



Apollo Hospital International Limited, Gandhinagar

Innovations in Energy Efficiency Leading to Reduction in Cost & Carbon Footprint of the Hospital

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Category : Cost Reduction

ABSTRACT

Apollo Hospitals International Hospital (AHIL), Ahmedabad is a 284 bedded JCI Accredited (1st Hospital in State of Gujarat) Super-specialty hospital providing best-in-class medical services since 2003. With the Global focus on Environment Protection, it is imperative that every organization should look inwards to ensure Sustainable Development. Most of the Healthcare Providers have been lagging behind in this regard. However, Apollo Hospitals has taken up this very crucial subject of using technology to promote optimal utilization of existing resources in a cost effective manner. As a part of this commitment, we have identified the key areas for improvement through Energy Conservation and reduction in per bed consumption of utilities through formulation of an objective Energy Objective and Policy. With this in focus and to achieve this goal, we initiated this Project for reduction in the overall utilization of Power, Water and Fuel in our hospital over a period of time since the year 2013-14. This required a multi-disciplinary approach to identify key improvement areas and suggest potential solutions. A team of Engineers, Technicians (with expertise in electrical, HVAC and plumbing services) and Quality staff was formed under the leadership of Engineering Head to implement the Project. Over a period of 4-5 years, the Hospital had been able to achieve its target of Energy efficiency, Cost reduction and Patient satisfaction. AHIL has brought down its Total Actual Energy Consumption (electricity + fuel) by 9.1% & Specific Energy Consumption (measured in KWH/BED/Year) by 13% till 2018-19. We have saved approx. INR 59.25 Million by implementing various energy conservation measures from 2014-15 to 2018-19 and in the process eliminated CO2 emissions of approx. 1,334 Metric Tonnes thereby contributing towards a Greener Planet. These efforts have been strengthened by implanting the ISO 50001:2011 standards for Energy Management becoming the First Hospital in the State of Gujarat to get the certification by Bureau Veritas.

Continuing with our quest for energy efficiency we have partnered with one of the leading experts in the field of Energy Saving (ESCO) to bring the latest innovations to the Hospital and reduce the overall consumption by another 15%. AHIL is striving to take the energy savings project to the next level by introducing state of Art technology for further optimizing our energy consumption.

BACKGROUND

Apollo Hospitals International Hospital (AHIL), Ahmedabad is a 284 bedded JCI Accredited (1st Hospital in State of Gujarat) Super-specialty hospital providing best-in-class medical services since 2003. 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.

One of the key areas where a need for improvement was felt was the Energy Conservation and reduction in 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 equipments
- Non Environment friendly Equipments and technology
- Challenges in meeting the needs of patients impacting the services for the patients

In order to achieve the goal the hospital under took a survey to identify opportunities for energy conservation and cost efficiency while contributing to a "green environment" as well. As a part of this initiative to improve the services, three major areas were identified for upgradation:

- 1- Improving air conditioning and HVAC system to make it more efficient, cost effective and environment friendly. It was also expected to help improve patient satisfaction levels and support the quality initiatives for better clinical outcomes.
- 2- Effective utilization of water for laundry, patient use and othe house keeping services in the hospitals and to provide round the clock Hot water for admitted patients. This was also expected to not only help in water conservation but also improve patient services and satisfaction levels.
- 3- Efficiency in consumption of power/fuel/other resources to reduce Utility Costs for better financial performance and make the hospital more environment-friendly. Further, it was also planned that measures taken shall be sustainable and continued with minimal capital investment.

ENERGY OBJECTIVE & POLICY

Objective	Energy Policy	Energy Planning and Review
<ul style="list-style-type: none"> • Continually bring down our energy Consumption year on year by at least 4% (post normalization) • Upgradation of Medical and Utility Equipments and systems with energy efficient systems • Continuously educate and train all employees on requirement of EnMS 	<ul style="list-style-type: none"> • Better use of Energy resources • Identify and implement Energy Improvement opportunities in design and procurement of energy systems and equipments. • Increase use of alternate renewable resources 	<ul style="list-style-type: none"> • Review of organizational activities that affect energy performance • Analyze Energy use and consumption based on measurement of data. • Identify areas for improvement and savings. • Establish an energy baseline for monitoring.

Started the energy saving interventions from year 2013/14 onwards. Using it as base year, AHIL has brought down Total Actual Energy Consumption (electricity + fuel) by 9.1% & Specific Energy Consumption (measured in KWH/BED/Year) by 13% till 2018-19.

MEASUREMENT

The project required a multi-disciplinary approach to identify key improvement areas and suggest potential solutions. A team of engineers, technicians (with expertise in electrical, HVAC and plumbing services) and quality staff was formed under the leadership of Engineering Head.

Addressing the above on a continuous basis required putting in place an effective energy management system with direct reporting to top management

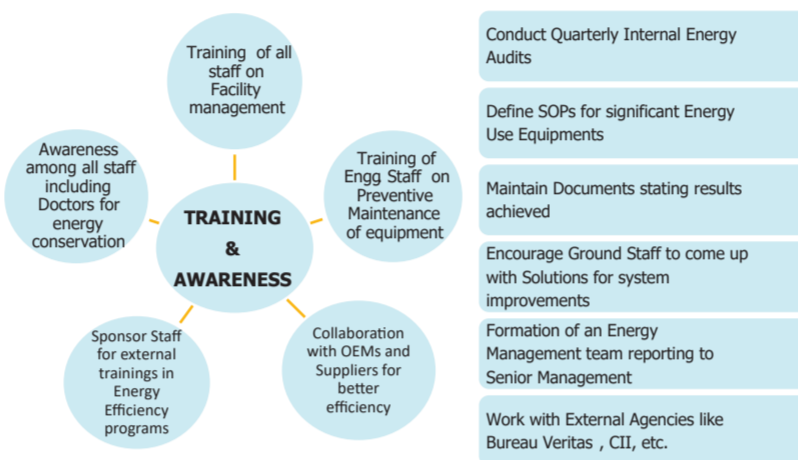
Further following optimisation targets were put in place :

1. Reduce the overall energy consumption at the hospital by at least 4% annually (adjusted for occupancy)
2. No internal Capital Investment for HVAC System -- To extend the operating life of HVAC system beyond their standard operating life of 10-15 years by effective operating & maintenance practices.
3. Replacement of the old and obsolete technology like florescent bulbs/CFLs etc. with more energy efficient products.
4. Conduct training and orientation for all Hospital staff for energy conservation measures.
5. Ensuring that Patient Services were not affected and any new technology shall help improve the patient satisfaction scores.

The process for measuring and reporting the progress on the Project to the Senior Management was an integral part of the Project to ensure compliance at all levels.

ACTIVITY

ACTIVITIES TO ACHIEVE ENERGY EFFICIENCY



MAJOR ENERGY CONSERVATION MEASURES IMPLEMENTED

Heat Pump installation	Reduce condenser temp in Cooling tower	Condensate recovery in Boiler	Reuse of RO Rejected Water
<ul style="list-style-type: none"> • Provides both heating and cooling simultaneously. • COP of 2-4.5, (produces about 2-4.5 times as much heat as the electricity it uses). • Saving of INR 617,298 from June 2017- May 2018 and 20,560 Kg of CO2 production was mitigated. • The total investment made on the heat pump was INR 18 lakh (total cost including installation). • The expected payback is 2.9 yrs. 	<ul style="list-style-type: none"> • 2 cooling towers of 300 TR each and condenser entry temp. maintained at 85°F. • Installed new CT of 400 TR making Cooling tower function efficient and reduce condenser water temp. to 80°F. • VFDs were installed in cooling towers • 1°F reduction in temperature converts into approx. 3% energy saving leading to approx. 15% energy saving with this measure. • Monetary savings of INR 465,375 per annum. 	<ul style="list-style-type: none"> • The average steam load for laundry is 500 Kg/Hr. and a condensate return of @ 100°C which was drained away. • It was observed that steam condensate can be collected into Boiler Feed Water Tank system using condensate recovery system. • This condensed high temperature water is fed back into the boiler, thus reducing the use of fuel. • An investment of only INR 150,000 in the setup of the system. • Saving of INR 332,347 per annum was obtained. 	<ul style="list-style-type: none"> • Two RO Plants for drinking and for dialysis with capacity of 1000 LPH each. • Generated approx. 75KLD as reject water. • Rejected water was wasted besides using power for STP pumps for treatment. • Use this rejected water in Public toilets leading to Reduction in use of Water and Electricity in Water Treatment Plant. • Amount of INR 1,063,158 for reduced water consumption and an addl. amount of INR 200,515/- in electricity consumption.

Overall Energy Consumption

Year	Occupancy	Electricity Units (kWh)	Fuel (MMBtu)	Total Energy Consumption (kWh + MMBtu)	Water Consumption (litres)
2013-2014	67,266	61,05,303	N/A	61,05,303	2,38,039
2014-2015	68,766	61,88,770	7,88,273	69,77,043	2,14,408
2015-2016	67,964	59,87,880	8,42,879	68,30,759	1,76,523
2016-2017	65,100	58,65,500	8,66,278	67,31,778	1,71,127
2017-2018	68,712	58,06,000	8,69,430	66,75,430	1,69,148
2018-2019	70,100	57,14,892	8,94,067	66,08,957	1,62,791

Energy Performance Indicators (EnPI)

Year	Electricity (kWh / Bed / Day)	Fuel (MMBtu / Bed / Day)	Fuel (MMBtu / Bed / Month)	Total Energy (kWh + MMBtu / Bed / Day)	Water (Litres / Bed / Day)
2013-2014	90.88	0	0	90.88	108.4
2014-2015	88.1	0.08	0.08	88.18	100.5
2015-2016	88.1	0.08	0.08	88.18	100.5
2016-2017	90	0.08	0.08	90.08	100.2
2017-2018	85.1	0.08	0.08	85.18	98.6
2018-2019	81.4	0.08	0.08	81.48	96.9

RESULTS

With the implementation of the project, we were able to achieve our target of Energy efficiency, Cost reduction and Patient satisfaction. The efforts have resulted in an elimination of significant amount of Carbon foot print for our hospital as well. The brief details of the outcomes of the project are given below.

Cost Effectiveness- Achieved cost reduction of INR 50.25 Million with continuous improvements considering 2013/14 as baseline including

1. INR 21.53 Million in reduced energy (Electricity + Fuel) consumption.
2. INR 15.26 Million with extension of working life of existing HVAC equipment (Chillers & Pumps) which were installed in 2003/04.
3. INR 9.79 Million in direct Capital Investment savings by implementing " JoulePAYS - PAY As You Save " contract with leading ESCO SJPL (Smart Joules)

Reduction of Carbon Footprint- The measures taken by the team under the project have helped the hospital in eliminating a total CO2 emission of approx. 1,360 Million tonnes.

Increase in Customer Satisfaction- These efforts helped in improving customer satisfaction through more efficient services including 24/7 hot water, better lighting, improved air-conditioning etc. to the patients, Visitors & staff. The savings have been achieved in an operational hospital, without compromising on comfort & convenience of patients which is a commendable achievement itself. These cost-savings achieved by AHIL has further enabled us to move more effectively towards our vision to bring health-care of international standards by touching a billion lives.

REDUCTION OF GREEN HOUSE GAS EMISSION

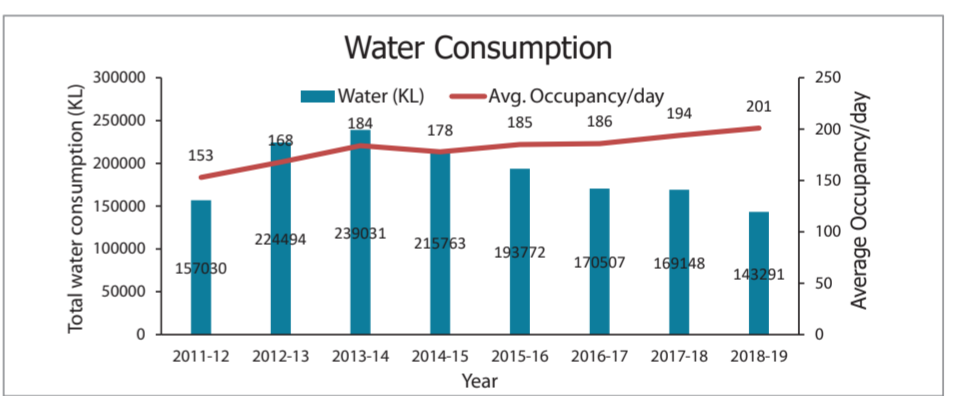
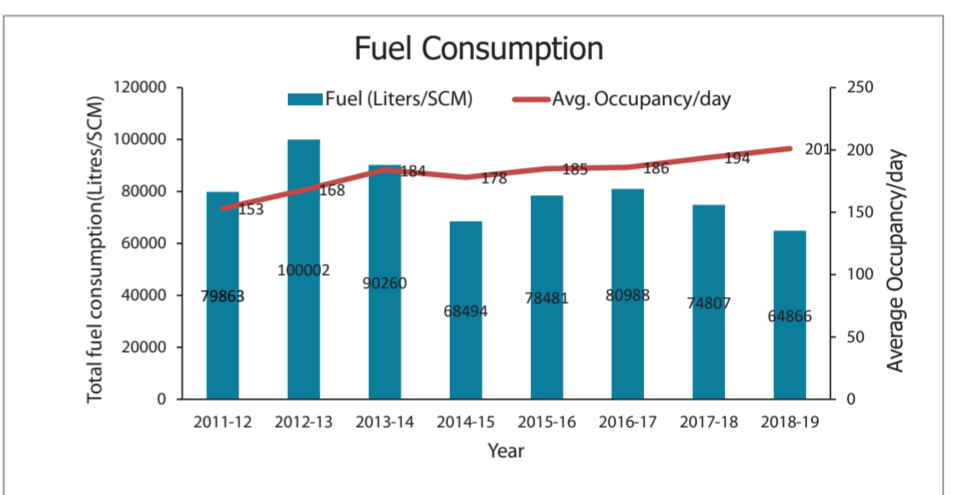
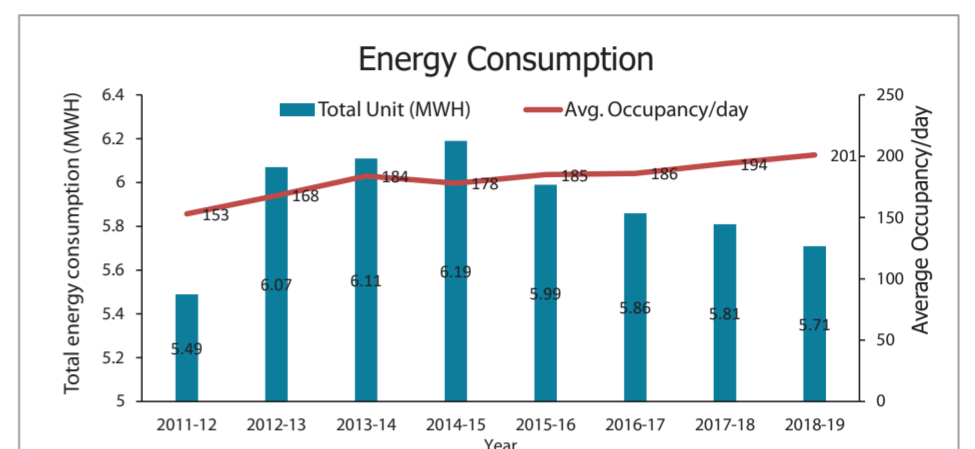
We have saved approx. INR 200 Lakhs by implementing various energy conservation measures from 2015/16 to 2018/19.

In process we have eliminated CO2 emissions of approx. 1,334 Metric Tonnes from 2015/16 to 2018/19) thereby contributing towards a Greener Planet.

Installed Greener Technologies and Implemented Energy Management System and Obtained ISO 50001:2011 Certification by Bureau Veritas



1st Hospital in Gujarat to get ISO 50001:2011



SUMMARY

AHIL is committed to sustainably optimize its energy & water resource consumption & reduce its overall carbon footprint. With this in focus we have continuously optimized our energy & water consumption since 2013-14 and have further implemented ISO 50001:2011 in the year 2017.

It is this continuous effort over the years for continual improvement wherein we have achieved a cost reduction of INR 59.25 Million and eliminated the carbon emission of approx.1,360 million tonnes of CO2 (from year 2014/15 to 2018/19) & have further demonstrated that cost reductions & carbon footprint reduction can be simultaneously pursued & achieved.

Further we have not rested on past achievements and pushed the boundaries of cost reduction & in process have come up with an innovative solution via partnering with a leading ESCO working in healthcare segment named SJPL. With this arrangement, with ZERO Capital Investment, Apollo Hospital will be able to get a guaranteed reduction in energy consumption & further implement latest energy efficient technology having an effective machine learning based remote monitoring, analysis & control system – DeJoule; enabling us to effectively monitor & control our energy assets.

FUTURE PROSPECTS

WAY FORWARD- SUSTAINABILITY OF ENERGY EFFICIENCY SYSTEMS

AHIL understand the energy efficiency is not a one time process. It is a continuous process and AHIL's quest for energy efficiency continues.

Strive to take the energy savings project to the next level by introducing state of Art technology for further optimizing our energy consumption.

We have partnered with one of the leading experts in the field of Energy Saving (ESCO) to bring the latest innovations to the Hospital.

The project is being implemented in partnership with– Smart Joules Pvt Ltd (SJPL) via an innovative Joule PAYS: Pay-As-You Save model, wherein AHIL only pays SJPL from the monthly savings in the energy consumption bill achieved over the baseline energy consumption.

As a part of the same AHIL is looking at guaranteed reduction in the overall energy consumption by atleast 15% with 2018 as the baseline with ZERO capital investment from AHIL. monthly savings in the energy consumption bill achieved over the baseline energy consumption.

SJPL shall be making a capital investment of approx. INR 10 Million from Feb'19–Oct'19 generating an annual energy savings to the tune of INR 7.5 Million.