The Green IT Guide

Ten Steps Toward Sustainable and Carbon-Neutral IT Infrastructure

Mike Halsey, MVP

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For our planet, and all the beauty she holds, and for everybody helping make their own lives more sustainable, even if it's only baby steps

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About the Author

Mike Halsey is the author of more than 20 books on IT systems, Microsoft Windows, productivity, and accessibility. He has been a Microsoft Most Valuable Professional (MVP) awardee for more than 10 years and is a recognized technical expert. He is known for being the author of the popular Windows Troubleshooting books and associated videos (Apress) and has also written *The Windows 10 Productivity Handbook* (Apress), *Windows 10 Troubleshooting* (Apress), *Windows 11 Made Easy* (Apress), and *Windows 11 Troubleshooting* (Apress).

Mike is well versed in the problems and issues that PC users, IT pros, and system administrators face when administering and maintaining all aspects of a PC ecosystem. He is a teacher who has built skills in helping people understand sometimes intimidating subjects in easy-to-understand ways, and put these skills to great effect in his books and training videos. Mike lives in the south of France with his two rescue border collies, Evan and Robbie, and tries to live as sustainable a life as possible. You can contact him on Twitter at @MikeHalsey.

About the Technical Reviewer

Andres Sacco has been working as a developer since 2007 in different languages including Java, PHP, Node.js, and Android. Most of his background is in Java and the libraries or frameworks associated with this language, for example, Spring, Hibernate, JSF, and Quarkus. In most of the companies that he worked for, he researched new technologies in order to improve the performance, stability, and quality of the applications of each company.

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CHAPTER 1

Understanding Your Place on Planet Earth

There have been a great many major issues that have troubled the world and humanity over the centuries, and on all of these issues, there have been advocates and deriders – subjects such as democracy vs. communism, the treatment of animals, one religion vs. another, borders, laws, where people settle and why, and more besides.

This isn't anything new and in fact is something that we should embrace and be proud of. I want to get this point out of the way from the very start. I am not here to be all preachy and holier-than-thou. I am not here to even claim that climate change exists (though the Earth is definitely not flat, and man *has* been to the Moon).

Difference of opinion is a great thing. As a species, humanity is extraordinarily varied. This doesn't make us any different from plants, animals, birds, and fish, where we can find so much variety that it's not even all been discovered yet. I'm not talking about how people look, their gender or none, where they're from, or what they like to do behind the closed door of their own home. I'm talking about people having a difference of opinion.

Within the scientific community, there is difference of opinion about climate change. This covers every aspect of the subject from whether it exists at all to whether it's been instigated by humanity, to what the effects of a changing climate will be anyway.

It's this difference of opinion that spurs scientific and philosophical achievement and helps the human race learn and progress. I'm fairly certain, though obviously there is no evidence for this, that early mankind might have been split for a while over the use of bones to hit animals over the head to knock them out or of the bow and arrow to hunt at medium to long range.

It's not a stretch though to imagine this might be the case, with the "old guard" grunting there was nothing wrong with just spearing a fish, and trying to kill an antelope at long range was a waste of time. In this circumstance, there would have been some

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debate, some watching, probably some mild laughter when it all went wrong, and finally a mutual understanding that perhaps this bow and arrow contraption might not be such a bad idea after all.

So it is with climate change. Some people say it doesn't exist; some people say it does. Some people say we've caused it, and other people say it would have happened anyway. Both sides of this create a debate, and it is from debate that we learn, both from each other, and also by using this as a launchpad to undertake research so we can better understand what is *really* going on.

What isn't in question though is that the Earth has been going through a fairly turbulent time in recent years, and flooding, rising temperatures, melting ice caps, and other things we term "natural disasters" are more frequent and much worse than they used to be.

When you add into this that the cost of living around the world is getting more expensive, and the cost of doing business is getting more and more expensive with regulation, energy costs, and more pushing up the price of everything, it's clear we should be doing something about it, if only to drive the bills back down again.

So this brings me to the point of this book. It's not to say "you're at fault, you're doing it wrong" but rather to look at the way we conduct business in the 21st century from a more philosophical viewpoint and to see if there's anything we can do to improve things for ourselves, our stakeholders, our customers, our suppliers, and our communities.

This is the approach I take in this book, one of inclusivity and corporate responsibility; after all, you wouldn't be doing the right thing if you deliberately pushed up the running costs for your business, would you?

One thing is for certain though that the science and the debate is changing regularly and rapidly, so I also won't be addressing specific technologies that I know will change and be upgraded over the coming years. I'll talk about such subjects in more general terms to keep this book as relevant into the future as it is on the day I began writing it. I hope you find it helpful.

What Is Climate Change and Why Does It Matter?

Climate change, also known as global warming, climate variability, and a multitude of other terms, is something that first came to mainstream attention in the late 1970s when scientists noticed that the ozone layer, the part of the Earth's stratosphere that absorbs solar radiation, was thinning. It took about 20 years however before the public and

political debate really began to start about what was causing it, what the knock-on and other effects might be, and what else might be going on that we hadn't noticed yet.

The political establishment has now broadly accepted the case for climate change, and there have been treaties and initiatives such as the Paris Climate Accords of 2016, to try and do something about it.

There are some in the scientific community who say we must act immediately to prevent a global catastrophe, some who say we can act more slowly, and others that claim it's likely already too late to do anything at all and that we should instead pack up and just go down the pub (I might have exaggerated that last part).

What is crystal clear, at least to this observer, is that governments aren't acting anywhere near as quickly as business is. Let's take vehicles as an example. I'm originally from the UK and now live in the south of France. I drive a small, completely electric vehicle to ferry me around, and a few days ago when I had to go to the city of Angouleme for my French residency permit meeting. Upon arrival, I discovered the town's electric car charging points had been completely removed.

It is this that I term as "Squeaky Bum Time" that highlights just how far behind governments are. France is set to ban the sale of all new cars that run on gasoline (petrol) or diesel from 2040. The UK has an even more ambitious target of banning sales by 2035 at the latest. France has a reasonably good network of electric car charging infrastructure, but it's spotty, patchy, and unreliable. There's no way to know if an electric charging point will be free and available for you at your destination, but also no way to know if it'll be working at all or, as in my own example, even exist in the first place.

Some apps and services exist to help us all make sense of this, but they're spotty and patchy as well, being only as good as the information they're fed. If governments pulled their fingers out, things might not be so bad, but at the rate they're all progressing in the deployment of electric charging points, there will likely never even remotely be enough to meet demand by the time all new cars on the road have to be electric.

The Benefits to Business

Corporations, on the other hand, have picked up this ball and rolled with it. Many of them are seeing the benefits in adopting more environmentally friendly policies and practices, and it is these initiatives, from the Gates' foundation machine that can make clean drinking water from poo to the creation of planes that fly purely from electricity, that we tend to hear about on the news.

The benefits to these businesses are very clear – they make the business more popular, raise its profile, and hopefully result in that business becoming much more profitable and competitive. This should be a no-brainer to anybody running a business from a small enterprise to a global corporation.

I would argue that *this* is why climate change matters to business. To bring it down to its simplest and crudest point, it's good PR. Nobody is going to stop using your products and services because you're seen as helping the environment or at least having targets for when you will be helping the environment.

On the contrary, in fact, word quickly gets around that company A is reducing the power consumption and dissipated heat from its data centers and that company B has switched all of its paper supplies, from letterheads to loo roll, to bamboo.

If the end result of driving down costs and driving up efficiency also means one less ice cap will melt, or that a village on the coast won't be hit by flood, that's just the icing on the cake. A cynical view you might say, and I'd agree, but if it helps make the medicine easier to swallow, it's probably worth it.

The Benefits to Individuals

So while the benefits to business are pretty much summed up by profits and money, what are the benefits to individuals? I'm a self-employed person sitting in my home office. I have no employees to inspire, no stakeholders to keep on side, and no customers to impress. You might be unsurprised to hear that this too comes down to money.

I don't want you think at this point that I'm entirely motivated by greed because I'm not. There are real and very tangible benefits to reducing our carbon emissions and using and creating technologies that are more environmentally sustainable.

Money however is just as important to individual people as it is to corporations. If you can remember the last time your energy bills were reduced by your supplier, then you're very probably luckier than most. Just as with business, the cost of living just keeps rising, and with two major events at the beginning of the 21st century, the 2008 economic downturn and the Covid pandemic, still to pay for, they're not going to be going down for a considerable time yet.

If however we use more energy-efficient IT and other devices in our homes however, the very first we'll notice is that our bills go down, and I can't see anybody complaining about that.

Out with the Old?

There is a long-used phrase where I hail from, "out with the old, in with the new," and it's widely accepted that a shiny new computer, tablet, or smartphone will be faster, more efficient, and better in every way than one that's even a few years old, let along something that is 10 years, or perhaps even several decades old, such as the transistor radio that has sat on the kitchen windowsill in your grandmother's house since you were small.

This approach to technology is a double-edged sword, and there are two very important threads here that must be considered. The first is energy efficiency, and the second is security and privacy.

I'll talk much more about this in Chapter 3, but the short version is that crime on the Internet, both criminal and state sponsored, doesn't stand still, and older IT equipment can be highly vulnerable to hacking and malware, which is the real reason Microsoft, Google, and Apple keep updating their operating systems, and you get near-constant updates to the software and apps you use.

To the first point however, it's not necessarily true that newer technology is more power efficient than older tech. Again something I'll detail in full in Chapter 2, while new processors and circuitry contain smaller and smaller components, each of which consumes less power than their predecessors, they're also far more powerful than the technology they replace.

These smaller circuits in modern devices can result in excess heat dissipation (and any excess heat given off by a device is energy that's not being used by the system and that is just being wasted instead by throwing it off into the air) and needing more powerful and energy-consuming chargers and power supplies to get it all working in the first place.

As an example of this, in late 2020, Apple released its M1 processor line. This was a new series of chips that would power the coming generations of iPads and iMac desktops and laptops and that were a powerful match for their rivals from Intel and AMD. These chips evolved from, and were built on, foundations Apple laid several years earlier in the processors they were making for the iPhone, and it speaks as to just how powerful those iPhone processors had become over time.

The iPhone 12, released around the same time, needed a charger that consumed a minimum of 20W (watts) of electricity, and we use wattage to measure power draw, while the iPhone 6, released 7 years prior but still receiving operating system updates after the launch of the iPhone 12, only needed a 5W charger, which might be small in itself, but across a population that can scale to a significant change in overall energy consumption.

But, I hear you cry, the iPhone 12 is a much better phone than the iPhone 6, with a better, brighter, larger screen, a far superior camera, and more besides. I use the iPhone as an example because everybody reading this book will know what it is and how it has evolved as a product. It's safe to say though that not everybody needs the features or power of a new phone, just as not everybody needs the features or power of a new laptop or desktop computer.

There are people in the world who just want to do some fairly straightforward things with their phone, such as messaging, maps, and perhaps even making the odd phone call (Do people still do this?; Ed). This is just as there are some people who on their home or work PCs just need to use Microsoft Office.

At the time of writing this, Microsoft states on their website that the minimum requirements to install and run Microsoft Office are a dual-core processor running at 1.6GHz or faster, 4GB of RAM (memory) or just 2GB for the 32-bit version which does almost all the same things, 4GB of available disk space, a screen resolution of 1280 by 768 pixels, and DirectX 9 to power the graphics.

DirectX is significant because it means we can gauge what hardware we can run Office on. DirectX 9 was first released back in 2002 for Windows XP, and the rest of the specification such as the minimum 2GB memory requirement and 4GB storage fit well with PCs from the time.

Now it's very easy to argue that if you install any software or operating system on a device that just meets the absolute minimum required specifications, then you'll have a truly horrible experience, and having hardware that's newer and faster will give you a much better time.

But this would still give us PC hardware released for Windows Vista in 2006, which (I'm writing this book in 2021) is 15-year-old hardware. The minimum specifications for Windows 11, released in 2021, state an eighth generation Intel Core processor or newer. These processors, code-named "Coffee Lake," "Amber Lake," and "Whiskey Lake," were first released in 2017, meaning when Windows 11 was released, a 4-year-old computer would not only be considered perfectly adequate for running the operating system at its launch, it would also be supported for a maximum of another 10 years, potentially making the PC 14 years old when it's no longer receiving updates. Windows 7 as an example has been receiving updates in extended support all the way to the end of 2022, 13 years after it launched.