Sustainable Building Management System

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Sustainable Building Management Systems have made tremendous strides in recent years toward embracing connectivity and interoperability standards. These efforts have given building owners more freedom to choose among manufacturers for both products and service support. Even greater benefits await an organization whose BMS is seamlessly merged with its information technology architecture. The synergy created by sharing infrastructure and data reduces operating costs and creates new service opportunities. Sustainable Building Management consists of

- ***Energy:*** reduce building energy consumption by promoting the use of renewable energy sources.
- ***Estimated annual usage:*** reduce demand for drinking water, generation of wastewater and impact on water resources.
- ***Air:*** improve indoor air quality and reduce the impact of emissions into the atmosphere.
- ***Materials:*** reduce the environmental impact of product life cycles and improve air quality.
- ***Waste management:*** improve indoor air quality and reduce the environmental impact of product life cycles.
- ***Economic efficiency:*** ensure economic property that support social development & that minimizes environmental impact.
- ***Architectural heritage:*** preserve the architectural heritage of construction sites.
- ***Health and life quality:*** improve the health and life quality of tenants and the neighboring community.
- ***Equity and civic spirit***: promote equity and civic spirit with respect to apartment facilities & renovation work.
- ***Information and participation:*** share a vision of projects based on user participation and information.

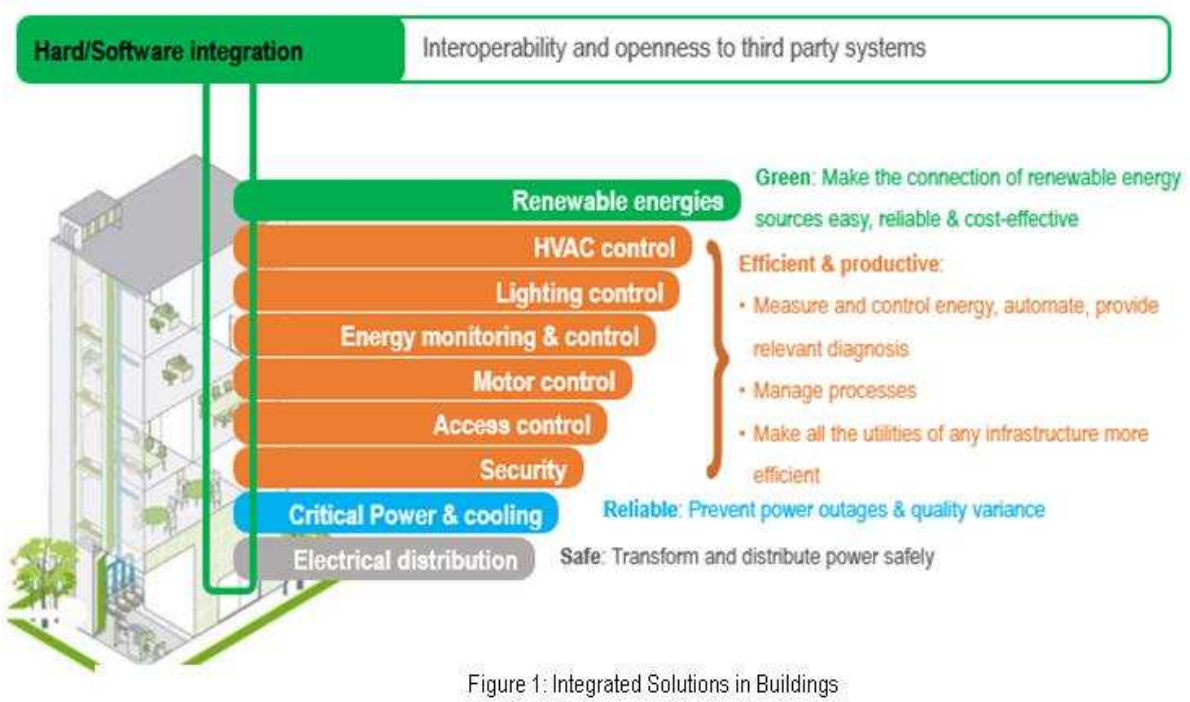


Figure 1: Integrated Solutions in Buildings

Functions:

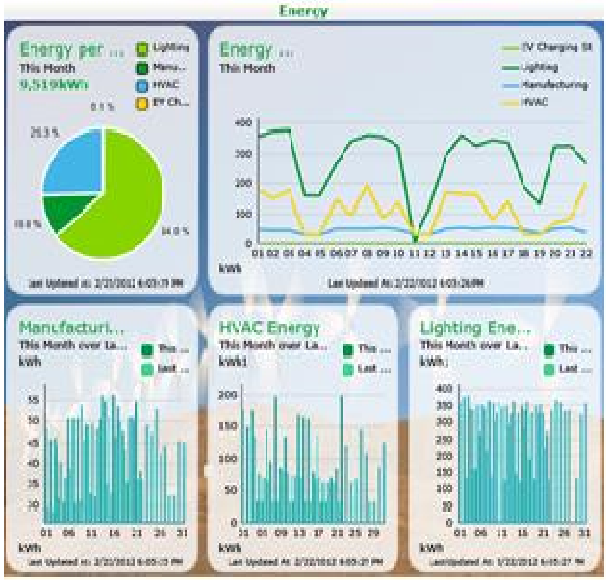
- Remote/Central control facility
- Automate and take control of various operation
- Manage all the systems
- Coordinate the various systems
- Provide a comfortable working environment in an efficient way
- To control, monitor and optimize building services (e.g., lighting; heating & cooling; security; audio-visual and entertainment systems; ventilation and climate control; time & attendance control and reporting)
- Facility Management and Preventive Maintenance

Benefits:

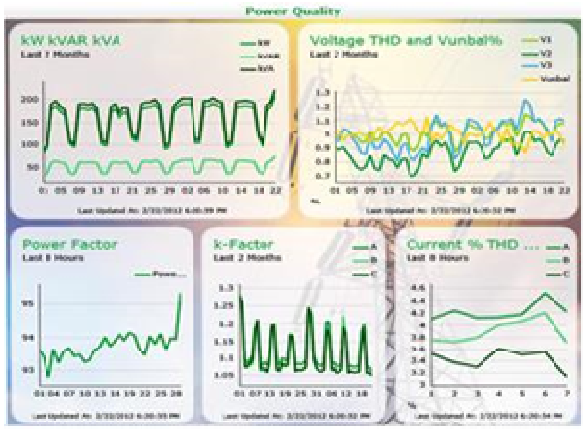
Building management will benefit in four important benefit categories:

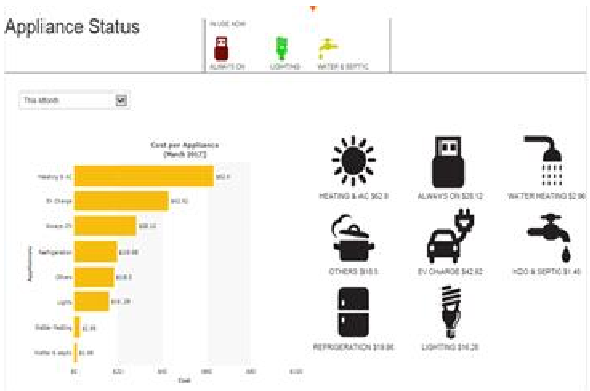
Higher Energy Efficiency

- Occupancy based control through Occupancy Sensor for meeting & Conference rooms, which resulted in 10-30% energy savings.



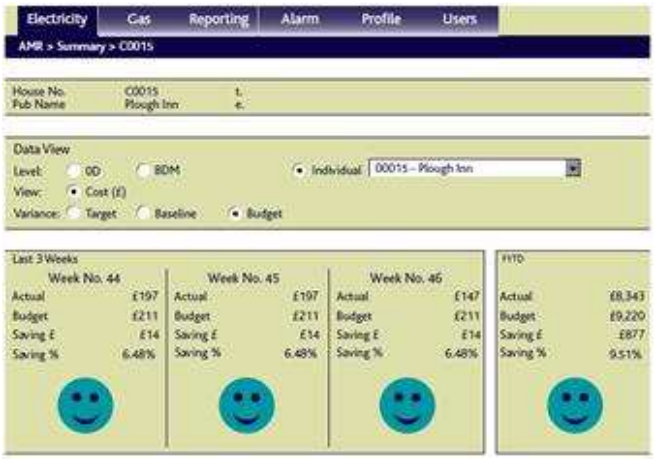
- Occupancy based control through Occupancy Sensor for meeting & Conference rooms, which resulted in 10-30% energy savings.
- Another control practice with direct ties to energy efficiency is what has become known as demand control ventilation. Here, only the proper amount of outside air is introduced into the space by monitoring return or space CO2 levels and controlling fresh air dampers which resulted in 15-20% energy savings
- Proper implementation of advanced, demand-based zoning systems such VAV and chilled beam had created good deal of energy savings.
- Coupling these strategies with proper static pressure control of the supply air (such as with VFD's on the fans) results in 20-40% energy savings





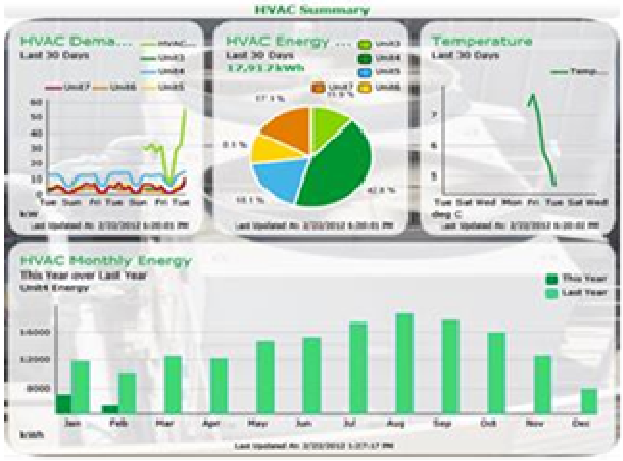
- Scheduled based operation of AHU's & Chiller's results in 10-15% energy savings
- Level based control through level transmitter/switch for PHE pumps for filling water in the tanks/sumps, which resulted in 25-35% saving in energy as well as water consumption

Lower Operating and Maintenance Costs



- Control from Centralized Command Center of entire campus
- Trends and logs provide information for further optimization of the system as well as for documentation requirements for building certification.
- Software alarms and notifications alert service personnel based on sensor data to issues before they cause discomfort to building occupants and escalate into bigger, more costly problems

Better Indoor Air Quality



- Temperature and humidity sensors monitor thermal comfort.
- Carbon dioxide (CO2) & carbon monoxide (CO) sensors monitor pollutants, ensuring the required minimum fresh air ventilation.
- Control systems provide smoke control during a fire, maintaining breathable air zones for evacuation.
- The control system monitors and controls natural ventilation dampers

Greater Occupant Comfort and Productivity

- Controllers, based on sensor input, provide optimal zone ventilating, heating, and air conditioning
- Sensors in each room sense temperature and allow occupant-controlled set points and overrides.
- Humidity sensors are used to control summer dehumidification and winter humidification of air.

Future trends:

Wireless Communications

A common feature of today's IT infrastructure is the in-building wireless distributed antenna system. The basic infrastructure is a system of cables, antennas and other components engineered to capture and convey signals throughout the building, and confine them to the interior. When added to the wired infrastructure, they can help building occupants tap the full power of todays and tomorrow's wireless services and applications.

The goal is to employ an in-building wireless distribution system that provides complete wireless coverage for a full range of voice and data services. Once a wireless distributed antenna system is installed, it can be modified and expanded without intrusive, costly infrastructure changes. A well-engineered system helps eliminate dead signal spots and facilitates the expanding number of wireless applications and devices. These include wireless LANs, personal communications services (PCS), cell phones, PDAs, pagers and two-way radios for maintenance and security.

Such a system also enables wireless building automation in conjunction with a state of the art building automation system. The wireless infrastructure will help the BAS access data from multiple enterprise applications and assimilate the data into meaningful information that helps busy managers operate more efficiently.

This technology will help customers seamlessly and cost-effectively integrate fire and security systems and other building controls, whether they are in one building or spread across a corporate campus. As momentum builds, wireless distribution technology will become an integral part of a facility's infrastructure, providing building owners with solutions that simplify operations, reduce costs and improve efficiencies

Internet of Things (IoT)

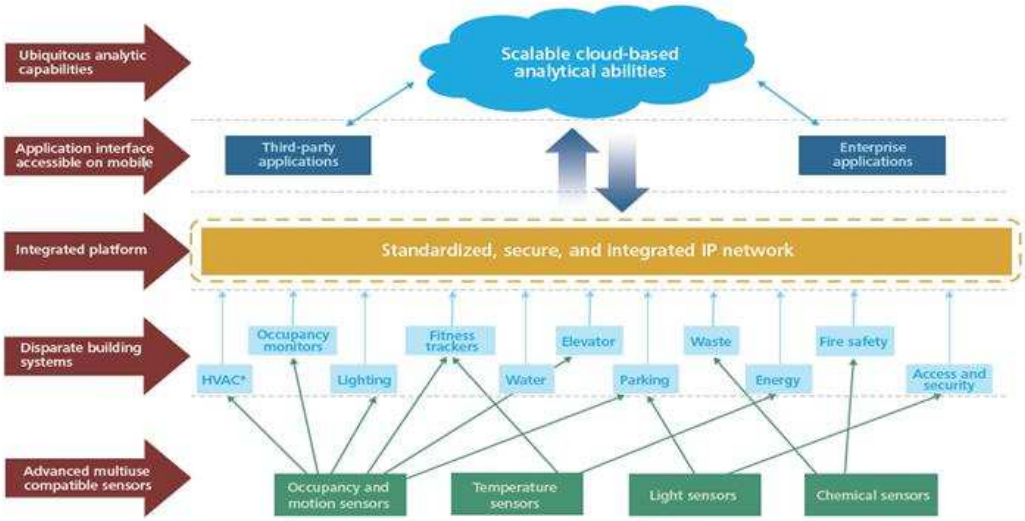


Figure 2: IoT information value stack for buildings

Internet of Things (IoT) applications aim to grow margins and enable features such as dramatically more efficient building operations, enhanced tenant relationships, and new revenue generation opportunities. Consider the increasingly popular smart thermostats that intuitively adjust the temperature, humidity, and light based on residents' preferences and climatic conditions.

While consumer IoT devices have drawn most press attention, it is enterprise-level adoption of the technology that will likely have the bigger impact on industry. Using IoT-enabled building management systems (BMS) to make building performance more efficient and also use sensor-generated data to enhance building user experience.

Recent smart-city forecasts highlight the potential: "Smart commercial buildings will be the highest user of Internet of Things (IoT) until 2017, after which smart homes will take the lead with just over 1 billion connected things in 2018." For instance, sensors in shopping malls can help owners connect directly and offer services to end customers. This would lead to building relationships with customers as well as strengthening tenant engagement.

BIM & BAS

The integration of green design is another factor that can add value to traditional BIM. The global recognition of the need for greater efficiency and sustainability has led to a significant increase in green design and implementation of sustainable features. Employing BIM facilitates the adoption of a variety of sustainability efforts from the very beginning of the design phase efforts that otherwise may have gone unrecognized in this early phase. Everything from building orientation and choice of materials to energy consumption and temperature analysis can be incorporated as parameters to deliver the best integration of all elements and to produce the optimum sustainable design.

At its best, sustainability resides in the design phase of a building. Optimization of sustainability achieved during the building's design phase provides the greater potential for optimization throughout the building's lifecycle.

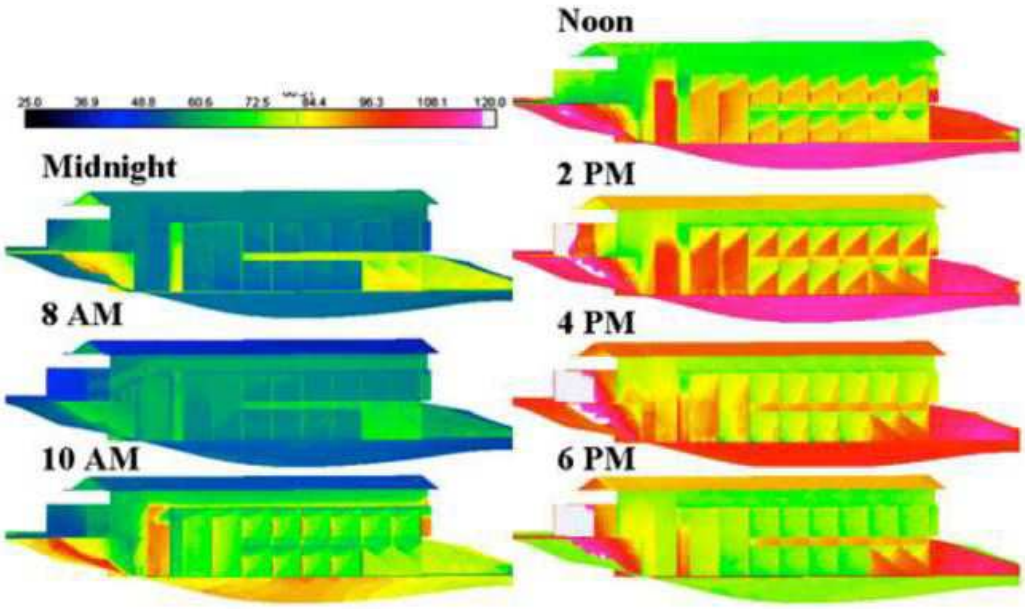


Figure 3: Energy analysis at different times during the course of a day

By utilizing BIM during the design process, an architect can compare differences in energy consumption between two design variations without having to use experimental data just the available environmental and case-specific data. Using BIM with specific variable parameters that are set according to project characteristics allows the designers to graphically portray differences in energy consumption between two unique designs or between two variations of the same design.

Examples of different project characteristics are:

- Geographic coordinates and location contain variables such as inherent average temperatures, climate conditions and wind.
- Building orientation with respect to the sun
- Maximum and minimum wind velocity
- Height
- Shading effect on temperature
- Materials (unique materials properties, thermal and cooling specifications and heat absorption)
- Size
- Building use
- Building envelope
- Owner specific variables

Conclusion:

Sustainable Building Management system, when embedded throughout an organization, its strategy and operations, can drive value across a number of dimensions, information technology architecture are a seamless entity. They work in concert because they share resources and adhere to the same set of standards. This ideal
scenario offers many benefits, including:

- Reduced management and infrastructure equipment costs.
- Critical building system information is readily available at all levels of the enterprise.
- Employees can access and act upon this information without the constraints of a dedicated workstation at a fixed location.
- New services are possible that save time and preserve resources.

When making an investment in BMS technology, an organization should look beyond today's configuration. Decision-makers need to cast a wider net and recognize the advantages of merging the building automation system into the IT infrastructure. Whatever technology platform is selected to harness energy and operational data, it must be fully compatible with the IT network that is already in place. Allow the BAS to rely on the IT network as the data highway for safe and reliable transportation of information. In return, the IT staff will provide critical services for planning and maintenance.