VISION

Formulate an Energy Vision

ITC Hotels are dedicated to integrating the culture and ethos of the region they are located in, thus offering unique indigenous experiences, while maintaining globally benchmarked standards in accommodation, environment and guest safety. Inspired by the ITC Limited's triple bottom line philosophy of creating economic, environmental and social capital, its hotel business is committed to delivering luxury experiences with sustainable practices embedded in it, in keeping with its guiding premise of 'Responsible Luxury'. With the maximum number of LEED® Platinum certified hotels in the world, ITC Hotels is the 'Greenest Luxury Hotel Chain in the World'.

ITC Rajputana was certified by the United States Green Building Council (USGBC) with its LEED Existing Building Operation & Maintenance (EB&OM) Platinum rating in November 2011. This has been achieved through optimal building orientation, efficient building envelope, highly efficient lighting, heating and cooling systems, maximum daylight utilization, use of green innovative technologies; and the monitoring of energy consumption at a granular level, which helps the hotel eliminate wastage and reduce consumption.

ITC Rajputana: Responsible Luxury

Profile:

- ITC Hotels is one of India's largest hotel chains, rated among the fastest growing hospitality chains in India with over 100 properties across the country.
- Headquartered in Kolkata, India- the ITC Hotels is also the exclusive franchisee of The Luxury Collection brand of Starwood Hotels and Resorts in India.
- ITC Rajputana, Jaipur is a LEED Platinum rated hotel. Employees: ~400

PLANNING

The total site area of ITC Rajputana is 284,301 sqft (26,412 m^2) with a gross floor area of approximately 337,495 sqft (31,354 m^2). Amenities include three restaurants — Jalmahal, Jaipur Pavilion, and Peshawari— three banquet halls and 219 guest rooms.

Establishing an Energy Team

ITC Rajputana has established an Energy Team with members specializing in energy efficiency, water efficiency and waste management. The team structure and specialization are based on the opportunities existing in the different areas of building operations. The HVAC systems, boiler, hot water system have the highest level of energy consumption and is therefore, allotted the highest number of specialists – from design and execution to retrofits and innovative projects. This is followed by focus on water efficiency, waste management and biodiversity, to develop a holistic approach to sustainable development. This is supported by a Green Initiative Core Team, comprising of:

- **Head - Green Initiatives** – Responsible for the half-yearly audit, which includes Energy Efficiency, Water Efficiency, Waste Management and Indoor Environmental Quality. Also responsible for driving the team, holding discussions and following up with the team for the different green initiatives.
- **Green Initiatives Lead -** Responsible for operation of the HVAC system in the project building and for driving the energy audits in the existing buildings. Also responsible for reviewing the new energy efficiency plans submitted by the consultants. Part of their task is to question all assumptions and ensure that no rule of thumb data or redefining standards are used.
- **Green Initiatives Team Member -** Responsible for energy metering and sub-metering across the facility. Regularly performs thermal comfort audits, occupant surveys and acoustic audits. Also responsible for identifying portable instruments, such as power meters, water flow meters, thermal imagers and lux meters (lighting), which are used for conducting basic checks and audits internally.

Establish Benchmarks

The following step-by-step procedure has been implemented at ITC Rajputana:

- A project profile has been created in the Energy STAR Portfolio Manager. A comparison of the energy use of similar types of buildings has been performed. The portfolio is updated by the Energy Team on a monthly basis.
- Energy STAR uses data on energy consumption, equipment loads, number of employees, percent cooling and heating, and the number of chillers to calculate the Energy Use Intensity.
- The end-use Energy Consumption is traced by the SCADA system. Energy sub-meters are installed in every energy consumable device or area and every chiller plant and the energy team monitor area-wise energy consumption.
- An Online Energy Monitoring (OEM) monitors chiller plant daily energy use and compares it with the day-to-day energy use. It also regulates the chilled water leaving temperature, based on the cooling demand and outdoor temperature.
- Building energy, in terms of area (kWh/sqm.), is measured through metering. It is then compared with the Energy Use Intensity, calculated by Energy STAR.
- Simultaneously, the energy data from the energy meters is matched with the energy bills, paid monthly by ITC Rajputana.
- Energy efficient devices, such as VFD on pumps and cooling units have been installed in the project building. The old lighting fixtures have been replaced with new energy efficient light fixtures.
- A solar hot water generator has been installed to meet the hot water requirement.
- A boiler has been installed, while a heat pump will be installed, to reduce diesel consumption.
- The figures for 2010-11 were the first calculated normalized energy data for ITC Rajputana. These figures are taken as the baseline for comparison:
    - 2010-11: The per capita energy consumption of ITC Rajputana was 155 kWh/sqm./year.
    - 2015-16: The per capita energy consumption of ITC Rajputana was 148 kWh/sqm./year.

Collect Data and Conduct Preliminary Analysis

The following data was collected during the site visit and then used for analysis:

- Annual and monthly building electricity usage (utility bills).
- Existing system data, including quantities, layouts, flow rates, coil capacities and design ratings from the building mechanical plans.
- Sequences of Operation from mechanical drawings and BMS as built documentation.
- Nameplate data from the air handler units, such as manufacturer, model number, fan motor power (kW), electrical data (volts, amps and phases), fan type etc.
- Operation schedules for buildings and independent zones.
- The building electrical and mechanical plans were also used to gather information on system types and configuration.
- Certain field measurements were taken to verify energy savings potential.

Conduct Audits

Accurate metering helped us identify buildings with the highest energy consumption and greatest potential for energy savings. A few such buildings were selected as a sample for a detailed energy audit, conducted by expert external agencies along with the internal teams.

The external agencies carried their own calibrated instruments for measuring power, temperature, flow rates of water and air, etc. These audits consisted of an assessment of air conditioning systems – measuring efficiencies of chillers, pumps, cooling towers, air-handling units, and optimizing operational and maintenance parameters. It also consisted of a lighting system assessment that included the measuring of lighting levels and lighting power, UPS assessment – measuring UPS efficiency and operational parameters.

The audits highlighted potential for improvement by changing system equipment replacement such as chillers, pumps, boilers, and mercury lights to LEDs and fans.

An estimate of cost v/s energy reduction was calculated and presented to the management, and a retrofit budget was allocated for prioritized areas. The “before and after” energy consumption was clearly documented to verify and ensure that the savings were a result of the implemented energy efficiency measures.

Once the savings were verified and showcased, it earned the confidence and willingness of the senior management to invest in similar efficiency measures in other ITC hotels. This led to the launch of the biggest retrofit program in the Hotel industry.

One of the requirements of this credit is to conduct an energy audit that meets the requirements of the ASHRAE Level 1 walk-through assessment.

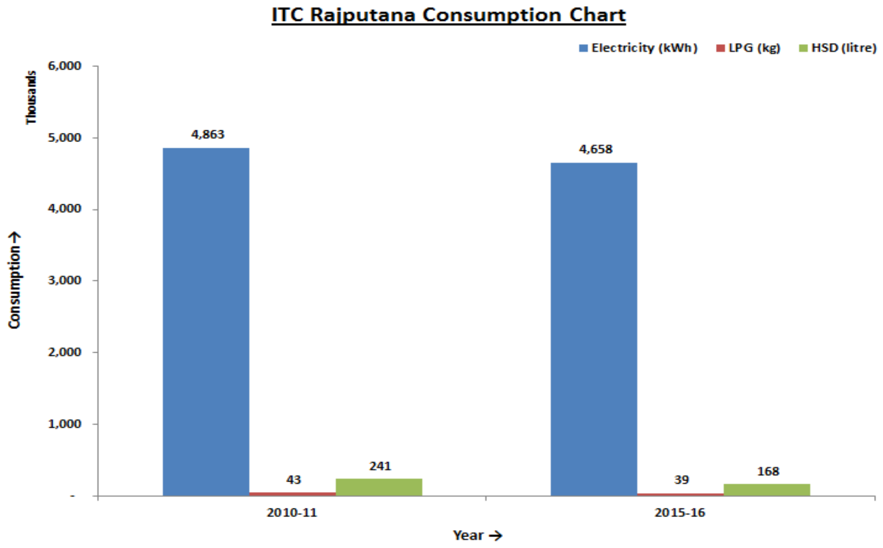
The ASHRAE Level 1 walk-through analysis evaluates a building's energy performance and energy consumption by analyzing building energy bills and conducting a brief visual survey. It gathers facility-wide energy consumption data, derives performance indicators and identifies a savings and cost analysis of low-cost and no-cost measures to improve building energy performance. As per the credit requirements, the project team has used the Energy Star Portfolio Manager to perform the comparison of the energy use intensity against similar characteristics.

Define Program Objectives and Targets:

Focus area	Goals for 2015-16	Status 2015-16	Goals for 2016-17
GHG (CO_2) Emissions	We will reduce our greenhouse gas emissions by between 4 and 6%.	Reduced our carbon emissions by 5.72%.	We will reduce our carbon intensity for next year by 6 to 8%.
Electricity	We will reduce our electricity consumption by between 2 and 3%.	Reduced our per capita electricity consumption by 2%.	We will reduce our per capita electricity consumption by 3-5% in the next FY.
Renewable Energy	We will increase our use of renewable energy in our total electricity consumption.	69% of our overall electricity requirements were met from energy renewable sources.	75-80% of our electricity requirements will be sourced from renewable sources. We have already installed a total capacity of 2.5 MW of wind power.

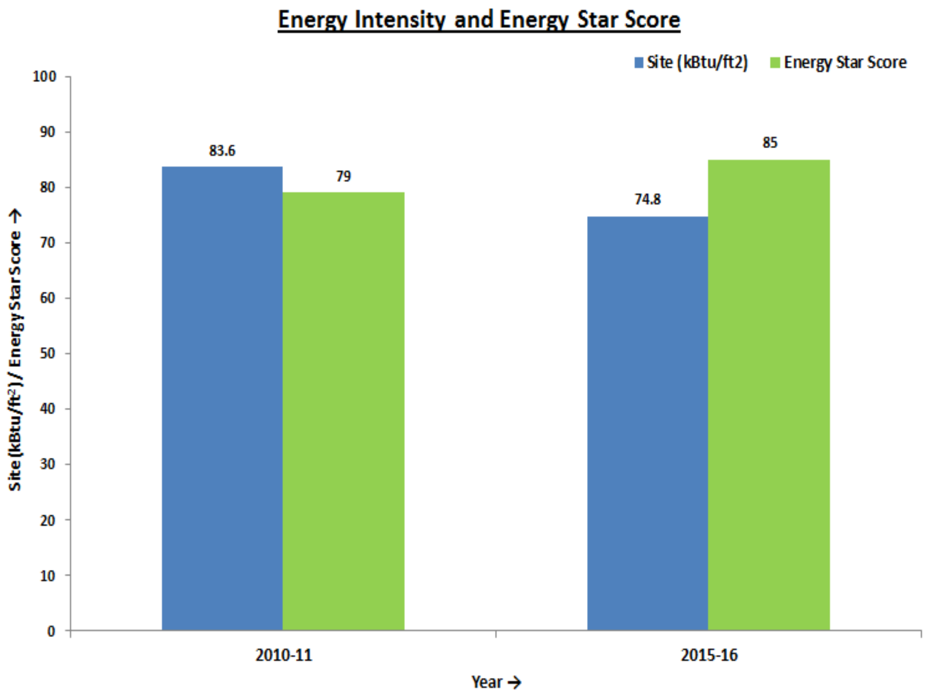
ITC Rajputana Consumption:

Site Energy Use Summary			
S. No.	Parameter	2010-11	2015-16
1	Electricity (kWh)	4,863,280	4,658,280
2	LPG (kg)	42,655	39,330
3	HSD (liter)	241,300	168,000

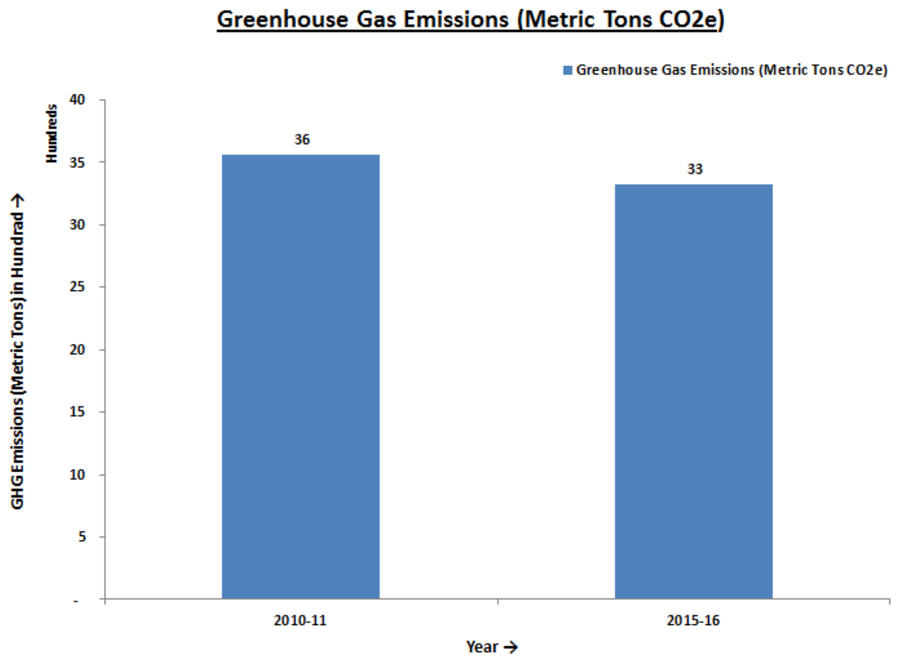


From the above chart, ITC Rajputana's consumption of electricity, LPG and HSD has been reduced up to 4%, 8% and 30%, respectively in the year 2015-16, as compared to the year, 2010-11.

Energy Intensity		
Year	**Site (kBtu/ft^2)**	**Energy Star Score**
2010-11	83.6	79
2015-16	74.8	85



Emission Reduction Reporting		
S. No.	Year	Greenhouse Gas Emissions (Metric Tons CO2e)
1	2010-11	3,561
2	2015-16	3,319



ITC Rajputana, Jaipur has reduced its consumption of HSD up to 30% in current year 2015-16, as compared to year 2010-11. So this reflects the 7% reduction in greenhouse gas emission (CO_2) gases.

IMPLEMENTATION

No cost measures: The first set of measures was the no-cost measures, which included the general observation of different locations, for example by checking sensors, Air Handling Unit air filters, Treated Fresh Air Units, Electrical Panels etc., and improving operational sequencing for equipment (particularly in air conditioning systems). These were the low-hanging fruits and did not require any capital investment.

Low cost measures: The second step included replacing small equipment, such as pumps, installing temperature sensors, fan belts for AHU and TFAs, and ensuring that the data mapped on the BMS for each input-output point was done in a proper manner (to schedule the major equipment on/off). This resulted in the second level of energy savings in the buildings.

Major retrofits: These required installing a variable frequency drive at the chiller plant, replacing old boilers, and installing more LED lights and efficient cooling towers on site. These measures required major investments and the energy savings were significant - often leading to a payback of less than 3 years.

Implemented EEM

ITC Rajputana has taken energy efficiency to a new level by implementing innovative technologies and smart automation. At the same time, ITC Rajputana has performed major retrofits, particularly concerning air conditioning systems, to bring them to the highest possible efficiency levels. In the last three years, three cooling towers have been replaced with new ones to eliminate wastage and bring about a huge reduction in energy consumption.

The case for a retrofit begins with a detailed audit of all the equipment of the chiller plant, including the chilled water pumps, condenser pumps, cooling towers and chillers. Over a period of time, the load in the buildings might have undergone changes as equipment has been replaced with newer and more efficient technology.

EEM 1: Cooling Tower Replacement

Electricity Usage Saving (kWh)	71,750
Cost Saving (INR)	538,125
Implementation Cost (INR)	1,500,000

The ITC Rajputana building has a centralized chiller plant to meet the cooling requirements. The chiller plant consists of three chillers of which two are currently operated and one is in the stand-by mode. The two chillers currently operating are of 250 and 150 TR. There is a set of six primary chilled water and condenser water pumps; primary pump operated by a 7.5kW and 4.0kW motor and condenser by a 22kW motor. Additionally, there are eleven secondary chilled water pumps to serve chilled water in four different zones to meet the building cooling load.

For the chiller plant heat rejection, three cooling towers are installed in the terrace, each of 250 TR (old cooling towers). Each cooling tower has two cells.

The cooling towers are used to reduce the heat of the condenser for the vapor compression cycle. A large fan (or fans) sucks cool and dry ambient air from below while warm water is sprayed near the top. As water cools due to adiabatic saturation (evaporation), the heat is transmitted to the cooler air. Also, part of the water evaporates, creating a cooling effect. The warm, saturated air passes through the cooling tower and is released into the atmosphere.

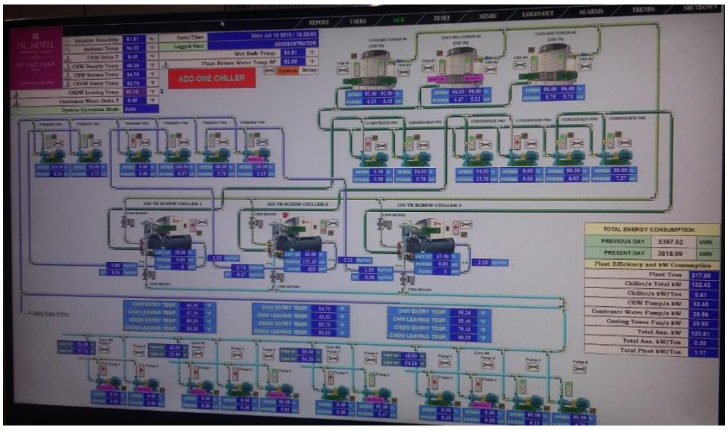
The important parameters from the point of determining the performance of the cooling towers, are:

- "Range" is the difference in the temperature of the cooling tower water inlet and the outlet.
- "Approach" is the difference between the cooling tower outlet cold water temperature and the ambient wet bulb temperature. Although, both range and approach should be monitored, 'Approach' is a better indicator of the cooling tower performance.

The steps for this measure have already been undertaken by The ITC Rajputana Jaipur Operation and Maintenance team and the same have been implemented on-**site. Three new cooling towers (each with a capacity of 350 TR) have been installed at the site.** By this replacement of cooling towers approach of cooling towers has been reduced to wet bulb temperature+4^{o}F to wet bulb temperature+2^{o}F. The cost of the budgeted EEM is Rs 15 lakhs.

EEM 2: Installation of Online Energy Manager (OEM) and Chilled water temperature reset

The ITC Rajputana building has a chiller plant, consisting of three chillers of which two are currently operated and one is in the stand-by mode. The two chillers currently operating are of 250TR and 150TR. The operating performance of the chiller plant depends on the variation of cooling load as required in the building.



The chiller plant includes a chiller, chilled water pumps (primary chilled water pumps and secondary chilled water pumps), condenser water pumps and cooling tower. Historically, the plant has been running in the manual mode with the Operation and Maintenance team setting the CHW set point at running hours.

Electricity Usage Saving (kWh)	20,500
Cost Saving (INR)	153,750
Implementation Cost (INR)	700,000

ITC Rajputana has installed an OEM (Online Energy Manager), which automatically controls and sequences the operation of the entire chilled water plant. In particular, the demand flow optimizes the temperature set points for chilled water and condenser water, while controlling of the pump and
fan speeds to maintain the proper energy balance with the building required cooling load.

The cost of the budgeted EEM is Rs. 7 Lacs.

Proposed EEM: All three chillers will be integrated based on the variable frequency drive. The steps for this measure have already been undertaken by the ITC Rajputana Operation and Maintenance team and the same has been ordered and implemented on-site this year (2016--2017).

EEM 3: Chiller Descaling

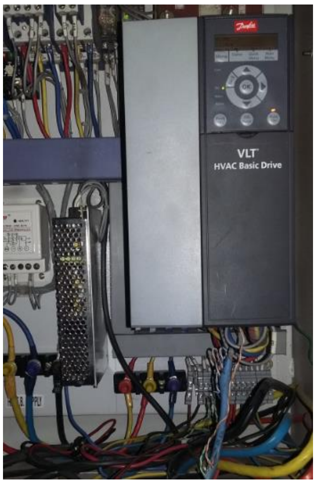
Electricity Usage Saving (kWh)	41,000
Cost Saving (INR)	307,500
Implementation Cost (INR)	500,000

ITC Rajputana has a chiller plant consisting of three chillers as mentioned. The qualifying parameter for the chiller operating performance is the coefficient of performance (COP), which depends on how efficiently the vapor compression cycle is performing. This further depends on a number of parameters, such as refrigerant gas, chiller physical tube size, number of passes, water flow rate (evaporator and condenser), chilled water entering and leaving temperature, compressor lift and fouling factors. Fouling factor determines the degree of “scale”. Higher the fouling factor, higher is the scale inside the tubes, resulting in lower heat transfer efficiency. By reducing the fouling factor, the chiller COP can be increased.

The condenser water approach temperature (i.e., temperature between the gas in the condenser coil and the water in the condenser bundle) can be reduced by using continuous descaling of the condenser water tubes inside the chiller, which will increase the chiller operating COP. The coefficient of performance (COP) of all three chillers at ITC Rajputana has been maintained properly near its design COP and the approach reduced from 4^{o}F to 1.5^{o}F. This may increase chiller efficiency.

EEM 4: AHU fan control through VFD

To condition the public area, a total of 22 AHUs are installed. All 22 AHUs are currently operational. All AHUs are of the “single zone cooling only” type. Out of these, 14 AHUs have been retrofit with a VFD and are designed to operate like a variable air volume (VAV) system. The rest of the seven AHUs do not have a VFD and work at one speed with a starter. Eight AHUs integrated with VFD.



Electricity Usage Saving (kWh)	24,600
Cost Saving (INR)	184,500
Implementation Cost (INR)	400,000

EEM 5: Lighting Control and Replacement of Mercury Lamp with LED

Accurate lighting design through simulation and controls:

Lighting designs are based on a simulation software, which indicates the optimum number of light fixtures needed to achieve the required lighting levels. This will eliminate the use of rule-of-thumb designs, thereby reducing lighting loads and subsequently, cooling, and electrical loads. Occupancy sensors for all cabins and restrooms reduce operational costs. ITC Rajputana lighting designs are highly efficient. The accurate design of the ITC Rajputana lighting systems has involved a lower investment, since the number of fixtures and lamps has been optimized and wastage is thus completely eliminated.

Lighting Control Schedule of ITC Rajputana:

ITC Rajputana is a five star luxury hotel and there are no after hours in the hospitality industry. However, there still are schedules for interior lighting installed in the common areas and restaurants (attached below). All lighting is controlled by either timers or occupancy sensors. This helps to reduce the electricity use at on the site.

The interiors of the building also include guest rooms, which are occupied when guests check in. The rooms have an automatic key based controller system, which ensures that lights are switched off once the guests exit the room. As the lighting of the room is dependent on guest occupancy, no automatic timers are installed but the key-based controller turns lights off whenever guests exit the rooms.

ITC Rajputana Lighting Schedule		
Common Space	**Type Of Control**	**Schedule**
Jalmahal Restaurant	Manual	Mode lighting morning, afternoon, evening & night
Peshawari Restaurant	Dimmer	Mode lighting morning, afternoon, evening & night
Coffee Shop	Manual	Mode lighting morning, afternoon, evening & night
Sheeshmahal Bar	Dimmer	Mode lighting morning, afternoon, evening & night
Gym & Spa	Dimmer	8 am to 5 pm
Banquet Hall 1	Dimmer	as per requirement
Banquet Hall 2	Dimmer	as per requirement
Banquet Hall 3	Dimmer	as per requirement
Pre-function 1	Timer	as per requirement

Pre-function 2	Timer	as per requirement
Pre-function 3	Timer	as per requirement
Main Lobby	Manual	No after hours - 24 hours operation
EC Lounge	Manual	Mode lighting morning, afternoon, evening & night

Replacement of Mercury and Sodium vapor lamps with LEDs:

ITC Rajputana replaced the 250W sodium vapor lamps used for street lighting with 60W LEDs, resulting in a 76% reduction in the connected load. The payback period for this measure is 0.4 years. The 500W halogen lamps were also replaced by 60W LED lights. The life of LEDs is several times higher than that of sodium vapor lamps, thus reducing maintenance or replacement costs. This has been implemented at ITC Rajputana, where the entire lighting system has been revamped and low-wattage LED streetlights installed to improve visibility for employee movement and safety.

The conventional CFL and metal halide light fixtures have also been replaced with efficient LED lights. This has resulted in a reduction in the lighting load by about 37%, compared with what was achieved through the use of conventional light fixtures.

Electricity Usage Saving (kWh)	30,750
Cost Saving (INR)	230,625
Implementation Cost (INR)	100,000

Occupancy Sensors:

There are plans to replace the T5 lamps with LED fixtures equipped with built-in occupancy sensors at the site. The sensors work on the passive infrared (PIR) technology and detect movement within the coverage area and accordingly alter the lighting levels and switch off the lights when there are no occupants in the room. The highest impact is observed during after-office hours when building occupancy is low.

EEM 6: New High Efficiency Boiler Installed and Complete Condensate Recovery

ITC Rajputana has installed newly high efficiency (88.2%) boiler of 600 kg/hr capacity. This new boiler has replaced the old one with the same capacity but lower efficiency (70%).
Currently, the building uses two boilers with 850 kg/hr. and 600 kg/hr capacities. However, at a time only one boiler is operated. The boiler is used for laundry, including washing and ironing. Additionally, some amount of steam is used for food preparation in the kitchen.
The condensate steam from the laundry return is used to heat up the service hot water in feed water tank.

Boiler Cost and Diesel Saving				
Total Diesel Consumption (2010-11) (ltr.)	**Total Diesel Consumption (2015-16) (ltr.)**	**Saving in Diesel (ltr.) (5 Years)**	**Cost Saving (INR)**	**Investment Cost (INR)**
54,750	45,625	45,625	2,691,875	700,000

EEM 7: Solar Hot Water System Installed at ITC Rajputana

ITC Rajputana has installed the Solar Hot Water System of 8KL capacity at the site. The total hot water per day consumption of ITC Rajputana is 70-75 KL, out of which 8 KL hot water is produced by the solar hot water system. This has reduced the consumption of diesel for the hot water generator by 27,675 liters over five years.

EEM 8: Pressure Regulated on LPG Gas Pipeline

Earlier, at ITC Rajputana, the pressure of the LPG gas pipeline was 20 psi. It has now been reduced to 10-15 psi. The result of this EEM was reflected in the consumption of LPG.

ITC Rajputana has reduced its consumption in LPG up to 8% in the current year 2015-16, as compared with 2010-11.

EEM 9: Single Clear Glazing to be replaced with Double Glazing Unit (DGU) in Public Areas and Guest Rooms:

Electricity Usage Saving (kWh)	16,400
Cost Saving (INR)	123,000
Implementation Cost (INR)	2,000,000

Earlier, at ITC Rajputana, a single pane glazing has been installed in public areas (guest room corridors) and guest rooms. Recently, the single pane glazing has been replaced by double pane glazing in public areas and guest rooms.

The U-value of the old single glaze unit is 0.72Btu/hr.ft2.^{O}F and the solar heat gain coefficient (SHGC) is 0.38. This affects the building envelope and adds significantly to the cooling load. The SGU glass absorbs more heat during the day, which increases the energy needed for cooling.

The U-value of the new double glaze unit is 0.56Btu/hr.ft2.^{O}F and the solar heat gain coefficient (SHGC) is 0.25. These panes have a 15mm air gap between the two layers, and provide better sound proofing.

The U-value of a double glazing window is the measure of its ability to transfer heat – so double glazing windows with the lowest U-value are the most efficient insulators against heat loss from a space. They have a transparent metallic coating that works in two ways to reduce energy. The dual action coating reflects the cooling back into the room, whilst allowing heat and light from the sun (known as passive solar heat gain) to pass through.

The increment in the thermal insulation OR building envelope by installing the DGU glass reduces the heat loss OR demand cooling load and AHU fan power. The investment for this replacement of SGU to DGU glasses is around Rs 20 lakhs.

Comparison between SGU and DGU glass; U-value and SC

S. No.	Glass Parameter	Old SGU Glass Value	New DGU Glass Value
1	U – value (Btu/hr.ft^2.°F)	0.72	0.56

2	Solar Heat Gain Coefficient (SHGC)	0.38	0.25

EEM 10: Onshore Renewable Energy Uses by ITC Rajputana

Use of Wind Energy

ITC Rajputana has an onshore wind farm with two 1.25 MW turbines, which provide a total installed power of 2.5 MW. Electricity generated from the turbines is used by ITC Rajputana following an agreement between the Rajasthan State Electricity Board and ITC Rajputana.

For the period April 1, 2015 to March 31, 2016, the total wind electricity generated was 3,277,856 kWh.

For the period of April 1, 2015 to March 31, 2016, the total electricity consumption of ITC Rajputana is = 4,720,560 kWh

The production from wind turbines over the year (2015-16) was therefore 69% of the total consumption of ITC Rajputana.

The total investment for the two windmills is around nine (9) Cr. (INR).

Month	Unit Generation	Monthly Consumption
Apr-15	199,365	397,880
May-15	275,952	435,320
Jun-15	391,381	475,160
Jul-15	650,760	483,720
Aug-15	574,974	445,580
Sep-15	274,850	414,600
Oct-15	209,818	391,260
Nov-15	145,529	347,060
Dec-15	95,073	321,600
Jan-16	82,251	323,360
Feb-16	169,281	313,940
Mar-16	208,622	371,080
Total	**3,277,856**	**4,720,560**

Use of Solar Energy

In the future, ITC Rajputana will install a Solar Power capacity of around 150kW. The investment for this project is around 1.1 Cr. (INR).

MEASUREMENT AND RESULTS

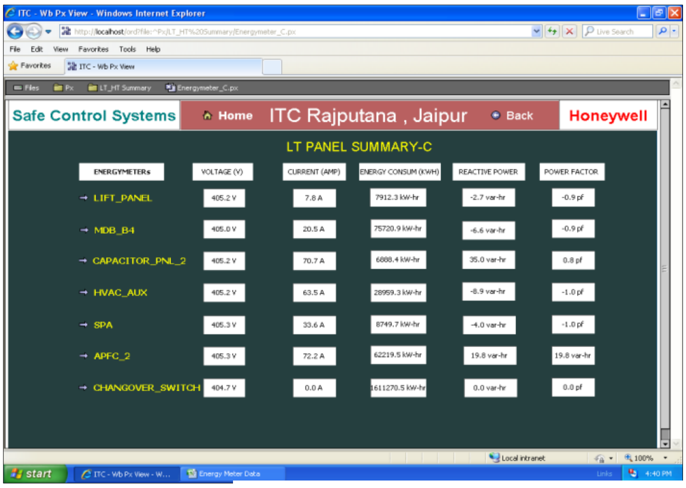
Calculate Energy Savings

Apart from designing buildings efficiently, the buildings are also monitored accurately and continuously to make sure the efficiencies are maintained over time. Measurement and verification have played a vital role in the evaluation and management of new technologies and energy conservation measures at ITC Rajputana. The energy team measures the consumption of all assets in a building in real-time as well as on a cumulative basis. Energy usage in the ITC Rajputana building can be typically categorized into HVAC, lighting, laundry, cooking and miscellaneous. When it comes to evaluating operations, new technologies, or identifying energy saving opportunities, measuring only the input energy is not sufficient. The team measures the system output too, so that they have the equipment/system efficiency to evaluate the systems and take informed decisions.

At ITC Rajputana, the energy consumption of all HVAC equipment/systems in the building along with their output is measured. For example, energy consumed is measured as well as tonnage (TR) produced by chillers and balance of plant to establish chiller level as well as plant level efficiencies. This efficiency data is used to continuously verify design verses actual performance and review operations.

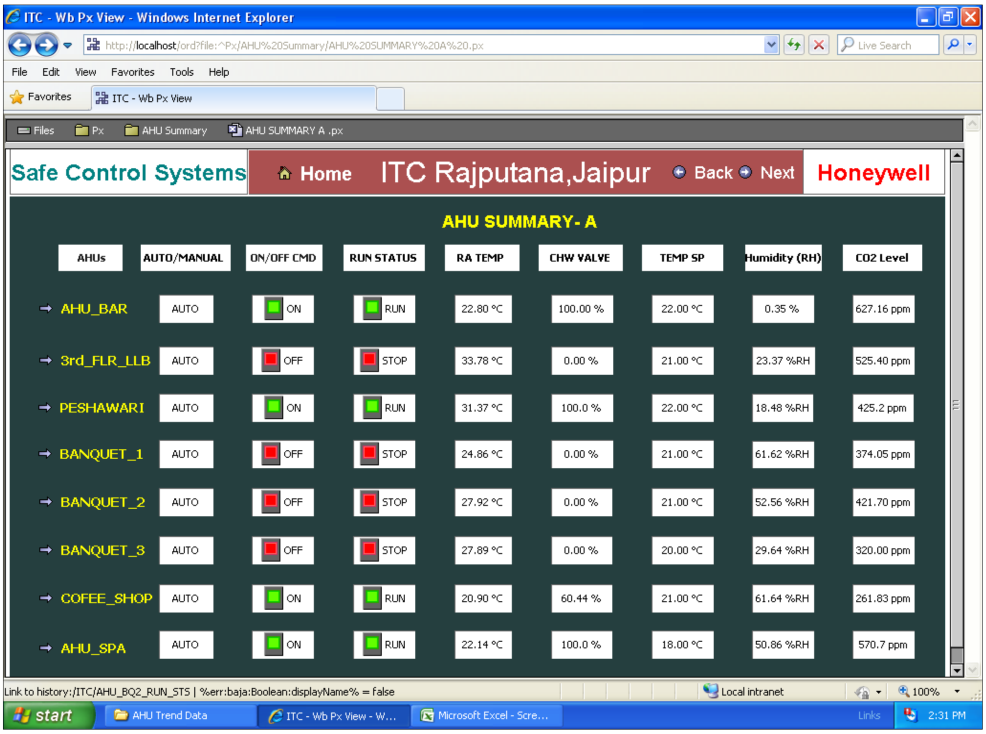
Data Analysis & Tracking

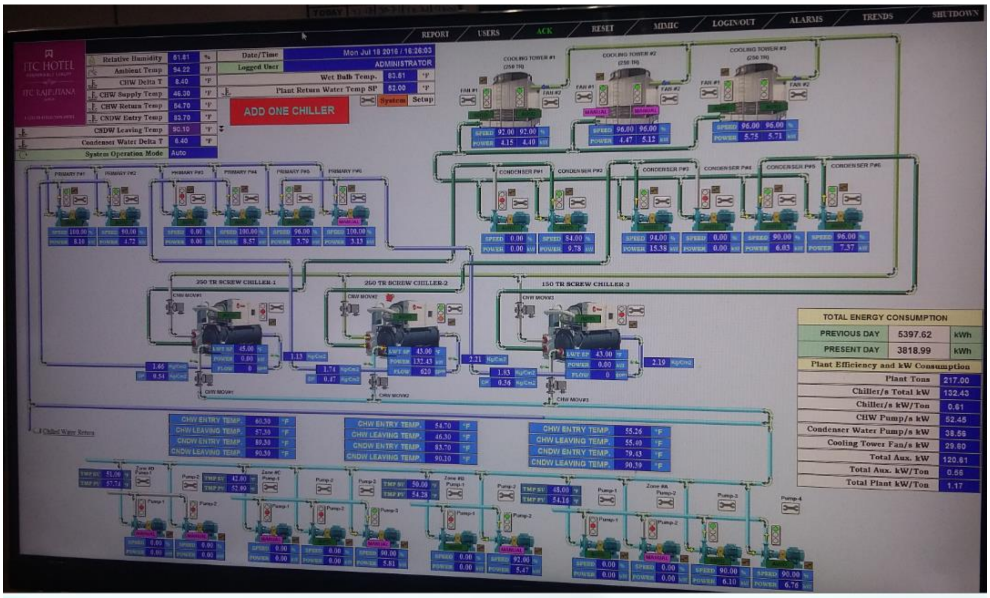
The Central Command Center helps to remotely monitor and optimize building operations.
The management of energy management systems, air handling systems, power usage effectiveness and energy consumption is done for various electrical systems for their performance across the building.



ITC Rajputana has an online energy manager for the chiller plant operation and its various pump operations. Chiller-plant performance data from all chiller plants on the site is compared on a weekly basis for optimization. This data also helps to validate the current design and improve designs for future buildings and systems.

The existing energy management system has been upgraded to a more powerful and capable Central Energy Management System, an enterprise-level energy monitoring and information tool. New energy meters and integrated energy meters have been added to third-party applications such as the building management systems, chiller-plant managers and SCADA systems, which takes the total number of integrated energy meters throughout the building to 22.




REPORT
USERS
ACK
RESET
MIMIC
LOGIN/OUT
ALARMS
TRENDS
SHUTDOWN
ITC HOTEL
ITC RAJPUTANA
Relative Humidity 61.61 %
Ambient Temp 94.22 °F
CHW Delta T 8.40 °F
CHW Supply Temp 46.30 °F
CHW Return Temp 54.70 °F
CNDW Entry Temp 83.70 °F
CNDW Leaving Temp 90.10 °F
Condenser Water Delta T 6.40 °F
System Operation Mode Auto
Date/Time Mon Jul 18 2016 / 16:26:03
Logged User ADMINISTRATOR
Wet Bulb Temp. 83.61 °F
Plant Return Water Temp SP 52.00 °F
System Setup
ADD ONE CHILLER
250 TR SCREW CHILLER-1
250 TR SCREW CHILLER-2
150 TR SCREW CHILLER-3
TOTAL ENERGY CONSUMPTION
PREVIOUS DAY 5397.62 kWh
PRESENT DAY 3818.99 kWh
Plant Efficiency and kW Consumption
Plant Tons 217.00
Chiller/s Total kW 132.43
Chiller/s kW/Ton 0.61
CHW Pump/s kW 52.45
Condenser Water Pump/s kW 38.56
Cooling Tower Fan/s kW 29.60
Total Aux. kW 120.61
Total Aux. kW/Ton 0.56
Total Plant kW/Ton 1.17