AI, climate and the environment: Strategies to reduce the impact

September 2025

CLIMATE LEADERS COALITION

An initiative of THE B TEAM Australasia

TABLE OF CONTENTS

FOREWORD

Artificial intelligence (AI) is changing how we make decisions, deliver services, innovate and communicate, connect and compete. This makes AI one of the defining forces of the decade.

Another defining force is climate change – and AI's emerging climate footprint is raising growing concern.

Data centres that power AI models are placing growing demands on electricity and driving up emissions at a time when we urgently need to bring them down. Data centres also consume vast amounts of water and critical minerals, and can have negative impacts on biodiversity and local communities.

Yet, AI can also be a powerful response to climate change. When designed and deployed responsibly, AI can accelerate decarbonisation, strengthen grid resilience, optimise resource consumption and support more efficient use of infrastructure.

This guide was developed by members of the Climate Leaders Coalition for fellow members. It sets out the environmental impacts of AI and showcases some practical solutions already being deployed. It provides explanations, strategies and case studies to guide sustainable AI adoption across Australia's economy. Importantly, it offers insights from CLC members working on real-world projects today.

This is far from a definitive blueprint – it is too early in AI's evolution for that. Our goal is to bring the engine rooms of data centres into the boardroom to spark new conversations about strategy, procurement, policy and the people we need at the table.

For members of the CLC, we hope this guide marks a broader shift in climate leadership: where our digital innovation supports, not undermines, our climate commitments.

Ann Sherry
Climate Leaders Coalition
Co-Chair

John Lydon
Climate Leaders Coalition
Co-Chair

Lynette Mayne
B Team Australasia
Executive Chair

Note: This report draws on both global and Australian data to illustrate key trends and insights. While all figures cited are accurate at the time of publication, many are evolving rapidly due to the pace of AI development and environmental reporting improvements. Readers are encouraged to consult the latest data sources for the most up-to-date information.

EXECUTIVE SUMMARY

AI is no longer on the horizon. It is being embedded into daily life, transforming everything from hospital wards to trading floors, classrooms to city streets. And this is just the beginning.

Based on the forecast from the International Data Corporation, by 2028, global AI investment could reach over US$600 billion, driven by generative and agentic AI. But as AI's reach expands, so too does its appetite for computational power – with serious implications for energy use, emissions and environmental sustainability.

The challenge

- **Energy:** AI is energy intensive. According to estimates by the International Energy Agency, global data centre energy demand could double to around 945 TWh by 2030, and to around 1 200 TWh by 2035 . Associated emissions could grow from 180 Mt today to 300 Mt by 2035.
- **Emissions:** By 2035, data centres are expected to add 3.5 gigatons of carbon emissions to the atmosphere. This is equivalent of 10% of total global emissions today.
- **Water:** Global AI could consume up to 6.6 billion cubic metres of fresh water annually by 2027 – more than half of the UK's total water use.
- **Resources:** According to Geoscience Australia, our country is one of the top global producers, but mining carries significant environmental costs.
- **Waste:** Australians already generate 25 kilograms of e-waste per person each year. Powerful new AI models often require next-generation chips and servers, rendering existing equipment obsolete sooner.
- **Infrastructure:** The International Energy Agency warns that simply generating more electricity won't be enough. Countries must also upgrade the infrastructure that supports AI, including addressing the embodied carbon from building new data centres.

The opportunity

AI also offers powerful solutions to help Australia realise a more sustainable future:

- **AI can optimise electricity grids,** reducing the need for new infrastructure and unlocking up to 175GW of transmission capacity.
- **AI-powered energy management** can reduce cooling energy in data centres by up to 40%.
- **AI-driven telemetry and monitoring systems** can detect inefficiencies in real-time, reducing system overwork and equipment failure, and cutting energy waste.
- **AI can forecast energy demand,** helping grid operators integrate renewables more reliably.
- **Dynamic workload balancing** shifts processing to times and locations where cleaner energy is available.
- **Efficiency strategies,** such as model pruning and using smaller models, can cut energy use without compromising performance.

Case studies from CLC members Telstra, Microsoft, Schneider Electric and SAP illustrate the opportunity.

Key actions for technology specialists

This report is primarily aimed at technology leaders – chief technology officers, chief information officers, data centre designers & operators, and technical decision-makers responsible for sustainable AI adoption.

Key considerations are:

- **Implement energy-efficient AI models** that minimise computational demands.
- **Embrace best practice data centre design,** including low-carbon energy, efficient cooling, sustainable materials and nature-positive activities.
- **Improve hardware production** through recycling and alternative, low-impact materials.
- **Optimise AI algorithms** to enhance performance and reduce resource consumption.
- **Collaborate across sectors** to drive responsible policies and regulations.
- **Implement workload management** through location and/or time of day shifting to capitalise on availability of green energy.

Key actions for C-suite leaders

One of the biggest challenges facing business leaders is balancing AI's competitive advantages and sustainability opportunities with its potential environmental cost.

While this is a technical document, there is a clear call to action for C-suite leaders. This report offers six principles for Australian organisations to consider when choosing AI providers.

These are:

1. Evaluate environmental impact holistically.
2. Look for verified commitment to sustainability.
3. Prioritise innovation in energy and water efficiency.
4. Seek collaborative, transparent partnerships.
5. Embrace ecosystem approaches.
6. Embed sustainability into responsible AI governance.

Call to action

AI is rapidly becoming integral to every organisation's operations. But so is sustainability, as the need to cut emissions, meet climate targets, and build resilient systems becomes increasingly urgent.

As these two forces converge, Australian organisations must take a deliberate approach to evaluate the environmental impact of their technology choices.

This means looking beyond performance and price, and examining how providers manage their data centres, source energy and handle electronic waste. A strong track record in sustainability, transparent reporting and ongoing innovation in efficiency are all critical.

AI adoption can be both smart and sustainable – and the decisions made now will shape tomorrow's legacy.

INTRODUCTION

AI is no longer on the horizon. It is embedded into daily life, transforming everything from hospital wards to trading floors, classrooms to city streets. And this is just the beginning.

As AI's reach expands, so too does its appetite for computational power – with serious implications for energy use, emissions and environmental sustainability[1].

Global investment in AI is accelerating rapidly. According to International Data Corporation, by 2028, spending on AI-enabled applications, infrastructure and related IT and business services could more than double to reach US$632 billion. This growth will be fuelled primarily by new Generative AI (Gen AI) technology and Agentic AI[2].

At the same time, traditional AI capabilities like machine learning and deep learning will continue to create significant productivity and business value improvements across industry sectors. McKinsey estimates Gen AI has the potential to add up to US$4.4 trillion annually across industries through productivity use cases alone[2].

As AI technology matures, businesses will move beyond experiments and pilots, integrating AI into their core operations to achieve measurable results which should be aligned with ESG goals and governance frameworks.

When implemented responsibly, AI can support both sustainability targets and business growth. But that means embedding ethical and environmental considerations into AI strategies from the start to avoid any unintended consequences.

The adoption of AI, without sustainable practices, can lead to increased carbon emissions, resource depletion, environmental degradation and negative community impact.

Conversely, the lack of AI adoption may place organisations at a competitive disadvantage, as they may miss out on AI-enabled efficiencies and innovation opportunities.

AI also brings unique strengths to sustainability: it can analyse complex systems, predict environmental impacts, optimise resource use, support smarter decision-making and empower a new sustainability workforce. In the right hands, AI is a tool for solving society's biggest challenges. The Climate Leaders Coalition explores some of these opportunities in the 2025 report, **AI and Scope 3: Precision on the path to net-zero emissions.**

To proactively address potential negative impacts, this guide outlines principles for sustainable AI adoption. These include:

- **Implement energy-efficient AI models** that minimise computational demands.
- **Embrace best practice data centre design** using renewable low-carbon energy, modern efficient cooling methods, lower impact building materials, and nature-positive solutions such as rewilding and biomimicry.
- **Improve hardware production** by employing recycling practices and developing alternative, low-impact materials.
- **Optimise AI algorithms** to enhance performance and reduce resource consumption.
- **Collaborate across sectors** to drive responsible policies and regulations.

A 2025 report from the International Energy Agency[3] warns that simply generating more electricity won't be enough to power AI's future. Countries must also upgrade the infrastructure behind AI – accelerating investment in electricity grids and ensuring that data centres, as well as the wider electricity system, are efficient and flexible. Achieving this will require stronger collaboration between policy makers, the technology sector and the energy industry.

By following these principles, technology, sustainability and data centre leaders can make more sustainable choices when selecting AI solutions, proactively balancing innovation with environmental stewardship.

IMPACT OF AI ON SUSTAINABILITY

ENERGY CONSUMPTION

The computational demands of AI, particularly in training complex models, can consume large amounts of energy[3].

Data centres, which host these AI operations, consume substantial electricity, contributing to carbon emissions and environmental degradation. As AI technologies advance, the energy footprint of data centres is expected to increase unless proactive measures are taken.

The advent of more sophisticated AI models has exacerbated this issue, necessitating large-scale data centres with immense energy requirements. For example, training OpenAI's GPT-3 emitted 552 tCO2e, which is the equivalent of driving 123 petrol-powered passenger vehicles for a year[4].

As each new AI model grows in sophistication and parameter count, the energy demands also increase. Energy demand from data centres is expected to rise by 150% and emissions by 100% between 2023 and 2030. For the world to maintain a net zero emissions pathway, these emissions need to halve. While significant gains in hardware and algorithmic efficiency are being made, the exponential growth in computational demand, fueled by larger models and new, resource-intensive applications, is widely projected to outpace these improvements in the short to medium term. Similarly, the renewable energy procured by technology companies through power purchase agreements (PPAs) is not expected to cover the increase in demand[5].

In Australia, data centres currently consume 2% of total electricity in the National Electricity Market (NEM), and is expected to triple to 6% by 2030 and then grow to 12% by 2050 (step change scenario)[6]. The sustainability challenge is amplified by the fact that many of these data centres draw power from non-renewable energy sources. For example, Australia's grid is 65% fossil fuel based in 2024[7] however, according to Open Electricity it has continued to shrink as more renewables are added[8].

Future impacts depend on how AI models are developed and operated and the changes they bring about. We are seeing massive improvements in model efficiency, such as with DeepSeek, in addition to small language models which are far less power hungry.

While AI is expected to drive a sharp rise in data centre energy demand, it's important not to overstate its role in isolation. Data centres underpin the full spectrum of digital services – from video streaming, cloud storage and enterprise software, to e-commerce platforms, social media and government systems. Energy consumption is rising across all of these areas, not just AI.

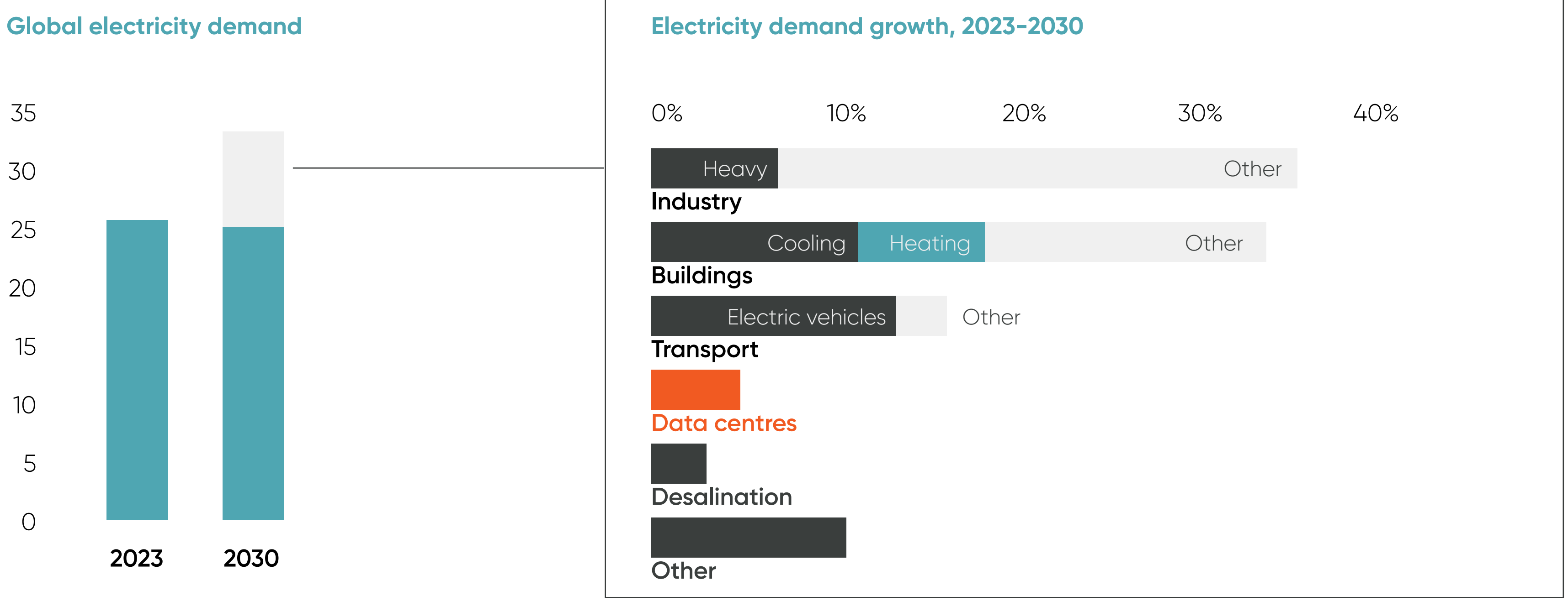
Goldman Sachs Research estimates that by 2028, AI will represent approximately 19% of total data centre power demand globally[9]. To manage the impacts, we must take a holistic, evidence-based approach that considers both the big picture and the local realities:

1 Clarify digital technology's footprint: Understand how much of the data centre energy load is truly attributable to AI versus other digital services evaluate the energy, emissions, and water use of the tech stack—including cloud and colocation—by considering current and future growth (especially from AI) and avoid isolating AI from the broader data and infrastructure impact.

2 Assess localised impacts: Examine how data centres affect surrounding communities – from workforce needs and electricity demand to water usage and infrastructure strain.

3 Put AI in context: Recognise that, while AI is a fast-growing contributor, the overall rise in global energy demand is driven by a range of sectors – from transport and manufacturing to traditional IT.

Data centres account for 3-4% of global electricity demand growth



Source: International Energy Agency global electricity demand projections[10]

WATER CONSUMPTION

Like all computational services, AI systems generate heat that require cooling to operate reliably and efficiently. Traditionally, this has been achieved using large volumes of water to cool chips, servers and data centre environments. To maintain optimal performance, depending on the requirements and design, servers must be kept at controlled temperatures (ideally 19°-21°) and humidity levels managed.

Water consumed often needs to be fresh and potable as impurities can impede equipment performance, which places water demands (both volume and quality) in direct conflict with neighbouring communities.

By 2027, the combined scope 1 and scope 2 water use associated with global AI is projected to reach between 4.2 and 6.6 billion cubic metres[11]. This is equivalent to roughly one-third to one-half of Australia's total annual water consumption.

By 2030, about half of tech water consumption will be in Asia Pacific, where warm, humid climates make cooling more water-intensive—Microsoft reports a regional WUE of 1.65 L/kWh, over three times its global average[3].

RESOURCE USE

AI systems are heavily reliant on hardware resources, including graphics processing units (GPUs) and specialised chips[12]. The production of these components requires rare earth materials – resources that are both finite and environmentally costly to extract.

Australia is one of the world's largest producers of rare earth minerals, and demand has increased mining activities, particularly in Western Australia[13]. Mining for rare earths contributes to environmental damage, such as habitat destruction, land degradation, water contamination, biodiversity loss and pollution.

The manufacturing process also involves toxic chemicals and high energy consumption, and can release of hazardous substances that pose risks to local communities and ecosystems[13].

The global supply chain for these materials adds further carbon emissions through extensive transportation and logistics – often powered by non-renewable energy sources[13].

The increasing demand for AI underscores the urgent need for more sustainable resource use across the technology industry. This includes designing for circularity, recycling rare earth materials, developing alternative materials, improving supply chain and logistics efficiency, and enhancing the efficiency of mining processes. These are essential steps that can mitigate the environmental impact of rare earths extraction.

WASTE **GENERATION**

As AI advances, hardware lifecycles are shrinking. Powerful new models often require next-generation chips and servers, rendering existing equipment obsolete sooner. The result is increased electronic waste (e-waste). Disposing of e-waste, or recycling materials, poses sustainability challenges.

Australia is already one of the world's largest per capita producers of e-waste. The country produces about 25 kilograms of e-waste per person each year[14]. With the increasing adoption of AI systems, this figure is expected to rise. E-waste contains hazardous materials, such as lead, mercury and cadmium, which can contaminate soil and water if not properly managed[15].

The management of e-waste in Australia is regulated under the National Television and Computer Recycling Scheme (NTCRS). This aims to improve recycling rates and reduce the amount of e-waste sent to landfills[16]. However, the rapid pace of technological innovation and corresponding surge in e-waste challenges Australia's existing recycling infrastructure. According to the Australian Bureau of Statistics, 500,000 tonnes of e-waste is generated annually, with 40% coming from households and only half able to be recycled[17].

To address this, we need to apply circular economy principles that prioritise reduction, reuse and redesign alongside robust e-waste management policies. According to the Ellen Macarthur Foundation, one of the world's most respected circular economy advocates, recycling should be considered a last resort, resort, and the waste designed out from the very beginning[18]. This means:

- **Maintaining and optimising hardware** to ensure it runs efficiently for as long as possible.
- **Extending the lifespan of equipment** to amortise the carbon consumed during manufacture and transport.
- **Increasing intensity of use,** for example, maximising server load to reduce the need for new purchases.
- **Refurbishing or remanufacturing** where feasible, balancing environmental benefit with the emissions from transport and processing.

In some cases, such as semiconductors which are difficult to refurbish, recycling may be the only option. However, this requires a viable reverse supply chain (the ability to take back components to the point of manufacture) and the capability to safely extract valuable base materials.

Globally, regulators have started to introduce Extended Producer Responsibility (EPR) legislation to ensure equipment manufacturers take responsibility for their products from cradle to grave. For example, in many European countries, fees are levied on imported products with a high percentage of virgin rather than recycled plastic materials, or with emissions-intensive design. This is incentivising more sustainable manufacturing at the design phase.

LIFECYCLE EMISSIONS

While data centre operational efficiency often dominates sustainability discussions, embodied carbon is an increasingly critical factor.

The World Green Building Council notes that buildings are responsible for ~40% of global carbon emissions – about 28% from operations (energy use) and 11% from materials and construction (embodied carbon)[19]. As electric grids and operations become greener, the "upfront" carbon from construction will comprise an even larger proportion of total emissions – potentially around 50% of the carbon footprint of new construction between now and 2050[19] if not addressed.

Upfront construction emissions are "locked-in." According to the GBCA, roughly 25% of a typical building's lifetime emissions occur during construction from the production and use of building materials[20]. These embodied emissions are essentially locked in before the data centre even opens and cannot be reversed once the building is built[20]. This makes early design and material choices critical for sustainability.

Data centre construction involves emissions-intensive materials like concrete and steel, which account for around 15% of global emissions between them and which are among the most difficult to decarbonise[21].

Likewise, the manufacture of AI hardware – from chips to servers – carries a significant carbon footprint. This means emissions are "locked in" before a server is switched on[22].

As demand for AI infrastructure grows, data centre operators must consider whole-of-life emissions in both planning and procurement decisions.

ECOSYSTEM STEWARDSHIP

As data centres expand to meet the growing computational demands of AI, their environmental footprint is physically increasing – and this impacts local ecosystems.

Construction of new data centres can disrupt local ecosystems that are already vulnerable to climate change, harming wildlife, water systems and native vegetation. The United Nations Kunming-Montreal Global Biodiversity Framework, signed in 2022, calls for urgent action to halt and reverse nature loss[23]. In line with this global ambition, data centre operators can contribute to climate and ecological resilience by integrating ecosystem stewardship throughout their lifecycle.

Nature-positive approaches for AI and data centres represent a strategic shift from mitigating harm to creating value. By integrating facilities with restored ecosystems, operators can lower operational costs through enhanced cooling and water management, increase uptime by boosting climate resilience, and in doing so, actively contribute to global biodiversity goals.

Key strategies include:

Site selection:

Avoid ecologically sensitive areas, including habitats for endangered species or regions with unique ecosystems.

Construction phase:

Reduce vegetation clearance, control erosion, repurpose materials, and reduce supply chain impacts through sustainable sourcing.

Landscape design:

Implement nature-based solutions like native tree planting (for natural cooling), rain gardens (to manage runoff), and habitat corridors (to support biodiversity) in surrounding ecosystems.

Operational stage:

Use renewable energy, prioritise low-water or air-based cooling systems, and recycle water on-site where feasible.

Building design:

Minimise land use through vertical design, and where possible, combine green roofs with solar panels to maximise surface efficiency.

Decommissioning:

Plan for responsible end-of-life by auditing material use, repurposing or recycling components, and restoring the site for ecological benefit.

To be both environmentally sustainable and socially just, ecosystem stewardship must be co-designed with First Nations people and Traditional Owners. This approach leverages millennia of Traditional Ecological Knowledge, leading to better results in biodiversity, ecological resilience, and long-term project success, as demonstrated by organisations such as the World Bank, the UN, IPBES, CSIRO and others.

COMMUNITY ENGAGEMENT

The construction and operation of data centres can have significant social as well as environmental impacts.

Data centre operators are expected to meet growing community and regulatory expectations by contributing to local priorities, economies, and ecosystems, while advancing digital transformation in ways that deliver broad societal benefit.

Data centre operators have a responsibility to act as good neighbours and contribute positively to local economies, priorities and ecosystems while advancing digital transformation in ways that benefit everyone.

Engagement should go beyond consultation. Data centres can become valued community assets by partnering with local governments, businesses, schools and non-profits to create well-paid jobs and apprenticeships, support grants programs, provide essential digital skills training and STEM education for both adults and children.

By aligning with local needs and seeking shared value, data centre operators can strengthen trust, build long-term community support, and help ensure that the benefits of digital infrastructure are widely and fairly distributed, even in a changing climate.

STRATEGIES TO REDUCE AI'S ENVIRONMENTAL IMPACT

The strategies described in this section offer a broad approach to reduce the environmental footprint of data centres by addressing 3 key areas:

1

Data centre design

We explore the trade-offs between retrofitting existing data centres versus designing new, energy-efficient facilities. Retrofitting can significantly reduce energy consumption through upgrades such as advanced cooling systems and renewable energy integration. However, designing new data centres from the ground up can embed sustainability at every level.

2

AI model optimisation

AI-driven power management, predictive analytics, and dynamic workload balancing can minimise energy waste while enhancing performance. We explore how optimising AI models through techniques such as model pruning and federated learning can reduce the computational burden, ultimately lowering the carbon footprint of AI applications hosted within these facilities.

3

Role of AI in energy transition

While reducing AI's own environmental footprint is essential, it's equally important to recognise its potential as a catalyst for the global energy transition. This section explores that opportunity, highlighting why building expertise in sustainable AI is not just a responsibility, but a strategic advantage for forward-thinking businesses. We explore building sustainable energy strategies, , decentralised energy grids and AI-driven energy optimisation.

By integrating these strategies, data centres can align net-zero operations with the growing demands of AI and digital infrastructure.

RETROFITTING DATA CENTRES

Improving energy efficiency

Equipping data centres with protective, sustainable and long-lasting equipment can reduce the total power consumption of the IT infrastructure. Sustainable investments can enhance day-to-day operations, reduce data centre costs and improve environmental performance. Every decision matters – whether it is onsite power generation for large-scale data centres or enforcing decarbonisation initiatives within a supply chain.

Improving monitoring and management capabilities at existing data and network sites supports timely performance data. Basic telemetry helps manage unit failures and identify where systems that are overworking, often due to faulty sensors, condensers or filters that compromise overall energy efficiency. Without effective controls, the temperature of the equipment room can have a material impact on operating costs and energy consumption.

Consistent reviews and reports of data centre energy consumption can enhance accountability and support documented sustainability strategies. Transparent reporting builds trust encourages positive stakeholder relationships and informs strategic decision-making.

Efficient energy use can be an effective carbon abatement strategy. By investing in low-energy, highly-efficient technologies and methods, data centres can significantly reduce their carbon footprints while operating in a secure, protected and sustainable IT environment.

Renewable energy adoption

Transitioning to renewable energy sources such as solar, wind, and hydroelectric power can drastically reduce the carbon footprint of data centres.
In Australia, where solar potential is high, integrating photovoltaic panels can provide a sustainable power source[7]. Using bioenergy from waste products can further reduce reliance on fossil fuels. Companies like Microsoft have committed to powering data centres with 100% renewable energy by 2025[25], setting a benchmark for sustainability in AI.

There are 3 common methods that can be employed by data centres to support energy efficiency.

Power purchase agreements (PPA)

There are 2 types of PPAs available to data centres.

1 **An offsite PPA** is a long-term contract between a corporation and a project developer for renewable energy. This contract allows data centre owners and operators to fix a price for power for the duration of the contract. PPAs allow data centre owners to purchase renewables at a considerable scale to meet environmental targets. In some cases, 100% of electricity is renewable when a PPA is executed.

2 **An onsite PPA** involves purchasing renewable energy via onsite installation, commonly solar photovoltaics (PV). These PPAs are the most common form of clean onsite generation. Data centre owners can also enter into PPAs for battery storage. Schneider Electric's Battery Energy Storage System (BESS) provides a fully self-contained solution built upon a highly efficient architecture that maximises renewable energy and minimises energy costs.

Energy attribute certificates (EAC)

An EAC is a contractual instrument that is used to track a data centre's renewable energy consumption. They are easy to obtain for commercial and industrial purchasers, represent zero carbon electricity generation, and are highly reliable when reputably sourced and third-party certified.

Utility green power programs

Data centres can benefit from utilities offering low carbon power options in the form of green tariffs and subscriber programs. This allows commercial and industrial customers to subscribe to, or purchase regulated renewable electricity at a utility tariff rate.

Renewable or low carbon energy

Incorporating renewable or low carbon energy is a highly effective carbon abatement strategy for both environmental factors and overall cost reduction. Microgrids are also an effective renewable energy investment for large-scale data centres using backup diesel generators and solar panels. Microgrids can provide renewable energy to power onsite data centre and IT equipment.

Australian data centre operator AirTrunk has been a pioneer in adopting sustainable practices. AirTrunk has committed to using renewable energy to power its hyperscale data centres and has implemented energy-efficient technologies to reduce overall energy consumption[26]. By integrating solar power and other renewable sources, AirTrunk aims to achieve significant reductions in carbon emissions.

Similarly, NEXTDC, another leading data centre provider in Australia, is committed to sustainability through its focus on energy efficiency, renewable energy adoption and carbon offset initiatives[27]. NEXTDC has achieved carbon neutrality for its operations by investing in renewable energy projects and purchasing carbon credits[27]. NEXTDC data centres are designed with energy-efficient infrastructure and advanced cooling systems to minimise energy consumption[27].

However, data centres need base load power at all times and cannot always rely on variable renewable energy sources. While renewables currently face limitations in meeting fluctuating demand, this presents a valuable opportunity to accelerate the deployment of firming technologies, such as batteries and long-duration storage. In the meantime, many operators are supporting the transition by sourcing renewable energy through power purchase agreements (PPAs) while drawing from the grid.

Optimising hardware usage and reducing downtime

Following circular economy principles – particularly prolonging the use or improving the usage of hardware – AI-driven management systems can optimise technology usage, allocate resources more efficiently and reduce idle time. Techniques such as dynamic voltage and frequency scaling (DVFS) adjust the power usage of processors based on real-time workloads, conserving energy during periods of low demand[24]. Solutions such as Schneider Electric's smart energy management platform, which integrates IoT and AI technologies, can enhance data centre efficiency[12].

Optimising hardware usage and reducing downtime can be achieved by investing in power system analytics and management software[28].
Power system analytics tools ensure that electrical systems operate as designed, helping to identify potential issues and mitigate their impact. AI-driven analytical studies safeguard data centres from system failures and potential catastrophic losses.

Management software, such as Schneider Electric's EcoStruxure™ solutions, allow data centres to monitor and control systems, devices and processes. These capabilities provide insight into electrical system health and energy efficiency. Specific software such as EcoStruxure™ Power Operation extracts energy and power information from networked devices. A wide range of solutions are available now, allowing data centres to maximise uptime, monitor power assets, provide sustainability analytics and facilitate capacity planning.

Carbon offset strategies

Some data centre operators are using carbon offsets as an interim measure while they transition toward fully eliminating emissions. These offsets, such as investments in reforestation, renewable energy, or energy efficiency projects, can compensate for residual emissions that are currently difficult to avoid. For instance, Microsoft's carbon offset scheme offsets emissions from data centres by investing in renewable energy and energy efficiency projects globally[29].
Offset units, or carbon credits, represent one tonne of emissions avoided or removed and are traded in regulated or voluntary markets. While offsets can play a role during the transition to net zero, they should not replace efforts to directly reduce emissions at the source.
In Australia, companies like AirTrunk and NEXTDC are combining renewable energy adoption and hardware optimisation with limited offset use, as they work toward long-term carbon neutrality.

Their approaches illustrate how offsets can serve as a temporary bridge, while the priority remains on deeper decarbonisation through operational improvements and clean energy integration.

REDESIGNING DATA CENTRES FOR THE AI ERA

When data centres are designed specifically for AI workloads, an opportunity exists to embed sustainability as a fundamental concept. This includes low-impact materials, renewable energy sources and responsible supply chains, alongside energy-efficient hardware, modular layouts for scalability, and AI-driven systems for predictive maintenance and energy management.

Microsoft's data centres, for example, use AI to predict failures and manage energy consumption, resulting in an 80–90% resource utilisation at scale, minimising underutilised hardware and excess energy usage[30].

As AI accelerates energy demand globally, the goal is not slow adoption but to embed sustainability into every layer of data centre design and operation. Research, innovation and a genuine culture of sustainable operations are integral factors in creating data centres with minimal impact. This section outlines how data centres can be designed, function and comply with today's standard of sustainable IT.

Mitigating AI impact through design

Site selection and energy planning

Select locations with access to renewable energy sources, favourable climate conditions for cooling, and proximity to power grids with capacity for expansion. Plan for multiple clean energy sources including solar, wind and other suitable options. Consider integrating on-site renewable energy generation to reduce grid dependency and transmission losses.

Advanced cooling system design

In addition to liquid cooling technologies and zero-water cooling systems, consider climate-adaptive designs that incorporate design elements that account for future climate projections, not just historical weather data, to prevent cooling capacity issues during extreme heat events.

AI-optimised infrastructure

Design for higher power densities (20-34 kW per rack) which are required by AI workloads while ensuring efficient cooling. Also, consider prefabricated modular data centres (MDCs) that reduce construction time and resource needs. Utilising digital twin simulations such as advanced modelling tools like Cadence Reality DC help simulate and optimise operational energy consumption and cooling for high-density AI equipment before physical construction.

Constructing AI-ready, sustainable data centres

1 Sustainable materials and construction methods

- **Low-carbon materials:** Steel and concrete are used heavily in the construction of data centres[29]. There are emerging methods such as "direct reduced iron" or DRI that could see reductions in emissions 60 – 97% in steel production[31]. For example, Microsoft has signed a partnership with H2 Green Steel who use such an approach[29]. Microsoft is also experimenting with bio-cements using algae cultivated limestone to estimating a 65% lower embodied carbon from similar strength conventional concrete[29].
- **Mass timber construction:** Consider structural mass timber to reduce steel and concrete usage. For example, Microsoft is implementing wood in its newest data centres[29].
- **Prefabrication:** Utilise prefabricated components to reduce on-site waste and improve construction efficiency.

2 Energy infrastructure development

- **Dedicated renewable infrastructure:** Invest in onsite or contracted renewable energy assets, such as wind or solar farms, to power data centre operations.
- **Grid enhancement partnerships:** Partner with utilities to strengthen local grid infrastructure, potentially through PPAs.
- **Energy storage systems:** Integrate advanced energy storage solutions to balance intermittent renewable energy sources and provide backup power.

3 Water conservation infrastructure

- **Water recycling systems:** Implement closed-loop water systems that recycle water within the cooling cycle to minimise water loss.
- **Alternative water sources:** Develop infrastructure to use reclaimed and recycled water.
- **Rainwater harvesting:** Install systems to capture and utilise rainwater for cooling and other non-potable uses.

4 Continuous improvement and innovation

- **Efficiency metrics monitoring:** Track key performance indicators like Power Usage Effectiveness (PUE), Water Usage Effectiveness (WUE) and Carbon Usage Effectiveness (CUE).
- **Technology refresh cycles:** Implement strategic hardware refresh cycles to benefit from advances in energy-efficient technologies.
- **Industry collaboration:** Participate in initiatives like NABERS and LEED to adopt and contribute to best practices.

Designing energy positive data centres

Designing an energy-positive and energy-efficient data centre requires strategic planning and investment. When optimised, data centres can minimise their own energy use and contribute to local energy supply.

Excess heat delivery

While data centres require a large amount of electricity, they also have the potential to deliver positive outputs including heat generation. Infrastructure upgrades in new builds can convert excess heat into an affordable utility, such as heated water, which can benefit local communities.

Energy recycling

Energy recycling is an efficient strategy. Schneider Electric's partnership with Sweden's EcoDataCenter has achieved 1.15 PUE (Power Usage Effectiveness) at 2N redundancy, thanks in part to the recovery systems that repurpose heat waste[28]. By converting this heat into usable energy, EcoDataCenter is able to reduce the cooling need of electrical rooms and feed surplus energy back into the grid to power homes and businesses[28].

Other strategies include:

- **Demand response integration** allows data centres to participate in grid programs that reduce power consumption during peak demand periods, supporting grid stability.
- **AI-powered optimisation** enables real-time control over systems such as cooling, with some implementations reducing cooling energy by up to 40%[28].
- **Dynamic workload management** shifts computing tasks to times or locations where renewable energy is cheaper, more abundant, maximising sustainability without compromising performance.

Innovations in water cooling and alternatives

Water management is a critical priority for data centre operations, particularly in water-stressed regions where access to clean water is limited. Minimising water use for cooling equipment is achievable through innovative cooling methods and active monitoring. Key strategies include:

Real-time water monitoring:

Deploy advanced monitoring systems to track water usage and identify opportunities for further conservation[32].

Tracking Water Usage Effectiveness (WUE):

Continuously measure and improve WUE, aiming for ultra-low or near-zero[32].

Adopt alternative cooling methods:

Transition from traditional water-based cooling to more water-efficient technologies like air-assisted liquid cooling[32].

Method 1 – Liquid-to-air cooling

Liquid-to-air cooling systems expel heat from data centres via air rather than water vapour. This solution is an effective cooling method for AI workloads as they are closed loop systems that do not require a continuous supply of fresh water[33].

Method 2 – Liquid-to-liquid cooling

Liquid-to-liquid cooling also employs a closed loop system by reusing water and minimising waste. Technologies like Coolant Distribution Units (CDUs) and in-rack manifolds enable direct-to-chip liquid cooling using warm water, eliminating the need for condensers. This solution preserves water and reduces indirect emissions from data centre operations[33].

Method 3 - Hot-aisle containment systems

A hot-aisle containment system (HACS) encloses the hot aisle to capture hot exhaust air from IT equipment. This turns the remainder of the room into a large cold-air supply plenum. By containing the hot aisle, the hot and cold air streams are separated. HACS can optimise data centre efficiency and reduce energy use by up to 43% compared to cold-aisle containment[33].

Method 4 – Direct-to-chip liquid cooling plates

This method uses liquid cooling plates directly attached to chips. The liquid absorbs heat from the chips and is then cooled down using heat exchangers[33].

Method 5 - Two-phase immersion cooling

Servers are immersed in a special fluid that boils at a lower temperature than water. Heat generated by the servers causes the fluid to boil, carrying heat away from the processors. The vapour then condenses on a cooled surface and returns to liquid form, creating a closed-loop system[33].

Reducing, reusing and recycling hardware

Adopting circular economy principles helps eradicate waste and regenerate nature. Products and materials are kept in circulation through maintenance, reuse, refurbishment, remanufacture, recycling and composting. This can be achieved by implementing the following strategies:

Building a recycling ecosystem

Discarded electronic equipment is one of the fastest growing waste streams in the industrialised world. Establishing a recycling system for IT products and equipment is essential and each company in the value chain has a role to play. Schneider Electric offers multiple recycling methods for uninterrupted power supply (UPS) batteries, including drop off, return shipping or its Trade UPS Program[34].

Creating circularity centres

A robust circularity strategy for data centres is a key component of a broader sustainability strategy. Some circularity centres already process decommissioned cloud servers and hardware, intelligently sorting and channelling components to optimise reuse or repurposing.

For example, Microsoft has created 4 circularity centres with further expansion in 8 locations around the world. Each uses an Intelligent Disposition and Routing System (IDARS) to establish and execute a zero-waste plan for every hardware asset. IDARS uses AI and machine learning, paired with supply chain management software, to process and sort end-of-life assets and optimise routes for those assets[29]. Microsoft's Internal Reuse Program further supports this goal by harvesting valuable components such as processors and memory for reuse across its data centre fleet[29].

Supporting customer products through to end-of-life

A true commitment to the circular economy means taking responsibility for products long after they leave inventory. Supporting end-of-life management not only reduces environmental impact but also strengthens customer relationships and unlocks cost savings.

Schneider Electric provides a strong example of this in practice. The company recovers obsolete medium voltage equipment from customers, removes and safely purifies environmentally harmful chemicals, and recovers 97% or more of materials[34]. This approach demonstrates how lifecycle stewardship can deliver both environmental and business value.

Government support for zero-impact data centres

Grants and incentives

Australia is now a regional data centre hub with Sydney and Melbourne in the top 10 data centre markets in the Asia-Pacific region[35]. The Australian Government's Department of Industry, Science and Resources offers grants and other incentives to support research, entrepreneurship and commercialisation in the data centre sector.

Procurement mandates

To foster this transformation, the Australian Government has mandated that, from mid-2025, all data centres providing services to the federal government must attain a 5 star rating from the National Australian Built Environment Rating System (NABERS), or equivalent such as a Power Usage Effectiveness of 1.4 or less[36]. China has also mandated that all government funded data centres must achieve a Power Usage Effectiveness of 1.3 and 100% renewable energy by 2025 closely mirroring what has been set out by the DTA[37].

Companies such as AirTrunk and NEXTDC show what is possible. AirTrunk has integrated solar power and other renewable sources to achieve considerable reductions in carbon emissions[26]. NEXTDC has invested in renewable energy projects and achieved carbon neutrality through the purchase of carbon credits[27]. Both operators are embracing energy-efficient infrastructure and advanced cooling systems to reduce energy consumption and environmental impact as demand for AI accelerates.

OPTIMISING THE SOFTWARE: CODE, MODELS AND ALGORITHMS

Researchers are focused on developing AI models that are both efficient and effective to minimise energy consumption without compromising performance. Techniques such as model pruning, quantisation and federated learning are being explored to achieve this balance[38].

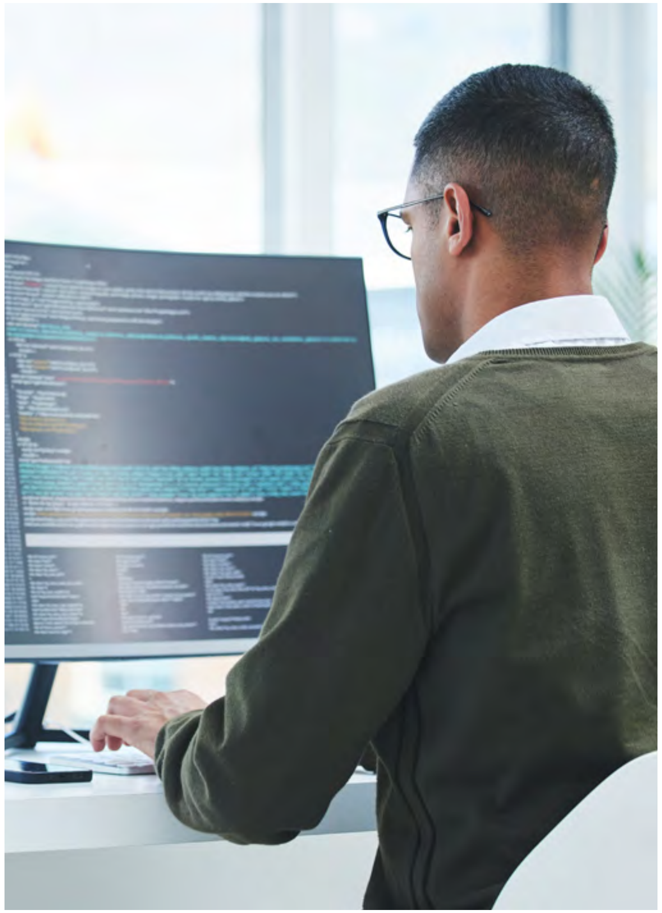
- **Model pruning** eliminates redundant parameters, reducing computational load without affecting accuracy.
- **Quantisation** reduces the precision of calculations without significantly affecting accuracy.
- **Federated learning** trains models across multiple devices, distributing computational load and dependence on centralised data centres.

Green software development is an emerging discipline that brings together climate science, software practices, architecture, electricity markets, hardware and data-centred design. The Green Software Foundation (GSF) plays a pivotal role by establishing standards, tools and best practices[39]. The GSF is collaborating with developers and open-source communities to adopt standards and frameworks such as the Software Carbon Intensity for AI, which lays out principles for reducing and measuring carbon intensity for software[39].

Other steps to support more sustainable AI development include:

- **Using open-source carbon estimator tools,** such as CodeCarbon to assess emissions intensity of models and support decision-making when assessing cost-benefit analysis[40].
- **Considering emissions impacts during model selection,** including the number of parameters, output type and whether a model is task-specific or multimodal to ensure the smallest model is used for the job[41].
- **Referring to rating tools** like Hugging Face's AI Energy Score to guide developers toward lower-emissions foundation models[42].

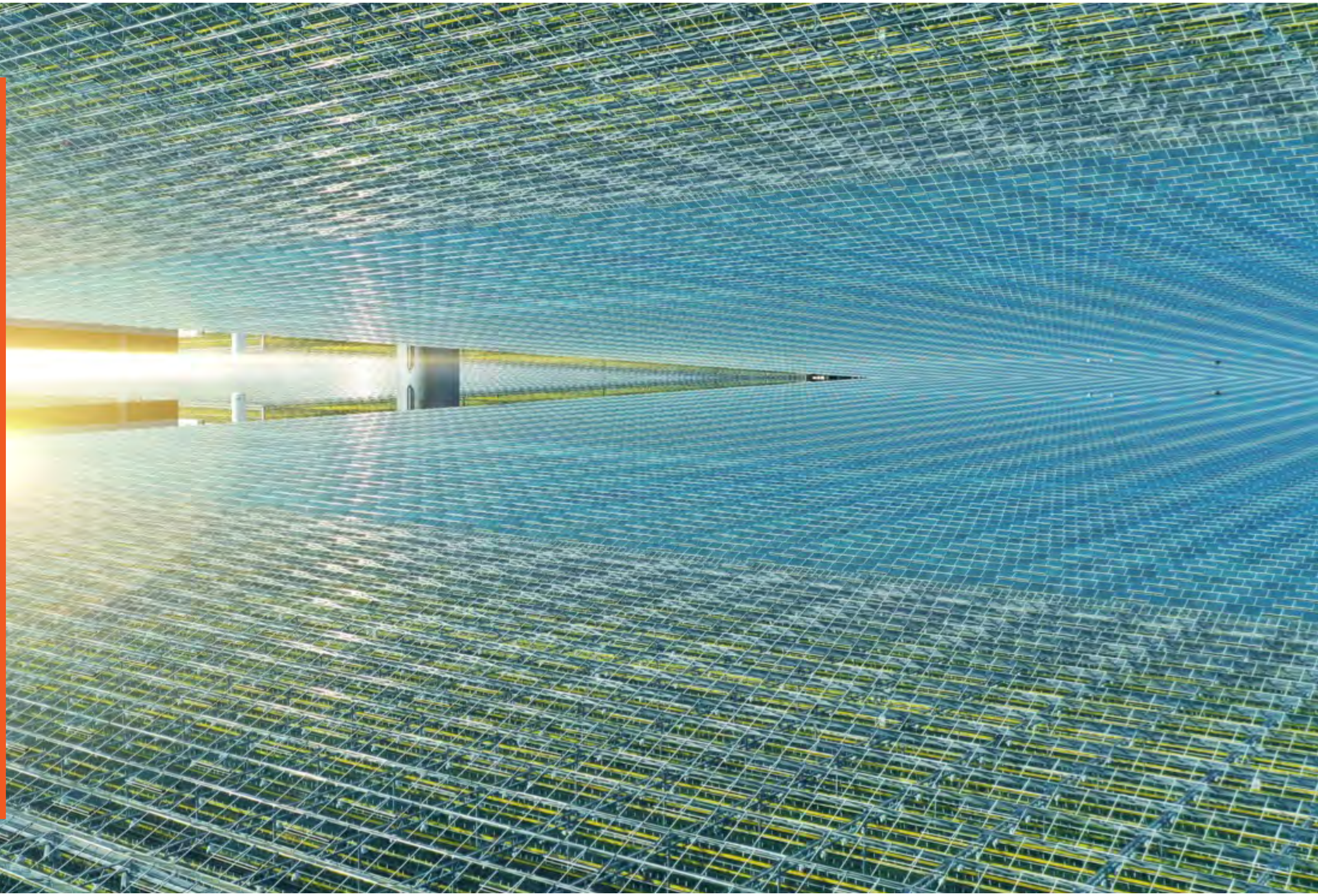
Developers are also building and optimising AI models that achieve similar outcomes with fewer resources. Small language models (SLMs) such as "Phi" achieve remarkable performance on a variety of benchmarks, matching or outperforming models up to 25 times larger[43]. When combined with renewable energy and efficient infrastructure, these approaches support more sustainable AI at scale.



AI AND THE ENERGY TRANSITION: OPPORTUNITIES AND RESPONSIBILITIES

While it is critical to mitigate the environmental footprint of AI itself, we must also recognise its dual role as a powerful tool for accelerating the global energy transition. This section explores that opportunity, which provides another compelling reason for businesses to build expertise in sustainable AI.

The International Energy Agency's (IEA) 2025 report, Energy and AI, highlights AI's immense potential to accelerate the global net-zero energy transition. From speeding up innovation to unlocking efficiency gains, AI could play a critical role in reaching net zero – but realising this transformative potential requires coordinated action[3].



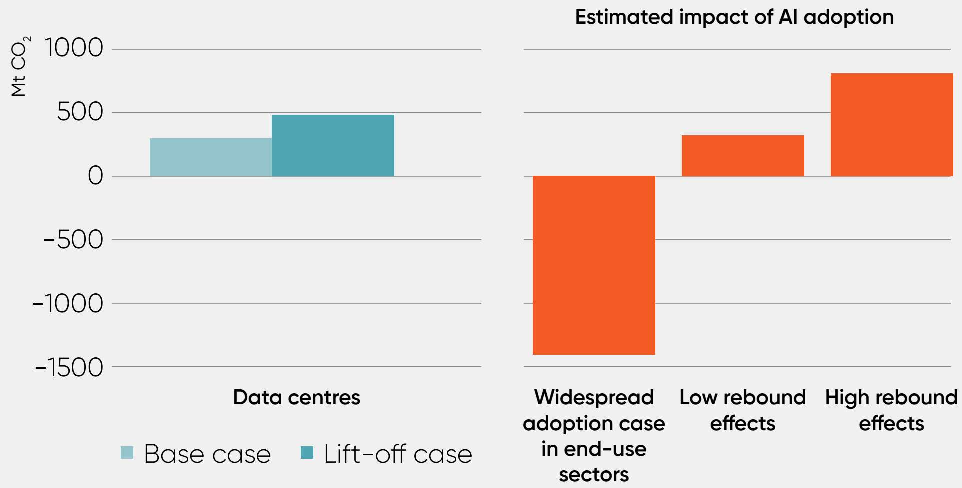
Unlocking efficiency

AI could reduce the time for new battery material discovery by a factor of 10, find fuel catalysts thousands of times faster than human researchers, and drive an estimated 30% reduction in the time to market for lower cost carbon and capture[3].

AI could unlock major efficiency and operational gains for the energy sector, unlocking up to 175 gigawatts (GW) of transmission capacity without the need for new lines[3]. This is more than the total increase in the data centre power load to 2030. If scaled up, existing AI-led interventions could save around 300 TWh of electricity globally, equivalent to annual electricity generation of Australia and New Zealand combined[3].

AI can drive significant **efficiency gains –** but could lead to rebound effects, where lower costs lead to increased usage and higher over-all energy or resource demand.

Indirect emissions from data centres in selected cases and an exploratory analysis of AI impacts emissions, 2035



While the widespread adoption of AI leads to emissions savings in excess of data centre emissions, such AI adoption is not guaranteed and could be negated by rebound effects

Source: Charts from the IEA painting the picture of AI and energy[3]

Building a sustainable energy strategy

A sustainable AI future depends on both clean power and smart systems. This requires a diversified, resilient energy mix – and the infrastructure to support it. In Australia, this may involve:

Scaling up renewables
and low-emissions sources such as solar, wind and hydro.

Considering emerging technologies,
including advanced geothermal and others.

Upgrading grid infrastructure
to accommodate decentralised, variable energy flows.

Enhancing dialogue
between government policymakers, the energy industry, and the technology sector, as well as strengthening collaboration to improve digital skills and to futureproof the energy workforce.

Shift to renewables

Transitioning to renewable energy sources is key to decarbonising data centres. Companies like Microsoft have already committed to powering their data centres with 100% renewable energy by 2025, setting a benchmark for sustainability in data centre operations[25].

According to Microsoft's 2024 Environmental Sustainability Report, renewable energy initiatives have reduced carbon emissions by 6 million metric tons annually[29].

In Australia, renewable energy sources currently supply around 38% of Australia's electricity generation, with substantial growth expected in the coming years[7]. The Australian Government has set ambitious targets to increase the share of renewables in the national energy market (NEM). Federal Government policy is a 43% reduction in 2005-level emissions by 2030, with 82% of electricity supplied by renewable sources by 2030[44].

This transition is supported by investments in large-scale solar and wind farms, battery storage projects, and enhancements to grid infrastructure to accommodate a higher proportion of renewable energy[46].

As data centres increasingly rely on renewable energy, their power usage will become more sustainable. Combining this with energy-efficient practices, advanced cooling systems and AI-driven energy management will further enhance environmental performance.

Decentralised energy grids

As Australia's electricity grid transforms, it is moving from a traditional, one-way power flow model to a more decentralised, dynamic system built around distributed energy resources (DER).

One in three Australian households has rooftop solar, for instance[44]. Collectively, these rooftop solar systems are now the second-largest source of renewable electricity generation in the country, trailing only wind. Add electric vehicles and battery storage, and we are seeing households and businesses shift from passive energy users to active market participants capable of generating, storing and even trading electricity.

AI plays a critical role in managing this complexity. Through real-time optimisation, AI algorithms can balance energy supply and demand across distributed assets like rooftop solar, community batteries and electric vehicles. This reduces energy waste and maximises the use of clean, local generation.

As Australia continues to scale its DER ecosystem and embed smart grid technologies, data centres will play an important role. By tapping into decentralised, AI-optimised energy networks, they can reduce emissions, increase reliability, and strengthen the overall sustainability of AI operations hosted or run in Australia.

COLLABORATION AND POLICY MAKING

Collaboration between governments, industries, and research institutions is essential to address AI's environmental impact. By pooling resources and expertise – in accordance with competition law and appropriate guardrails – stakeholders can create incentives for renewable energy adoption, fund research into energy-efficient AI models, and enforce rigorous standards for e-waste management.

Policy frameworks play a pivotal role by setting clear guidelines and expectations. They can mandate responsible lifecycle planning – from design and development to deployment, upgrade and eventual disposal – embedding environmental considerations at every AI system stage.

Collaborative efforts can spur innovation, as knowledge exchange between academia, industry experts and public bodies often leads to breakthroughs that might not emerge in isolation. Governments can catalyse this innovation by investing in public-private partnerships, offering grants or subsidies for green AI projects, and ensuring regulatory environments reward sustainable practices.

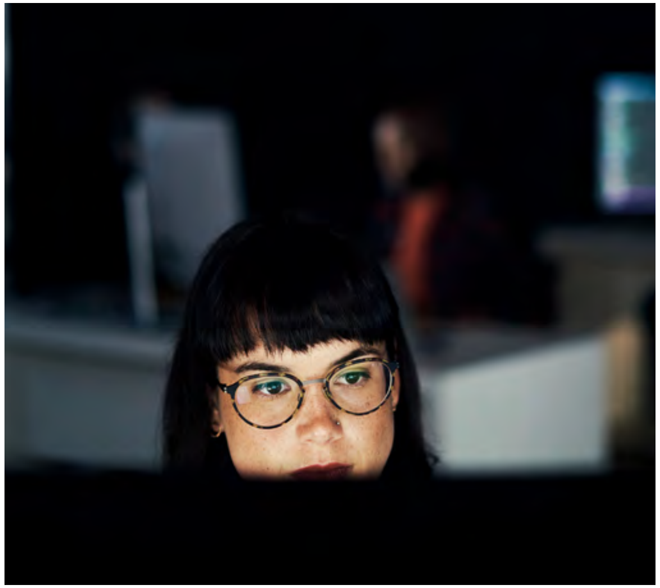
Industry players can adopt and scale novel solutions rapidly, leveraging real-world data to refine AI-driven efficiency measures. Together, these actions create a positive feedback loop where better policies encourage technological advancements, and new discoveries inform and enhance the policy landscape. By working together, governments, businesses and research institutions can accelerate the adoption of sustainable AI, minimising emissions while unlocking broader benefits across the digital economy.

CASE STUDIES AND INTERVIEWS

CASE STUDY: MICROSOFT

In 2020, Microsoft committed to becoming a carbon negative, water positive and zero waste company by 2030. With data centres in 34 countries, this requires a wide variety of strategies to reduce resource use, address water stress and safeguard critical watersheds.

To achieve these goals, Microsoft has explored innovative end-to-end approaches to data centre development – from experimenting with new materials and unusual locations to developing energy efficient chips and network cabling.



Innovations in cooling

In Finland and Denmark, Microsoft partners with local utilities to divert waste heat from data centres into district heating systems – cutting carbon while warming homes and businesses. Where that's not possible, Microsoft has pioneered advanced liquid cooling technologies including two-phase immersion, cold plate systems, and direct-to-chip cooling, significantly reducing water and energy use.

Sustainable construction

Microsoft is using alternative lower-embodied carbon materials like biogenic limestone instead of concrete. This can potentially reduce embodied carbon by more than 50% in comparison to traditional mixes. Other experiments with cross-laminated timber aim to reduce carbon-intensive materials such as steel and concrete.

Powering the data centre

To reduce backup power emissions, Microsoft has explored low-carbon alternatives such as solid oxide and proton exchange membrane fuel cell technologies. These alternatives aim to replace traditional fossil fuel-based methods, ensuring data centres remain operational during outages. In Ireland, Microsoft's data centres use wind turbines paired with battery systems to capture surplus energy and provide it to the local grid during periods of peak demand.

Microsoft is also retrofitting existing facilities, experimenting with cutting-edge energy technologies, and collaborating with grid operators to balance supply and demand. By investing in innovative power solutions and renewable energy while maintaining operational reliability, Microsoft exemplifies a forward-thinking approach to sustainable AI adoption and energy resilience.

CASE STUDY: SCHNEIDER ELECTRIC

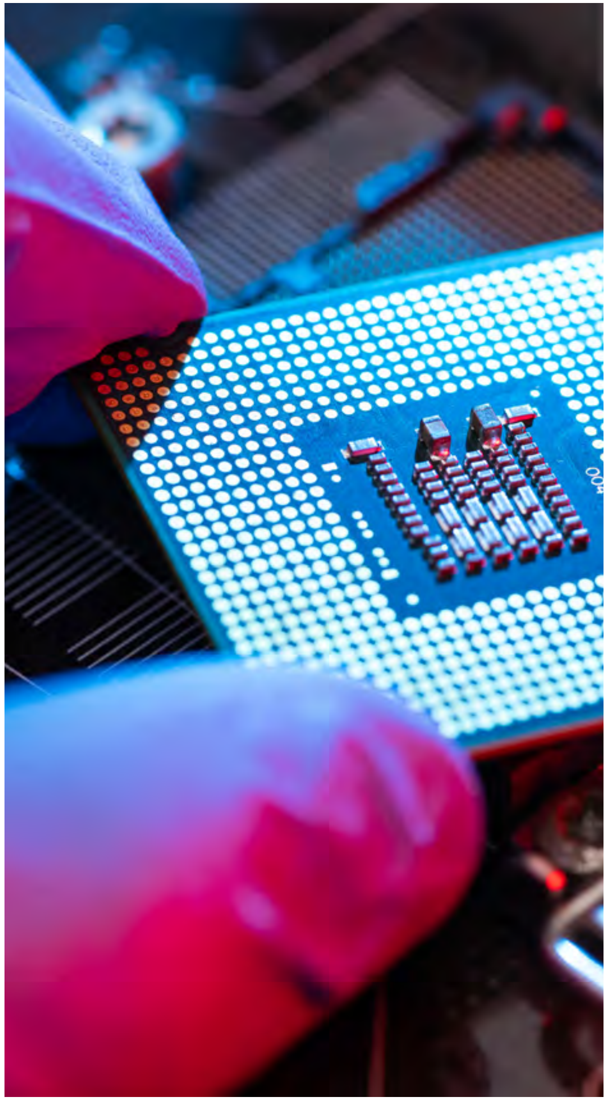
Schneider Electric and NVIDIA have joined forces to address the ever-evolving requirements of data centre power, cooling and racks. Together, they have recognised that the traditional means are no longer sufficient for GPU-based servers arranged in high-density AI clusters.

This partnership has helped to address significant challenges between data centres and AI by teaming up experts from each organisation to co-develop reference designs of the physical infrastructure for both retrofit and purpose-built data centres.

New innovative designs provide data centre operators with guidance and technical specifications to streamline and accelerate deployment of high-density AI clusters.

The first full facility reference design details a design for AI racks (up to 70 kW/rack) with liquid cooling. They offer 2 design options, depending on the standards used – one based on international (IEC) standards, and one based on American (ANSI) standards.

The newest full facility reference design outlines a layout for NVIDIA's DGX SuperPOD using GB200 NVL72 racks, which support power loads up to 132kW per rack with liquid cooling. A version based on IEC standards is currently available.
This partnership is giving many in the industry confidence. For instance, Worldwide Technology has credited the Schneider Electric and NVIDIA strategic partnership with enabling Scott Data to launch its new GPU-as-a-Service offering[45].



CASE STUDY: SAP

SAP is committed to reducing its environmental impact through various sustainability initiatives focused on AI investments and data centre operations. Over the past several years, SAP has implemented several strategies to minimise emissions and enhance energy efficiency.

SAP has deployed AI-driven energy management systems across its data centres. These systems use machine learning algorithms to predict and optimise energy consumption, resulting in more efficient use of resources. SAP's data centres are also powered by renewable energy sources, such as wind and solar, contributing to a significant reduction in carbon emissions.

SAP is also considering the most effective methods to reduce the environmental impact of AI. This includes prioritising the most-efficient generative AI models for use cases, or automatically using prediction models to terminate certain compute tasks, which can reduce energy usage for certain computations by up to 80%.

SAP is helping its customers to harness technology act as an enabler. This includes offering AI in relevant, reliable and responsible ways to allow businesses to generate sustainability reporting from captured metrics with the press of a button, or mapping emissions factors using AI to more accurately understand the true carbon footprint of materials.

More than just offering new solutions, SAP works closely with academic institutions, such as Germany's Hasso Plattner Institute and Stanford University in the United States, to disseminate technical knowledge to students and industry participants to upskill people on sustainable programming and sustainable data centre operations.

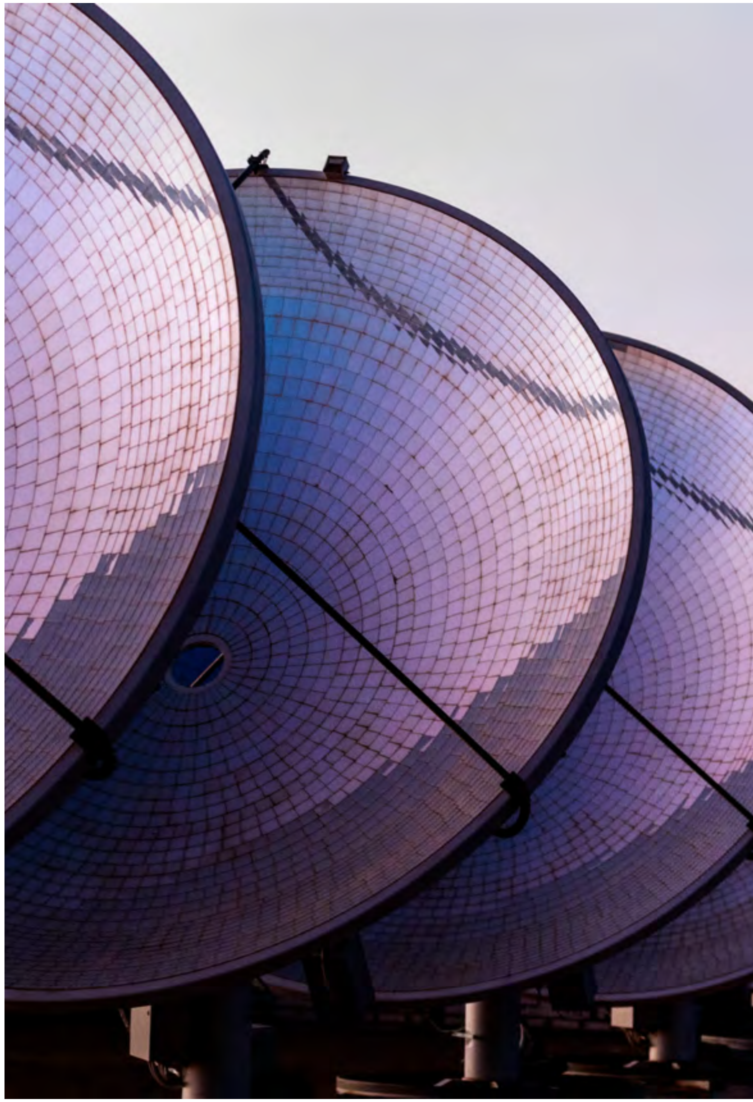
CASE STUDY: TELSTRA

Telstra is committed to reducing its environmental impact through targeted investments in energy efficiency, legacy network decommissioning, and AI-enabled optimisation. The company is making good progress towards its 2030 scope 1+2 and scope 3 emissions reduction targets, driven by a combination of legacy equipment decommissioning, infrastructure upgrades and grid decarbonisation (which Telstra is also contributing to).

A key focus has been on managing emissions as its telecommunications network and technology evolves. Telstra is invested in building a more autonomous network which will use AI to simplify network interactions with self-configuring, self-optimising, and self healing properties. It has also piloted AI-powered energy optimisation features across its connectivity platforms. This includes piloting AI-enabled observability and power optimisation features that have reduced energy usage and improved operational efficiency.

In its data centres and exchanges, Telstra has invested in advanced cooling systems, battery upgrades and alternative energy sources. These efforts are supported by AI-driven analytics and telemetry to monitor equipment performance and identify inefficiencies to optimise emissions and energy performance.

These initiatives reflect Telstra's ambition outlined in its Connected Future 30 strategy that highlights technology leadership and sustainability as key enablers in achieving its 2030 ambition. By combining infrastructure innovation with intelligent technology deployment, Telstra is actively reducing emissions while improving network resilience and service continuity for customers.



PRINCIPLES FOR AUSTRALIAN ORGANISATIONS WHEN CHOOSING AI PROVIDERS

As this guide has outlined, sustainability in technology procurement goes well beyond carbon emissions. It also includes water use, waste management and the broader environmental footprint of digital infrastructure.

As Australian organisations adopt AI solutions, these factors must be considered as part of technology selection, vendor engagement and procurement processes – to reduce emissions, manage resource use, and ensure long-term resilience and compliance. Alongside capabilities and cost, environmental criteria like climate, water and waste impacts should be evaluated in line with business and technical outcomes.

To guide this consideration process, the following practical framework outlines six principles to keep in mind.

1 EVALUATE ENVIRONMENTAL IMPACT HOLISTICALLY

Assess the environmental impact of potential AI providers based on a full spectrum of data centre operations, energy sources, water usage and e-waste management practices.

2 LOOK FOR VERIFIED COMMITMENT TO SUSTAINABILITY

AI providers that have strong commitments to sustainability, including clear sustainability goals, transparent reporting practices, and practical initiatives that reduce their carbon footprints. Organisations should consider aligning with regulation and policy including:

- NABERS (National Australian Built Environment Rating System)
- NGERS (National Greenhouse and Energy Reporting Scheme).

Commitments and progress towards achieving them should be accompanied by accessible, independently verified data so customers can evaluate provider performance and its impact on their own sustainability initiatives.

3 PRIORITISE INNOVATION IN ENERGY AND WATER EFFICIENCY

Look for the use of advanced technologies for energy and water management, retrofitting of existing infrastructures, and the development of sustainable AI models. Ideally, these initiatives will be detailed in publicly available reports.

4 SEEK COLLABORATIVE, TRANSPARENT PARTNERSHIPS

Effective collaboration and transparency are essential for achieving sustainability goals. Organisations that favour partnerships with AI providers that are open to sharing data and insights, keen to collaborate on sustainability projects, and adhere to ethical standards.

5 EMBRACE ECOSYSTEM APPROACHES

As AI and sustainability are fast-evolving fields, companies cannot be expected to source and operate current best practice without accessing capabilities across the wider business and technology ecosystem. No organisation can do it all in-house, so leveraging partnerships to identify and deploy best practices faster and more effectively.

6 EMBED SUSTAINABILITY INTO RESPONSIBLE AI GOVERNANCE

Sustainable AI is not just about technology. It is also about how AI is used. Organisations should build sustainability into their responsible AI strategies, including:

- **User training** on efficient prompting and resource-aware usage
- **Internal awareness** of the environmental impact of AI tools
- **Promoting behaviours** that minimise unnecessary computing and emissions

Encouraging thoughtful use and empowering employees with best practice can reduce load, conserve resources and enhance the user experience.

CONCLUSION

AI adoption is accelerating across all sectors, with Australian organisations increasingly integrating it into core operations. At the same time, regulatory, investor, and community expectations around sustainability are intensifying. As these trends converge, it is essential for organisations to assess the environmental impact of their technology choices, particularly regarding energy use, emissions, and resource intensity.

This means looking beyond performance and price, and examining how providers manage their data centres, source energy and handle electronic waste. A strong track record in sustainability, transparent reporting and ongoing innovation in efficiency are all critical.

Moving forward, Australian organisations can take the following steps:

- Assess AI providers through the lens of their environmental practices.
- Prioritise partnerships with providers that demonstrate strong sustainability commitments and innovations in energy efficiency.
- Promote transparency and collaboration in all AI projects.
- Deploy technologies and strategies that reduce carbon footprints and improve energy management.
- Train users to adopt energy-conscious AI practices.

The choice is not between innovation and sustainability; the challenge is to pursue innovation through sustainability. For the leaders of today, building a smart, efficient, and responsible AI infrastructure is not just a technical requirement or a climate obligation – it is the foundation of a durable competitive advantage and a lasting legacy.

REFERENCES

1. **Microsoft. (2025). Reducing the world's carbon footprint – Microsoft Unlocked.** (video) https://unlocked.microsoft.com/the-prompt/

2. **McKinsey and Company. (2023). The economic potential of generative ai the next productivity frontier.** https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/the%20economic%20potential%20of%20generative%20ai%20the%20next%20productivity%20frontier/the-economic-potential-of-generative-ai-the-next-productivity-frontier.pdf

3. **International Energy Agency. (2025). Energy and AI.** https://iea.blob.core.windows.net/assets/86ed1178-4d77-45ac-ab38-28e849f3b93f/EnergyandAI.pdf

4. **Saenko, K. (2024). A Computer Scientist Breaks Down Generative AI's Hefty Carbon Footprint.** https://www.scientificamerican.com/article/a-computer-scientist-breaks-down-generative-ais-hefty-carbon-footprint/

5. **Goldman Sachs. (2024). AI data centers global power surge and the sustainability impact.** https://www.goldmansachs.com/images/migrated/insights/pages/gs-research/gs-sustain-generational-growth-ai-data-centers-global-power-surge-and-the-sustainability-impact/sustain-data-center-redaction.pdf

6. **Oxford Economics Australia, Data Centre Energy Demand (2025).** https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/2025-iasr-scenarios/final-docs/oxford-economics-australia-data-centre-energy-consumption-report.pdf

7. **Australian Energy Market Operator (AEMO). (2024). National Energy Market Overview.** https://www.aemo.com.au/-/media/Files/Electricity/NEM/National-Electricity-Market-Fact-Sheet.pdf

8. **Open Electricity. (n.d.). Data Tracker. (Dataset).** https://opennem.iberdrola.com.au/energy/nem/?range=1y&interval=1w&view=discrete-time

9. **Goldman Sachs. (2024). AI is poised to drive 160% increase in data center power demand.** https://www.goldmansachs.com/insights/articles/AI-poised-to-drive-160-increase-in-power-demand

10. **International Energy Agency. (2024). Energy World Outlook 2024.** https://iea.blob.core.windows.net/assets/140a0470-5b90-4922-a0e9-838b3ac6918c/WorldEnergyOutlook2024.pdf

11. **Li, P, Yang, J, Islam, M, Ren S. (2025). Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models.** https://arxiv.org/pdf/2304.03271

12. **Schneider Electric. (2023). The AI Disruption: Challenges and Guidance for Data Center Design.** https://www.se.com/ww/en/download/document/SPD_WP110_EN/

13. **Australian Government, Geoscience Australia. (2025). Critical minerals at Geoscience Australia.** https://www.ga.gov.au/scientific-topics/minerals/critical-minerals

14. **Golev, A., Schmeda-Lopez, D.R., Smart, S.K., Corder, G.D., McFarland, E.W. (2016) Where next on e-waste in Australia? Waste Management,** 58, pp. 348-358

15. **Victorian Government, Environmental Protection Authority Victoria. (2020). Managing electronic waste.** https://www.epa.vic.gov.au/for-business/find-a-topic/manage-e-waste

16. Australian Government, Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2025). National Television and Computer Recycling Scheme. https://www.dcceew.gov.au/environment/protection/waste/product-stewardship/products-schemes/television-computer-recycling-scheme.

17. Australian Bureau of Statistics (ABS). (2020). Waste Account, Australia, Experimental Estimates. https://www.abs.gov.au/statistics/environment/environmental-management/waste-account-australia-experimental-estimates/latest-release

18. Ellen McArthur Foundation. (n.d.). What is a circular economy?. https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

19. World Green Building Council. (2019). Bringing embodied carbon upfront. https://worldgbc.org/climate-action/embodied-carbon/

20. Green Building Council of Australia. (2023). Reducing upfront carbon at scale. https://new.gbca.org.au/news/gbca-media-releases/reducing-upfront-carbon-at-scale/

21. Climate Group. (2024). The Steel and Concrete Transformation. https://www.theclimategroup.org/sites/default/files/2024-09/The%20Steel%20and%20Concrete%20Transformation%20-%202024%20market%20outlook%20on%20lower%20emission%20steel%20and%20concrete.pdf

22. Wu, C, J, Acun, B, Rhagavendra, R, Hazelwood, K. (2024). Beyond Efficiency: Scaling AI Sustainably. https://arxiv.org/html/2406.05303v1

23. United Nations. (2022). Kunming-Montreal Global Biodiversity Framework. https://www.unep.org/resources/kunming-montreal-global-biodiversity-framework

24. Schneider Electric. (2024). AI Reference Designs to Enable Adoption: A collaboration between Schneider Electric and NVIDIA. https://download.schneider-electric.com/files?p_File_Name=EB1_V2_EN.pdf&p_Doc_Ref=SPD_EB1_EN&p_enDocType=White+Paper

25. Microsoft. (2022). An update on Microsoft's sustainability commitments: Building a foundation for 2030 – The Official Microsoft Blog. https://blogs.microsoft.com/blog/2022/03/10/an-update-on-microsofts-sustainability-commitments-building-a-foundation-for-2030/

26. AirTrunk. (2024). AirTrunk FY24 Sustainability Report. https://airtrunk.com/insights/airtrunk-fy24-sustainability-report/

27. NEXTDC. (2024). FY24 NEXTDC Environmental, Social and Governance Report. https://nextdc.com/hubfs/Corporate%20Governance/ESG/FY24_NEXTDC_ESG_Report.pdf

28. Schneider Electric. (n.d.) EcoDataCenter: Customer Story Key Figures. https://www.se.com/ww/en/work/campaign/life-is-on/case-study/ecodatacenter.jsp

29. Microsoft. (2024a). 2024 Environmental Sustainability Report. https://www.microsoft.com/en-us/corporate-responsibility/sustainability/report

30. Microsoft. (2024c). Sustainable by design: Innovating for energy efficiency in AI part1 and part 2. https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/09/12/sustainable-by-design-innovating-for-energy-efficiency-in-ai-part-1/?mscm=1, https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/09/26/sustainable-by-design-innovating-for-energy-efficiency-in-ai-part-2/?mscm=1

31. **Fennell, P, Driver, J, Bataille, C and Davis, S, J. (2022). Cement and Steel – nine steps to net zero.** https://www.nature.com/articles/d41586-022-00758-4#ref-CR1

32. **Microsoft. (2024d). Sustainable by design: Transforming datacenter water efficiency.** https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/07/25/sustainable-by-design-transforming-datacenter-water-efficiency/?mscm=1

33. **Motivair Corp. (n.d.). Leveraging The Most Comprehensive End-To-End Liquid Cooling Platform.** https://www.motivaircorp.com/products/liquid-cooling-systems/

34. **Schneider Electric. (n.d.). Recycling Options.** https://www.se.com/au/en/work/support/product-support/recycling-options.jsp

35. **Australian Government, Austrade. (n.d.). Artificial Intelligence Data Centres.** https://international.austrade.gov.au/en/do-business-with-australia/sectors/technology/ai-and-data-centres

36. **Australian Government, Department of Finance. (2023). Net Zero in Government Operations Strategy.** https://www.finance.gov.au/sites/default/files/2023-11/Net_Zero_Government_Operations_Strategy.pdf

37. **The People's Republic of China. (2024). China sets green targets for data centers.** https://english.www.gov.cn/news/202407/24/content_WS66a0b167c6d0868f4e8e96ba.html

38. **Kamalov, Saidjon. (2024). Optimizing model pruning for energy-efficient deep learning.** https://annalsmcs.org/index.php/amcs/article/view/428

39. **Green Software Foundation. (2025). Green Software Foundation 2024 Annual Report.** https://greensoftware.foundation/ and https://drive.google.com/file/d/1grzqNwVt3eaOfkLAYkv2rAHDq9Nc6mib/view

40. **Boston Consulting Group. (2020). Top AI Experts Create Code Carbon, a Tool to Track and Reduce Computing's CO2 Emissions.** https://www.bcg.com/press/1december2020-top-ai-experts-create-codecarbon

41. **Luccioni, A, S, Jernite, Y, Strubell, E. (2024). Power Hungry Processing: Watts Driving the Cost of AI Deployment?.** https://arxiv.org/pdf/2311.16863

42. **Hugging Face. (2025). Announcing AI Score Ratings.** https://huggingface.co/blog/sasha/announcing-ai-energy-score

43. **Microsoft. (2024b). Sustainable by design: Advancing the sustainability of AI.** https://blogs.microsoft.com/blog/2024/04/02/sustainable-by-design-advancing-the-sustainability-of-ai/

44. **Australian Energy Market Operator. (2024). Integrated System Plan.** https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-integrated-system-plan-isp.pdf?la=en

45. **Worldwide Technology. (2024). Scott Data Embraces AI Transformation to Offer GPU as a Service.** https://www.wwt.com/case-study/scott-data-embraces-ai-transformation-to-offer-gpu-as-a-service

46. **Australian Government, Department of Industry, Science, Energy and Resources, (DISR). (2023). Department of Industry, Science, Energy and Resources Annual Report 2022 – 2023.** https://www.industry.gov.au/publications/annual-report-2022-23

ACKNOWLEDGING OUR CLC LEARNING & SHARING JOURNEY

The Climate Leaders Coalition AI Deep Dive Team acknowledge the many people involved in leading this work and enriching our learning experience through a series of workshops, special events and interviews. Thank you for your dedication, enthusiasm and a willingness to share different perspectives, harnessing the power of collective knowledge across the local and global ecosystem.

We would like to dedicate a special thank you to:

Project Lead Sponsors:

Microsoft

Steven Miller
Managing Director,
Microsoft Australia and New Zealand

Rik Irons-Mclean
Chief Technology Officer, Enterprise Commercial,
Microsoft Australia and New Zealand

Mahomed Ayoob
Snr Technology Strategist,
Microsoft Australia and New Zealand

Thought Partners:

THE B TEAM

Alina Jurcola
Project Director, The B Team Australasia,
and CLC representative

EY – Shape the future with confidence

Emma Herd
Co-Leader, EY Net Zero Centre
Partner, Climate Change and
Sustainability Services
EY Australia

Simon Colman
Director, Climate Change
& Sustainability Services
(CCaSS)

Lisa Bouari
EY Regional AI Leader, Oceania,
Partner, AI & Data, EY Australia

Flynn McBean
Director, Consulting

CLC Project Team Members

Microsoft

Mahomed Ayoob
Microsoft

Sarah Carney
Microsoft

SAP

Eamon Fenwick
SAP

Schneider Electric

Astrid Groves
Schneider Electric

Natalia Gallo Villegas
Schneider Electric

Telstra

Tim Osborne
Telstra

PARTICIPATING CLC MEMBER CEOS

Steven Miller
Microsoft

Angela Colantuono
SAP

Colette Munro
Schneider Electric

CLC ORGANISING COMMITTEE

Ann Sherry
Co-chair

John Lydon
Co-chair

Lynette Mayne
Executive Chair,
The B Team Australasia

Ian Smith
Member

John O'Brien
Member

Judy Slatyer
Member

Keith Tuffley
Member

Anna Skarbek
Member

CLC EXECUTIVE TEAM

Beth Dowe
Executive Director

Judy Slatyer
Project Director

Alina Jurcola
Project Director

Dr Jane Watts
Project Director