



# Energy Savings Through Metering

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In partnership with BMSi Ltd



**SIM ENERGY** LTD



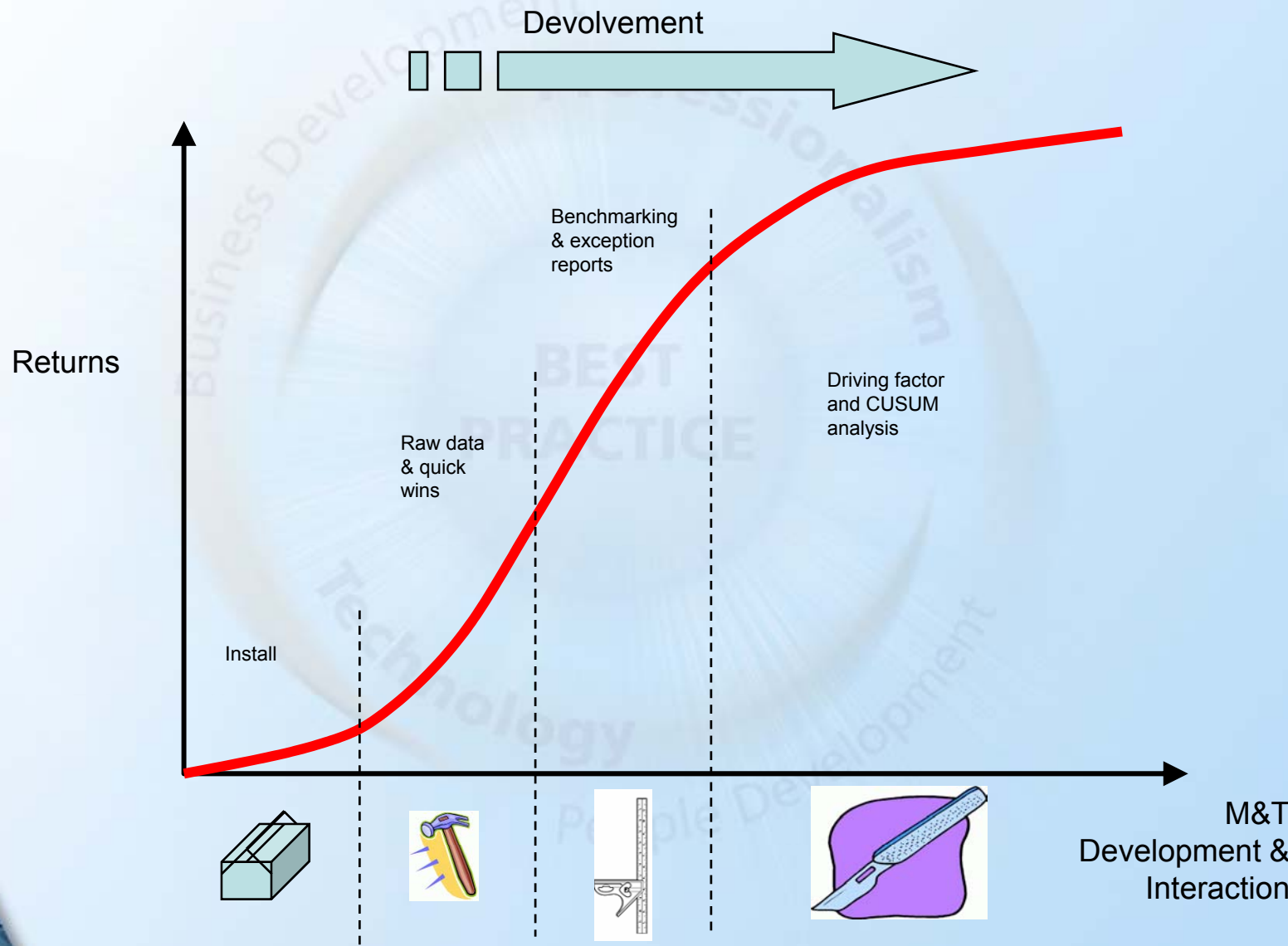
# Why meter?

- “You cannot manage what you cannot measure”
- But you can reduce energy consumption without metering....!



- You cannot know how efficient plant:
  - Should be
  - Could be
  - Is

# What benefit



# Model study...

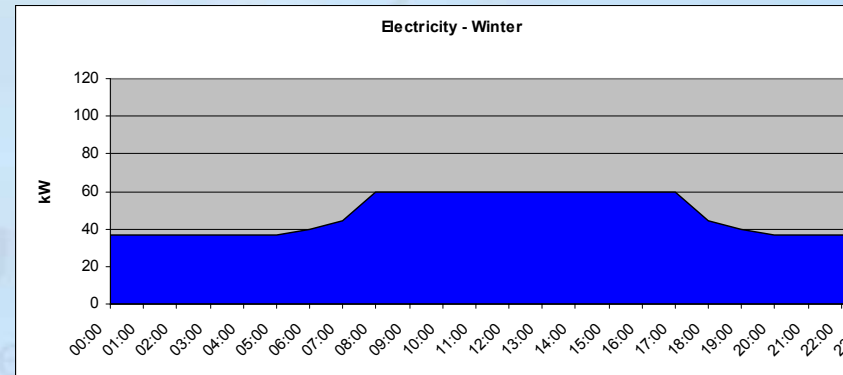
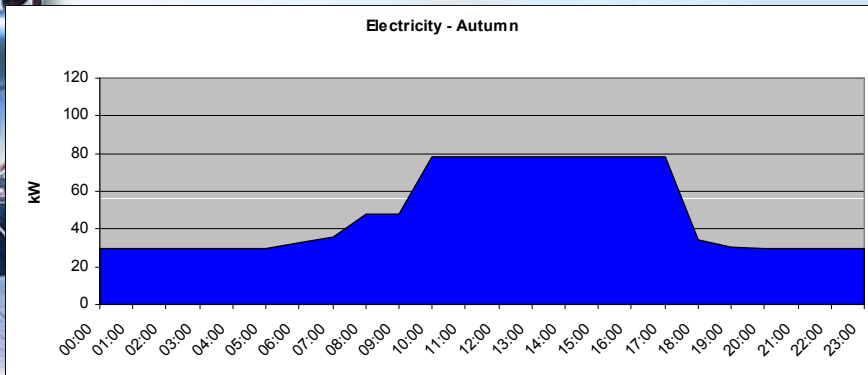
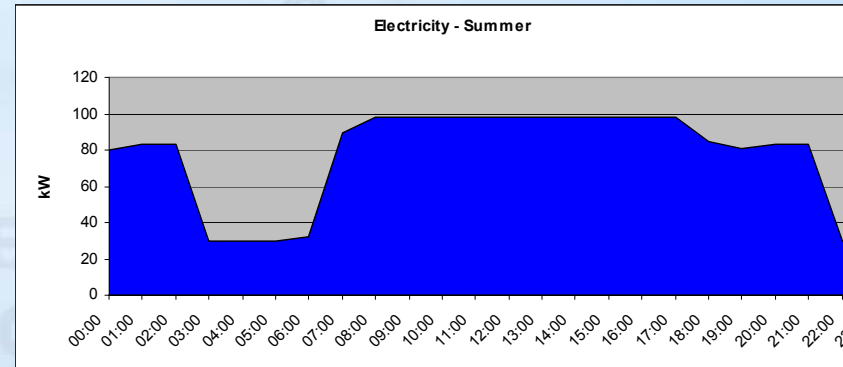
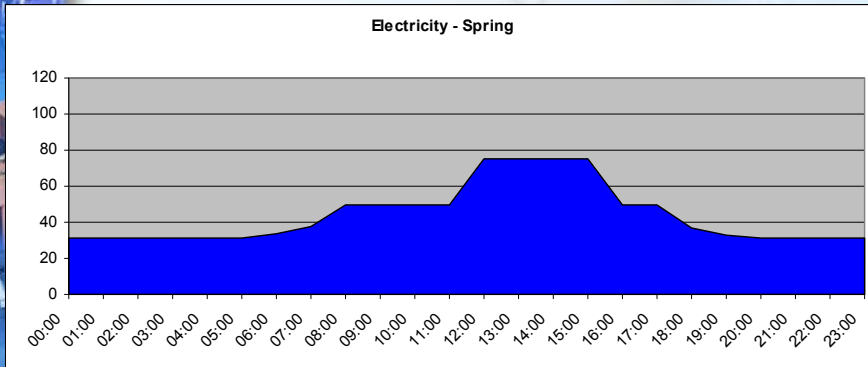
- A most unusual building...



# Phase 1 - What would you normally get...

Summary	Quarterly useage		Quarterly cost	
	Electricity	Gas	Electricity	Gas
Spring	96,041	37,230	£ 9,604	£ 1,117
Summer	166,431	14,673	£ 16,643	£ 440
Autumn	104,636	26,864	£ 10,464	£ 806
Winter	103,888	96,360	£ 10,389	£ 2,891
<b>Total</b>	<b>470,996</b>	<b>175,127</b>	<b>£ 47,099.60</b>	<b>£5,253.81</b>

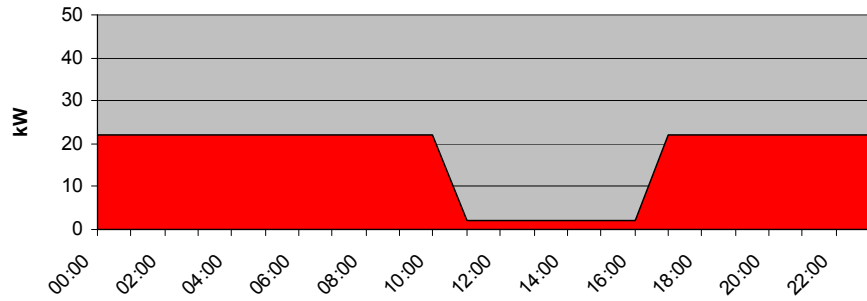
# Phase 2 – AMR and 24hr profiles



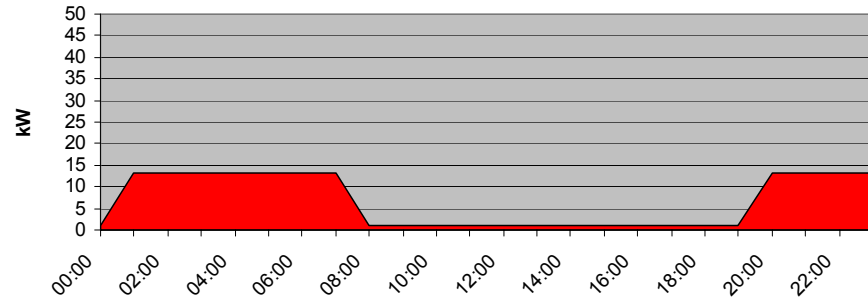


Development  
Professi

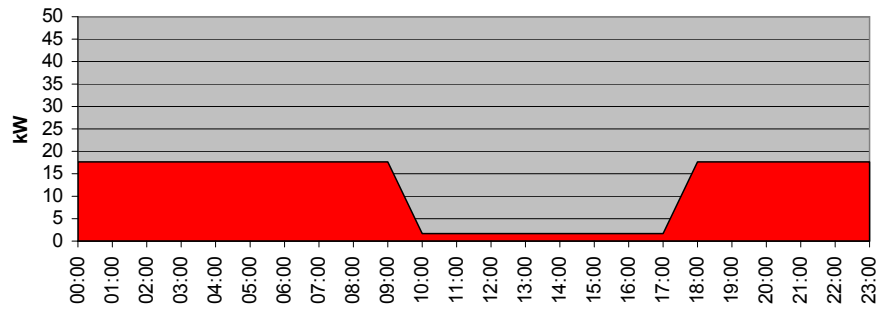
Gas - Spring



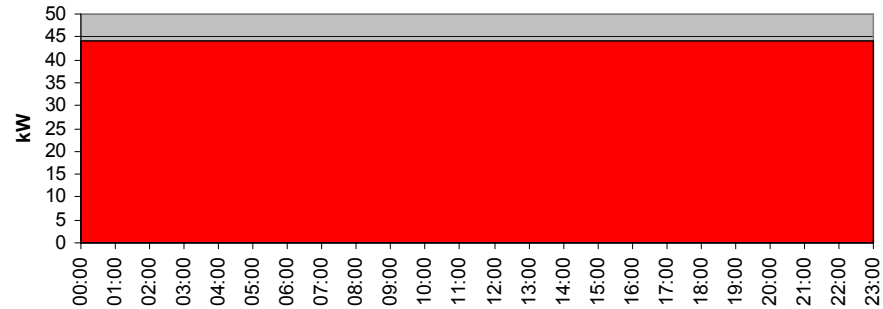
Gas - Summer



Gas - Autumn



Gas - Winter



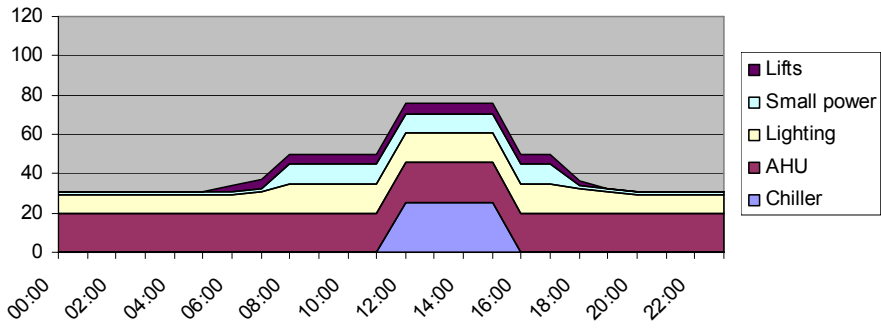
People

## Phase 3 – Energy Management Strategy

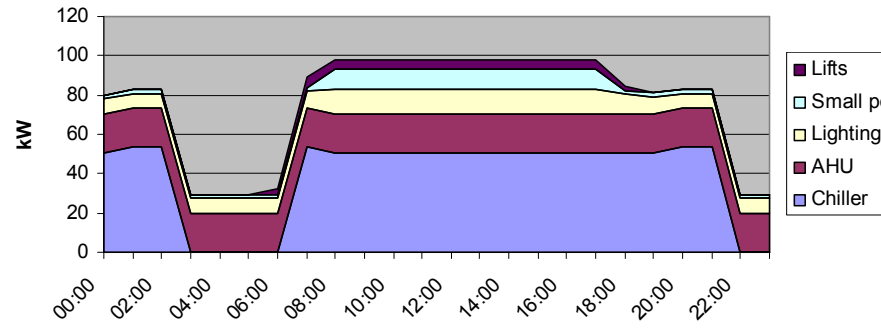
- Improve granularity of data – install more meters
- Group into asset types:
  - HVAC
  - Lighting
  - Small power etc
- Analyse asset loads
- Identify quick wins



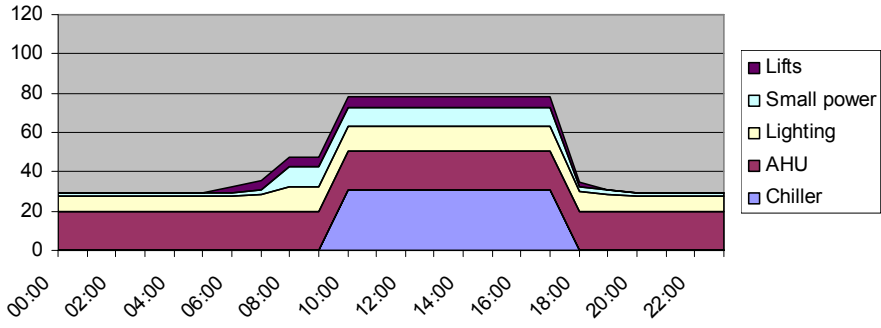
Electricity - Spring



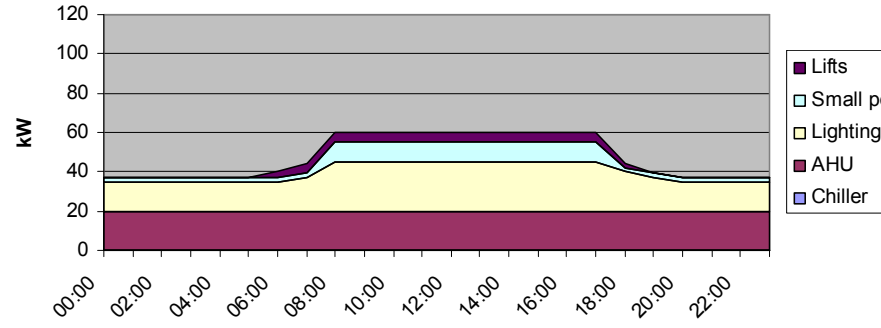
Electricity - Summer



Electricity - Autumn



Electricity - Winter



## Quick wins...

- Chilling fighting the heating
- Lighting and small power left on at night
- Building being conditioned at night/weekends

10 – 20% improvement possible

# Benchmarking and exceptions

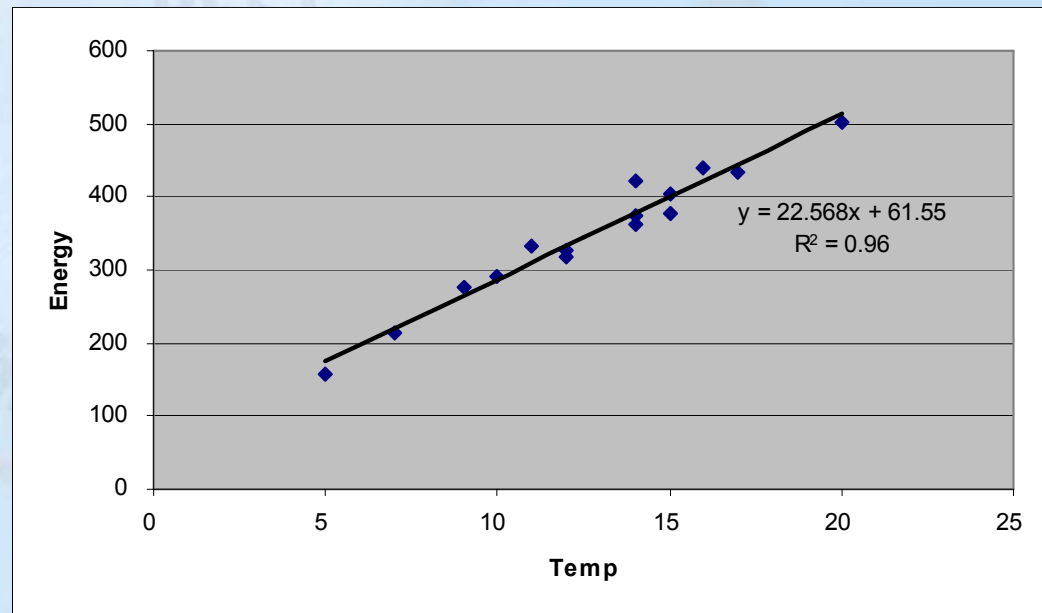
- Feature of most energy databases
- Requires historical or industry data to make benchmarks
- Dynamic benchmarking
- DRIVING FACTORS:
  - By nature of business
    - Property – energy/m<sup>2</sup>
    - Manufacturing – energy/item made
    - Commercial – energy/turnover
  - By nature of equipment
    - Air conditioning – energy/Degree day
    - Escalators – energy/m ascent
- leading to...

# Cumulative Sum Analysis (CUSUM)

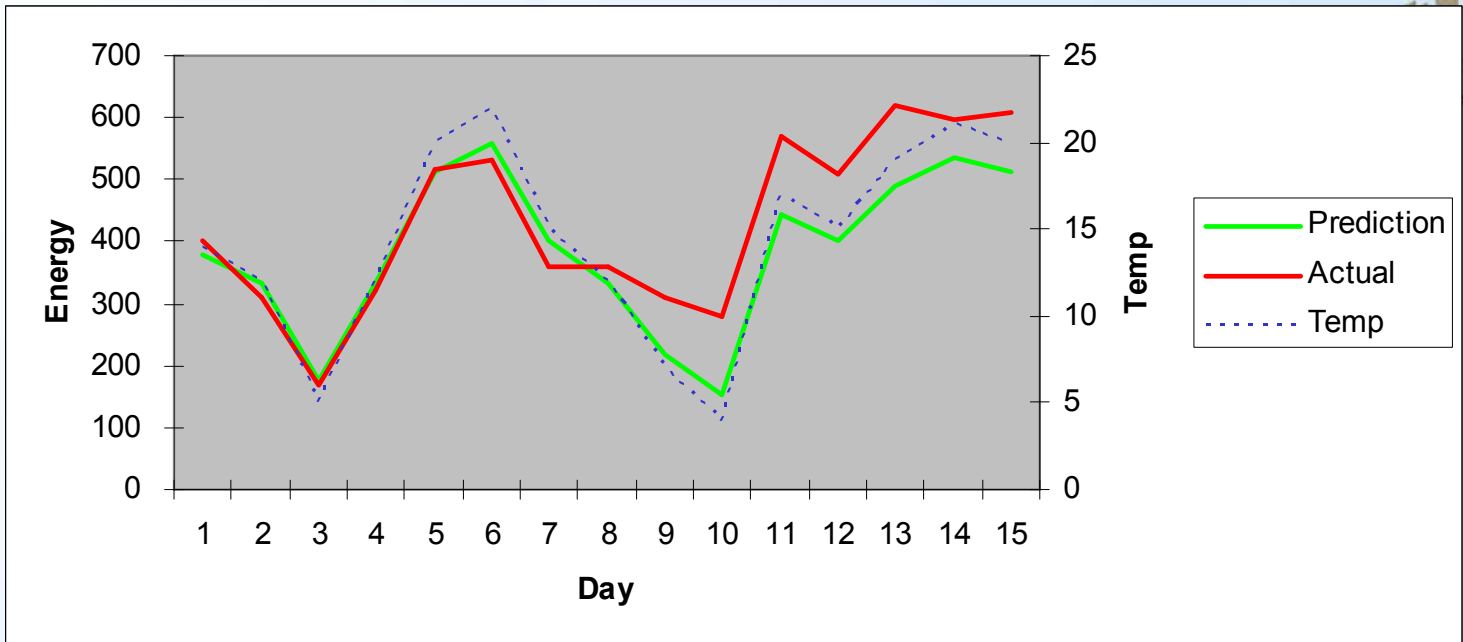
1. Establish a record of driving factor against energy use

2. Plot a scatter graph and establish a trend

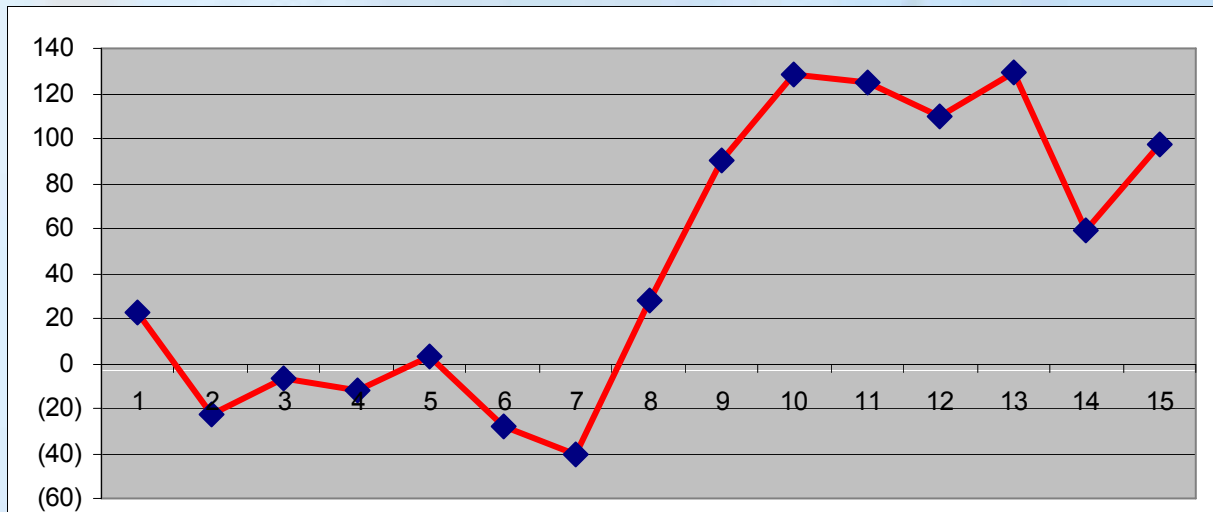
Day	Temp	Energy
1	15	376
2	12	318
3	14	423
4	16	440
5	15	404
6	14	375
7	17	433
8	20	503
9	14	364
10	12	328
11	10	290
12	7	214
13	5	158
14	9	277
15	11	332



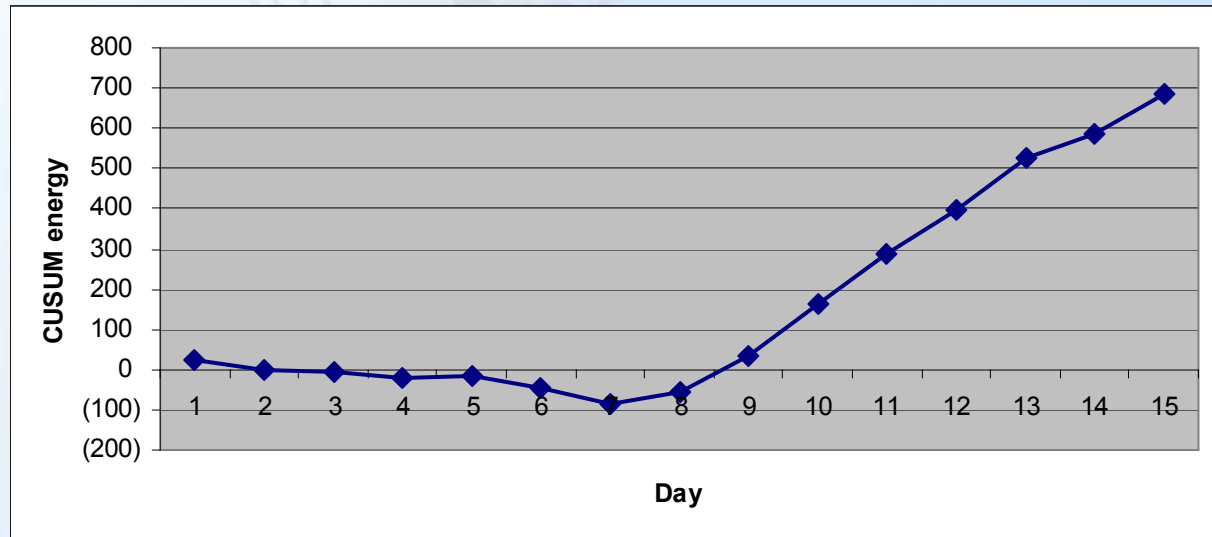
### 3. Make predictions and record actual consumption



### 4. Calculate the variation between predicted and actual consumption



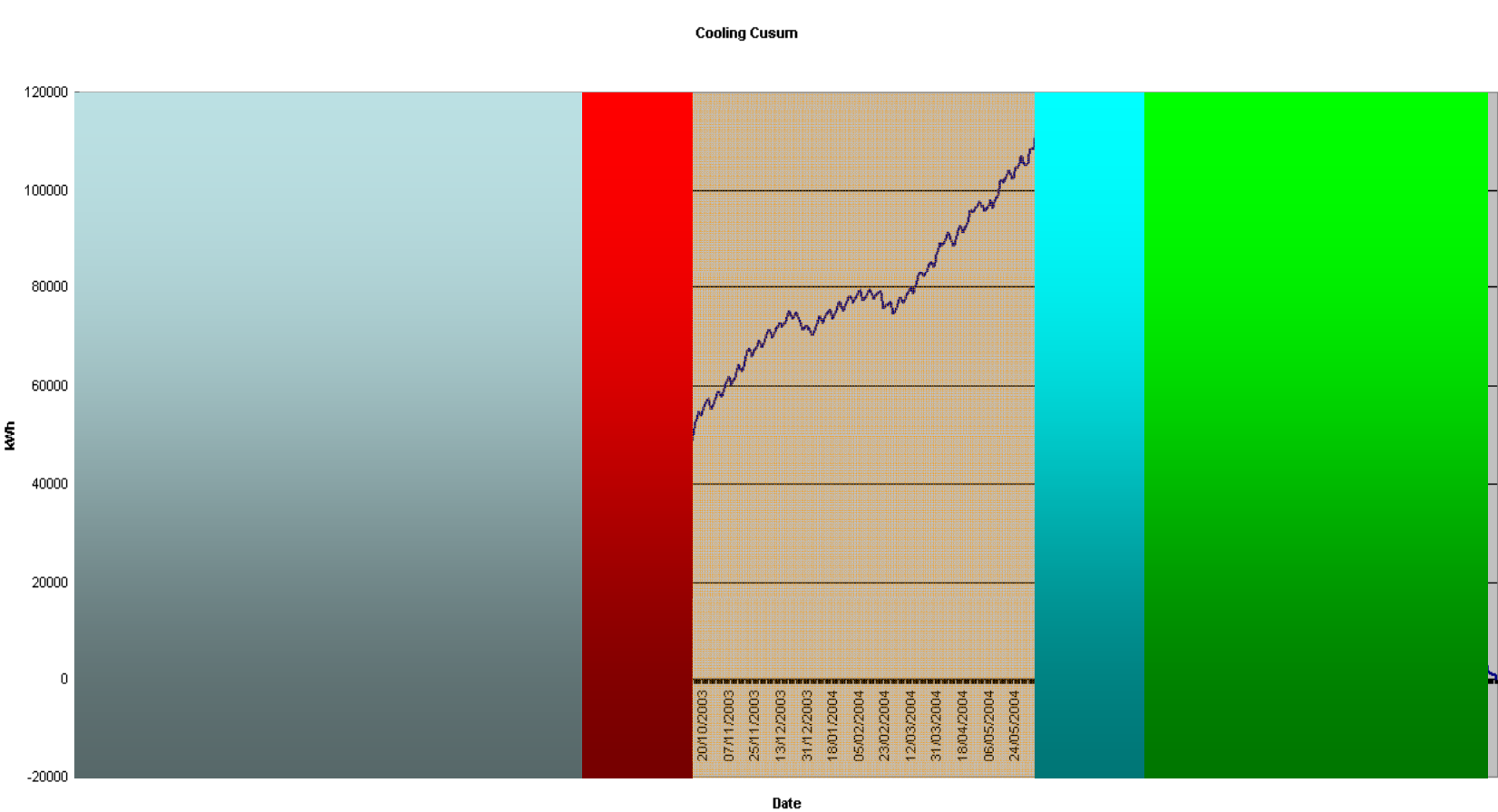
## 5. Cumulatively sum the variations



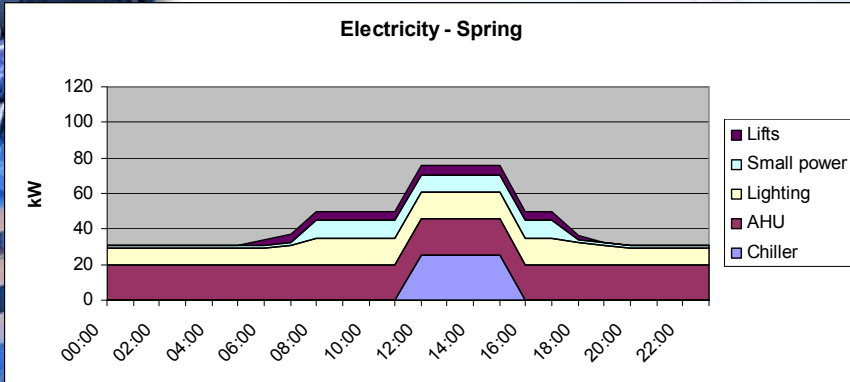
Identify:

- Stable performance
- Optimum performance
- Problems stabilising
- Effects of energy efficiency on stable operation

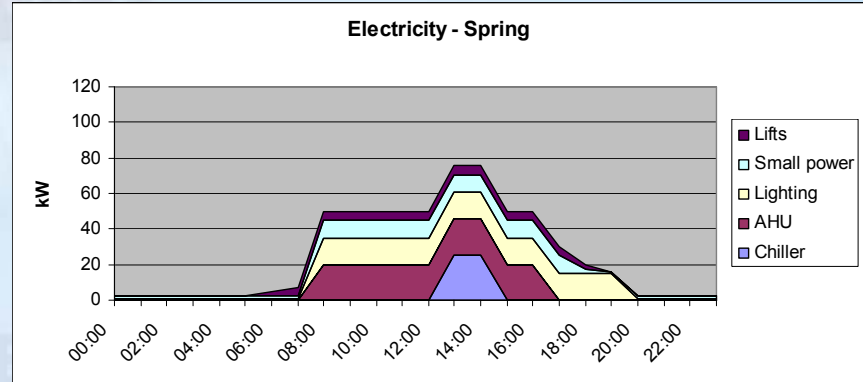
# Example – 3 storey common user office building – chiller energy



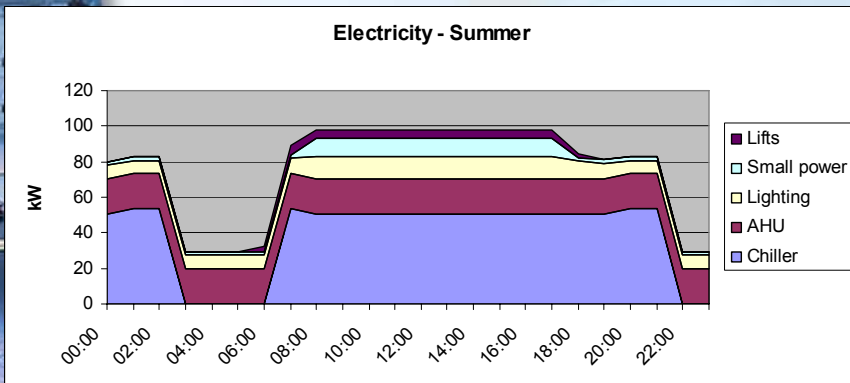
Electricity - Spring



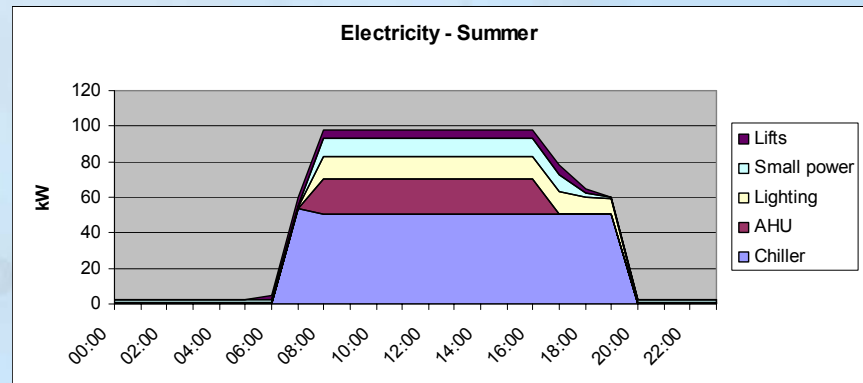
Electricity - Spring



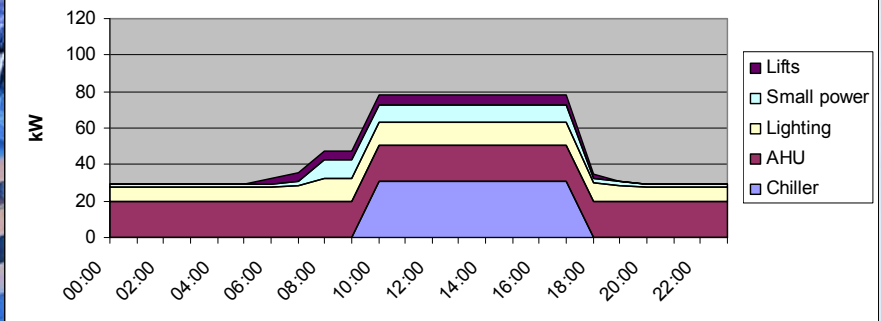
Electricity - Summer



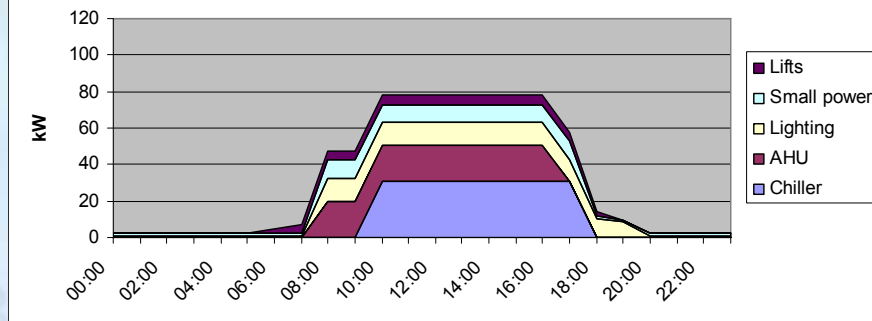
Electricity - Summer



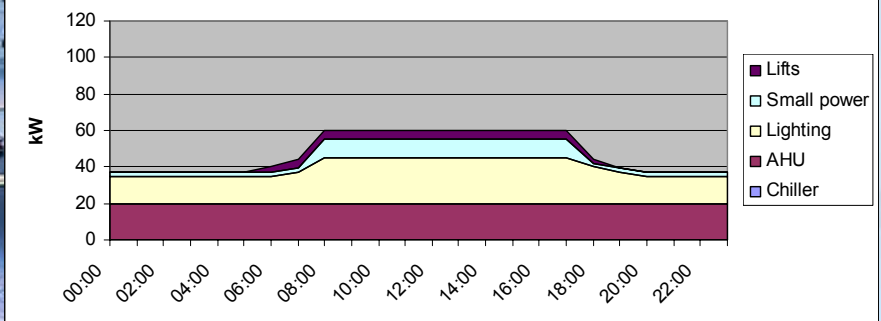
Electricity - Autumn



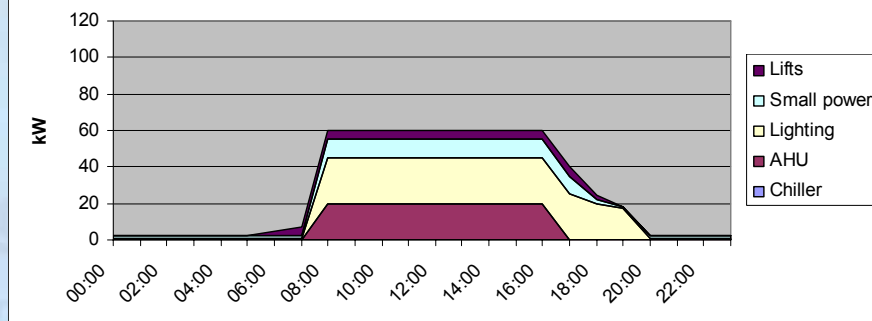
Electricity - Autumn



Electricity - Winter

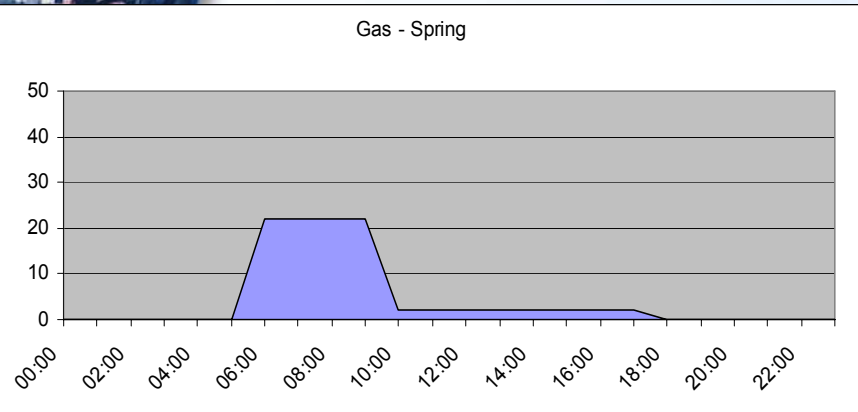


Electricity - Winter

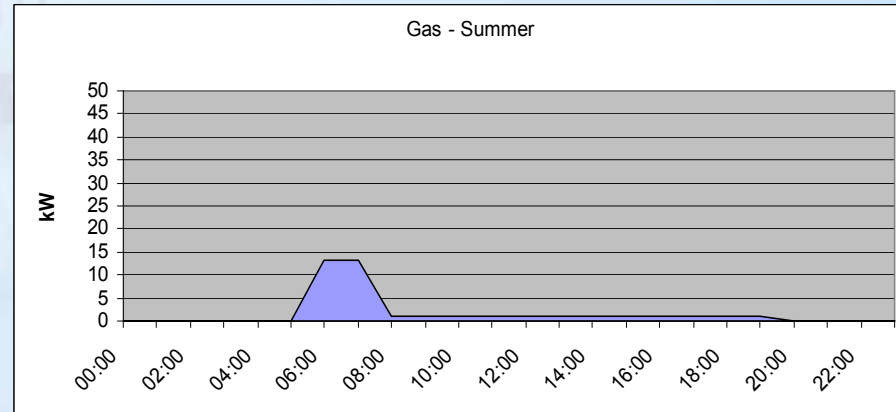




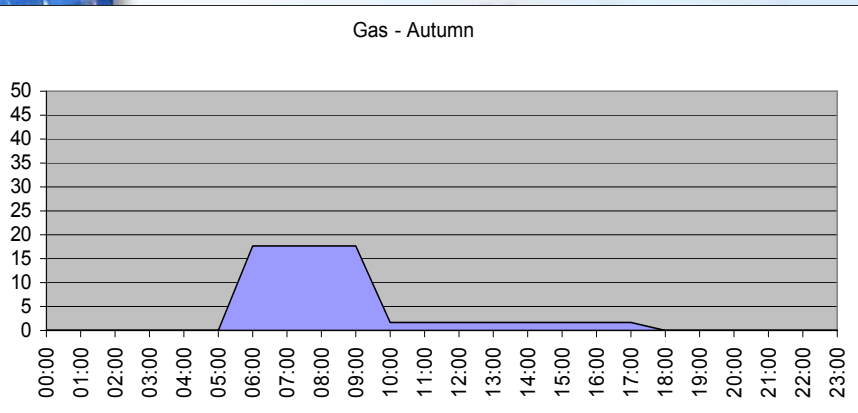
Gas - Spring



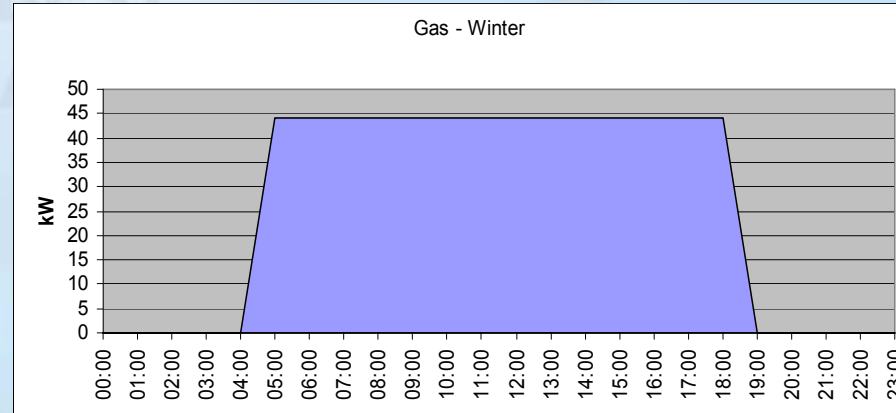
Gas - Summer



Gas - Autumn

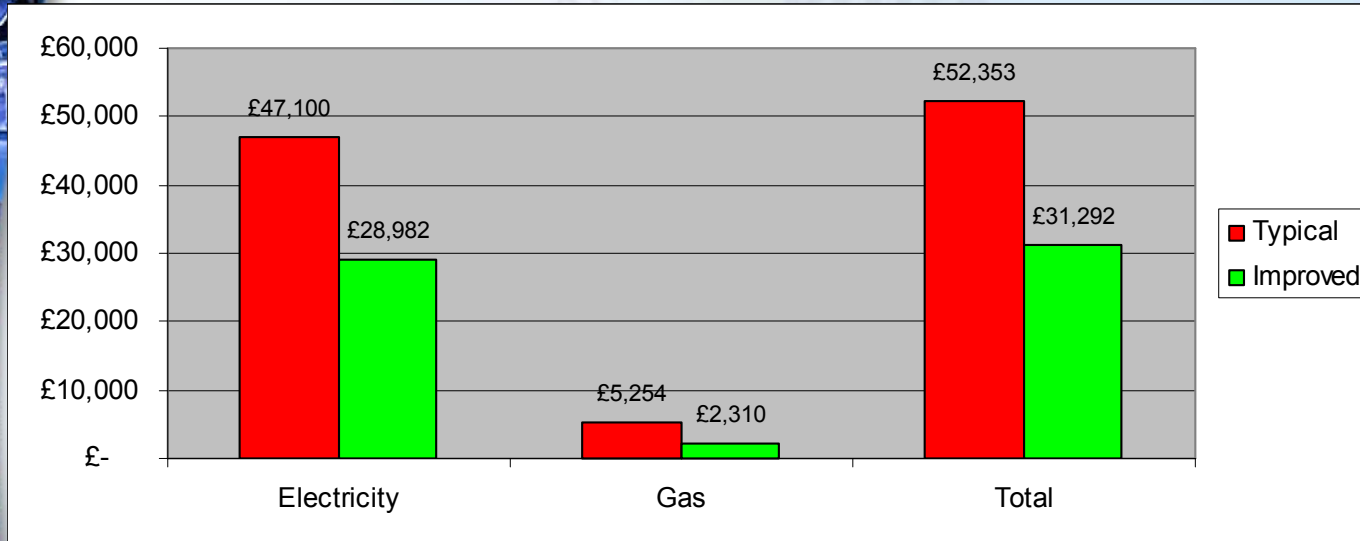


Gas - Winter



Technology  
People Developer

# Typical savings



**40% saving in consumption through better control only!**

30 – 60% by implementation of a full PI strategy including:

- metering
- improved controls
- behavioural change
- devolved responsibility

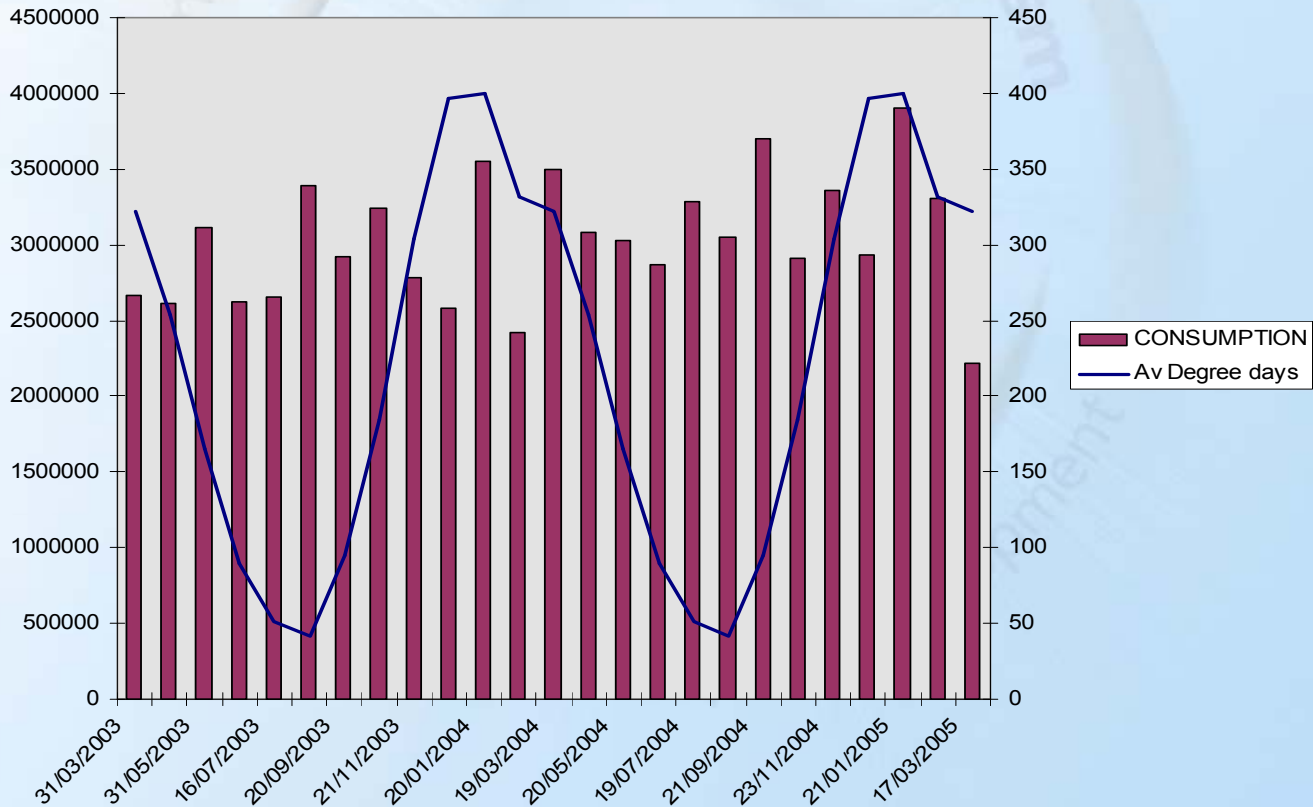
## Further references

- Vilnis Vesma - <http://vesma.com/>



# Good Practise examples

## Terminal 4, Heathrow Airport



# The benefits

## Measured savings after programme (extrapolated to one year):

- £136k per annum
- 2.7 GWh
- 108 CO2 tonnes
- 13% saving on T4 total power

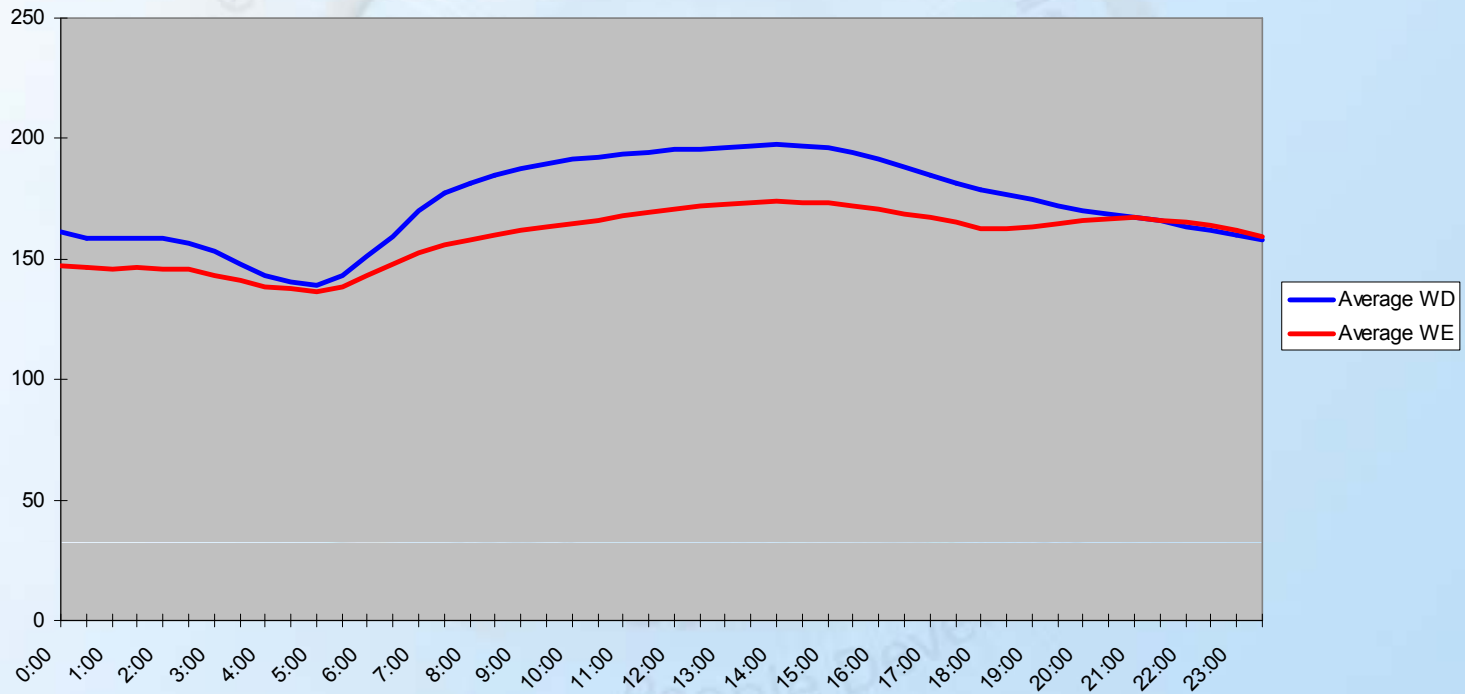
## Latest detailed HV reading:

- March 2005
  - 27% below average monthly consumption
  - 37% below March 2004 consumption
  - 17% below March 2003 consumption
  - Lowest monthly consumption in five years

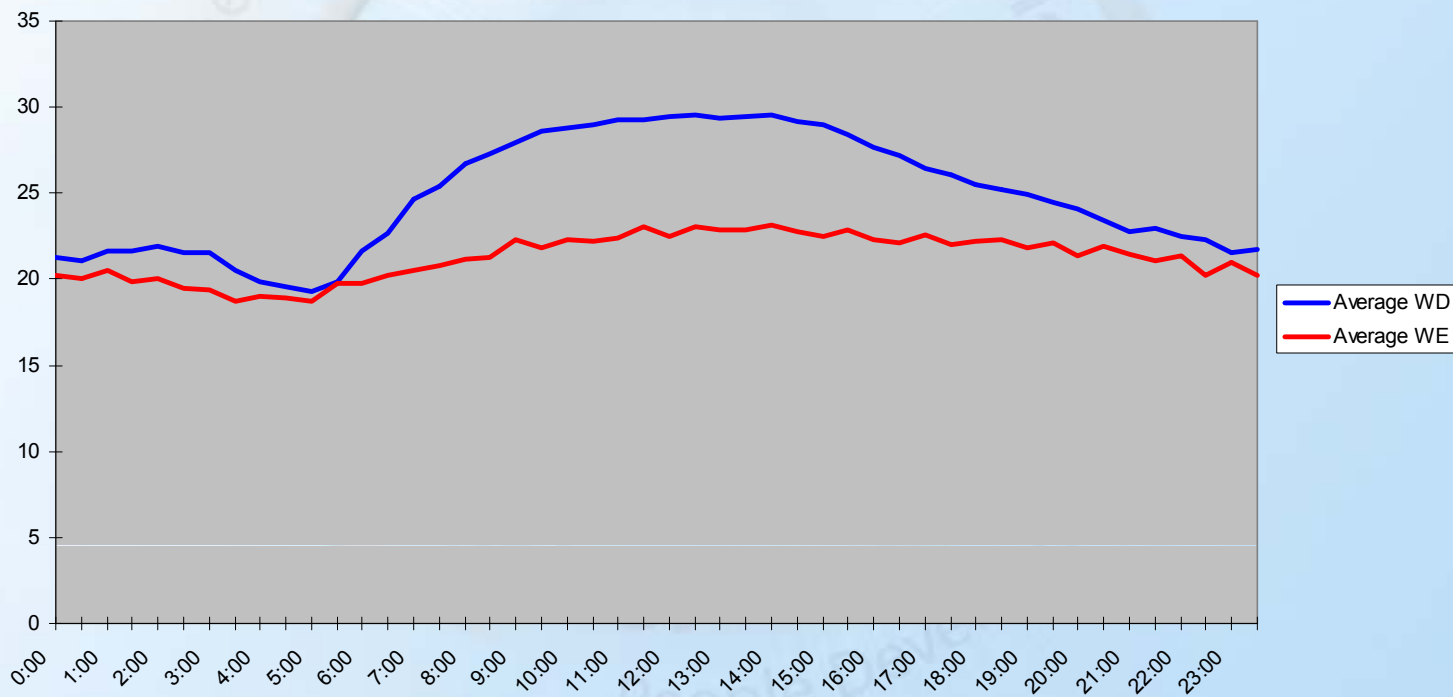
# Good Practise Examples

## Heathrow Point Complex – 3 multi-use office buildings

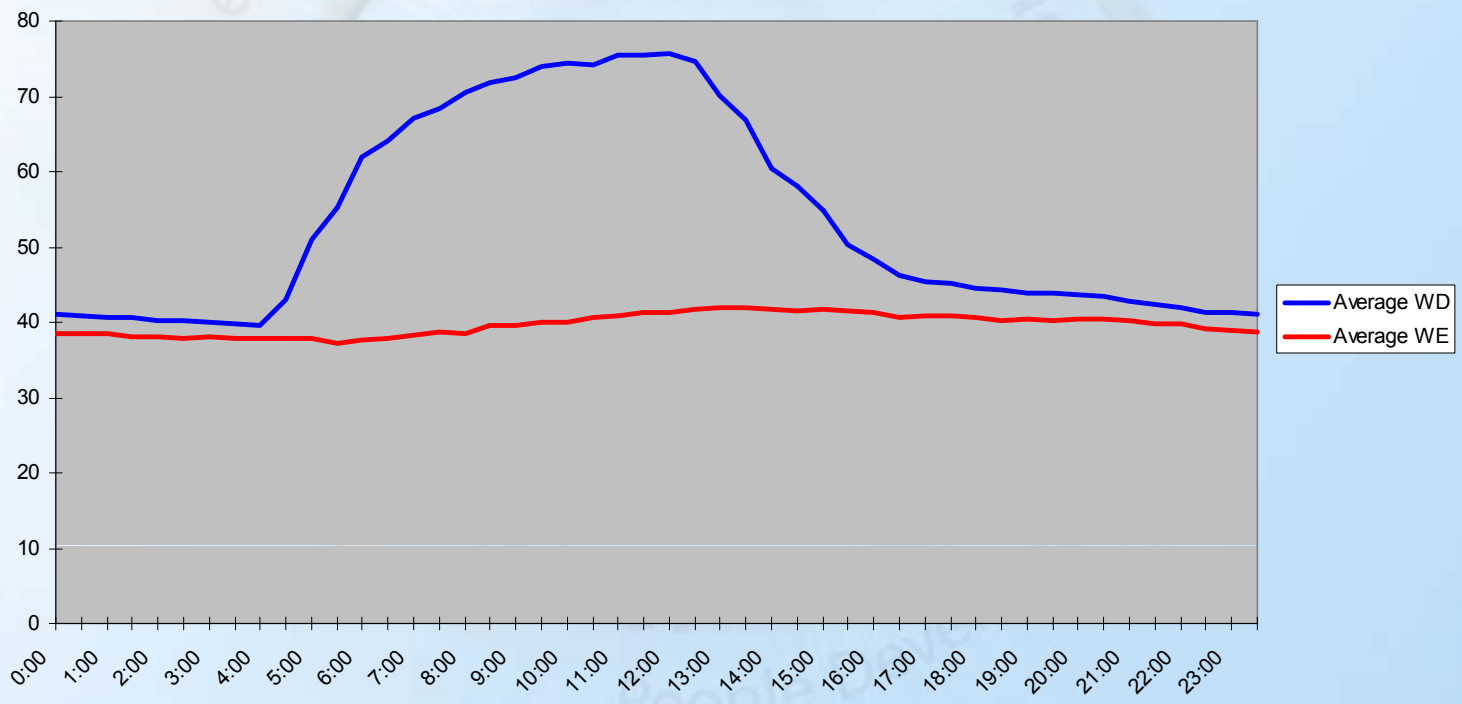
HPW Annual kWh



HPN Annual kWh



HPTC Annual kWh



Building	HPW	HPN	HPTC	Total
Annual cost	£121,710	£ 16,946	£ 34,816	£173,472
Baseload %	40%	40%	38%	

Eliminate:				
Weekend load	£ 32,612	£ 4,270	£ 8,125	£ 45,006
Night load	£ 29,920	£ 4,073	£ 4,073	£ 38,065

Total saving	£ 83,071
	48%
Improved annual cost	£ 90,401

# Summary

- Smart metering solution SPB = 1-3 years
- Up to 60% improvement possible
- Other requirements:
  - Behaviours
  - Processes/Operations
- Work to get more out of the investment

# Thank you for listening



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