IT Analysis – Blue-Sky Green?

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Revolutionising Green Power

In an earlier article, Quocirca looked at how major energy savings could be made in very large data centres by looking at moving from taking power from the national grid, and moving to a community combined heat and power (CCHP) approach, where highly efficient compact generators are utilised to provide locally generated power (so minimising power losses due to transmission) and making heat available for both space and water heating. This bred a fair amount of interest from various area, and Quocirca has been looking at other means of looking beyond the obvious for how energy utilisation can be best optimised within the workplace.

Within this article, Quocirca looks at the possibilities for energy capture and at regeneration. The figures quoted throughout this article are provided as pointers only to the order of magnitude of waste that we create on a daily basis – each of the figures is at best a theoretical figure, and recovering the energy would involve heavy losses.

Although many of the approaches here are only looking to recover small amounts of energy, the idea is to look at where organisations use these amounts to power, for example, CCTV, biometric security devices, emergency lighting and so on, or how a proportion of the overall energy requirements for an organisation can be offset through the use of energy storage systems (e.g. via supercapicitors or high-efficiency long life re-chargeable battery systems).

Semi "mainstream" approaches

Already, many companies are looking to solar power for either space/water heating or for electricity generation. A new generation of "printable" photo-voltaics is due on the market in the next year or so, and the cost and energy equation in the manufacture of such systems should make a lot more sense than many existing photo-voltaics for use in less sunny climates such as the UK. Also, heat pumps are being used to provide space/water heating using the steady temperatures of underground environments providing very high efficiencies in power/heat conversion.

However, other areas which may become mainstream in the next few years also include:

Direct human power capture

Every morning and every evening, there is a massive wastage of power from the majority of organisations. Each employee on site will at least come in through the front door, and will leave via it in the evening. If we assume that these doors are of a revolving nature, have a mass of 250kg, and that the door is being moved through a circular path of 1 meter in 3 seconds, each person will be providing a nominal power output of 83 Watts just to get through the door. If you have 1000 employees, that's 166kW of potential energy that you are wasting in just letting the door swing round after each person has come through it. If each person has to go through 10 more doors each day, it all starts to add up. The first step, obviously, would be to get rid of those doors that are powered.

Already, there are CCTV systems on the market that are self powered from the energy created through doors being opened and closed, enabling photos to be taken of each person that goes through. Through the use of storage batteries, commonly used doors could provide the majority of their own power to drive biometric security devices.

Power regeneration

The majority of buildings over 2 or 3 floors have elevators. Again, if we assume that an elevator has a mass of 2 tonnes and that it is travelling from a height of 20 meters (approximately 5 floors) over a time of 60 seconds, we have a nominal energy that has to be dissipated through braking of 6.5kW each time this happens. If the elevator is used 20 times per day, we have a wasted theoretical energy capacity of 130kW. Again, capturing as much of this power as possible (probably around the 15 - 30% level) through regenerative approaches could well be cost effective.

Heat-to-Power

A common problem for many organisations is dealing with excess, low grade heat. For example, areas within data centres run hot – but only into the 50 or 60 degrees centigrade level. Reusing this heat to heat water to hand-warm is possible, so cutting down on the need for direct heating, but there is another approach which can result in electrical output.

The majority of thermometers these days do not use mercury or alcohol, instead using an attribute of how two dissimilar metals perform under changing temperature. This effect makes use of the voltaic potential difference where electricity is continuously generated by two wires of different metals welded together. The thermoelectric effect generally means that more electricity is generated as the temperature increases. Such a single device, known as a thermocouple, would provide around 1-1.5 volts at microamps, so is not much use on its own. However, thermocouples are cheap, the majority being made from very common metals (e.g. iron, copper and nickel alloys). Therefore, connecting many of these together in parallel and in serial can provide useful power outputs that work directly from the heat of a data centre. These devices, known as thermopiles, are the subject of much experimentation to see how efficient and effective they can be, and at what price useful systems can be mass manufactured.

It also becomes incumbent on us to put more pressure on the vendors we are dealing with. Looking at the data centre, how many of those LEDs are providing any information that is useful? A fully managed centre won't have people looking for amber or red LEDS in the sea of green, so why waste the power? Do we really want to save a pound here and there by having cheap fans, when a proper fan will last longer and will cool more effectively at less wattage? Should we settle for generalised operating systems and middleware that provide functionality we will never use, taking up precious CPU cycles that need power and cooling? These areas will be expanded upon in later articles.

Green is far bigger than it at first appears – if you really do want to be green, then new thinking will be required.

About Quocirca

Quocirca is a primary research and analysis company specialising in the business impact of information technology and communications (ITC). With world-wide, native language reach, Quocirca provides in-depth insights into the views of buyers and influencers in large, mid-sized and small organisations. Its analyst team is made up of real-world practitioners with first hand experience of ITC delivery who continuously research and track the industry and its real usage in the markets.

Through researching perceptions, Quocirca uncovers the real hurdles to technology adoption – the personal and political aspects of an organisation's environment and the pressures of the need for demonstrable business value in any implementation. This capability to uncover and report back on the end-user perceptions in the market enables Quocirca to advise on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform businesses and the processes that drive them, but often fails to do so. Quocirca's mission is to help organisations improve their success rate in process enablement through better levels of understanding and the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly surveying users, purchasers and resellers of ITC products and services on emerging, evolving and maturing technologies. Over time, Quocirca has built a picture of long term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca's clients include Oracle, Microsoft, IBM, Dell, T-Mobile, Vodafone, EMC, Symantec and Cisco, along with other large and medium sized vendors, service providers and more specialist firms.

Details of Quocirca's work and the services it offers can be found at
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