

# Using Building Energy Management Systems (BEMS) Best Practice for Energy and Carbon Savings.

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Energy Consultant's

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# Housekeeping and Introduction.



None  
Planned.



Reception  
Area.  
Swipe  
Card.



Silent  
Please.

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# Contents and Objectives

- What is a BEMS?
- Why Optimise a BEMS?
- BEMS Best Practice
- Examples of BEMS Changes / Impact
- Questions & Open Discussion Welcomed at Anytime.
- Aiming for 30 to 45 Minutes.

# What is a BEMS?

(Tool for Energy Management, not a Substitute.)

- Intelligent Switch.
- Turns things On / Off.
- Opens a valve
- Interface with other plant / equipment. Integrated with Security, CCTV etc.
- Regardless of manufacturer, all BEMS systems have the capability of allowing changes to be made / introduced.
- Networks for Global passing of Data.
- Data Logging for Analysis.



# Why Optimise a BEMS?

- Industry Standards suggest 22% saving with BEMS.
- Further savings possible using best practice.



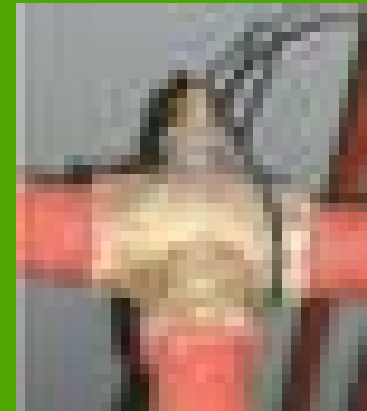
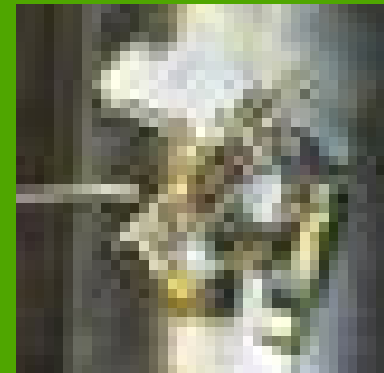
*Save Energy, Save £££, Reduce Carbon*

# BEMS Best Practice

BEMS Best Practice

# Automatic Control

- Why operate Plant in Hand with BEMS?
- Feedback inputs can be fitted to switches.

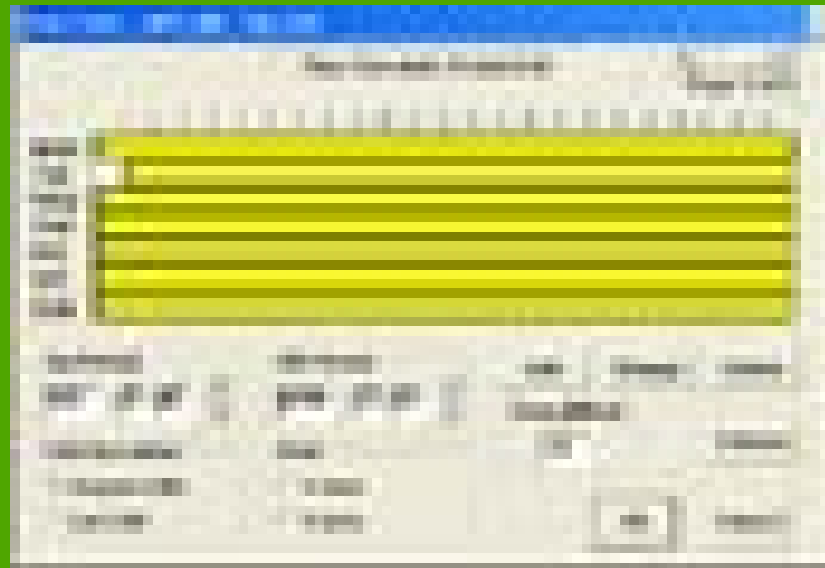


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BEMS Best Practice

# Timeschedules

- Do Timeschedules reflect occupancy and operation of the site.
- Can they be Rationalised.
- Quick win with instant savings.





BEMS Best Practice

# Holiday Schedule – HMP Durham

- Bank holidays.
- Christmas and New Year holidays.
- Make full use of holiday schedules. Plan ahead.



BEMS Best Practice

# Setpoints

- Avoid heating and cooling (set deadbands)
- Setpoints should be set to match demand of heat loss, whilst maintaining comfort for staff.



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BEMS Best Practice

# Optimisers

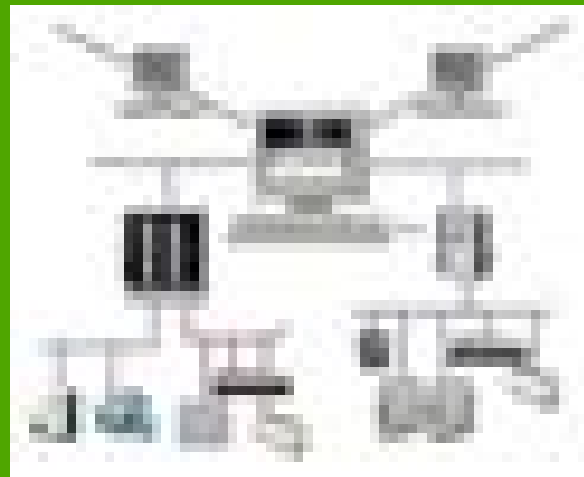
- Set for the correct occupancy temperature at occupancy time.
- Don't forget you can Optimise Off as well as On.



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BEMS Best Practice

# Optimisers



**Optimise On**  
**20°C @ 09:00**

**Optimise Off**  
**19°C @ 17:00**



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BEMS Best Practice

# Compensation

- Can any fixed setpoint be Compensated.
- Can the Compensation ratios be Rationalised.
- Can other influences be used ie Room Temp.
- Do the boilers produce DHW, if not Compensate them.



BEMS Best Practice

# Compensation

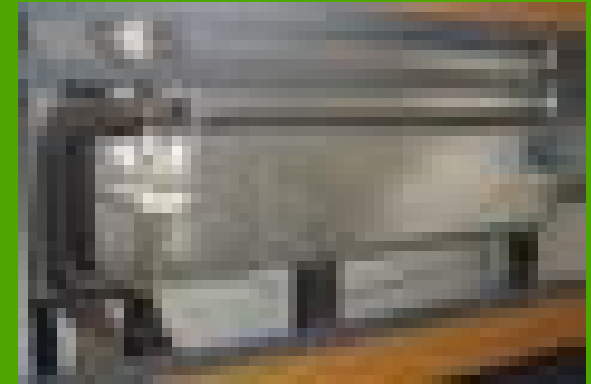
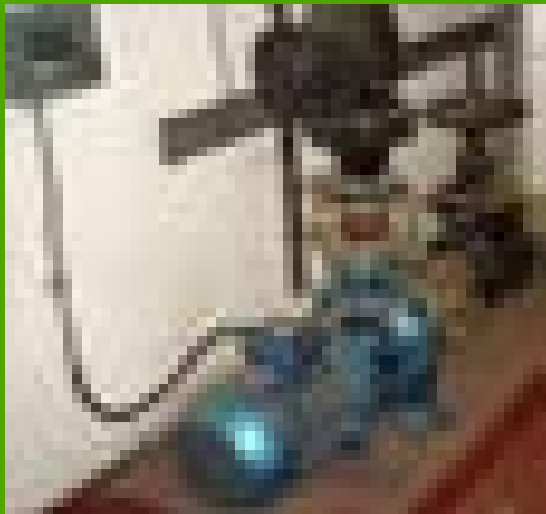


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BEMS Best Practice

# Demand Programming

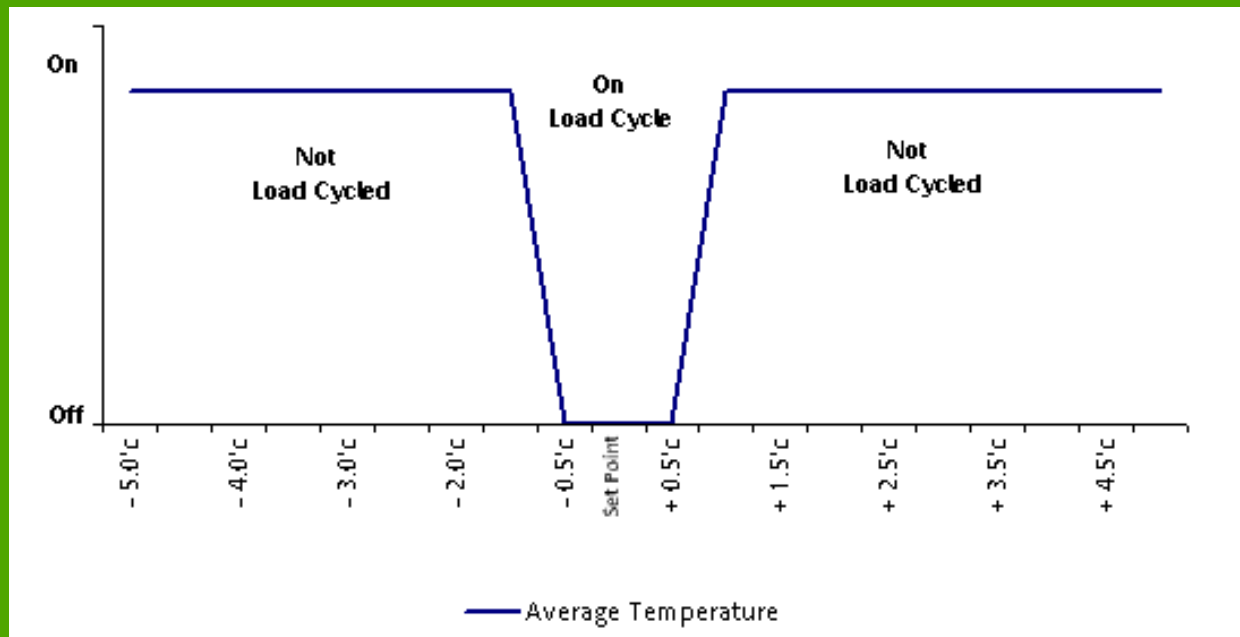
- Monitor the position of heating and cooling valves.
- If no demand then stop pumps or chillers etc.
- Only start once a demand returns.
- Improves efficiency of primary plant.



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# Load Cycling

- For ventilation plant without VSD.
- Demand driven depending on space temp and humidity being satisfied.





# Boiler Control



**LTHW:**

**Boiler Flow Temperature  
Control**

**Setpoint 80°C**

*Boilers could 'short cycle' if the  
BEMS sequences the boilers on  
too fast!*

# Boiler Control



**LTHW:**

**Boiler Return Temperature  
Control**

**Setpoint 70°C**

*Return Temperature Control  
gives better representation of  
system 'load'*

## BEMS Best Practice Boiler Control – thermostats

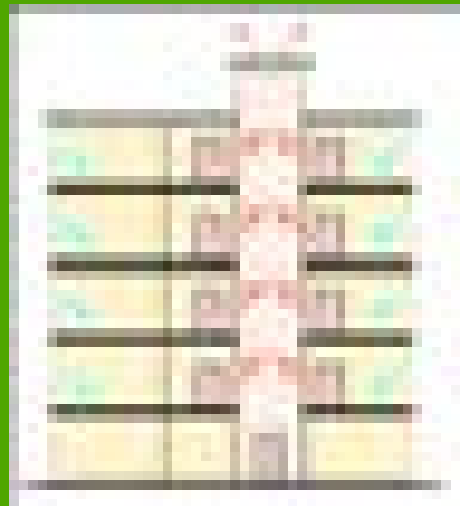
- Ensure thermostats are set higher than the BEMS.
- This will prevent boiler dry cycling.



BEMS Best Practice

# Night Purge

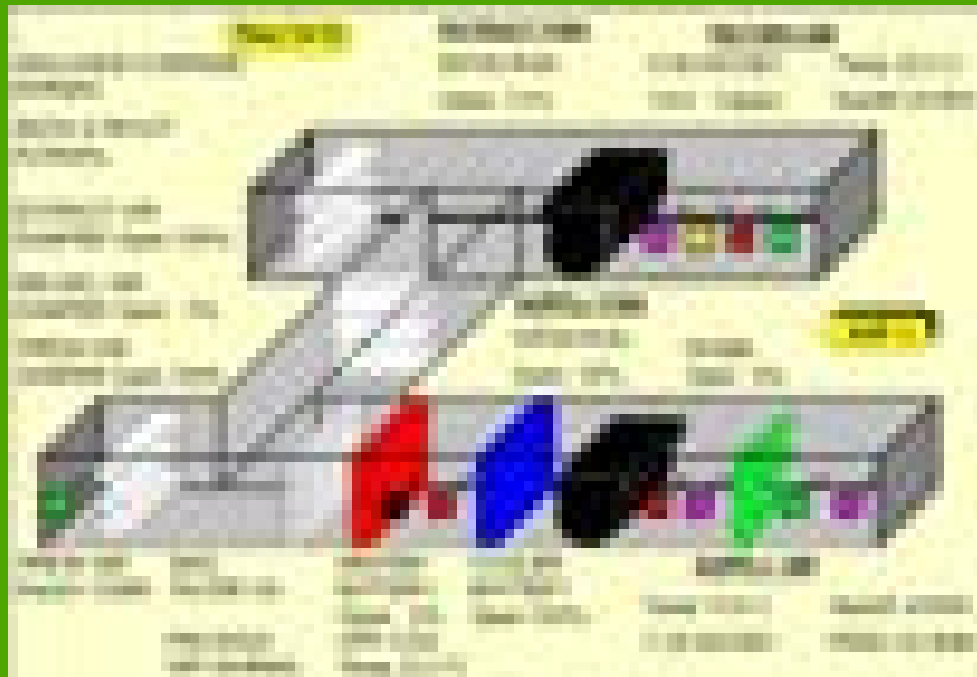
- The purpose of this night purge is to remove any excessive heat from the building, utilising the cheap evening tariff and free cooling to reduce the mechanical cooling load at occupancy start.
- Summer and Winter Settings (21°C and 23°C)



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## BEMS Best Practice Damper Economy Override

- Reuse extract air if colder than outside air to save on cooling, by simple programming.
- Reuse extract air if warmer than outside air to save on heating, by simple programming.



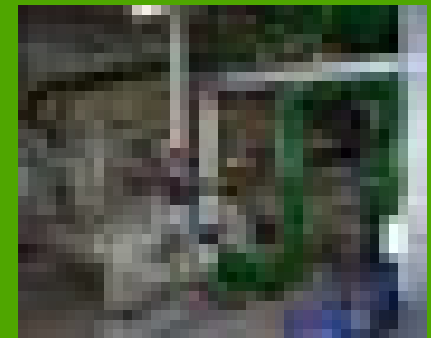
BEMS Best Practice

## Ambient 'Hold Off'

- Stop mechanically heating a building dependent on Outside Air Temperature.
- Can also be used for Chillers, if vent plant can use free cooling.



Degree Day 15.5°C

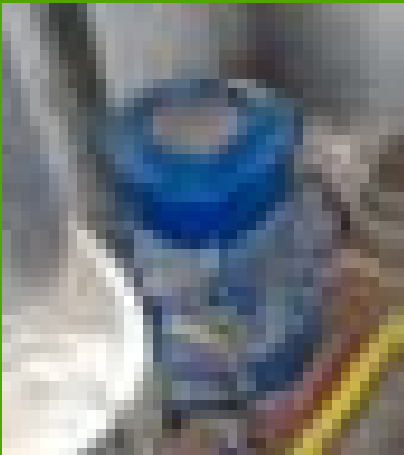
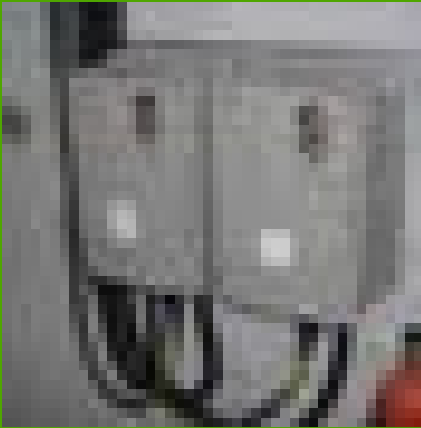


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# Variable Speed Drives

## Control Methods:

- Pressure, Air Quality
- Temperature, Air Velocity
- Reference of secondary plant condition
- Linking with a BEMS maximises the potential and provides visibility!!



Pressure	Temperature	Velocity	Quality
10.5	22.5	1.2	95
10.5	22.5	1.2	95
10.5	22.5	1.2	95
10.5	22.5	1.2	95
10.5	22.5	1.2	95
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10.5	22.5	1.2	95
10.5	22.5	1.2	95

# Control Loops

**Poor control parameters can cause;**

- Excessive field device operation (actuators)
- Poor temperature control, inefficient energy use.....
- Energy wastage



**Resolve = Appropriately set;**

- Setpoints
- Control Points with calculated Proportional Band & Integral Action
- Sufficient Dead band between Heating & Cooling



BEMS Best Practice

# 24hr Operation ??

If no other option then consider.

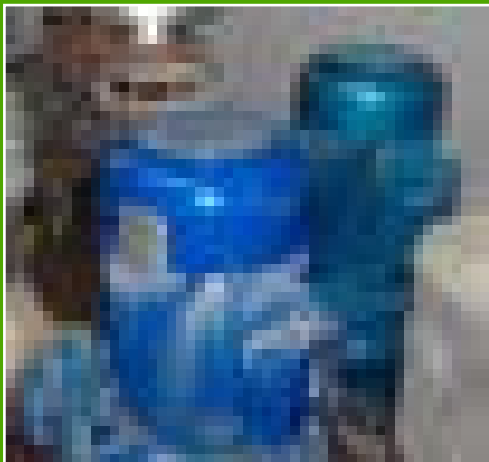
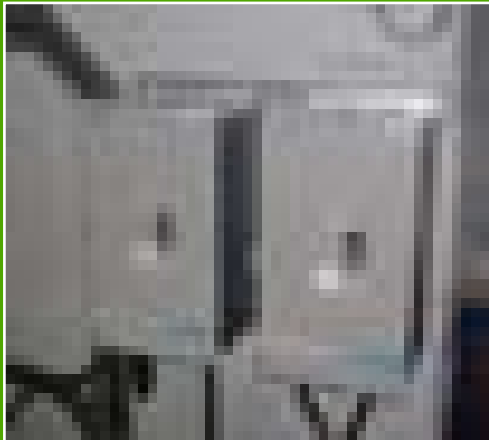
- Demand Programming
- Occupancy Switch
- PIR / Motion Detectors
- Zoning of Areas

*~ Activate a 'relaxed' temperature setpoint / condition overnight*

*~ Turn Off Services that can be.*

# Benefits of AMR and aM&T for Validation of BEMS Best Practice for Energy and Carbon Savings

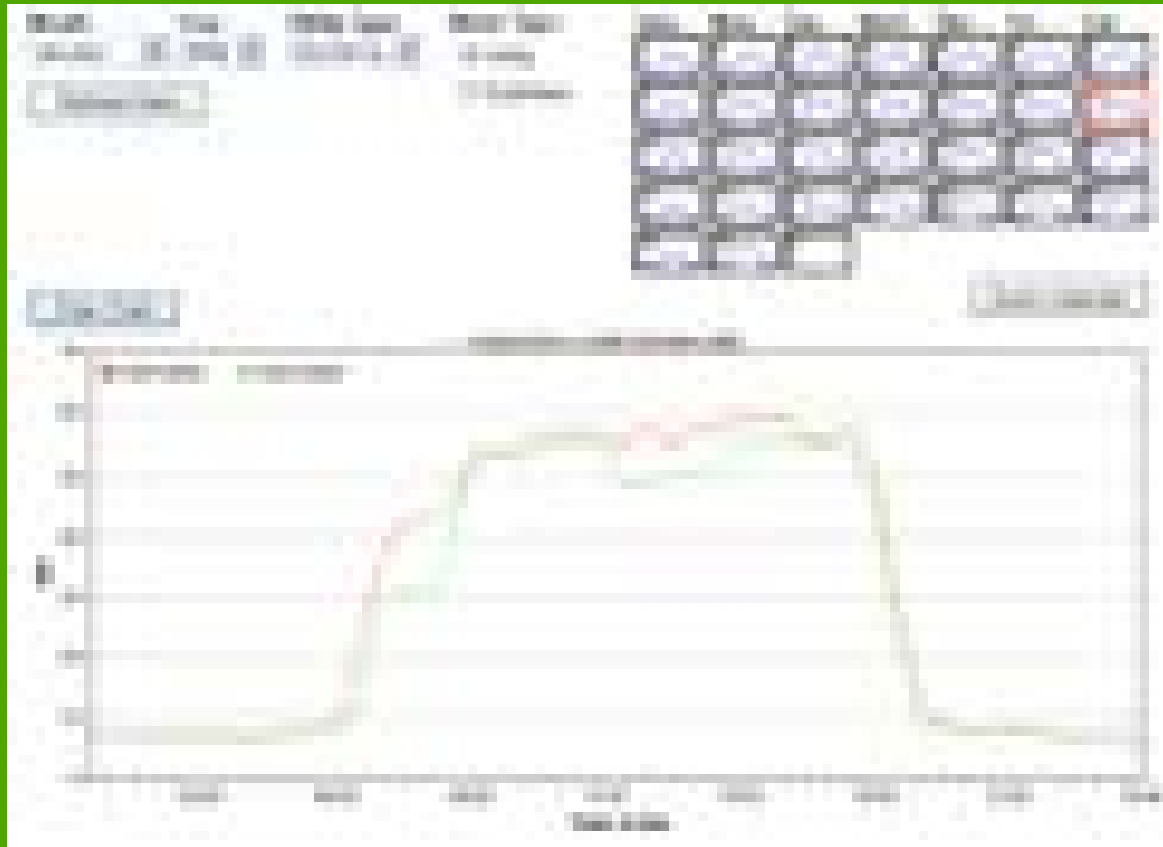
# Energy Saving Initiatives - *Implemented & Tracked*



*Energy and carbon reduction measures / initiatives can be tracked and monitored to ensure their maximum potential is realised and achieved.....*

## Examples Timeschedules & Load Cycling

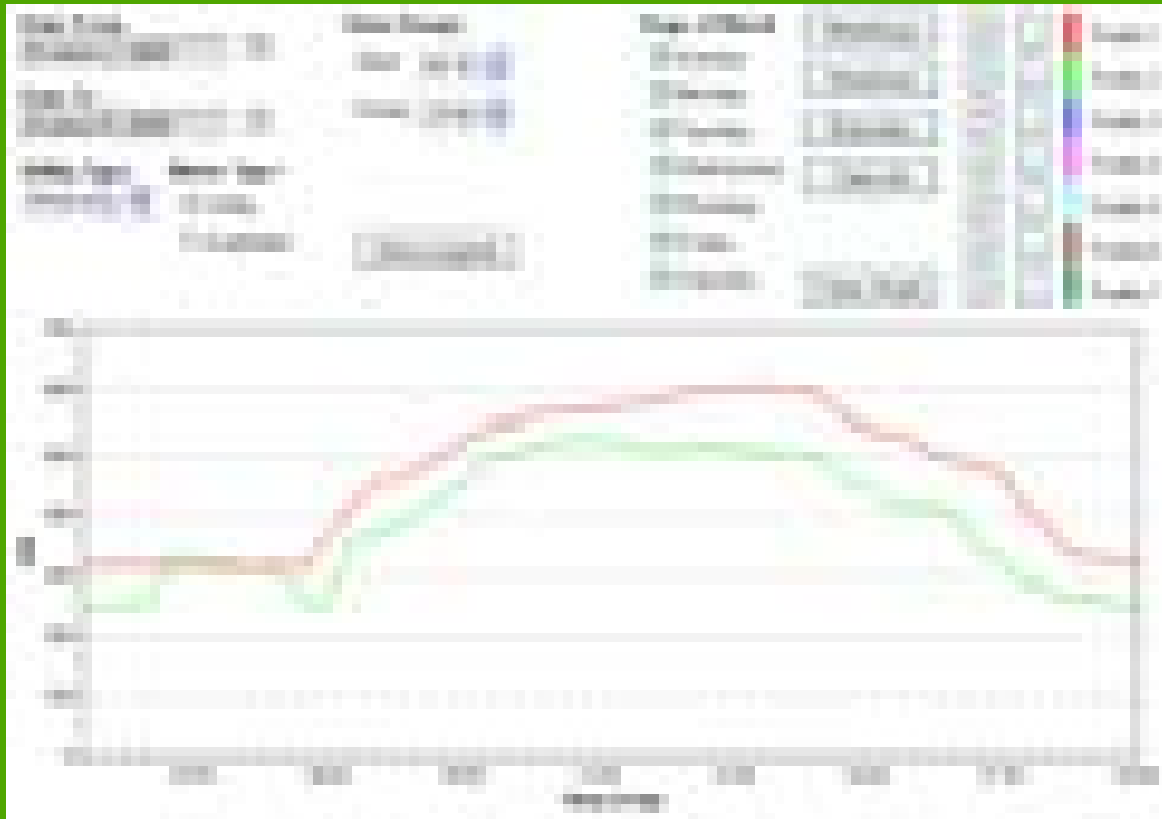
- Profile comparison following Timeschedule Rationalisation and Load Cycling.



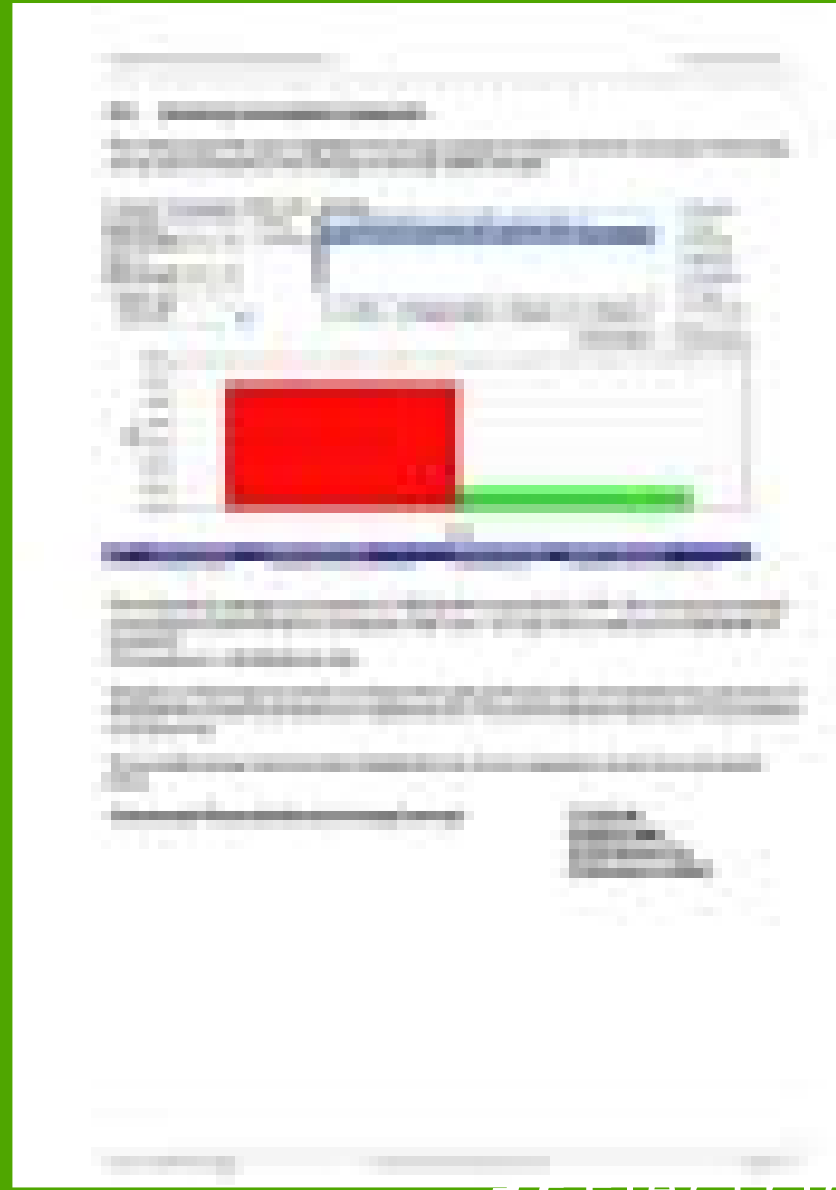
## Examples

## Night Purge

- Profile comparison following the implementation of Night Purge




# Energy Survey – *savings on the day*



# Questions

**Thank you**

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