

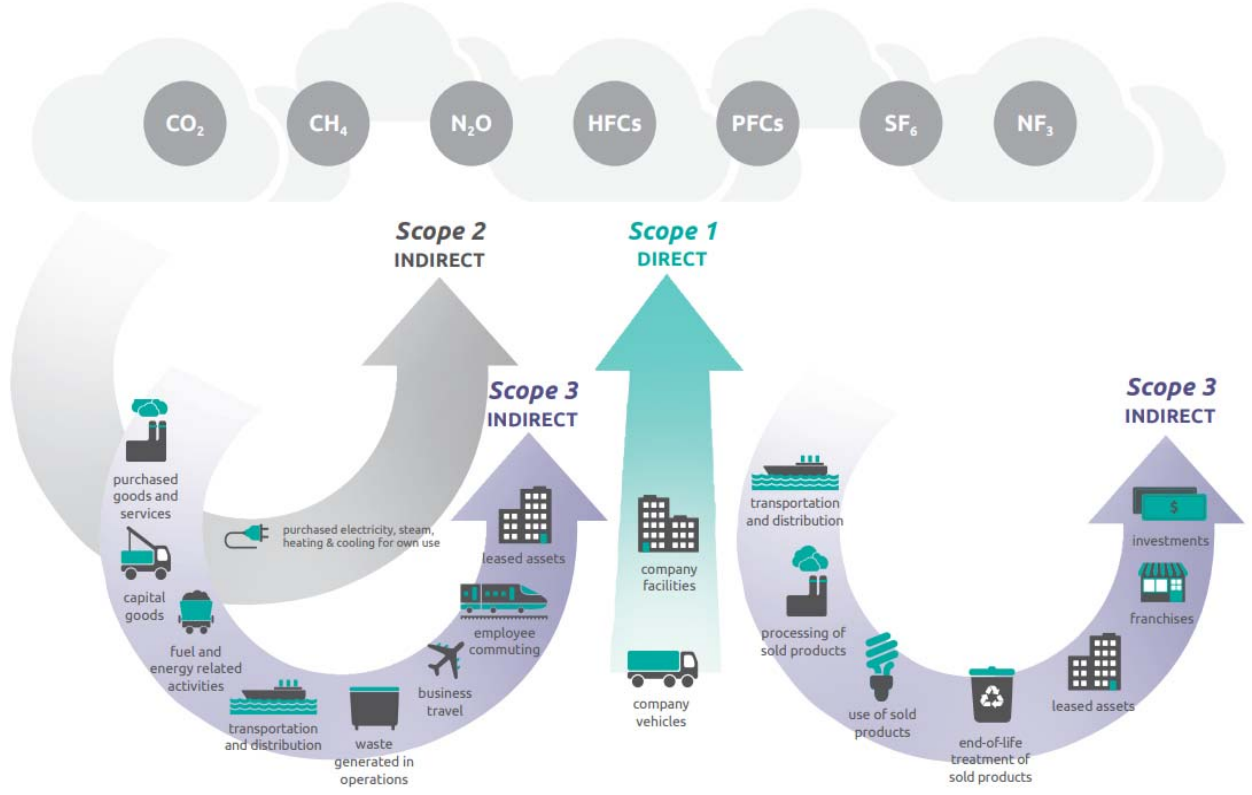
# Making Your Assets Greener



By Alan Barber

[www.apse.org.uk](http://www.apse.org.uk)

# Emissions



# How to get your estate to be net zero carbon

- ▶ Reduce energy usage and optimise building performance (i.e. energy efficiency)
- ▶ Generate renewable local power
- ▶ Offset

# Challenges

- ▶ Corporate challenges
- ▶ Zero carbon heating
- ▶ Grid capacity
- ▶ Funding

# Benchmark buildings

| Site     | Annual Electricity Usage (kWh) | Floor Area (m <sup>2</sup> ) | kWh/m <sup>2</sup> |
|----------|--------------------------------|------------------------------|--------------------|
| Office A | 500,000                        | 4,000                        | 125                |
| Office B | 600,000                        | 5,000                        | 120                |
| Office C | 700,000                        | 10,000                       | 70                 |

- ▶ kWh/m<sup>2</sup>
- ▶ Display Energy Certificate (DEC)
- ▶ Energy Performance Certificate (EPC)
- ▶ CIBSE Benchmarking Tool
- ▶ Condition surveys

# Carbon Conversion Factors

| Fuel kWh                  | kg CO <sub>2</sub> e |
|---------------------------|----------------------|
| Fuel Oil                  | 0.26782              |
| Grid supplied electricity | 0.2556               |
| LPG                       | 0.21447              |
| Natural Gas               | 0.18385              |
| Biomass wood pellets      | 0.01563              |

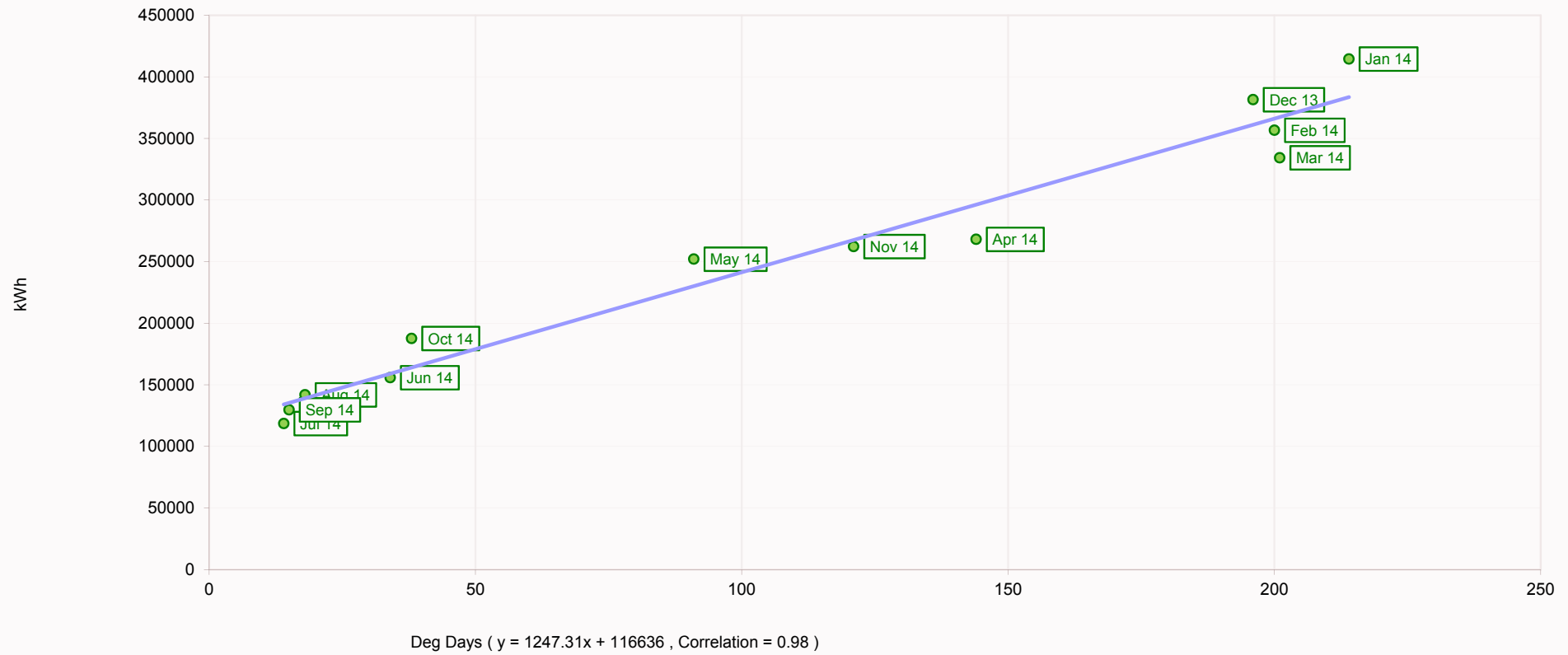
# Leisure Centre Case Study

# Prioritising projects and feasibility studies

- ▶ Analysing existing and proposed building loads
- ▶ Comparing technologies
- ▶ Maintenance requirements and cost
- ▶ Carbon savings
- ▶ Cost savings
  - ▶ Available Supply Capacity
  - ▶ Triads
- ▶ Funding opportunities
- ▶ Payback and ROI



# Degree Day Analysis



# Carbon and Cost Reduction Strategy

| Item         | Description of project                   | Estimated savings in Year 1     |                         |                         | Accumulative saving over 10 years including energy and maintenance (£ in 10 yrs) | Estimated cost and payback periods    |                        |
|--------------|--|---------------------------------|-------------------------|-------------------------|--|---------------------------------------|------------------------|
|              |  | Total cost saving (£ in Year 1) | Energy savings (kWh/yr) | CO2 savings (tonnes/yr) |  | Potential capital cost of project (£) | Simple payback (years) |
| 1            | BMS strategy upgrade                     | £6,000                          | 230,000                 | 42                      | £80,000  | £18,000                               | 3                      |
| 2            | Gas driven Combined Heat and Power (CHP) | £95,000                         | N/A                     | 250                     | £1,250,000   | £360,000                              | 3.8                    |
| 3            | Install LED lighting                     | £19,000                         | 100,000                 | 26                      | £250,000   | £65,000                               | 3.4                    |
| 4            | 25kWp solar PV                           | £3,700                          | 23,000                  | 6                       | £50,000  | £25,000                               | 6                      |
| <u>Total</u> | -  | <u>123,700</u>                  | <u>353,000</u>          | <u>324</u>              | <u>£1,630,000</u>  | <u>£468,000</u>                       | <u>3.8</u>             |

# LED Lighting

| Existing                            |                     |                | Proposed           |                     |                | Savings  |                    |                       | Payback                    |  |
|-------------------------------------|---------------------|----------------|--------------------|---------------------|----------------|----------|--------------------|-----------------------|----------------------------|--|
| Existing luminaire                  | Annual Running Cost | Carbon (tonne) | Proposed Luminaire | Annual Running Cost | Carbon (tonne) | % saving | Annual cost saving | Carbon saving (tonne) | Payback via energy savings | Payback via energy savings and maintenance |
| Recessed downlight with 40W ES lamp | £2,315              | 4.1            | LED Equivalent     | £347                | 0.6            | 85       | £1,968             | 3.5                   | 4.2                        | 3.6  |
| 50W halogen spot                    | £2,894              | 5.2            | LED Equivalent     | £579                | 1.0            | 80       | £2,315             | 4.1                   | 2.7                        | 2.4  |
| 150mm diameter recessed single CFL  | £1,730              | 3.1            | LED Equivalent     | £347                | 0.6            | 80       | £1,383             | 2.5                   | 6.0                        | 4.8  |
| 1463mm (5ft) T5 single 35W batten   | £2,330              | 4.1            | LED Equivalent     | £1,389              | 2.5            | 40       | £940               | 1.7                   | 10.4                       | 7.7  |
| 1500mm (5ft) T8 single 58W batten   | £3,860              | 6.9            | LED Equivalent     | £1,389              | 2.5            | 64       | £2,471             | 4.4                   | 3.9                        | 3.5  |
| 1500mm (5ft) T12 single 65W batten  | £4,326              | 7.7            | LED Equivalent     | £1,389              | 2.5            | 68       | £2,937             | 5.2                   | 3.3                        | 3.0  |
| 2D 38W surface mounted bulkhead     | £2,529              | 4.5            | LED Equivalent     | £752                | 1.3            | 70       | £1,777             | 3.2                   | 4.8                        | 4.0  |
| 600x600 T5 4 tubes recessed         | £1,864              | 3.3            | LED Equivalent     | £926                | 1.6            | 50       | £938               | 1.7                   | 11.9                       | 8.8  |
| 600x600 T8 4 tubes recessed         | £4,792              | 8.5            | LED Equivalent     | £1,563              | 2.8            | 67       | £3,229             | 5.7                   | 3.5                        | 3.1  |

Based on 100no. Luminaires on for 14 hours/day, 5 days/week

# Building Management System (BMS) Audit



The audit includes:

- ▶ Site visit to survey the BMS and building services installations
- ▶ Download of the existing BMS control strategy
- ▶ Checks of plant operation
- ▶ Remote evaluation of the control strategy, including a review of:
  - ▶ Occupancy schedule
  - ▶ Control setpoints, parameters and loops
  - ▶ Controller firmware and system control users
  - ▶ Systems alarms
  - ▶ Safety circuits and building protection strategies

# Further Considerations

- ▶ Variable speed drives
- ▶ Pool cover
- ▶ Refrigerant leaks
- ▶ District heating
- ▶ Using playing fields for ground source heat pump loops
- ▶ Income generation

# Any questions?

To find out more about how APSE Energy can help you contact Phil Brennan, Head of APSE Energy at [pbrennan@apse.org.uk](mailto:pbrennan@apse.org.uk), or Charlotte Banks, Energy Research and Project Officer at [cbanks@apse.org.uk](mailto:cbanks@apse.org.uk), or call 0161 772 1810.