
1. Module details

Module name

ENERGY MANAGEMENT 1

Nominal duration

One module
It is anticipated that students will achieve the competencies specified in 35 to 40 hours.

Module codes

EA144

Discipline code

2. Module purpose

To enable students to gather relevant information required to document on implementation strategy for an energy management program applicable to the various energy sources used in refrigeration/air conditioning and building services.

3. Prerequisites

EA136 - Building Management Systems
EA145 - Introduction to Refrigeration
EA146 - Introduction to Air Conditioning

4. Relationship to competency standards

TBA

5. Content

1. Typical Energy Sources and Characteristics:

- supply authorities
- standard units of measurement
- electricity
- steam
- hot water
- high temperature hot water
- town gas
- LP Gas
- solar
- waste heat
- petrol
- diesel

2. Energy Usage

- office lighting
- air conditioning systems
- refrigeration systems
- security systems
- computer systems
- standby/emergency systems
- lifts and escalators

3. Energy auditing process

- energy costs and tariffs
- energy consumption

- predicting future costs
- plotting consumption trends
- historical data
- collecting information using surveys
- comparisons of actual to recorded usage
- energy balance
- instrumentation
- building management systems
- estimating savings potential

4. System operation for energy efficiency:

- types of systems
- efficiency in building structures
- operation of a vehicle fleet
- proportion total energy consumption against individual systems
- passive building design
- preventative maintenance procedures
- monitoring building management systems
- operation of major and minor plant
- inappropriate energy management procedures
- building plant control systems
- Australian standards/local authority requirements
- case studies

5. Implementing energy management procedures for a building

- recording base year data
- climatic conditions for locality
- establishing energy costs and tariffs
- building and systems surveys
- pay back period
- survey analysis
- energy conservation procedures
- informing stockholders
- recommendations and documentation
- implementation issues
- monitoring, evaluation and follow up

6. Learning outcome details

Learning outcome 1

Assessment criteria

On the completion of this module, the learner will be able to:

Compare characteristics of typical energy sources used in the refrigeration/air conditioning and building services field.

Short answer tests.

1.1 State the standard units of several energy sources.

1.2 Identify the characteristics of several energy sources.

1.3 List the various local Supply Authorities requirements for safety and consumption.

Learning outcome 2

Investigate the energy requirements of several components of a refrigeration/air conditioning and building services system.

Assessment criteria

Short answer tests.
Project.

- 2.1 Identify the major consumers of energy in several different building services systems.
- 2.2 State the normal ranges of energy consumption for several major plant items from several building services systems.
- 2.3 Predict the annual consumption of several major plant from a given building services system.

Learning outcome 3

Demonstrate the processes necessary to conduct various components of an energy auditing process for a given building.

Assessment criteria

Project.

- 3.1 List the energy costs and tariffs for the local supply authorities.
- 3.2 Emulate appropriate energy audit documentation processes.
- 3.3 Locate the sources of information required for energy auditing purposes.
- 3.4 Locate the sources of information required for energy auditing purposes.
- 3.5 Categorise the various steps in the energy auditing process in sequential steps.
- 3.6 Plan the method of data gathering for energy audits.

Learning outcome 4

Specify the requirements for energy efficient operation of refrigeration/air conditioning and building systems.

Assessment criteria

Project.

- 4.1 Identify the role of maintenance procedures on building services systems.
- 4.2 Compile a plant operating annual operating timetable for a given building.
- 4.3 State the requirements of an energy efficient plant control system.
- 4.4 Formulate a staff awareness raising policy for energy conservation in a multi - story building.

	4.5 Investigate the role of passive building design in energy conservation.
Learning outcome 5	Document an implementation strategy for an energy management program.
Assessment criteria	<p>Project.</p> <p>5.1 Prepare a project management brief for an implementation policy of an energy management program in a multi-storey building.</p> <p>5.2 List the steps involved in an implementation strategy.</p> <p>5.3 Analyse relevant information relating to energy conservation.</p> <p>5.4 State evaluation and validation procedures for an energy management program.</p>
7. Assessment Strategies	See Assessment Criteria.
8. Module Delivery Strategies	<p>This module provides for delivery by off-the-job training in a variety of modes.</p> <p>Assessment instruments will need to be developed by the module provider. These instruments will need to reflect consistency with stated module learning outcomes and related assessment criteria.</p> <p>Alternative assessment procedures will need to be considered, and applied as appropriate to student's needs.</p>
9. Resource Requirements	<p>All references used should be up to date and relevant for Australian conditions.</p> <p>Walsh, Munro and Spencer, An Australian Climatic Data Base for Use in the Estimation of Building Energy Use, CSIRO 1993.</p> <p>Delsante A E., Mason M.D., An Expanded Climatic Databank for Australia. AIRAH Federal Conference, Adelaide 1990.</p> <p>AIRAH/ACS Design Aid DA9: Air Conditioning Systems - Load Estimation & Psychrometrics.</p> <p>ASHRAE Fundamentals 1989, Chapters 24 & 26.</p> <p>State Projects NSW, Building Energy Manual, NSW Public Works 1993.</p>