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TIME I.T. CHANGED

SPECIAL ISSUE

THE **DIGITAL INFORMATION** ISSUE

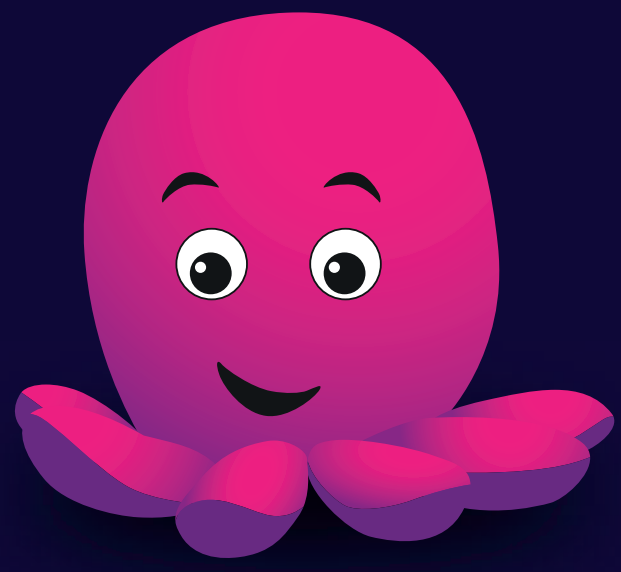
REMOTE WORKING
How transforming the way we work could bring huge benefits to our wellbeing (and the planet)

DEVICES
Why we could all be making better choices when it comes to refreshing our computing devices

THE CLOUD
The 'greenest public cloud' is powered by a hydroelectric dam and a company that's doing things differently

RE-PURPOSING
Repurposing existing laptops to 'thin clients' can reduce embodied GHG emissions by 40%

Because energy shouldn't cost The Earth.



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Welcome to this special I.T. issue of My Green Pod Magazine!

The way we use information technology (I.T.) can help to change the way we work and drive down greenhouse gas emissions. Think about it: we use electricity to power all our I.T. and two-thirds of us commute by car to work. Combined, energy and transport create over 40% of the UK's carbon emissions – but four simple steps would reduce our I.T. carbon footprint and help to build a sustainable future. Read on to find out more!

Justin Sutton-Parker, GUEST EDITOR
Computer Science PhD Researcher
MBA, Sustainability & Leadership

Sustainability. It's a topic we are acutely aware of, but what role does it play in I.T.? My latest PhD research indicates the way we work creates so much greenhouse gas (GHG) pollution that a forest the size of Canada and Greenland would be required to clear it.

It's time I.T. changed. Looking beyond current strategies of renewable energy and electric cars, I.T. can support a better way of working that will create a more sustainable future and help slow global warming to +1.5°C.

YOUR I.T.-RELATED FOOTPRINT

To achieve a proposed 50% reduction in I.T.-related emissions, we all need to adopt a new way of working.

In this special edition, academics and international I.T. companies explain how four simple behavioural changes can drive that goal, including:

1. reducing personal computing energy consumption
2. remote working
3. transitioning to green cloud computing
4. more sustainable hardware lifecycle management.

Think these are 'other people's issues'? Think again. Even now, if you are reading this online, you are already involved – through the energy powering your device, the internet, the cloud data centre delivering your content and how you arrived at your physical location.

These choices and actions all add to our I.T.-related carbon footprint.

THE IMPACT OF COLLECTIVE ACTION

What if you were equipped with the information to respond to a sustainable call to action? To choose a laptop that uses 90% less energy, to commute 40% less, to ask your employer what your organisation is doing about sustainable I.T.?

By making these changes a reality, a year from now you could have reduced your IT-related carbon emissions by over 500kg CO_2e.

If you're not sold on the accounting statistic, then perhaps a real-life equivalent will help. That's the equivalent reduction of a car not driving 1,930 miles, or of freeing up the photosynthesis capacity of 0.64 acres of forest to sequester your individual I.T. pollution.

PARTNERSHIPS AT WORK

In the spirit of the United Nations' Sustainable Development Goals, we could all make a real difference if we act in partnership as a nation of sustainable workers.

As an example, the UK's service sector employs over 16 million people. Considering this is over 50% of the UK's workforce, it's very likely that you are one of those employees.

If we all responded to the call to action outlined in this issue, we would abate 8.8m tCO_2e each year. That's equivalent to the pollution caused by 31bn vehicle miles.

Collectively, we would have released over 10.3m acres of forest to clean our air free from other sources of pollution. And contemplating that trees are the lungs of our world, that's not a bad idea.

So, read on and discover not only what I.T. companies are doing to make a difference, but also what you can do personally. If we want to tackle climate change, it's time I.T. changed. ■

"ICT holds significant potential to drive innovation and enable new low-carbon technologies and behaviours, ranging from energy efficiencies in buildings, enabling remote working and optimisation of transport systems, to smart health and smart agriculture applications. Our report for the GSMA last year, *The Enablement Effect*, identified over 2,000 million tonnes CO_2e annual reductions globally that are already enabled by mobile telecommunications technologies, which is almost 10 times greater than the mobile sector's entire emissions." BARONESS BROWN OF CAMBRIDGE, chair of the Carbon Trust

Measure your organisation’s IT related carbon footprint with Px3 and start your journey towards a more sustainable future

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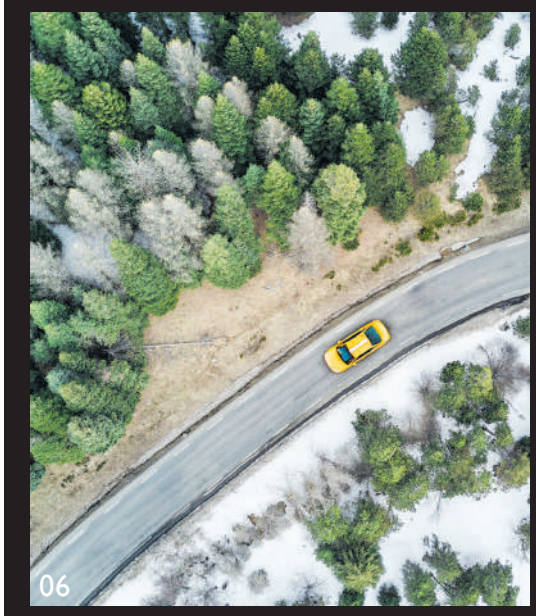
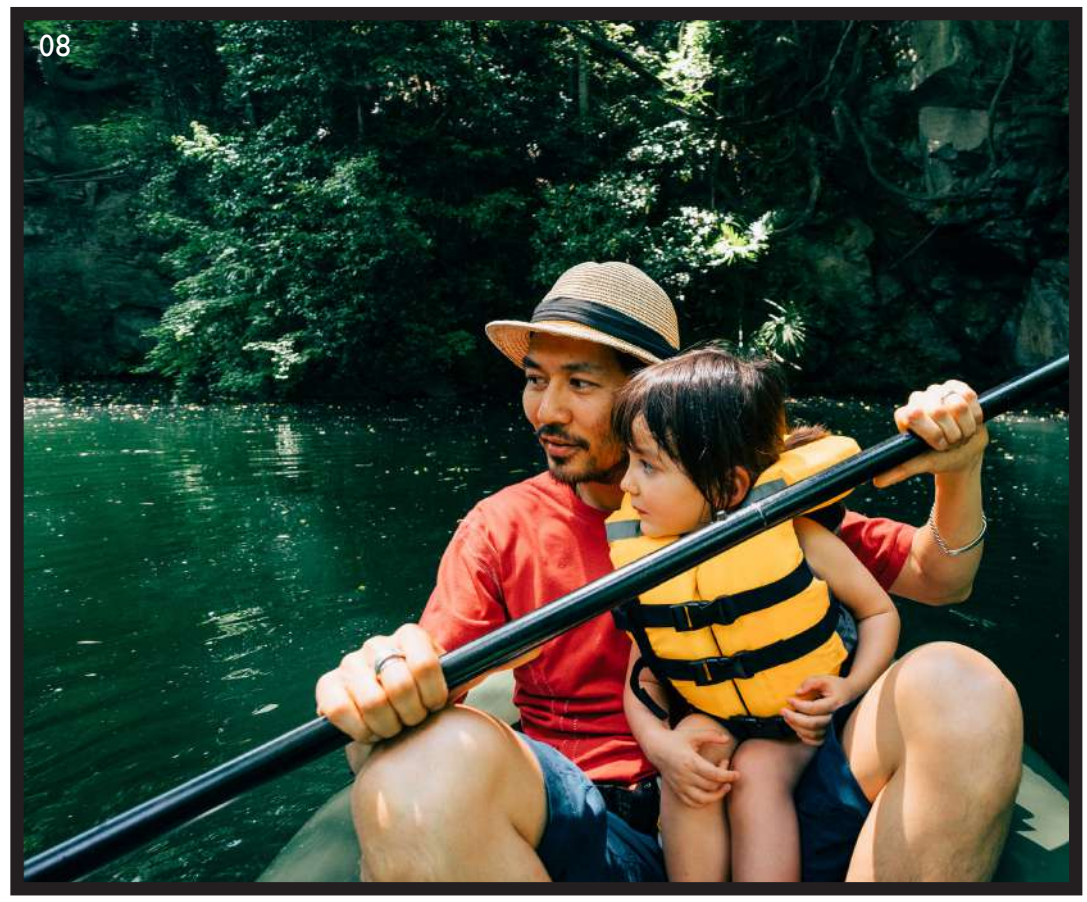




GUEST EDITOR: Justin Sutton-Parker **EDITOR-IN-CHIEF:** Katie Hill **DESIGN:** Suzanne Taylor **PUBLISHER:** Jarvis Smith **PUBLISHING:** My Green Pod/Printed by the Guardian

Justin Sutton-Parker decodes personal I.T. sustainability success

ALL ABOUT 'EVE'

'Climate change is one of the biggest environmental issues of our era and I've seen the impact firsthand during my many explorations. Examining any and all sources of greenhouse gas reduction is vital to building a sustainable future for us all.'

SIR RANULPH FIENNES

Humans don't own the environment: instead, our rapacious tribe is integral to it.

Having grown in such numbers and strived for such innovation, we must now play our role in creating a sustainable present if we are to safeguard the future.

The United Nations states that 'Sustainability is the principle of ensuring that our actions today do not limit the range of economic, social, and environmental options open to future generations'.

Arguably, sustainability is not about stopping life's everyday activities. It is about conducting those activities in a way that reduces harm in both the short and long term. But on an individual level, how do we measure our environmental success?

Have you ever leapt out of bed and said, 'Today I must measure my personal anthropogenic interference on the influence of the temperature of the ground due to the radiative forcing of the gases carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, sulphur hexafluoride and perfluorocarbons with units of CO_2e'? Unless you are a climatologist, greenhouse gas (GHG) accountant or, dare I say it, me, then probably not. Instead, as you walk to work rather than commuting, you will simply sense that you're doing something that feels right.

MEASURING EMISSIONS

The problem is that the measurement for GHG emissions, known as carbon dioxide equivalent units – or CO_2e – is, to the majority of us, intangible. It lacks analogy, which complicates the measurement of personal success.

Who knows what one tonne of CO_2e looks like? It could be the size of a mouse, an elephant – or Cumbria.

When presenting results from I.T.-related GHG emission audits, I regularly announce that a company has generated several thousand tonnes of CO_2e emissions and pause for effect. The heads nod slowly in concerned agreement, while the eyes vacantly confirm that nobody in the room has any idea what I'm talking about. I then go for the analogy, 'that's the emissions equivalent of over 7 million miles driven in a year.' The room erupts with smiles of instant understanding, despite the fact that I've just delivered bad news.

THAT SUSTAINABILITY FEELING

This lack of appreciation for carbon accounting extends all the way through most organisations and, in my experience, becomes even more remote for people who are not compensated – financially or professionally – for improvements in a company's environmental performance. That's why I created EVE.

EVE is an acronym for Employee Vehicle Equivalent; it's simply a per capita representation of I.T.-related GHG emissions, analogised as the equivalent vehicle miles.

Simply put, it measures how much pollution a person creates when using I.T. and commuting to access I.T. for work. But instead of CO_2e units, it shows the pollution in equivalent car exhaust fumes.

The concept is not to shift the commercial carbon footprint from the business to the individual, but to appeal to a wider audience by reaching outside the managerial corporate and social responsibility key performance indicators of compliance and accounting. It's for individuals who want to measure that 'sustainability feeling' due to a personal interest, regardless of their role at work.

In addition to making the measurement of personal environmental success feasible, EVE also sets a baseline for improvement. As your EVE counter reduces month by month – when you choose a more energy-efficient computer or work from home to reduce commuting – your success will have the tangibility we often seek.

Perhaps it's gamifying personal environmental stewardship. Perhaps we should create league tables. Who knows – that's for you to decide.

A CASE STUDY

In the meantime, to appreciate what is achievable by adopting just two of the four simple steps to sustainable I.T., this extract from my research highlights the outcomes delivered by the choice of two real-life end-user computer and working behavioural choices.

In this scenario (see table, below), User A has been equipped with a desktop computer and a display, at a desk within the organisation's commercial office space. Consequently, User A commutes by car to the offices five days per week.

User B has selected a low-energy laptop computer. A virtual desktop infrastructure enables secure working from any location. Consequently, User B chooses to work from home two days per week. This naturally reduces commuting to access I.T.

Having undertaken the sustainable I.T. practice recommendations, User B has reduced annual GHG by over 40%. Individually measured, the EVE value has reduced from 1:4278 to 1:2544, removing the annual equivalent of 1,734 car miles from our atmosphere annually.

THE KEY TO SUCCESS

In isolation that's quite an achievement – but communicated and adopted among wider audiences, EVE is arguably the key to recognising personal I.T. sustainability success.

Read on to find out more about how to reduce your I.T.-related vehicle miles. When you leap out of bed tomorrow, you can think that perhaps it's as simple as being 'All about EVE.' ■

COMPARING BEHAVIOUR CHOICES

GHG CO_2e values, equivalent vehicle miles and abatement percentage for two real-life users:

USER	ANNUAL END USER COMPUTING EMISSIONS	ANNUAL COMMUTING TO ACCESS IT EMISSIONS	ANNUAL TOTAL IT-RELATED EMISSIONS	EMPLOYEE VEHICLE MILES EQUIVALENT
A (Legacy)	16kg CO_2e	1,192kg CO_2e	1,208kg CO_2e	4,278 miles
B (Sustainable)	3kg CO_2e	715kg CO_2e	718kg CO_2e	2,544 miles
Abatement total	13kg CO_2e	477kg CO_2e	490kg CO_2e	1,734 miles
Abatement %	81%	40%	41%	41%

FURTHER INFORMATION

■ More about sustainable I.T. is at **px3.org.uk**

UK BUSINESS NEEDS **SUSTAINABLE I.T.** TO BECOME NET ZERO

By Justin Sutton-Parker & Frederik Dahlmann, Associate Professor of Strategy & Sustainability at University of Warwick, Warwick Business School

H.M. Government plans for the UK to be net zero by 2050. National emissions will be reduced as far as possible, and the rest balanced by schemes to offset an equivalent amount of greenhouse gases (GHGs).

Tree planting will play a part; the process of converting light energy into chemical energy via photosynthesis absorbs CO2 and emits oxygen.

However, this natural capacity is limited by one key factor: land mass. As our climate crisis deepens, tree-planting strategies will only take us so far before we reach our coastlines.

CLEANING UK AIR

If the GHG emissions created by any country exceed the capacity of a forest equal to its land mass, then that nation must look to other sources in order to sequester pollution.

As an example, the UK's land mass is 60 million acres. Last year, the UK created over 450 million tCO2e GHG emissions. To remove this level of pollution via photosynthesis would require over 580 million acres of forest. That's a land mass nearly 10 times the size of the UK and over 70 times larger than our current available woodland.

It's reasonable to say that, mathematically, the UK is currently relying on the rest of the world's forests to clean its air.

Consequently, we need to examine all realms to find new ways to reduce emissions. One of the possibilities is sustainable I.T. in business.

BUSINESS EMISSIONS

UK GHG contributions differ from global statistics based on our specific geographic and socio-economic profile. Transport is the largest contributor at 26%, caused by 808bn annual passenger miles. It's followed by energy supply (25%), business (17%), agriculture (10%) and waste management (4%).

By nature of requiring goods to be transported, employees to commute and operations to be powered, UK business contributes significantly to the top three GHG emission sources.

The government recognises this; since last year, all quoted companies operating in the UK, large unquoted companies and large limited liability partnerships (LLPs), government departments, non-ministerial departments, agencies and non-departmental public bodies have been subject to annual mandatory GHG emissions reporting.

The organisations subject to this newly expanded legislation are categorised as the 'service sector'. They collectively employ 16.1 million people, with 10.7 million working in large companies and 5.37 million in the public sector. This represents 50% of the UK total workforce (32.4 million).

The service sector consumes 32% of all UK electricity, with 11% attributed to the use of I.T. solutions. As a result, I.T. is the sector's third-largest consumer of electricity behind lighting (14.5%) and cooling and ventilation (13.4%), creating an estimated 7.8m tCO2e of annual GHG emissions.

I.T.-RELATED EMISSIONS

While I.T. GHG emissions are typically accounted as scope 2, there are also scope 3, 'people-based' GHG emissions associated with business I.T.

Companies are only slowly realising their wider impacts and responsibilities. Statistics indicate that almost 11 million service sector workers commute by car, and 67% use computers to conduct their work. This equates to almost 31bn car miles per year being travelled to access I.T. systems, generating 12.6m tCO2e annual emissions.

Combined, the UK service sector produces over 20m tCO2e of I.T.-related emissions annually. It would take 24 million acres of forest to sequester that level of pollution – or a woodland almost half the size of the UK.

NEW STRATEGIES

UK businesses need to consider new ways and means to shrink their corporate carbon footprints. Adopting bold steps to measure, account for and reduce GHG emissions through innovative sustainable I.T. solutions is critical if we are to achieve net zero by 2050.

The emissions created by running computer devices and data centres – plus commuting to and from work – are areas with significant potential for mitigation. The effects of the pandemic should present an opportunity to review and plan new I.T. strategies that are consistent with addressing another urgent global challenge. ■

FURTHER INFORMATION

■ More on Dr Frederik Dahlmann is at **wbs.ac.uk/about/person/frederik-dahlmann**

PHOTOGRAPHY ISTOCK

TRANSFORMING THE WAY WE WORK

Shifting what work looks like could bring huge benefits to our wellbeing and our planet

2020 is the year the entire world stopped. A global pandemic brought manmade disruptions to a halt, allowing the planet's cycles to return to their natural rhythm.

We were able to hear the outdoors clearer and louder than ever. We saw dolphins and other marine life in Venetian canals. While we quarantined indoors, feral goats ventured down mountains and sat on city walls.

2020 was the year wildlife reclaimed the lands we had slowly taken away.

A CLEANER, QUIETER LIFE

As wildlife got a break from human impact, some cities cut their pollution in half. In the northern Indian state of Punjab, residents saw the Himalayan mountains for the first time in decades. Residents of overly polluted cities experienced clearer skies and were able to breathe clean air.

As the air and water became cleaner, the Earth also got quieter. A study by Imperial College London revealed that between March and May 2020, global levels of seismic activity dropped by an average of 50%. This resulted in the longest and most pronounced quiet period of seismic noise in recorded history.

HUMANS AND CLIMATE CHANGE

Global lockdown revealed how human activity impacts global warming and drives climate change.

Increases in atmospheric greenhouse gases (GHGs) cause global warming. When these molecules trap heat and radiate warmth back to the Earth's surface, the heat no longer dissipates back into space as it would under normal conditions. This trapped heat then creates climate change via rising temperatures.

Research shows that human interference has already caused 1.0°C global warming above pre-industrial levels. Today, human activity creates 53.5 billion tonnes of CO_2 annually.

As we continue to expand and grow, scientists suggests the increase will reach 1.5°C by 2052 and 2°C by the end of the century.

This will lead to a 59% loss of coral reefs by 2060 and by 2080 we will see global flooding and drought.

If we don't act fast, sea levels will rise 0.77m by 2100 as polar ice melts and oceans experience thermal expansion. Rising seas will submerge substantial landmass in low-lying areas, meaning hundreds of coastal cities will be vulnerable to flooding.

THREATS TO BIODIVERSITY

Terrestrial biodiversity and ecosystems will also be damaged, causing species loss and the extinction of an average of 6% of insects, plants and vertebrates.

According to the United Nations, around one million animal and plant species are now threatened with extinction, many within decades. That's more than ever before in human history.

As we have seen in recent headlines, nature is declining at an unprecedented rate. These extinctions will have grave impacts on people around the globe. 'The overwhelming evidence of the IPBES Global Assessment, from a wide range of different fields of knowledge, presents an ominous picture', said Sir Robert Watson, IPBES chair. 'The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide.'

Aquatic marine life is also under threat. The acidification of aquatic ecosystems will disrupt marine catches by 1.5 million tonnes due to the depletion of fish populations.

Humans will also see an increase of heat-related morbidity and mortality in addition to seeing an increase in pandemics such as Covid-19.

EMISSIONS FROM I.T.

Human activity, the primary source of global warming, includes electricity, heat production and other energy (35%); agriculture, forestry and other land uses (24%); industry (21%); transportation (14%) and buildings (6%).

Information technology (I.T.) is a major energy consumer, using over 10% of all business electricity, while employee commute is responsible for 27% of miles travelled. Combined, it's estimated that I.T. and commuting contribute to over 5% of global carbon dioxide, nitrous oxide and methane emissions.

Electricity in I.T. – driven by devices, networking and data centres – contributes to 2.3% of global emissions. Commuting accounts for 2.8% of global emissions, producing 2.7 billion tonnes of annual global greenhouse pollution – equivalent to 573 million vehicles.

Removing that pollution from our atmosphere would require 3.2 billion acres of forest – an area roughly the size of Canada and Greenland combined.

SUPPORTING THE SDGS

We must act now. The I.T. sector is being urged to adopt sustainable strategies to reduce environmental impact with technology that enables business innovation while at the same time reducing the impact of work on the world.

For software company Citrix, this is a priority that represents an opportunity to drive momentum by aligning to the United Nations Sustainable Development Goals (SDGs).

"IMAGINE WHAT 2050 WOULD LOOK LIKE IF WE MADE SUSTAINABILITY A PRIORITY IN ALL THAT WE DO"

Citrix believes that it supports nine of the 17 United Nations Sustainable Development Goals by reducing pollution and supporting work-life balance; improving productivity and extending product lifespan; reducing car commuting and energy consumption; reducing information and communication technology's impact on the Earth's ecosystems and partnering with customers and alliances to build solutions to help reduce I.T.'s impact on the environment.

SOLUTIONS FOR BUSINESS

What if there were solutions that didn't just focus on the wellbeing of the employee, but also began to look at strategies and solutions that can mitigate climate change?

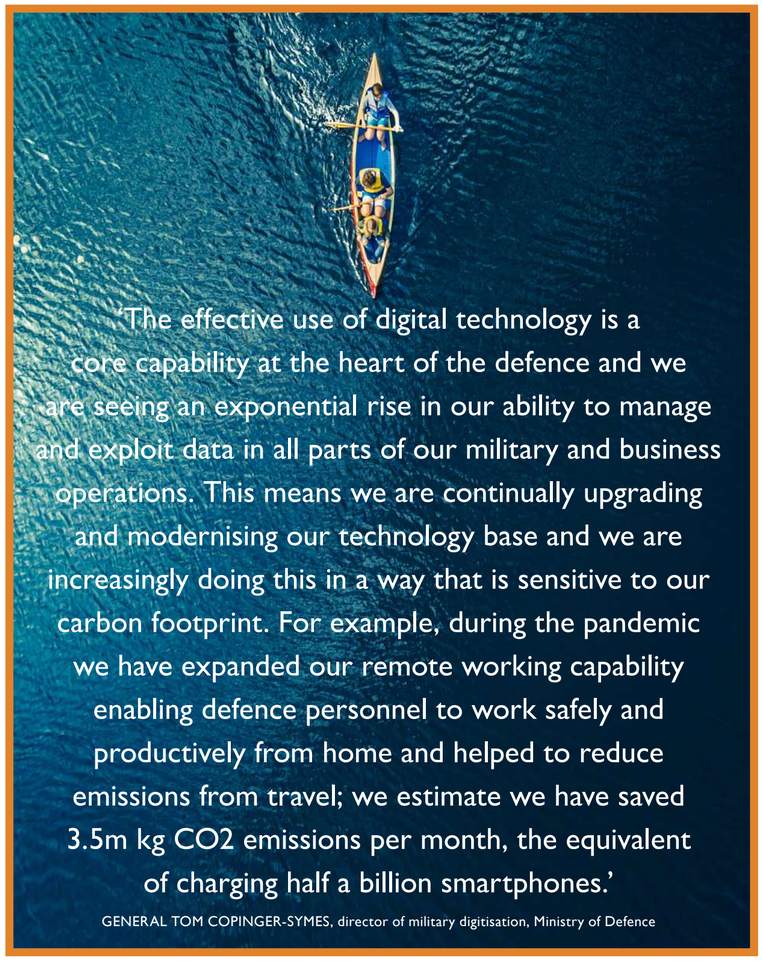
Justin Sutton-Parker of Citrix and his PhD research, has outlined four strategies that organisations can adopt to help reduce their annual global greenhouse emissions to a level that would be equal to planting 67 million acres of forest.

These solutions allow organisations to enable the use of low-energy devices, reduce employee commuting by enabling remote working, reduce global greenhouse emissions from data centres by moving to the cloud and extend the lifecycle of electronic devices.

While organisations can procure low-energy devices such as Chrome books, users can launch virtual desktop solutions with the same look and feel of a locally installed desktop. Selecting a vendor that offers cloud choice, holistic security and digital workspace allows organisations to encourage the use of low-energy devices without risking security or employee experience.

End-user devices contribute to 35% of I.T.'s total global greenhouse emissions, of which 80% are created during the end-use phase. This is due to the electricity consumed during the device's lifetime. Allowing the selection of devices with low total energy consumption is vital to lowering organisational carbon footprints and achieving sustainability goals.

To help an organisation enable low-energy devices, Citrix offers solutions such as virtual apps and desktops, providing high performance irrespective of the endpoint device. This means low-energy devices can be selected regardless of their operating system, and organisations can reduce end-user computing device emissions by 90% annually.



'The effective use of digital technology is a core capability at the heart of the defence and we are seeing an exponential rise in our ability to manage and exploit data in all parts of our military and business operations. This means we are continually upgrading and modernising our technology base and we are increasingly doing this in a way that is sensitive to our carbon footprint. For example, during the pandemic we have expanded our remote working capability enabling defence personnel to work safely and productively from home and helped to reduce emissions from travel; we estimate we have saved 3.5m kg CO2 emissions per month, the equivalent of charging half a billion smartphones.'

GENERAL TOM COPINGER-SYMES, director of military digitisation, Ministry of Defence

FLEXIBLE WORKSTYLES

Remote work is a critical part of sustainability; transportation is responsible for 14% of annual global greenhouse gas emissions, with cars contributing 72% of this total.

Commuting is at the heart of the transport pollution issue. By reducing the frequency of employees' commutes, greenhouse gas emissions could be reduced by 40%.

Adopting a truly flexible workstyle policy would enable employees to work from home, or walk or cycle to an alternative local environment, such as a coffee shop. This flexibility without restriction empowers organisations to create a truly sustainable workstyle policy designed to reduce employee commuting and lower environmental impact. As well as helping to reduce the impact on the environment, this approach could bring huge benefits to employees' work-life balance.

Carbon Trust reports that 66% of people feel positive about an organisation that can demonstrate it is reducing its carbon footprint. Organisations can improve engagement by enabling employees to choose the device that suits their environmental values. Enabling free device choice and flexible or remote working also improves employee retention by improving their experience and work-life balance.

DATA CENTRES

Reducing data centre emissions and moving to cloud services is one way an organisation can reduce its carbon footprint. 3% of global electricity is consumed by the world's 8 million data centres, which produce over 290m tCO2e emissions annually. Adopting data centre solutions with zero carbon impact is an essential element of achieving sustainability.

Citrix technologies transform how people work, and represent the future of work. The combination of Citrix workspace, networking and analytics allows employees to work securely and effectively from any location.

Citrix offers cloud services that simplify the delivery and management of Citrix technologies, enabling the extension of existing on-premises locations or moving 100% to the cloud.

REDUCING E-WASTE

Lastly, extending the device lifecycle can reduce electronic waste and allow an organisation to create a truly sustainable model in I.T.

50 million tonnes of electronic waste ('e-waste') are produced annually, yet only 20% is recycled through formal channels. Extending the lifespan of a device tackles the issue of e-waste by spreading the environmental impact across five years (instead of three years), as procurement, recycling and re-purposing processes are 'pushed out' by two years.

Through virtualisation, devices can enjoy a longer useful lifespan as they continue to offer the user a great experience and help create truly sustainable procurement policies.

Re-imagining the work-life balance could transform employee wellbeing and environmental impact

SUSTAINABLE BUSINESS

I.T. can play a major role in enabling organisations to become more sustainable through solutions such as the use of low end-point devices, remote work policies, moving to the cloud and extending the lifecycle of our devices.

This will help to improve not only the future of how people work but also the wellbeing of our planet.

INNOVATION AT WORK

Imagine what the world could look like by 2050 if we tap into technologies that enable sustainable strategies. Imagine what the world could look like if we made lifestyle changes that focused on the wellbeing of the planet. Imagine how revolutionary we can be as we shift what work looks like – what a work-life balance looks like.

Imagine creating truly circular economies, allowing not just nature but also humanity to thrive. Imagine being able to work in green spaces, no longer sitting in rush hour for two to three hours.

Imagine being able to step into your garden during the day. Imagine breaking early in the day to go for a swim in waters that are clear and clean, or if you're in the city being able to breathe in clean air and sift through urban sounds without the constant distraction of vehicle horns.

Imagine what 2050 would look like if we make sustainability a top priority in all that we do.

The future of our existence relies on our need to be innovative and flexible. This year taught us all to pause and focus on what truly matters. ■

FURTHER INFORMATION

■ Learn about new models of work, or request a demo of Citrix products, at **citrix.com**

(LESS) POWER TO THE PEOPLE

Next time you replace your computing device, make energy efficiency a top priority

In the 1830s, Charles Babbage created the world's first computer: the Analytical Engine. The mechanical device included a calculating unit called 'the mill', a 'store' for pre-processed data and input and output devices called the 'reader' and the 'printer'.

Fundamentally, the construction of modern personal computers has not changed a great deal. The mill has evolved into the central processing unit (CPU), hard drives and memory take care of storage and pre-processing and a combination of keyboards plus screens enable input and output.

There is one thing that has changed dramatically, and that is the quantity of computers being used today – not to mention the fact that they all consume electricity.

Babbage's Analytical Engine was one computer for a population that was then 1bn. Today it is estimated that there are now 4.6bn active internet users. Considering that each user has to use a computing device to access digital services powered by the internet's 75m servers, it is fair to suggest that, at very least, there is one computer for every two people in the world.

PRACTICAL SUSTAINABILITY

This exponential digitisation, known as the Fourth Industrial Revolution, has simply become part of our working lives.

Now, over two-thirds of job roles in the UK's largest employment sector require the use of a personal computer such as a desktop, thin client, laptop or tablet.

As a result, over 10 million employees spend over five hours each day in front of a computer screen. While this drives productivity, it also creates high levels of energy consumption.

'The opportunity, both for the ICT sector as well as the sectors and organisations at the forefront of deploying impactful digital technologies, is enormous. Given the slow pace of progress against the Sustainable Development Goals, it is also non-negotiable. In our *Digital with Purpose: Delivering a SMARTer 2030* report, we present very specific commitments for all who are on this journey – the first commitment: to share a common purpose. For us, achieving the SDGs is the central framework to unlock transformative action.' LUIS NEVES, CEO, Global Enabling Sustainability Initiative (GeSI)

'The research from the International Conference on Sustainable Energy I.T. helps to confirm that sustainability does indeed work hand in hand with lower operating costs and the conservation of energy and other natural resources. Sustainability is now not just a nice to have, but a reality that we all must embrace if we want to thrive on Mother Earth and ensure our beautiful world remains that way for many generations to come.' MICHAEL WYATT, head of Google Chrome Enterprise EMEA

Almost 1% of all global greenhouse gas (GHG) emissions are created by personal computers; this suggests that, by selecting a more energy-efficient computer, we can all play a part in helping to ensure a sustainable future.

Specialist Computer Centres (SCC) has supplied a vast array of end-user computing such as desktops, thin clients, laptops and tablets to commercial and public sectors for over 45 years. It understands that reducing I.T. energy consumption also reduces greenhouse gas emissions, and focuses on making I.T. work for its customers to improve the way they do business.

This involves supporting long-term profitable business operations; looking ahead, it also includes a focus on the environment. Add the two together and sustainability becomes both feasible and practical.

DESKTOPS TO MOBILE DEVICES

The human love of convenience is already pushing personal computer choice organically towards devices with a lower impact.

In 2000, the desktop computer was predominantly the device of choice in UK offices, representing over 90% of all commercial devices. Now, some 20 years later, the balance has shifted in favour of mobile devices such as laptops and tablets, which now account for almost half of all business computers.

Desktops continue to have a practical use in some instances, but they consume on average three times as much energy as laptops. At the same time, some laptop models consume in the region of 50% less energy than equivalently specified models.

We still have a way to go if we want to achieve the perfect balance of energy-efficient end-user computing – and we could still be making better choices when refreshing our personal computers.

SLASHING EMISSIONS BY 50%

A recent scientific study from the 10th International Conference on Sustainable Energy Information Technology (SEIT) measured a range of laptops for energy and concomitant GHG emissions in a business environment.

The results indicated that in all instances where a Google Chrome OS operating system was installed, the use-phase energy consumption was up to 57% lower than in comparable laptops.

On further examination, the Google Chrome laptops consumed an average of 12kWh in a full working year. Considering that even an efficient desktop computer will consume in the region of eight times this value, the impact of selecting low-energy devices such as Chromebooks is clear.

When examining tablets that can also operate in the same way as a laptop, the Microsoft Surface Go proved incredibly efficient and achieved similar energy consumption values.

With a detachable keyboard that delivers a user experience similar to that of a classic notebook, the energy and concomitant GHG savings delivered by moving wholesale from legacy notebook devices to the Surface Go would be considerable. As the study notes, GHG emissions could be reduced by over 50%.

RESTRICTION-FREE DEVICE CHOICE

The point here is not to promote one offering over another, but to suggest that when selecting a personal computer, energy efficiency during the working day should been considered as key by both the user and the company.

But sometimes making sustainable choices can be restricted by being tied to certain criteria, including specific operating systems that need to 'match' with corporate standards or specific application backwards compatibility.

However, this idea that corporate laptops and tablets all need to be a clone or the next closest evolution is perhaps outdated.

The majority of modern workers use cloud applications to access productivity suites today; where high security and remote access to bespoke or legacy applications is vital, then virtual desktop infrastructure (VDI) or desktop as a service (DaaS) is available.

This means reliance on a particular locally installed desktop operating system is becoming less of an issue. As an example, VDI and DaaS allow for a virtual instance of your usual corporate workspace to be accessed on almost any type of device. A Microsoft Windows 10 desktop can appear on an Apple Mac OS device or perhaps a Chromebook.

These technologies are already highly prevalent, created by companies such as Citrix and Microsoft, so restriction-free and sustainable device choice has truly become a reality.

IMPACT ON UK EMISSIONS

Over 254 million personal computers and notebooks are sold globally each year, and extrapolating the environmental impact that could be achieved in the UK alone is highly appealing.

As an indication, if all 10 million service sector employees selected an energy-efficient device the next time desktops or legacy laptops required replacement, an estimated combined abatement of greenhouse gas emissions in the region of 70% could be achieved.

When making personal computing device selections, organisations and employees participating in 'bring your own device' schemes should prioritise energy efficiency alongside cost, performance and aesthetics. Doing so could, over the next five years of device refresh, help us all on the path to achieving the nirvana of net zero end-user computing.

Armed with the accurate energy data and making the right choices for a sustainable future, together we can accelerate a move to low-carbon personal computing by appreciating that supplying less power to the people is a step in the right direction. ■

FURTHER INFORMATION

■ More about SCC is at **scc.com**

PHOTOGRAPHY ISTOCK

TECH FOR AFFORDABLE **CLEAN POWER**

Tech-driven smart tariffs are driving down energy bills and speeding the shift to a cleaner future

Energy use in homes currently accounts for 14% of the UK's total greenhouse gas (GHG) emissions. Given that global CO_2 emissions must fall every year from 2020 to avoid catastrophic warming (1.5°c by 2100), the energy sector has a significant role to play in the reduction of carbon emissions.

Octopus Energy launched in 2016 with a vision to use technology to bring down prices, ensure great service and drive towards a renewable future powered by a smart grid, which Octopus sees as an essential element of affordable decarbonisation. Since then, Renewable Energy Association has named Octopus Energy 'the company doing the most to advance renewables in the UK'.

The domestic energy arm of Octopus Energy now serves almost 1.6 million customers with 100% renewable electricity, resulting in savings of around 5,000,000 tonnes of CO_2 per year. Octopus Energy for Business manages almost 10,000 customers with proprietary energy offerings.

'Our mission is to make the transition to green energy affordable', said Greg Jackson, founder and CEO of Octopus Energy; 'in fact, our job is to make greener energy cheaper than dirty energy and to provide outstanding customer service while we're doing it.'

TECH TO TACKLE CLIMATE CHANGE

One way to reduce the need for dirty fossil fuels is to shift collective consumption patterns and better distribute energy usage throughout the day - to times when energy is greenest (and cheapest).

The tech behind Octopus Energy's smart tariffs drives down customers' bills

By thinking differently and leveraging the power of new technologies, Octopus Energy has seized the opportunity to use technology to drive a dramatically more efficient system – not just in the UK, but globally.

This approach has led to the development of tariffs and tech products that encourage a shift in consumer behaviour, spreading consumption throughout the day and smoothing out carbon-intensive 'peaks'.

At the heart of this transformation is Kraken, a cloud-based tech platform that Octopus Energy built from scratch.

INTRODUCING KRAKEN

Kraken is essentially a big robot that uses algorithms, machine learning and big data to manage the entire process of retail energy pretty much automatically, driving efficiencies from trading through to billing.

Perhaps most importantly, Kraken simplifies complex 'smart' tariffs that vary energy prices throughout the day to match the availability of wind and solar energy.

These smart tariffs allow customers to make greener choices and save money by shifting their consumption to times when electricity is cleaner and cheaper.

GET PAID FOR USING POWER

Agile Octopus, a world-first time-of-use tariff, is one of the 'smart' tariffs enabled by Kraken. It unlocks dynamic wholesale pricing to benefit customers, alerting them when energy is cheapest and greenest.

Across the UK, whenever more electricity is generated than consumed, energy prices fall. Agile Octopus allows customers to take advantage of these negative price events and get paid for the electricity they use.

Octopus's integration with Amazon's Alexa allows customers to benefit from real-time energy pricing using voice automation.

A TARIFF FOR EV DRIVERS

Octopus Go is Octopus's smart energy tariff for electric vehicle (EV) drivers; it was designed to make the move to an EV smoother and more affordable. Octopus Go's super-low overnight price encourages users to charge up when power is greenest and in low demand. Powerloop, Octopus's revolutionary vehicle-to-grid bundle, lets users store green, cheap energy in their car's battery to avoid demand and price peaks.

BALANCING SUPPLY AND DEMAND

With the launch of Outgoing Octopus, Octopus became the first energy supplier in the UK to offer a smart export tariff. When the government's Feed-in Tariff scheme ended, Outgoing Octopus gave UK homeowners with solar panels a way to make money by exporting excess power to the grid. Since then, the company hasn't stopped innovating in its renewable mission.

The UK's energy grid has to be balanced in real time, matching supply (the energy being generated) with demand (the energy we use). Too much or too little power going into the grid, and the system becomes unstable, which could cause blackouts.

offered customers up to 5p per kWh to take excess power off the grid. The result: customers used 71MWh more electricity in the offered windows – eight times more than those in the control group – proving that even modest price incentives drive behavioural change.

This provided a glimpse of the future for renewable energy generation. A future where large amounts of green energy are available at zero marginal cost – if we can make the most of it.

But the innovation doesn't end there. Octopus Energy's open API enables customers to hack the energy system themselves, turning it green and developing smart integrations for the connected homes. It has attracted a fan base of developers like Kim Bauters, who created OctopusWatch, an app which helps users find the cheapest times to use renewable energy. And there are many more examples of how Octopus's 'Agile Pioneers' are pushing boundaries, building their own apps, running their own smart appliances and creating greener, smarter homes.

'Our mission is to make the transition to green energy affordable – in fact, our job is to make greener energy cheaper than dirty energy and to provide outstanding customer service while we're doing it.'

GREG JACKSON, founder and CEO of Octopus Energy

Octopus Energy's Agile Pioneers are building apps and smart appliances for greener, smarter homes

Covid-19 has had a huge impact on how energy is being used across the UK. On average overall demand is down 20% since lockdown, and with two bank holidays back in May, we saw a combination of record low levels of demand with large amounts of renewable energy from solar and wind.

THE IMPACT OF PRICE INCENTIVES

Kraken enabled Octopus Energy to conduct the UK's first large-scale consumer energy trial.

During May's bank holiday weekends, 100,000 customers were invited to take part in a 'plunge pricing' trial in which Octopus Energy paid customers to move their energy use into off-peak windows. High renewable output, coupled with low demand, meant prices fell below zero, so Octopus

TAKING CLEAN ENERGY GLOBAL

Kraken Technologies was developed to enable select third parties to take advantage of the technology developed on the Kraken platform by Octopus Energy. Kraken is now licensed several to other companies, including Australia's largest energy supplier Origin and European energy leader E.ON, serving more than 12 million customers across the globe.

WHAT'S NEXT?

These Kraken-enabled innovations are significantly improving the UK energy grid's renewable mix, and facilitating the use of excess renewable power when there is risk of overloading the grid.

These innovations can do the same thing to grids across the world and provide a basis for a global transition to green energy.

'We're thrilled to be able to accelerate our global expansion to make the green energy transition cheaper and faster', Greg said. 'It's a testament to our team and our technology that in just four years we've created a business which has the world beating a path to our door and can face the future with such excitement. We're looking forward to continuing to use technology to reduce energy costs, increase renewables and improve customer service in the UK, Australia, Germany and now many more countries.'

After growing from zero to a million customers in less than four years, ambitions are now even higher for the proprietary tech platform. Greg expects to see 100 million customers by 2030, accelerating global access to affordable green energy and supporting a worldwide transition to decentralised, decarbonised energy. ■

FURTHER INFORMATION

■ Save with Octopus Energy at **mygreenpod.octopus.energy**

CLOUD COMPUTING GIVES A DAM(N)

Professor Rob Procter & Justin Sutton-Parker take a look at 'the world's greenest public cloud'

The world's 8 million data centres are accountable for over 1% of global greenhouse gas (GHG) emissions. Each square foot consumes 30 times more electricity than office space, meaning data centre energy efficiency is critical to sustainability and climate change.

As is the case with all electricity consumption, two elements are key to achieving green credentials. First, energy consumption efficiency and second, being powered by renewable and low-carbon sources that drive down the carbon intensity.

Leading cloud data centre providers understand the impact of both factors.

DATA CENTRE EFFICIENCY

With regards to efficiency, myriad strategies are implemented to reduce energy waste. These range from optimising power distribution and using free cooling, such as ice-cold fjord water, to cutting-edge activities including neural network algorithmic computation to mimic cognitive behaviour.

This latter practice enables statistical analysis of operations and the resulting machine learning improves data centre performance automatically in reaction to external influences such as workload or climatic temperature change or airflow.

How well the data centre energy is managed is measured by the I.T. industry standard of Power Usage Effectiveness (PUE). This value is created by dividing 'Total Facility Power' by 'I.T. Equipment Power'. The resulting ratio creates a benchmark; an average non-cloud data centre achieves 1.54 whereas cloud data centres are now achieving a PUE as low as 1.1. This suggests that inside a well-managed cloud data centre, 40% less energy is wasted on facility operations such as lighting, with the energy mainly used directly for computing.

CUE PERFORMANCE

Regardless of efficiency, data centres consume vast amounts of energy. Even a moderately sized data centre will consume 5.7m kWh per year – equivalent to 10m car miles. The carbon intensity of a data centre's electricity at the point of generation is essential to its impact on the environment.

The I.T. industry measures this in carbon usage efficiency (CUE), calculated by dividing the total CO_2e emissions caused by the total data centre energy by the I.T. equipment energy (kWh). This means the source of electricity will affect CUE performance.

As an example, coal-generated electricity has approximately 870g CO_2e/kwh while wind and solar have 11-72g CO_2e/kWh. Even if the most energy-efficient data centre is powered by coal-based electricity then it will create over eight times more GHG emissions than an inefficient equivalent powered by wind-generated electricity.

David Rowe is founder and CEO of Hydro66 – the cloud service provider powered by a local hydroelectric dam in Boden, Sweden (opposite page)

RENEWABLE VS GREEN ENERGY

In the UK the government publishes figures that state we have approximately 18.5% renewable energy in our national grid. This sounds promising, but in fact that renewable energy is not necessarily 'green energy'. Reliance on coal has reduced by 91% since 1990, but the renewable energy supplies are mainly nuclear (42%) and biomass (35%).

Nuclear has a low carbon intensity but it can be calamitous for the environment. Biomass is in the short term less destructive but in many cases actually has a higher carbon content than coal. It's definitely renewable, but at 900g CO_2e/kwh it's not good from a GHG emissions point of view.

The sad fact is that only 3% of UK energy comes from natural, environmentally friendly sources such as hydro, wind and solar.

Consequently, any cloud computing company willing to drive renewable energy adoption from wind, solar or hydro is undoubtedly welcome.

Currently, the major cloud computing providers are working hard to deliver environmental gains. Google invests heavily in renewable energy purchases and related schemes to offset its entire energy consumption and Microsoft is at around 70%, with a goal to be carbon neutral by 2030.

LOCATION-BASED ENERGY

One cloud service provider has taken this a step further to focus on what is known as location-based energy, which is different from market-based supply. The former is low-carbon renewable energy generated at the location and directly supplied to the data centre. The latter is renewable energy purchased to offset energy used.

Located at the head of a hydroelectric dam in Boden, Sweden, Hydro66 uses locally generated hydropower (0.05g CO_2/kWh) and the naturally cool environment to power and manage operations.

'THE GREENEST PUBLIC CLOUD'

Hydro66 has arguably created the greenest public cloud on the planet, with sustainable land use, community support for local electricity use, a locally integrated design and build and an ultra-efficient water usage profile.

The company, named after its global map latitude coordinate and the power that drives the data centre, says it enables organisations to host computing as a cloud that 'is green', as opposed to one that has 'bought green'.

This strategy renders the carbon intensity held in any national grid irrelevant. Hydro66 connects directly to a natural power source that is over 99.99% less carbon intensive than fossil fuel energy.

In an interview with My Green Pod, Hydro66 founder and CEO David Rowe explains why this matters.

How does renewable energy reduce the GHG emissions associated with data centre operations, especially on-premise data centres?

'Data centres are to some extent the hidden dirty secret of modern life and are not going away, so therefore we have to mitigate their impact on the environment, preferably to zero.

'During the lifetime of a data centre, the electricity used for I.T. and for cooling is by far the largest contributor to its environmental impact.

'Using renewable energy means we can continue innovating and improving our digital infrastructure without harming the planet by the back door.

'The challenge with 'switching to renewables' as a simple solution is finding a renewable source that doesn't remove someone else's ability to use it, otherwise you are just shifting the problem.

'On-premise operators have many business challenges around flexibility, scalability and cost, and yet the moral imperative to do the right thing by the planet is getting more urgent.'

Why is Hydro66 different from other public cloud providers that also focus on renewable energy?

'We applaud the efforts of all providers who are transparent and open about their footprint. With regard to ourselves, we believe the journey towards true environmental responsibility has to begin before you build a data centre. It has to be built in, not bolted on.

'Site selection starts with identifying sustainable land use, engaged community support, a plentiful supply of locally generated (or on-site self-generated) renewable energy, a design that allows for low water usage, a local and truly reliable utility grid system that allows removal of diesel generators and lead-acid batteries from the design, and many other factors that allow us to 'be green', not 'buy green' after the fact.'

What sustainability gains do you expect to offer customers who take up your service, which you describe as the greenest public cloud on the planet?

'The Uptime Institute has published some excellent research on the gains that can be made from shifting from older I.T. equipment in a legacy data centre (on premises or older co-location) to modern equipment in an ultra-efficient green cloud data centre such as Hydro66.

'The kWh saved can easily be multiplied by 10 or more for the same compute load. Factor in the almost-zero CO_2 electricity used by Hydro66 and the gains will be extremely significant.'

By using Hydro66, can companies now shift their equivalent scope 2 data centre emissions accounting to scope 3 supply chain as zero carbon?

'We know there are huge operational and transparency challenges for many legacy data centre operators and their customers seeking even basic reporting on their environmental impact.

'We make it easy for companies to allocate a CO_2 cost to their operations with us. Granular and in some cases near real-time reporting of kWh and CO_2 at the server level – or even at the cloud service layer – allows a new level of transparency for companies that share our commitment to simple and open green principles.'

Finally, what would be your message to our readers and the companies they work for in relation to adopting sustainable cloud computing practices?

'It's time to do the right thing with your I.T. infrastructure. If you are in a leadership position, then it's with you to encourage strategic moves towards green cloud infrastructure.

'Identify partners who can be trusted to advise you. And remember that moving to a greener future should be an opportunity to foster innovation and save money – done properly, this will affect your bottom line positively and do the world of good for your entire organisation and its stakeholders.'

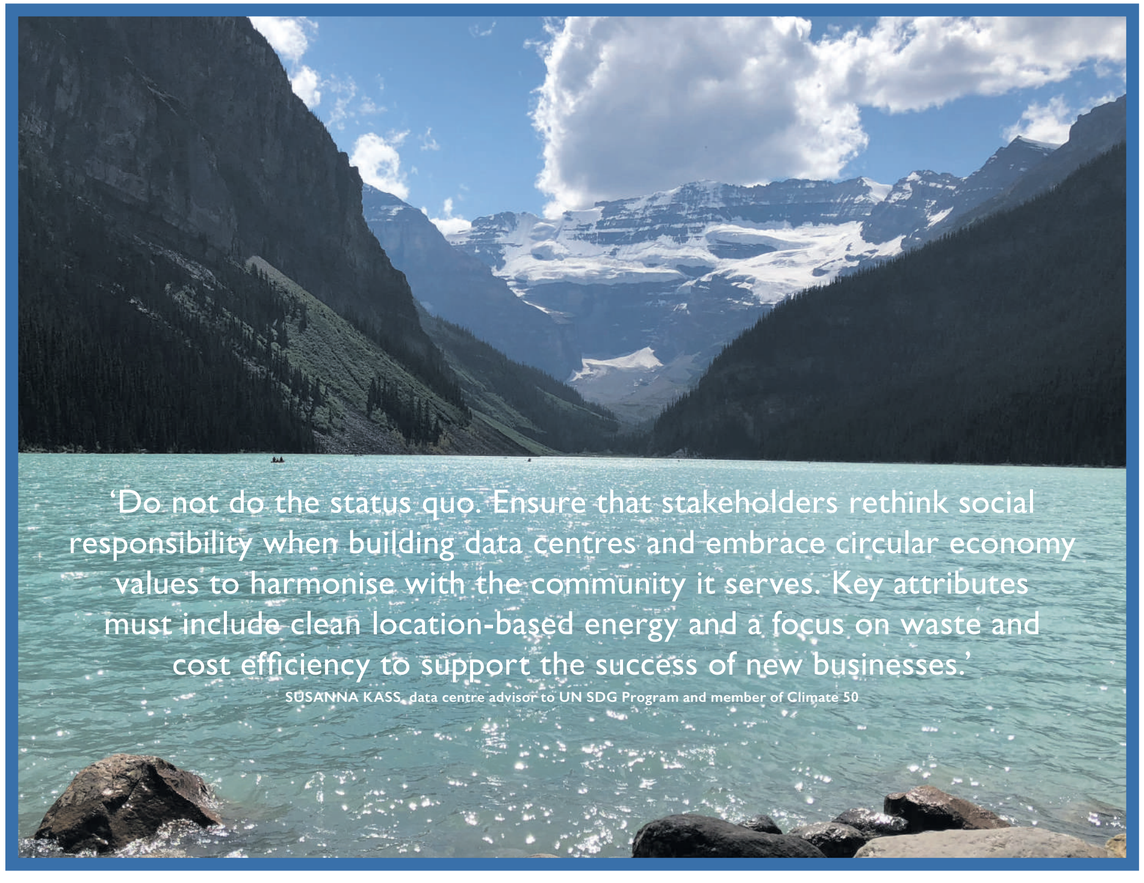
LIGHTER CLOUD COMPUTING

It's evident that cloud computing as a whole is examining its carbon footprint and making great strides to lower the industry's overall environmental impact.

Through admirable investments in renewable energy offsets, solar and wind farm schemes and extreme 'green' measures such as Hydro66, it is reasonable to say that some cloud computing companies really do give a dam(n). ■

FURTHER INFORMATION

■ More about Hydro66 and its green cloud infrastructure is at **hydro66.com**



SOFTWARE TO CREATE **NEW** PURPOSE

Software, repurposed devices and thin clients are changing the game for responsible businesses

We're experiencing a 'Fourth Industrial Revolution', and universal digitisation is exponentially creating more computer data than ever before.

As an example, Google services in excess of 3.5bn searches per day; in the same 24 hours 2.5 quintillion bytes of data are created as we communicate, create and consume content.

Demand is growing daily as artificial intelligence (AI) and the internet of things (IoT) are introduced to everyday objects and become part of our life. In context, 90% of the world's data were created in the last two years.

KEEPING PACE

To keep pace with intense digital demand, tech companies research and develop faster chipsets, bigger hard drives and dense circuitry to produce increasingly performant personal computers.

This constant evolution is congruent with the observation of Moore's law, which observes that the number of transistors in a dense integrated circuit will double every two years. The founder of Intel was suggesting that processing capabilities of 'computers' will double every 24 months.

This theory has, with minor deviations, proven to be true; following the popularisation of personal computers in the 1980s, businesses have been fighting to keep pace at the desktop ever since.

THE PERFORMANCE RACE

As a result, investment in business desktop and laptop computers is, in many cases, somewhat short term. The personal computing hardware is usually performant for three years at most; from year four and onwards, as productivity declines, the once bright solution is destined for replacement.

There is a race to stay productive as old computers struggle with new, more powerful applications designed for faster processors.

It has exacerbated the issue of excessive waste electrical and electronic equipment (WEEE). Last year over 54 million tonnes of WEEE were generated globally as old hardware models made way for new.

But what if this cyclical performance race could end? What if, when a personal computer approached the end of its useful lifecycle, it could be repurposed and used for several more years?

REPURPOSING HARDWARE

That idea is already a reality: with IGEL software, moving to a new device is no longer the only option. In fact, more and more organisations have come to realise that their existing personal computer hardware can be made into 'thin clients'.

By installing purpose-built versions of Linux operating systems on existing Windows PCs and laptops, IGEL can convert legacy personal computers into easy-to-manage 'endpoint devices'. In simple terms, this is just a computer interface.

This means that repurposing old hardware to run Linux edge operating systems from IGEL supports sustainability and at the same time helps to safeguard the planet's resources.

VIRTUALISED DESKTOPS

Igel's innovative approach to lifecycle extension is not only great for the environment, it also suits modern working trends towards digital workspaces.

To explain, businesses and educational establishments typically rely on Microsoft Windows applications. In some cases, hundreds of applications – some of which have been in place for years.

Over the last 20 years, organisations have utilised Virtual Desktop infrastructure (VDI) as a way to deploy corporate or educational applications and data securely and efficiently to employees or students.

These virtualised desktops and applications run in data centres; employees can access them remotely, via internet technologies, while consuming little local processing power and storing no data on the local computing device.

INTRODUCING THIN CLIENTS

In recent years, Desktop as a Service (DaaS) solutions have represented the next step. They use similar technologies but, instead of being hosted in local data centres, the desktops and applications are provided as a service from cloud computing organisations like Citrix, VMware, Amazon and Microsoft.

This year, the need to rapidly deploy desktops and applications in a secure manner to remote workers during the pandemic has seen exponential increases in DaaS adoption, increasing both familiarity and popularity among users.

Access to these virtualised desktops and applications in either the cloud or corporate data centres requires an endpoint. For many organisations, thin clients have been the first choice for such an endpoint.

Often, thin clients are purchased new. Models such as the IGEL UD3 last for many years longer than traditional computing devices because they have fewer components and no moving parts.

REDUCING IMPACTS

If your users already have legacy personal computing devices such as supposedly outdated laptops, why not convert them to thin clients as you move to DaaS?

By repurposing the hardware, the embodied emissions created during the manufacture and distribution of every device can be spread across many more years, reducing the long-term environmental impact.

Simply put, refreshing your personal computing estate less regularly means that fewer resources will be mined from the Earth.

'REFRESHING YOUR PERSONAL COMPUTING ESTATE LESS REGULARLY MEANS THAT FEWER RESOURCES WILL BE MINED FROM THE EARTH'

PHOTOGRAPHY ISTOCK

'A THIN CLIENT STRATEGY BASED ON REPURPOSED HARDWARE IS A POSITIVE STEP'

EXTENDED LIFECYCLES

As an example, repurposing a personal computer with an 80 kgCO2e embodied value, such as an average laptop, to last a further two years will reduce the annual embodied emissions by 40%.

Scaled across a 1,000-user organisation, this repurposing approach has a considerable environmental impact.

In fact, creating 1,000 IGEL thin clients from existing laptops that have reached a three-year useful lifecycle will reduce embodied annual emissions from just over 27 tCO2e each year to 16.3 tCO2e by adding a further 24 months of useful lifecycle.

The difference is equal to over 38,000 car miles not being driven annually, releasing the sequestering capabilities of over 13 acres of forest.

NEW PURPOSE

The next time your organisation's personal computers reach what you might think is the end of their useful lifecycle, think again.

Think about repurposing existing personal computers to become thin clients to speed secure remote office working or to enable device sharing in education.

And when thinking about this, think about IGEL, and how the intelligent use of software can create new purpose. ■

'IT'S ALL ABOUT RUNNING WINDOWS DESKTOPS AND APPLICATIONS, BUT NOT JUST ON YOUR PC'

'THE ANNUAL GLOBAL GHG EMISSIONS CREATED BY PERSONAL DEVICES IS EQUAL TO DRIVING A STANDARD CAR OVER ONE TRILLION MILES. THAT'S 12 ONE-WAY TICKETS TO MARS'

FURTHER INFORMATION

■ Find out more about thin client hardware and software at **igel.com**

A GUIDING STAR IN SUSTAINABLE I.T.

Get support on your journey to a sustainable workspace – and transform your organisation

I.T.-related greenhouse gas (GHG) emissions are responsible for as much as 5% of global emissions due to embodied pollution, energy use and commuting. A recent study suggests a forest the size Canada and Greenland would be required to sequester the sector's pollution.

As a leading I.T. solutions provider, Cetus is helping to change that worrying statistic by supporting organisations that want to reduce their environmental impact.

Cetus is taking '4 simple steps' to sustainable I.T., encouraging the adoption of I.T. solutions that can:

- Enable restriction-free end-user computing device selection so organisations can plan for and buy energy-efficient devices
- Create secure and flexible working capabilities that increase home or local working, decrease commuting and encourage modal shift
- Enable organisations to move from less efficient on-premises data centres to highly efficient, carbon-zero cloud data centres powered or underpinned by renewable energy consumption and investment
- Extend the useful lifespan of devices to reduce annual embodied GHG emissions as organisations delay refreshes of I.T. devices

Cetus is a hybrid cloud and workspace specialist with two decades' experience in helping public and private sectors to achieve their business objectives through technology.

A Citrix platinum partner with long-standing partnerships with leading vendors, Cetus is a safe pair of hands to help you on the journey to more sustainable I.T. Its business case methodology looks at the financial benefits and emissions reductions of I.T. transformation projects.

To support you with your sustainability journey, Cetus offers a Cloud & Infrastructure Transformation Assessment and Workspace assessments. It uses I.T. discovery and undertakes research to establish a baseline for your computing requirements, end-user device estate and the applications used to provide a clear picture of the changes that need to be made to help you make the move to a more energy-efficient future.

WHAT IS SUSTAINABLE I.T.?

Over the past few decades, Cetus has become more aware of the negative impact that our energy consumption has on the world.

Sustainable I.T. builds on the principles of Green I.T. – reducing the environmental impact of I.T. products and infrastructure.

Despite the excess emissions created by I.T., only 40% of businesses have formal plans to address this impact as part of their Corporate Social Responsibility (CSR) strategy or Streamlined Energy and Carbon Reporting (SECR) obligations.

We all have an important role to play in acting collectively and responsibly to ensure a cleaner and healthier world, not just for ourselves but also for future generations.

WHY IS NOW THE TIME TO ACT?

The SECR policy was introduced last year, and supports the government's net zero emissions target.

The policy stipulates that companies now need to report on energy usage, GHG emissions and at least one emissions intensity metric for their current and previous financial year.

Companies are required to submit a description of measures taken to improve their energy efficiency during the year.

I.T. practices present a great opportunity to reduce energy consumption; your I.T. strategy is one of the primary ways to make a positive impact on your company's carbon footprint.

In the annual list of CIO priorities, sustainability falls behind security, application performance and scalability. The irony is that by adopting the right strategic approach, all these priorities can be addressed holistically rather than in silos.

Even small changes can reduce the impact of I.T. on the environment. Powering or cooling I.T. contributes to around 10% of all electricity consumption. A typical Windows desktop PC consumes 200 watts, whereas the consumption of thin client devices such as Chromebooks can be as low as 6 watts.

Over a three-year period, the total life cost of a thin client device is 35% less than a Windows PC delivering a similar function; with a software thin client, the savings can be as high as 47%.

REMOTE WORKING

When Professor Robert Kelly was interrupted by his children during a BBC interview in 2017, who would have thought it was a foretaste of the reality we now all experience on a daily basis?

While collaboration software such as Microsoft Teams and Zoom is a relatively recent innovation, delivering desktops and applications from the data centre is not new. In fact, Cetus has been delivering workspace solutions for over 20 years.

The Covid-19 crisis drove the most rapid digital transformation shift we have ever witnessed and forced the almost-overnight adoption of remote working across many industries. This drastic increase in remote working has demonstrated what it is truly possible.

BALANCE AND WELLBEING

Numerous studies have shown that remote working can have a positive impact on productivity, performance and retention. For many of us, this shifting paradigm in work patterns has reinforced the notion that work is not a place you go, but something you do.

A study produced by CEBR found that by reducing commuting hours and consolidating offices through sustainable I.T. practices, remote work could help reduce annual CO_2 emissions by 214 million tonnes.

Despite this, the importance of face-to-face interaction in business contexts has not diminished. We can't all work remotely, and for those who can, it may not be a full-time solution. Balance is key but with the right strategy – underpinned by the right technology platform – we can significantly reduce emissions while improving an individual's work-life balance and wellbeing.

GREEN CLOUDS

8 million on-premises data centres consume 3% of global electricity – and 40% of data centres are energy inefficient, incurring unnecessary expense and significantly contributing to I.T.'s energy and emissions.

Carbon-zero cloud computing allows for delivery from an energy-efficient data centre, and 'hyperscale' service providers are increasingly using renewable energy to reduce carbon emissions.

Transitioning from data centres to hyperscale-hosted cloud services can help to reduce your environmental impact. AWS customers need only 16% of the power of an on-premise infrastructure while Azure (powered by 70% renewable energy) is 44% more efficient than the average on-premise data centre.

HOSTED DESKTOPS

While hyperscalers have driven efficiencies and flexibility to a new level, considerations around cost, management, complexity, the sovereignty of data and the need for on-premise resources mean a wholesale migration to a hyperscaler is not necessarily the right move for all organisations.

A hosted desktop solution using products such as Citrix and Microsoft Virtual Desktop may provide a better solution thanks to the power savings, manageability, performance and security enhancements.

PHOTOGRAPHY ISTOCK

> 'It's clear that by using digital virtualisation and workspace technologies to empower flexible and remote work models, companies can positively impact sustainability.'
>
> TIM MINAHAN, executive vice president of Citrix

With a correctly deployed and energy-efficient hosted desktop solution in place, end-user device security is easier to manage as the information displayed on the device is securely held in the data centre; only screen and keyboard requests are transmitted from the device.

EXTEND THE LIFE OF A DEVICE

The sustainability benefits of a hosted desktop environment can also extend the effective lifecycle of the desktop PC. It is estimated that around 50% of the total whole-life emissions of a PC relate to manufacturing and distribution. Therefore, extending the effective life of a PC and monitor has a significant and positive overall impact on the carbon footprint of your end-user device estate.

Technology offered by Citrix allows students to remotely access the processing power of high-power graphics workstations on campus from virtually any end-user device.

Organisations in the healthcare and local government sectors have both financial and logistical challenges to manage as Windows 7 operating reached the end of its support lifecycle earlier this year. This virtual approach can be used to deliver a secure and supported Windows desktop on equipment that would otherwise be disposed of.

Although not as efficient as a thin client device, using a compatible browser or a simple installed piece of software, a functioning but unsupported Windows 7 PC can deliver a virtual Windows 10 desktop – even though the memory and supported operating system to process it locally are absent from the device.

MICROSOFT AND CITRIX

Earlier this year, Microsoft and Citrix strengthened their long-standing partnership by announcing a multi-year agreement in which Microsoft will promote Citrix Workspace as a preferred digital workspace solution for the 'future of work'.

Citrix will use Microsoft Azure as its preferred cloud services provider, moving existing on-premises Citrix customers to Microsoft Azure and enabling users to work from anywhere across multiple devices.

BUILD A SUSTAINABLE I.T. MODEL

In broad terms, if you are looking for the most carbon-efficient means of delivering I.T. to your business, you need to minimise commuting and business travel by architecting for remote working, address energy-inefficient data centres and switch to more energy-efficient devices.

In order to achieve this, you need to consider cloud (or hybrid cloud) and workspace as part of your I.T. strategy.

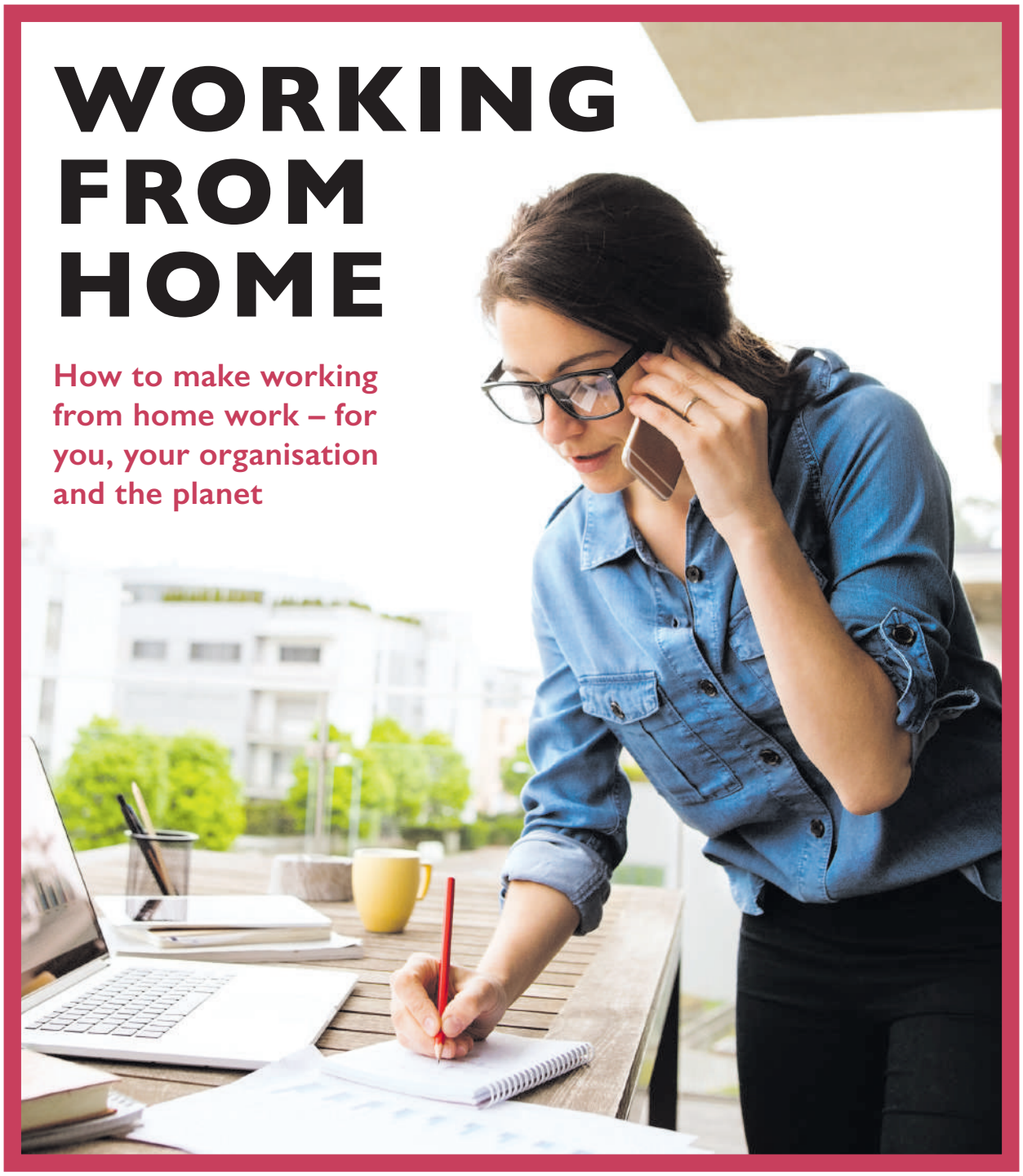
It is important for businesses to understand where they are on this journey – which constraints exist and how to deliver a strategy that not only enhances the user experience but also has a positive impact on business as usual. If you need a helping hand to guide you on the pathway to achieving sustainable I.T., Cetus will take you on that journey and will act as your guiding star. ■

FURTHER INFORMATION

- Join the movement to transform I.T. at **cetus-solutions.com**

WORKING FROM HOME

How to make working from home work – for you, your organisation and the planet



We have all spent more time working from home than we had perhaps expected at the start of 2020.

Some months later, we are adjusting to this new way of working; one positive is that, from an environmental standpoint, the impact has been felt.

Earth Overshoot Day was three weeks later this year due to a lack of commuting and travel in general. As a collective, we almost made it to September before our anthropogenic consumption outstripped the Earth's annual resources.

Looking ahead to the rest of the year – and certainly to the next – our ability to make the most of our work resources will be key to building a sustainable future as we begin to find a new balance between office and home.

These resources will include not only us as employees, but also the energy that powers productivity and the hardware and software that make work possible.

STRATEGIES FOR IMPACT

If we can achieve more while consuming less, then we would help to move Earth Overshoot Day each time we set to work, wherever we are.

'Clearly sustainability is critical in how and why we move forward digitally. Personally I believe that it is the responsibility of all of us to build, test and use technology responsibly. As Robert Swann said of climate change: "*The greatest threat to our planet is the belief that someone else will save it...*' JACQUELINE DE ROJAS CBE, president of techUK

Lakeside's 4,000 customers use the digital workspace analytics company daily to excel in digital experience monitoring. They get help with measuring resources and are able to focus on improved efficiency.

Accessing 10,000+ data points on I.T. performance and usage from every endpoint, such as a laptop or desktop computer, I.T. visibility is improved.

By analysing the data, Lakeside can quantify end-user experience and provide optimal end-user computing performance that boosts productivity by flagging priority problems that can be remediated by I.T. or automatically through Lakeside's AI and automation framework.

Identifying over-provisioning, reducing the volume of I.T. incidents and optimising I.T. operations can also reduce costs – not just through limiting downtime and increasing performance, but importantly also by actively tuning systems to use less power.

Lakeside's cloud dashboards highlight devices that, if managed better, could reduce their energy consumption while achieving the same output. Scale this company-wide and immediately resources that cause greenhouse gas (GHG) emissions can be refined to have a lower annual carbon footprint.

The data are so compelling that the I.T. sustainability experts at PX3 use Lakeside to calculate device emissions. Incorporating unique application, environmental algorithms and emissions equivalents, the team produces in-depth assessments that enable organisations to create baselines and improvement strategies for I.T.-related GHG impact.

ASSESSING I.T. EMISSIONS

PX3 co-founder and CIO Ewen Anderson says, 'Lakeside's ability to report thousands of data points from incredibly short intervals allows PX3 to build a picture of I.T. energy consumption across business infrastructures regardless of location.

'Additional contextual measurements and ratios generated by unique research enables an incredibly accurate assessment of I.T. GHG emissions.

'We use this not only to account for the environmental impact using international protocols but also to highlight, through our application, analogous equivalents that people will relate to in an instant.

'These include representations such as vehicle miles per capita or forest acres required to sequester a company's I.T. pollution.

'In the context of the UN Sustainable Development Goals that drive our business ethics, partnering with Lakeside is a key ingredient to delivering on number 17: partnership for the goals'.

When you examine what your new way of working looks like, take time to think about efficiency and sustainability. Consider that Lakeside analytics can offer a vision of I.T. so rich that we can certainly make working from home better for you, your organisation and the planet. ■

FURTHER INFORMATION

■ More about how you can improve working from home is at **lakesidesoftware.com**

2020 marks the 10th anniversary of the UK's leading sustainability awards – and it's going to be a big one

P·E·A·

IN ASSOCIATION WITH CITRIX®

AWARDS 2020

The University of Sydney reports that since lockdown, there has been a 2.5Gt (4.6%) reduction in global greenhouse gas emissions – that's the largest drop in human history.

Almost overnight, human behaviour stopped being the problem and became part of the solution to the climate crisis.

Individuals all over the world have dedicated their lives to the creation of a fairer and more sustainable future. They're often unsung heroes, following inner convictions without expecting any recognition or reward.

DIGITAL PIONEERS

This year, the P.E.A. Awards has a new title sponsor, Citrix. Like P.E.A. Award winners, the company's goal is to reimagine the future and make the extraordinary possible.

Citrix does this by providing the most comprehensive secure digital workspace; it unifies the apps, data and services we need to be productive, and simplifies the management of complex cloud environments.

To reflect current trends in sustainability, two new P.E.A. Awards categories have been launched: Electric Vehicles and Digital Technology.

'We are very excited to welcome our new title sponsor, Citrix', says Jarvis Smith, P.E.A. Awards founder and co-founder of My Green Pod. 'This digital technology company has a full suite of IT solutions that enables people to work from home. Our motto for this year's P.E.A. Awards is 'disrupt or be disrupted' – the search for our climate superheroes is on!'

CELEBRATING GREEN HEROES

For 10 years, the P.E.A. (People. Environment. Achievement.) Awards has scoured the globe for green heroes so their efforts can be recognised.

Previous winners have bravely pioneered new ideas and refused to accept a status quo that will ultimately lead to our own destruction. If this sounds like you – or someone you know – we want to hear from you.

Entries and nominations are now open for 2020's P.E.A. Awards. The winners will be announced at a virtual event in November 2020.

FURTHER INFORMATON

- Enter or nominate your green heroes at **peaawards.com**
- Deadline for entries is **midnight, 30 September 2020**

CATEGORIES

DIGITAL TECHNOLOGY ENERGY ELECTRIC VEHICLE VEGAN MONEY

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