How to build a sustainable IT department

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Welcome

Sustainability is more than just another business buzzword. It's a way of doing business that respects environmental concerns and the health and wellbeing of every community, so that companies can prosper in the present without compromising life for future generations. With many of the world's governments, leading businesses and billions of people demanding action, sustainability is high on the agenda for companies of all sizes, impacting manufacturing, services, procurement, investment, management and HR.

Inevitably, it's also changing the way those companies provide IT. After all, IT is core to modern business, and the equipment and services deployed and managed by the IT team are a major contributor to that company's environmental and social impact.

What's more, embracing sustainability doesn't always come at a cost for business. Indeed, supporting and promoting sustainability could help your IT team reduce costs and your company win customers.

How, then, do you go about remodelling IT with sustainability in mind? Over the next pages we'll look at the problems many organisations face, and how these can be managed. We'll look at how managed services can help address sustainability, and how new working practices can transform a company's environmental impact. We'll also look towards the future and how overarching megatrends will affect IT and sustainability in years to come.

Maggie Holland

About our sponsor

HP has been at the forefront of business technology for almost 80 years, driving innovation within the IT sector. While HP understands how important technology is to business, it also understands that businesses need to be socially responsible, especially when it comes to the environment. Sustainability is a major part of HP's agenda, both as a company itself, and in terms of the products it designs and manufactures. Through life changing third world CSR strategies, and a commitment to recycling and reusing, HP is leading the way in terms of sustainable IT.

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The Legacy Problem

Understanding where your impact comes from is the first step to reducing it

Studies suggest that ICT contributes between 1.5% and 2% of global carbon emissions. A huge (and growing) proportion of that is created by data centres, which consume roughly 3% of all globally generated power, but the majority of what's left is produced by the office IT equipment that many of us use every day. This hardware is the first barrier on the road to sustainable IT, and the older the hardware, the bigger that barrier is. Desktop PCs, monitors, servers, printers, copiers and network infrastructure can all use a lot of energy, and the older they are, the more they're likely to use.

Take the desktop PC, for example. Even over the last ten years there has been much progress in making PCs more power efficient. Desktop processors have benefited from advances in mobile processor technology, ensuring that they scale upwards and downwards more efficiently to match performance to the task in hand. Hard disks have grown smarter in their adoption of low-energy sleep and standby modes or been replaced entirely by less draining Solid State Drives (SSDs). A typical desktop PC of ten years ago may have used anywhere between 60W and 200W while idle and up to 300W while working hard; performance PCs and workstations would have used considerably more. Today's equivalent desktop PC may use under 30W while idle and less than 60W under load.

Meanwhile, hulking CRT monitors have been ditched in favour of flatscreen LCDs, which in turn have been replaced by modern LED-backlit displays. Simply switching from CCFL tube backlights to LEDs cuts consumption by up to 72%, and where a 24-inch monitor of 2008 might use 60W or more in operation, the 2018 equivalent might use under 20W.

PCs and monitors make a sizable contribution to a firm's energy use, and the larger the company, the higher the impact. Yet, they're far from the only devices pushing up your carbon footprint. A workgroup laser printer might use anywhere up to 800W while printing, though improvements in power saving technology will mean it uses as little as 15W to 35W while ready and less

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than 2W to 4W while asleep. Some older models would use up to 60W even in standby. Office copiers will use similar amounts of energy, pushing the impact on your carbon footprint further. And that's before you take consumables like toner and paper into account, the production of which also uses materials and water.

Larger small businesses and medium-sized and large enterprises will also have additional energy consumption through the server room. Not only do you have servers running 24/7, each consuming somewhere in the region of 50W to 200W, but all the network and storage infrastructure to support them. What's more, so much hardware in one space needs cooling, while UPS devices for redundant power supply pushes consumption even further. Even for a well-managed server room, 2W of power could be used in power distribution, UPS and cooling for every watt consumed by hardware. In practice, this figure could be even higher.

The Lifecycle View

Energy consumption during operation is far from the whole story. Building a sustainable IT department means taking a wider view and looking at the social and environmental impact of your hardware across the whole product lifecycle. With a PC, monitor or printer this starts with the sourcing of the raw materials used in the components, including plastics, precious metals and rare Earth metals, not to mention the water, energy and materials used during their production. Then comes the materials, water and energy consumed during the assembly of the product itself, not to mention testing. Even that doesn't include materials, energy and water used to manufacture any packaging, nor the fuel used in transporting components or shipping the finished device.

This mounts up more than you might think. Back in 2011, a study by researchers from Arizona State University and Rochester Institute of Technology suggested that the manufacturing phase represented 62% to 70% of the total primary energy used in the production and operation of a PC throughout its lifecycle. While manufacturers have worked hard in the last seven years to reduce this figure, supply chain and operations impact still account for a sizable proportion of a PC's lifecycle carbon footprint. With HP, for example, 47% of the company's 2016 carbon footprint was created before[1] products were sold and put into active use.

What's more, hardware's environmental impact doesn't end once the product is no longer used. While legislation, such as the EU's WEEE directive, imposes responsibilities on manufacturers for the disposal of waste electronic equipment, the process of dismantling, recycling and disposing of components has an impact on their carbon footprint, and therefore on your organisation's carbon footprint. Building a sustainable IT department means not just sizing up the impact of manufacture, but also thinking about what happens when your PCs, printers and other hardware products reach end-of-life.

What does this mean for IT teams? More than anything else, it means understanding where your equipment has come from, how it's being used and where it's going to end up. It means researching products and manufacturers and working with those that provide transparency over their operations and environmental impact – and that have a proven commitment to reducing it. It may mean rethinking the way you use some products or the way you purchase them, or prolonging the lifecycle of some products and – when it comes to replacing them – opting for devices designed and built with sustainability in mind. It also means taking full advantage of recycling options and ensuring that any consumables you use are manufactured and recycled responsibly.

> "Building a sustainable IT department means taking a wider view and looking at the social and environmental impact of your hardware."

Shrinking the footprint

Responsible manufacturers are taking steps to reduce the impact of both manufacturing and operating IT hardware. For example, in 1992, HP launched its Design for Environment (DfE) programme, focusing on energy efficiency, materials innovation and the design of business and service models that would help HP use less materials, increase the use of recycled or recyclable materials, and reduce greenhouse gases used in manufacture and operation. Over the last 25 years the programme has evolved, with the current target a 25% reduction in global greenhouse gas emissions by 2025 compared to 2015.

Managing the Problem

Ten steps to reduce your carbon footprint

Understanding the full scope of IT's impact is one thing, getting to grips with it is a whole new challenge. This is less a project than the start of an ongoing process, where you put practices and policies in place to both help reduce your carbon footprint and enable further reductions, moving on.

1 Turn the problem into a plan

Either create a sustainable IT policy or make it into an overall IT plan. While defining strategies and working practices is important, it also helps to have metrics in place and measurable goals. This means measuring where you are now, then defining realistic targets such as an x% reduction in energy consumption over the next x years. To measure, you can use free tools like HP's Carbon Footprint Calculator and/or energy meters to work out where you are now and the areas in which you can drop energy consumption quickly. The more information you can gather on what laptops, PCs, printers, servers and network infrastructures are used, the easier it will be to find energy savings.

2 Optimise existing hardware

If you've bought a PC, laptop, printer, monitor or server in the last ten to 15 years then it's going to have some useful power management features built-in, including low-power standby modes, and sleep or hibernate modes where power consumption will be minimal. What's more, devices have grown much more efficient at coming out of standby or waking from sleep, enabling you to use these features more assertively without preventing the teams you support from going about their business. Set the timers as low as you dare, then move them if you need to. In the case of Windows PCs and laptops, check that they're set to use a balanced or power-saving power plan unless there's a specific need to prioritise performance. It's the best way to make full use of the power-saving features of modern hardware, and most office users have fairly light performance requirements.

Where products have a timer to power down outside of working hours, use them

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too. People can always turn them on manually if they're working late or at the weekend.

3 Turn the screensaver off and the brightness down

If you're using the power management settings properly then there should never be a screensaver playing in your office; if the PC isn't being used, the screen shouldn't be active. A screensaver has no real function on a modern LCD display and just wastes energy. And while we're on the subject of displays, turn the brightness levels down. Monitors can offer eye-popping brightness levels of 250 cd/m2 or more, but that level isn't really necessary in most office contexts, and might actually leave workers' eyes feeling more tired. You can make some tangible energy savings by ramping the brightness down.

4 Manage your printers

Modern business printers have a range of features that can help you reduce paper, toner and energy waste. Duplex modes, where you print on both sides of the sheet, are an obvious example. High-quality draft modes print faster (using less energy) and use less toner, but are still perfectly acceptable for internal and much external use. Pull-printing features are another great tool. Here users send a job to the printer as normal but have to authenticate at the printer before the job releases and prints. This can stop people printing those unnecessary or repeated print jobs that end up piling up around the device. Again, less paper, toner and energy down the drain – and it's better for security as well.

Educating teams to use these features is a great start, but you can also use management tools like HP JetAdmin to create printing policies and apply them to printers, even configuring new devices as soon as they join the network. On the one hand, you can create groups for users and define policies for those groups, controlling colour printing and making duplex printing the default. On the other, you can use these tools to track ongoing usage, gather more data and see if there are other policies that might help you meet your sustainability goals.

5 Don't forget the consumables

Ink, toner and paper all come with their own environmental footprint, both in terms of the materials, energy and water used in manufacturing and in terms of any impact when they're disposed of or recycled. Take this into account by making sure you know how the products you buy are manufactured and whether or how they can be recycled after you've used them. For example, HP toner cartridges combine recycled plastic from old toner cartridges with new plastics to create cartridges where up to 38% of the content is recycled.[2] Not only does HP publish how much of the material content in key products is recycled; it also has policies in place to increase those percentages.

6 Upgrade, repair or responsibly replace

New equipment tends to be more energy efficient than old, though it's worth extending the product lifecycle through upgrade and repair where it's possible and effective to do so. Adding more RAM, changing the HDD or switching a near-dead battery for a new one can give a desktop PC or a laptop another year or two of local service, though it's not worth prolonging the inevitable where it has an adverse effect on everyday use.

When it is time to replace, make energy-efficiency and sustainability key factors in your purchase decision. Consolidate and standardise, so that you're working more efficiently with manufacturers and suppliers, and choose with the product's full lifecycle in mind, so that what you buy comes with a smaller environmental footprint and will last longer in the years to come. Certifications like Energy Star EU Ecolabel can really help here, as you get both clear labelling and information on what the label means. Meanwhile, public databases and third-party assessments like those of the Carbon Disclosure Project or EPEAT can give you a more in-depth view. Responsible manufacturers and their products will have certification to give some idea of their

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sustainability credentials, while the best will publish detailed reports so you can check these for yourself.

Buying new can also be an opportunity to change your device line-up or support new working styles. If you support teams that could work more flexibly, invest in laptops rather than desktops. You can always provide hotdesks with monitors, keyboards and mice where needed. Similarly, think about switching some of your laser printers for printers that use newer, ink-based technologies. HP PageWide printers deliver high-quality black text and colour documents on plain paper, but faster[3] and at lower costs than equivalent lasers.[4] When it comes to energy efficiency, they're in a different league, with multifunction colour printers that use less than 45W even while printing; a tenth of what the equivalent laser printer might consume.[5]

Finally, replacement can also be an opportunity to consolidate. For example, a fleet of older workgroup and personal laser printers, not to mention copiers, could be switched out for a smaller number of faster, more efficient multi-function devices. With one move you reduce energy consumption and free up office space that could be better used elsewhere.

7 Sort out the server room

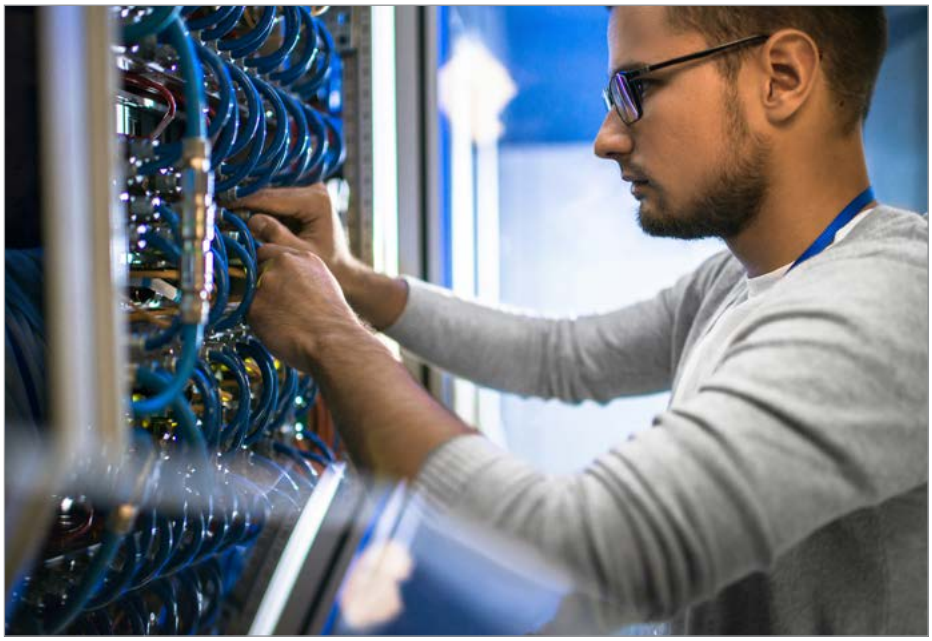
Similar principles apply to the server room. Combine smaller, more efficient servers with the power of virtualisation, and you can get the same – or better – performance for fewer watt/hours. In some enterprises, microservers and network attached storage (NAS) appliances may be able to cover file storage and backup requirements with a smaller energy footprint. Rethink your cooling, too. Is there another arrangement of racks or servers that might allow for more efficient cooling? Could you use alternative cooling systems outside of the summer months, or use the heat productively by venting it out into the office? Could you move some applications to the cloud (though be aware that this comes with its own carbon footprint)? Servers are always going to be a big contributor to greenhouse gas emissions, but there are ways to mitigate that contribution.

8 If you can't automate power-saving, switch off

Some IT products might not have modern power saving features, or the features might not be reliable in use. If that's the case, work around it. Either make switching these devices off manually part of a routine, or use smart switches or even old-fashioned timer switches to turn them off outside business hours. Some businesses find that having desktop hardware plugged into a switched gang socket can be a simple but effective way of saving energy, though this can cause problems for updates or data backup. Last one out? Turn everything off.

9 Don't horde – recycle or re-use

If something is obsolete, unwanted or unfixable, don't keep it sitting in a cupboard; either repair it and put it back into action, recycle it through a government or manufacturer scheme, or give it to a charity or organisation that could re-use it.



10 Make IT part of the solution

Often, IT is seen as a big part of the sustainability problem, but it can also be part of the solution. By providing services and equipment that enable flexible working practices, IT can help reduce the impact of commuting. Make more use of communications technology, particularly video conferencing, and you can cut down on the need for business travel, particularly air travel. Use IT to optimise logistics or supply chain, and you can cut back on fuel consumption and redress the balance further. In every business there are opportunities for IT to make a positive environmental or social impact. Look for them, work out what you can do and then push a business case for doing it.

Upgrade your printer to cut down consumption

Thanks to new toner formulations and innovations in print engine technology, today's HP LaserJet printers use up to 56% less energy on average than their 2010[6] equivalents, with the latest models consuming up to 42% less energy[7] during use than the previous generation. What's more, HP toner cartridges with JetIntelligence technology contribute up to 55% less CO_2 emissions than previous generation toner cartridges.[8] HP's PageWide printers offer even more energy-efficient printing, using ink-based PageWide technology to print laser-quality black-and-white and colour pages at speeds of up to 75ppm. PageWide printers use up to 71% less energy[9] and generate up to 95% less supplies and packaging waste[9] than equivalent laser printers, reducing the carbon footprint of printing by up to 80%.[9] Overall, 100% of HP's PageWide range contains a minimum of 5% post-consumer recycled content plastic.[10]

Sustainability as a Service

Want a shortcut to sustainability? Embrace 'as a service' models

Not every business or IT department has the time or resources to plan and implement a proper sustainability strategy. What's more, buying in new energy-efficient hardware could mean a huge upfront investment, leaving many businesses feeling that they have no choice but to stretch the lifecycle of old hardware. Instead of enjoying cost savings and reducing their carbon footprint, they're stuck trying to squeeze life out of old, outdated devices.

Luckily, there is an alternative approach: to start deploying hardware through an 'as a service' model. Here, businesses partner with a solutions provider offering devices, consumables, advice and support as a service for a fixed monthly or annual fee. This approach has a range of business advantages. Firstly, instead of a large, capital expenditure investment for new equipment, you have more affordable and predictable long-term operating expenditure, which can be easier to budget for, particularly smaller businesses.

Secondly, as a service solutions are more flexible and scalable. Need to grow your company? Just scale up your solution to cover more seats. You can even change the mix of devices you bring in to match your changing needs. Most importantly, adopting the 'as a service' model means you have help and support throughout the product lifecycle. At the start of the process, you work with the partner to analyse your business needs, set requirements and choose the right mix of devices to match them. Once devices are deployed, you have technical support and advice on tap, while tasks like updating or buying consumables are taken care of for you. It even looks after products once they reach end-of-life; your old hardware is taken away, securely cleared then re-used or recycled. As long as you're continuing the service, new hardware is brought in.

Sustainability and Managed Print Services

Managed Print Services is the best-known class of 'as a service' hardware solutions. The MPS partner comes in, assesses your worklflows, printing practices and copying and printing needs, then recommends printers and multi-function devices. Backed

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by the right hardware and technology, a good MPS partner can help sustainability, recommending strategies like consolidation, duplex printing or use of print management tools and solutions which can reduce the number of printers in your fleet, the energy they use and their environmental impact.

For instance, a large fleet of different laser printers, personal printers and copiers could be replaced by a smaller fleet of high-performance multi-function devices, working more energy-efficiently and using a smaller range of consumables. A partner might suggest new document workflows that minimise paper use, or they could configure printers and management tools to support duplex printing or pull-printing, reducing wasted paper and ink or toner. They'll also ensure that you have enough ink or toner cartridges to meet your needs without a stockpile developing, while taking away spent cartridges for recycling so that you don't need to.

Perhaps best of all, an effective MPS provider will monitor, manage and proactively repair your printers, extending their working lifespan and minimising downtime. HP A3 laser and PageWide printers feature components that use sensors to warn providers when a component is wearing out, even reducing performance to keep the printer up and running until a technician can come in with a replacement. When the device finally reaches end-of-life, it's collected and responsibly recycled. MPS is good for business, helping to reduce the total costs and IT burdens associated with operating printers, but it's also a simple measure that promotes sustainability.

Through these measures, solutions like HP Managed Print Services can help reduce printing-related energy usage by up to 40%, decrease printing and imaging costs by up to 30% and lower paper waste by 25% or more.[11]

Sustainability and Device as a Service

Device as a Service (DaaS) does much the same thing for PCs, laptops, mobile devices and supporting hardware. Again, there's a consultancy element, where the provider comes in and assesses your needs, then helps define a perfect mix of devices to cover the requirements of different users. Once products are deployed, the provider can help with everything from management to security updates to support, repair and replacement, using the data and insights gained from managing the service to ensure you always have the optimal setup.

This brings similar advantages. A provider can configure devices with company-wide settings that prioritise energy-efficiency and power-management. They can keep devices in tip-top working order through proactive on-site service and regular patching. This ensures that devices are optimised throughout their lifecycle, delivering the features and performance each team or individual needs. DaaS can also help your organisation embrace sustainability, not just through planning for the future, but by supporting you as you pilot new working practices or flexible working initiatives, scaling up and changing the mix of devices as the business transforms.

Will adopting DaaS and MPS give you a one-stop solution for sustainability? No. That takes wider changes to working and procurement practices. But will it give you a

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End of Life?

HP believes in recycling, recycling 102,800 tonnes of hardware and 17,100 tonnes of ink and toner cartridges during 2016. Between 2016 and 2025, HP aims to recycle over 1.2 million tonnes of hardware and supplies. This doesn't mean, however, that products are dismantled and recycled if they can be reused. In 2016, 57% of HP Managed Print Services office print technology that ended its first service life was audited, tested and securely cleaned of data, then remarketed to a second customer.[12] HP also works to extend product life, designing printers to be more easily repairable and selling replacement parts. In 2016, 5.05 million units of hardware were repaired by HP.

It's Not Just About the Hardware

New ideas and working practices could reduce your impact further

As we mentioned earlier, building a sustainable IT department doesn't just mean making your IT more sustainable, but also finding ways in which IT can support the business's wider sustainability goals. In fact, there are several areas where IT can play a positive role in reducing your organisation's carbon footprint, while potentially bringing in cost-savings and improving the health and wellbeing of its teams.

Flexible Working

The key one is flexible working, where employees are enabled to work part-time in the office and part-time from home or elsewhere – or even to spend the majority of their time working remotely. There are many benefits, both for workers and the business. Recent research from HSBC[13] found that flexible working was more likely to increase productivity than financial incentives, and that those regions where flexible working was more popular were also the most productive. According to the report, 81% of workers surveyed who could work remotely believed it helped improve their productivity.

Flexible working can help employees with their wellbeing and achieve a better work-life balance, but it's also good for sustainability.

Employees working from home aren't commuting. In 2014 analysts for the Carbon Trust found that, by working from home two days a week for a year, an average UK employee would save 390kg of CO_2 emissions, 50 hours of commuting time and £450 including travel costs.

Adopt flexible working practices and companies can rethink the office space, using hotdesking and more flexible workspaces to downsize on office space and reduce energy consumption in heating, cooling and lighting, not to mention water usage. This has to be offset by energy consumed at workers' homes in heating, lighting and powering equipment, but the savings are still considerable. In its report, the Carbon Trust[14] suggests that hotdesking could save anywhere between 280kg and 700kg of CO_2 emissions per employee, with cost savings of £100 to £195 for the business, depending on the location of the office and business

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property rental costs.

Flexible working strategies go hand in hand with lightweight, mobile computers that can, in themselves, contribute energy savings. Employees get a laptop they can work from in the office, from home or on the road, but which consumes much less power than a desktop PC and monitor. Even under full-load, an average business laptop will consume well under 50W, and often under 10W while idle. If employees need a bigger screen and full-sized keyboard for specific tasks, you can set up hotdesks with docking stations to provide them.

Alternatives to business travel

Business travel is a massive cost for many businesses and makes sizable contributions to their carbon footprint. According to the WWF, it could account for more than 50% of a non-manufacturing company's carbon footprint, and that if European companies cut their business travel by 20%, it would save the equivalent amount of CO_2 emissions to taking one third of UK cars off the road. One of the best things an organisation can do to reduce greenhouse gas emissions – not to mention operating costs – is minimise both business travel by air and more local travel to meetings or branch offices by car. IT can help with both.

The obvious solution is videoconferencing. Boardroom scale and personal solutions are now very affordable, and for some smaller companies all it takes is the HD webcam built into company laptops and widely available software like Skype for Business, JoinMe, GoToMeeting, Amazon Chime or Google Hangouts Meet. While there will always be situations where face-to-face meetings are the best way to fix a deal or get a solution to a problem hammered out, switching to video conferencing can help you cut down on the wasted time, expense and greenhouse gas emissions intrinsic to business travel – which is good news both for the business and its employees.

It's also worth remembering that other technologies can help knit a geographically disparate organisation and its partners and key customers together. Team messaging and business social networking services, including Skype for Business, Slack and Yammer, encourage a community mentality and can be more efficient than traditional Instant Messaging or email.

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Saving paper?

The paper used by customers in HP products represents around 17% of HP's carbon footprint.[15] As a result, HP works to help ensure that paper is used responsibly. More than 55% of HP's paper products are FSC certified,[15] and the majority of LaserJet products released since 2015 are configured for auto duplex printing out of the box. Using HP Managed Print Services has also been shown to reduce paper waste by up to 25%.[16]

The Future of Sustainability in Business

We face even bigger social and environmental challenges, but technology gives us the means to meet them

While businesses are doing more than ever to embrace sustainability, there's more hard work ahead. In January NASA announced that Earth's 2017 global surface temperatures ranked as the second warmest since records began in 1880. While temperatures were slightly lower than the 2016 peak, it continues a trend where the five warmest years on record have all taken place since 2010. The planet's temperatures continue to hover more than 1 degree Celsius above late 19th century levels, driven primarily by increased greenhouse gas emissions. We're a long way from putting the brakes on climate change.

Meanwhile, new challenges are emerging. One of the global 'megatrends' HP talks about is rapid urbanisation, where global population growth leads to cities of 10 million or more inhabitants, living and working in more constrained conditions and smaller spaces. This will inevitably take its toll on the environment. The heat island effect, where urban areas grow significantly warmer than surrounding rural areas, is spreading across the globe, with cities that are up to five times warmer. The more people moving to these megacities, the more pollution rises, with cities producing nearly 75% of the world's greenhouse gas emissions.

Population growth is also putting pressure on the world's resources. Food and water are the obvious examples, but with increasing technology adoption amongst

> "The heat island effect, where urban areas grow significantly warmer than surrounding rural areas, is spreading across the globe."

emerging working and middle classes, we'll also see more competition for the precious and rare-earth metals used in their manufacture, not to mention more concern over plastics and their environmental impact. Put it all together, and the need for businesses to reduce their carbon footprint will be just as intense, if not more so.

However, technology has a positive role to play in the future of sustainable business. By embracing innovation around AI, IoT, new additive manufacturing technologies and environmentally-aware design, companies can make a more positive impact on the world.

Virtual Reality and Mixed Reality technologies aren't just for games and entertainment. In the future, these technologies could be harnessed for business-grade telepresence, bringing people from different offices, countries or even continents together in a way that feels more natural than today's video-conferencing. With VR and AR, it will be possible to collaborate and share ideas with others as if you're in the same room, even if they're thousands of miles away, with rich overlays of business data or tools that blend the physical and virtual worlds in powerful new ways. Why explain a new product design with notes and schematics when you can pass a virtual prototype and share your thinking? These technologies could cut down the need for business travel even further or revolutionise flexible working strategies.

The Smart Office could produce more efficient workplaces, with embedded sensors gathering data that AI-powered services can use to optimise lighting, heating and computing resources for specific areas, teams and tasks. Already, cutting-edge office buildings like The Edge in Amsterdam have a smart infrastructure powered by over 30,000 sensors, covering parking and desk allocation, locker access, food ordering and more. The main tenant, Deloitte, has seen talent attraction and retention soar skywards, while absenteeism is down by 60%. The Edge has an outstanding BREEAM rating for sustainability and uses 70% less energy than office buildings of comparable size and use.

Additive manufacturing will transform manufacturing processes and supply chains, as manufacturers embrace 3D printing technologies like HP Multi Jet Fusion to manufacture products in smaller batches – even on demand – in energy-efficient micro-plants located where their customers live. This creates huge opportunities for businesses of every size, while eliminating the costs associated with shipping goods around the planet. Instead, companies can create virtual inventories and manufacture when and where needed, eliminating waste and reducing emissions due to distribution. According to a study in the Energy Policy Journal, combining 3D printing with more localised supply chains could reduce global carbon emissions by 535.5 million metric tons by 2025; the equivalent of taking more than 110 million cars off the road for a year.

Internet of Things has many roles to play in sustainability, not least in the development of more resilient, repairable devices. When products use components that can tell you when they're going faulty or wearing out, it's easier to take proactive measures, prevent downtime and extend a product's life.

Blockchain might be best known as the technology behind Bitcoin, but it also has the potential to transform global supply chains. It enables companies to track how goods are moving and where they are, plus every transaction that happens as goods move through the supply chain. The real value comes when Blockchain-powered electronic ledgers and data are connected between suppliers, customers and intermediaries, and when the data is used to optimise routes and logistics systems, driving down the cost and environmental impact intrinsic to moving products, components and materials around. Combine Blockchain with AI, and you're looking at a world where global trade comes with a smaller carbon footprint.

A Better Use for Plastic Bottles

More than 80% of HP ink cartridges contain between 45% and 70% recycled content, including plastics recovered and recycled from plastic bottles collected in Haiti,[17] where HP is helping to create jobs and improve lives. Through 2016, HP manufactured more than 3.4 billion HP ink and toner cartridges using more than 88,900 tonnes of recycled content, including 3.7 billion plastic bottles.[17] By bringing Haitian bottle collectors into the supply chain, HP creates economic opportunities for them and quality of life improvements for their families.

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For details see:
http://h20195.www2.hp.com/v2/getpdf.aspx/4AA6-3804ENUS.pdf

5. Energy claim based on TEC data reported on energystar.gov. Data normalized to determine energy efficiency of majority of in-class business printers $300-$800 USD and MFPs $400–$1,000 USD as of November 2015; market share as reported by IDC as of Q3 2015. Actual results may vary.
Learn more at:
https://www8.hp.com/us/en/PWA/PageWide/claims.html?jumpid=nm_2eias7w1p8

6. HP Brochure: Print with Purpose, p3
http://www8.hp.com/h20195/v2/getpdf.aspx/4AA4-2457ENW.pdf

7. In 2015, Hewlett-Packard Company launched five HP LaserJet printers rated by EPEAT at the Gold level in the United States, including the HP LaserJet Enterprise M506dn15, which uses up to 42% less energy than its predecessor. The specific SKUs for the products rated by EPEAT at the Gold level are HP LaserJet Enterprise M506dn (F2A69A#201 and F2A69A#AAZ).
HP Sustainability Report 2015, p3
http://www8.hp.com/h20195/v2/GetPDF.aspx/c05154920.pdf

8. The CO2 reduction was based on a comparison between HP LaserJet Enterprise 506dn and the predecessor product (HP LaserJet Enterprise P3015). CO2 reduction for cartridges is reported per 1,000 pages printed (Kg CO2 e/1,000 pages).
HP Sustainability Report, 2015
http://www8.hp.com/h20195/v2/GetPDF.aspx/c05154920.pdf

9. BLI Custom Test Report, Comparative Reliability, Energy Consumption, Image Quality and Waste Evaluation, HP PageWide Pro 552dw vs. Competitive Laser Models, May 2016.
For further details see: HP whitepaper: conserve resources without sacrificing performance
http://www8.hp.com/h20195/v2/getpdf.aspx/4AA5-1482EEW.pdf

10. HP Brochure: Leading the way through a responsible materials strategy, p3
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15. HP Sustainability Report, 2016, p48
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