
USING BIG DATA FOR OPERATIONS & ENERGY MANAGEMENT IN HOSPITALITY



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Abstract

The hospitality industry is increasingly focusing on better energy management as it looks to improve guest comfort levels while optimizing energy consumption. The effort is to reduce carbon footprint, bring in more energy efficiency by use of data-driven approaches and keep operational costs under check.

The industry, amid its diversity, faces certain common concerns about areas in which energy is wasted. Its diversity lies in the different kind of establishments it supports - be

it large convention hotels, restaurants, guest houses, inns or motels. The varied nature of the physical facilities and the activities that they host can make energy management especially challenging.

This paper talks about the data analytics-based approach to determine Operational Effectiveness and Energy Management (OE&EM) for the hospitality industry.

Need for Operational & Energy Efficiency

Unlike other commercial buildings, hotels have unique energy requirements because of the variety of facilities available, functions provided and operational schedules. A hotel usually operates 24x7, round the year, although some sections such as the ballroom or a restaurant may be closed during specific periods in a day. Guest occupancy levels in hotels vary significantly across the year. In many hotels, even when a guest room is not occupied, the air conditioning is kept switched on to prevent odor or guest discomfort. These factors contribute to the rising need for a specialized focus on Energy Management and Operational Effectiveness in the hospitality industry.

Advancements in IT, data convergence, and data analytics have found increased relevance in the way facility operations and management services are being delivered in the industry. Key Performance Indicators (KPIs) such as guest comfort, complaints, internal thermal and schedule policy compliance, energy consumption, benchmarking, etc. are being examined by hotel operators closely to understand and answer the "whats" and "whys," resulting in better insights into energy consumption and operations.

Breaking the Silos

The hospitality industry has Facility Management Systems and Energy Management Systems such as Building Management System (BMS), guest room controls system, metering / sub-metering and Property Management Systems working in silos. The recent innovations in Information Communication Technology and high performance machines saw advent of concepts such as cloud connectivity, high speed data transfer, distributed databases, open standards for building controls such as LONWorks, BACnet, OPC, etc.

These allow the hospitality sector to integrate various energy management systems and use the data for informed decision-making in day-to-day operations that can help improve:

- Guest comfort
- Overall hotel energy efficiency
- Lifecycle operating cost of hotel assets

Building controls systems are an offspring of industrial automation and controls systems. These systems are proprietary in nature and were conceived for use in stand-alone mode, with limited operational and consumption data sharing capabilities which can be leveraged for analytical purposes.

The end of 20th century saw standards like TCP/IP, XML and standard databases being acknowledged as the need for enhancing the scope of data sharing for remote monitoring, centralized aggregation, analytics, etc. These technologies form the foundation for development of enterprise data analysis systems by collecting data from multiple sources such as Building Management System or Control Systems, Energy Monitoring System, Guest Room Management System and Property Management System (see Figure 1). They provide insights we wouldn't otherwise have.

BMS companies are lagging in adoption of the required IT standards. There is a major challenge in integrating with analytical engine for operational improvement and energy cost reduction.



Building Management System: Control system controlling and connecting common area assets such as AHUs, Pumps, Chillers



Property Management System: System used as guest database for booking, special instructions (VIP room, etc.), also sometimes provided integration with guest complaints



Guest Room Controls: Smart thermostats controlling the lighting, HVAC equipment in hotel rooms. Some hotels still have old thermostats which do not have commutating capabilities.



Energy Monitoring System: Hospitality industry has many meters (mostly stand-alone but having commutating capabilities) installed

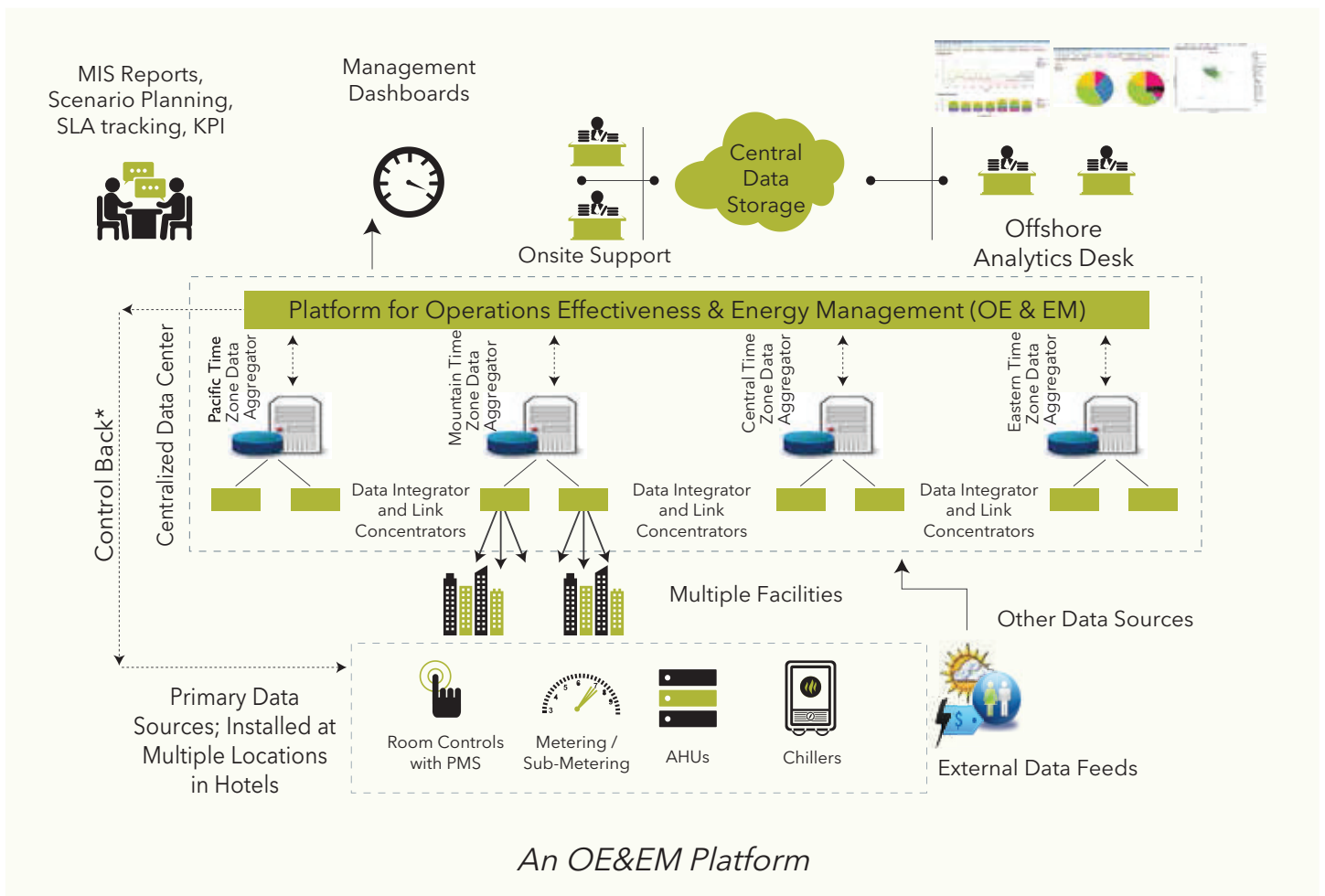
Energy Operations Management Systems and Uses

Power of Big Data Analytics

The hospitality industry can effectively reduce energy use by leveraging on the **OE&EM Platform** as this helps improve bottom line and brings down operating costs. Understanding energy and operations components (such as energy and operations spend and its break-up, its correlation with business needs, guest comfort, weather, availability, etc.) in the sector is the first step towards this.

Energy and operations management can be achieved by ensuring major systems are run as per best optimized schedule and set points, detecting breakdown, identifying inefficiency of

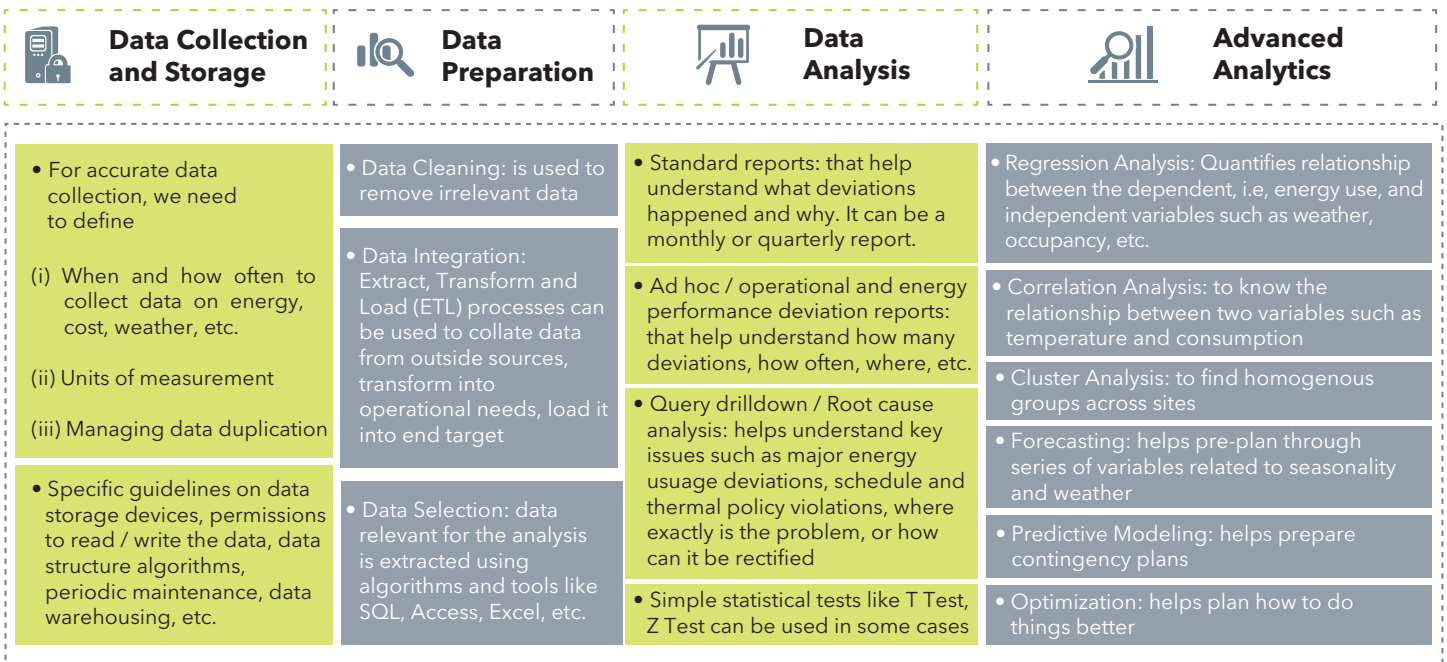
systems, and reducing energy leaks. This is done by integrating BMS, utility meters and sub-meters, guest room controls, Property Management System and other business systems (such as financial components related to breakdown cost, annual maintenance contract, retrofit costs, service costs, work orders, etc.) to collect site data on a central energy platform. The **OE&EM Platform** has the capability to run algorithms. Data analysts and scientists use it to identify opportunities for operational improvements and energy cost reductions.



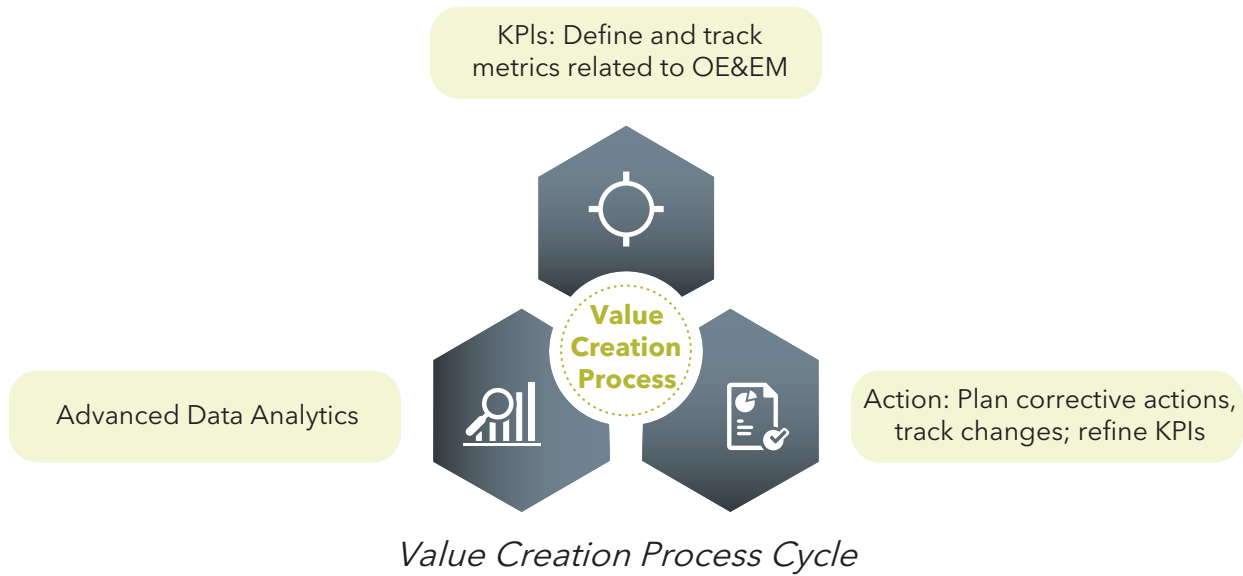
Contemporary Building Management Systems (also called as Energy Management Systems) provide capabilities for collecting millions of data points, deviation detection, data trends, schedule management, and consumption monitoring. However, there is an abundance of data and an absence of analysis, making it a "data rich but information poor" situation.

Big Data analytics tools help identify **"What" (pattern analysis)** as reference, and later Subject Matter Experts use this pattern analysis to identify the **"Whys"** and action to correct the deviation. This methodology of using analytics to transform data into useful information is the added advantage of OE&EM Platform-based operations.

Journey In Advanced Analytics



The goal of OE&EM is to generate Business Intelligence. Typical value creation process based on data analytics can be depicted.



This framework will help make the Energy Management System of the hospitality industry a more data-centric one which will boost operational efficiencies with minimum capital investments. Being a continuous process, it also helps sustain the operational improvements and energy savings for a longer period. The centralized view enables organizations to compare their performances through benchmarking and by prioritizing action plans.

'Center' of Gravity

An analytics-based approach, backed by an Energy and Operations Center, which is different from the traditional approach of retrofits and refurbishments, is the ideal way to move forward. Key elements of analytics-based Operational Effectiveness and Energy Management approach are:

- It is a **No/Low CAPEX** model for achieving energy savings that leverage existing infrastructure
- Empowers operations and management teams to proactively manage equipment performance and reduce downtime. It reduces man-hours spent on diagnosis and reporting.

About the Authors



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About EcoEnergy

EcoEnergy's award-winning connected services combine the power of its Technology Platform & the agility of its Command Center with the expertise of its industry experts and analysts to deliver desired business outcomes - such as energy efficiency and occupancy comfort. Forever pushing the edge of the learning curve, EcoEnergy has built strong expertise across industries and employs only the latest technologies to deliver transformative results.

EcoEnergy is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp., a leading provider to the aerospace and building systems industries worldwide.