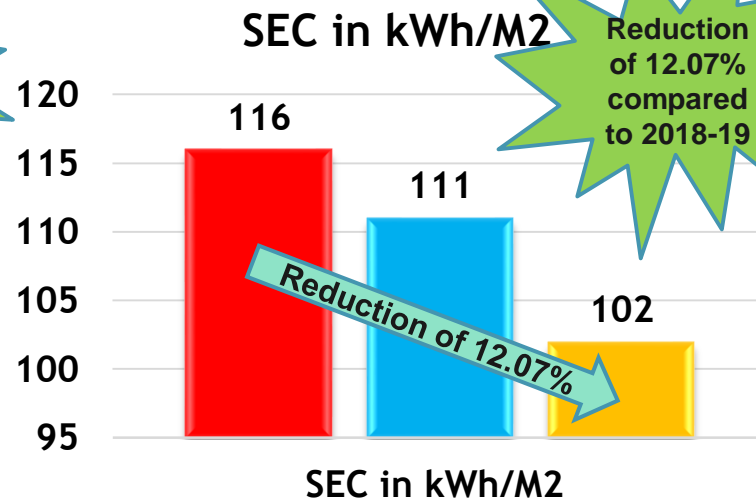
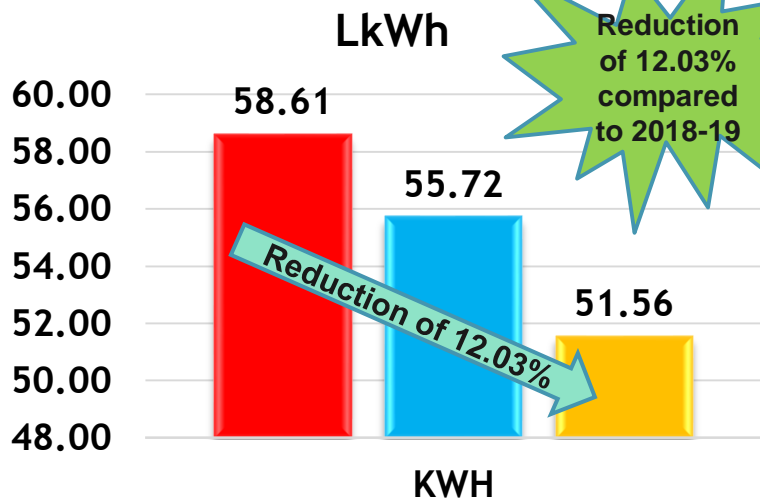


Glass type	Direction
Double Glaze Unit	NW
Low-U Double Glaze Unit	SW

Parameter	Baseline Glass specs as per AHRAE 90.1	Normal DGU Glass (North-east)	Low e Glass (South-west)
U Value (Btu/hr-sqft *F)	1.2	0.49	0.35
SHGC	0.25	0.35	0.23

# Energy Consumption Overview

Parameter	2018-19	2019-20	2020-21
KWH	5860805	5571526	5155549
SEC in kWh/M2	116	111	102
kWh/Bed	13082	12436	11508
No. Of Beds	448	448	448
Average Occupancy	88%	89%	87%
Built Up area	50336	50336	50336



■ 2018-19   ■ 2019-20   ■ 2020-21

■ 2018-19   ■ 2019-20   ■ 2020-21

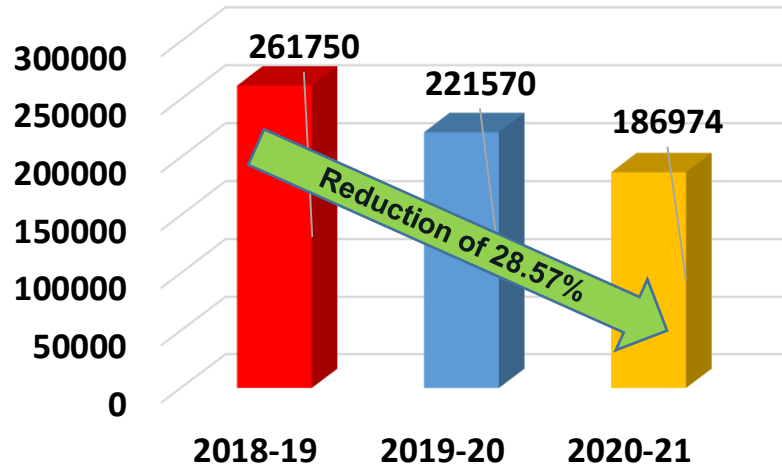
■ 2018-19   ■ 2019-20   ■ 2020-21

- ✓ Energy Consumption:-Reduction of 12.03% compared to 2018-19
- ✓ SEC:- There is a reduction of 12.07% compared to 2018-19
- ✓ kWh/Bed:- Reduction of 12.03% since 2018-19

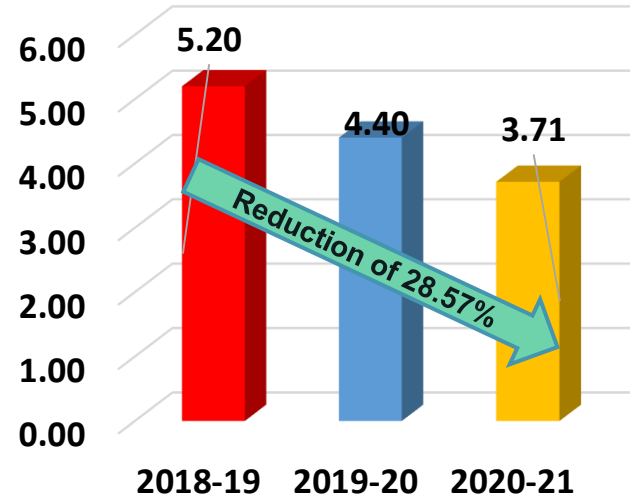
# Thermal Energy Consumption Overview

Parameter	2018-19	2019-20	2020-21
HSD /PNG (CBM)	261750	221570	186974
PNG CBM/M2	5.20	4.40	3.71
PNG CBM/Bed	584	495	417
No. Of Beds	448	448	448
Average Occupancy	88	89	87%
Built Up area	50336	50336	50336

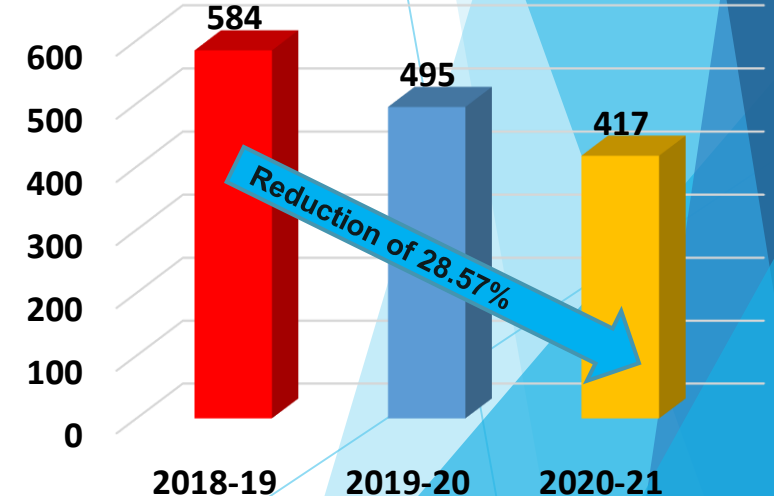
**PNG Consumption**



**PNG CBM/M2**



**PNG CBM/Bed**



- ✓ HSD+PNG/M2:- There is a reduction of 28.57% compared to 2018-19
- ✓ HSD+PNG Consumption:- Reduction of 28.65% compared to 2018-19
- ✓ HSD+PNG/BED:- There is a reduction of 28.60% compared to 2018-19

# FORTIS MOHALI ENERGY PERFORMANCE VS GLOBAL, NATIONAL & COMPETITION BENCHMARK

## Internal Benchmark

❖ Bring down the SEC to a double digit figure by 2023

Target	Consumption (kWh)	SEC (kWh/m <sup>2</sup> )	% Saving
Short Term	5000880	99	3.0%
Mid term	4825850	96	6.5%
Long term	4639995	92	10.0%

Specific Energy consumption of Fortis Mohali is 102 kwh/m<sup>2</sup>

BEE National benchmark is defined for Hospitals is 200 kWh/m<sup>2</sup>

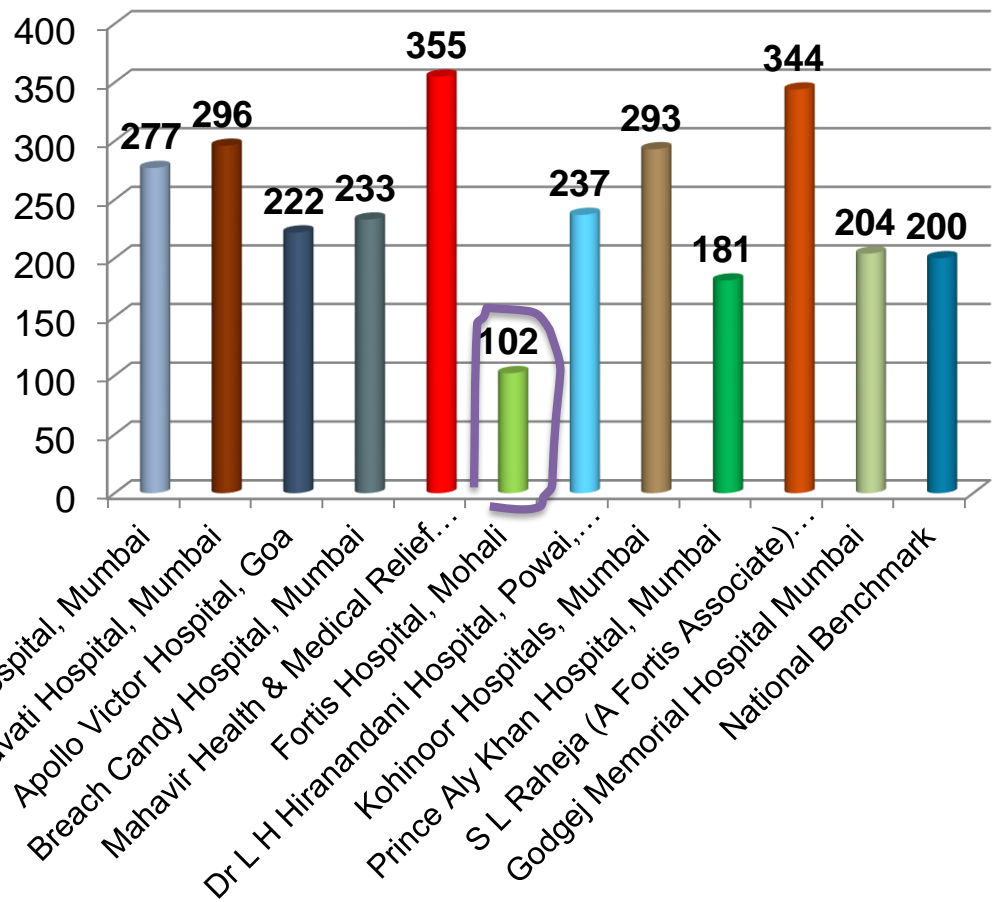
Global benchmarking defined by Serbia, UK and Germany (CIBSE TM 46), (EnEv) 205kWh/m<sup>2</sup>

Specific Energy consumption of Fortis Mohali is 102 kwh/m<sup>2</sup> which is 51.5 % below the global bench marking and 49% below the National Benchmark

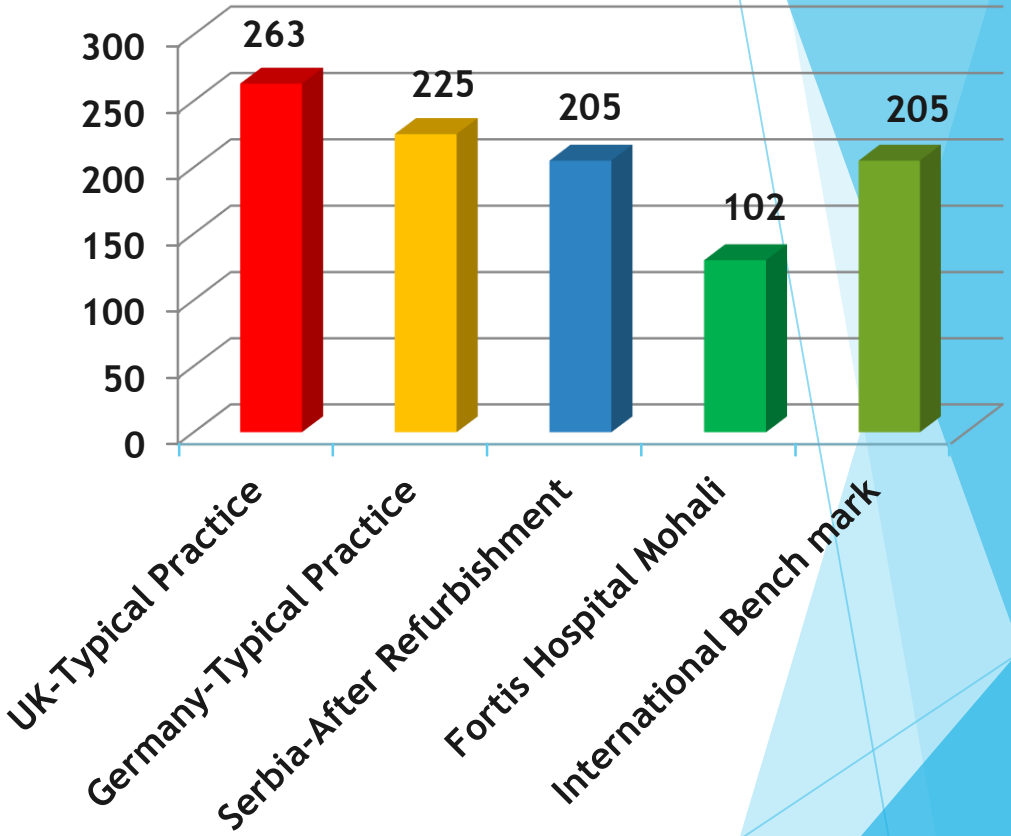
# NATIONAL BENCH MARKING (KWH/SQM)

# International Benchmarking

Specific Energy Consumption (kWh/Sqm/Year)



Specific Energy Consumption -kWh/Sq.Mtrs./year

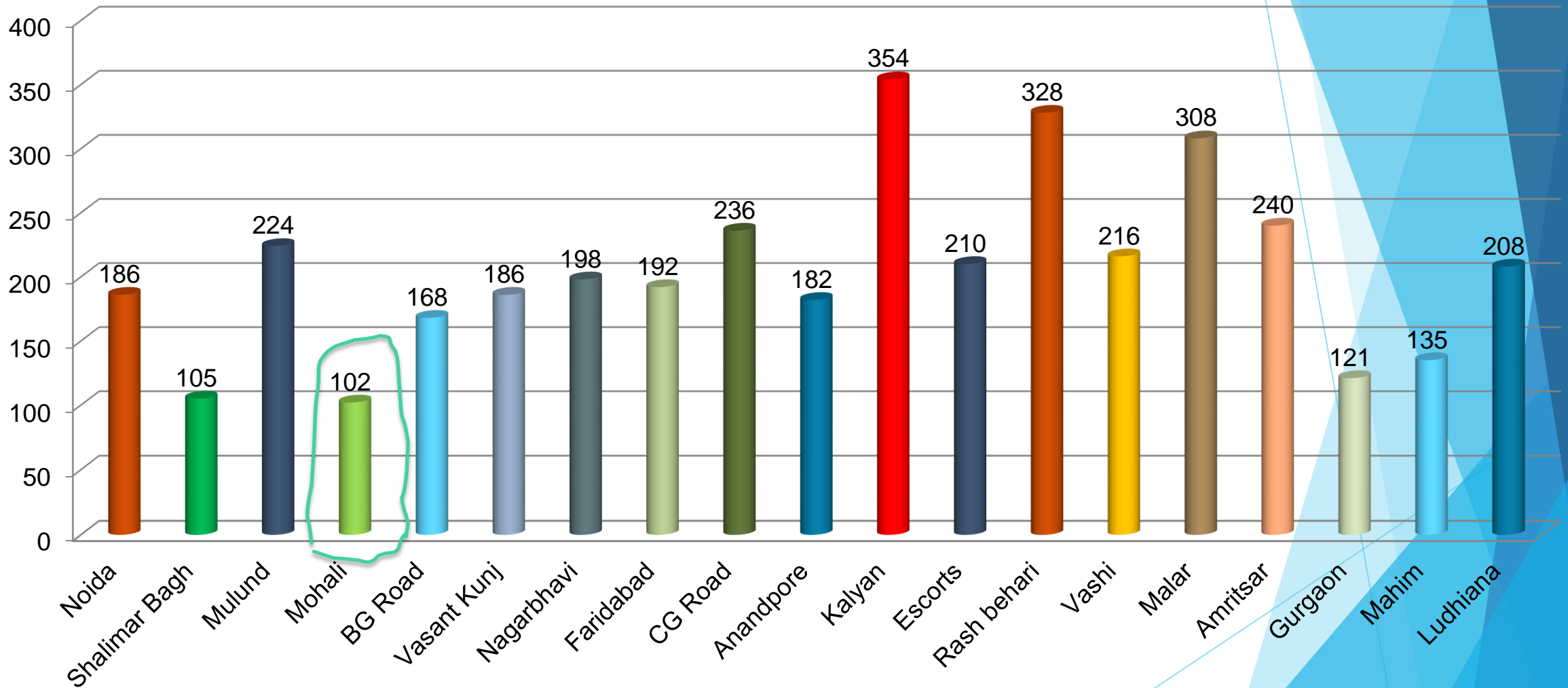


Reference A report on Energy efficient hospitals survey by CII, Schneider and S.L.Raheja  
**BEE National benchmark is defined for Hospitals is 200 kWh/m2**

Comparison of building energy benchmarks in Serbia, UK and Germany (CIBSE TM 46), (EnEv)----- KWH/M2

# EPI Index across Fortis Hospitals

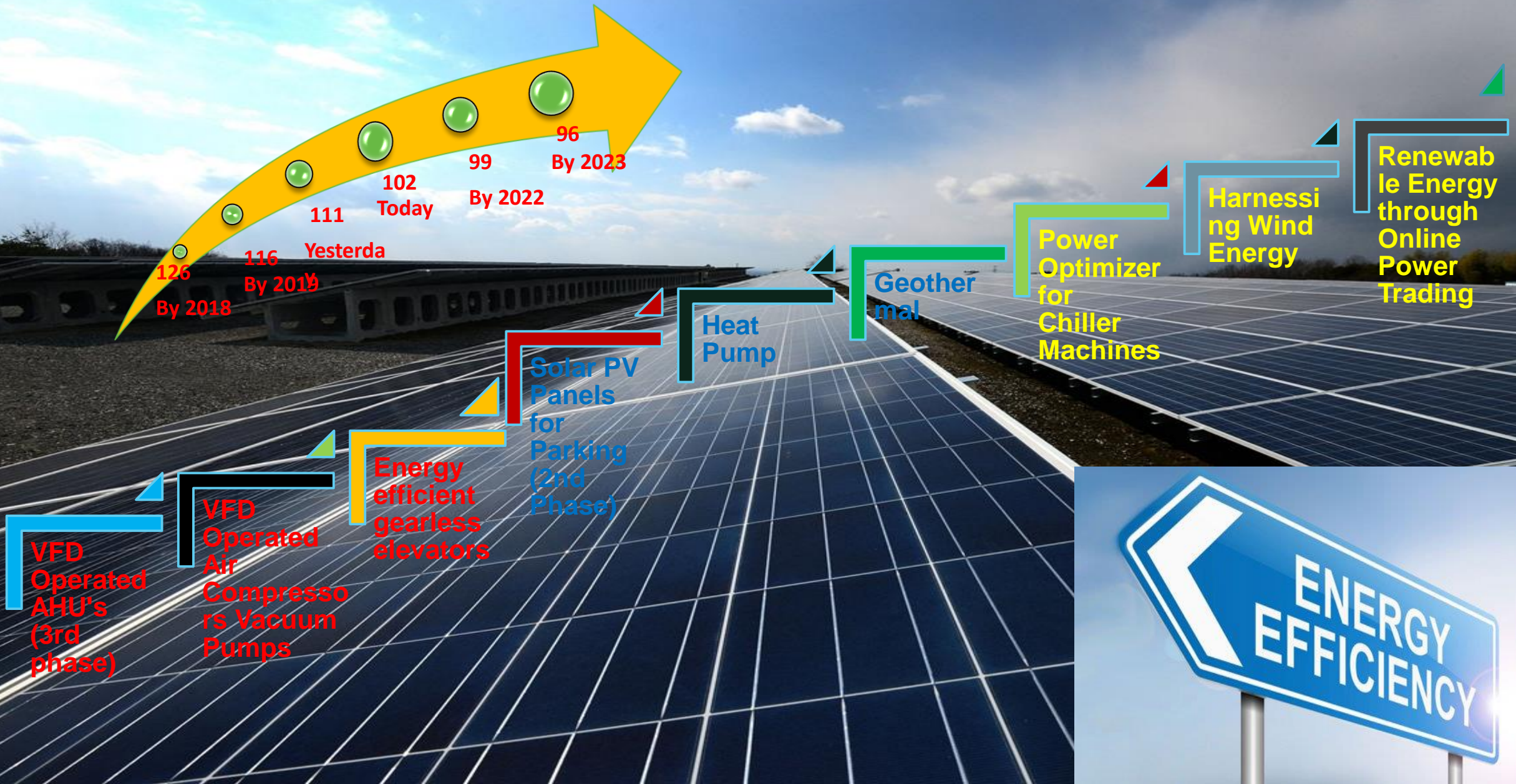
## Energy performance Index



Energy performance Index for Fortis Group Hospitals All Weather



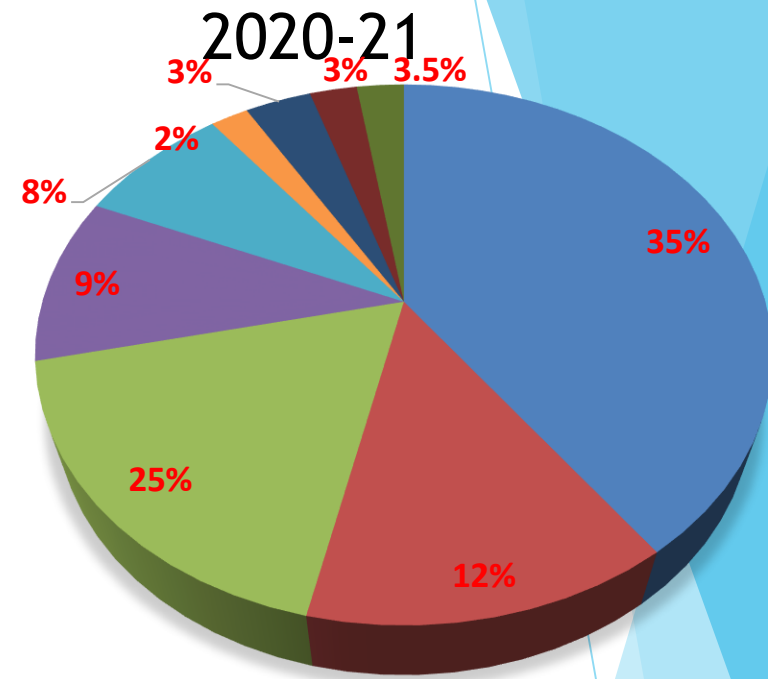
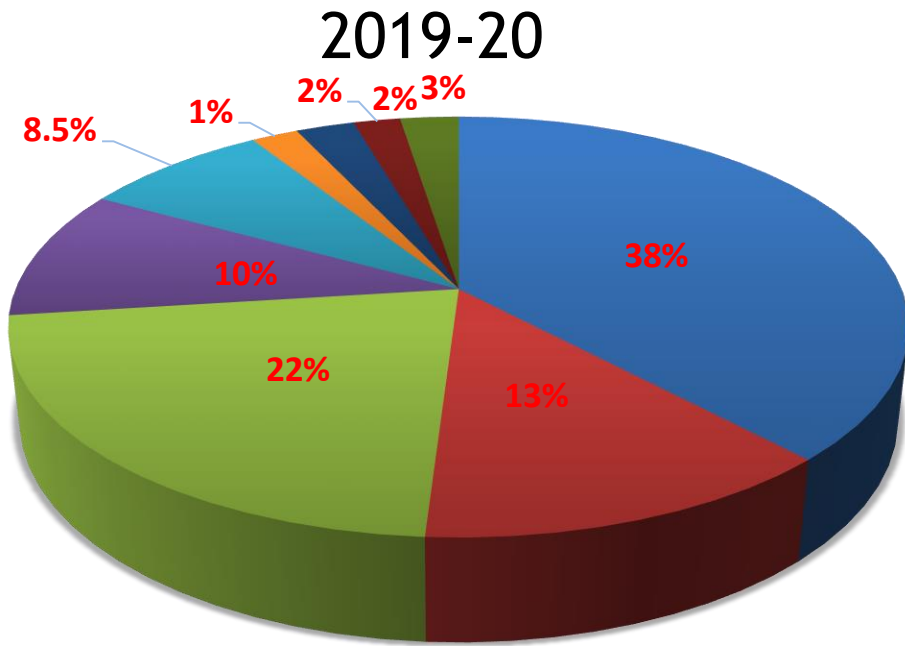
# Roadmap for being Global Leader in Energy Efficiency....



# ENCON PROJECTS PLANNED IN FY 2021-23

Year	Description
2021-22	VFD Operated AHU's (3rd phase)
2021-22	VFD Operated Air Compressor/Vacuum Pumps
2021-22	Energy efficient gearless elevators
2021-22	Solar PV Panels for Parking (2nd Phase)
2021-22	Heat Pump for Hot Water
2021-22	Geo Thermal system to stop usage of Cooling Towers for water cooled Chillers
2022-23	Power Optimizer for Chiller Machines
2022-23	Harnessing Wind Energy
2022-23	Renewable Energy through Online Power Trading

# ELECTRICAL LOAD DISTRIBUTION(%)



- HVAC
- Boilers
- Laundry
- Lighting
- Water Systems
- Medical Gases
- Medical Equipment
- DG Sets
- STP

- HVAC
- Medical Equipment
- Water Systems
- Lighting
- Boilers
- DG Sets

Area	2019-20	2020-21	Remarks
HVAC	38	35	Reduction of 3% kWh due to Modification in ducts for one AHU run's instead of two and VFD operated AHU's , Dehumidifier and FCU replacement.
Lighting	13	12	Reduction of 1% due to the LED replacement & motion sensors and rest due to the addition of other loads
Medical Equipment's	22	25	Increased by 3% due to the new equipment's
Water System	8.5	8	Slightly decreased by 0.5% due to modification in STP/ETP
Laundry	3	3.5	Increased by 0.5% due to the new equipment's

# Our Encon Journey

Best Design Award from American Institute of Architects

**1999**

**2018**

- 1. Chillers on VSD
- 2. PNG for Boilers
- 3. Installation of ETP and reutilization of Water
- 4. VFD operated Air compressor

**2018**  
EPI 116

**2019**

- 1. Automatic Chiller Tube cleaning System
- 2. PNG for Kitchen
- 3. Replacement of Conventional AHU's with VFD operated AHU's
- 4. Additional Automatic power factor controller
- 5. STP Modification with UV

**2019**  
EPI 111

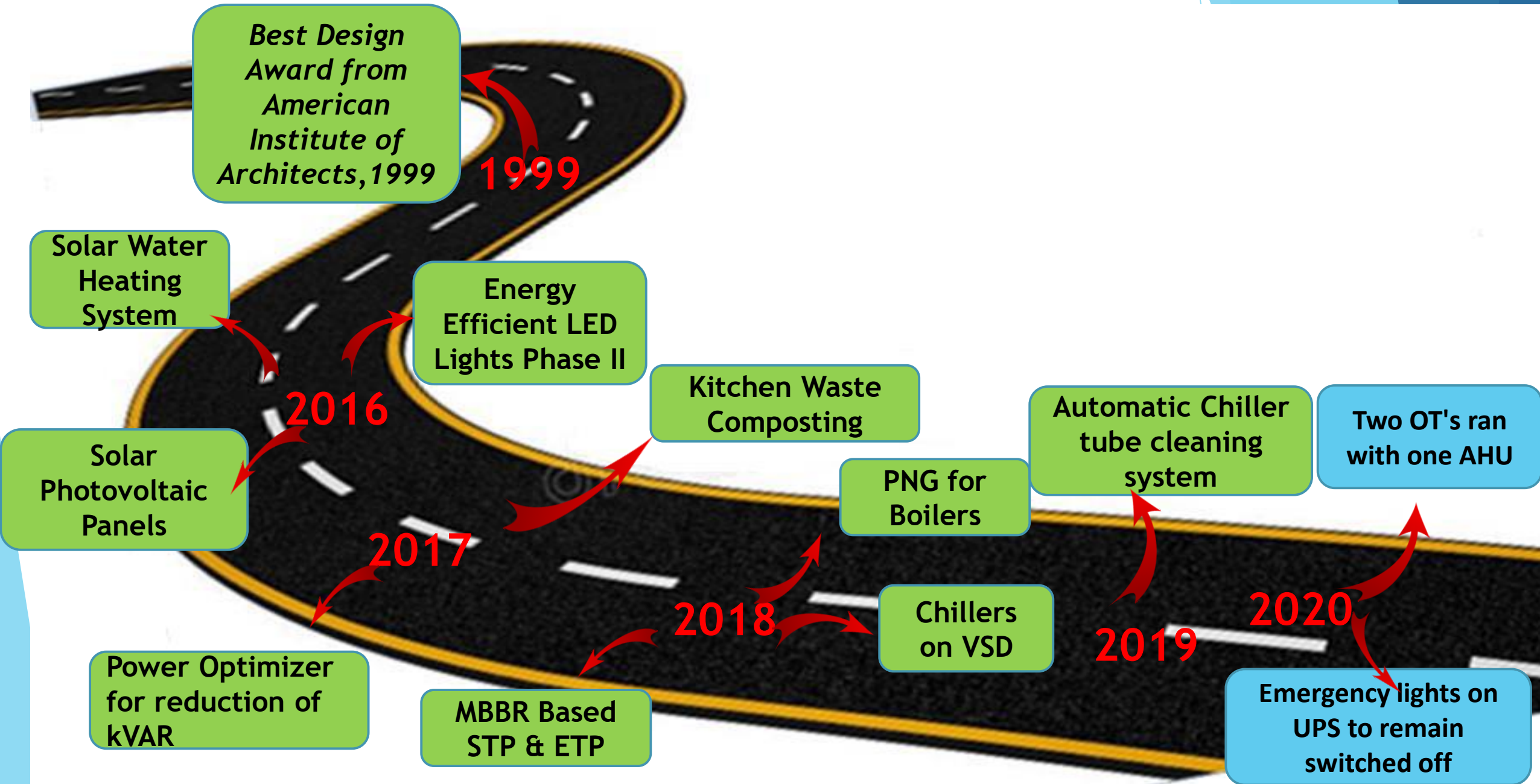
**2020**

- 1. Double skin AHU with VFD
- 2. Split AC's replaced with FCU's
- 3. Humidity controls in OT's
- 4. Creation of negative pressure OT/ICU's
- 5. Ensured 24X7 Operation of boilers on PNG instead of HSD
- 6. PC's will go to sleep mode automatically

**2020**  
EPI 102

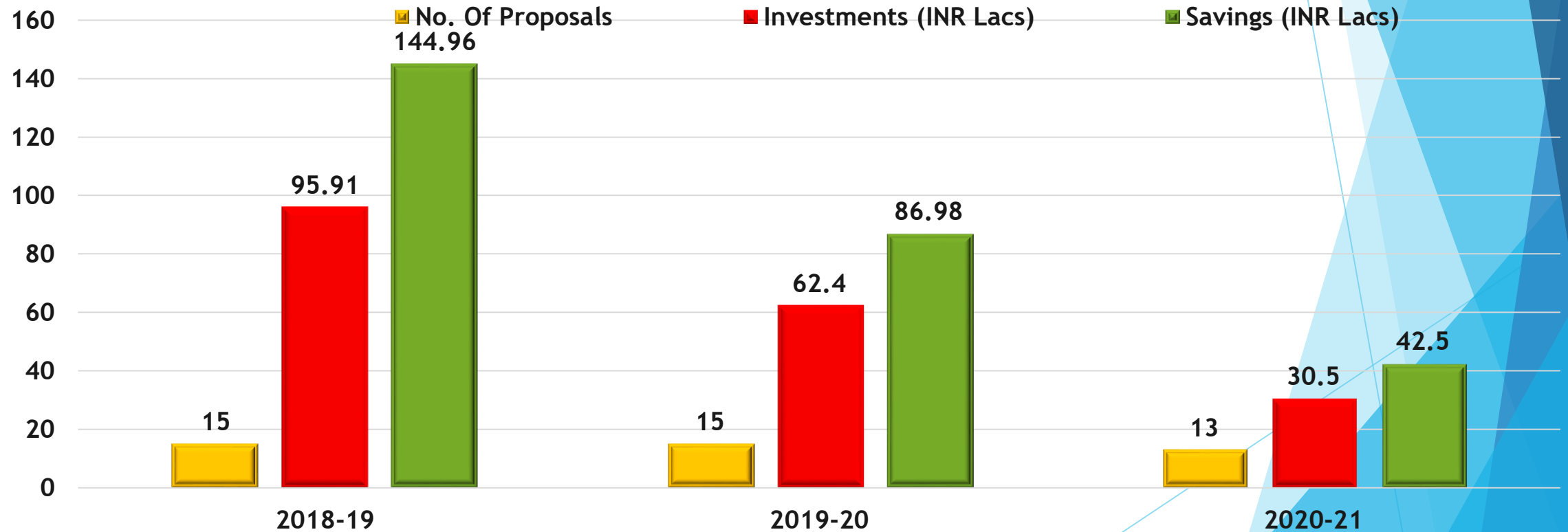
**BEE National Benchmark 200**

# FIRST OF ITS KIND PROJECTS IN HOSPITAL



# SUMMARY OF PROJECT IMPLEMENTED IN LAST THREE YEARS

Year	No of Energy Saving Projects	Investments (INR Million)	Electrical Savings (Million kWh)	Thermal Savings Million Kcal/MTOE)	Savings (INR Million)
2018-19	15	9.59	0.75	0.143	14.496
2019-20	15	6.24	0.746	0.007	8.698
2020-21	13	3.05	0.422	0.015	4.25



# LIST OF ENCON PROJECTS IN 2020-21

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Thermal Saving	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)	CO2e Reduction (MT)
1	Vintage old inefficient AHU's replaced with New double skin AHU with VFD	2020-21	82760	0	0.68277	1	2	68
2	Split AC's replaced with FCU's in Engineering Service Area & revrse for night.	2020-21	22700	0	0.187275	0.5	3	19
3	Humidity controls in OT's	2020-21	20000	0	0.165	0.85	5	16
4	Creation of negative pressure OT/ICU's thus load on chiller reduced	2020-21	13000	0	0.10725	0.5	5	11
5	Ensured 24X7 Operation of boilers on PNG instead of HSD by all boilers got PNG compatible	2020-21	0	15	0.77	0.2	0	40
6	Optimized usage of primary pumps in HVAC chiller system	2020-21	43200	0	0.356	0	0	35
7	PC's will go to sleep mode automatically after 3 minutes if not in use across hospital	2020-21	20000	0	0.165	0	0	16
8	Rational n optimum use of elevators	2020-21	47200	0	0.389	0	0	39
9	Emergency lights on UPS to remain switched off , only to be on during power outage	2020-21	20000	0	0.165	0	0	16
10	Linear Accelerator/Brachy area AHU ran with one AHU	2020-21	30000	0	0.248	0	0	25
11	Optimization of ICU AHU's running in nights/COVID period	2020-21	47900	0	0.395	0	0	39
12	Two OT's ran with one AHU during Covid period/Night ( 3 nos)	2020-21	51200	0	0.422	0	0	42
13	Chiller running optimization done by increase in set point during Covid phase/dry summer	2020-21	23900	0	0.197	0	0	20
<b>Total</b>			<b>421860</b>	<b>15</b>	<b>4.249295</b>	<b>3.05</b>	<b>15</b>	<b>386</b>

**These projects have been replicated in other units**

# Energy Savings Project Implemented in 2020-21

Split AC's replaced with FCU's  
Investment of 0.05Million  
Saving of 0.23LkWh



Rational n optimum use of elevators

Zero Fund Investment  
Saving of 0.47LkWh

Vintage old inefficient AHU's replacement

Investment of 1.0Million  
Saving of 0.83LkWh

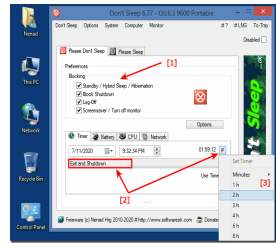
PC's will go to sleep mode automatically  
Zero Fund Investment  
Saving of 0.20LkWh

Two OT's ran with one AHU  
Zero Fund Investment  
Saving of 0.51LkWh

Optimized usage of primary pumps in HVAC chiller system  
Zero Fund Investment  
Saving of 0.43LkWh



Savings of 4.22LkWh Power Units & 386MT CO2e





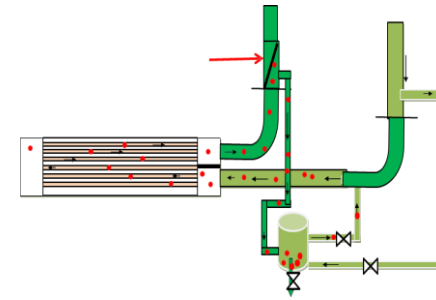
# Energy Savings Project Implemented in 2019-20



REPLACEMENT OF CONVENTIONAL AHU'S



AUTOMATIC POWER FACTOR CONTROLLER



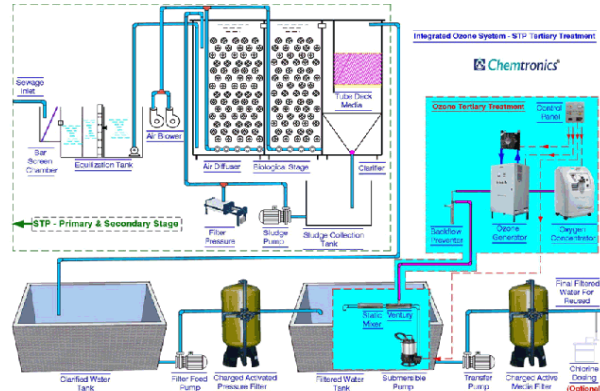
AUTOMATIC chiller tube cleaning system



MODIFICATION OF LIGHTING CIRCUIT



HYDROPATH



UV/UF filtration in STP



PNG & AGNISUMUKH Burner in Kitchen



Thermal recycling in Laundry

Savings of 7.46LkWh Power Units & 630MT CO2e

# Energy Savings Project Implemented in 2018-19



**Chillers on VSD**



**PNG for boilers**



**Splits AC's for night**



**LED Lights**



**Energy Efficient Motors**



**VFD operated  
Air Compressor**



**VFD on AHU's**

Savings of 7.45LkWh Power  
Units & 988MT CO<sub>2</sub>e

# Innovative Project (1)

## Optimized usage of primary pumps in HVAC chiller system

**Statement:** Running Operations of HVAC contributes to huge Energy costs thus its rational usage was need of the hour

### Trigger for implementing the project

The trigger was to stop the wastage of energy.

**Working:** Although primary pumps were installed to cater water to the chiller so that adequate GPM required for efficient running in maintaining the desired output temperatures are maintained. However, we observed that due to the placement of our plant in basement, in team meeting technicians came up with idea that water flow can be made available in case we stop even running Primary pumps, in order to have it established we placed GPM meters and through gravity we could achieve the desired GPM.

OEM was consulted hence one bye-pass line was connected in return line & observed the required GPM needed were achieved hence, Primary pumps 7.5 kW ( 2Nos) remained switched off for 10-12 hours in a day. Team work led to this innovation.



### Cost Benefit Analysis

Energy Savings	43200 kWh
Cost Savings	Rs.3.56Lacs
Investment	Nil
Payback	Immediately

**Replication Potential: Yes**

# Innovative Project (2)

## ENERGY CONSERVATION THROUGH OPTIMUM USAGE OF OT AHU's

**Statement: 6 Nos OT's remained in operation 24x7 with AHU's running**

### Trigger for implementing the project

Challenge: 6 Numbers Cardiac and Ortho OT's were being fed from AHU's each on 100% fresh air supply. OT's AHU's remain on 24X7 irrespective of occupied or not and it was always painful to maintain temperatures and run AHU even if there are no cases post OT hours.

Result :We decided to run one AHU and give flow through duct by placing damper and thus we were able to give airflow through running one AHU and kept One AHU off of 12.5 KW the raise the temperature up to 27-28 deg during night hours and continue this during Sundays.

**Replication Potential: Yes**



### Cost Benefit Analysis

Energy Savings	51200 kWh
Cost Savings	Rs.4.22Lacs
Investment	Nil
Payback	Immediately

# Innovative Project (3)

**Emergency lights on UPS to remain switched off , only to be on during power outage**

## Statement:

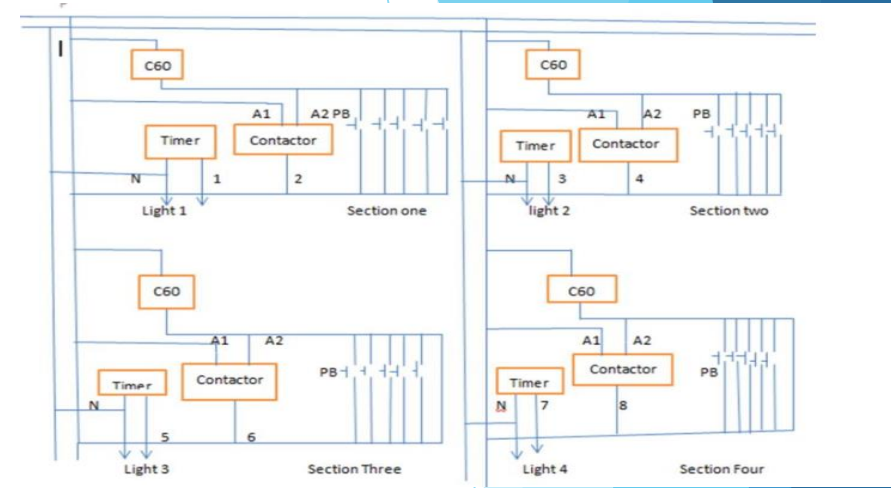
Central UPS which caters to critical OT Supply, Lighting etc. is lifeline and remained loaded during day.

## Trigger for implementing the project

With rise in facility and equipment load , UPS remained loaded with each passing day and in order to have reliable operations there was a need to reduce load on it to have smooth parallel operations of 2x200 kVa Operations

## Working:

Innovative idea came during Energy conservation brain storming meeting. It was observed that Emergency Lights remain ON 24X7 During day as well as night. In order to reduce load decided and made a provision to shut these lights off and will come into work only during the power outage thus reduces the load on UPS besides average life of these tubes were enhanced.



## Cost Benefit Analysis

Energy Savings	20000 kWh
Cost Savings	Rs.1.65Lacs
Investment	Nil
Payback	Immediately

**Replication Potential: Yes**

# Encon Project- Vintage old inefficient AHU's replaced with New double skin AHU with VFD

**Statement:** Inefficient ICU's AHU's replaced with Efficient VFD operated AHU's

## Trigger for implementing the project

Consistent problems were being faced due to non efficient AHU's resulted in increased complaints and patient discomfort. Analysis was done during the peak rainy season hence found AHU's were working with 50-55% efficiency thus decided to replace with efficient AHU's so that the wasteful energy losses be controlled with no patient discomfort.

## Working:

The planning was done in such a way that disruption in day to day operations would be minimal and for this had to wait for shutdowns/ movement of patients to other ICU's was a challenge.



## Cost Benefit Analysis

Energy Savings	82760 kWh
Cost Savings	Rs.6.83Lacs
Investment	10 Lacs
Payback	5 Months

**Replication Potential: Yes**

# Encon Project- Rational & optimum use of elevators

## Statement

Some elevators were found to be in use during off hours when not required hence rationalize its usage and were able to stop 4 elevators for more than 10 hours a day not only saving us huge kWh besides reduction in less complaints due to less wear and tear enhanced life.



### Cost Benefit Analysis

Energy Savings	47200 kWh
Cost Savings	Rs.3.89Lacs
Investment	Nil
Payback	Immediately

Replication Potential: Yes

# Encon Project- Optimization of ICU AHU's running in nights/COVID period

## Statement

Both Cardiac (CCU) & SICU( Surgical) ICU's were being fed with two AHU's , but it was observed during Covid period with low occupancy there was no need to give low temperatures , Also with new high end AHU's running both the ducts were modified with auto damper controls.



### Cost Benefit Analysis

Energy Savings	47900 kWh
Cost Savings	Rs.3.95Lacs
Investment	Nil
Payback	Immediately

Replication Potential: Yes

## Encon Project- Split AC's replaced with FCU's in Engineering Service Area & reverse for night

### Statement

Some of the splits were shutoff during the day and were remain in operation during night hence huge energy savings were achieved.



### Cost Benefit Analysis

Energy Savings	22700 kWh
Cost Savings	Rs.1.87Lacs
Investment	5.0 Lacs
Payback	3 Months

Replication Potential: Yes

## Encon Project- Linear Accelerator/Brachy area AHU ran with one AHU

### Statement

Two bunkers were made but only one Linear Accelerator was commissioned in first phase along with Brachy therapy and brachy was installed with second Linac AHU besides some equipment's room, hence both high ned AHU 's were in use during covid time managed running at higher set points later on modifications done in ducting and thus ran both Brachy and Linac with one AHU. Managed to shut off one AHU during Covid time and later on managed with one AHU both linear accelerator and Brach therapy by doing duct modifications.



### Cost Benefit Analysis

Energy Savings	30000 kWh
Cost Savings	Rs.2.48Lacs
Investment	Nil
Payback	Immediately

Replication Potential: Yes



**Encon Project- Creation of negative pressure OT/ICU's thus load on chiller reduced**

**Encon Project- Ensured 24X7 Operation of boilers on PNG instead of HSD by all boilers got PNG compatible**

## Statement

## Statement

Though our endeavour was to make our Consultants safe due to Covid Pandemics hence request came from Management to create Negative pressure ICU's and OT's, we did the same and as a result we could give high temperature in OT's resulted in some energy savings. Two ICU's and 2 OT's were dedicated for such covid positive procedures.

All boilers got converted into PNG besides both kitchens in the hospital makes the operations cost effective due to differential in costings per liter of HSD and LPG. Losses were minimal besides maintenance and low sulphur contents in atmosphere. It thus contributed to ozone layer depletion as well.

### Cost Benefit Analysis

Energy Savings	13000 kWh
Cost Savings	Rs.1.07Lacs
Investment	5.0 Lacs
Payback	5 Months

**Replication Potential: Yes**

### Cost Benefit Analysis

HSD Savings	15000 Litres
Cost Savings	Rs.7.7Lacs
Investment	2.0 Lacs
Payback	Immediately

**Replication Potential: Yes**

# Encon Project- Chiller running optimization done by increase in set point during Covid phase/dry summer

## Statement

Due to low occupancy during April 2020, we decided to increase the chiller set point which continued till dry summer as well resulted in energy savings.



## Cost Benefit Analysis

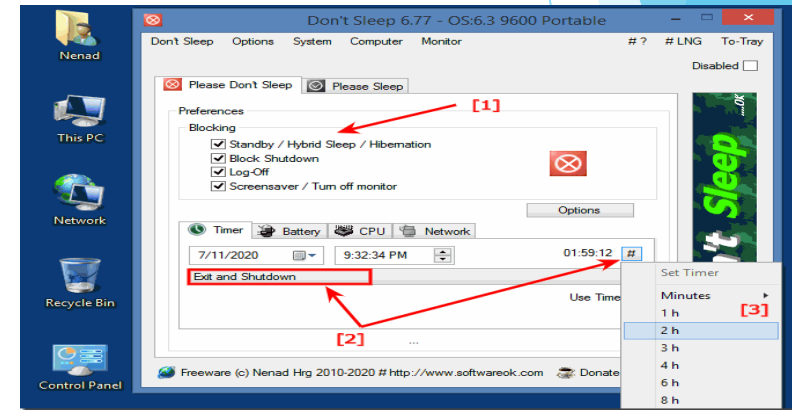
Energy Savings	23900 kWh
Cost Savings	Rs.1.97Lacs
Investment	Nil
Payback	Immediately

Replication Potential: Yes

# Encon Project- PC's will go to sleep mode automatically after 3 minutes if not in use across hospital

## Statement

Modifications done by IT resulted in huge energy savings



## Cost Benefit Analysis

Energy Savings	20000 kWh
Cost Savings	Rs.1.65Lacs
Investment	Nil
Payback	Immediately

Replication Potential: Yes

# Encon Project- Humidity controls in OT's

## Statement

Earlier OT's were equipped with double coil with hot water provision, which were converted into chilled water system in order to meet temperature requirements over a period of time but during rainy seasons humidity controls challenges were taken control through excessive cooling thereby resulting in huge costs, hence to save energy costs in this situation dehumidifiers were provided in OT's and results were found to be excellent in providing comfort to surgeons and OT staff besides savings energy costs.



## Cost Benefit Analysis

Energy Savings	20000 kWh
Cost Savings	Rs.1.65Lacs
Investment	8.5 Lacs
Payback	5 Months

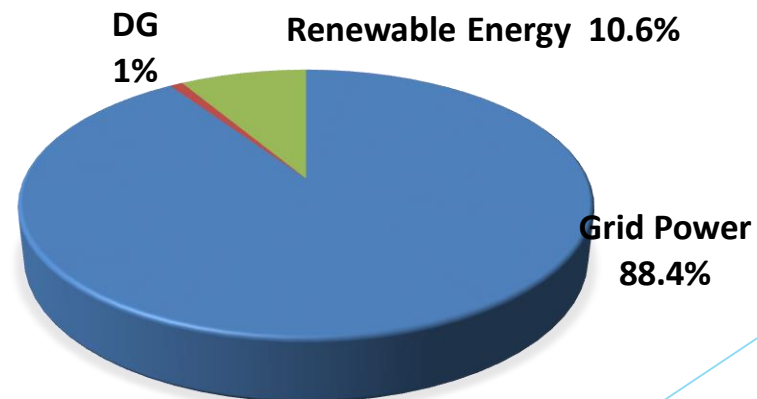
**Replication Potential: Yes**

# UTILISATION OF RENEWABLE ENERGY SOURCES

Technology (Electrical)	Type of Energy	Onsite/Offsite	Installed Capacity (Kw)	Generation (LkWh)	% of Overall electrical Energy
1	Solar PV Panels	Onsite	420kW	5.459	10.59%

Technology (Thermal)	Type of Energy	Onsite/Offsite	Installed Capacity (kCal)	Usage LkCal	% of Overall Thermal Energy
1	Solar Water Heater	Onsite	8000	25.55	70%
2	Rainwater harvesting	Onsite	400	18.00	35%

## ENERGY CONSUMPTION TREND 2020-21



# Results Achieved on Green Initiatives

Green Initiatives4538	Amount Saving INR (Million)	CO2t Reduction	Equivalent to trees planted
Going the LED way	3.39	432	29376
Solar electricity generation Rooftop	0.25	68	4674
Solar water heating	1.98	57	3917
Solar electricity generation in car parking	0.2	65	4538
Rain water harvesting pits			Improved ground water security

Reduction of 622 CO2t by these projects

**Solar electricity generation Rooftop**



**Solar electricity generation in car parking**



**Going the LED way**



**Rain water harvesting pits**



**Solar water heating**



# UTILIZATION OF WASTE MATERIAL



**DRY AND WET GARBAGE FROM KITCHEN**



**STP/ETP PLANT**

FHM Generates mainly these type of waste

- Water, Paper, waste oil and E waste.
- Water waste is treated by using STP/ETP and reused in Gardening/Landscaping.
- We use identified vendor for paper, waste oil and E waste for recycling as per state laws.
- Condensation recovery in heating water for daily usage


# GHG Inventorisation

Fortis Mohali is committed to GHG reduction not only by reduction of its own facilities but also creating Benchmarks for Indian Buildings as Smart Building.

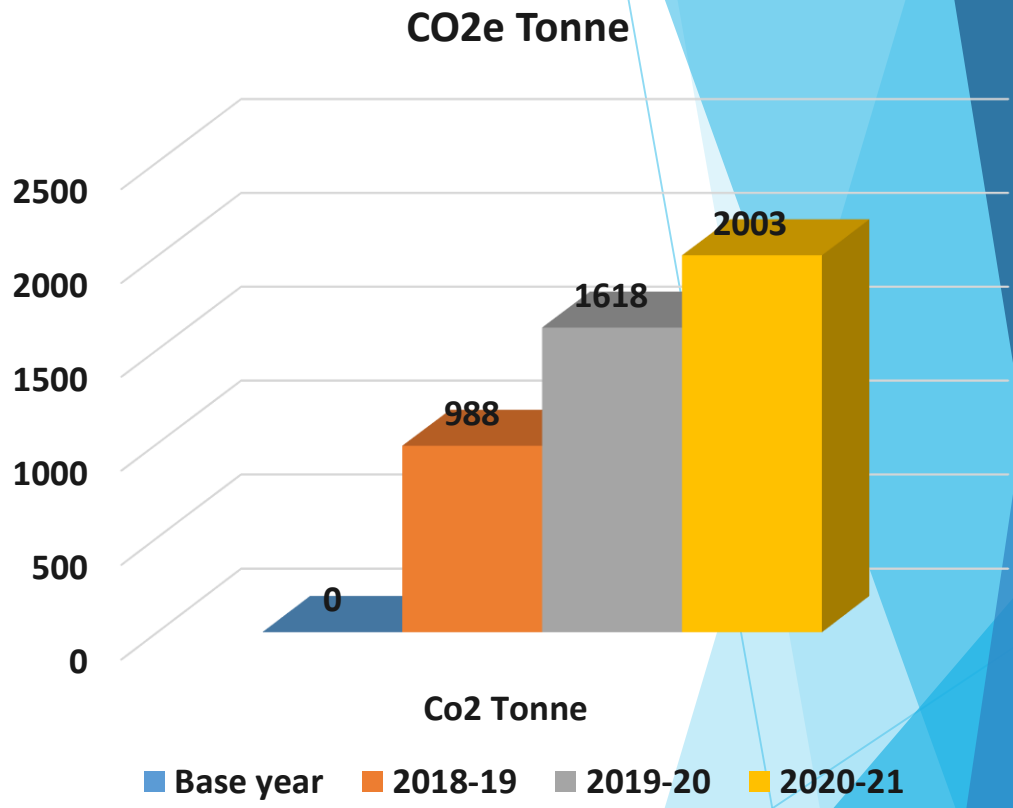
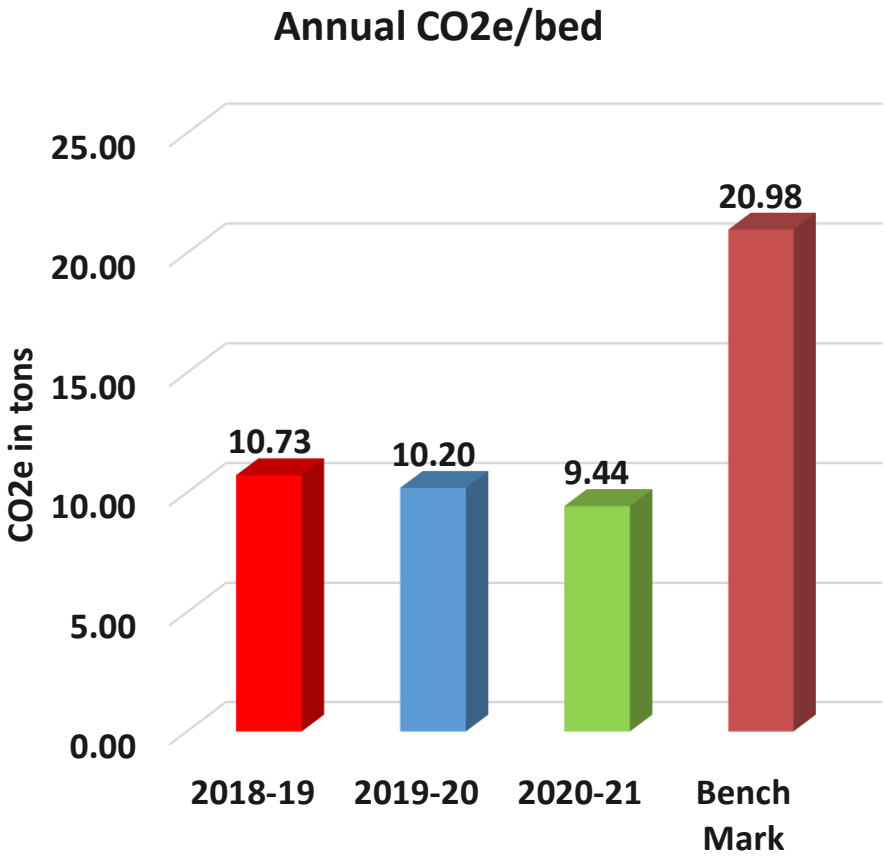
Fortis Mohali Every year allocates Budget for Energy Efficiency program as a corporate initiative and allocate the budget based on Global competition, any project below 5years of pay back qualifies for it, This year Fortis Mohall has allocated approx. 10 Million INR for this program Globally.

2020-21 Project was part of the same corporate budgeting program.

**Reduction of 2003CO2e tons from 2018 to last year.**

	FORTIS HOSPITAL, MOHALI	FHM - 1B
	POLICY ON GREEN PURCHASE AND CLEAN HOSPITAL	Page No: 1 of 1
		Reviewed on: 1/7/19
		Valid till: 30/6/21
PREPARED BY Head Engineering	APPROVED BY Director	
<p><b>1.0 Purpose</b> To mitigate ill effects of environment (GREEN) on patients and staff and even hasten the recovery process through infection free ambience (CLEAN).</p> <p><b>2.0 Scope</b> The entire hospital building (structural Requirement), processes followed and outcome measured.</p> <p><b>3.0 Procedure</b> 3.1 The process shall cover the a) Environment Management Requirement b) Structural Requirement c) Process Requirement d) Outcome Requirement</p> <p><b>4.0 Responsibility</b> Various departments across FHM FOLLOWING DIFFERENT LAWS AND REGULATIONS APPLICABLE AS PER STATE, NATIONAL LAWS AND FOLLOWS JCI/NABH/AHPI GUIDELINES.</p> <p><b>5.0 Outcome:-</b> a. Hospital has established monitoring, review &amp; verification of Procedures b. Reports ( Third Party Validation) c. Purchasing green products</p> <p><b>5.0 Reference:</b> <a href="http://ahpi.in/AHPI%20Standard%20for%20Green%20&amp;%20Clean%20Hospital.pdf">http://ahpi.in/AHPI%20Standard%20for%20Green%20&amp;%20Clean%20Hospital.pdf</a></p>		

# Carbon Footprint Reduction



**Reference** IFHE : International Federation of Hospital Engineering 2013

CO2e Calculation for EB units from Central Electricity Authority of India (0.82kg/unit)

CO2e Calculation for PNG from [www.epa.gov/energy/greenhouses](http://www.epa.gov/energy/greenhouses) (1.95mtCO2/SCM)

CO2e Calculation for HSD from [ecoscore.be](http://ecoscore.be) (2.64kg/litre)

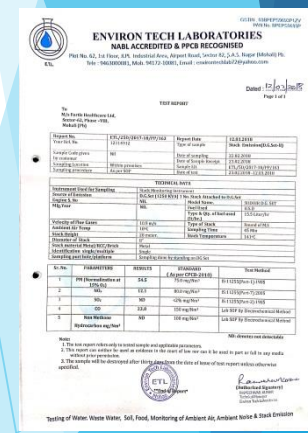
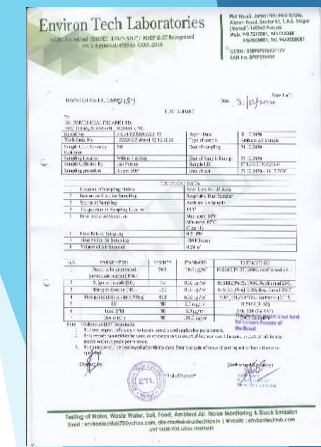
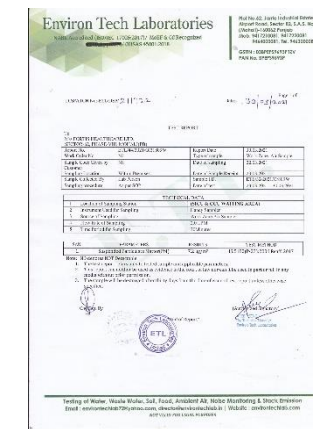


# Environmental Monitoring

100% Compliance against the pollution norms:

- DG Sets Stack monitoring.
- Air Quality monitoring
- 24 hrs Ambient Noise monitoring
- DG Sets Noise monitoring.
- Monitoring & controlling of waste water parameter.
- Monthly drinking water analysis.
- Medical Compressed Air Validation as per ISO 8573-1: 2010 (E)

Sr. no.	Parameters	Results	Standard	Test Method
1	Suspended Particulate Meter(PM)	7.2µg/m <sup>3</sup>		IS:5182(P-23):2006 Reaff. 2017
2	Respirable Suspended Particular Meter (PM10)	76.8	100.0µg/m <sup>3</sup>	IS:5182(P-23):2006 Reaff. 2017
3	Sulphur Dioxide (SO2)	7.4	80.0µg/m <sup>3</sup>	IS:5182(P-2):1999 Reaff. 2001
4	Nitrogen dioxide (NO2)	12.2	80.0µg/m <sup>3</sup>	IS:5182(P-6):2006 Reaff. 2017
5	Fine Particulate matter (PM2.5)	41.8	60.0µg/m <sup>3</sup>	SOP (ETL/SOP/02-Section-4):2015
6	CO	ND	2.0µg/m <sup>3</sup>	IS:5182 (P-10)
7	Lead (pb)	ND	1.0µg/m <sup>3</sup>	Lab. SOP (BY AAS)
8	Ozone (O3)	ND	100.0µg/m <sup>3</sup>	CPCB Guideline



# Green Supply Chain

**a. Information on Projects implemented-** Our Housekeeping cleaning Agents & Card Board and Wooden Packing Boxes are purchased from identified vendor who manufactures with Recycled material.

**b. Information on Evaluation done-** Different vendors were evaluated and manufacturing processes and materials used were certified by FHM as per FHM standard before giving clearance for the Boxes.

**c. Information on Benefits achieved-** 50% reduction in cost and contribution to green initiative by the company.

Use of 100% LED lights in entire complex



Minimize exposure of building occupants and cleaning personnel to potentially hazardous chemical, biological and particulate contaminants

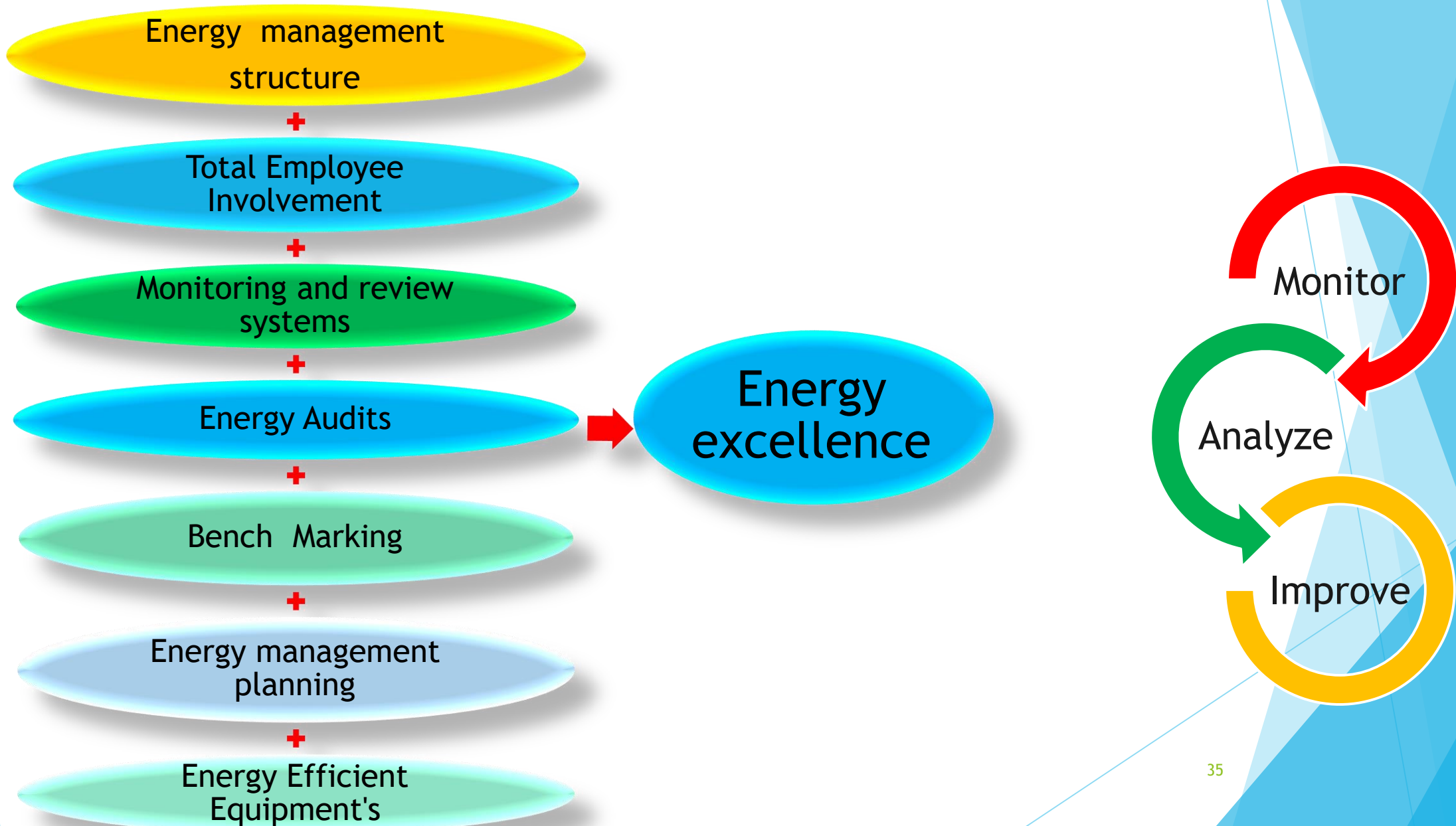


Our Green chillers provide air conditioning comfort with lowest electrical energy

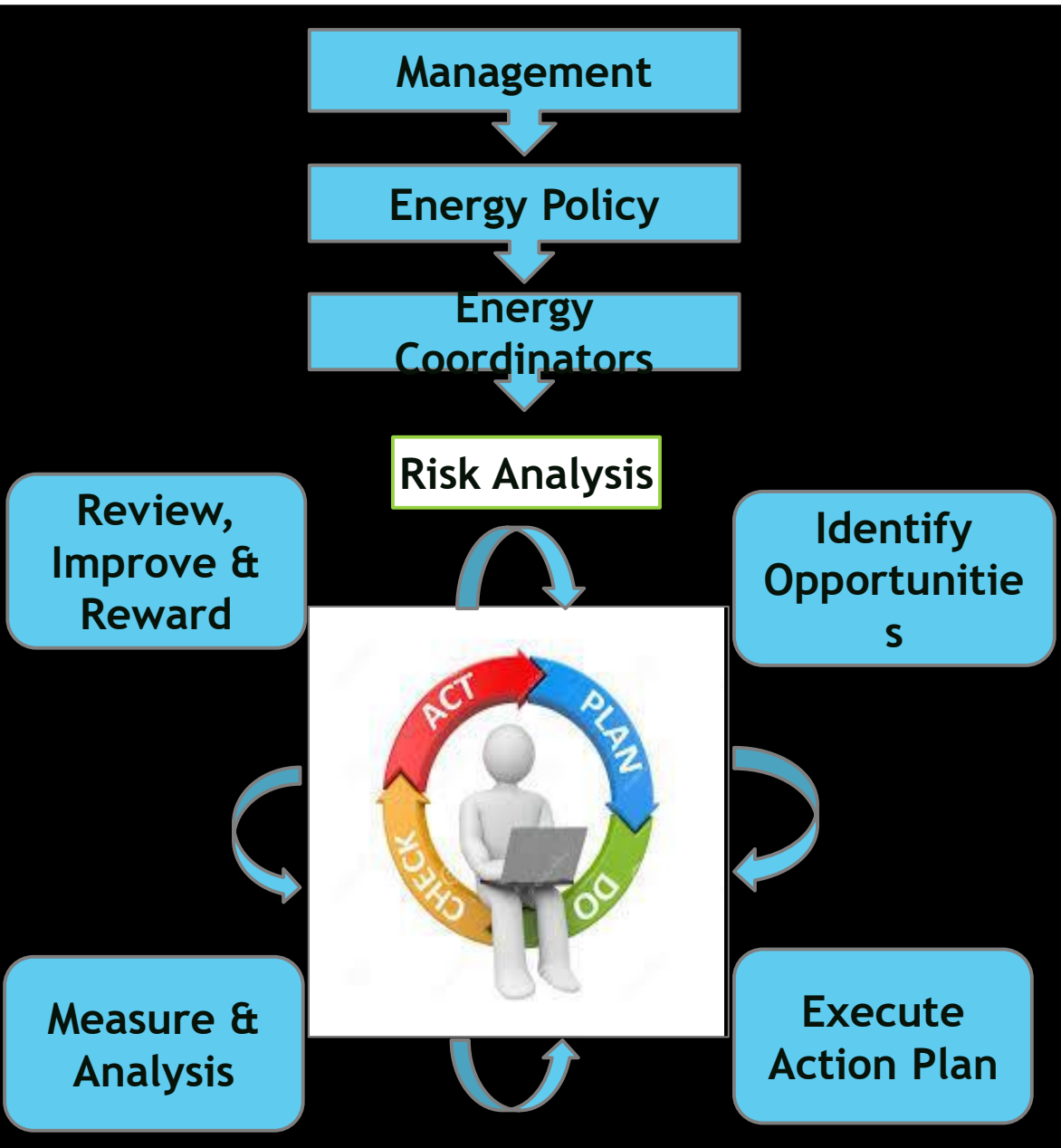


Segregation of dry and wet garbage at kitchen  
Wet garbage 100% recycling through AGA for piggery

# Energy excellence frame work-FHM



# EnCon Team – Monitoring & Trainings



# MEASURING AND MONITORING

Morning Meet with all HOD & GM

Daily HLP consumption compared to last year

Online energy data capturing system

Online HVAC monitoring system (BMS)

Energy meters for load capturing

Engineering Executive Meet

Compare and analyze deviation in shift, shift-wise

Daily energy report

Monthly report on the energy indices

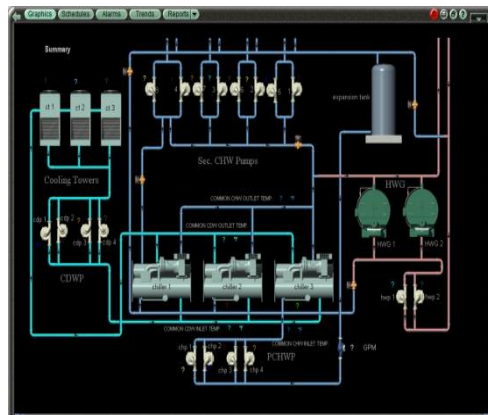
Monthly performance review

Energy trends analysis

Engineering Staff level meet

Action plan for any deviation

Energy consumed for the day units	Today	Budget	Act. YTD	Budget YTD	Act. YTD	% Var	% Var YTD	11/06/2015	11/06/2015	11/06/2015
Power	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Water	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Gas	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Steam	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Chilled Water	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Hot Water	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Compressed Air	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Refrigerant	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Other	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000
Total	10000	10000	10000	10000	10000	0.00	0.00	10000	10000	10000



**ELECTRICIAN**

- Recording Units shift wise

**SHIFT ENGINEER**

- Formatting Daily Report

**CHIEF ENGINEER**

- Discussing and Analyzing with All HOD's and Engineers

# Kaizen Initiatives by in-house Technicians & Supervisors Team

Timer Controller for peripheral lighting



Motion Sensor for corridors



Disinfection spray booth & Hand Sanitizer paddler



Limit Switch for Air curtains and Fire shaft Door



Damaged pedestal fan converted into wall mounted fan in engineering Area



Battery Operated Emergency lights in Corridors/stairs



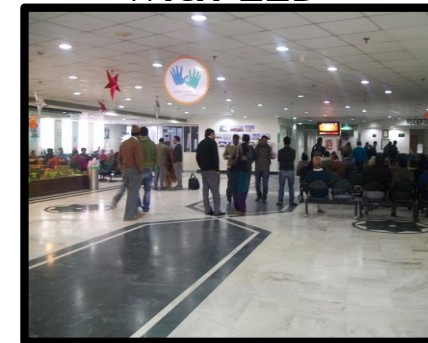
Auto Operation of DG Fresh Air/Exhaust fans



Covid sample taken booth



Conventional lights replacement with LED



Modification in ducts for Two OT's ran with one AHU



# Implementation of ISO 50001

ISO 50001 Implementation WIP

0.07% investment of energy saving projects on total turnover of the company

# WATER - CONSERVATION METHODOLOGY

## Use of New Technology

Automated Water Taps

Sprinkler System for Irrigation

Automated Urinals

## Water Recycling

STP Plant

ETP Plant

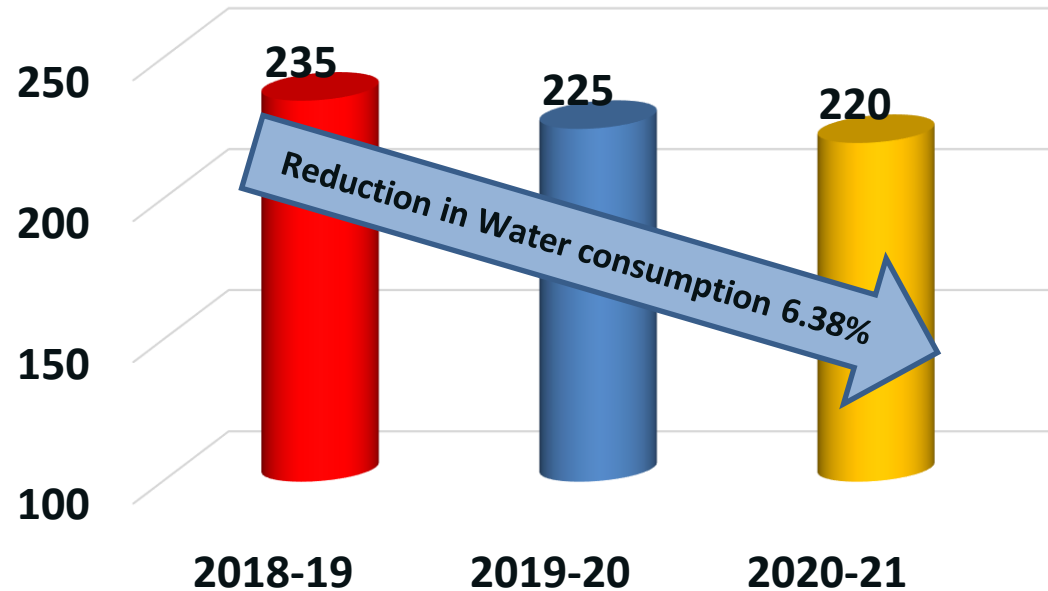
UV/SOFTNER in STP

RO Reject Water

Water Less Urinals - Bio Tabs



### Water Consumption Trend KL/Day



## Efficiency Improvement

Benchmarking

Auditing

Monitoring & Analysis

Improving

## Renewable Substitution

Rain Water Harvesting

Municipal Waste Water Treatment and Reprocessing

## Innovation

MGF Backwash

AHU Condensate

Cooling Tower blow down Reuse

## Water Flow Restrictors





# FHM Awards & Recognition



NABH Nursing Excellence- 2016

**AHPI Award for Quality Beyond Accreditation - 2019**

**BEE NATIONAL ENERGY CONSERVATION AWARD 2015**

**Multispecialty Hospital in Chandigarh - The Week - Nielsen Best Hospitals Survey - 2015, 2014**

**AHPI Award for Best Green Hospital- 2019**

**AHPI Award for Quality Beyond Accreditation - 2015**

**Doc n Doc Gammex Saviour - Best Multispecialty Hospital - 2014**

**NABH Nursing Excellence- 2016**

**Asia Pacific Hand Hygiene Excellence Award- 2015**

**Best Sustainable Hospital Project Award by HBII-MEDGATE - 2014**

**CII National award for Excellence in Energy Management- 2016, 2017,2018,2019,2020**

**No. 1 Private Multispecialty Hospital in Chandigarh - The Week - Nielsen Best Hospitals Survey -2015**

**Pan Fortis Innovation Award - 2014**

**Indian Health & Wellness Awards 2016**

**State Energy Conservation Award PEDDA-2019, 2021**

**Intel Embedded Challenge Award for Innovation in Industry (Catheter reprocessing) 2014**

