



JATIN H PANDYA

GM PROJECTS & FACILITY

APOLLO HOSPITAL INTERNATIONAL LIMITED

**Reduction in Utility cost to improve Hospital
Contribution Margin in Healthcare Facility**

INTRODUCTION

Apollo Hospital International Limited (AHIL), Ahmedabad is 290 bedded JCI Accredited (1st Hospital in State of Gujarat) Super speciality hospitals providing best in class medical services since 2003.

Since the hospital was commissioned 17 years back, some of the technology had become obsolete and the utility costs were impacting the financial health of the organization.

It was needed to identify the opportunities of the energy conservation and the cost efficiency while contributing to a “ green environment” as well.

AHIL is committed to sustainably optimize its energy consumption and reduce its overall cost.



PROBLEM DEFINITION

Since the hospital was commissioned 15 years back, some of the technology had become obsolete and the utility costs were impacting the financial health of the organization.

It was needed to identify the opportunities of the energy conservation and the cost efficiency while contributing to a “green environment” as well.



PROBLEM DIAGNOSIS

One of the key areas where a need for environment was felt was the Energy Conservation and reduction in the cost of the utilities due to the following reasons:

- ✓ Older Technology not adequate to meet current requirements
- ✓ Higher Cost of Maintenance of existing infrastructure and equipment
- ✓ Non Environment friendly Equipment and technology

It is required a major shift in managing our Energy and Utility services and work to reduce the consumption of energy through a multi-disciplinary approach and reduce the financial impact of Energy and other utilities and adoption of technologies for reduction in Cost was targeted



PROBLEM REMEDY

- Feasibility study
- ESCO MoU (Smart Joules)
- 1st Phase of Implementation
- 2nd Phase of Implementation
- 3rd Phase of Implementation

Feasibility Study

- Data capturing of last 3 yrs (Jan'19)

ESCO MoU

- MoU made in Feb'19
- ESCO Audit - Feb-Mar'19
- As per mutual agreement between AHIL & ESCO baseline was decided from Jan'18 to Dec'19

1st Phase of implementation

- April to Jun'19
- Installation of New Energy Efficient HVAC Pumps – 4 nos.
- Cooling Tower Retrofit
- Replacement of Conventional Lights with energy efficient LED lights
- Smart Energy Meter Installation

PROBLEM REMEDY

2nd Phase of implementation

- Jul to Oct'19
- Replacing 1 inefficient 325TR chiller with a modern, energy efficient 400 TR VFD chiller
- Installation of timers & temperature control and PID Controller
- Connecting standalone AC with centralised air conditioning system thereby avoiding the energy wastage
- VFD Commissioned for Cooling Tower, Kitchen Exhaust and OT AHU
- Air washer installation for Patient relative waiting room-cum-dormitory (Atithi) replacing Package AC.
- Replacing old inefficient Water Treatment Plant (WTP) pumps with high energy efficient pumps
- Blood Bank Fan Coil Unit (FCU) installation & allied fittings - replacement work

3rd Phase of implementation

- Nov, Dec'19, Jan'20
- DeJoule Deployment (BMS)
- Optimization of steam distribution system for laundry
- Replacement of AHU's 3-way valve with modulating 2 way valves (60 nos.)
- BLDC Fan (39 nos.) Installation
- Automatic Tube Cleaning System (ATCS) Installation for continuous performance enhancement of chiller

Sustenance

- Mist Cooling System
- Tertiary Pumps Installation
- Motorized Damper on AHU
- Heat Reflective Paint for Atithi hall and condenser pipe line
- DeJoule deployment for HVAC low side to optimize its performance

Other Activities to Achieve Energy Efficiency



- Conduct Quarterly Internal Energy Audits**
- Define SOPs for significant Energy Use Equipments**
- Maintain Documents stating results achieved**
- Encourage Ground Staff to come up with Solutions for system improvements**
- Formation of an Energy Management team reporting to Senior Management**
- Work with External Agencies like Bureau Veritas, CII, etc.**

Other Energy Conservation Measures Implemented

S.No	Measure	Investment (INR)	Annual savings (INR)	Payback period (yrs)
1	Replacement of De-rated capacitor I No. of 25 KVAR	10,000	1,73,574	0.6
2	Provided VFD on kitchen exhaust and laundry fresh air fan	30,000	38,139	0.78
3	Reduced the speed of AHU blower with existing VFD	0	1,04,978	0
4	VFD installation on condenser pump and cooling tower	1,50,000	1,31,890	1.13
5	Installation of heat pump to increase boiler feed water from 31 to 60°C	18,00,000	6,17,398	2.9
6	Increasing boiler feed water temp from 60 to 80°C by collecting condensate.	1,50,000	3,32,347	0.45
7	Installation of new efficient LED lights	26,92,880	3,85,440	6.9
8	Replacement of diesel with PNG	80,000	27,81,686	0.02
9	Water conservation	25,000	12,63,673	0.02
10	Use of central chiller with PHE for drinking water use	50,000	378,000	0.13

Other Energy Conservation Measures Implemented

S.No	Measure	Investment (INR)	Annual savings (INR)	Payback period (yrs)
11	Installation of new Chiller.	8,500,000.00	4,000,000.00	2.1
12	Retrofit of HVAC Pumps	575,000.00	1,000,000.00	0.6
13	Retrofit of old cooling tower (2x300TR).	350,000.00	500,000.00	0.7
14	Connecting CBCC Air Cooled Chilled with centralized Chilled Water System through PHE.	515,000.00	300,000.00	1.7
15	Retrofit of WTP Pumps.	155,000.00	100,000.00	1.6
16	Installation of PID Controller on Existing VFDs	100,000.00	80,000.00	1.3
17	Temperature controller and Timers on Split/Window AC/Exhaust Fan.	10,000.00	20,000.00	0.5
18	Air washer installation for Atithi, so that during low WBT cooling can be done through air washer instead of Package AC.	300,000.00	200,000.00	1.5
19	Installation of 2 Way Valves on all AHUs.	1,000,000.00	500,000.00	2.0
20	Optimisation of Steam System for Laundry.	200,000.00	250,000.00	0.8

Monitoring of Energy Performance

AHIL has an operational energy management system, wherein Smart Energy Meters have been installed on various energy assets.

Energy consumption data is captured & analysed continuously remotely using a cloud based software system call DigiReach to take corrective action & control the operation of various assets .

Year	Occupancy	Electricity Units (kWh)	Fuel (PNG) (KWh)	Fuel (diesel) (KWh)	Total Energy (KWh)	SEC(kwh/ m2/year)
2014-2015	67,264	6,105,900	N/A	944,120	7,050,020	170
2015-2016	67,964	5,987,880	842,679	N/A	6,830,559	165
2016-2017	65,100	5,860,500	866,578	N/A	6,727,078	162
2017-2018	69,712	5,806,060	800,430	N/A	6,606,490	159
2018-2019	70,199	5,714,850	694,067	N/A	6,408,917	155
2019-2020	67,401	52,77,340	729,697	N/A	6,007,042	145

LOCKING THE IMPROVEMENT

AHIL has recently (in Feb 2019) implemented a very innovative energy conservation model called Joule PAYS in partnership with a renowned ESCO working in healthcare sector – Smart Joules Pvt Ltd (SJPL).

Under this model; AHIL will be making **ZERO Capital Investment** to implement various energy conservation measures across the hospital but will get a guaranteed energy savings of at least 15% reduction in their energy consumption over the baseline energy consumption.

Further, AHIL only pays to SJPL from the energy savings achieved on monthly basis w.r.t baseline energy consumption. The agreement between AHIL and SJPL is for duration of 5 years to ensure long term sustainability of the conservation measures and to help strengthen the culture of energy management.

After successful journey of AHIL with ESCO we recommend that our other units can also adopt this model for developing sustainable Energy Efficient and Environment friendly ecosystem.



Audit Type	Audit name	Month/Year	Organisation conduction audit
Detailed Audit	1.Energy Audit	July 2020	Dev Consultants
	2.Energy audit by SJ	Feb to April 2020	Smart Joules pvt ltd
Process Audit	1.Energy Management system (ISO50001:2011) Certification Audit	Nov 2020	Bureau Veritas
	2.Surveillance Audit 1	March 20120- December 2020	Bureau Veritas
Quarterly Audit	1.Procurement audit	20 th Nov 2020	Apollo
	2.operation theatre audit	28 th Nov 2020	
	3.ICU audit	4 th Dec 2020	
	4.biomedical equipment audit	11 th Dec 2020	
	5. HR training audit	18 th Dec 2020	
Quarterly Audit	1.Procurement audit	15 th March 2020	Apollo
	2.operation theatre audit	23 rd March 2020	
	3.ICU audit	4 th Oct 2020	
	4.biomedical equipment audit	9 th Oct 2020	
	5. HR training audit	15 th Oct 2020	

CLONING THE IMPROVEMENT

AHIL is committed to sustainably optimize its energy consumption and reduce its overall cost.

work to reduce the consumption of energy through a multi-disciplinary approach and reduce the financial impact of Energy and other utilities, above mentioned initiatives have been taken and followed for each action we have taken.



TANGIBLE RESULTS

Overall Contribution margin has increased by 6.4 Cr, This project alone has contributed ~75 Lac per Annum with ZERO Capital Investment.

We have installed new equipment worth INR 1.25 Cr in this phase without any capital investment for AHIL.

This has saved 1.05 Cr of capital expenses.

Reduce Maintenance cost by 8-10% of capex.

Carbon footprint reduced till date:

S.No.	Month	Savings (kWh)	Tonnes of CO ₂
1	Apr-19 to Mar-20	5,49,070	565.37
2	Apr-20	2,61,048	271.49
3	May-20	2,73,792	284.74
4	Jun-20	2,30,265	239.48
5	Jul-20	1,28,534	133.68
6	Aug-20	1,47,359	153.25
7	Sep-20	98,794	102.75
8	Oct-20	1,00,465	104.48
9	Nov-20		
10	Dec-20		
11	Jan-21		
12	Feb-21		
13	Mar-21		
	Total	17,89,328	1,855

INTANGIBLE RESULTS

Customer Satisfaction increased after implementation of these initiatives.

The above savings in operational cost has been achieved in a running hospital, without compromising on the comfort & convenience of patients.

ISO 50001 - We glad to sustain the same ZERO Non Conformity status for last 3 years and reaccredited in Nov 2020 with new 2018 standrads



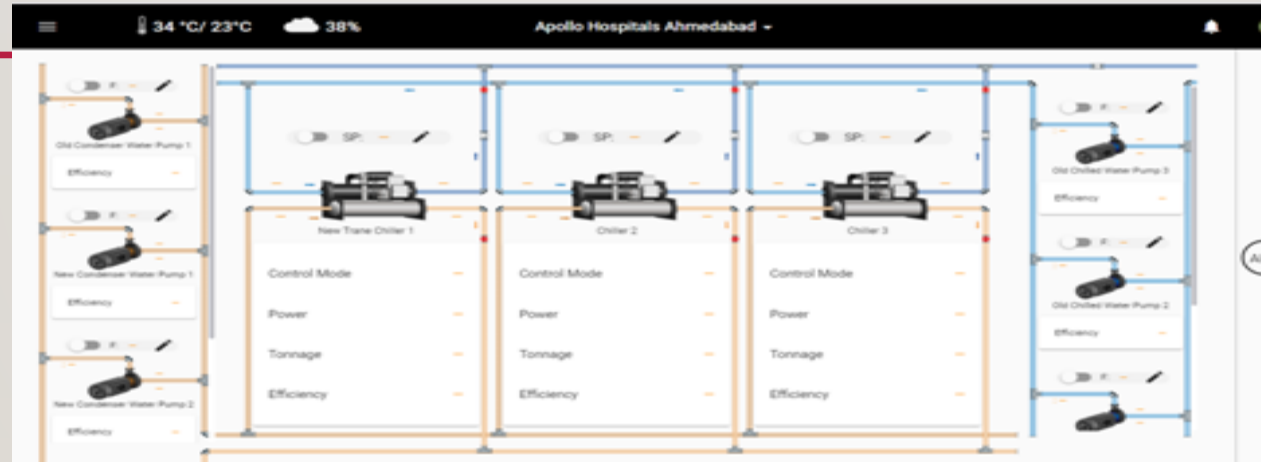
Newer Initiatives



PID Controllers



Online Data Management



Dejoule (BMS) system for Apollo

- Thank you