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S.L. RAHEJA HOSPITAL
A Fortis ASSOCIATE

A Report on

Energy Efficient Hospitals – visiting the realities

Foreword

Dr Vivek Desai
Chairman, CII Western Region Healthcare Sub-Committee &
Managing Director
Hosmac India Pvt Ltd

Healthcare is one of the fastest growing sectors in India; the healthcare spending is set to double every five years till 2020. Hospitals are an inseparable part of the healthcare delivery system. In most hospitals, continuous operations and the latest equipments require uninterrupted power supply for suitable functioning. As per the Ministry of Power, Government of India, there is a huge potential of energy savings in hospitals and healthcare institutions. Energy Audit studies conducted across different sectors including hospitals indicate huge energy saving potential.

A detailed understanding of the power spend per bed per day brings to light the collective impact we as an industry have on the electricity consumption in this country. It has been observed that if energy conservation measures are adopted and coupled with enabling architectural design to harness natural light and ventilation, it should be possible to bring about a reduction of 10% in electricity consumption. Even this 10% reduction would imply a saving of up to INR 800 Million ever year, sufficient to cater to the cap-ex requirement of setting up a 150 bed tertiary care Hospital!

Green Hospitals tend to make maximum use of natural light and solar energy. The green buildings should be constructed in a specific angle of alignment with the sun which enhances the use of nature light. The major orientation of the building in north and south directions maximizes use of natural light. Shades on the south side block unwanted direct sunlight while reflecting light onto the ceiling of the interior. This further provides natural lighting and controls the internal environment of the hospital. This form of buildings aids in establishing a passive cooling system for the interiors. Windows must be located in such a manner so as to ensure ventilation, and increase access to natural light and reduce heat. Also, using simple operational measures like installing unitary air conditioning systems, sensors, etc also reduce the wastage of electricity in various departments of the hospitals. Augmenting these efforts with incorporation of solar power should also be encouraged.

Message

Dr Uma Nambiar
CEO, S L Raheja Hospital &
Zonal Director (Mumbai), Fortis Healthcare

Dear Readers,

It is now becoming increasingly evident that hospitals are responsible for generating large amounts of waste as well as indulge in wasteful use of energy.

With people becoming aware of green hospitals, many new hospital buildings are incorporating such measure to reduce their carbon foot print.

The problem however is with the old hospitals which are not designed in a very energy efficient manner and in such hospitals, power and water costs can be significant which is largely the case with the hospitals in Mumbai that we have studied in this survey.

Most of the hospital being standalone facilities also feel that the entire exercise of studying the energy wastage and taking corrective steps to save wasteful expenditure of energy may not be a cost effective exercise for an old hospitals.

It is with the idea of analyzing these details in these respects that the study was conducted in the hospitals of western region. As was expected, we did have some interesting findings and definitely there is an immense scope for saving energies as well as profiting from the measures adopted to that effect.

For all hospitals this could start as a corporate social responsibility to lighten the collective carbon footprint. It is a fact that in the long run, this will even result in introducing efficiencies in operations.

There are many initiatives that the hospitals can take to reduce wasteful expenditures of energy especially by adopting measures directed at improving indoor air quality, efficient air conditioning, judicious use of disposables, minimizing the use of paper or recycling paper, recycling kitchen waste, using biodegradable bags for garbage collection, improving water management through efficient plumbing mechanisms, use of natural light or renewable energy sources.

The next steps for the hospitals in Mumbai could involve formation of a consortium which could adopt eco friendly strategies to be used in high energy consumption areas of hospitals and evolve a procedure to work towards collective pooling of carbon credits thus generated.

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Executive Summary

Healthcare executives today face energy costs that continue to rise, creating very difficult challenges managing the facility operating budget. Hospitals and clinics have high energy demands due to 24x7 availability, medical imaging equipment, and special requirements for clean air and disease control. Acute and extended care facilities must manage energy consumption to achieve optimal patient care, comfort and safety as efficiently as possible. Hence, healthcare managers must take new and creative steps that put energy costs in check, both for regulatory compliance and sustainable business goals.

This paper is intended to raise awareness of the many areas of potential savings that relate to energy consumption at healthcare facilities. Cost effective recommendations and best practices will be outlined, demonstrating how management can take action to address their energy inefficiencies and implement energy programs. The reader will also learn some of the often overlooked techniques that comprehensively address energy conservation and increased building operating efficiency.

Energy Facts in Healthcare Facilities Today

The Producer Price Index for Fuels, Related Products, and Power clearly illustrates the trend for increasing prices. And high energy prices are forecast to continue due to limited supply and refining capacity, a tense global political climate, and brisk worldwide demand for fossil fuel. Healthcare-related research figures from the ENERGY STAR® program indicate that energy consumption per square foot in hospitals is much higher than many other types of buildings, primarily due to 24x7 hours of operation and demanding requirements for air filtration and air exchange. However, just because hospitals run 24x7 it does not mean there are fewer opportunities to save energy. This paper will explore these opportunities in detail, and how specific techniques for energy conservation can be applied to the unique industry requirements facing healthcare executives. Healthcare energy demand is expected to grow significantly in the coming years.

Business Concerns Facing Healthcare Executives

Even though there is brisk demand for healthcare services today, the executive manager faces competition and significant challenges running a successful healthcare business. Hospitals, for example, must serve the uninsured public and spend money implementing systems and procedures that help them conform to government regulations such as the Health Insurance.

What Drives High Energy Use at Healthcare Facilities?

- High Efficiency Particulate Air (HEPA) filtration is required to prevent the spread of disease (also known as nosocomial infection) in the ventilation system. HEPA filters that achieve 99.7% efficiency place greater electric demand on fans for proper air circulation.
- Stringent indoor air quality (IAQ) levels must be maintained, especially in operating rooms (OR), emergency rooms (ER), intensive care units (ICU), and laboratories. These rooms require 20 to 30 air changes per hour.
- Certain types of rooms have special HVAC pressurization requirements. ORs, ERs, and ICUs, generally run over-pressure for protective isolation from airborne infection. Quarantine rooms require negative pressure (and UV lights) for infectious isolation and the control of diseases.
- IAQ must be strictly regulated for temperature, humidity, and quality. This increases the need for proper heating, cooling, and fresh air intake.

- Domestic hot water must be heated to 130 F to kill legionella bacteria. But then the water temperature has to be lowered to 105 F before use.
- Some rooms require climate control set at 60 F to accommodate the adhesive cement used for orthopedics, which tend to set too quickly in warmer temperatures.
- Laundry facilities and kitchens can consume 10-15% of the building's energy, increasing the need to more closely monitor hours of peak demand from these source.
- Hospitals require that power be provided at 100% uptime for patient care and liability concerns. Backup generators contribute to increased operating costs, or cogeneration (also known as combined heat and power, or CHP) investment may be necessary.

Background of the survey:

Energy expenditure is a significant component for healthcare providers after manpower and consumables costs. This clearly signifies the opportunity for hospitals to cut costs and also contribute to reducing India's carbon foot print. There is a pressing need for hospitals, particularly those under construction, to adopt the 'Green Hospital' concept to make maximum use of natural light and solar energy.

Consequently, this reduction in power costs may also translate into lower consumer bills and healthcare expenses.

Given this background, CII Western Region Healthcare Sub-Committee along with S L Raheja (A Fortis Associate) Hospital and Schneider Electric conducted an exclusive Survey on Energy Efficiency of Hospitals.

The objective was to share best practices on green hospitals, deliberate on the challenges & issues and present case studies on benefits & savings associated with green hospitals.

The survey is initiated to understand the energy consumption pattern of the large and medium scale hospitals and healthcare service facilities in western India. A questionnaire was devised by Schneider Electric India covering parameters related to energy consumption cycles of these hospitals.

Agenda of the survey:

- Ascertain the energy usage pattern for participating hospitals
- Comparison with National Benchmark
- Identify the Energy consumption patterns and loop-holes.
- Identify the Savings Potential
- The Way Forward
    - Data churning to get more analysis
    - Widen the Scope of the study
    - Consortium of Hospitals to Liaison with Government
    - Carbon Foot Print Study

Participating Hospitals:

1. Jaslok Hospital, Mumbai
2. Lilavati Hospital, Mumbai
3. Apollo Victor Hospital, Goa

4. K B Bhabha Municipal General Hospital, Mumbai
5. Aditya Birla Memorial Hospital, Pune
6. Breach Candy Hospital, Mumbai
7. Bhopal Memorial Hospital & Research Centre, Bhopal
8. Vrundavan Hospital, Goa
9. Mahavir Health & Medical Relief Society, Surat
10. Fortis Hospitals Ltd, Kalyan
11. Fortis Hospitals Ltd, Mulund
12. Fortis Hospitals Ltd, Vashi
13. Dr L H Hiranandani Hospital, Powai, Mumbai
14. Holy Family Hospital, Mumbai
15. Kohinoor Hospitals, Mumbai
16. Prince Aly Khan Hospital, Mumbai
17. S L Raheja (A Fortis Associate) Hospital, Mumbai
18. Saifee Hospital, Mumbai
19. Godrej Memorial Hospital, Mumbai
20. Civil Hospital, Ahmedabad
21. Sir H N Hospital, Mumbai
22. SPS Apollo Hospitals, Ludhiana
23. Apollo Gleneagles Hospital Ltd, Kolkata

Energy Performance Index (EPI):

Energy Performance Index is defined as total energy consumption per unit of built up area of the Building per year **(kWh/Sq. mts/year)**. In other words it can be referred as **Specific Energy Consumption** of the building per annum.

Importance of EPI:

National commercial **Energy Benchmarking Initiative** was framed to standardize

- Energy Data Collection
- Baselines setting for commercial buildings
- Energy performance target setting and monitoring

The information would be useful to the users and the stakeholders to evaluate:

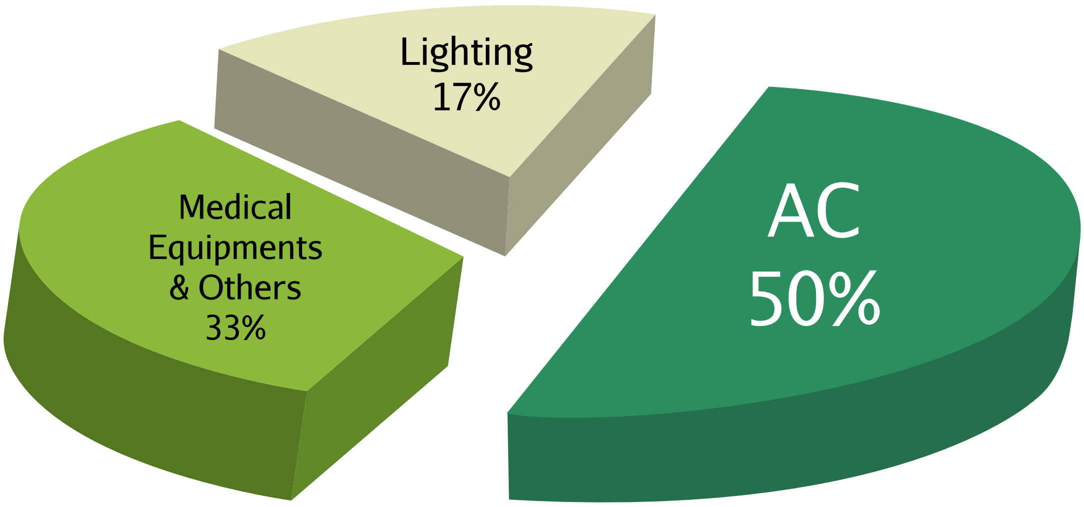
- Energy efficiency of the building
- Track improvements compared to other buildings
- Recognize the top performers

Findings of the survey:

- The data collected from different hospital is analyzed primarily targeting the EPI calculation and benchmark the results with reference to ECBC standard.
- The surveys conducted among the hospitals are in different climate zones as per ECBC guideline. The minimum EPI for this zone is 200 kWh/sq. mt/annum (Average)

- More than 60% hospitals and healthcare facilities fail to meet the minimum EPI criteria leading to a huge potential of energy performance improvement.

- The main contributors of energy consumption are HVAC, Medical equipments and Lighting.



Energy performance index for participating hospitals

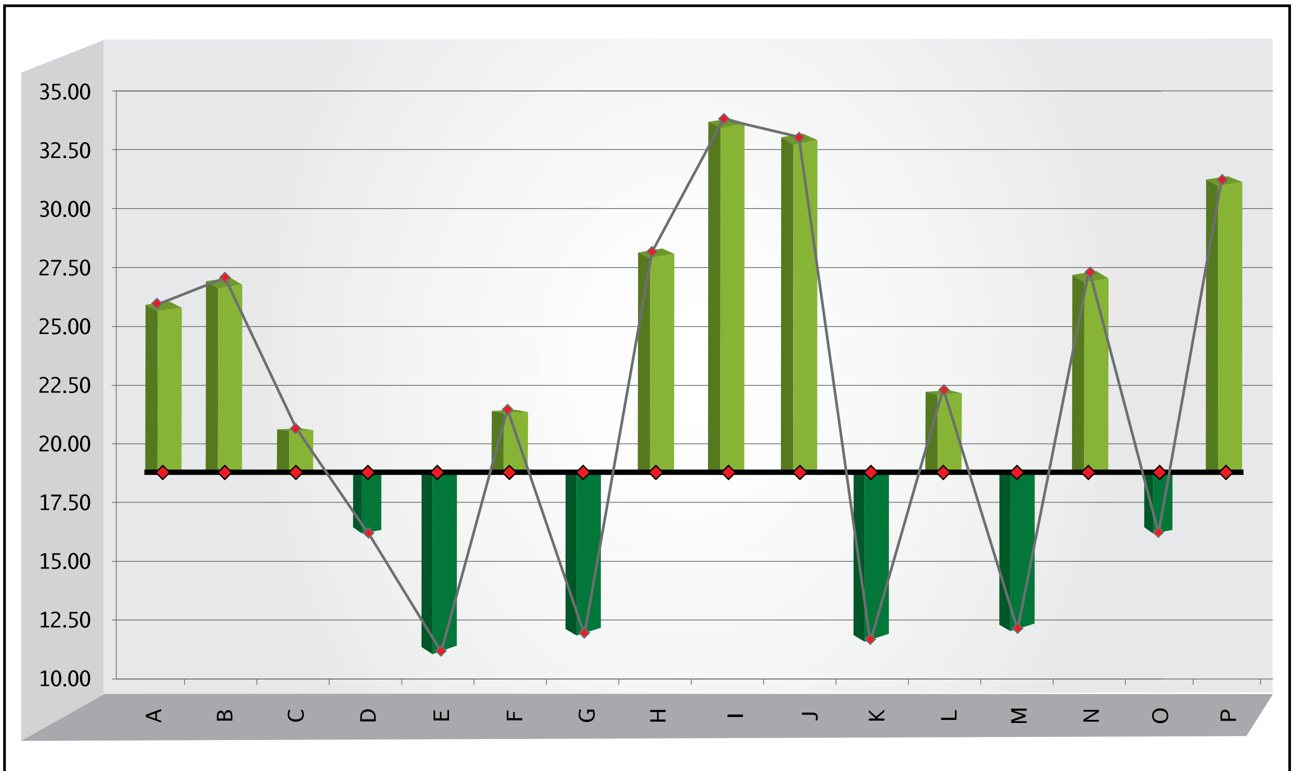


Fig - 2: *The above bar chart shows the EPI in terms of Energy Consumption of the hospitals per sq. m of the built up area. The Blue line is the benchmark EPI where as the bar stands for individual EPI of each hospital covered under survey. The hospitals having better EPI than minimum benchmark value are below the benchmark line*

Energy consumption per bed in Hospitals

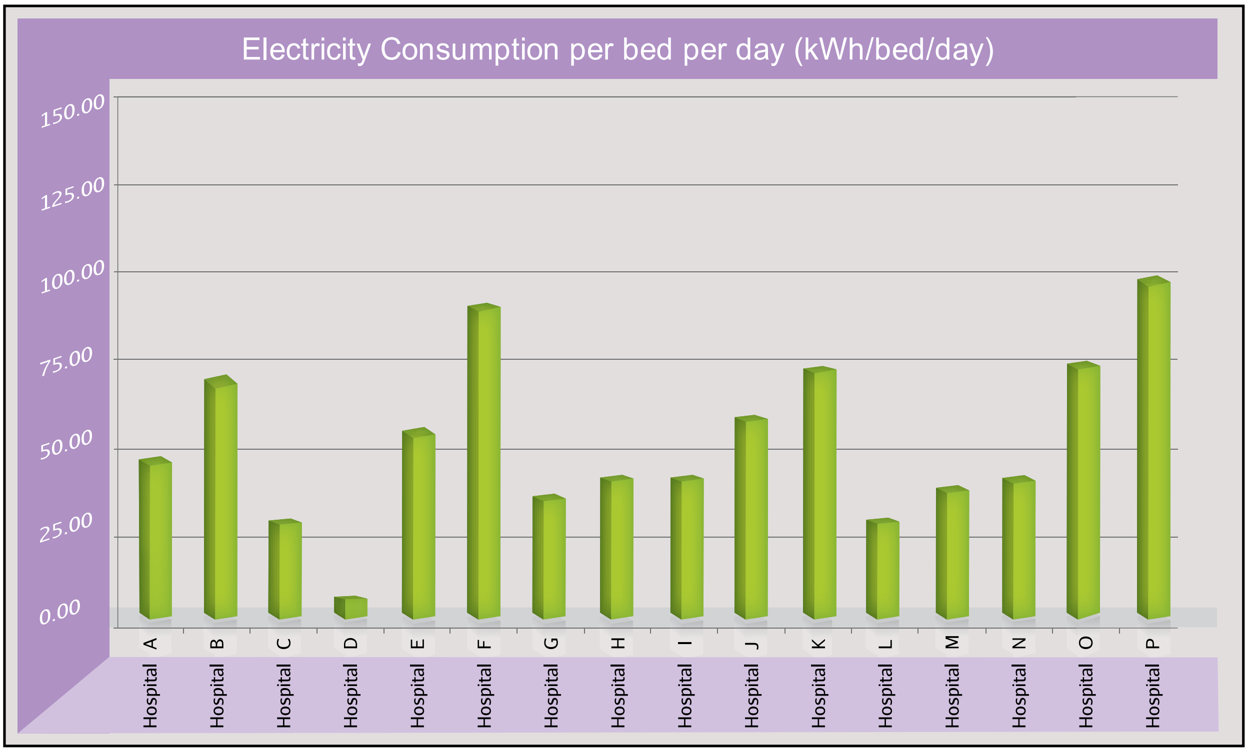


Fig - 3: *The above bar chart shows the specific energy consumption of different hospitals under the survey.*

Energy Cost per bed for hospitals-Mumbai against National average

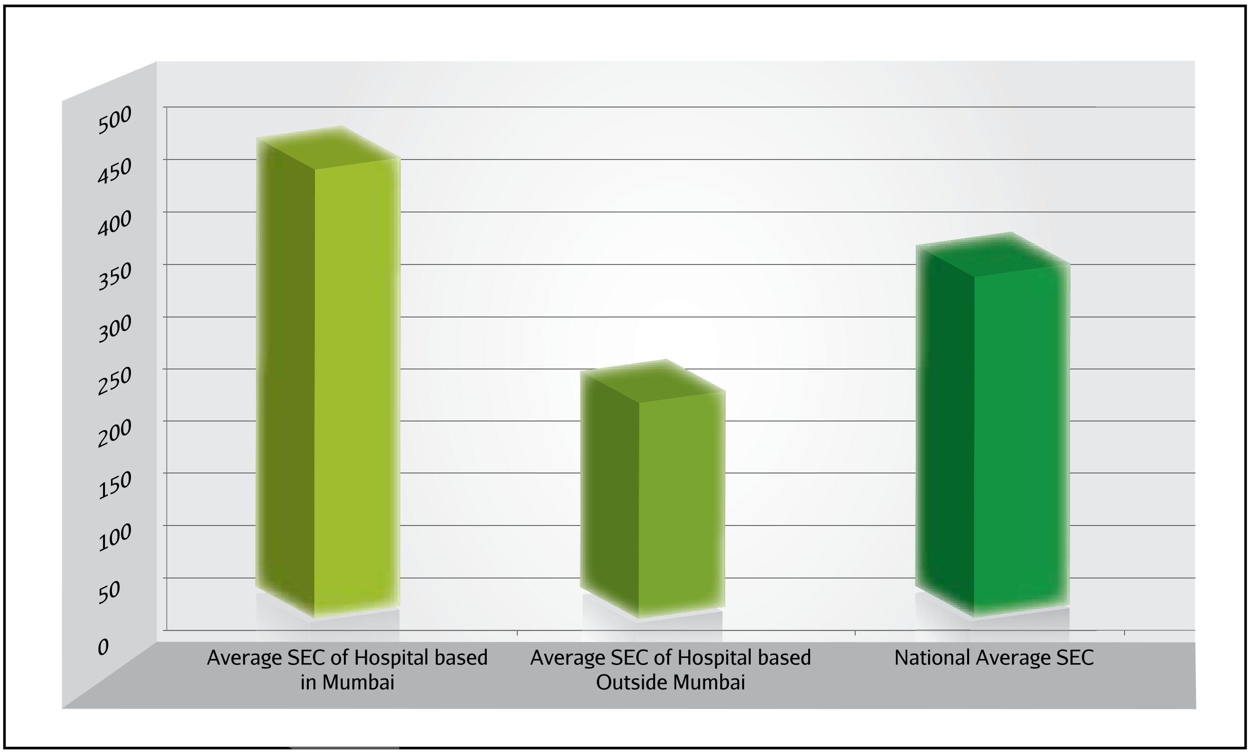


Fig - 4: *Per bed energy cost comparison*

Way Forward

Energy Efficiency

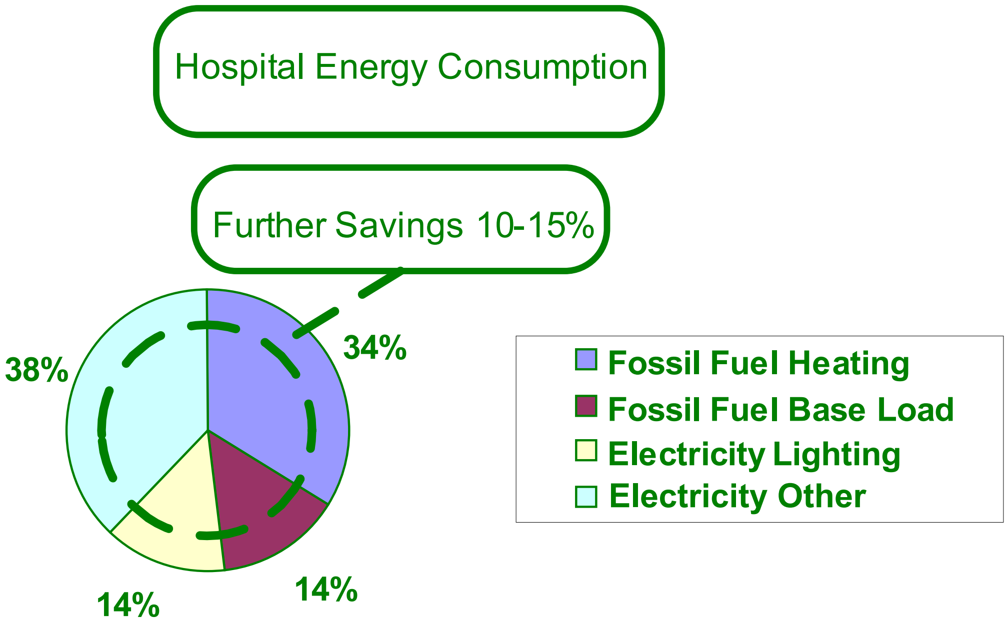
INTRODUCTION

The scope of this section covers the impact on energy efficiency and water consumption of the active measurement and control facilitated by a fully integrated intelligent technology and service infrastructure that provides significant further savings in the region of 10-15% over the accepted good design practice for a modern healthcare facility.

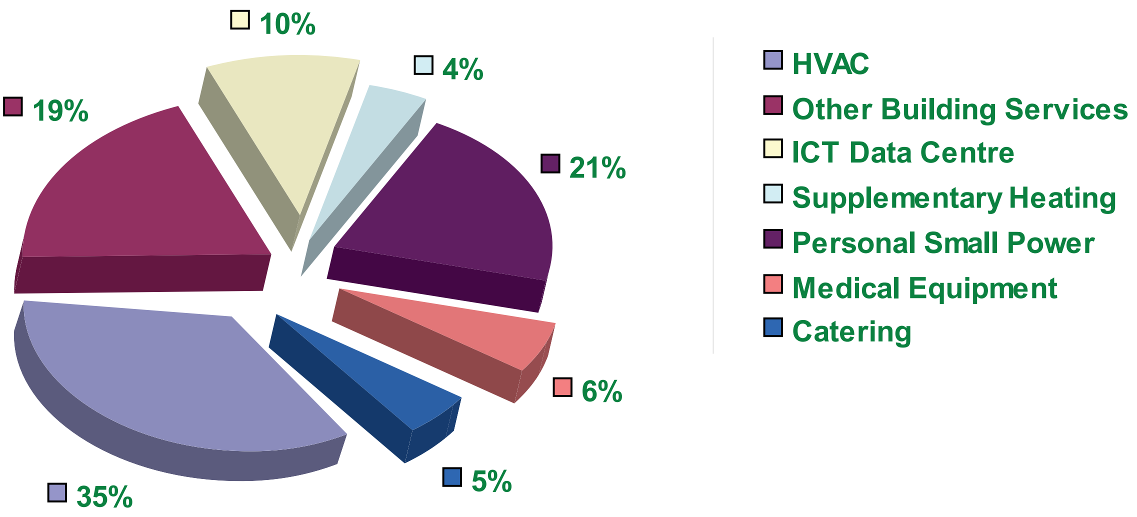
Thus further savings will be achieved in the following key areas: -

- Active Controls
  - ⇒ Occupancy based interoperation of HVAC, Lighting and power.
  - ⇒ Advanced control techniques with increased levels of energy saving automation
  - ⇒ Advanced technology
  - ⇒ Intelligent, interactive patient and staff interfaces to encourage energy efficiency through behavioral change
- Advanced measurement
  - ⇒ Smart metering infrastructure
  - ⇒ Self metering devices
- Advanced Management & Services
  - ⇒ Intelligent data analysis
  - ⇒ Real energy performance distributed dashboard techniques
  - ⇒ 24/7 Remote specialist energy services
  - ⇒ Enterprise level energy management and benchmarking
  - ⇒ Efficiency based facilities intervention

An illustration of the breakdown of anticipated energy use based on good practice design for a new Acute hospital with over 500 beds is shown below: -



Electricity Other Breakdown



Source: *United Kingdom Department Of Health Energy Efficiency Guide no.72*

Notes: Fossil fuel base load is made up of domestic hot water services and process loads such as sterilizers, distribution losses.

The following table illustrates how the integrated technology and service infrastructure will impact hospital energy consumption: -

Energy Use	Active Controls	Advanced Measuring	Advanced Services	Details
Heating & Cooling	☑	☑	☑	• Occupancy based interoperation to set back heating when not required • Interoperation with solar shading to account for solar gain and set back heating accordingly • Efficiency based primary energy plant control • Intelligent heat metering and corrective actions • Behaviour changing user controls
Base Load		☑		• Intelligent metering and usage pattern analysis
Lighting	☑	☑	☑	• Occupancy based interoperation to dim when natural light is available and interact with solar shading • Intelligent metering and corrective actions. • High frequency switching of external lighting

HVAC (Elec)	☑	☑	☑	• Occupancy based interoperation to set back cooling when not required • Interoperation with solar shading to account for solar gain and set back heating accordingly • Efficiency based primary energy plant control • Intelligent heat metering and corrective actions • Behaviour changing user controls
Other Building Services	☑	☑	☑	• Occupancy based interoperation to set back mode where applicable • Power Factor and advanced power quality analytics and management • Smart Grid utilisation • Enterprise Level energy management functions • Load shedding • Maximum demand control
ICT Data Centre	☑	☑	☑	• Fully integrated data centre physical infrastructure (cooling, power, UPS, security, data management) • Load balancing • Heat reclaim systems • In row cooling • Advanced enterprise level monitoring and management
Electric Heating	☑	☑	☑	• Occupancy based interoperation to set back heating when not required • Interoperation with solar shading to account for solar gain and set back heating accordingly • Intelligent heat metering and corrective actions • Behaviour changing user controls
Personal Small Power		☑		• Occupancy, time schedule or maximum demand based circuit activation/deactivation • Intelligent metering
Medical Equipment		☑		• Intelligent metering and monitoring
Catering		☑		• Intelligent metering and monitoring

It is essential for a modern hospital to focus on the energy efficiency of it's facilities and to install the appropriate infrastructure to manage energy consumption effectively now and in the future.

Measurement normalization and analysis of consumption W.A.G.E.S. (Water, Air, Gas, Electricity, Steam).

The measurement system - Electricity

Electricity Consumption is monitored by various devices across the electrical distribution system.

Intelligent meters may be located in medium-voltage and low-voltage distribution boards. As well as providing a local display these meters will be networked together back to local gateways located on the technical Ethernet network. The most common form of communications for these systems is Modbus.

In addition to stand-alone meter it is possible to monitor electrical consumption from modern circuit breakers that also have network capability.

By using a comprehensive electricity management supervisory system these meters are able to report full electrical performance and status information including power factor and harmonics to ensure the electrical distribution system is operating efficiently at all times.

Electrical consumption may also be obtained from other intelligent devices controlled from the BAS including the variable speed drives managing pump and fan motors.

Energy consumption data may be distributed from the electrical supervisory system to the BAS for analysis.

Heat

The measurement of energy consumed by systems using hot and chilled water will be managed by heat meters. This will include domestic hot water circuits.

Energy consumption will be monitored on a floor/department basis to ensure full visibility of the distribution of use.

Heat meters providing a local display will use flow and return temperature sensors combined with an ultrasound flow meter to calculate thermal energy consumed. They will be able to report:

- Scope (instantaneous and total)
- Thermal energy (instantaneous and total)
- Outlet Temperature
- Return Temperature
- Temperature difference

These meters will communicate via the intelligent infrastructure using open protocol such as Modbus or M-Bus. The system will trend log the data and make it available to the enterprise energy management software.

Gas

Gas consumption will be obtained by monitoring of a volt-free intrinsically safe pulse output from the gas meter into the intelligent infrastructure and made available to the enterprise energy management software.

Steam

Steam consumption will be obtained by monitoring of a 4-20mA signal from the steam meter local display unit into the intelligent infrastructure and made available to the enterprise energy management software.

Water

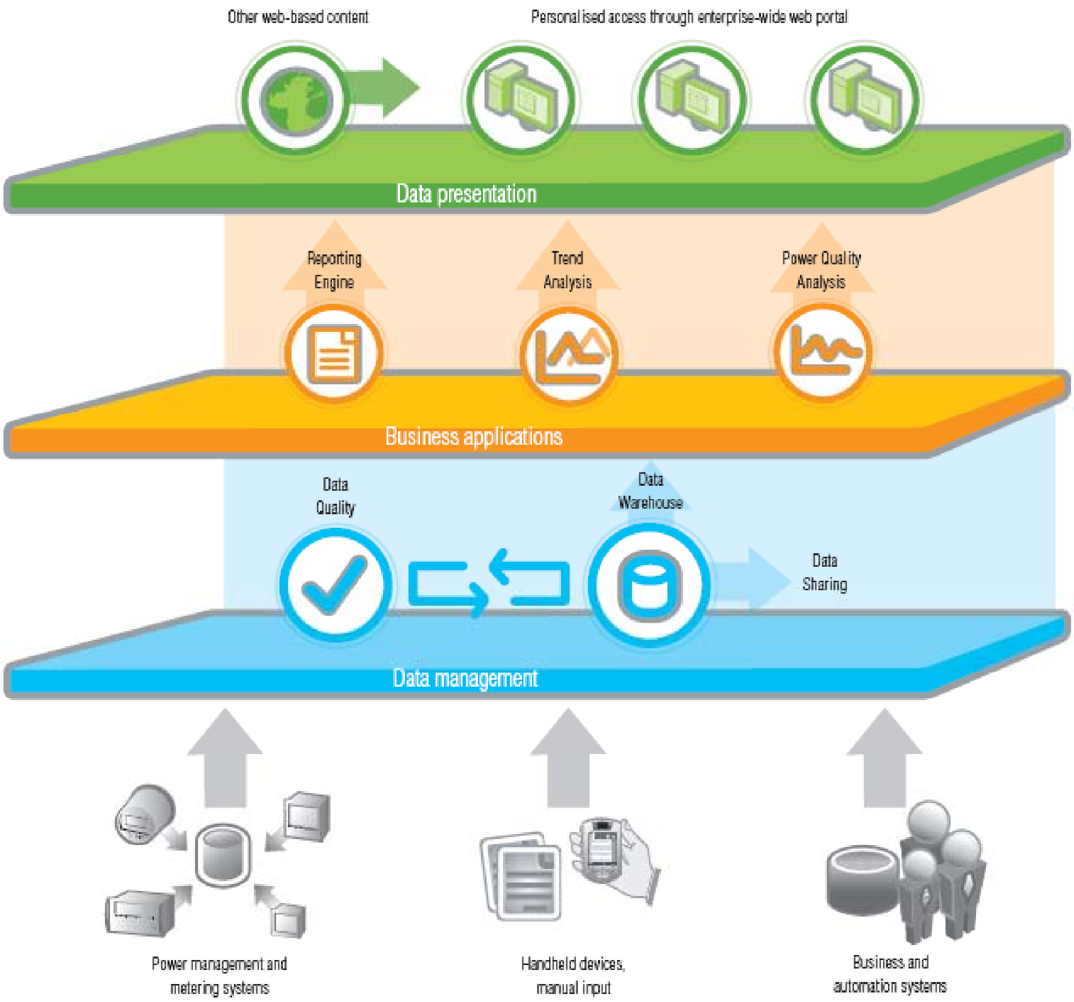
Incoming supply water consumption will be obtained by monitoring of a volt-free pulse output from the water meter into the intelligent infrastructure and made available to the enterprise energy management software.

Software analysis measures

In addition to the above mentioned meters, the intelligent infrastructure will include an integrated software module capable of receiving and managing all the information from meters around the hospital.

This software module manages the energy resources of the area and provides information needed to reduce costs of facility management.

An overview of the complete system is illustrated below: -



The system will communicate with different devices installed and manage the information received through the main industry communications standard Ethernet, capturing and storing information automatically on active and reactive Power quarter-hour by measuring points located in the installation. In this way it will then build a system for collecting information over the entire hospital facility:

The software will also highlight real-time conditions of energy distribution in the system, analyze the quality and reliability of supply and respond quickly to any alarms and critical situations.

These conditions are not related to conditions already monitored but to specific alarm conditions related to energy carriers. Examples include assignment of alert thresholds linked to consumption of a department, or rapid increases in consumption of a user load, and so on.

The system will also be capable of predicting future energy consumption based on past trends and calculate the cost allocation for different users.

It is integrated into a software system for automatic generation of reports and charts. You can therefore show the major quantities linked to the quality of energy as the waveform, harmonics, peaks and the symmetrical components. The ability to set alarm thresholds and the management there of, tends to minimize service disruptions and costs associated with unexpected events.

An example of the web portal dashboard to facilitate entry to the detailed information is illustrated below:

Through analysis of the detailed reports produced by the systems it will also be possible to perform analysis of quality in accordance with EN50160, analyze, harmonics, holes and voltage spikes, to verify these parameters correspond to those agreed with the supplier by contract.

Software analysis of measures must be able, depending on the operation parameters of buildings and according to the forecasts available (weather, local employment, program of activities) to define a forecasting model expected consumption for different energy carriers.

Such a model can see a dual usage pattern:

- In the short term (i.e. even in real time) it can be used to choose the cheapest source of supply in the face of very short-term projections of forecast consumption.
- In the medium/long-term it can help the Energy Manager policy-purchasing /supply of energy, or to decisions about programs to use their own sources of production (cogeneration, tri generation, etc.)

Remote Energy Services

The ability to export data off-site to an external energy bureau service provides greater capability for analysis by energy experts. The energy data can be reported back to the hospital management via the internet and by making use of co-operation with energy consultants real-time action can be taken to maintain energy efficiency.

Future energy performance may be predicted by use of existing energy profiles, regression analysis and the effect of additional or reduced loads and their operating times.

By comparing energy consumption with similar facilities managed from the same bureau a continuous benchmark can be maintained ensuring best practice for the sector.

Combining energy data with real-time system performance data such as measurement of control output against system set-point can help to highlight other operational efficiencies. This can allow poorly performing equipment to be identified and targeted efficiently.

Specific Energy Saving Techniques

Significant energy savings can be made by applying appropriate technology in the area of data centres and external lighting.

Data Centres

Data centres are significant users of energy, as servers become more powerful and more software tasks are virtualised. There is significant scope for energy management and energy savings compared with standard data centres if the right approach is taken.

In-row cooling combined with enclosed racks can allow cooling load to be more accurately matched with the power consumption of individual racks. Variable speed drives on the cooling fans and chilled water supply further ensure that energy is used efficiently.

Electrical metering on individual outlets on each rack PDU enables precise monitoring of server electricity consumption. This can help identify how server usage affects electricity demand and can help IT specialists to equalise processing loads.

Active heat reclaim systems can be installed to gain low and medium grade heat from the data centre to contribute to the heating base load thus reducing fossil fuel consumption

External Lighting

Lighting of roadways and external car parks can add significantly to the energy consumption of a hospital. Use of controllers for reducing the voltage of electrical supplies to external lighting can significantly reduce costs of energy consumption and reduce maintenance costs by extending the life of fittings.

The high frequency switching techniques used are illustrated below: -

1- Progressive start-up of lighting until nominal voltage.

2- Regulation of nominal voltage. Time band determined.

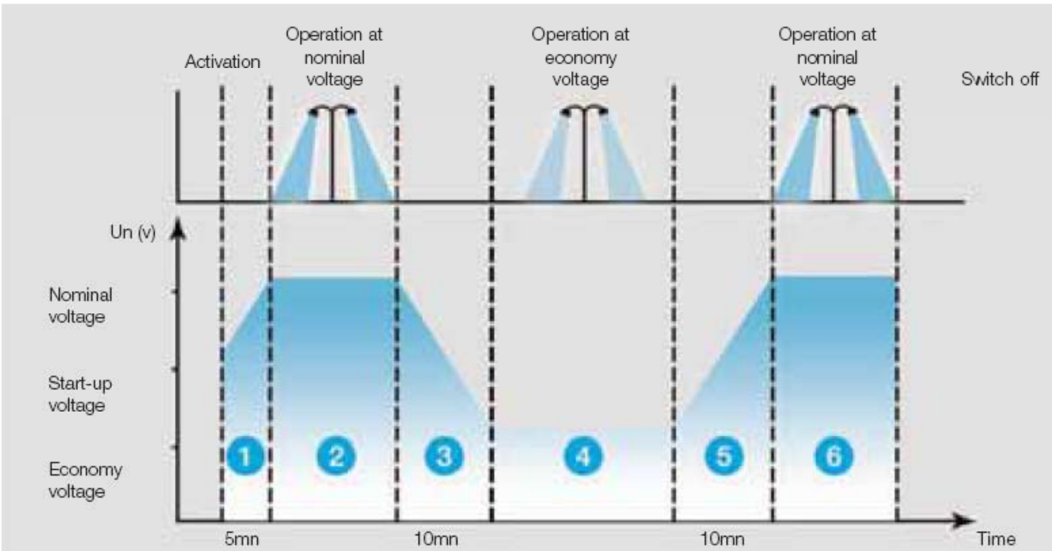
3- Economy mode operates in a continuous linear period for 10 minutes.

4- Economy voltage initiated for a specified time.

5- Economy mode de-activated in a continuous linear period for 10 minutes.

6- Regulation of nominal voltage. Time band determined. Off cycle.

The technology implemented is Pulse Width Modulation to control the output to the lamps, it utilises high frequency switching techniques to modify the output voltages according to programmed parameters. Energy savings are achieved over a six stage operation.



Specific Energy Cost Saving Techniques

The intelligent infrastructure uses specific techniques to take action to save the cost of energy in the hospital.

Bill Validation

By automatically checking utility bills against metered readings and consumption at point of use, typical savings in the range of 3 – 10% are achieved through the elimination of estimated values by the utility and mistaken demand and other charges levied.

Demand Response

Utility companies will often pay a substantial annual fee to the hospital for having the facility to request the hospital to run on generator power for short periods of particularly high demand for the utility company. This will result in an overall energy cost saving for the hospital.

Smart Grid

A smart grid system will use a combination of on site generation and real time demand monitoring to gain the most cost effective means of energy supply for the hospital by taking advantage of the best rates from the utility company and limiting peak demand whilst maximising energy efficiency.

Corporate And Social Responsibility

Corporations and public authorities, including hospitals, have a responsibility to manage the use of energy as part of their relationship with society. The use of energy displays in public spaces within a hospital can help demonstrate that a hospital is acting as effectively as possible in this regard. Displays can present energy consumption savings in clear formats and can either use data derived locally or via the Internet.

Patient And Staff Satisfaction

Good energy management will be reflected by good patient comfort and reduced length of hospital in-patient times. A patient that is comfortable will respond better to treatment and allow the hospital to be more efficient. An energy efficient working environment will enable staff comfort and help enable them to be more productive.

Case Studies

More efficient hospitals

There are few business activities that are as sensitive to disruption as health-care. Locum, who manages more than two million square metres of premises for caregivers in Stockholm County, knows this very well. Commissioning Schneider Electric to optimise indoor climate and rationalise energy management in the county's local hospitals was therefore filled with extraordinary challenges. The goal is to save more than 8,600 MWh per annum.

PROJECT OVERVIEW

Location: Stockholm

Market: Properties

Surface: 240 000 m^2

Locum's investment: SEK 76 million (about EUR 8.6 million)

Measures: Lighting control, installation of solar thermal collectors, ventilation conversions and other technical equipment and fittings.

Status: Installation proceeding to 2012, when the guarantee and project-monitoring phase will begin.

GOALS

- Energy saving: 8,619 MWh per annum (6,075 MWh guaranteed), of which:
- Heating: 5,045 MWh per annum (4,288 MWh guaranteed)
- Electricity: 3,574 MWh per annum (1,787 MWh guaranteed)
- Cost saving: SEK 6.7 million (about EUR 750,000) per annum at 2009 energy prices
- Reduced emissions of greenhouse gases: 648 tonnes carbon dioxide, 0.9 tonnes sulphur dioxide, 1.3 tonnes nitric oxide and 0.26 tonnes dust per annum.

locum.

VÄRDEN FÖR VÅRDEN

PHOTO: MIKAEL ULLÉN AND CAROLA BURETORP

Nacka Närsjukhus is one of the properties of the project.

Locum hired Schneider Electric in 2009 to achieve energy savings at 13 healthcare properties managed by Locum in Stockholm County. Already in the initial analysis phase, Schneider Electric took into consideration the special prerequisites of Locum's tenants by performing a detailed study of operational hours, temperatures, types of activity, as well as other special requirements.

"It is crucial that our tenants be caused minimum disruption and do not experience any impairments as a result of our energy rationalisation, which is a considerable challenge in view of that the project must be coordinated with many other ongoing operative changes," says Saija Thacker, Environmental Officer of Locum.

Another important result of the analysis is that it provides Locum with tools to track, measure and evaluate energy consumption even after major changes.

"All activities and premises managed by Locum are now linked to energy consumption, which will be continuously checked and tallied during the guarantee and performance phase. This initial process will provide the foundations for us to always be able to calculate the properties' current baseline, even after considerable operational changes, thus enabling Locum to maintain traceability of energy consumption," says Nicklas Larsson, Project Manager at Schneider Electric.

”Furthermore, it is positive that we will significantly reduce our environmental impact with lower emissionst,” concludes Saija Thacker, Environmental Officer of Locum.

Electricity is the area that can be rationalised the absolute most with a 20-percent reduction in consumption. respektive

GUARANTEED SAVINGS

Schneider Electric completed the analysis phase at the end of 2009 by proposing a number of substantial measures with guaranteed energy savings in the form of an Energy Performance Contracting (EPC) agreement. This stipulates that Locum makes an investment of SEK 76 million (about EUR 8.6 million), and that Schneider Electric guarantees energy savings related to heating and electricity of more than 6,000 MWh per annum, and an even higher ultimate goal. Should the savings be less than this figure, Schneider Electric will be liable for the difference.

Among the 13 local hospitals is Handens Närsjukhus.

SUBSTANTIAL MEASURES

Locum decided to go ahead with the proposals that, in addition to energy savings, will also reduce environmental impact, secure the properties’ long-term value and technical standard, quality-assure climate comfort, and improve certain technical equipment. The installation phase was initiated in 2010 and is estimated to continue until 2012.

Concrete measures include extensive lighting installations, where each individual room in all 13 hospital properties has been reviewed. Schneider Electric is also carrying out two major ventilation conversions, installing several solar thermal collectors in central Stockholm, and modernising other technical equipment and fittings such as heating systems, fans and taps.

LONG-TERM IMPACT

The guarantee and project-monitoring phase will begin when the installation work is completed in 2012, and will then run for nine years. In this phase, the equipment and fittings will be fine-tuned, while the savings are measured. The extensive evaluation phase will ensure that all equipment and fittings be optimally aligned and that the achieved savings be sustainable in the long-term.

The savings goal of more than 8,600 MWh per annum represents SEK 6.7 million (about EUR 750,000) per annum at 2009 energy prices, and is based on reduced consumption of both electricity and heating. Electricity is the area that can be rationalised the absolute most with a 20-percent reduction in consumption, while it’s the 15-percent saving of heating, representing more than 5,000 MWh, that will have the greatest effect.

”Furthermore, it is positive that we will significantly reduce our environmental impact with lower emissions,” concludes Saija Thacker, Environmental Officer of Locum.

LOCUM AB

Locum AB is one of Sweden’s larger property managers with a property portfolio of about 2.1 million square metres located in Stockholm County. Major tenants are healthcare institutions in the County. Locum AB is owned by Stockholm County Council, and is tasked by the County Council to manage its property portfolio.

Hiram G. Andrews Center

Johnstown, PA

Project Cost
$12,857,390

Annual Project Savings
$1,240,000

Utility Conservation Measures

- Boiler replacement
- Steam system upgrade
- Heating system replacement
- Direct digital controls
- HVAC upgrade
- Lighting upgrades
- Plumbing upgrades
- Window replacement
- Security system upgrade

Energy Conservation Services

The Hiram G. Andrews Center provides a comprehensive vocational rehabilitation program featuring the integration of education, counseling, and evaluation services with assistive technology and therapy in a barrier-free environment. The facility contains more than 550,000 square feet under one roof.

TAC Energy Solutions was asked to provide performance contracting services to establish baseline energy costs and design improvements to existing systems. The project provides energy and utility savings of $1.24 million per year and results in a net positive annual cash flow ranging from approximately $8,458 (year 2) to $181,642 (year 10).

The project centers around the replacement of the three existing 400 bhp coal-fired steam boilers installed in 1957 with two 600 bhp, 300 psig high pressure dual-fuel steam boilers. New high pressure steam headers and piping were installed. The plant generates electricity using a single-stage steam turbine coupled to a 500 kW synchronous generator. The cogeneration plant is operated in parallel with the Penelec system and interconnected with the campus' existing 4.16 kV "preferred" distribution circuit.

Many areas of the facility were heated with a failing in-floor radiant heating system. This heating system was replaced with a four-pipe fan coil unit system complete with comprehensive direct digital controls. The new HVAC system brought the facility up to code for outside air requirements while eliminating significant "shoulder month" comfort problems. Energy efficient T-8 lamps and electronic ballasts were installed and existing water fixtures were replaced with low-flow commodes and water-free urinals.

Additional energy conservation work involves providing new windows, controls, new air handling units, rebalancing the existing systems, new dishwasher and conveying system, canopies and snow melt systems, security, lighting, and raised flooring.

"Up to this point in the energy project, I am very pleased with our decision to competitively select TAC (now Schneider Electric). Because they are an engineering-based firm, they have brought a great deal of technical expertise to the table compared to other firms.

From both a project management and a personal chemistry standpoint, they have a great bunch of professionals who are very easy to work with and are self-sufficient – which has been a big help to my staff and me.

An unexpected benefit has been the availability of the people at TAC (now Schneider Electric) to answer technical questions and to provide assistance on issues totally unrelated to the on-going energy project. If I had to do it all over again, I would choose TAC (now Schneider Electric) without hesitation."

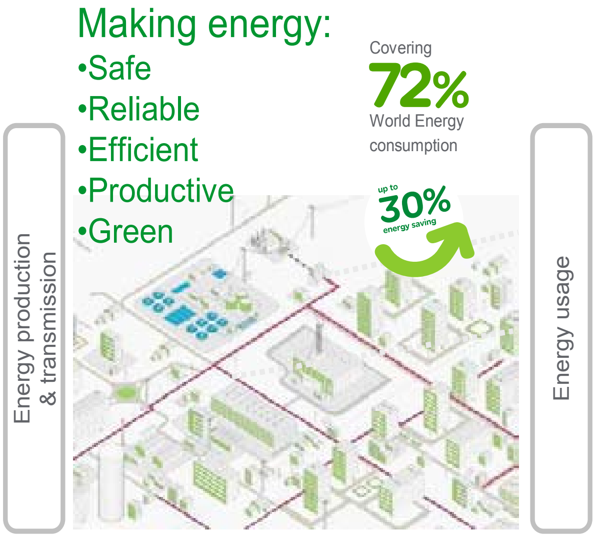
Carol Taylor
Business Manager
Hiram G. Andrews Center

Profiles

Schneider Electric's profile

The global specialist in energy managemen

As a global specialist in energy management with operations in more than 100 countries, Schneider Electric offers integrated solutions across multiple market segments, including leadership positions in energy and infrastructure, industrial processes, building automation, and data centres/networks, as well as a broad presence in residential applications. Focused on making energy safe, reliable, and efficient, the company's 110,000 plus employees achieved sales of 19.6 billion euros in 2010, through an active commitment to help individuals and organizations "Make the most of their energy."



€19.6bn
Global Sales in 2010

110,000+ people
In more than 100 countries

5%
Sales devoted to R&D

170 years
of history through innovation and leading brands

Worldwide leading positions

Safe, with power and control	**#1**
Reliable, with critical power & cooling	**#1**
Efficient, with energy efficiency	**#1**
Productive, with industrial, building and home automation	**Top 3**
Green, with renewable energy solutions	**Top 3**

About Schneider Electric India

Schneider Electric entered into India through a Joint Venture with Tata in 1963 and became a fully owned subsidiary of Schneider Electric in the year 1995. With key acquisitions of S&S Switchgear & Crompton Greaves Low Voltage Division in 2000, Conzerv Systems & Meher Capacitors in 2009 and Zicom Electronic Security System Integration Business in 2010, Schneider Electric India consolidated its position in the Indian market as the Global specialist in Energy Management.

Over its brief history, Schneider Electric has established a strong market presence and industrial base in the country. Through its organic growth and the introduction of state-of-the art products and solutions from internationally acquired brands like Clipsal, TAC, APC & Pelco, Schneider Electric India has built an unrivalled offer portfolio.

Today, after over a decade of high growth, Schneider Electric India boasts of 8400+ employees, 12 global manufacturing plants, 500+ authorised partners, 2 global Customer Care Centers, 6 R&D centers, and 1 Project and Engineering Center. The company enjoys a leadership position in catering to its customers' Energy Management needs. (figures as on July 1 2010)

Walking the talk in Sustainable development

"You must be the change you wish to see in the world." This quote from Mahatma Gandhi sums up the mindset of Schneider Electric.

Beyond business solutions, we cover all the aspects of sustainable development: society, governance and environment. And because you cannot manage what you cannot measure, we follow our improvements with a unique tool: the Planet & Society barometer.

A Recognised
Sustainable commitment

Present in major Socially Responsible Investment Index

Find out more about Schneider Electric at www.schneider-electric.com

Confederation of Indian Industry
Since 1895

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the growth of industry in India, partnering industry and government alike through advisory and consultative processes.

CII is a non-government, not-for-profit, industry led and industry managed organisation, playing a proactive role in India's development process. Founded over 115 years ago, it is India's premier business association, with a direct membership of over 8100 organisations from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 90,000 companies from around 400 national and regional sectoral associations.

CII catalyses change by working closely with government on policy issues, enhancing efficiency, competitiveness and expanding business opportunities for industry through a range of specialised services and global linkages. It also provides a platform for sectoral consensus building and networking. Major emphasis is laid on projecting a positive image of business, assisting industry to identify and execute corporate citizenship programmes. Partnerships with over 120 NGOs across the country carry forward our initiatives in integrated and inclusive development, which include health, education, livelihood, diversity management, skill development and environment, to name a few.

CII has taken up the agenda of "Business for Livelihood" for the year 2010-11. Businesses are part of civil society and creating livelihoods is the best act of corporate social responsibility. Looking ahead, the focus for 2010-11 would be on the four key Enablers for Sustainable Enterprises: Education, Employability, Innovation and Entrepreneurship. While Education and Employability help create a qualified and skilled workforce, Innovation and Entrepreneurship would drive growth and employment generation.

With 64 offices and 7 Centres of Excellence in India, and 7 overseas in Australia, China, France, Singapore, South Africa, UK, and USA, and institutional partnerships with 223 counterpart organisations in 90 countries, CII serves as a reference point for Indian industry and the international business community.

S.L. RAHEJA HOSPITAL
A Fortis ASSOCIATE

"S. L. Raheja (A Fortis Associate) Hospital is a 140 bedded, multi-specialty facility that provides comprehensive & affordable care to patients suffering from various ailments. Known widely as a leading hospital for advancedmanagement in Diabetes & Oncology, the hospital is poised to develop as a centre of excellence in Diabetes, Oncology, Trauma, Cardiac Sciences, Emergency Services and critical care under the professional management of Fortis healthcare.

S. L. Raheja (A Fortis Associate) Hospital is committed in improving the health of the society, in general. The hospital provides home care facility for chronic/terminally ill patients. For every case, concerted effort is made by each employee, not only to treat diseases, but also prevent them"

NOTES

CII
Confederation of Indian Industry
Since 1895

Confederation of Indian Industry (WR),
105, Kakad Chambers, 132 Dr A B Road, Worli,
Mumbai 400 018, India
Phone: +91-22 2493 1790. Extn 438 • Fax: +91-22 2493 9463, 2494 5831
Email: prakash.boga@cii.in • Website: www.cii.in

Schneider Electric

Schneider Electric
Unit No 1141,1142, Building No 11, 4th Floor, Solitaire Corporate Park,
Andheri Kurla Road, Chakala, Andheri East,
Mumbai 400059, India
Phone: +91-22-39404000 ext.156 • Fax: +91-22-30738800

S.L. RAHEJA HOSPITAL
A Fortis ASSOCIATE

S. L. Raheja (A Fortis Associate) Hospital
Raheja Rugnalaya Marg, Mahim
Mumbai 400 016, India
Phone: +91-22-66529999 • Fax: +91-22-24442486
Email: info@rahejahospital.com