Building Energy Management System (BEMS)

Overview

Building Energy Management Systems (BEMS) are computer-based systems that help to manage, control and monitor building technical services (HVAC, lighting etc.) and the energy consumption of devices used by the building. They provide the information and the tools that building managers need both to understand the energy usage of their buildings and to control and improve their buildings' energy performance. Key vendors: Honeywell, Johnson Controls, Schneider Electric, Siemens

Applicable Industries

- Construction
- Smart City
- Smart Grid

Applicable Functions

- Facility Maintenance
- Information Technology
- Warehouse Management

Case Studies

IoT Solutions for Smart City? | Internet of Things Case Study

There were several challenges faced:

It is challenging to build an appliance that can withstand a wide range of voltage fluctuations from as low at 90v to as high as 320v. Since the device would be ...

Market Size

Estimate A

$2.4 billion (2015, Global, BEMS), $10.8 billion (2024)

Source: Navigant Research

Estimate B

$16.7 billion (2013, Global, BEMS), $23.1 billion (2017)

Source: Memoori

Estimate C

$5.5 billion by 2020 (2016)

Source: Global Industry Analysts

User Viewpoint

Business Value

How does this use case impact an organization's performance?

BEMS can be fully networked into a cloud-based environment with end-to-end strategies accomplished by an open type of integration. This holistic networking concept is the IoT. Once networked, rich sources of data that were conventionally stand-alone now enable better ways to manage and measure buildings and portfolios of buildings.

The benefits can be summarized in a few ways:

1) BEMS increases energy efficiency. By measuring, monitoring and optimizing the energy requirements of a building, BEMS can control electricity requirements by

approximately 80%.

2) Improves environmental conditions. Renewable energy such as solar and wind energy can be sporadic in nature. In such cases, grid operators resort to cost-effective solutions like demand response (DR) to manage and reduce the demand for electricity during peak hours. Next-generation BEMS has computer-aided tools for setting up DR programs. Thus, by using BEMS, facilities can easily switch to renewable energy installations, using clean energy and therefore benefiting the environment.

3) Reduces cost. BEMS monitors and intelligently manages and controls energy services in plants and buildings by maintaining a balance between conditions, energy use, and operating requirements.

4) Low maintenance. Next-generation BEMS monitors and controls conditions like temperature, quality of air and lighting, the comfort level of employees are improved, thereby increasing productivity.

Key Performance Indicators

How is the success of the system measured for users and for the business?

Energy used, on-site energy used, how much energy is saved and how energy saving improved over time, the total value of energy.

System Capabilities & Requirements

What are the typical capabilities in this use case?

Typical system capabilities:

1)Monitor the consumption and requirement of the energy in components

2) Analyze the available consumption data

3) Control the usage of energy consuming components in the premises by keeping same or improving the user experience

4) Control power generation, storage, distribution and sharing with other grids according to the requirements

Performance Requirements: Correct setup and constant monitoring of parameters.

Deployment Environment

Where is the 'edge' of the solution deployed?

Most commonly implemented in large projects with extensive mechanical, HVAC, electrical, and plumbing systems.

Stakeholder Viewpoint

Investment Decision Makers & Influencers

Which organizations, departments, or individuals typically makes an investment decision and allocates budget?

Facility owners are typically the investment decision makers and influencers.

System Operators

Which organizations, departments, or individuals are responsible for operating and maintaining the system?

The facility owners are typically the system operators. If they outsource this service to a service company than the service company will be the system operators.

System End Users

Who are the regular users of the system?

The facility owners are typically the system end users. If they outsource this service to a service company than the service company will be the end users.

External Data Users

Which external stakeholders are provided with limited access to the data?

The energy management platform vendors and industrial researchers could be the external data users.

Technology Viewpoint

Sensors

What sensors are typically used to provide data into the IoT system, and which factors define their deployment?

Sensors are one of the key components of the BEMS system. Sensor and control technologies for a BEMS provide the intelligent backbone that connects equipment, building subsystems, and analytical tools in near-real time to foster a proactive, reactive, and sometimes autodidact, efficient building technology ecosystem. While sensors and controls are the critical enabling aspect of a BEMS, often they are the most overlooked piece of the puzzle.

Here are the sensors that are commonly seen in an energy management system: Temperature sensors, motion sensors, humidity sensors, illuminance sensors, CO2 sensors, and microwave/ PIR occupancy

sensors.

Analytics

What types of analysis are typically used to transform data into actionable information?

Data analytics is useful for a variety of scopes such as benchmarking and for comparison, to establish a baseline, to evaluate a building energy management system, to achieve energy and operational efficiency, to uncover potential energy efficiency upgrades, to develop an energy management plan and much more.

Cybersecurity

What factors define the trustworthiness of the solution?

Cybersecurity risk management is a crucial part of the business. Outsiders can take control of all connected systems to turn off lights, trigger a fire alarm and cause panic, add external users to access controls, interfere with the HVAC system to knock staff off their guard and disrupt machines.

Cloud & Edge Platforms

What factors define the cloud and edge platforms used to integrate the solution?

The collected data related to power, security, occupancy, water and temperature are all connected and gathered in the cloud.

Connectivity

What factors define the connectivity solutions used to provide both device-to-device and device-to-cloud communication?

Latency requirements

User Interface

What factors define the interfaces available to the system users?

UI must be comprehensive while enabling users to monitor everything necessary within a lot of data collected.

Data Viewpoint

Data Sources

How is data obtained by the system?

The energy consumption data is sourced from meters and sensors, enabling managers to analyze how energy is spent.

Source: (A multidimensional model for building energy management)

Data Types

What data points are typically collected by the system?

Individual data types from building automation layers such as temperature and

luminance that are related with building performance.

Data Volume

What volume of data is expected from each deployment, and from the system as a whole?

Depending on the usage of energy.

Implementation Viewpoint

Business & Organizational Challenges

What business challenges could impact deployment?

The business challenges include high costs of integrated systems, compliance with building and safety standards, maintenance and service, and security concerns.

Some organizations would be unwilling to adopt the technology based on concerns of cybersecurity and the high fees associated with upgrading their current system and/or building.

Integration Challenges

What integration challenges could impact deployment?

High-performance buildings demand more functionality, system integration and dynamic computation, but market?and technical barriers prevent control systems from keeping up with the rapid pace of building and energy system innovation. Unless these systems can evolve to support modern buildings, they will remain the missing link undermining the future of the high-performance buildings industry

Installation Challenges

What installation challenges could impact deployment?

Similar to the integration challenges, old systems are not compatible with this type of technology. Therefore, it is a challenge to do installations to some buildings.

IoT ONE Use Case

Accelerating the Industrial Internet of Things

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