

# **Unit 32: Building Management Systems**

**Unit code** J/615/1418

**Unit level** 5

**Credit value** 15

---

## **Introduction**

The earliest examples of Building Management Systems are found in large public and commercial premises. For the most part, these were used for automatic control of heating, cooling, and in some instances, security. However, Building Management System applications have broadened in scope and are becoming common in the domestic market, such as extra-low-voltage, intelligent lighting, which is already becoming the norm for many new homes (not exclusively those at the higher end of the market).

An environment controlled by a computer can provide, not only, the optimum levels of heat, humidity and lighting for a building and its occupants, but also monitor energy use and contribute to energy conservation. Incorporating Energy Demand Management (EDM) into the Building Management System can facilitate automatic conformance with current energy usage regulations. The advent of the smart phone and low-cost apps has opened the door to truly remote control and monitoring of a building's environment and security. Heating and lighting can be switched on and set by the homeowner long before they reach their own front door.

The aim of this unit is to explore the rapidly growing range of services provided by Building Management System technology and assess its contribution to the renewable energy debate. There is also an opportunity to apply this research by carrying out a design of a Building Management System.

On successful completion the students will be conversant with current and emerging Building Management System technologies, will have developed the tools to evaluate the benefit of a Building Management System and apply their theoretical knowledge to a real-life installation.

## **Learning Outcomes**

By the end of this unit students will be able to:

1. Evaluate emerging Building Management System technologies.
2. Assess how a Building Management System can optimise cost and energy usage.
3. Discuss the differences between Building Management Systems for domestic and non-domestic buildings.
4. Specify a Building Management System suitable for a large domestic installation.

## Essential Content

### L01 Evaluate emerging Building Management System technologies.

#### *Types of Building Management System:*

Centralised system; a single Central Processing Unit (CPU).

Distributed Intelligence Systems: intelligent outstations with communications channels.

#### *System integration:*

Cloud and web applications, mobile apps, protocols.

#### *Adaptive energy management:*

Conditional logic, human intervention, energy policy management.

### L02 Assess how a Building Management System can optimise cost and energy usage

#### *Control:*

Regulating equipment performance, electrical voltage.

Close control of heating and cooling, and lighting.

Energy usage feedback, weather compensation.

#### *Monitoring:*

Develop a monitoring methodology.

Develop methodology for cost and energy savings.

#### *Sustainability.*

### L03 Discuss the differences between Building Management Systems for domestic and non-domestic buildings

#### *Requirements for domestic installations:*

Smart homes.

#### *Requirements for non-domestic installations.*

Remote control through smart phone apps.

Environmental requirements.

**L04 Specify a Building Management System suitable for a large domestic installation**

*Regulations and standards:*

Health and safety.

Building regulations.

Manufacturing certifications.

*Client requirements:*

*Design.*

Elements of Building Management System design.

Suitability of technologies.

Protocols and component selection.

Commissioning process.

*Proposal:*

Proposal writing.

Presentation formats and techniques.

## Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
<b>LO1</b> Evaluate emerging Building Management System technologies.		<b>D1</b> Justify the use of BMS system in support of greater user control.
<p><b>P1</b> Discuss the principles of Building Management System.</p> <p><b>P2</b> Explain the different approaches to system integration.</p>	<b>M1</b> Compare BMS technologies for a given application.	
<b>LO2</b> Assess how a Building Management System can optimise cost and energy usage		<b>LO2 LO3 LO4</b> <b>D2</b> Justify recommendations for a BMS based on a cost, improved building efficiency and improved performance.
<p><b>P3</b> Record, on a data sheet, energy costs and usage for a given set of buildings.</p> <p><b>P4</b> Select a Building Management System to optimise cost and energy usage.</p> <p><b>P5</b> Justify the selection of a Building Management System in achieving greater sustainability through control and monitoring.</p>	<b>M2</b> Analyse variations in energy costs and usage data between two given buildings; one which incorporates a Building Management System and one that does not.	
<b>LO3</b> Discuss the differences between Building Management Systems for domestic and non-domestic buildings		
<p><b>P6</b> Research functions, components, software and systems suitable for a large domestic installation.</p> <p><b>P7</b> Evaluate how a non-domestic Building Management System would differ from a domestic.</p>	<b>M3</b> Compare a BMS for a domestic installation and a non-domestic installation; in terms of cost, functionality, monitoring and design philosophy.	
<b>LO4</b> Specify a Building Management System suitable for a large domestic installation		
<p><b>P8</b> Prepare a design proposal for a large domestic Building Management System installation.</p> <p><b>P9</b> Prepare costings for a large domestic Building Management System installation proposal.</p>	<b>M4</b> Analyse different strategies for a large domestic Building Management System installation with reference to cost analysis and manufacturers' data.	

## Recommended Resources

### Textbooks

LEVERMORE, G. (2000) *Building Energy Management Systems: An Application to Heating, Natural Ventilation, Lighting and Occupant Satisfaction*. 2nd Ed. London: E & FN. Spon.

NIZAMIC, F. (2016) *A Smart Energy System for Sustainable Buildings: The Case of the Bernoulliborg*. 1st Ed. Amazon CreateSpace

SINOPOLO, J. (2009) *Smart Buildings Systems for Architects, Owners and Builders*. Oxford: Butterworth-Heinemann.

### Links

This unit links to the following related units:

*Unit 9: Principles of Heating Services Design & Installation*

*Unit 10: Principles of Ventilation and Air Conditioning Design & Installation*

*Unit 16: Principles of Alternative Energy*

*Unit 17: Principles of Public Health Engineering*

*Unit 25: Management for Complex Buildings*

*Unit 39: Transport Systems in Buildings*

*Unit 45: Maintenance & Operations*