



**carbon
control**
SOFTWARE

SOFTWARE CONCEPT REPORT

www.carboncontrolsoftware.com

ABSTRACT



Computer systems and Information Technology in general, use a significant amount of energy on a daily basis and subsequently contribute to an organisation's overall carbon footprint. Like walking on a "soft sandy beach" everyone leaves a footprint, and the aim of **Carbon Control Software (CCS)** is to reduce the amount of carbon emissions produced by an organisation through the efficient utilisation of energy used to operate computer systems.

With the facility to both measure the amount of energy used and enforce automated energy management policies, CCS can in effect reduce the energy usage of an organisation's IT infrastructure, offering:

- Significant decrease in energy costs
- Reduction in organisation's overall carbon footprint
- Compliance with EU Regulations & Legislation
- Ability to disclose 'green' credentials on global carbon disclosure network CarbonEarth

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OVERVIEW

Why should we pay attention to our energy usage and carbon footprint?

Ever more companies see climate change as a growing threat to their commercial interests, according to a study carried out on behalf of 315 global investors.

Investors want firms to quantify and disclose the likely costs and benefits derived from climate change.

“Increasingly investors view good carbon management as a sign of good corporate management”

- Paul Dickinson, Chief Executive of the Carbon Disclosure Project

What is the impact of information technology on the global environment?

Ever thought of ways to make your computing more environmentally friendly?

Since computers, monitors, printers and other miscellaneous peripherals use electricity, you can do so by reducing the amount of energy they consume.

New research shows that computers generate an estimated 35 million tons of the gas each year - the equivalent of one million typical flights to and from the UK. And Gartner, the international information technology research company, estimates that globally the IT industry accounts for around 2 per cent of carbon dioxide emissions - much the same as aviation.

An additional fact is that companies stand to save a substantial amount of money through improvements in education of end-users with regards to energy use and computer best practice.

Carbon Control Software offers companies a simple solution which allows them to both reduce their overall energy consumption whilst still maintaining maximum productivity levels.

KEY DISTINCTIONS

How can software help us achieve efficient power management of our computer systems?

Reducing the energy consumption of computers and monitors is simple, and it does not require investing in newer models. Turning computers off at night and putting them into low power mode when they are idle can reduce their annual energy consumption by more than half.

Power management can be done manually or automatically. Manual power management requires users to physically turn off their computer or put it into low power mode. As such, it requires an education program.

Achieving consistently high levels of manual power management in a large organisation can be difficult. Through automatic power management (either by properly configuring any built in power management features, or using third party software) can theoretically ensure 100% of computers are turned off at night and in low power mode when idle.

How can Carbon Control Software provide you with information about your IT energy usage?

Carbon Control Software resides as a Windows-based service on company computer systems, comprised of both desktops and laptops, providing real-time accurate measurements of computer activity. The measurements are then processed further and expressed in terms of energy usage by a particular computer system over a given period of time.

Additionally Carbon Control Software has the ability to measure offline or remote computer activity by storing measurement data in temporary storage space on the local machine. Upon connecting the system to the network, the permanent storage database will be updated with the relevant offline activity measurements.

Carbon Control Software offers system administrators a variety of reports, statistics and graphs of energy usage information on corporate networks, allowing for the calculation of the overall energy consumption of the company's IT infrastructure and subsequent estimation of carbon emissions.

Managers, directors and supervisors are provided with customised reports containing information relating to energy usage, energy wastage and energy saving data for:

- Individual Computer Systems

- Users
- Departments
- Company

How can Carbon Control Software optimise your energy usage and reduce your carbon footprint?

As well as providing companies with valuable information on energy usage and carbon emissions, CCS offers system administrators the facility to enforce computer usage policies on end-users within the company to help optimise their energy usage and ultimately reduce their overall carbon footprint.

System administrators are able to define both global enterprise-wide policies and local end-user policies, which will govern the usage of computer systems across the organisation.

This type of enforcement can vary from a simple warning message, informing users of potential negligence, to the application of an automated shutdown or hibernation procedure on the offending system.

Through the utilisation of the automated CCS policies described above, companies are now, for the first time, able to conform to existing standards and legislation without having to invest in expensive system usage surveys and other manual-based procedures.

How can Carbon Control Software and CarbonEarth facilitate carbon disclosure inline with the objectives of the Carbon Disclosure Project?

The Carbon Disclosure Project (CDP) is an independent not-for-profit organisation aiming to create a lasting relationship between shareholders and corporations regarding the implications for shareholder value and commercial operations presented by climate change.

Both investors and corporations have a huge role to play in mitigating against the effects of climate change and in driving emissions reductions globally. By facilitating a dialogue and engagement on climate change CDP plays a vital role in the steps to encouraging corporations to measure, manage and reduce emissions.

In line with the overall strategy of the Carbon Disclosure Project, Carbon Control Software is the first technological advancement in software to offer both, a means of reducing the carbon footprint and

a forum for disclosing carbon footprint reduction to the world through the global carbon disclosure website, CarbonEarth.

With carbon disclosure being the primary driver and through utilisation of the increasingly popular media of online social networking, CarbonEarth has been designed as a bi-product of Carbon Control Software to offer organisations a complete “carbon friendly” solution for Information Technology, from information to action to disclosure.

How can Carbon Control Software offer a means of compliance with EU HSE Regulations in IT?

The Directive

The 1993 Working Time Directive (93/104/EC) was a major step forward, setting a 48-hour maximum working week and laying down requirements for rest and leave periods.

The Directive’s main objective is to promote health and safety at work, given the clear evidence that people who work long hours run higher risks of illness and accidents.

It binds all 25 Member States of the EU. The ETUC regards this legislation not only as a basic cornerstone of workers’ well being, but also as an indispensable feature of the social dimension of the internal market, especially in light of enlargement.

Its main provisions cover:

- Maximum weekly working time of 48 hours on average, including overtime
- At least four weeks paid annual leave
- Minimum rest period of 11 hours in each 24, and one day in each week
- Rest break if the working day is longer than six hours
- Maximum of eight hours’ night work, on average, in each 24.

One of the aspects of this legislation is that Employees should be entitled to short break for every 2 hours spent working continuously at their computer. CCS allows a Health and Safety policy to be generated that will work across your entire organisational structure. If an employee is recorded working at their computer just over the set time limit before a break should be taken then CCS will display the countdown timer to indicate that it is now going into standby. The CCS timer will replace the normal standby text with a recommendation to take a break prompt. If the user accepts this break they simply have to leave their computer and it will automatically go into standby. Should the user decide to decline this break or return before the break limit is over to resume working then CCS will record this as a non-compliant break.

The Reporting Tool offers the ability to generate a graph based upon the compliance or non-compliance of these breaks. If this is done per employee then it will show if the break was completed or not, the length of time that the break lasted for, and will provide the function to print this report in PDF. Once printed the employee and the employees’ manager will both be required to sign the printed document to show acknowledgement of the data held.

SYSTEM DESIGN & ARCHITECTURE

Carbon Control Software is designed as a multi part application working within the network and collecting information about network system activity. The software determines the precise time of the last user input on a particular computer and according to energy saving policies established in scope of the whole enterprise, sends the machine to suspend (standby or hibernate) or shutdown mode. All states of machine are reported to a central database and based on this data the system can generate reports and charts showing energy usage, as well as savings earned, as a benefit of deploying properly defined saving policies.

The methodology behind the design of Carbon Control Software has been accomplished with the view of user transparency i.e. not disrupting end user activity.

Database

Carbon Control Software system architecture is based primarily on client/server technology. The heart of the system represents a database working on the Microsoft SQL Server 2005 engine. The database stores and processes all the information collected by clients' software within the network. The initial data received by the database formation constitutes the basis for further processing to help shape the energy reports, charts and statistics. Simultaneously, the database system supplies the client all information required for client functionality, such as power saving policy, database configuration or pre-determined system actions.

System Management & Deployment

Carbon Control Software contains the tools for database management, remote deployment of the client and the reporting module based on web technologies. The system can operate both on a local database server which requires a dedicated server on the corporate network or alternatively the database may be remotely hosted thereby leaving only the task of installing the client application on all network workstations and management tools on a single system.

Dynamic Client

The client operates in a dynamic fashion, allowing for both “connected state” to a local or remote database system or alternatively the client may also operate in a ‘disconnected state’, which essentially means the client stores data in local text file and uploads the data to database when connection can be restored or established.

CarbonEarth Data

The final component of the architecture is the information channel linking the Carbon Control Software database with the CarbonEarth global database. At the discretion of the network administrator the Carbon Control Software will periodically send data to the CarbonEarth database via a secure channel, authenticated by the unique disclosure key used by the organisation running Carbon Control Software.

Upon receipt of the data, the CarbonEarth server will process the data by asserting which source the data was supplied from via the unique identifier, thereby associating the data with appropriate source and populating the correct entries within the CarbonEarth database so that the latest data is rendered via the CarbonEarth map interface.

The process by which the data source is stamped using the unique identifier and association thereafter by the CarbonEarth server is essentially the unique part of this complete digital Carbon Disclosure process.

COMPETITOR ANALYSIS

Feature	Carbon Control Software	Verdiem	Local Cooling	Night Watchman	Powerwise	PowerSave
System Scope	Network	Network	Local	Network	Network	Network
Energy Policies	Yes	Yes	Yes	Yes	Yes	Yes
Detailed Reports	Yes	Yes	No	Yes	No	No
Carbon Disclosure	Yes	No	No	No	No	No
Remote Hosting	Yes	No	No	No	No	No
Operating System	XP/Vista	XP	XP	XP/Vista	XP/Vista	XP/Mac
H & S	Yes	No	No	No	No	No

The primary competitors in relation to Carbon Control Software are Night Watchman, owned by 1E, and Verdiem, which has recently received \$8 million dollars in financial backing. Both are organisations that are based in the United States and are only now beginning to venture outside of this domain.

When compared against the rivals CCS is able to meet or beat what is currently offered in functionality. It is the only software of its kind to allow the data to be uploaded to a website for open disclosure to the world in a bid to help organisation meet with Carbon Disclosure Project (CDP) requirements. It is the only available product that encompasses a Health and Safety feature where it will keep track of employee recommended break times. CCS also provides clients with the option to connect to a remote SQL database that is set-up and managed by CCS staff. Thus removing the need for the client to purchase, build, and maintain their own. In turn this reduces the clients overall cost expenditure on the deployment of CCS within their IT infrastructure.

CCS is designed in a manner that, upon reaching the required time limit of inactivity before applying energy saving policies, it will perform some pre-policy checks. These are done in the following order:

- **A “Critical Application List” has been created.** This means that if the PC is idle and CCS goes to put the PC into standby it will first check all the current applications running against a list of programs (that the Client provides us with) that cannot be interrupted while it is active in any capacity E.G. Sage performing automatic payroll tasks.
- **CCS HD Check:** CCS will now check (after the Critical Apps List) the Hard Drive state. If Hard Drive is speeding up or maintaining speed it will not put the PC into standby. If it is stopped then it will move onto a CPU usage check.
- **CCS CPU Usage Check:** Before CCS energy saving policies are enforced, the client will check 5 times every 250 milliseconds for CPU activity over 3%. If any of these 5 checks observe CPU activity over 3% then any energy saving action will temporarily cease. If all 5 checks are subsequently below 3% then energy saving enforcement action is initiated by the Carbon Control Software client.

RESEARCH & DEVELOPMENT

As the software is developed naturally Carbon Control Software will facilitate further research and development in the following key areas:

- Database Administration Tool – different designs relating to how this tool should look, work, and function are being addressed. The current level of thinking is to develop this tool with a web-based functionality in mind. By encapsulating this into the current version the administration of policies etc. can be done from any PC or mobile device with internet access as long as the user has the required authorisation.
- To produce a more streamlined version of the product for commercialisation on current Windows supported Operating Systems.
- To develop a version compatible on other Operating Systems such as Mac.

Data Representation & Analysis

Carbon Control Software has already changed in regards to its methods of data representation and analysis over the last 6 months. Originally the data that could be reported on was limited and done with static graphical interfaces. At present this has been completely changed providing the clients with:

- Exciting animated graphical representation of data using AJAX for user interaction
- A wider range of data to perform analysis on than before
- The ability to compare data from 2 different time periods of the clients choosing
- The use of Flash technology to enhance the quality and definition of the graphical information generated
- The ability to save multiple graphs and print them as a PDF document
- To view Health and Safety breaks that were either complied or not complied with in graphical form. The time of each non-complied break being shown next to the break date. Again this graph can be printed to PDF for future use.

Dynamic PC Power Management

PC Power Management relies upon the method of enforcing a standby, hibernate or shutdown action on a computer system. This energy saving mechanism forms the principal foundation of power management within a corporate IT infrastructure, with the possibilities of extending power management to internal system components.

This natural evolution of PC power management will involve optimisation of disk usage, processor throttle and memory utilisation on each system within the network.

Conscious Social Networking

The idea of social networking is to bring groups of likeminded individuals together to converse, interact and exchange ideas. Through development of CarbonEarth, users the world over are able to converse with each other through instant messaging, interact in group activities such as blogging and exchange ideas through the creation of a 'green' user profile. Famous social networking websites allow people to network who share similar backgrounds, such as where they went to school. CarbonEarth members are linked by their combined desire to see a better environment. To do this, they are offered the ability to disclose their carbon footprint and then offer solutions to reduce it. Users can use a 'Carbon Calculator' to work out their own personal carbon footprint, which is then displayed as a 'footprint' on a map at the users location; showing web users where carbon emissions are being emitted and in what volumes.

CarbonEarth is unique in that it combines the ability to generate a carbon footprint with the ability to place this footprint on a global map. The 'yellow pages' of global carbon emissions, CarbonEarth also allows users to augment their footprint information with a personal profile about themselves to offer ideas about carbon emission reductions.

CONCLUSION

With the facility to both measure the amount of energy used and enforce automated energy management policies, the Carbon Control Software (CCS) suite provides effective methodologies in optimising the use of computer systems, offering:

- Centralised PC power management
- Automated IT HSE policy system
- Detailed reports on PC power consumption, savings & HSE
- Global Carbon Disclosure on Carbon Earth

With all of the features above, Carbon Control Software offers a complete software-based solution to modern businesses looking to:

- a) Improve IT energy efficiency
- b) Promote IT environmental responsibility
- c) Create considerable savings in IT energy costs
- d) Comply with EU Carbon Reductions (as set in the report TARGET 2020) & EC Working Time Directive