

# Heating Control Strategies

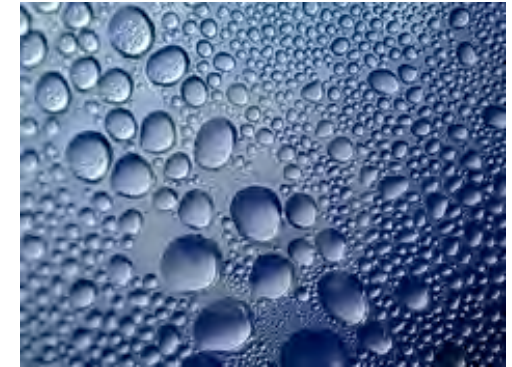
Maximising  
Efficiencies

**Mr Andy Lee**  
**Chartered Energy Engineer**



# Heating Control Strategies

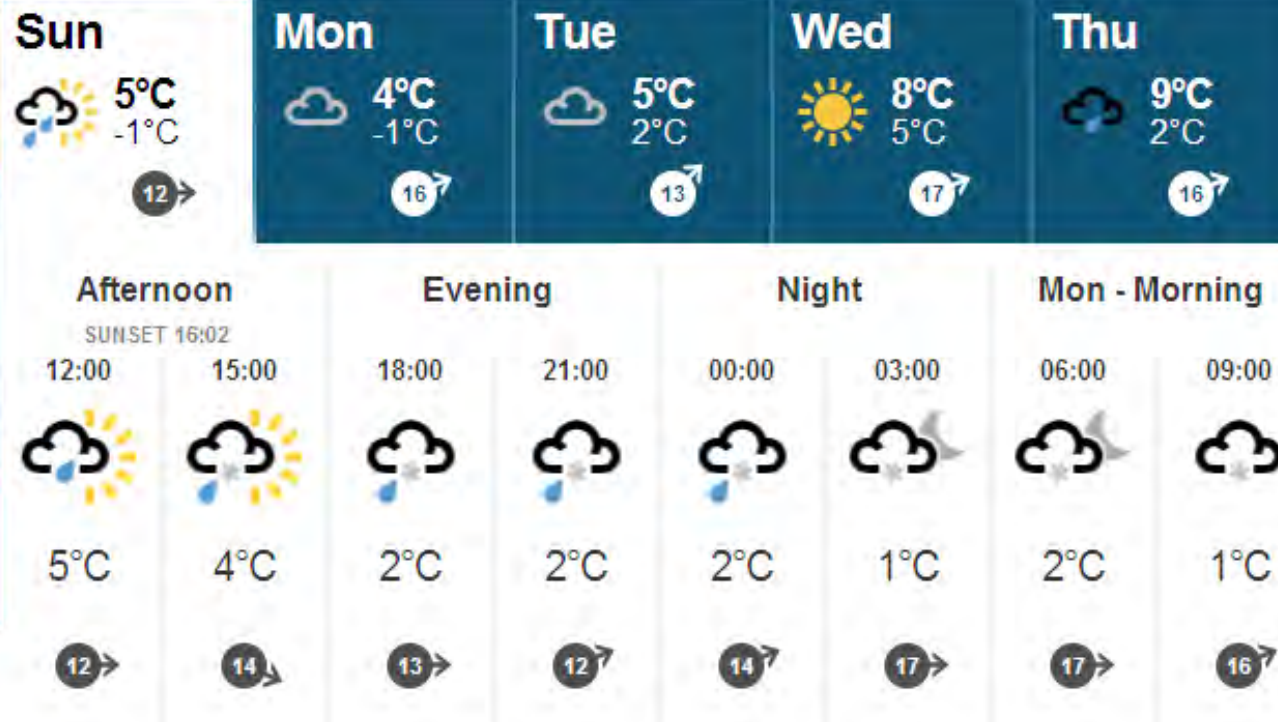
Maximising  
Efficiencies



# Weather Forecast

Maximising  
Efficiencies

## WEATHER ANTRIM



# Temperatures

Maximising  
Efficiencies

- Comfort

Hospitality	Restaurants/dining rooms	22-24
	Bars	20-22
	Hotels	19-21

- Fabric Protection

10°C to 12°C

- Frost Protection

2°C to 5°C

# Poor Practice

Maximising  
Efficiencies



# Poor Practice

Maximising  
Efficiencies



# Poor Practice

Maximising  
Efficiencies



# Poor Practice

Maximising  
Efficiencies



# Understanding Controls

Maximising  
Efficiencies

- Before putting a plan in place, an understanding of the type of controls installed is required



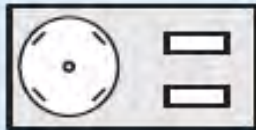
# Common Controls

Maximising  
Efficiencies



## Time switch

Simple time control of a system that will only switch one heating circuit. Most suitable for combination boilers. If installing a new time switch choose one that is easy to understand and use.



## Programmer

A programmer can switch two circuits separately (usually heating and hot water). There are three basic types:

- ▶ A mini-programmer allows space heating and hot water to be on together, or hot water alone, but not heating alone
- ▶ A standard programmer uses the same time settings for space heating and hot water
- ▶ A full programmer allows the time settings for space heating and hot water to be fully independent.

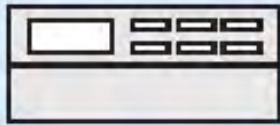


## Room thermostat

Simple room temperature control. Most modern room thermostats are able to smooth out the temperature cycle, so that on and off periods are not too long. Wireless units are now available that provide increased flexibility in positioning and eliminate visible wiring.

# Common Controls

Maximising  
Efficiencies



## Programmable room thermostat

Allows different temperatures to be set for different periods in the day or week. Provides a better match to the business working pattern than the more simple time switches, for example. This is important if occupancy is varied over the day or week. These can also provide a 'night setback feature' where a minimum temperature can be maintained at night. Many are battery operated and can replace a conventional thermostat without the need for additional cabling. Many also allow time control of hot water.



## Cylinder thermostat

Simple control of stored hot water temperature, usually strapped to the side of the hot water cylinder. It is commonly used with a motorised valve to provide close control of water temperature.



## Frost thermostat

Simple override control used to avoid frost damage to a building and/or boiler and system. A frost air thermostat should be fitted in a suitable place inside the building so that a minimum temperature is always maintained.

# Common Controls

Maximising  
Efficiencies



## Thermostatic radiator valve

Used to limit temperatures in individual rooms and so reduce energy consumption. Provides an upper limit to room temperatures and so can usefully prevent overheating due to solar and incidental gains from equipment.



## Motorised valve

Used to control water flow from boiler to heating and hot water circuits. Two-port valves can also be used to provide zone control, such as lower temperatures in unoccupied areas or different heating times. Three-port valves are used with controls such as weather compensators.

# Timeswitch

Maximising  
Efficiencies

- If only control, override in extreme weather
  - Avoid excess energy by having weather watch plan



# Programmer

Maximising  
Efficiencies

- If only control, override in extreme weather
  - Avoid excess energy by having weather watch plan
  - Could set multiple periods to reduce energy costs



# Room Thermostat

Maximising  
Efficiencies

- May be used in combination with time clock
- If not in representative location, set higher



# Programmable Room Thermostat

Maximising  
Efficiencies

- Temperature
- Multi-channel time control
- If not in representative location, set higher



# Cylinder Thermostat

Maximising  
Efficiencies

- Set at 60°C plus
- Use time control for frost protect



# Frost Thermostat

Maximising  
Efficiencies

- Policeman
- Purpose is to avoid frost damage
- But must be in a representative location



# Thermostatic Radiator Valves

Maximising  
Efficiencies

- Shouldn't be installed in room with main control thermostat
- Prone to tampering
- Operation generally misunderstood
  - More often than not at position 0 or 5
- Consider locking pins



# Thermostatic Radiator Valves

Maximising  
Efficiencies

- TRVs
  - No 0 = No heating
  - No \* = 7°C
  - No 1 = 13°C
  - No 2 = 17°C
  - No. 3 = 20°C
  - No. 4 = 23°C
  - No. 5 = 26°C



# Motorised Valve

Maximising  
Efficiencies

- Should be checked regularly
  - Prone to passing and sticking
  - Manual override is a quick fix but could end in problems
- Algorithms
  - Variable temperature



- External Temperature Sensors
  - Install on North face
  - Avoid chimney walls and other walls subject to high internal heat gains
  - Do not install under eaves
  - Do not install above windows
  - Do not install above ventilation grilles

- Internal room sensors
  - Away from sources of draught
  - Not in partitioned areas which may have different conditions than the general space
  - Away from sources of heat (including heat produced from emitter)
  - Out of reach of direct sunlight
  - Approximately 1500 mm from the floor
  - In a position which is unlikely to be covered

- Firing Control
  - Normally based on water temperature
- Sequence Control
  - Only boilers required fire

# Air Handling Units

Maximising  
Efficiencies

- Burst coils even with intelligent controls
- Potential issues at low demand
- Large units may need high and low level sensors
- Valves should fail open

# Building Management Systems

Maximising  
Efficiencies

- Prepare a schedule of setpoints and settings
  - regularly audit against schedule

# Building Management Systems

Maximising  
Efficiencies

- Sensors are referenced correctly
- Standby plant operates on failure of duty plant
- Weather compensation curves
- Sensors are in representative locations
- Calibration

# Building Management Systems

Maximising Efficiencies

- Fabric Protection
  - Building should not go below dewpoint (10°C)

# Building Management Systems

Maximising Efficiencies

- Pumps should automatically operate at 2°C external temperature
- Fire boilers at 0°C external temperature
- AHU coils fully open <2°C on-coil
- Circulate DHW at temperature in extreme weather
  - Likely runs next to cold pipes

# Building Management Systems

Maximising  
Efficiencies

- Learn what alarms are important
  - The boy that cried wolf
- Have a dry-run
  - raise frost temperature and record what happens