



Taking the first steps towards green buildings

In his summer statement, **Chancellor Rishi Sunak** announced a billion-pound programme to help improve energy efficiency in schools, hospitals and other public buildings. Called '**The Public Sector Decarbonisation Scheme**', the programme, which is part of UK's efforts to reduce greenhouse gas emissions from the public sector by 50%, is expected to see substantial investments in energy efficiency and heating upgrades over the next year.

'The Public Sector Decarbonisation Scheme' "will offer grants to public sector bodies, including schools and hospitals, to fund both energy efficiency and low carbon heat upgrades". Schools and other educational institutions will be able to apply for grants from the government to make their buildings more energy-efficient under a new public sector decarbonisation scheme. These grants will include the **£560 million** in additional condition improvement funding for 2020-21 and **£1 billion** for 50 rebuilding schemes starting from September 2021.

It goes without saying that 'The Public Sector Decarbonisation Scheme' is laudable in its objectives, as the world as a whole is dealing with an unprecedented ecological crisis. However, perhaps the first thing facilities managers should invest in when looking to improve energy efficiency is an instrument that allows them to accurately measure and record energy usage. Having an initial benchmark – before embarking on any changes and upgrades – is essential for measuring improvement and progress through time.

A portable energy logger (PEL) like the **Chauvin Arnoux PEL103** is the ideal tool for accurately monitoring power consumption and much more, including harmonic levels, voltage imbalance and power factor. In addition, by using a **PEL103** across entire buildings and recording the results over time, facilities managers will be able to gain detailed and revealing insights into what's actually contributing to their energy bills.



A **PEL** is an all-in-one instrument that measures a whole range of electrical parameters, such as voltage, frequency, current, real power, reactive power, harmonic levels and more. Crucially, the **PEL** doesn't only measure these parameters, it also stores the results over a period of time that can range from a few minutes to months. This is essential, as some key issues, like equipment that is not needed during the shutdown but is still switched on and off automatically by a timer, can only be identified by looking at time-stamped energy usage records.

A **PEL103** can be installed quickly and easily in a distribution cabinet where it can monitor circuits for lighting, HVAC, display screens, computer systems and more. If it is to deliver its full range of benefits, the **PEL** should be set up to make recordings over time. A day is good, but a full week or even longer is likely to be even better, as interesting things often happen at weekends! For instance, according to a survey carried out by British Gas, up to **46%** of the electrical energy used by SMEs was consumed outside normal business hours, so paying attention to those out-of-hours costs can yield big dividends.

Buying a **PEL** can be a very profitable long-term investment and connecting to it remotely can give you valuable insights even if you can't regularly visit the site. This is particularly useful during school holidays or during lockdown, when everyone is advised to work from home.

The **PEL** will give premises managers information about the power factor of the loads. Most electrical loads consume two "types" of power – active power and reactive power. The active power does useful things – light the lights, turn the motor and so on – while reactive power does nothing useful. But the catch is that you pay the same for active and reactive power! But where does power factor come in? It simply tells you how much reactive power your loads are consuming. If the power factor is 1.0, they consume no reactive power, but if it's any lower – 0.9 or 0.8, say – then you're paying for useless reactive power.

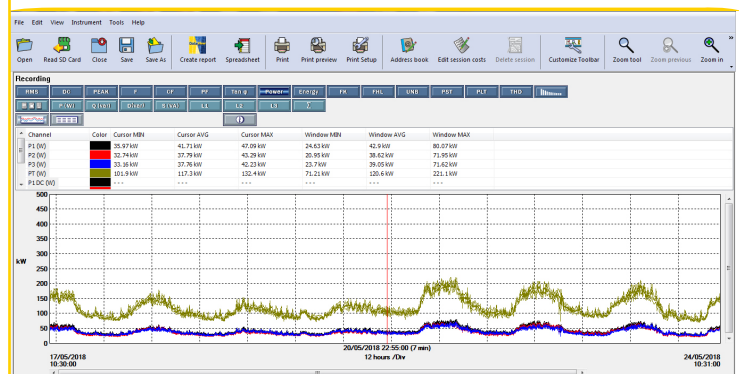


Apparent Power (kVA)

The good news is that it's possible to 'correct' poor power factor, bringing it nearer to 1.0 and reducing the amount of reactive power you pay for. This correction usually takes the form of capacitors fitted near the main distribution board and you may already have them. But, over time, capacitors can lose their capacitance and, of course, the loads on your system may change. As a result, your power factor may be much worse than you think, and reactive power may be costing you a lot of money.

In case you're wondering how monitoring energy efficiency actually works out in practice, **Peter Halloway**, Regional Sales Manager at **Chauvin Arnoux** describes how a recent project at a secondary school in Kent provided some eye-opening findings. "We were working on an energy efficiency project at a typical secondary school and we logged the measurements over an eleven-day period," remembers Peter. "The period included the half term holidays, a week of term time and a weekend. The logged results revealed some very interesting statistics."

"The total energy consumed in the period came to just over £2,000, which correlated well with the school's annual electricity bill of around seventy thousand pounds. But even at the weekend, when there was no activity on the premises, there was still a load of around 30 A per phase. Also, there was a phase imbalance that was producing an excessive current flow in the neutral."



Another important finding from the investigation was that harmonics were unexpectedly high, which is actually a common problem given the proliferation of non-linear loads in our fast-moving technological world. In this case, the data showed that the third- and fifth-order harmonics were dominant. Third-order harmonics in schools and other

non-industrial installations are typically caused by personal computers, office equipment and electronic lighting, and in this installation the fifth-order harmonics were ultimately traced to the server UPS.

"Having analysed the data we had recorded over the eleven-day period, we were able to recommend a solution that would balance the loads and explain how to reduce the harmonics by fitting filters," Peter added. "An even simpler solution however would have been to educate staff to turn off lighting and equipment at the end of the day or even install systems to turn it off automatically.

Relatively small changes like this will deliver big benefits over the years, giving organisations a golden opportunity to enhance their green credentials whilst simultaneously saving thousands of pounds. In short, a PEL is the right choice for kick-starting any organisation's decarbonisation programme – and it's a modest investment with the potential for delivering very big benefits!"



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