



# Role of Metering and Energy Management in Building Energy Efficiency

ECBC Regional Workshop, Ranchi

April 18<sup>th</sup>, 2017

# Why Energy Management?

## The Problem

- Organisation looking for an energy management solution
- Reduce energy cost
- Cost-effective solution

## The Solution

- Energy Management Solution
- On site or on cloud with controls capabilities
- Create a robust energy data framework

## The Benefits

- Helps reduce energy cost by 5-10%;
- Helps benchmark energy use across sites;
- Helps in sustainability reports, CDP or GRI reporting and inclusion in sustainability indices;

# Basic Elements of an Enterprise Energy Management

## Targets and Goals

- Top management buy-in
- Someone is responsible for achieving the targets

## Metering Infrastructure

- Energy efficiency starts at the meters
- Decide on the level of sub-metering

## Invest in Energy Management System

- Take help of analytics
- Use a graduated and differentiated approach

## Reap the Rewards

- Data driven decisionmaking
- Energy, CO2, and Sustainability roadmap and reporting

*It is an organisation's ability to*

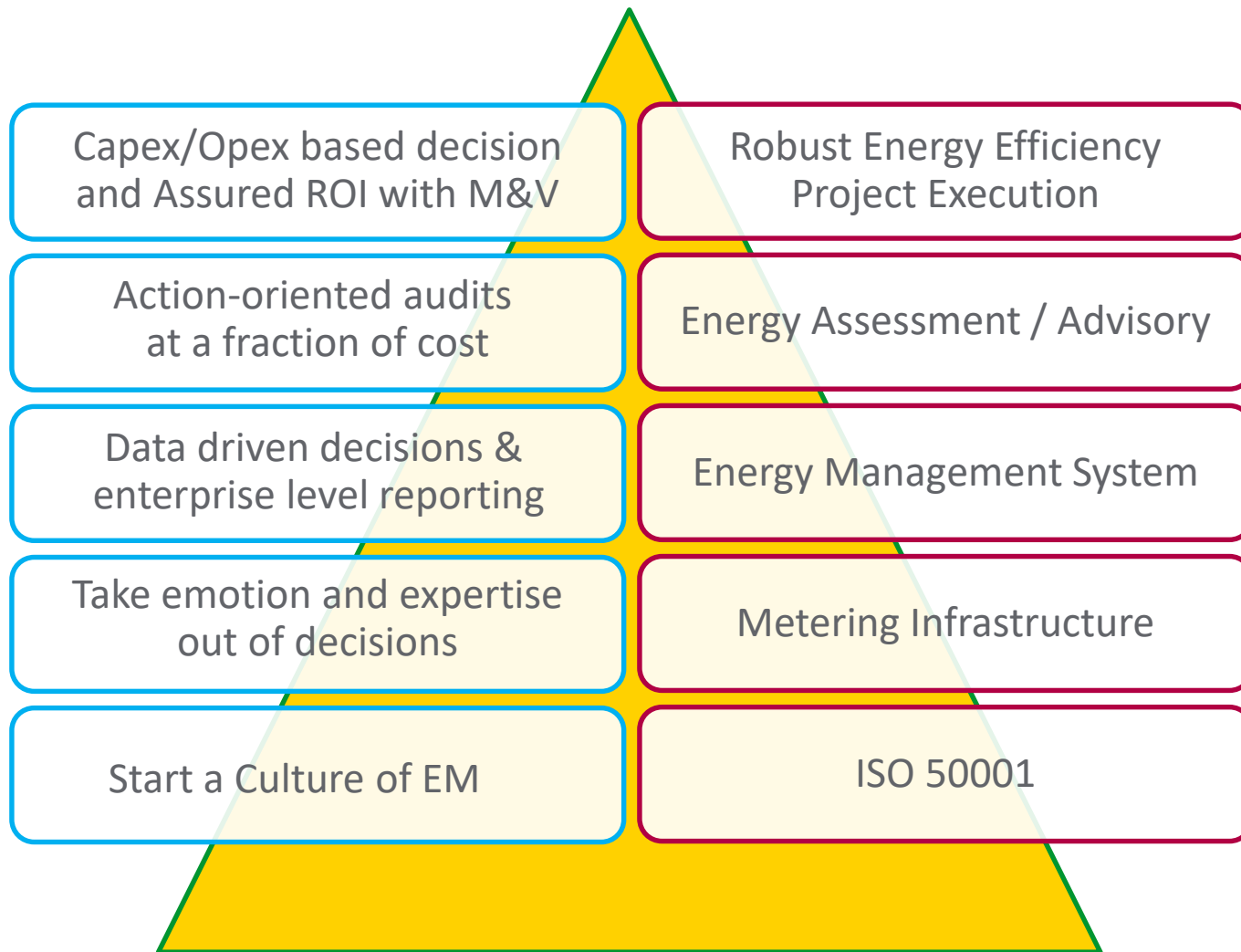
*set aggressive energy efficiency targets and goals based on internal or external benchmarks*

*optimise energy use at all levels through energy data collection*

*institute appropriate process and procedures based on best practices to take informed decisions*

*proactively deal with any climate change and sustainability policies and regulations*

# KPI Driven Energy Management: From ISO 50001 to Capex Investments



# Codes and Standards: Implications for KPI Driven Energy Management

## ECBC

- Advanced Metering Requirements
- Need to validate component and system perf.
- EPI Based Whole Building Compliance

## NBC Sustainability Chapter

- Ensuring Building Performance
- Load Segregation and Advanced Metering
- Better O&M Through EMS

## ISO 50001

- EnPI Model requires EMS
- Define and track KPIs for Target Setting

## Green Building Rating Systems

- Advanced Metering Reqs
- M&V reqd. for building performance validation
- Dynamic EPI reporting

## Utility Meter

- Get monthly or yearly energy consumption data
- Find out total built or carpet area and no. of employees
- Calculate EPI

## System Approach

- Develop a sub-metering plan
- Monitor energy use at the system level
- Calculate LPD, EPD, KW/ton and roll it up to calculate EPI

## Component Approach

- Develop a sub-metering plan
- Monitor energy use at component level
- Specify the most energy-efficient equipment/appliances

# Benefits of Energy Management

## Monitor

Increased  
employee  
awareness

2%

Installation of  
meters

Analytics  
and  
Improved  
awareness

3%

Dashboards:  
Cost allocation  
Benchmarking  
Incentivizing

## Control

Improved  
awareness,  
identification of  
O&M improvements

10%

Facility tune-up  
Elimination of  
waste

## Optimize

15%  
to 30%

Operation  
Benchmarking,  
project improvements,  
continuous attention

Continuous  
improvement  
Action plans

Source: Schneider Electric best practices, US Department of Energy Metering Guide, Feb 2006





# Case Study I: Hospital Energy Management

# Hospital Sector: Size and Benchmarks

Approx. **1.1 million beds (0.9 bed per 1,000 in 2014)**;  
Approx. **50,000 beds** in the next 5-6 years;  
Approx. **10% energy use** of commercial buildings

Private sector's share in hospitals and hospital beds is approx. **75%** and **40%**

Energy intensity benchmarks for Indian hospital:

**200 – 300 kWh/m<sup>2</sup> or 10,000-20,000/bed** (Pvt hospitals: Multi-Speciality)

**50 – 150 kWh/m<sup>2</sup> or 15-15000/bed** (Govt hospitals: Urban & Rural)

(Sources: Govt and industry publications)

## Energy Costs in a typical private hospital

Annual Expense: 300 kWh/m<sup>2</sup> or 20,000 kWh/bed

Monthly Expense: ₹16/sq. ft. or ₹12,000/bed

## Energy Costs for a BEE 5-Star rated hospital

Monthly Expense: ₹8/sq. ft. or ₹4,500/bed

**More than 50% energy and  
cost saving potential**

## **ENERGY PERFORMANCE INDEX**

Energy Consumed normalised by built up area

## **ENERGY PERFORMANCE PER BED**

Energy Consumed normalised by number of beds

## **ENERGY MANAGEMENT OF HOSPITAL EQUIPMENT**

Procurement and O&M Guidelines for hospital medical equipment (approx 50% energy use)

## **ENERGY PERFORMANCE INDEX**

Varies from 180-390 (large) and 170-285 (medium)

## **ENERGY PERFORMANCE PER BED**

Varies from 21,000 to 30,000 (large) and 10,000 to 25,000 (medium)

## **ENERGY MANAGEMENT OF HOSPITAL EQUIPMENT**

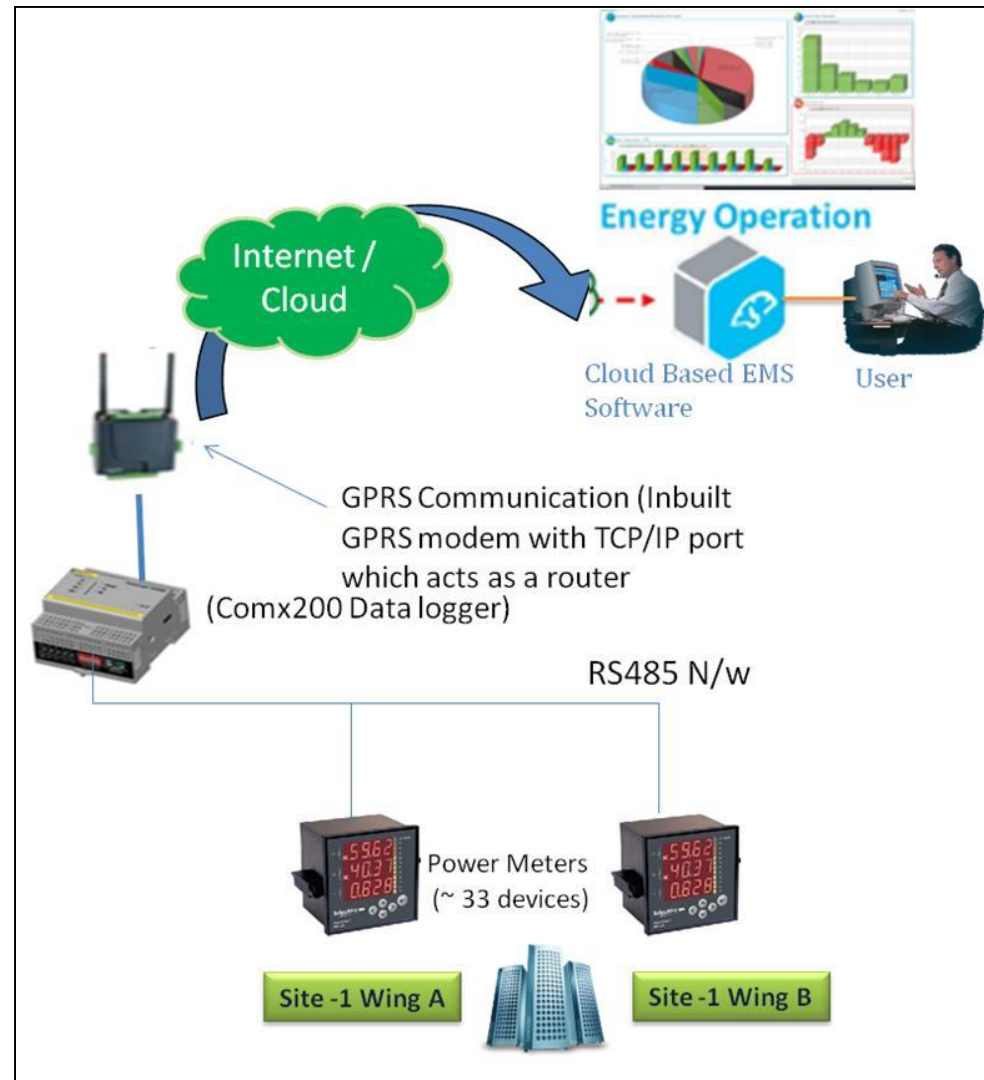
Procurement and O&M Guidelines almost non-existent for hospital medical equipment – Big Opportunity



# Case Study I: Public Sector Building Energy Management

# Niti Aayog Project Highlights

- NITI Aayog has set itself a target to achieve a **BEE 5 Star rating** (from its current level of BEE 3 star rating)
- Working closely with **EESL** and **BEE**, **Schneider Electric** has installed its energy management system SEO at **Yojana Bhawan** building in New Delhi.
- **SEO - a cloud based energy management system which**
  - Captures data from energy meters
  - Helps track energy savings from ECMs
  - Makes the data available online for energy analytics
  - Helps track energy KPIs
  - Provides ready-to-use framework for ISO 50001, LEED, GRIHA etc.



System Architecture – Yojana Bhawan EMS Solution

# Building Energy Use Dashboard

Desktop Engineering Level Corporate Level



**Yojana Bhawan, Sansad Marg, New Delhi**

Building Area: 23116 m<sup>2</sup> | Employees: 700 | Operating hrs: 10:00 AM - 6:00 PM



Current BEE Star Rat



## Total energy consumption

704,755 kWh YTD and 160,255 kWh MTD



## Total energy cost

Rs. 5,172,902 YTD and Rs. 1,176,272 MTD (at Rs. 7.34 per kWh)

## Building Energy Consumption - YTD (Months)



## Energy use comparison (week on week)

2,807 kWh (5 % reduction)



## Energy cost comparison (week on week)

Rs. 20,603 (5 % reduction)

Energy Management System developed by [Schneider Electric](#)

Building Overview | Energy consumption | Energy breakdown | Lighting | Raw power | Pump

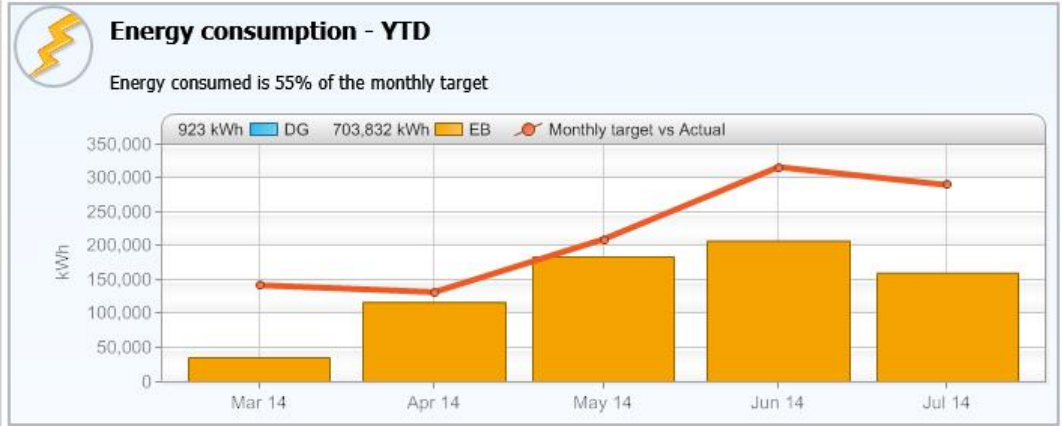
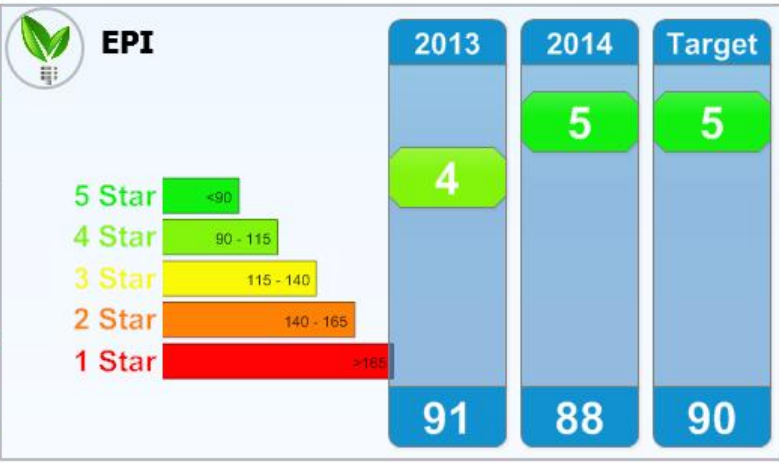


# Tracking Performance

Desktop | Engineering Level | **Corporate Level**



**Yojana Bhawan, New Delhi**  
**Targeted BEE Star Rating**



**EPI - Estimated**  
 87.62 kWh/m<sup>2</sup>

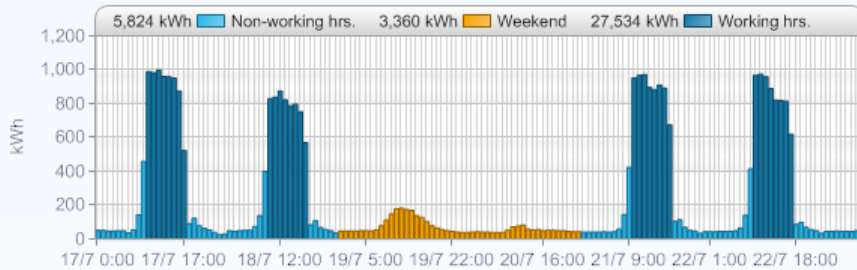
**ECI - Estimated**  
 Rs. 643.15/m<sup>2</sup>

Energy Management System developed by [Schneider Electric](#)

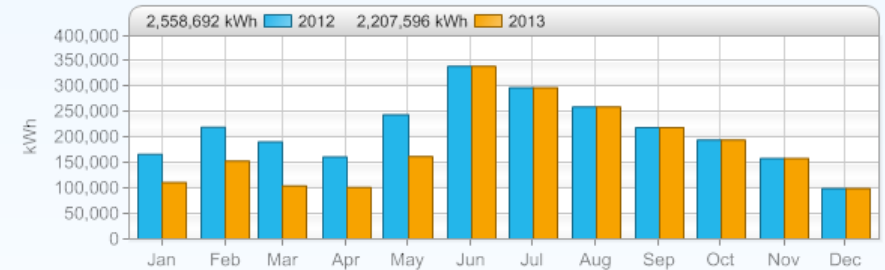
# Monitoring Hourly, Daily, Monthly Energy



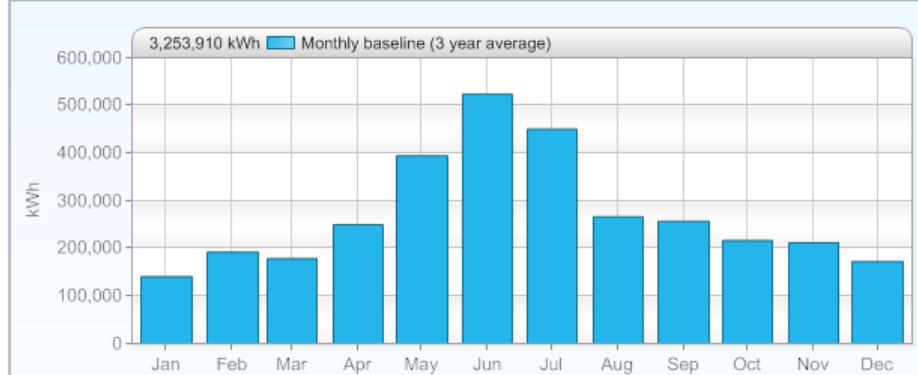
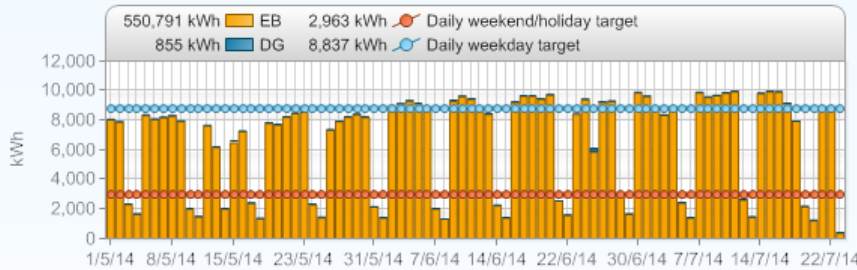
## Hourly energy use - working vs non-working hrs. (Last 6 days)



## Energy use comparison (year on year using utility meter)



## Daily energy use (Last 83 days)



Energy consumed is 55% of the monthly target



Energy used (2012 vs 2013) - reduced by 12 % (295,800 kWh)

Energy Management System developed by [Schneider Electric](#)



## CONNECT WITH US

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