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Will switching off street lights save energy?

Yes of course it will, but simply saving energy by switching off lamps could well in fact cost a huge amount of money to achieve this.

What do we mean by switching off? Do we mean permanent removal of lighting or merely switching off after midnight until just before daybreak?

But before we consider switching lights off at all we must exhaustively consider all aspects of road and community safety and risk management. There are a lot of no win no fee lawyers ready to pounce.

We must be clear in our minds how the cost for electrical energy is derived.

If for example we have an offer from the electricity company to supply energy at a cost of say £300/kW of load for dusk to dawn burning (c., 4100 hrs p.a.) there is an understanding that we will in fact use 4100 hours of lighting load p.a..

The calculation at arriving at the cost (£300/kW) is based upon the use of half hourly metered purchase of power from the generating company by the electricity company who then sell it on to you.

The electricity supplier purchases power 12 months in advance based on the estimated power usage by the lighting authorities.

So far so good.

But what happens if, after negotiating a contract between the supplier and the lighting authority that a decision is made to turn off lighting at midnight or switching off all together? In the case of the former, switching off at midnight, we are speaking about the time that energy is at its cheapest. It is also a load balancing facility by the generations because you can't easily "turn down" the output of a generating station.

If we did switch off part of night, the companies will simply increase the already expensive day rate.

Make the analogy with Virgin Trains going between Manchester and London:- the early morning peak fare is c..£300; but if you delayed your departure time until say 10.00am you could travel for as little as £50 - great! But what would happen if everyone did that? Simply all other fares would rise to achieve the required profitability levels.

The electricity companies are no different.

Switching lighting off altogether has even greater ramifications.

Again any reduction in load purchase would result in energy price increases elsewhere to make good the profit deficit.

However; there are bigger problems, that would emerge if policy decided on switching off lighting altogether.

Well then how do we physically switch lighting off?

Dead easy; you pull the fuse or turn it off at the CCT breaker. Well that's it isn't it? No it's not; true, the light is switched off, but the Electricity Company will take the view that unless it is part of a short term experiment they will consider that the installation is still on the inventory and subject to energy charges being levied as part of your connections agreement.

Well the object of switching lighting off, is, we are told to save energy, and by switching we will certainly save energy and in the process reduce CO² emissions.

However, to make savings on the cost of energy reduction, the installation will need to be permanently de-energised. This requires that the mains input feed be it in a lighting column or a feed control pillar must be disconnected from the mains cable by the electricity company or their agent. Such disconnections are very expensive, costing c. £500/unit for a single phase paper lead cable and considerably more for a 3-phase system. After disconnection of the mains cable, the cost of permanently removing the lighting column and reinstatement will be in the region of £100/unit.

Even if the lighting in question is on a private Local Authority cable and only a single 3-phase disconnection is required, the payback would be a minimum of 5 years on a main road system (150 watt SOX) and considerably more with lower wattages.

Individual mains connections to every column makes the whole thing a non-starter typically costing £500/unit to disconnect and remove the column for an energy saving of c. £60 p.a., i.e. 9/10 years payback and consideration must be given to road signing where illumination of those signs is mandatory. In most instances those signs are fed from an adjacent lighting column. However, you've turned the lighting off! A possible solution is to use solar powered signs but these are very expensive to purchase.

Even allowing for the removal of a facility, that in most instances enhances the environment and is a proven aid in crime reduction (including car crime) and road safety, the proposal will in general terms have such a long term payback, or maybe no payback at all, one must question the reasons for the notion of switching off lighting, but let us not be totally dismissive, because by switching off there will be the reality of reducing the CO² footprint. However, as I will explain later in this paper, there are far more efficient ways of saving energy and reducing CO².

Switching off seems to be quite a vociferous minority who are calling for this. Is it the dark skies lobby? It is true that the night sky has been ignored on so many occasions; we've all seen badly controlled installations at such locations as large retail parks; light pollution, profligate energy usage with higher than necessary CO² emissions. These things really do need to be addressed.

Energy Supply Chains

The world population is rising exponentially and the sources of non-renewables: coal, gas, oil, can only diminish. With the new super giants of China and India becoming the new industrialists of the world, how can we say to them (with 25% of the world population) use less energy. That would be morally wrong and practicably nonsensical. Moreover, the world's largest oil and gas reserves are in the hands of some pretty unstable or hostile governments: Iran, Iraq, Russia, Nigeria, Venezuela. Not for nothing is deep mined coal in the UK again coming to the fore.

You may have noticed from technical journals that recruitment in the nuclear industry has been rapidly expanding. Nuclear power is not the total answer but must surely play a not insignificant part of our energy strategy.

France derives over 80% of its electricity from nuclear sources and they export some to the UK via the Channel cable link. We could buy 'off the shelf' nuclear stations from the French, saving on time (which is so important) and R & D costs on the new UK designs.

We buy French cars, French wine and French [PAUSE]...other things.

We are at a crisis point in energy provision so what do we do?

Sustainable Street Lighting

Street lighting needs to be sustained; it is an important part of the expectation level of our lifestyle, not just in the UK but across the developed and developing world. The reasons for its permanence are too well established for further debate, but let's look at the practicalities of affordability and technology.

Much of the lighting stock of the UK is obsolete, expensive to maintain and high in energy usage and releases c. 2 million tonnes of CO² p.a.

Much of the existing lighting stock in the UK is low pressure sodium, which is very good at producing light (up to 200 Lm/watt), far better than high pressure white SOX, but being monochromatic, most of it is wasted. You can test this looking at a Dulux paint chart under low pressure SOX. The only colours you can see are yellow and orange, all other colours appear brown and grey. Look at the same chart under high pressure sodium or fluorescent of a much lower wattage and you see the whole range of colours. So you see more with less light, because that light is polychromatic whereas SOX is monochromatic, so we use less electrical energy and release less CO² if we reduce the wattage in the unit. But even changing over from low pressure SOX lighting to high pressure either by new build or retro-fit is not the whole answer. We must embrace the new technologies now available.

Both traditional low pressure and high pressure sodium have one thing in common, they both utilise old style control gear technology, i.e. magnetic ballasts that require igniters and the need to regularly change the power factor capacitor, in itself an expensive process.

Failure to maintain power factor of 85/90% will result in action by the electricity supplier; this could result in additional charges for reactive power usage or the ultimate sanction of disconnection.

So, how do we avoid these problems and save energy, money and CO² reduction?

By way of a solution, Tameside embarked on a strategy to achieve the objectives of both power and CO² reduction and to give a more affordable maintenance regime.

Thus we have achieved some of the objectives, it's not the only answer but it is but one of many. But what are the other solutions? Merely to say, as so many do, we are studying various options or we are evaluating other propositions is not good enough. In a lot of cases these are merely euphemisms for 'doing nothing'.

Public Interest –V- The Environmental Lobby

Are we really saying that lobbyists are not members of the public or are they themselves saving it? The bottom line in all this is we're all in it together, 'muck and nettles'. The divisiveness of hard-line standpoints can only ensure that there will never be mutually acceptable resolve. Not very adult is it?

Look at some of the areas of debate:

Turning Lighting off – well I have explained that this may well cost money rather than save. Only with the introduction of actual metering will power costs reflect actual usage, with those metered costs being at a higher rate than conventional dusk to dawn lighting. Online central management lighting controls are now emerging but this is not in general use and is expensive to install.

CO² Reduction – Any reduction in power will result in lower CO² emissions and in that respect we are as one; it is to be commended. However, the lighting progressives would argue, and rightly so, that the latest technical innovation can achieve the same objectives without the need to 'switch off' thus maintaining the lighting facility that for most people is a boon and a way of life.

Dark Skies – I would venture to suggest that the overwhelming majority of 'the public' don't give a damn about the night sky. That is not to say that we would not show care and concern about what is in reality the most awesome and mind blowing phenomena there has ever been. It is incumbent on the lighting professions to seek to minimise light pollution because apart from visual obtrusiveness it has an actual cost in wasted energy and CO² emissions. But beware, even the most carefully designed fittings with no light source visible above the horizontal, i.e. full cut-off, does cause light pollution. This is because light is reflected back up from the road surface into the atmosphere where particulates in the air themselves become a light source. This is more noticeable on a hazy night or near to sources of pollution, e.g. sawmills, factories, vehicle exhausts, etc.

Lighting is such a wide all-embracing subject and to attempt to try and answer just some of the questions involved would take more time than these simple outlines in my paper, but as always I will happily speak with any of you at any time. Thanks.

Mark Brody to APSE northern seminar