



The A B C of Energy Management

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ABC of Energy management or:

Analysis

to

Zero Emissions

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Ask the *questions* to ascertain the *facts*:

- **What?** Utilities Energy Data
Instrumentation Organisation
- **Where?** Water Standards G H G
- **When?** Benchmarks Networking
Heating Lighting Policy
- **Why?** Controls Analysis Review
- **How?** Meters Targets VSD's
Join the dots kWh

ABC of Energy management

Check for:

- commitment by management
- energy **policy** – is it part of environment policy (ISO 14,001 etc.)?

This is YOUR “licence to operate”

ABC of Energy management

- Policy in place
- *Organisation*: EM structure
- *Standards* – BS En 16001
- Monitor consumption - *GHG*
- Set targets
- *Networking*: internal – staff
external – events & publications
- Review

Energy Management Standard BS EN 16001

- Benchmarking
- Energy efficiency services
- Certificates Energy audits;
- E E and savings calculations
- Energy Management in transport

Published 2009; Implemented 2010.

(Not to be confused with

'Carbon Trust Standard')

BS EN 16001 Case Study

Camfil Farr

- Better understand energy issues

Business Achievements

- Savings: G 35%; E 22%; W 12%;
- Creation of a formalised energy policy and objectives

How do we go about *analysis*?

Lord Kelvin said:

When you measure what you are speaking about and express it in numbers you know something about it, but, when you cannot express it in numbers your knowledge about it is of a meagre and unsatisfactory kind

.....

How do we go about *analysis*?

..... *or put more simply:*

If you don't measure it,
you can't improve it.

What do we measure?

Utilities:

- Electricity – mains or generated
- Gas – mains and bottled
- Oil – for heating and process
- *Water – mains, boreholes, etc*

How do we go about measuring *utilities*?

- Walk the site
- Find and read the meters
- Previous energy records
- Talk to staff & tenants
- ‘Out of hours’ checks

How do we go about *monitoring*?

- sub-metering
- portable analyser
- suppliers data analysis
- *aM&T* - Automatic Monitoring and Targeting
- Use *kWh*

Monitoring – collecting the *Data*

Electricity, gas and water Meters, and, Analysers



Integral automatic metering



Instrumentation



How do we go about *metering*?

TM39

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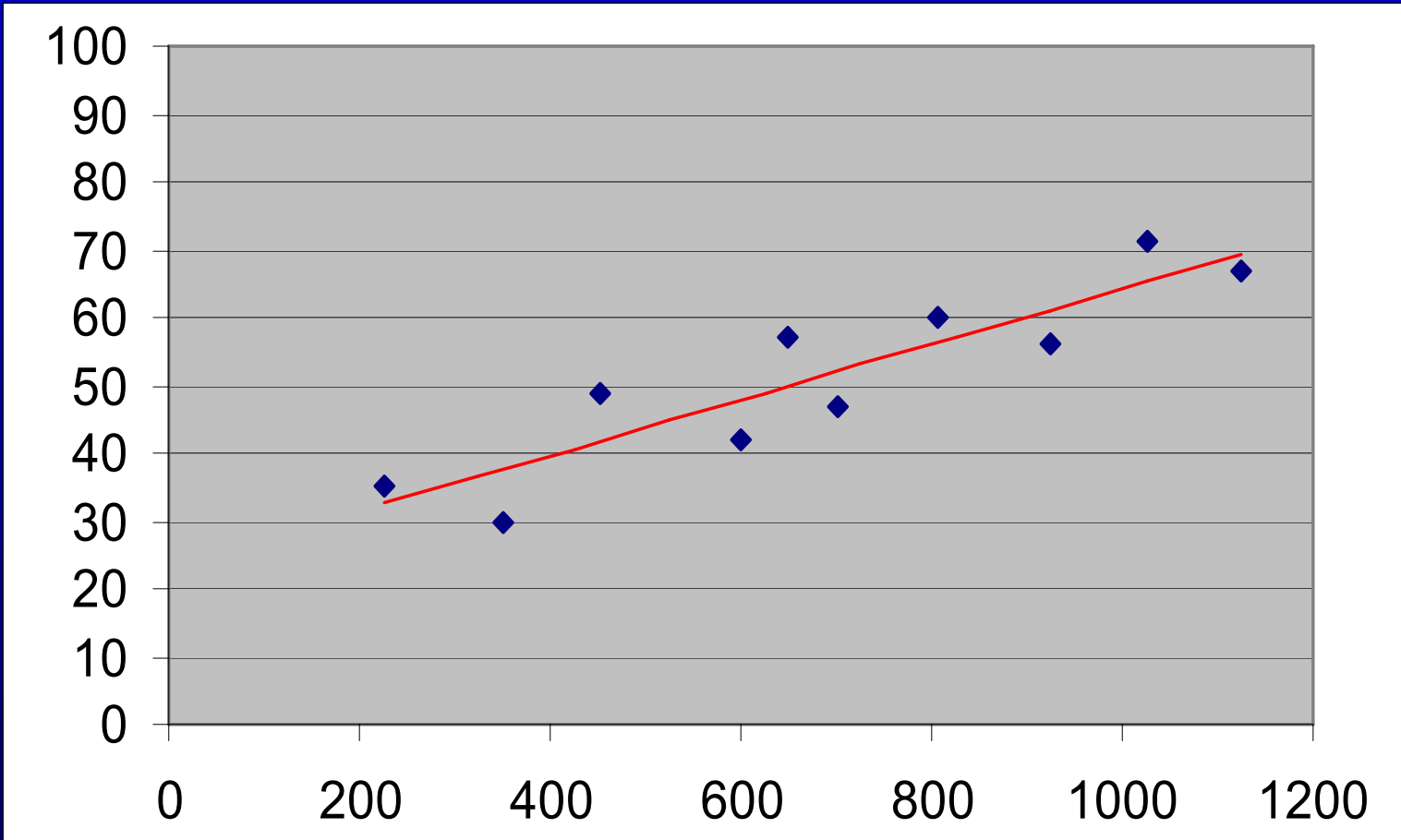


Remember: the place where you manage your energy

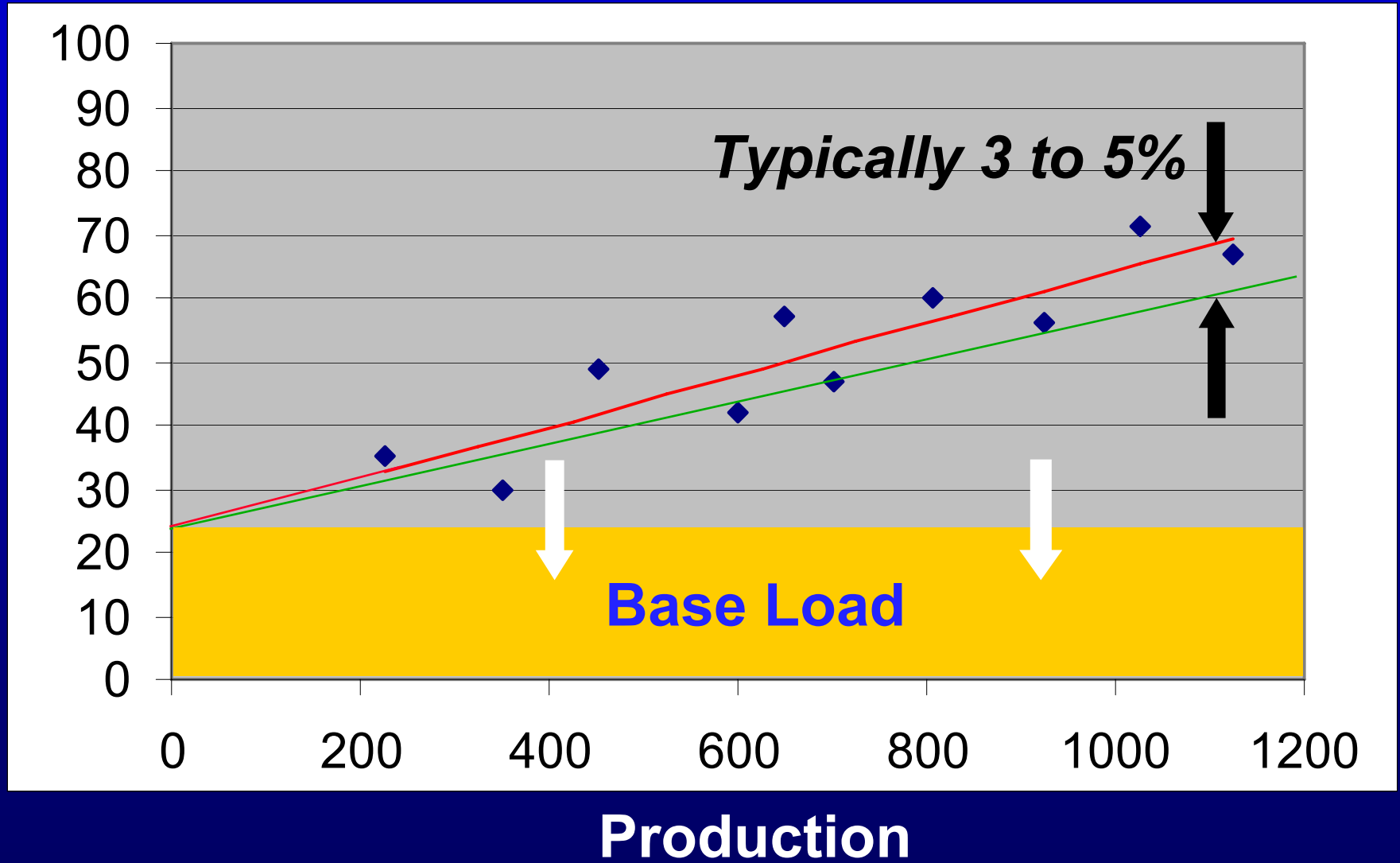


..... is not usually the place where you measure it.

Analysis – plot the data:



Analysis – “join the dots” and set the targets:



Analysis – check against *benchmarks*:

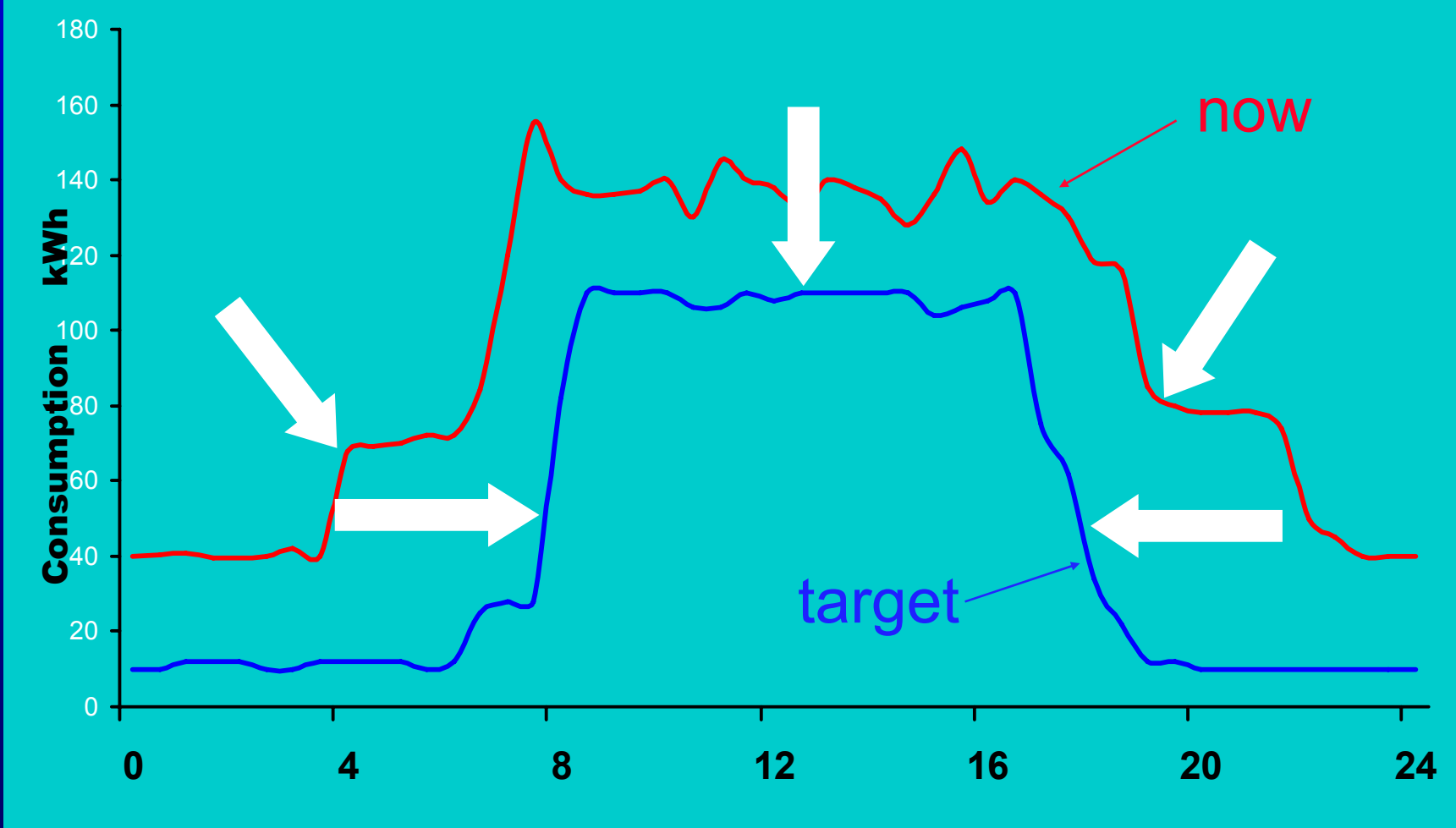
- Building Regulations part L
- CIBSE Guide F: Energy Efficiency in Buildings
- Energy Consumption Guides
- Good Practice Guides

How do we go about analysis?

Include hours of operation:

- Daytime hours only
- No weekends
- Evening/night working

The "Top Hat" approach



Daily consumption

ABC of Energy management – quick recap

A **B** **C** **D** **E** **F** **G**

H **I** **J** **K** **L** **M** **N**

O **P** **Q** **R** **S** **T** **U**

V **W** **X** **Y** **Z**

Where does the *energy* go?

- **Building(s)**
- **Offices, meeting rooms, etc**
- **Plant rooms**
- **Process**
- **Yards/car parks**

Where does the energy go?

- Office equipment
- Heating system
- Ventilation
- Air conditioning
- Boilers
- Motors & drives
- Lighting
- Compressed air
- Space heating
- Machines

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Lighting

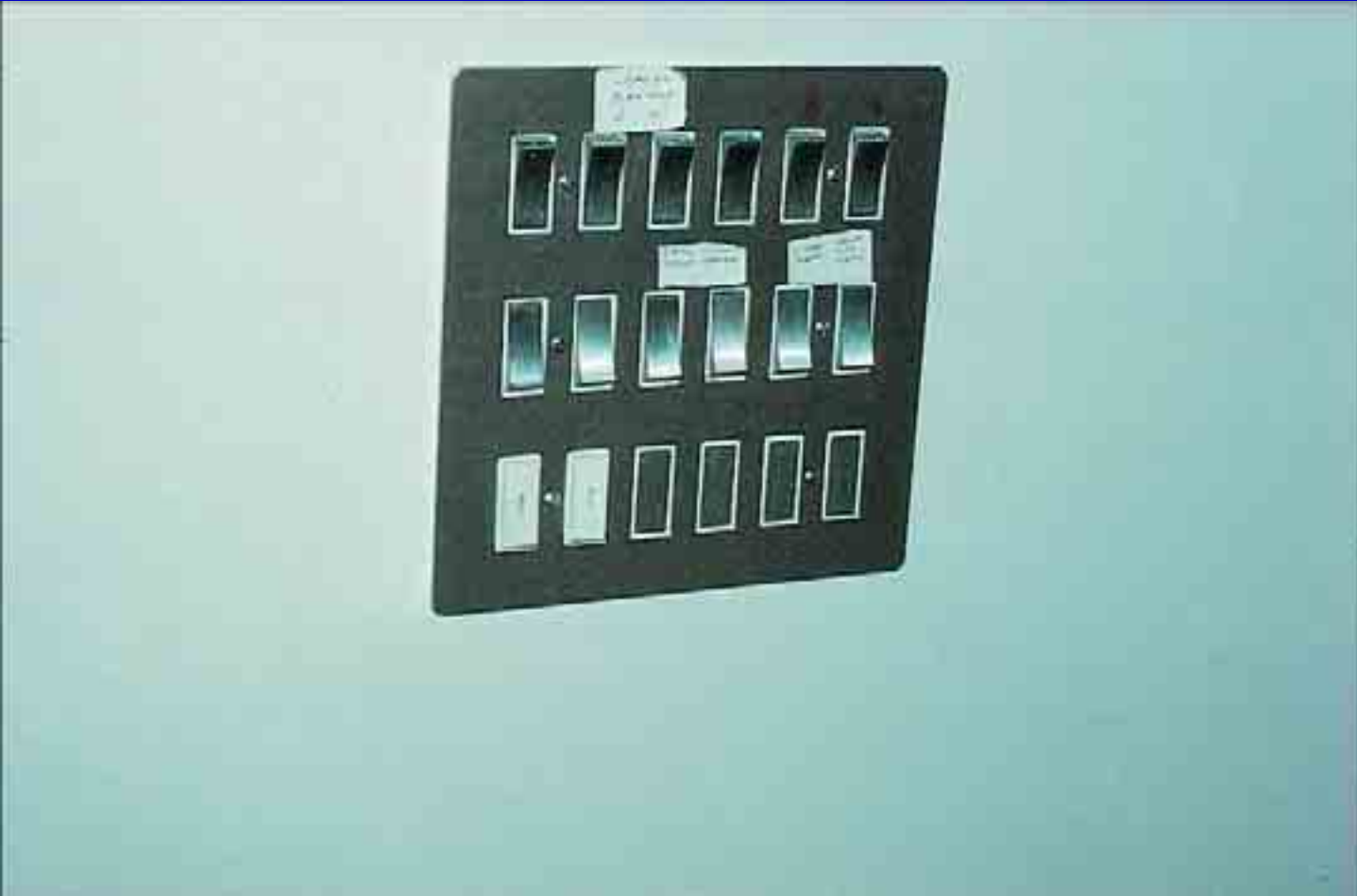
DID YOU KNOW?

It is possible to cut your lighting bills by up to 30% by implementing energy saving measures.

Lighting - fittings



Lighting – controls???



Lighting controls – right place



Lighting controls – wrong place!



Lack of lighting controls:



Lack of lighting controls:



Lighting benchmarks

- An inexpensive light meter will give enough accuracy to establish if lighting is in line with the following 'adequate' levels:

Type of use	Lux
Close detailed work	1,000 – 2,000
Offices	400
Workshops	300
Stairs and corridors	200
Rest rooms	100
Street lighting	20
Security lighting	5

- Use time-lapse video recording to study intermittently occupied spaces

Lighting measurement



ENVIRONMENTAL ANALYTICAL & COMMUNICATIONS

- 40** SOUND LEVEL AND VIBRATION METER
 RANGE = 120 - 150dB
 Features: 1/1 octave, 1/3 octave, 1/12 octave, 1/24 octave, 1/48 octave, 1/96 octave, 1/192 octave, 1/384 octave, 1/768 octave, 1/1536 octave, 1/3072 octave, 1/6144 octave, 1/12288 octave, 1/24576 octave, 1/49152 octave, 1/98304 octave, 1/196608 octave, 1/393216 octave, 1/786432 octave, 1/1572864 octave, 1/3145728 octave, 1/6291456 octave, 1/12582912 octave, 1/25165824 octave, 1/50331648 octave, 1/100663296 octave, 1/201326592 octave, 1/402653184 octave, 1/805306368 octave, 1/1610612736 octave, 1/3221225472 octave, 1/6442450944 octave, 1/12884901888 octave, 1/25769803776 octave, 1/51539607552 octave, 1/103079215104 octave, 1/206158430208 octave, 1/412316860416 octave, 1/824633720832 octave, 1/1649267441664 octave, 1/3298534883328 octave, 1/6597069766656 octave, 1/13194139533312 octave, 1/26388279066624 octave, 1/52776558133248 octave, 1/105553116266496 octave, 1/211106232532992 octave, 1/422212465065984 octave, 1/844424930131968 octave, 1/1688849860263936 octave, 1/3377699720527872 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Car park lighting



Case Study: Car Park Lighting

Fitting lighting controls

Before: 1,219,634 kWh p.a.

After: 1,110,499 kWh p.a.

Saving: 9.1% = £7093 p.a.

Cost of installation: £3,000

Payback: 5 months

Lighting and controls



New Lighting – LED's



Where does the energy go?



Heating (and cooling) Systems *insulation*



..... the solution:



..... and how it should be done:



Where does the energy go? *Motors*



Motors and Drives

DID YOU KNOW?

Most fans and pumps are oversized for the duties they perform.

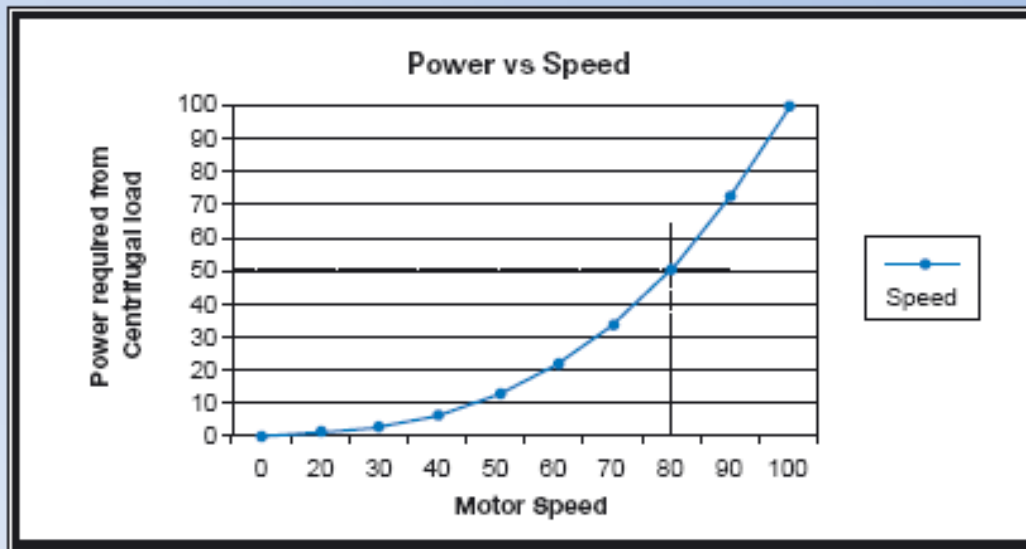
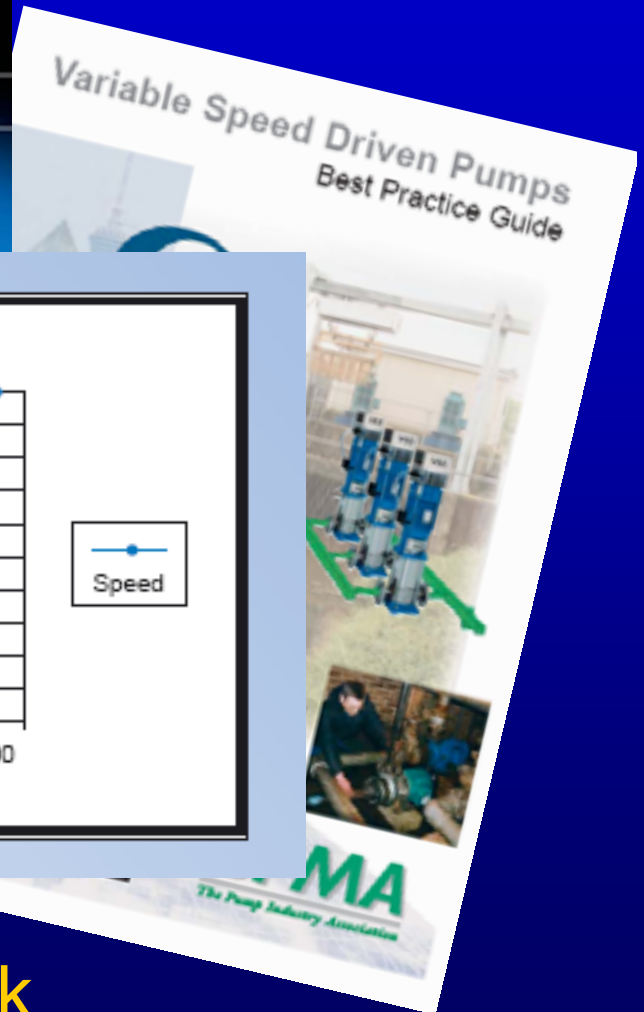
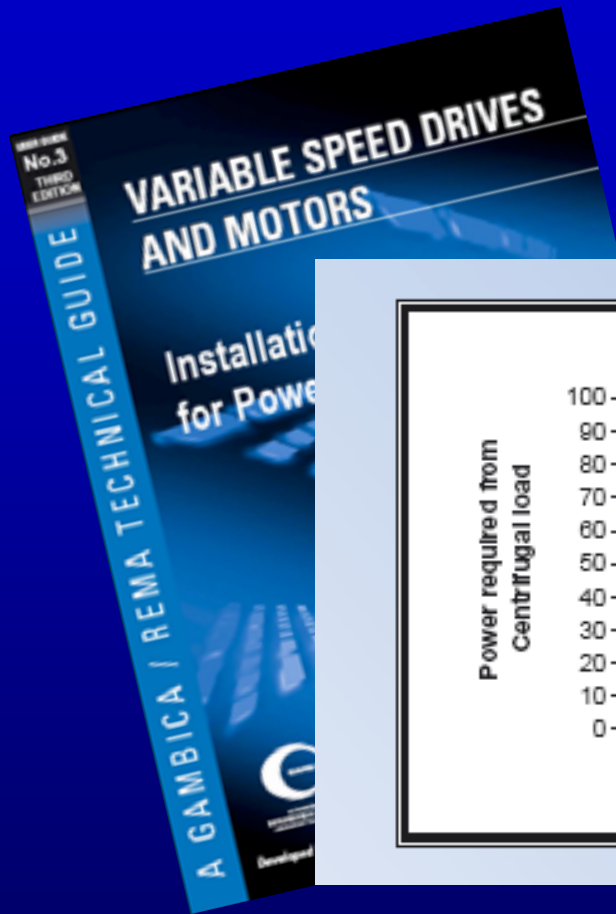
fact:

Reducing fan speed not only reduces energy consumption but may also reduce noise and vibration.

DID YOU KNOW?

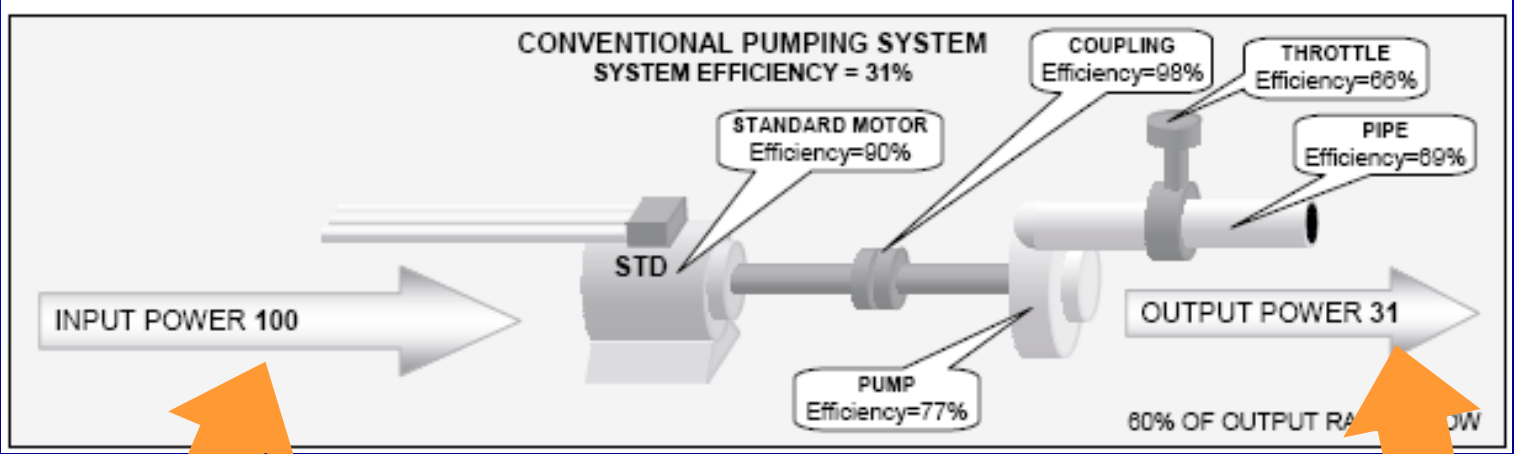
Using a VSD to slow down a fan or pump motor from 100% to 80% can save as much as 50% on energy use.

Variable Speed Drives (VSD's)



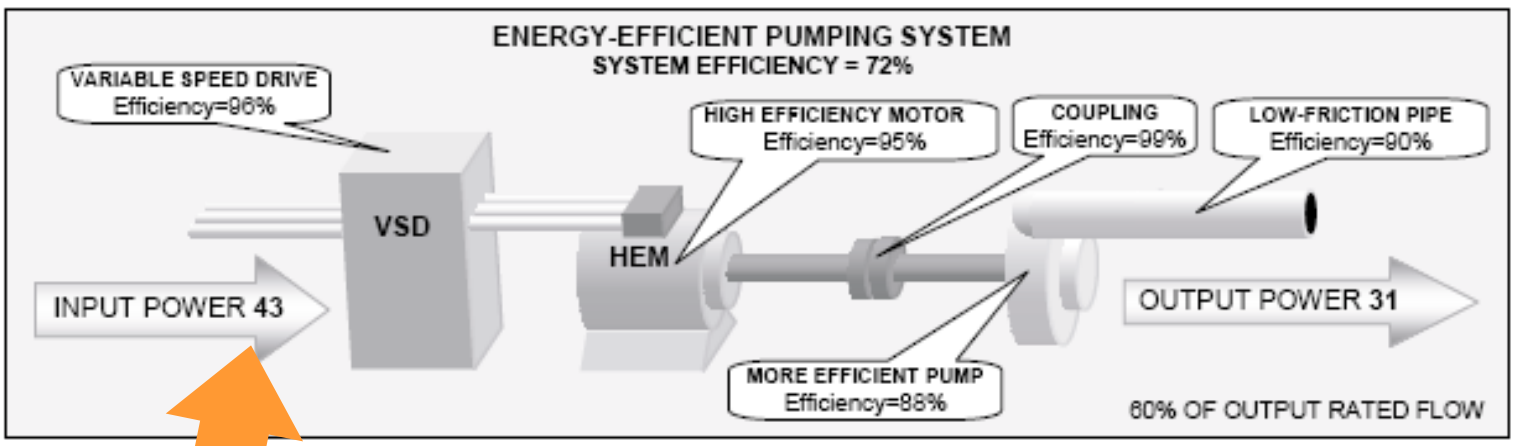
www.gambica.org.uk

Variable Speed Drives



Efficiency = 31%

Variable Speed Drives



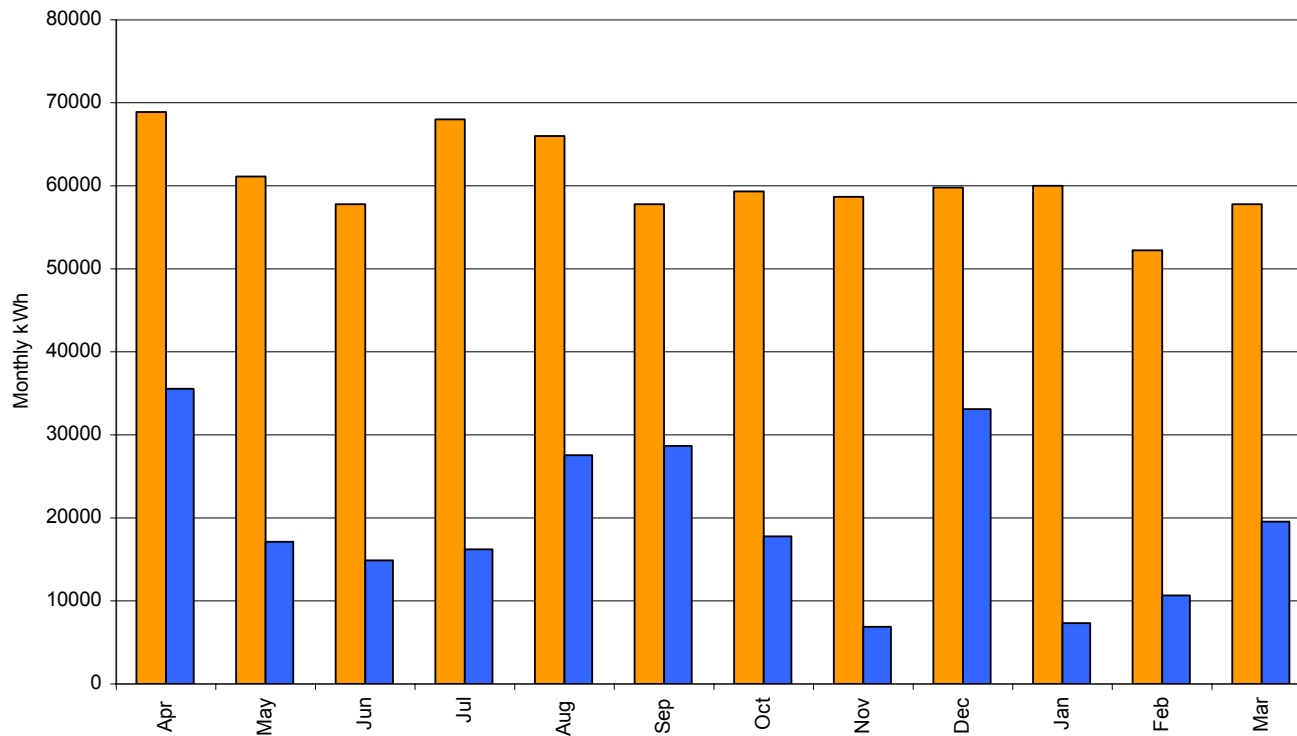
Efficiency now = 72%

Variable Speed Drives



Variable Speed Drives

AHU1 Terminal 1 Variable Speed Drive

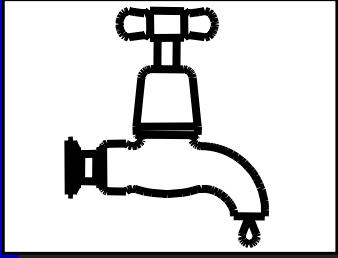


Average Before = 60,000kWh: average after = 20,000 *Saving over 60%*

ABC of Energy management – quick recap

A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z

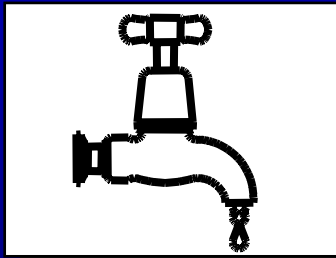
Cost of *Water* losses from a tap:



One drop/second

4.8 m³/year

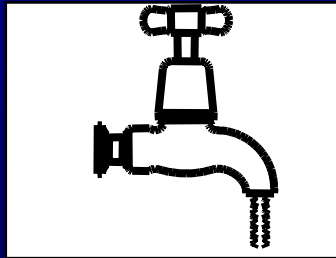
£4 - £8/year



Drops breaking to a stream

31 m³/year

£25 - £55/year

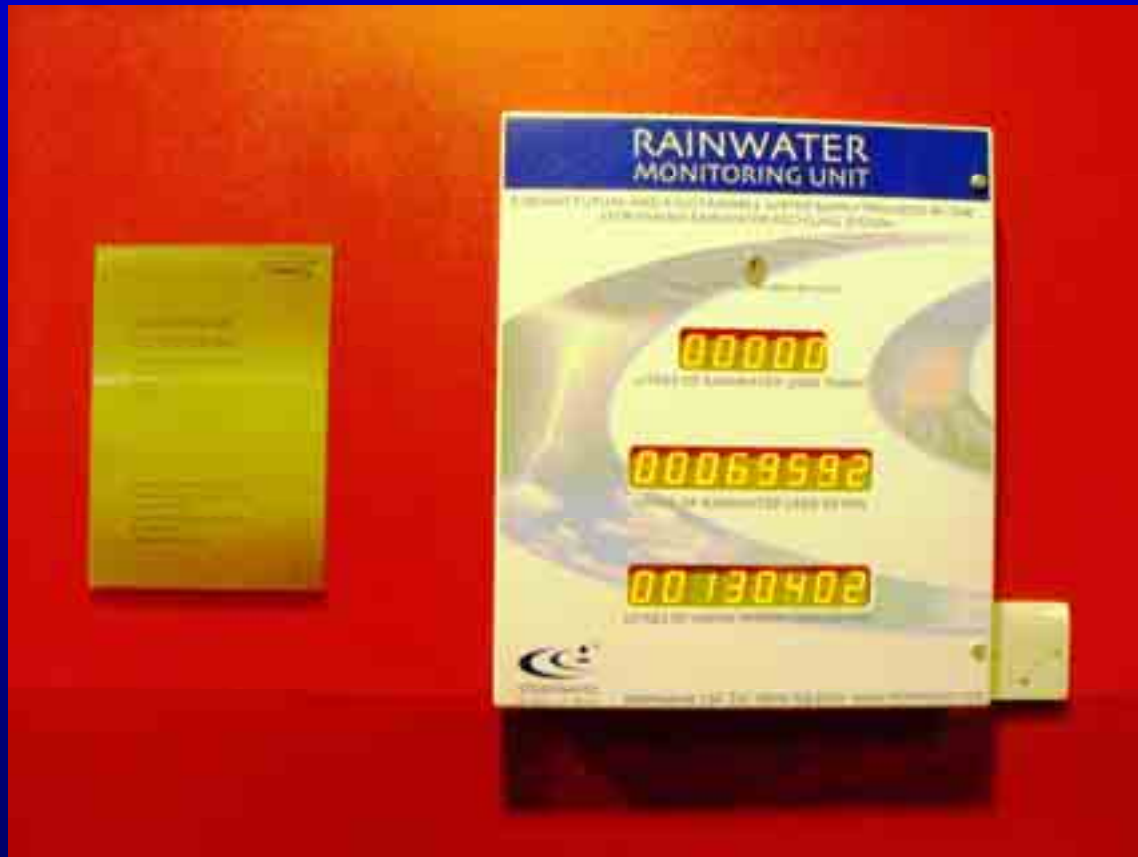


3 mm stream

336 m³/year

£250 - £550/year

Rainwater harvesting



Publications

Some other CIBSE publications:

- TM44 Inspection of Air Conditioning Systems
- TM46 Energy Benchmarks
- TM47 Operational Ratings and Display Energy Certificates
- TM50 Energy Efficiency in Commercial Kitchens

and many more

www.cibse.org

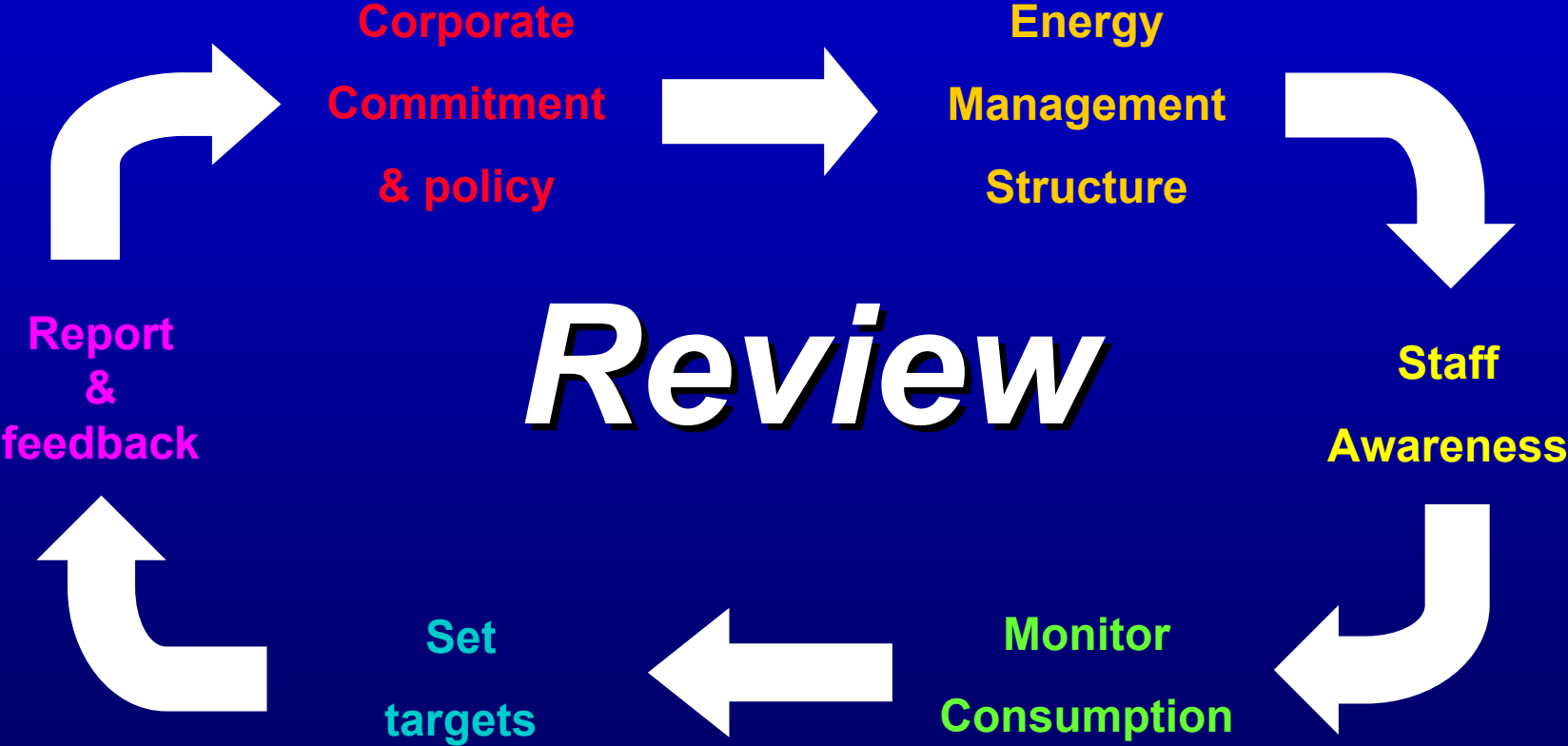
Take control:

- Adjust heating controls to suit occupation
- Turn off unnecessary lights & equipment
- Close doors & windows when heating/cooling
- Replace lights with energy saving equivalents
- Regularly maintain plant and equipment

Take control:

- Insulate heating/cooling pipework and fittings
- Check building insulation is sufficient
- Fit water conservation devices
- Draughtproofing
- Inform colleagues of all of the above!

The conclusion:



ABC of Energy management

and finally

A B C D E F G

H I J K L M N

O P Q R S T U

V W X Y Z

The A B C of Energy Management

A to Z: Analysis to Zero Emissions

This presentation was produced

for



by

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