It's our time to take the lead.
The pathway to sustainable tech growth.

Look around, and it is clear that we now live in an increasingly digital world. Everywhere we turn we hear talk of SmartCities, Artificial Intelligence, Big Data and ChatGPT. Technology and digital solutions are here and growing, with the social, educational, health and business value of technology unquestionable. But behind the scenes, this growth has a carbon cost that has remained invisible to most of us.

The information and communication technology (ICT) sector is now estimated to account for somewhere between 4 to 6% of global greenhouse gas emissions, and is predicted to consume over 20% of global energy by 2030. A much quoted comparison that continues to shock is that data centres running the software we so depend on, now have the same carbon impact as the aviation industry.

Everything, everywhere, all at once.

The recent IPCC synthesis report, the conclusion of its sixth assessment cycle, gave us an updated call to action. The world's leading scientists have once again shown us that we have no time to spare, and that, as António Guterres, the Secretary General of the United Nations, stated we now must do "everything, everywhere, all at once" if we are to hold to the 1.5° temperature change a set by the Paris agreement. By the time the next IPCC assessment cycle completes it may well be 2030, it is the same timeframe we have to make a difference to avoid reaching the tipping point, the critical threshold that, if crossed, will lead to large and often irreversible changes in the climate system.

Digital and technology underpins almost everything we do, it is everywhere, and the time is now to start focusing on reducing its energy consumption. Having spent the last two years engaging with some of the world's leading cloud service providers, software companies, digital leaders, technology consultancies and system integrators it is now my strong opinion that we have an opportunity ahead of us, one that could see us take the technology sector to the forefront of decarbonisation.

Eric Zie
CEO GoCodeGreen

Let's talk about the HOW.

I have observed that the most successful companies taking action do three things well, and this is regardless of size or complexity of their IT estates. Alongside this they recognise that this isn't a 'once and done' exercise, and that they must embed sustainable IT practices as part of 'what they do everyday'.

01 They understand sustainable software engineering **principles**

02 They **measure** and are constantly seeking to improve the granularity of their measurement

03 They take action and apply green coding **techniques** to maximise energy efficiency and the impact they have across their total IT

1. The principles behind sustainable or green software are not new, and represent logical considerations that should form part of any good design. Maximise engineering, hardware and data efficiencies and building carbon awareness into software are all key. For example always consider ways to constrain your consumption and maximise the use of compute resources. Make this real by creating targets and set them as part of your acceptance criteria, and think about selecting the most energy efficient compute, hosting, software solutions and tooling as ways of minimising energy usage. Ensure that your teams understand the principles and are able to start embedding them in all future design and change activity through applied learning and development.

2. Undertaking measurement is vital, it allows for targeted action and helps ensure that you know that the principles you've adopted and actions you've taken are making a difference. Measurement can come in many forms, with differing levels of accuracy and coverage. For those wanting to undertake a deep decarbonisation I've seen that those undertaking full 'lifecycle' or 'product' level analysis are having the greatest impact.

Imagine trying to reduce the carbon impact of a mobile phone. To have any chance of targeting appropriate actions you'd want to understand where the raw materials were sourced, the methods used during manufacturing, the method of distribution, the usage and expected lifespan and eventually the choices made at the end of its usual life. All of these stages and activities lead to energy being used and emissions being generated. The more efficient the choices made and techniques deployed during each of these activity phases, the less energy used and the less carbon impact associated with the product.

There is a methodology called the Greenhouse Gas (GHG) Protocol Product Standard that helps to decompose a product into its lifecycle stages as a way to achieve the above. Now imagine software as a 'product', and for anyone involved in designing, building or operating software you'll immediately be able to align the steps of pre-processing, production, distribution, use and end of life to the various stages of software product development and operation. By taking the same underlying approach for a digital product or service to that of a physical product, and measuring the impact of each lifecycle stage, we can then start to identify and target action to improve energy efficiency and reduce consumption.

Building a comprehensive approach to decarbonisation at this level is a complex task, and the steps required to perform these calculations might seem too difficult an undertaking, which creates a barrier to measurement and action. That's why GoCodeGreen has developed a measurement platform with the sole purpose of helping bring the next step closer to your reach.

3. Targeting lifecycle stage driven action. Once your software product has been measured you'll want to target opportunities to improve energy efficiency and reduce its carbon impact. Depending on the lifecycle stage and maturity of your product there will be different choices and prioritisation calls you can take, and this is where 'green' coding techniques alongside other infrastructure and deployment choices start to play a critical role.

Green coding techniques help the software developer improve the energy efficiency of their code. Imagine you are operating in a compute constrained environment, what would you do? First you'd want to identify any high energy consumption features and then monitor energy usage to enable code optimisation. Once you are able to measure energy usage you might then target different areas and processes that are running, for example improving the efficiency of data caching and exchanges; compressing and aggregating stored data; or find efficiencies from using smaller image sizes or font types. You could then start to remove unused or frivolous features; or identify and remove unnecessary logging, loops and polling. As you start fine-tuning you could examine your codes ability to adapt to device power; and even start to limit computational accuracy based on operational needs. In some cases, especially when redesigning or building from new, it is possible to select the most energy efficient programming language; or maximise code reuse and no-code assets as part of a more structural change.

Ultimately deploying a sustainable software engineering technique is about finding the most efficient way of doing or achieving something. We recommend you look at the work being completed by the likes of the Green Software Foundation, who are starting to take the concept of carbon intensity at code level and location based workload placement to a practical level for software engineers.

The great news is that I have seen examples of all of the above in different scenarios and alongside hosting and other changes creating carbon reduction opportunities of up to 56%. That's a scale of reduction in energy usage that's achievable and worth having.

In our digital world we must move forward, our actions be progressive, and able to utilise the advancements in technology to create the efficiencies needed to support the growth of digital.

The technology sector is full of some of the smartest people around. We are doers. The ingenuity, innovation mindset and sheer determination to solve problems makes us a uniquely capable group. We must stop thinking that taking action means we will need to in some way slow things down, that we have to regress to some version of the past that might have been less polluting. In our digital world we must move forward, our actions be progressive, and able to utilise the advancements in technology to create the efficiencies needed to support the growth of digital. But we should recognise that we can only meet the needs of societies and business for more technology if we base this growth on a more sustainable IT sector.

GoCodeGreen is nominated for the Earthshot Prize in the Fix our Climate category in 2023. We have built the world's first product lifecycle based measurement and decisioning platform to help you understand and take action to reduce the carbon impact of the digital products and services you are designing, building and operating. Through our independent measurement we can help ensure that there will be no greenwashing as you start to decarbonise your technology and IT. We are holding a mirror up, and what we all now need is for you to look at yourselves and embrace the opportunity to make an even better, faster, more efficient, planet-friendly version of your amazing digital solutions.