Cambridge Carbon Footprint

RETROFITWORKS
BUILDING EFFICIENCY TOGETHER

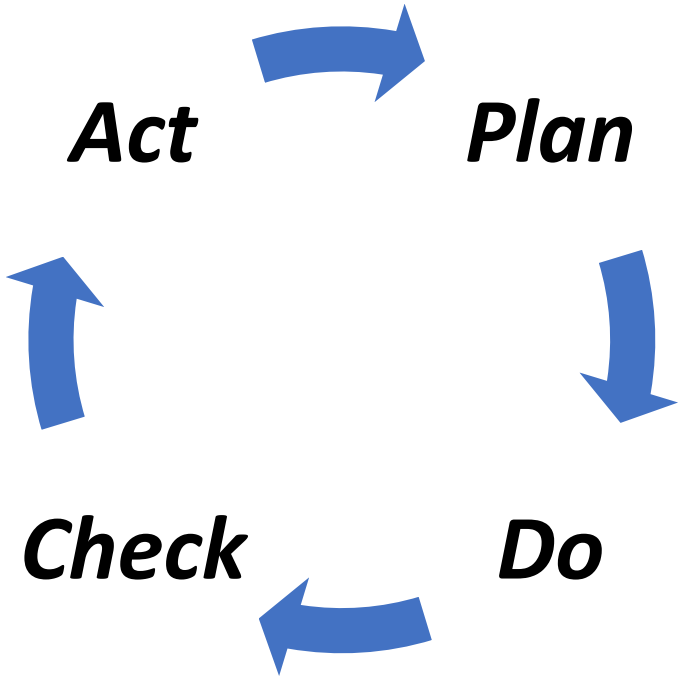
Setting targets and monitoring progress

Agreeing your action plan/environmental management system (EMS) and tracking progress

ENE Eastern NewEnergy

European Union
European Regional Development Fund

HM Government



Why Monitor & Measure

If you don't know what you have it is not possible to improve.

- Create SMART targets to achieve
- If approaches are working, they can be kept
- If approaches are not working, they can be adapted to more suitable approaches.
- Check to see if you are meeting each short-term targets
- Monitoring is different from evaluating.
- The reasons for tracking progress are different from the reasons for evaluating.

Setting targets and monitoring progress

Agreeing your action plan/environmental management system (EMS) and tracking progress

The stages of Monitoring and Evaluation

1. Measurement and data collection (Find Out)
2. Monitoring and data analysis (Make a plan)
3. Identify potential energy savings & implement energy saving initiatives (Make things happen)
4. Energy bench marking and setting energy targets. (Watch, Think, Discuss, SMART)
5. Energy reporting and reflection (Modify the plan and start again)

Monitoring: The collection and analysis of information about a project or programme, undertaken while the project/programme is ongoing

Evaluation: The periodic, retrospective assessment of an organisation, project or programme that might be conducted internally or by external independent evaluators

SMART: Specific **M**easurable **A**chievable **R**elevant **T**ime

Intensity Ratio: Is a way of defining your emissions data in relation to an appropriate business metric

SMART Target rules

- Use basic principles for SMART targets to ensure that monitoring relevant
- Be focused and feasible in relation to available resources
- Be useful and timely
- Useable by, and/or comparable to
- Credible, valid and reliable
- Sensitive to unequal power relations
- Ethical e.g. in relation to data consent and protection
- Consider an intensity ratio
- Analyse energy use based on measurement and other data
- Use analysis to identify areas of significant energy use
- Identify, prioritise and record opportunities for improving energy performance.

Intensity Ratio Examples

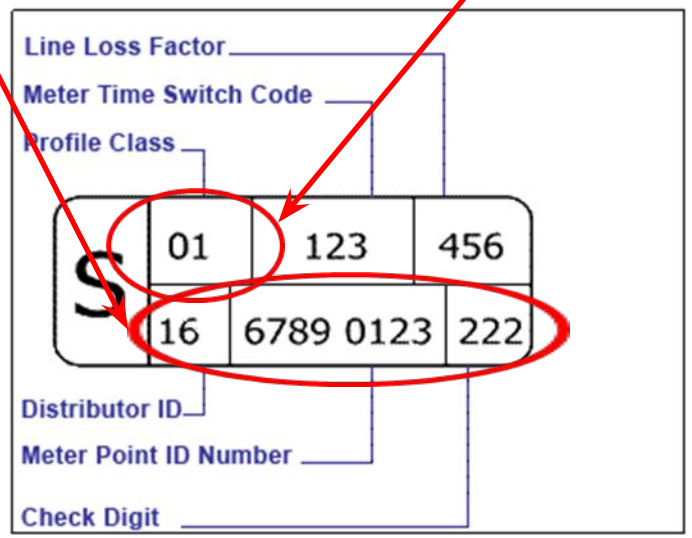
Type of intensity ratio	Intensity Measurement
All	Tonnes CO^2 per total £m sales revenue
	Tonnes CO^2 per Staff member (FT)
Transport	Tonnes CO^2 per pallet case
	Tonnes CO^2 per RTK (Revenue per kilometre per 1 tonne transported)
Passenger Carriers	Grammes/Kg of CO^2 per passenger kilometre
Beverages	Grammes/Kg of CO^2 per litre of beverage produced
Retail	Tonnes CO2 per m^2 of gross store area
Banking	Tonnes CO2 per £m of income
Manufacturing	Tonnes CO2 per tonne of production/1000 parts
Property/Offices	Tonnes CO2 per total m^2 (single m^2 is also possible)

What meter do you have, what tariffs can you have

Meter Point Administration Number (MPAN)

MPAN 'Core

Load profile – if 00 then half-hourly



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Typical Half Hourly Data

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72.60			00:00	00:30	01:00	01:30	02:00	02:30	03:00	03:30	04:00	04:30	05:00	05:30	06:00	06:30	07:00	07:30	08:00	08:30	09:00	09:30	10:00	10:30	11:00	11:30
COREMPAN	Date	Reading Type																								
1800035290670	01/07/2012	kWh	25.60	27.70	28.20	29.00	26.70	29.00	29.30	28.30	27.20	29.20	29.10	28.80	30.40	28.80	29.80	29.40	30.70	31.20	29.90	29.20	29.40	28.30	27.90	29.30
1800035290670	02/07/2012	kWh	28.30	28.70	28.50	29.80	29.20	29.10	25.30	26.50	27.40	25.30	25.10	26.10	33.40	39.00	45.40	50.80	52.60	54.20	57.10	55.50	52.20	48.90	65.60	66.20
1800035290670	03/07/2012	kWh	24.50	24.40	24.70	24.50	24.60	24.60	24.70	24.90	25.20	25.10	24.70	24.50	30.20	39.30	42.20	47.60	54.30	55.30	52.20	53.00	52.20	50.50	67.60	66.80
1800035290670	04/07/2012	kWh	24.40	25.10	25.10	24.80	24.90	24.70	24.20	24.20	24.10	23.30	25.50	27.30	35.60	39.80	41.50	44.90	49.60	55.30	59.20	53.30	54.80	52.00	72.60	69.00
1800035290670	05/07/2012	kWh	24.70	25.20	25.50	25.10	25.40	24.90	25.50	23.80	23.30	23.00	25.30	25.80	31.40	35.60	40.10	47.80	53.30	51.00	49.30	50.60	53.60	55.10	72.20	71.50
1800035290670	06/07/2012	kWh	26.20	27.70	27.60	26.90	27.20	25.90	26.80	26.20	26.70	25.20	27.10	29.00	35.60	37.50	43.50	45.60	48.20	49.50	51.30	48.90	48.30	46.70	65.00	65.90
1800035290670	07/07/2012	kWh	25.00	25.30	25.20	25.50	24.90	24.10	23.80	23.90	23.60	24.00	26.60	27.00	28.90	28.60	27.30	28.20	28.70	29.90	27.50	28.20	27.70	27.60	27.70	27.80
1800035290670	08/07/2012	kWh	28.80	28.30	27.20	27.90	29.60	28.10	26.30	26.50	28.10	29.10	27.60	26.40	26.40	28.70	29.40	26.80	26.60	26.60	28.60	29.20	28.10	26.90	26.80	26.80
1800035290670	09/07/2012	kWh	27.00	26.80	27.20	28.70	28.00	27.20	27.10	28.80	28.60	27.40	26.20	27.00	31.40	41.20	40.60	45.40	48.20	47.50	47.90	49.50	48.50	48.90	67.90	64.00
1800035290670	10/07/2012	kWh	25.60	25.90	25.40	25.50	25.50	25.40	23.40	24.60	24.70	24.60	24.30	24.80	31.80	38.00	42.20	46.70	48.20	50.80	50.00	48.60	48.30	48.10	66.10	64.80
1800035290670	11/07/2012	kWh	24.30	25.10	23.80	24.00	24.00	23.60	22.70	21.40	21.70	21.60	21.80	23.50	33.30	34.50	41.90	46.10	47.90	50.10	52.50	50.30	48.80	48.00	66.10	62.70
1800035290670	12/07/2012	kWh	24.50	24.50	24.60	24.80	24.70	24.30	24.50	23.40	22.80	22.80	22.70	24.40	30.90	37.40	43.60	48.90	55.40	50.90	48.70	48.60	48.00	47.50	65.20	62.20
1800035290670	13/07/2012	kWh	28.00	27.40	25.60	25.80	27.00	27.40	24.80	24.70	26.20	25.90	25.10	27.20	34.90	35.20	43.60	49.90	48.60	48.70	47.40	46.90	45.50	45.70	63.50	55.20
1800035290670	14/07/2012	kWh	24.20	23.80	24.10	22.90	23.00	23.40	24.10	23.20	24.30	23.90	23.50	23.50	23.60	23.30	26.60	27.70	27.00	28.50	29.10	27.10	27.80	26.50	25.90	26.00
1800035290670	15/07/2012	kWh	25.30	26.20	26.00	25.90	25.90	25.40	25.50	25.20	25.80	26.00	25.60	25.90	25.90	26.50	28.40	26.20	25.20	26.80	26.00	25.10	25.60	25.90	25.60	26.30
1800035290670	16/07/2012	kWh	26.70	26.40	26.10	27.20	26.50	25.70	25.70	25.60	26.20	26.80	26.30	25.60	30.50	33.90	43.10	45.50	49.10	50.30	50.90	49.00	48.80	48.50	48.20	51.80
1800035290670	17/07/2012	kWh	23.80	23.20	23.70	23.70	23.50	23.30	23.80	23.80	23.60	23.60	23.50	24.20	28.20	35.00	44.90	51.90	54.00	55.60	54.30	53.40	55.10	54.40	66.20	63.60
1800035290670	18/07/2012	kWh	23.40	23.80	23.60	23.20	22.80	23.00	23.20	23.30	23.30	23.50	23.30	23.40	29.10	36.90	41.10	48.70	53.00	54.40	51.20	52.50	53.50	53.80	63.40	62.50
1800035290670	19/07/2012	kWh	24.30	23.90	24.20	24.20	24.00	24.60	24.00	24.80	24.30	24.20	24.10	25.10	32.00	35.70	43.40	48.40	49.90	52.20	53.10	52.20	52.70	51.00	64.00	63.20
1800035290670	20/07/2012	kWh	23.40	23.50	23.20	23.40	23.50	23.20	22.60	22.50	22.40	22.20	22.60	23.20	28.00	34.80	41.70	44.50	46.30	47.90	48.50	49.80	47.10	44.90	62.00	62.10
1800035290670	21/07/2012	kWh	24.40	24.80	25.20	25.40	24.70	24.70	24.30	24.00	23.90	24.10	24.00	23.80	23.70	24.80	27.80	29.00	30.20	27.70	25.70	25.50	25.70	25.50	25.30	24.40
1800035290670	22/07/2012	kWh	26.50	26.80	26.70	26.70	26.00	25.50	24.90	25.30	25.30	24.90	23.10	23.10	24.00	23.90	24.70	23.90	23.30	23.60	24.40	24.10	24.50	28.50	25.70	25.70
1800035290670	23/07/2012	kWh	24.80	24.80	24.70	25.30	25.20	23.90	24.00	24.10	24.90	24.40	25.00	25.00	27.60	33.50	38.70	45.60	50.30	50.10	50.90	51.90	50.40	51.60	52.50	55.30
1800035290670	24/07/2012	kWh	25.80	25.00	25.10	24.60	24.60	24.80	24.60	25.20	24.50	24.30	26.10	24.10	31.10	36.90	42.90	49.30	52.40	52.10	51.80	51.30	51.20	49.00	48.70	48.20
1800035290670	25/07/2012	kWh	24.50	25.10	24.10	24.90	23.90	24.30	23.40	24.30	23.10	23.90	24.10	24.30	28.50	34.80	39.90	43.70	47.30	49.20	50.60	51.90	50.40	50.70	49.40	50.90
1800035290670	26/07/2012	kWh	28.30	28.40	28.20	28.50	28.20	27.80	28.40	27.20	28.30	27.80	28.00	28.30	32.10	37.00	41.40	47.70	47.90	49.90	53.70	53.00	51.60	50.70	52.40	54.80

Days of the month

Half Hourly periods over 24 hours

Eastern NewEnergy

European Union
European Regional Development Fund

HM Government

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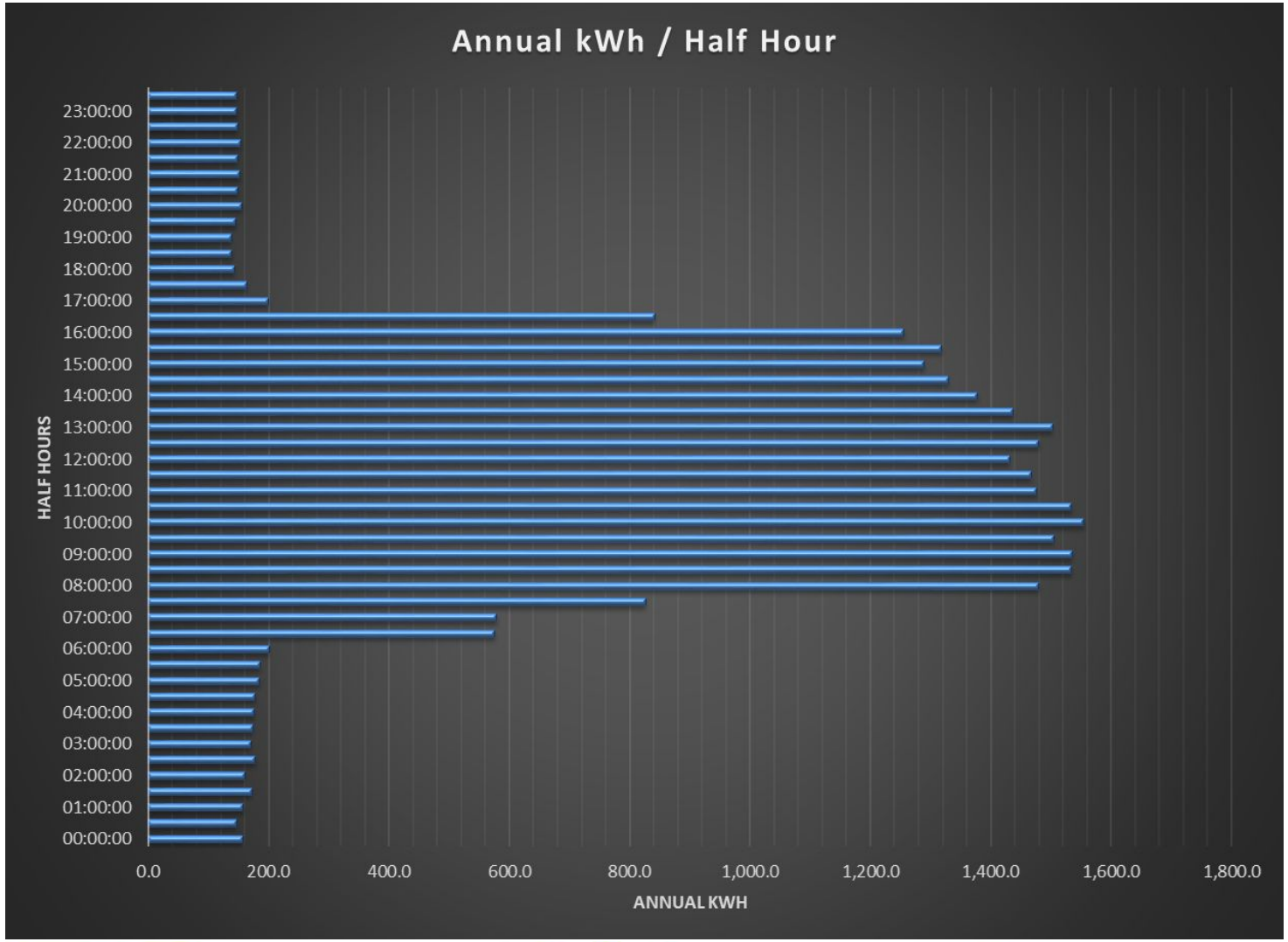
Actual Half Hourly Data

Case Study
Spice
Warehouse



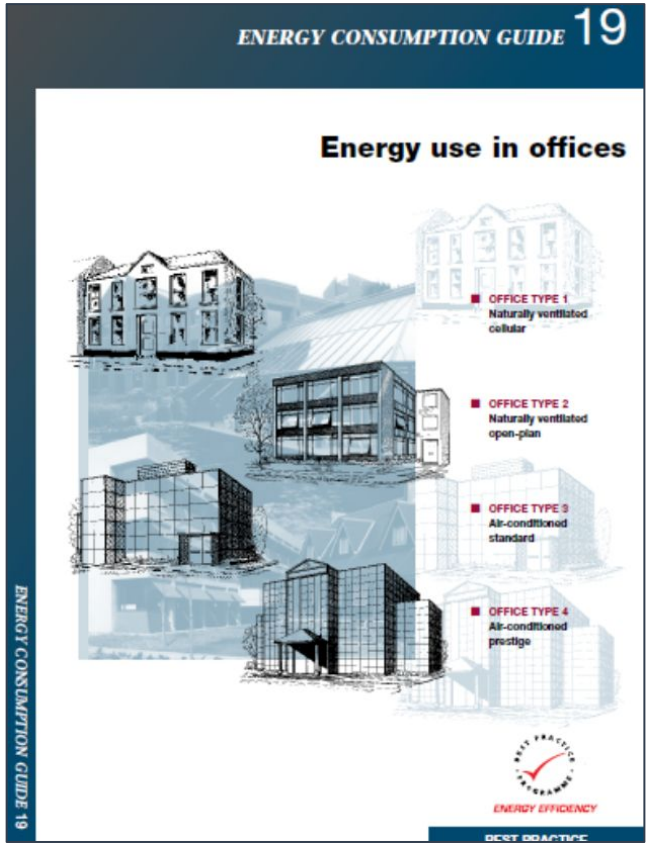
Eastern NewEnergy

European Union
European Regional Development Fund

HM Government

Identifying Significant energy use
(Energy Consumption Guide ECG 019)

- Heating & hot water
- Cooling
- Fans, pumps & controls
- Humidification
- Lighting
- Catering
- Small power
- ICT dedicated facility



https://www.cibse.org/getmedia/7fb5616f-1ed7-4854-bf72-2dae1d8bde62/ECG19-Energy-Use-in-Offices-(formerly-ECON19

https://www.cibse.org/getmedia/070252ba-cd5e-4b74-ba0b-4bb51e8d55c2/ECG36-Energy-Efficiency-in-Hotels-a-Guide-for-Owners-and-Managers.pdf.aspx

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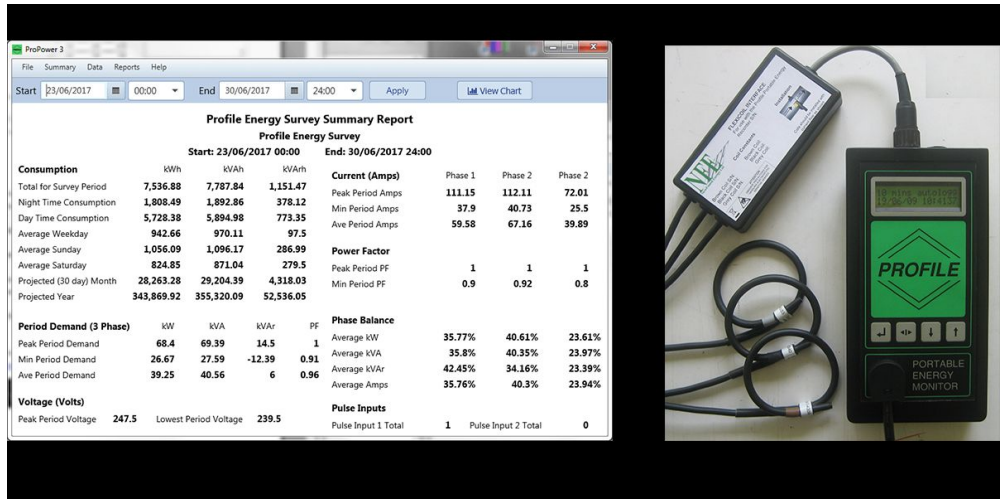
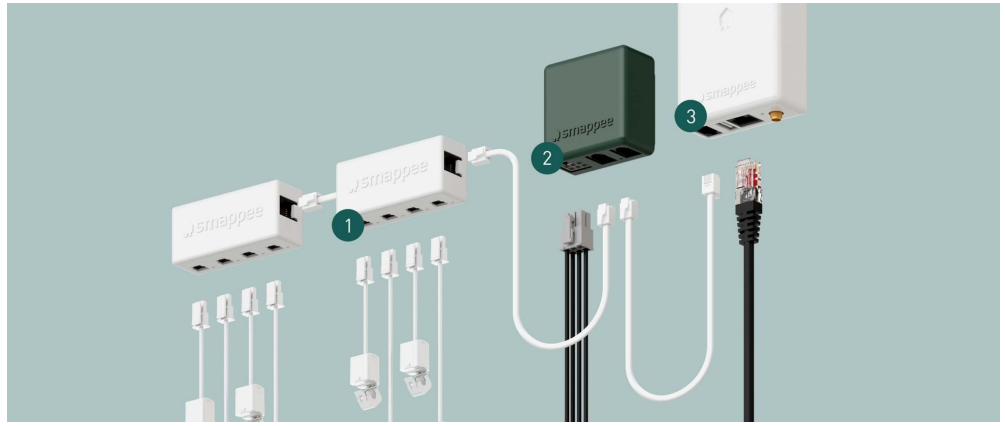
Data logging



Profile Portable 3-Phase Energy Monitor



Smappee Energy Monitoring

- Data logging
- Single phase – cheap for profiling, easy to use
- Three phase – 'full story' – need access to cabinets, H&S considerations
- Temperature & relative humidity

NewFound Energy Ltd, Park View House,
Worrall Street, Congleton, Cheshire, CW12 1DT
Email: info@newfound-energy.co.uk
https://www.newfound-energy.co.uk/
Telephone: +44 (0)1260 290151

Smappee Gas & Water

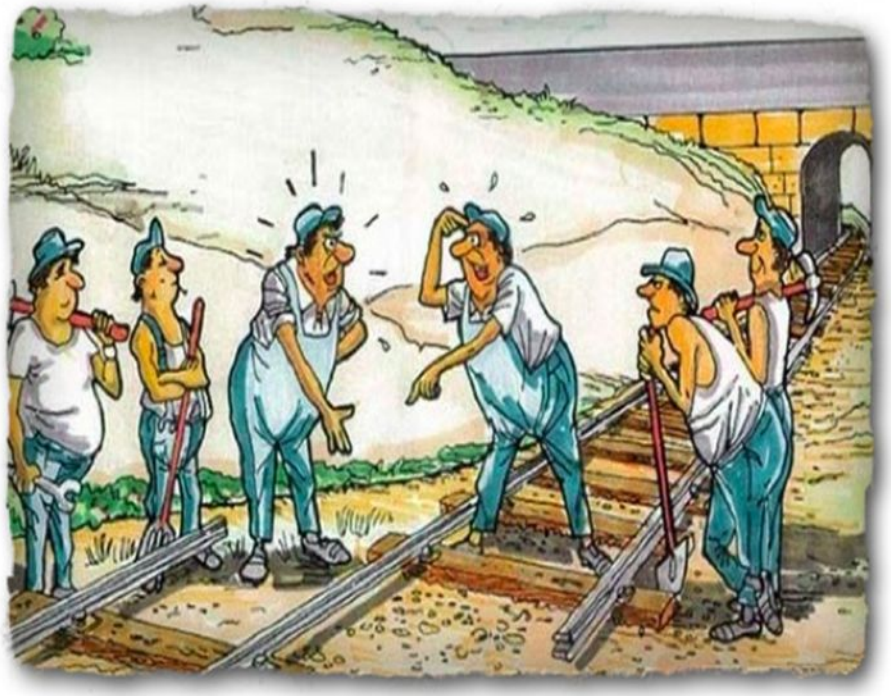
Recon T portable 3-phase energy logger

Eastern NewEnergy

European Union
European Regional Development Fund

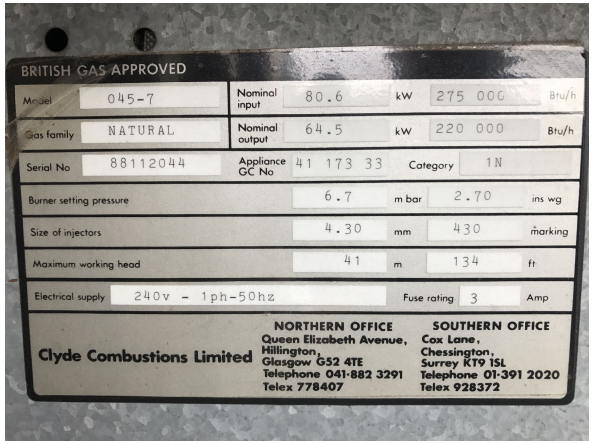
HM Government

- Which project?
  - Think about which programmes or projects you want to assess
  - What time period?
  - Will it be permeant?
  - Is it an on-going activity which requires monitoring, 24/7 or Day shift
  - Is it a completed activity that will require evaluation.
- Who?
  - Identify the key internal and external stakeholders,
  - Consider how to involve them in the format of the monitoring
  - Who will undertake the implementation, analysis and communication of findings.

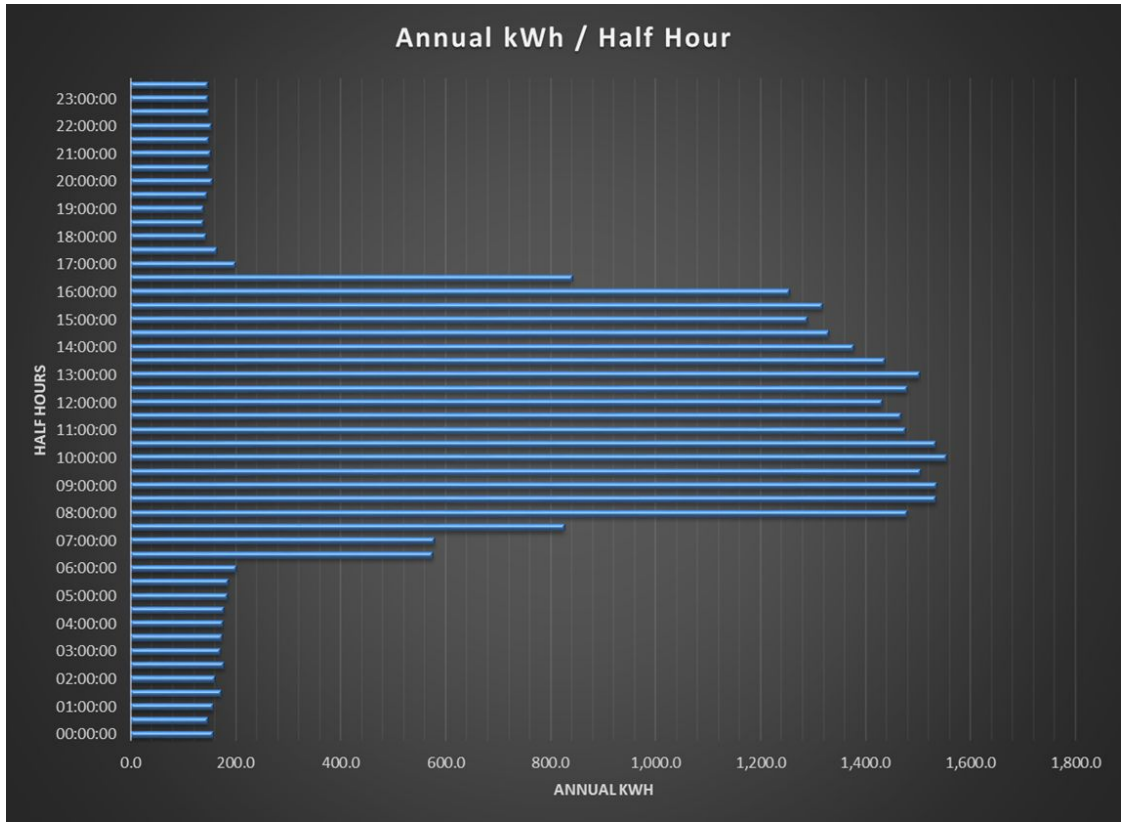


Looking for energy patterns

- Typical office building occupancy is 08:30 to 17:30 over Monday to Friday
- 45% of global electricity use in motors, In buildings typical motor load is for pumps and fans
- Plate check: kW rating, Take a reading? Data logging?
- What equipment does/does not work outside normal hours?
- Main Boilers (Satellite Sites)
- Check the equipment plates
- Supply invoices
- Half-hourly metering (HHM) data where applicable, Meter readings
- Establish an energy baseline based upon current use
- Gather Load Data
- Lighting load can be substantial
- Count or estimate lamps
- Hot water generation
- Take photographs



Looking for energy patterns



- Gather Load Data
- Lighting load can be substantial
- Count or estimate lamps
- Hot water generation

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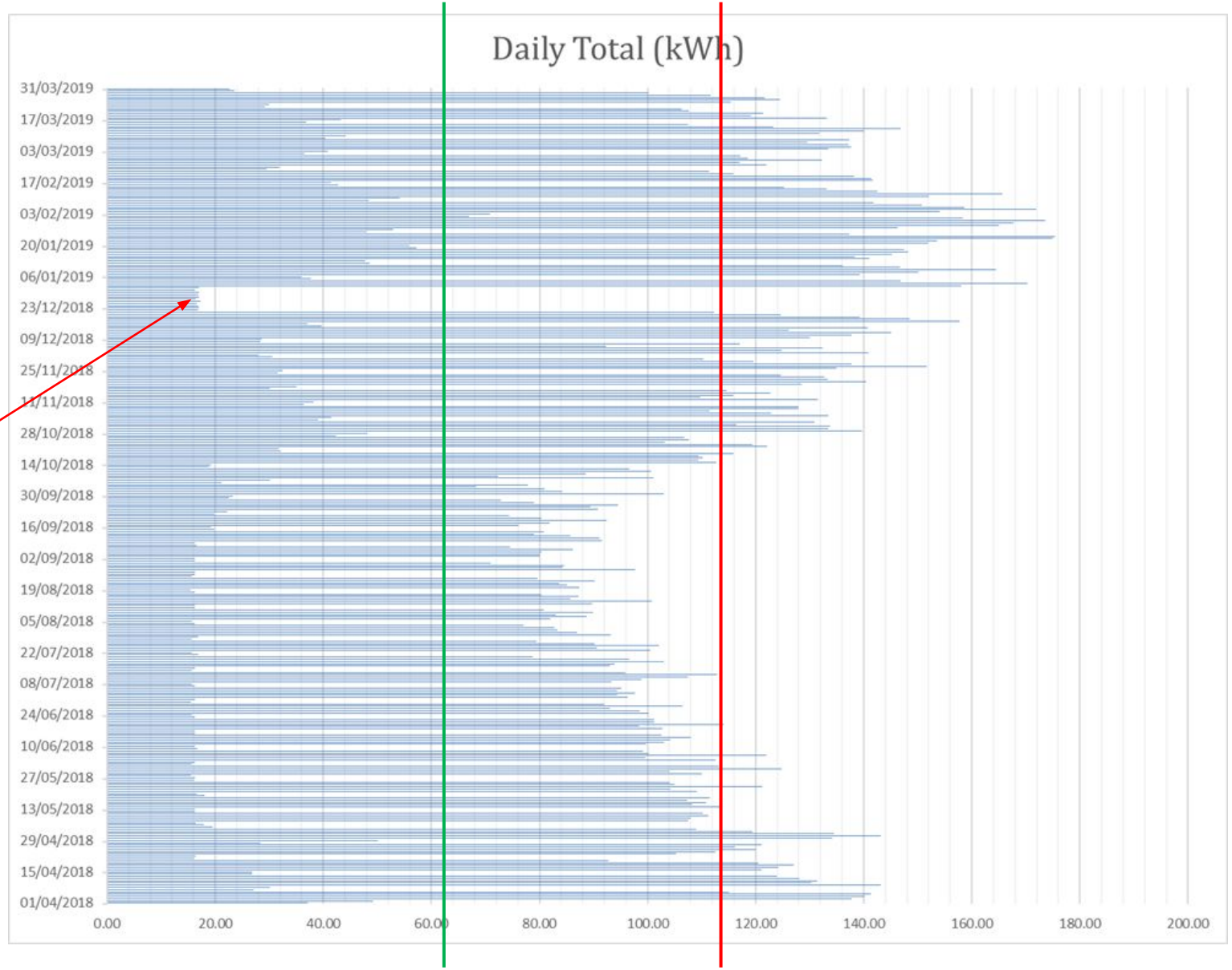
Case Study
Spice Warehouse

Christmas shut down

Looking for energy patterns



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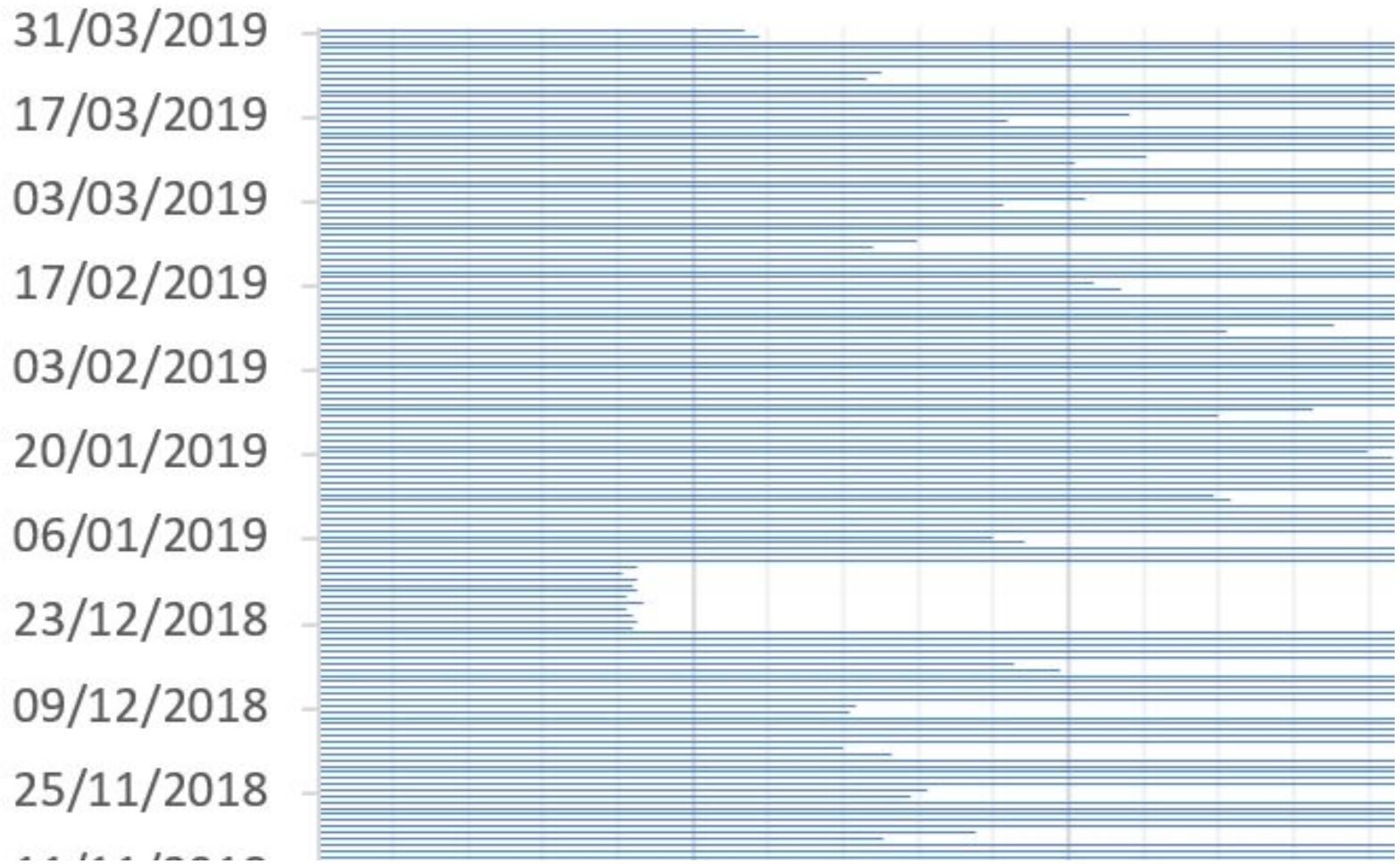
Case Study - Spice Warehouse



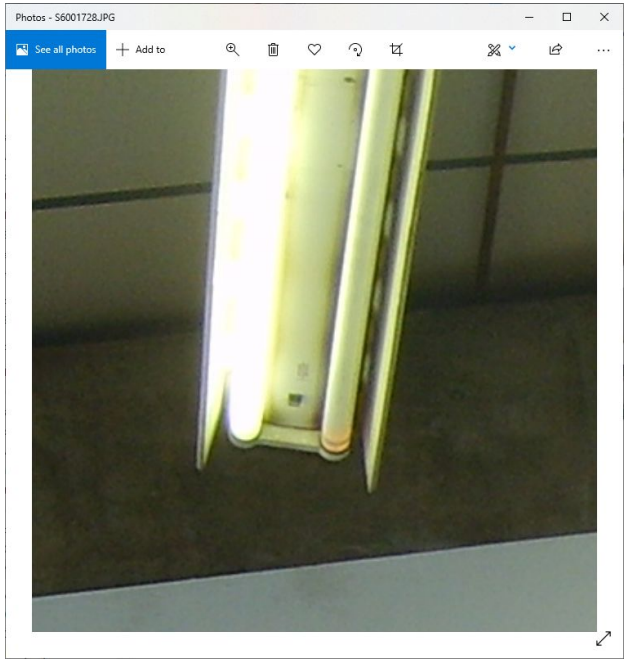
(HHD)
Half Hourly Data

Each line represents a day

Case Study - Spice Warehouse

Electric Fork Lift truck

Weighing scales and bag sealing

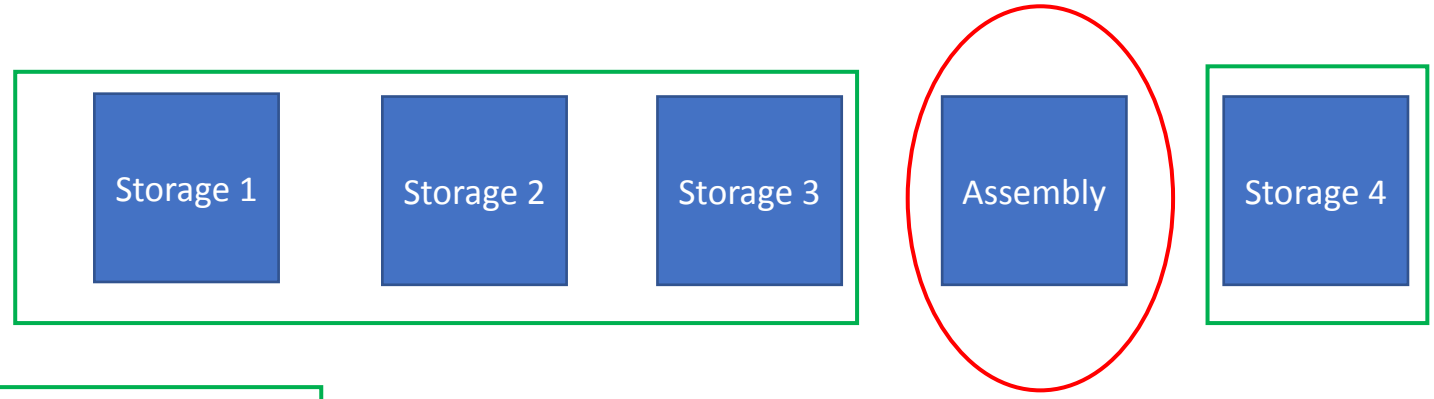


Failing T8 tube

Sales office

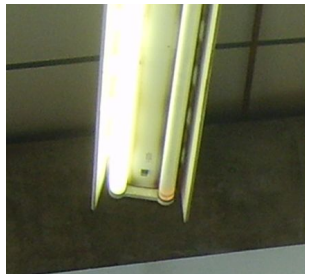
Factory front

Case Study – Internet component manufacturer



Electronics Company (West Sussex)

- Assured storage and assembly used minimal/no energy
- Each building had own meter
- No record of which meter was in which building
- Three meters obstructed by racking (S1 to S3)



RetrofitWorks is a partner in the Eastern New Energy (ENE) project, a collaborative research project led by the University of East London with the aim to build a stronger Local Energy and Low Carbon Economy in the East of England. The Eastern New Energy project is part-funded by the European Regional Development Fund (ERDF).

What Support is available?

The project is designed to help local enterprises (private and social) and other organisations across the region understand and remove the barriers that we all face in rapidly decarbonising our communities, buildings, transport, and lives. It covers the counties of Hertfordshire, Cambridgeshire, Norfolk, Suffolk, Rutland and parts of Lincolnshire and Essex.

For SME companies we can help you with the following:

- Develop and commercialise your low carbon products, technologies and services.
- Grow and develop your business – and take advantage of rapidly growing 'green' market sectors.
- Retrofit affordable low/zero carbon homes.

The Eastern New Energy team can support the development of your product or service, our support incudes:

- Do you need help understanding and identifying business opportunities for your business in low carbon growth market sectors?
- We can help you with finding and meeting new customers (and retaining existing ones) as low carbon considerations become increasingly important to them.
- Helping with demonstrations of products and services.
- Developing and implementing a low carbon marketing and communications strategy for your business.
- Finding complementary businesses with whom you can collaborate.

Working with you to improve the retrofit supply chain to:

- We can help introduce new products and services for retrofit.
- Identify retrofit packages, introduce new technologies and approaches to reducing energy use, in housing, maximising decarbonisation and minimising cost.
- Facilitate demonstrations of these retrofit packages.

The focus wherever possible will be on using innovative approaches and techniques (such as smart energy systems, high performance insulation materials, digital controls, etc) – combined with use of standard measures as part of an innovative approach.

All of the business support services and workshops we provide in the ENE project are free.

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Thank you for listening

Any Questions

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