5 steps to sustainable GenAI

Powering business transformation
with Dell Technologies and BT

DELL Technologies

BT

Summary

Artificial Intelligence is transforming the business landscape, promising to accelerate innovation and empower organisations across industries to advance their goals. The energy intensity of AI technologies poses a clear challenge to advancing sustainability and energy efficiency, so technology leaders must take the right approach to generative AI (GenAI) adoption in order to limit environmental impact.

This guide takes you through the five steps you can take to navigate this challenge by adopting a holistic approach to sustainable GenAI adoption with BT and Dell Technologies.

Contents

Advance your business with sustainable GenAI

GenAI promises to deliver a giant leap forward in productivity, efficiency and waste reduction. For most, adoption is not a question of if but when. 76% of IT leaders surveyed by Dell Technologies in 2023 said they believe GenAI will be significant or transformative for their organisations.[1] Businesses are eager to reap the benefits and gain competitive advantage, but the high energy intensity of AI technologies is giving many decision makers pause for thought. GenAI uses large language models (LLMs) involving trillions of parameters – and this technology is just getting started.

It has been estimated that just training an LLM like ChatGPT-3 would require 1,300MWh of electricity.[2] That's enough to cover the typical consumption for hundreds of British homes – for a whole year.[3] This is to say nothing of the energy required to run such a model. With the market predicted to hit £1 trillion by 2032, organisations need to find ways to minimise environmental impacts while maximising the extraordinary potential of GenAI.[4]

Not least, this is because more and more businesses are obliged to report on their environmental impact. The UK government has committed to net zero by 2050, and many UK companies will be required to report climate-related data from 2025.

Businesses face increasing regulatory, shareholder and cost pressure to reduce their environmental impacts. Gartner predicts that 70% of enterprises adopting GenAI will cite sustainability (along with digital sovereignty) as top criteria for selecting public cloud GenAI services by 2027.[5]

Now is the time to start planning how you will adopt GenAI without compromising your priorities.

This guide is designed to help you navigate this challenge with the combined expertise of BT and Dell. We outline the five steps you should take to carry out this important work, inviting you to take a holistic, enterprise-wide approach that considers the whole digital value chain. We will also showcase how BT and Dell can support you today, as we continue to innovate and develop infrastructure solutions that utilise the latest technology.

Five steps for sustainably adopting and running GenAI

1 Establish your carbon baseline

Measure your emissions across the whole digital value chain to establish your carbon baseline. This is a good first step and will help you determine where to reduce emissions.

2 Embed sustainability across your infrastructure

Embed sustainability in your data centre by taking steps to increase energy efficiency through management and by refreshing your hardware, creating a platform for sustainable growth.

3 Rightsize your AI investment with as-a-service models

As-a-service models can help you ensure your investment meets your needs. By maintaining the latest technology, you can reduce management costs and drive sustainability.

4 Bring AI to your data wherever it resides

Whether your data resides in a private data centre, co-location or public cloud, location should be no barrier to deploying AI. How these sites are powered will affect efficiency and sustainability.

5 Collaborate with partners and suppliers

Sustainability and energy efficiency are best achieved through collaboration. Strategic partnerships with third parties can help you overcome the complex challenges associated with AI adoption.

Step 01

Establish your carbon baseline

When developing a strategy for sustainable GenAI, a good place to start is with your business's carbon footprint. Measuring emissions across the whole digital value chain will help you prioritise emissions reduction by establishing your carbon baseline. This could even mean starting with estimated data simply to create a clearer picture of where your business currently stands.

How can we support you?

Technology suppliers can provide lifecycle analysis for all hardware, just like Dell Technologies offers its business customers. BT enables customers to obtain emissions data for their networking components and end point devices through the **Digital Carbon Calculator**.

The PACT framework, launched by the World Business Council for Sustainable Development (WBCSD), sets out the methodology for the secure, auditable and verifiable exchange of this data between suppliers and customers. You can ask your supplier to provide product-level carbon footprint data using a PACT-compliant platform, such as SAP SDX.

For on-premises equipment, the most carbon-intensive phase is typically when devices are in use. Real-time power monitoring is therefore particularly important for determining your overall carbon footprint and identifying opportunities to reduce consumption.

Dell OME OpenManage Power Manager is a convenient way to remotely manage server power and thermals, decrease power usage and comply with sustainability reporting requirements. With **Dell CloudIQ**, the APEX AIOps platform for infrastructure insights that tracks and forecasts capacity requirements, can resolve issues up to 10x faster, saving IT departments one day per week on average.[6]

BT's **Carbon Network Dashboard** enables customers to view real-time power, energy and carbon data for their on-premises equipment. Customers can obtain rich insights that help them optimise their devices based on ports and PoE utilisation, peak traffic and grid carbon intensity.

Mapping your carbon footprint is more complex where there is a service component, such as with cloud-based shared infrastructure. This is because no specific standards exist for the kind of analysis required. You can ask your provider to estimate the emissions involved based on a consumption model that aligns with the guidance set out in the GHG Protocol.[7]

Resolving issues up to **10x faster**, saving IT departments one day per week on average.

Where is new technology taking us?

STEP 1

The business value of GenAI is directly related to the quality of data being used.

Organisations are naturally eager to use their own high-quality data, but they need to be able to do this securely. Data sovereignty and security are therefore of the utmost importance, so Dell Technologies is working on Project Alvarium, an initiative to create a Data Confidence Fabric (DCF) designed to provide a trustworthy data framework. This innovative project integrates various technologies to ensure that data from edge devices can be trusted, which is crucial for effective and reliable automated systems.

By integrating Project Alvarium's DCF into its infrastructure, Dell can **accurately and securely track** the energy usage of their systems **in real time**.

This technology not only monitors energy consumption but also identifies the sources of that energy – whether it be fossil fuels, wind or solar. The real-time data gathered provides a transparent view of Dell's energy footprint, facilitating informed decision making about energy use and optimising operations.

Step 02

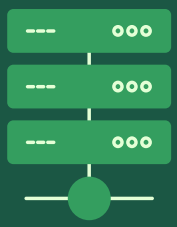
Embed sustainability across your infrastructure

Adopting GenAI not only entails increased energy consumption but involves new requirements and patterns of energy usage. This will create new demands and affect how you manage your networks and data centre quite significantly. BT's research shows that AI traffic over the network and into data centres behaves very differently compared to traditional models. AI models can cause unexpected network demand leading to sharp increases in power demand, as network switches are provisioned based on expected peak load.

There are several ways that you can increase energy efficiency through network design, smart management and by refreshing your hardware with the latest, most energy-efficient technology.

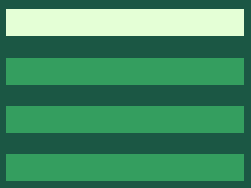
Our recommendations for smart infrastructure management

Dimension your switches/ network correctly. Bigger isn't always better: efficiency can be achieved when switches are provisioned accurately for an expected level of traffic

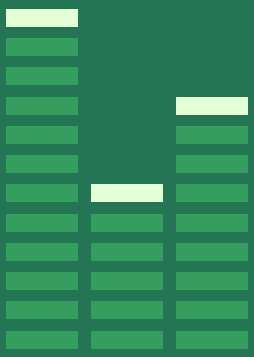


Use fixed networking where possible: fixed networks may use more energy than mobile networks, but they do so more efficiently

Switch off edge equipment after data is sent and send data as quickly as possible



Consider distributed architecture for running AI workloads that require training. Research published by HAL shows that completely distributed architecture consumes between 14% and 25% less energy than fully centralised architectures[8]



Measure Total Usage Effectiveness (TUE)* rather than simply Power Usage Effectiveness (PUE) when calculating edge efficiency and designing data in transit from networks to edge

For customer managed networks: **design a lower-peak-capacity, lower-footprint network** for smooth data transfer

For shared networks: collaborate with your network service provider for support with provisioning peak capacity and **guidance on transmitting data at peak load times**

*TUE = PUE x ITUE (IT Usage Effectiveness). ITUE takes into account support components, such as cooling fans and power supply units, that can misleadingly be treated as part of IT equipment usage within PUE.

How can we support you?

Energy efficient technology has come on leaps and bounds in recent times, rendering old hardware a burden. What took six servers in 2013 takes just one today, and the latest generation of Dell Technologies storage devices is up to 40% more energy efficient than the previous generation.[9]

One new **Dell PowerEdge** can do the work of up to five previous-generation servers.[10] The AI-optimised PowerEdge server portfolio has had energy intensity reduced by 83% over the last decade.[11] **Dell PowerEdge XE9680 with AMD Instinct™ MI300X accelerator** delivers high performance that allows you to unlock the value of your data and gain a competitive edge by training your own customised LLMs. Dell's thermal and cooling technologies enhance heat management, compute density and energy efficiency and can enable higher performance for AI and HPC workloads.

BT's **Managed Edge Cloud** platform and multi-cloud networking capabilities, such as **Connected Cloud Edge**, give customers the option to deploy networks to the closest possible hand-off point to the clouds and partners that matter across the ecosystem, and then to deploy the high-performance connections and services to meet their needs.

CASE STUDY

Powering NHS trusts through the cloud

BT, with the support of Dell and other partners, delivered the **Health Cloud** solution to a large NHS acute trust. The bespoke system connects a local data centre with an existing optical connection, so providers across the region can securely access and share patient data as well as run their AI models in an efficient way. The cloud has enabled the trust to modernise their infrastructure, remove legacy hardware from hospital environments and become the primary tenant for a connected, collaborative regional cloud platform.]

Where is new technology taking us?

BT are currently developing long-term liquid cooling trials with key BT and Dell Technologies partners to create an ecosystem of advanced cooling methods that will enable the most efficient deployments of AI systems available. Most BT data centres operate around 1.3–1.4 PUE, but with some liquid immersion systems this could be reduced closer to a PUE of 1.05, resulting in a **30–40% potential energy reduction**.

Dell's EU BRAINE project aims to bring AI to the edge as efficiently as possible. One of the innovations developed as part of this project is an advanced two-phase liquid cooling system called a thermosyphon. This thermal solution is highly efficient and designed to manage the substantial heat generated by AI and GenAI computing systems. The system integrates several innovative features that enhance performance, energy efficiency and environmental impact compared to traditional cooling methods.

Step 03

Rightsize your AI investment with as-a-service models

The as-a-service model is an increasingly sought-after approach to carrying out digital transformation and managing burgeoning data demands while advancing sustainability and energy efficiency. Forrester finds that 88% of businesses anticipate sustainability benefits from adopting an as-a-service model and 65% expect savings of more than 10% by doing so.[12] This chimes with the finding that 71% of businesses say they need a partner to accelerate their programs and advance their sustainability goals.[13] Renewal, replacement and recycling are at the core of maintaining a sustainable IT environment; as-a-service solutions support the circular economy while ensuring your business operates with the latest hardware.

Service providers can also help businesses provision more accurately for GenAI adoption, ensuring their data centres are optimally sized to reduce costs and waste, and can deliver compute and storage resources for consistent cloud infrastructure. In addition, the flexibility offered by as-a-service models is key to helping organisations reduce their network carbon footprint while scaling out their AI capabilities. Data transmission networks are responsible for around 2–3% of global electricity consumption and can account for a significant amount of consumption for businesses.[14]

Like similar models, as-a-service network services that provide cloud-based solutions on a pay-as-you-go basis allow businesses to more easily scale up or down their resources based on their requirements.

How can we support you?

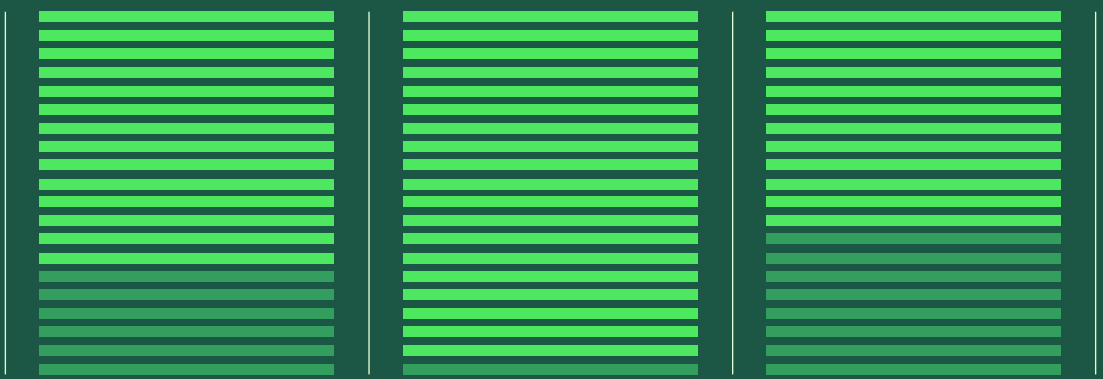
Dell Flexible Consumption solutions help customers rightsize their investments to avoid overprovisioning and minimise overall expenditure. **Dell APEX** allows customers to utilise the multicloud, helping them cut costs and reduce waste while gaining more control over their applications and data. APEX reduces IT management and maintenance time by 42% and can reduce overprovisioned capacity by 34%, helping you cut costs while minimising e-waste and reducing your business's carbon footprint.[15, 16]

The principle of access over ownership is vital to the circular economy. In 2023, 95% of systems returned to **Dell Financial Services** gained a second life by being refurbished and reused.[18]

The remaining were recycled in adherence with all applicable international, regional, national and local laws and conventions.

In line with Dell's commitment to circularity, the latest Dell devices are built for efficiency and designed for the modern workplace. Dell has achieved a 60% reduction in energy intensity across its commercial monitor portfolio since 2014, and its latest accessories are designed to improve user experience and enhance collaboration wherever work happens.[19]

BT and Dell can help you select best-in-class capability providers who are investing in the environments required to drive AI workloads sustainably, at the intersection between private/public infrastructure.



On average, 70% of materials Dell Technologies recovers through **Dell Recovery Services** and other channels are reused in the industry.[17]

In 2023, 95% of systems returned to **Dell Financial Services** gained a second life by being refurbished and reused.[18]

Dell has achieved a 60% reduction in energy intensity

Where is new technology taking us?

BT is developing a new network, **Global Fabric**, on a network-as-a-service model, which transforms and future proofs connectivity through the world's largest pre-integrated cloud and public network. Like the cloud itself, Global Fabric is designed for flexibility, scalability and resilience, both in the quality of connectivity and the convenience of pay-as-you-use. By combining the power of the cloud and networks, customers will be able to optimise application performance, user experience and cost.

Global Fabric

This new high-capacity, fully programmable network is built with state-of-the-art equipment offering improvements in efficiency, sustainability and resilience.

BT estimates that, when fully rolled out, Global Fabric will use 79% less electricity than current global networks – reducing BT's scope 2 emissions and customers' scope 3 emissions – providing customers with a low carbon platform to run their AI models.

79% less electricity than current global networks

Step 04

Bring AI to your data wherever it resides

Greater and greater demand for data and analysis is driving the increased use of LLMs, meaning that where your data resides, who interacts with it and how it can generate more value are becoming business critical issues for IT teams. Developing your location strategy for AI processing and storage involves making decisions about latency, security and sustainability. Careful consideration is required to find the appropriate balance between each of these crucial factors and their implications for each of your workloads/applications. For example, connecting to the nearest Carrier Neutral Facility (CNF) is both performant and likely to be where your business partners (eg SaaS, SASE) are also located, but it may not be the most sustainable solution.

Be mindful of where you deploy your workloads

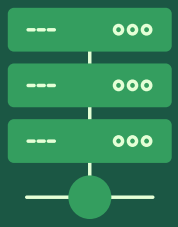
A good starting point is to use data centres powered by renewable energy. Many data centre operators have committed to source 100% renewable energy, which can be achieved through onsite renewable generation as well as through Renewable Energy Certificates (RECs). However, some data centre locations do not have access to renewable energy and are located in regions where RECs are not available, so their efficiency depends on the regional grid carbon intensity. Cloud providers can supply data on grid carbon intensity for the regions they operate in.

Due to such variations in efficiency and energy sources, lower energy consumption does not necessarily mean lower carbon emissions. Cloud services therefore will not always advance your sustainability goals, and some businesses may have quite different potential for reducing their footprint through the cloud.

STEP 4

Our recommendations for selecting a sustainable data centre:

Consider trade-offs between latency, sovereignty and sustainability when thinking about where to host your AI models



Collaborate with your data centre operator to ensure they are committed to 100% renewable energy

Carefully consider local grid carbon intensity when deploying AI workloads in a private data centre without access to sources of renewable energy or RECs

In Britain, **the National Grid and Electricity Map** both provide grid carbon intensity data, including forecasts for planning deployment of workloads and apps

Distinguish between energy consumption and carbon footprint, and focus on how your business's carbon footprint can be reduced when pursuing sustainability goals

STEP 4

How can we support you?

On **Dell Precision workstations**, you can use your own data and run quantised AI models locally with a minimal infrastructure footprint. Precision workstations allow AI developers and data scientists to develop and refine AI models locally before developing at scale.

AI-based **Dell Optimizer** software, built into Precision workstations, improves performance across applications by learning how people work. Users running GenAI models on mobile, battery-powered workstations can boost application performance while reducing battery draw.

Dell has the industry's widest portfolio of EPEAT Climate+-designated product types:

- 100% of notebooks
- 100% of desktops
- 91% of displays
- 80% of servers

Dell products have earned certifications from ENERGY STAR®, 80 Plus, TCO, and the China Environmental Label Program, and they meet strict US EPA energy-efficiency specifications.

Where is new technology taking us?

As the world moves further towards cloud-native infrastructure, optimisation of the workloads and systems operating on that infrastructure is increasingly imperative. The proliferation of AI and GenAI applications will only heighten the importance of this work.

As part of the BRAINE project, Dell Technologies is developing the use of AI to orchestrate cloud-native workloads for optimum power efficiency. AI and GenAI services that can reduce their power consumption while still meeting required service levels are critical for achieving optimal sustainability. This requires optimisation all the way down to the infrastructure itself.

BRAINE

An increasing focus of research and development in AI is small language models (SLMs), which can perform inferencing at the edge (on a low-powered device) and promise hardware cost minimisation, low-latency performance, power minimisation and accuracy. Having highly specialised SLMs that do not require significant energy to operate can be most efficiently achieved through a process known as distillation. With LLMs out of reach for many due to size and cost, SLMs represent a potentially more sustainable alternative.

Step 05

Collaborate with partners and suppliers

Collaboration must be at the heart of a net zero future. Sustainability goals are best pursued through partnerships; organisations can't overcome all the challenges involved on their own. This is becoming increasingly clear: 57% of UK respondents to a recent Dell survey said that their organisation needs the help of a third-party partner to achieve its sustainability goals.[20] 78% of survey respondents in the UK also said that their technology vendors need to have transparent and clear sustainability goals, and to demonstrate accountability for the emissions generated across their value chain.[21]

The most effective way to advance efficiency and sustainability is to work within a sustainable digital ecosystem. By working together, we can put collaboration before competition to drive positive change for the planet and our customers. How you contribute to this shared goal must, however, follow the particular needs of your business. Your unique requirements should also dictate how you approach AI adoption more generally.

Assess the overall advantage of adopting AI for your business

Everyone knows that GenAI promises to supercharge productivity and accelerate innovation – but many businesses aren't sure where to start.

The industry is moving quickly, and no one wants to be left behind. Though getting started soon is important, it is equally crucial to carefully weigh the costs and benefits of AI adoption for your business before launching new initiatives. AI comes in many shapes and sizes and the potential applications of GenAI in particular are extensive. Assessing the costs and benefits of adoption will give you a much clearer picture of the work you will need to undertake on simultaneously advancing sustainability and energy efficiency.

Utilising AI technologies will most likely be key to competitiveness in the medium and long term, but you should avoid biting off more than your organisation can chew in the short term. Ensure that your initiatives are achievable and consistent with your priorities and wider business strategy. As this guide has shown you, there are many ways to prioritise sustainability and energy efficiency when adopting AI. It has also shown you that the most effective approach is a holistic one, encompassing the whole digital value chain.

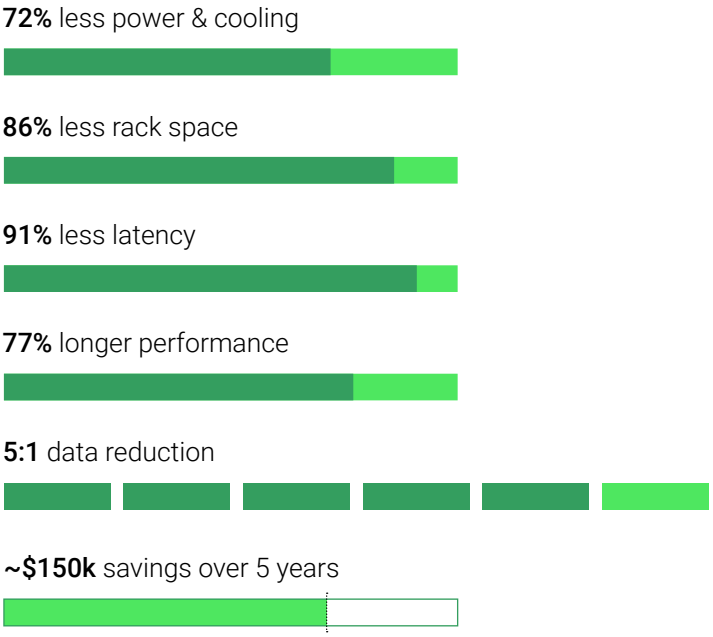
STEP 5

How can we support you?

Dell Technologies also offers a range of services to support you as you carry out your AI adoption strategy:

Dell ProConsult Advisory Services can assess your data center and deliver a strategic plan to achieve efficiency and lower emissions. The new Get Efficient Assessment gives you insights into how current energy consumption and subsequent costs can be reduced with latest Dell products.

Get Efficient customers have achieved:[22]



Dell Professional Services can help you get started and support you through-out your AI journey.

Dell Data Preparation Services provides clean and accurate datasets in the right format to simplify data integration and enable AI projects to advance smoothly.

Dell Implementation Services reduces time to value by helping establish an operational AI platform for inferencing and model customisation.

Dell Education Services bolsters AI skills in your organisation.

Conclusion

Adopting sustainable AI today

This guide has put AI in context and shown you five steps you can take to successfully adopt and run AI. GenAI represents a huge opportunity for your business, but it does not come without challenges. Minimising the environmental impact and costs from new energy-intensive technologies requires careful planning and the right level of expertise.

We have showcased a range of products, services and solutions on offer and introduced you to some of the work Dell Technologies and BT have done and will continue to do into the near future. We are committed to innovation and applying the latest technology to help solve major business challenges facing our customers today.

Take your next steps with a trusted partner

Dell Technologies' and BT's consultants work as trusted advisors whose mission is to help you realise the benefits of GenAI for your business. How you navigate advancing sustainability and energy efficiency while adopting AI will not depend on a single product or even a set of best practices: ultimately, it depends on the right combination of intelligence, strategy, technology and services.

Reach out to a sales representative today

Notes & citations

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21 **Dell Technologies**, 'Innovation Catalysts Study' (February, 2024).

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