5.1 Energy system

Air conditioning and mechanical ventilation

Although the cooling requirements of a building will be reduced by minimizing heat gain through windows and other external surfaces, energy must also be used to condition spaces in Abu Dhabi's climate. Efficient system performance is therefore a critical factor in achieving reductions in energy usage.

For most buildings the performance of the air-conditioning system is based upon:

- The efficiency of energy conversion from electricity to cooling, typically provided by localized units, central chillers or district cooling
- The effectiveness of the fans providing air to the spaces, both fresh and recirculated air
- The selection of appropriate sensors and controls for various system elements in different zones
- The response of the system to variation in thermal loads and occupant requirements
- The inclusion of energy recovery, performance modulation and other efficiency measures.

There are requirements for all aspects of system performance outlined by ASHRAE Standard 90.1-2007. However in order to achieve the target performance required by credit RE-R1 it will be necessary to demonstrate improvement beyond the levels defined in Standard 90.1-2007.

Lighting

Good lighting design can reduce energy usage internally and externally. Internal lighting energy is restricted on a basis of power used per unit area. Power allowance is based on the building type or the space type classification as outlined in Standard 90.1-2007. Example performance for the building type classification is shown in table 5.1.

In addition to reducing the energy consumed by lighting systems, good use of controls and sensors can increase energy savings and reduce the cooling load required. Examples of lighting controls include:

- Occupancy sensors
- Daylight sensors
- Dimmable controls
- Programmable time controls

External lighting is also restricted on the basis of power use, either per unit area or per linear meter as defined by Standard 90.1-2007 for various functions. Furthermore external lighting should be controlled to ensure that it is not operational during daylight hours, which will reduce energy wastage.

Renewables

The use of onsite renewable energy sources to contribute towards the building load is encouraged. Renewable technologies should be designed to integrate with proposed building design, HVAC systems and lighting.

Table 5.1

Building Area Type	Power Density (W/m²)
Automotive Facility	10
Convention Centre	13
Courthouse	13
Dining: bar lounge/leisure	14
Dining: cafeteria/fast food	15
Dining: Family	17
Dormitory	11
Exercise center	11
Gymnasium	12
Health-care clinic	11
Hospital	13
Library	14
Manufacturing facility	14
Motel	11
Motion picture theater	13
Multifamily	8
Museum	12
Office	11
Parking Garage	3
Penitentiary	11
Performing arts theater	17
Police/fire station	11
Post office	12
Religious building	14
Retail	16