Whitepaper
Using cloud technology to enhance sustainability and reduce consumption

Environmental issues are a common part of most IT strategies as awareness of carbon footprints and energy use of technology has become widespread. But how can cloud computing help to improve sustainability, and what role should the cloud play in green IT planning? This report examines the green credentials of cloud computing.

Green IT aims to use computers and IT resources in a more efficient and environmentally responsible way. With businesses dependent on technology, and staff working on desktops, laptops, netbooks and smartphones all day, connected to servers running 24/7, IT has been estimated to be responsible for 2% of global carbon emissions – not to mention the cost of all that electricity.

Adopting virtualisation and cloud computing can save companies a great deal in energy costs as the number of internal servers used can be reduced and application management can be outsourced to a cloud provider.

The cloud provider's energy usage can be consolidated and made more efficient by supporting multiple customers with server capacity and application services – such as software-as-a-service (SaaS) – as a result.

Because the SaaS pay-as-you-go model allows firms to choose only the specific applications they need at any given time, instead of having to pay for the entire suite of software on their premises, they can save money. IT staff costs can also be reduced because upgrade and maintenance responsibilities are shouldered by the cloud provider.

If firms use dedicated hosting services via the cloud, they can also shop for "green" hosting providers that use solar-, hydro- or wind-power as part of their energy supply from the grid. Some hosting companies in the UK and other parts of Europe have already sourced some kind of green power supply.

Cloud computing options

Infrastructure as a service (IaaS) via the cloud offers scalable computing power to companies without requiring them to bring hardware services in-house. With IaaS, cloud providers supply the infrastructure as needed to support businesses running their own applications.

By converting infrastructure to a periodic and predictable cost, a company can avoid unexpected repairs and upgrades while being assured of maximum uptime.

IaaS provides the scaling of processing power, so users are never caught in the position of overload while avoiding the costs of under-utilised capacity. Like SaaS, the cost of IT staffing is reduced through reduced internal maintenance, upgrade and support costs.

Another way to save power is to consider thin-client or server-based computing to serve all or parts of your business. A thin-client computer using a simple web browser and/ or remote desktop virtualisation software can use up to half the energy of a standard desktop loaded with its own dedicated applications. The applications can instead be accessed on demand from a remote server from any location via the cloud.

In addition, firms can save further cash and become greener at the same time by moving their documents and other data into the cloud. Instead of staff being forced to use inefficient and time-consuming filing cabinets filled with hard copies, and copying and printing out endless pieces of paper for themselves and others, firms can make those documents available electronically by storing them securely in the cloud. Staff can then access them when they like from any location 24/7.

This saves on paper and ink and reduces printer carbon emissions. It also reduces confusion as often there is only ever one version of a document to cope with. Anyone

who needs to can access previous versions or edits, and in most cases there is very little need to print anything. If you need to send a copy to someone you can e-mail it to them.

What is the environmental impact of the cloud?
Environmental campaigner Greenpeace published a report this year – *Make IT Green: Cloud Computing and its Contribution to Climate Change* – which questioned the amount of energy being used in datacentres hosting cloud services.

The report criticised large companies using the cloud to deliver on-demand services to consumers and businesses, including Google, Yahoo, Facebook, Apple and Microsoft.

Greenpeace said these companies' datacentres providing cloud-based services were not tapping into enough green sources on the power grid, such as wind- and hydro-electricity. While Google and Yahoo had recently built individual datacentres with an improved greener energy mix, most of the power at those sites relied on "dirty" sources of power such as coal and nuclear. The reliance on dirty power applied to other datacentres used by those two firms and the datacentres operated by the other companies covered in the report.

While some see nuclear power as a green energy when compared to energy created from coal, many in the green movement don't.

And putting aside the Greenpeace report, there are still many who believe that adopting cloud services may well save firms money through the consolidated supply of services, but that the positive environmental impact is uncertain, as more energy is simply being used in extremely large and remotely connected datacentres instead.

Ovum analyst Vuk Trifkovic says: "The debate about the environmental impact of cloud computing was re-ignited by the release of the Greenpeace report. Although the report fails to explain fully the impact of cloud computing on energy consumption, Greenpeace rightly highlights the issue of electrical energy sourcing.

"The impact of cloud computing on power consumption will depend on its energy efficiency, its impact on overall demand for computing, and the extent to which cloud computing providers power their operations with electricity from sustainable sources."

Ovum says cloud computing typically boosts energy efficiency per unit of output. On the other hand, the cloud could be expanding the scope of computing, thereby driving higher aggregate electricity consumption. This effect – technological progress enabling greater efficiency, increasing usage and driving power consumption upward rather than downward – is known as "Jevons paradox". The concept was invoked to explain the apparent increase in coal consumption following the improvements in steam engine efficiency in the 19th century.

Greenpeace challenged cloud providers to use their market clout to drive green changes in the electricity supply chain to reduce carbon emissions. Trifkovic says: "In this regard, we agree with Greenpeace: greater reliance on renewable or zero-carbon energy sources in the cloud computing generation is imperative."

Cloud management and legislation
Ovum also says firms have been sluggish on the governance of their cloud computing policies, which doesn't bode well for those seeing the cloud as a green IT solution.

An Ovum report published this year says the governance of cloud computing policies has become too reactive and unco-ordinated at many IT organisations.

Laurent Lachal, the report's author, says a new approach is needed to manage policies and procedures around cloud computing – as it cannot thrive without an effective governance framework – that supports co-ordination between IT and business teams.

Although there is continuing debate about whether cloud computing is intrinsically greener than delivering IT services efficiently in-house, the UK's carbon trading scheme is likely to push larger organisations towards the cloud anyway.

The UK's Carbon Reduction Commitment (CRC), renamed the CRC Energy Efficiency Scheme, applies to about 5,000 large private and public sector UK organisations that consume more than 6,000 MWh of electricity per year.

Participants only purchase carbon credits based on their own levels of carbon emissions, not those generated by third-party suppliers on their behalf - including cloud providers.

Organisations could therefore be tempted to outsource more of their services, including IT, so that their carbon emissions do not appear to rise year-on-year, potentially avoiding CRC cash penalties and damage to their reputation.