Asset Management & Energy Efficiency

Control strategies to improve energy efficiency in Hospitals

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Agenda

- Energy Usage
- Energy Savings
- Strategies for Energy Efficiency and Reliability
- Benefit of Integration

Energy Usage

Hospitals have the

highest consumption of energy/m²

of all buildings.

Amount of energy consumed each year

16 tonnes of CO_2/bed space

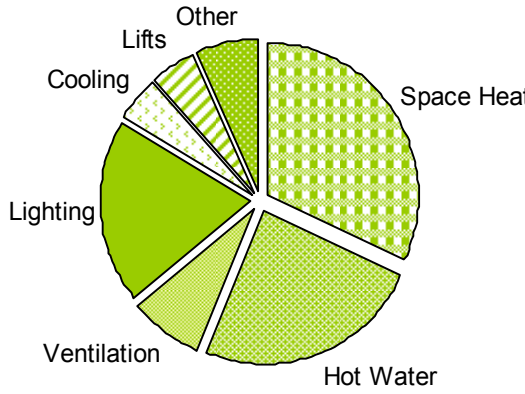
Energy Usage

HVAC (Heating, ventilation, air conditioning)

HVAC account for almost **50%** of electrical energy costs in a hospital:

- **Ventilation**:
  range from 35-140 m3/person/hour depending on the function of the room (e.g. general or intensive-care)
- **Indoor air humidity**:
  relative humidity of 35-70%, at temperatures normal for hospitals (22-24°C).
- **Heating**
  - mainly supplied by fuel fired boilers that produce hot water or steam.

Energy Usage - other costs



Domestic hot water:

- Consumption can average 100 to 200 litres/bed per day.

Kitchens & laundry: 20%

- Energy consumption in kitchens = >10% of total energy usage.
- Laundry:10 - 15% of the total energy consumption.

Lighting: 20 - 35% of electricity costs

Medical & IT equipment, data storage: 17 – 20 %

- Requirements for secured power for both equipment and data centres.

Lifts: 20 - 30%

Energy Savings

Typical areas for energy savings

Measures	Laboratories	Health care
High-efficiency lighting	●	◑
Occupancy sensors	◑	◑
Efficient parking lot lighting	◑	◑
Skylights and photocell controls	◑	●
Automatic lighting controls	◑	◑
Exterior shading	◑	◑
Cool roof	◑	◑
High-efficiency HVAC	●	●
Direct digital controls	◑	◑
Variable-speed drives	◑	◑
Demand-controlled ventilation	○	○
Direct/indirect evaporative cooling	○	○
Water-heating heat recovery	●	●

● = Highest potential
◑ = Some potential
○ = Least potential

Potential Energy Conservation Measures for Laboratories and Healthcare

Strategies for Energy Efficiency and Reliability

Heating, ventilation and air conditioning

- Maintain proper temperatures

Room Type	Temperature °C
Wards	22 - 24
Circulation spaces	19 -24
Consulting/treatment rooms	22 - 24
Nurses stations	19 - 22
Operating Theatres	17 - 19

Source: CIBSE, Heating Guide B1

- Make sure time schedules are set for unoccupied areas.
- Locate thermostats in correct places.
- Check controls regularly to ensure heating and cooling are used when required.

Strategies for Energy Efficiency and Reliability

Heating, ventilation and air conditioning (Cont…)

- Automate smaller spaces, such as treatment and consulting rooms, with occupancy sensors.
- Take advantage of natural ventilation where you can.
- Upgrade controls to centralised DDC system that can adjust temperature with quick changing weather.
- Set up "set back temperature" in unoccupied zones.
- Set "Dead Band" so that heating and cooling do not operate at the same time.
- Install Variable Speed Drives on fans and pumps to match the demand of the building.
- Maintain fans, pumps, air ducts and HVAC components to optimize performance.
- Install networked building management systems so HVAC systems and other components can work together optimally and deliver the most comfort possible in the most energy efficient manner.
- Calibrate, check and adjust thermostats to accurately heat and cool building zones.
- Consider cogeneration.
- Reduce capital expenditures by extending the service life of equipment through pro active maintenance and service agreements.

Strategies for Energy Efficiency and Reliability

Other strategies for Lighting

- Maintain windows, skylights and light fittings clean.
- Upgrade to high efficiency lighting.
- Implement compact fluorescent lamps in closets and store rooms
- Specify high frequency fluorescent lighting system with mirror reflectors where possible. They reduce energy use and heat output, extend lamp life and can be dimmed.
- Maximise daylight when possible in consulting and meeting rooms. “Switching in parallel” allows light fixtures near the windows to be dimmed or even turned off when not required. This reduces energy use and heat generated by the lamps.
- Install occupancy sensors in areas such as toilets, bathrooms, storerooms and areas where lighting is zoned.
- Adopt a period of “down time” lighting. Reducing overall lighting levels to allow for patients to rest while lower energy use.
- Upgrade exit signs to light emitting diodes (LED).

Benefits of integration

Integration between BMS, ACS and CCTV

A site-wide single interface

- one person to be trained on multiple systems.

Components are share between systems and become multi-use.

- A motion sensor can be used for lighting control during occupied hours, and intrusion detection during unoccupied hours.

Better response to occupant needs,

- offering patients and staff greater security and peace of mind.

More information put to effective use,

- Video recording can be triggered by an alarm or event of motion automatically.

Benefit of Integration

Integration between BMS, ACS and CCTV

The Access Control system can produce alarm inputs to the CCTV system

Combining these systems can help…

- Determine who caused the alarm
- Determine who used the access card
- Determine who else was nearby

It can aid security guards in their job…

- Call attention to potential problems
- Show them the cameras at the location of the alarm
- Quickly recall video from the time of the event

Benefits of integration

Integration between BMS, ACS and CCTV

- Trigger lights and climate settings based on card entry to building or room
- Use security system to unlock doors and create a muster report during fire alarms
- Use occupancy count to automatically adjust temperature control variables
- Cost benefits of installing one system instead of two
- Maintenance and training benefits
- Ease of use

With one front end, you can control many building systems: maximize your investment and minimize your training expense!

End of Presentation – Thank you for your attention

Systems Integration

Building Management System (BAS)

Maintenance and Service