Data Centres as Enabling Infrastructure

Prepared by Mandala

NOVEMBER 2025

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Note: All dollar figures are Australian dollars unless indicated otherwise.

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Executive summary

Data centres drive economic growth and investment across Australia's economy

Data centres are at the core of Australia's digital infrastructure, underpinning AI, cloud services, and the digital lives of Australians. Like other productive industries, data centres require energy and water. They use energy to power IT equipment, and they use energy and water in the support systems that cool servers and keep data centres running. Using water for cooling reduces the amount of energy needed.

Today, data centres consume 3.9 terawatt hours (TWh) of energy annually, or 2 per cent of Australia's annual electricity consumption. They use the same amount of electricity as shopping centres in Australia, and much less than other industrial activities like mining and manufacturing. Data centre use is forecast to grow to around 6 per cent by 2030.

Data centres use 5.5 gigalitres (GL), or 0.04 per cent, of potable water nationally. This is seven times less water than Australia's public swimming pools use annually. Data centres consume 0.7 and 0.2 per cent of Sydney and Melbourne's water, respectively. This is forecast to reach 1.9 per cent for Sydney and 0.9 per cent for Melbourne in 2030.

Data centres generate large economic benefits relative to their energy consumption

The technology sector, including data centres, generates around $12.6 billion in gross value added per TWh of energy consumed. This is higher than mining ($9.1 billion per TWh) and manufacturing ($8.8 billion per TWh). This reflects the essential role of data centres in enabling digital services across the economy.

Data centres are not just consumers of energy, they play an active role as investors across the supply chain, from generation to end use

Through power purchase agreements (PPAs) that underwrite new renewable projects and on-site solar installations, data centres currently support 1.5 TWh of renewable energy generation. This represents nearly 40 per cent of their energy consumption and is equivalent to powering over 200,000 homes annually.

Data centres have invested $3.1 billion in grid infrastructure since 2020, with a further $7.2 billion forecast by 2030. This includes $1.1 billion of excess capacity for communities and other industries.

Data centres are over seven times more efficient than on-premise servers. They save electricity by aggregating compute power and using superior chips and cooling technologies.

Data centres are currently modest water users and are providing capital to invest in water-reducing technologies as they grow

Investments in innovative cooling technologies, including closed-loop cooling systems, enable data centres to handle high-density AI workloads while maintaining water efficiency.

Data centres have contributed $40 million to potable water pipeline upgrades, creating excess capacity for communities equivalent to the water use of 10,000 households.

Recycled water represents a major opportunity for data centres to reduce their potable water use. They are expected to invest between $500 million and $1.1 billion in recycled water infrastructure by 2030, potentially replacing up to half of their water consumption.

Effective policy settings can harness data centre growth in a way that accelerates Australia's clean energy transition while ensuring sustainable energy and water practices

Accelerating approvals, promoting industry-informed standards, and facilitating private investment will help Australia to position itself as a leading destination for sustainable data centre investment. These policy priorities will enable data centre growth to accelerate renewable energy deployment and drive investments in innovative and sustainable water solutions.

DATA CENTRES AS ENABLING INFRASTRUCTURE

Data centres aggregate energy and water to power Australia's digital economy

2% of Australia's energy
Projected to reach **6% by 2030**

$12.6 Billion
Gross value added per TWh of energy consumed

<0.1% of Australia's water
Currently **0.7%** of Sydney and **0.2%** of Melbourne water use

Data centres drive investments in Australia's energy and water systems

$7.2 Billion
Invested in grid infrastructure **by 2030**

Up to **$1.1 Billion**
Invested in recycled water **by 2030**

Data centres support sustainable energy and water practices

70% of data centre energy demand is attributable **to renewable sources**

1.5 TWh Direct renewable generation
Supported through on-site generation and Power Purchase Agreements

Up to **50% Recycled water by 2030**
Equivalent to the annual water consumed by **50,000 Australian homes**

Coordinated action is needed to harness sustainable data centre growth

- **Accelerate infrastructure approvals**
- **Support industry-informed standards**
- **Facilitate private investment**

1 Data centres power Australia's digital economy

1.1 Data centres are at the core of our national digital infrastructure

Australians are increasingly reliant on data centres to facilitate their digital lives. Every time we pick up a device to send a message, join a video call, run an internet search, purchase goods, or pay a bill online, we are relying on the advanced capabilities of data centres. Even when we are not actively online, data centres underpin essential services integral to our lives. They enable the cloud systems relied on by government and businesses to provide services such as banking, communications, emergency response, and Australia's passport, tax, and welfare systems.

Data centres facilitate high-performance computing, which can run at speeds more than one million times faster than the fastest desktop or laptop. This makes data centres and their servers efficient at completing complex tasks such as cloud computing, which enables users to access data and applications via the internet, and allows them to handle the heavy workload from artificial intelligence (AI). The centrality of data centres to our digital infrastructure and their economic benefits across the economy were detailed in a previous report, Empowering Australia's Digital Future, released in October 2024.

EXHIBIT 1

Data centres touch everyone's daily life and are behind every swipe, tap, and click

Illustrative example of digital interactions that take place in a typical day

This is Claire. Claire lives with her two children in Sydney. She works for an accounting firm in the city. Claire relies on technology to make her day easier and more productive. Behind every swipe, tap, and click lies a vast digital ecosystem enabled by data centres enabling her digital interactions.

		She needs data centres to...
7am	**Claire is getting her family ready for the day** ▪ She checks if it will rain today using her Bureau of Meteorology app ▪ She makes sure her train is on time using her Transport NSW app	Calculate real-time weather and transport updates
9am	**At work** ▪ Claire joins a video call with her team over Microsoft Teams ▪ She processes invoices with cloud-based technology	Deliver audio and video content to her laptop
12pm	**On her lunch break** ▪ Claire pays an overdue electricity bill on her phone ▪ Claire uses HotDoc to book a GP appointment for her son	Host app services and payment processing systems
4pm	**On her way to pick up the kids** ▪ Claire receives an email from her daughter's school to confirm her parent-teacher interview next week	Receive and reply to emails
7pm	**That evening** ▪ Claire lets her kids watch the latest episode of Bluey on Netflix while she makes dinner	Find and stream content from around the world

Source: Mandala (2024) *Empowering Australia's Digital Future.*

Undertaking these vital computing tasks, which are the engine room of our economy, requires energy and water. Data centres use energy to power the servers that run the IT loads, and they use energy and water in the support systems that cool servers and keep data centres running smoothly and safely.

This report details the impact that data centres are having and the role they are playing in Australia's energy and water systems. The remainder of Chapter 1 outlines data centres' current and forecasted energy and water use in Australia. Chapter 2 examines data centres' participation in Australia's energy system, detailing their involvement across generation, transmission and distribution, and consumption. Chapter 3 analyses data centres' engagement with Australia's water networks. Chapter 4 presents policy recommendations that support sustainable and responsible data centre development.

1.2

Data centres aggregate energy and water use to power our digital economy, and consume modestly compared to overall national usage

Data centres use electricity to power compute and supporting infrastructure

Powering Australia's digital infrastructure requires energy. Data centres use electricity for two primary purposes: (1) to power their IT load; and (2) to power the infrastructure load that runs their efficient support systems to maintain smooth and safe operations (see Exhibit 2). The primary support system is the cooling infrastructure required to ensure the data centre's servers can function. More data centres are using water as well as electricity to disperse heat.

The Australian Energy Market Operator (AEMO) estimates that Australian data centres consumed 3.9 terawatt hours (TWh) in 2025.[1] AEMO's baseline scenario for energy generation forecasts that by 2030 data centre energy consumption could reach 12 TWh (or 6 per cent of the National Electricity Market's grid supplied electricity). This growth will occur through two channels: existing data centres ramping up operations (contributing 4.5 TWh) and new data centres coming online (contributing 3.5 TWh) (see Exhibit 3). This growth largely reflects growth in Australia's digital economy.

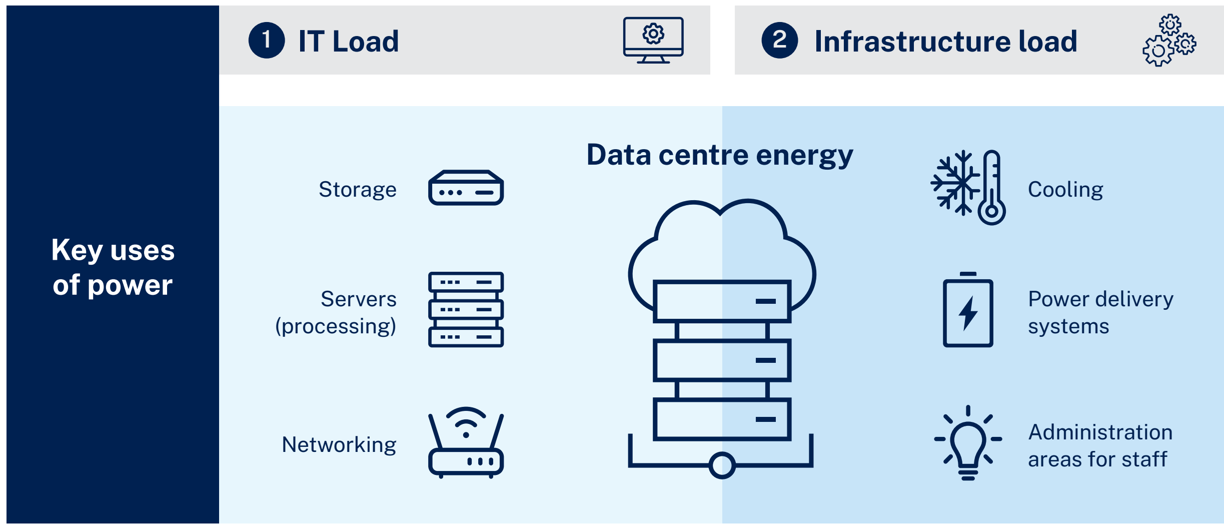
Data centres consume around 2 per cent of Australia's annual electricity consumption.[2] Shopping centres use the same amount of electricity as data centres, while other industrial activities, such as mining, metal manufacturing, and other manufacturing, make up between 5 and 16 per cent of electricity consumption each year. Australian households account for approximately 31 per cent of total electricity consumed annually.

As a key component of Australia's digital infrastructure, data centres put energy to productive use, supporting all sectors of the economy by underpinning their digital services. The tech sector (including data centres) generates $12.6 billion in gross value added (GVA) per TWh of energy consumed. This ratio of economic contribution is greater than many other key sectors, including mining ($9.1 billion per TWh) and manufacturing ($8.8 billion per TWh) (see Exhibit 4).

While data centre demand forecasts remain uncertain, in large part due to evolving AI development and adoption patterns, AEMO's modelling provides a credible basis for projections.[3] Accurate forecasts on data centre growth are further complicated by limited transparency on project pipelines due to commercial sensitivities and uncertain end-user demand, resulting in 'phantom demand'. This refers to the large share of grid connection requests unlikely to materialise as actual electricity draw. Phantom demand reflects firms competing to capture future demand rather than providing a reliable guide to future consumption. AEMO received 44 GW of data centre connection requests as part of its 2025 Inputs, Assumptions, and Scenarios Report (IASR).[4] Work by AEMO, network service providers, and Oxford Economics reduced this to 7.9 GW of non-duplicative prospective projects deemed likely to proceed. Accounting for utilisation rates and existing facility capacity, only around 6 GW of new capacity is expected to be required under AEMO's forecasts.[5]

EXHIBIT 2

Data centres use electricity to power their customers' IT loads, which are growing, and associated cooling requirements



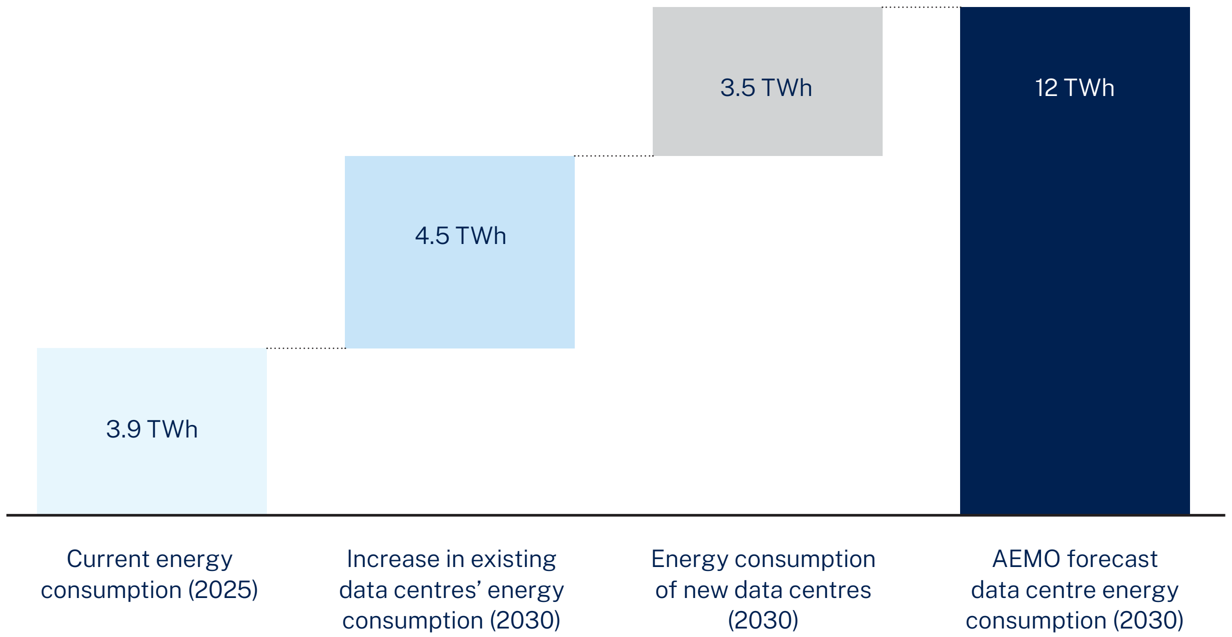
	1 IT Load	2 Infrastructure load
Definition	• **IT load** is the power consumed by the computing and networking equipment. • This electricity use powers computing and data processing tasks.	• **Infrastructure load** is the power consumed by non-IT systems required to operate the data centre. • This includes power for cooling, lighting, and power delivery systems.
Key drivers	• IT load is primarily driven by the demands of data centre customers and end users. • They increasingly rely on digital services, cloud computing, and data-intensive applications that run off new, more powerful chips.	• Infrastructure load is influenced by IT load, but data centre operators have more control over the power consumed by non-IT systems, implementing efficient technologies and optimising data centre design to reduce it.

Note: IT load makes up the majority of data centre power requirements.
Source: Vimal (2023) *Power Usage Effectiveness (PUE) in Data Centers*; Zhang (2024) *PUE (Power Usage Effectiveness): Optimizing Data Centers*; Mandala analysis.

EXHIBIT 3

Data centres are expected to consume 12 TWh of electricity by 2030 to enable Australia's growing digital needs

Electricity consumption for existing and new data centres, TWh, 2025 and 2030F



Source: AEMO (2025) *Data centre energy demand*; Mandala analysis.

1 AEMO took a bottom-up and top-down approach to data centre demand forecasting. See appendix for further details. All years are financial years unless otherwise specified.
2 The vast majority of this is concentrated in the National Electricity Market (NEM) which operates in the eastern and south-eastern states of Australia. Oxford Economics (2025) *Data centre energy demand.*
3 See appendix for a detailed explanation of AEMO's data centre demand forecasting methodology.
4 The 2025 IASR provides inputs, assumptions and scenario frameworks that will inform AEMO's primary reports, including the 2025 Electricity Statement of Opportunities (ESOO) and the 2026 Integrated System Plan (ISP), which provides a roadmap for the development of the National Electricity Market.
5 Oxford Economics (2025) *Surging data centre connection requests drive phantom demand for power – Research Briefing.*

EXHIBIT 4

Data centres use 2% of Australia's electricity to power our digital economy

Annual proportion of electricity usage in Australia by select industries[1] (% of electricity consumption and TWh), and GVA per TWh of electricity used, 2025

Industry	% of electricity consumption	Electricity consumption in TWh	$B GVA per TWh
Australian households	31%	78 TWh	N/A
Mining total	16%	40 TWh	$9.1
Primary metal and metal product manufacturing	12%	29 TWh	$0.8
Electricity, gas, water, and waste services total	10%	26 TWh	$1.9
Other manufacturing	5%	13 TWh	$8.8
Data centres[2]	2%	3.9 TWh	$12.6[3]

Shopping centres consume **the same** amount of electricity as data centres in Australia.

Note: All figures are adjusted for 2025. ABS Energy Account subject to changes between 2023 and 2024 release.
1 This excludes total energy usage (e.g., coal, oil products, natural gas or biofuels, and waste).
2 Electricity consumption for Data centres in FY2025 based on AEMO estimates.
3 Figure represents the ratio of the technology sector's direct GVA in FY2021 (adjusted to 2025 values) to the combined electricity consumption of Information Media and Telecommunications FY2021 (adjusted to 2025 values) and Data centres in FY2025.
Source: Oxford Economics (2025) *Data Centre Energy Demand*; ABS (2024) *Energy Account*; IEA (2024) *Australia - Electricity*; Enerdata (2024) *Australia Energy Information*; NABERS (2023) *2022/23 NABERS Energy for Shopping Centres*; Property Council of Australia (n.d.) *Research Overview*; Tech Council of Australia (2021) *The economic contribution of Australia's tech sector*; Mandala analysis.

Data centres use water primarily for cooling operations

Data centres use water as an efficient way to cool servers, including chips. While data centre water use is and will remain relatively small compared to other industrial users, demand is centred in urban areas and is expected to grow over the coming years. As a result, the emergence of data centre water use is attracting greater attention. Both industry and government have a role to play in ensuring that data centre water consumption is sustainable and does not impact local communities.

Why data centres use water in cooling

Data centre cooling involves balancing energy efficiency, water usage, costs, and site-specific requirements. There is generally a trade-off between energy and water efficiency. In many cases, using a water cooled design reduces data centre energy consumption compared to a 100 per cent air cooled design.

Water is far more effective at transferring heat than air, due to its higher specific heat capacity and thermal conductivity. It can absorb a lot of heat energy without a significant rise in its own temperature. Further, heat moves through water about 25 times faster than through air, so water transfers more heat in the same amount of time. Water's higher density also means it has superior heat transfer properties, carrying roughly 3,500 times the heat compared with the same volume of air.[6]

Data centres have unique design considerations and different locations require different cooling approaches. When designing data centres, developers will look at a range of factors, including environmental data, water scarcity, and power availability as key inputs. Some data centres use innovative designs that result in no ongoing water consumption for cooling. Likewise, some use innovative engineering solutions that reduce the electricity needed to cool equipment by switching off mechanical plant at certain times to deliver the same level of cooling, resulting in less stress on the grid, less energy consumption, and less carbon emissions.

6 Zhang et al. (2022) *Discussions of Cold Plate Liquid Cooling Technology and Its Applications in Data Center Thermal Management.*

Data centres' IT loads generate heat, which must be managed so they can function properly. There are different options for both server-level cooling and building-level cooling (see Exhibit 5).

At the building level, the primary methods for managing heat in a data centre are air cooling, which does not use any water, and water-based cooling systems (including chilled water systems and evaporative cooling). Cooling solutions using water are less energy intensive than air cooling but consume more water. At the server level, new generation liquid cooling systems are increasingly being deployed. Unlike water-based cooling, liquid cooling does not necessarily increase water consumption. This is because it uses a small amount of water moving continuously in a closed-loop, rather than being evaporated.[7]

Data centres ultimately face a trade-off between using water for cooling, which is more energy-efficient, and using air-cooling systems that consume more electricity but no water. Data centres often install multiple cooling systems in the same facility and determine which system to use based on weather and environmental conditions.[8]

EXHIBIT 5

Data centres use water for cooling customer workloads, minimising electricity use

Server
House CPU/GPU chips that functionally generate heat

Cooling type	Cooling description
Air cooling	• Cool air is drawn into the data centre and circulated to cool server racks. • If conditions permit, air from outside the data centre is brought in and circulated. • Hot air is redirected out of the data centre.
Indirect evaporative cooling	• Hot air from the data centre is channelled into an air handling unit (AHU) where it is cooled via a heat exchanger using evaporated water. • Cooled, dry air is then blown from the AHU onto the server racks.
Direct evaporative cooling	• Warm air from the data centre passes through evaporative pads where water cools and humidifies the airstream. • The cooled and humidified air is supplied straight to the server racks, without a separating heat exchanger.
Direct-to-chip liquid cooling	• Liquid is delivered to a cold plate that sits directly on top of the computer chip. • Heat is transferred through the plate and absorbed by the liquid. • This method is coupled with air cooling, or indirect or direct evaporative cooling, which requires water.
Immersion liquid cooling	• Computer chips are fully or partially immersed in water or another dielectric fluid. • Water is either still or circulated with pumps. • This method does not require any other type of cooling.

Source: Microsoft (2023) *Modern data center cooling*; Berkeley Lab (2024) *2024 United States Data Center Energy Usage Report*; Expert interviews; Mandala analysis.

7 Equinix (2024) *How Data Centers Use Water, and How We're Working to Use Water Responsibly.*
8 Ibid.

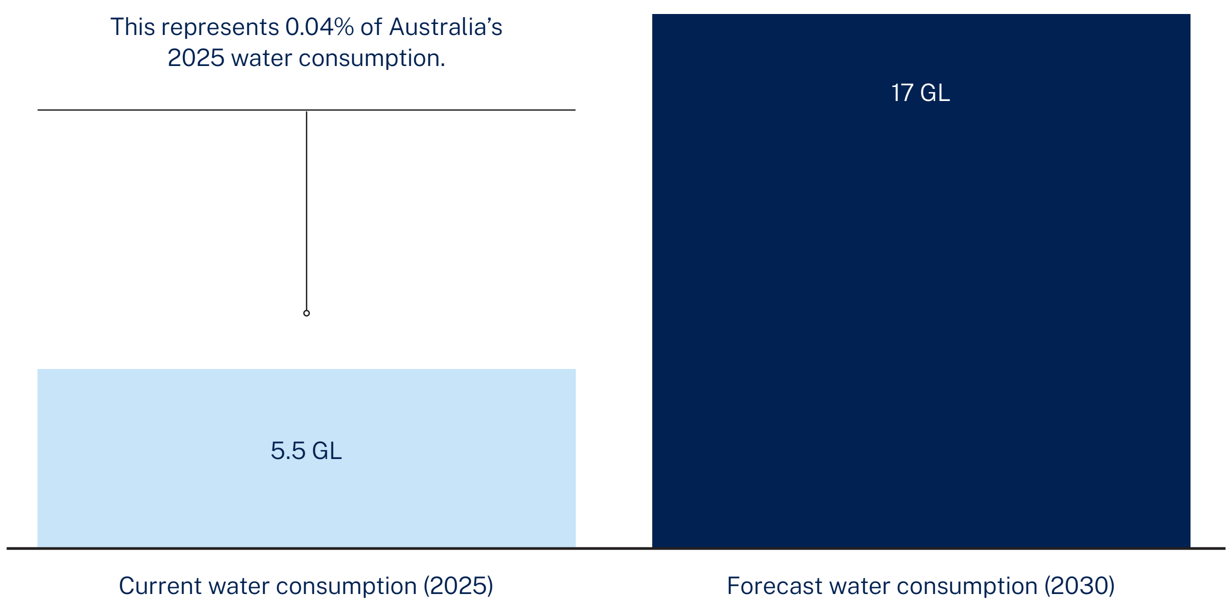
Data centres currently consume around 5.5 gigalitres (GL) of water annually, or 0.04 per cent of Australia's total water use.[9] This is expected to increase to 17 GL by 2030 (see Exhibit 6). This growth is driven by two key factors: the need to mitigate increasing energy consumption, and the growing deployment of graphics processing units (GPUs) for AI workloads.

Estimates surrounding the future water consumption of data centres vary. Limited data exists on data centre water use in Australia, with estimates based on multiple sources. As with energy demand forecasts, water projections can be affected by 'phantom demand' (capacity requests for connections or supply that may never materialise). Water use projections can also be impacted by the metric used to determine data centre water use. For instance, typical daily usage differs from maximum water use on a hot day. While data centres rarely require the maximum water use for a hot day, they do need to request this for the worst-case scenario. If water projections use maximum water usage as a daily figure, they can significantly overestimate the future water use of data centres. As data centres become a more significant contributor to water demand, greater coordination between water authorities, data centre operators, and other stakeholders will improve public forecasts of demand requirements. Data centres can make a positive contribution to the market as investors in water infrastructure and water reduction technologies.

EXHIBIT 6

Data centre water demand could reach 17 GL by 2030 as water cooling supports growing digital demands and AI workloads

Current and forecast data centre water consumption, GL, 2025 and 2030F



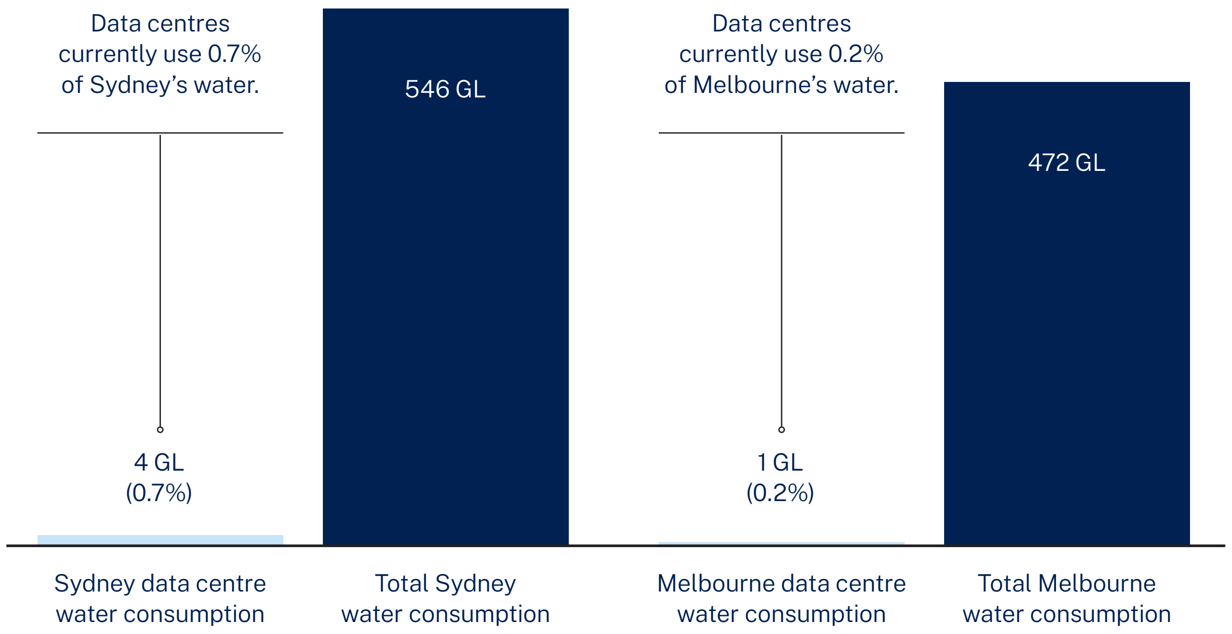
Source: ABC (2025) *Data centres are vital for the future and AI but their environmental footprint can be a problem*; Oxford Economics (2025) *Data centre energy demand*; Expert interviews; Mandala analysis.

Relative to Australia's overall water use, data centres have a small impact. Data centres use just 0.04 per cent of Australia's total water used in 2025, at 5.5 GL.[10] Australia's public swimming pools use seven times more water than this. In major data centre locations in Sydney and Melbourne, data centres use 0.7 and 0.2 per cent of local water use, respectively (see Exhibit 7). By 2030, it is forecast that data centres will use around 1.9 and 0.9 per cent of local water use in Sydney and Melbourne respectively.[11,12]

9 Total water use (less Electricity, gas, water, and waste services). ABS (2025), *Water Account, Australia, 2021-22 financial year.*
10 ABS (2023) *Water Account, Australia, Table 1.1.*
11 Sydney Water (2024) *Price Proposal 2025–30.*
12 Greater Western Water, Melbourne Water, South East Water and Yarra Valley Water (2024) *Greater Melbourne Urban Water and System Strategy: Water for Life.*

EXHIBIT 7

Data centres currently consume under 1% of Sydney and Melbourne's water



Public swimming pools across Australia use **7x** more water than data centres.

Source: Oxford Economics (2025) *Data centre energy demand*; Sydney Water (2024) *Water conservation: 2023-24 performance and forward plan*; Greater Western Water (2024) *Melbourne's Annual Water Outlook 2025*; Mandala analysis.

1.3
Data centres drive investments in energy and water infrastructure

Data centres serve as both consumers and enablers of Australia's energy and water systems. Their need for speed and scale to meet our growing digital demands, and the associated requirements for reliable power and cooling systems, drive substantial investment across supply chains (see Exhibit 8). This accelerates infrastructure development, improves grid reliability and water security, creates excess capacity that benefits local communities, and supports Australia's transition to more sustainable and resilient networks.

In Australia's electricity system, data centres are driving and co-financing investments in renewable energy generation, transmission and distribution networks, as well as in technologies to manage their own usage. This includes PPAs that underwrite new solar and wind projects, purchasing large generation certificates that increase the returns of renewable projects, grid infrastructure upgrades that improve capacity and reliability, and on-site generation and storage systems that reduce demand pressures.

Data centre development is similarly catalysing investment in Australia's water system. This includes potable water pipeline upgrades, recycled water infrastructure, and advanced treatment technologies. Data centres are funding pipeline expansions that benefit local communities, and investing in recycled water facilities that reduce demand on potable supplies. They are also improving overall water efficiency by deploying innovative cooling technologies.

EXHIBIT 8

Data centres participate in Australia's energy and water systems as both enablers for supporting infrastructure and as an end user

Energy: Supply chain component	Energy: Data centre participation	Water: Supply chain component	Water: Data centre participation
Generation	▪ Support renewable energy development through PPAs. ▪ Invest in on-site renewable energy generation.	Catchment and storage	▪ Co-invest in catchment areas.
Transmission and distribution	▪ Invest in transmission and distribution lines. ▪ Invest in terminal stations and substation augmentation.	Treatment and distribution	▪ Co-invest in potable drinking water pipeline development. ▪ Poised to co-invest in recycled water pipeline development.
Usage	▪ Invest in energy efficiency technologies.	Usage	▪ Invest in rainwater efficiency technologies and recycled water. ▪ Invest in technologies that do not require water for primary cooling.

Note: Illustrative view of the role of data centres in energy and water supply chains.
Source: Expert interviews; Mandala analysis.

Urban locations are essential for Australia's data centres

Data centres tend to be built in urban and peri-urban areas to deliver low-latency performance for modern digital services. With 88 per cent of Australians living in urban areas,[13] close proximity of data centres ensures fast data transmission and a seamless user experience for the largest number of customers. This is critical for cloud computing, AI inferencing, and the real-time synchronisation or back-up of data between facilities.

Further, to provide the resiliency that enables cloud services to recover from infrastructure or service disruptions, data centres are strategically built in interconnected clusters that are designed to operate independently of one another with separate power, networking, and security. Data centres also require a variety of high-skilled workers, constant logistical access to essential supply chain components (such as servers and networking equipment), and proximity to key enabling infrastructure (such as telecommunications, electricity, and water).

Data centres could be located in regional areas to complement urban facilities for certain functions in the future. For example, data centres dedicated to AI training face fewer constraints to their location as latency and real-time data back-up are less critical. However, to date, there has not been sufficient demand for such facilities in Australia to the same degree as is currently occurring in certain other countries, such as the United States.[14]

13 Based on population in 'Significant Urban Areas' as defined by the ABS. ABS (2025) *Regional population*.
14 Expert interviews; Mandala analysis.

DATA CENTRES AS ENABLING INFRASTRUCTURE

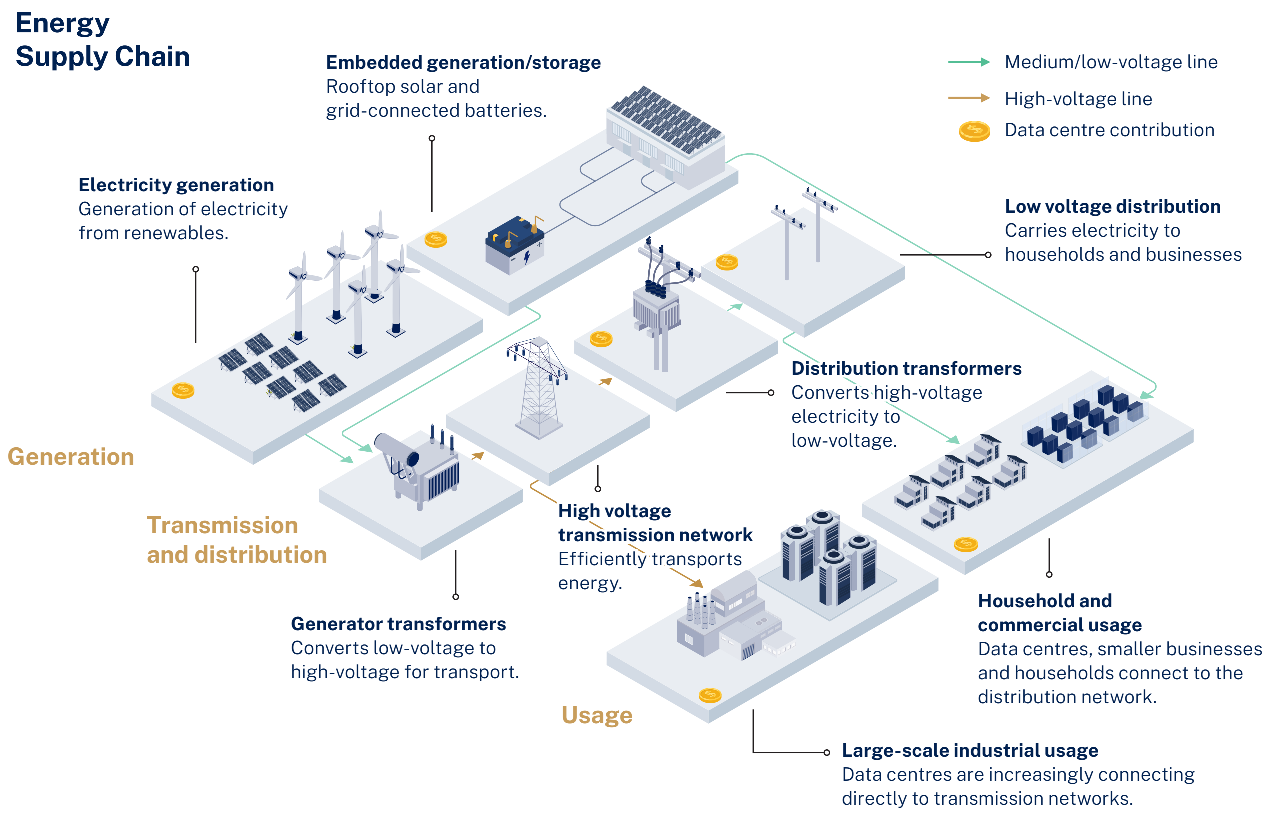
2 Data centres support Australia's renewable energy future

2.1 Data centres contribute across all parts of Australia's electricity system

While data centres consume a relatively small portion of Australia's total energy (2 per cent), they contribute to each component of the electricity supply chain. Data centres support renewable energy generation, finance the buildout of transmission and distribution infrastructure, and invest in energy efficiency technologies as consumers (see Exhibit 9). Currently, around 70 per cent of data centres energy consumption is offset by renewables. As data centre demand increases, their investments and contributions will also grow, strengthening energy infrastructure for both the digital and broader economy.

EXHIBIT 9

Data centres are playing an active role across Australia's electricity supply chain



Source: AEMO (2017) *Electricity Supply Infographic*; Expert interviews; Mandala analysis.

EXHIBIT 10

Data centres contribute to the electricity system through supporting generation, investing in the grid, and using energy efficiently

Boost renewable energy through on-site solar and power purchase agreements	Fund energy infrastructure that can support broader community needs	Invest in technologies to reduce energy consumption

▪ **1.5 TWh** of energy added to the grid through PPAs annually.
▪ **11 GWh** of on-site solar industry wide, equivalent of energy used by 2,000 homes.
▪ **70%** of total energy consumption from renewable energy.
	▪ **$3 billion** invested in grid infrastructure between 2020 and 2025.
	  ▪ Includes **$500 million** of infrastructure for public use.
	▪ Projected **$7.2 billion** to be invested over the next 5 years.
	  ▪ Includes **$1.1 billion** available for public use.
		▪ Data centres are **7x more efficient** than on premise servers, driven by:
		  ▪ investments in **higher quality** and more efficient computer chips,
		  ▪ investments in more **efficient cooling** technology,
		  ▪ **less distribution loss.**

Source: Mandala analysis.

2.2

Data centres directly support 1.5 terawatt hours of renewable energy generation in Australia

Data centres contribute to the development of new renewable energy projects in Australia through three main mechanisms. They enter into PPAs, which are long-term contracts to buy power from renewable energy projects at fixed prices.[15] They purchase large-scale generation certificates (LGCs), which are created when renewable energy is generated and allow data centres to offset their grid electricity consumption.[16] They also make direct investments in on-site generation, such as rooftop solar.

Data centres have secured renewable energy PPAs generating around 1.5 TWh of clean energy annually, equivalent to approximately 40 per cent of their annual energy consumption. This figure includes only operational PPAs.[17] These PPAs offset data centres' energy consumption.

PPAs are typically signed before renewable projects secure financing and provide important revenue certainty to investors. As a result, data centres' active PPAs help to underwrite additional renewable energy capacity in the grid, enough to power over 200,000 homes a year. Private underwriting of renewable projects through PPAs reduces the burden on government programs, such as the over-subscribed Capacity Investment Scheme.[18]

Long development and approval timelines for new renewable projects limit data centres' ability to procure energy from PPAs. Wind projects, which currently make up only 17 per cent of data centres' PPA purchases, take an average of 53 months to complete.[19] Wind projects are well-suited to supply data centres due to the fact that wind projects generally have higher capacity factors than solar projects.[20]

CASE STUDY

Amazon is driving investment in renewable energy through PPAs

Amazon is a large corporate purchaser of PPAs in Australia. Through these agreements, it has committed to 11 solar and wind projects across New South Wales (NSW), Queensland, and Victoria. Eight of these are already in operation and deliver around 1 TWh of renewable energy annually. Once all 11 projects are operational, they are expected to deliver 1.4 TWh annually, enough to power around 290,000 Australian homes.[21]

Amazon's operational projects include the 125 MW Amazon Solar Project in Wandoan, Queensland. This solar facility comprises over 250,000 photovoltaic panels and generates enough renewable energy to power more than 60,000 homes annually.[22]

Amazon has also invested in solar farms in Suntop and Gunnedah in NSW, a wind farm in Hawkesdale in Victoria, and rooftop solar installations in Melbourne and Sydney.[23] To support its expanding data centre network in Australia, Amazon is adding three new solar farms in Victoria and Queensland, providing an additional 170 MW of capacity.[24]

15 Power purchase agreements (PPAs) are agreements whereby data centres agree to buy power from a renewable energy project at a fixed price over a longer term. These long-term contracts provide critical revenue certainty to investors, enabling projects to secure financing and proceed to development.
16 LGCs are certificates that are created when renewable energy is generated, which data centres can purchase to offset their grid electricity consumption.
17 Additional PPAs have been signed for projects that are not yet operational.
18 Department of Climate Change, Energy, the Environment and Water (2025) *Capacity Investment Scheme*; Department of Climate Change, Energy, the Environment and Water (2025) *A 40 GW target to boost Australia's energy system.*
19 Western Sydney University (2024) *Australian first study reveals renewable energy project lead-times.*
20 Capacity factor measures actual energy output as a percentage of theoretical maximum output, accounting for intermittent generation from weather-dependent sources.
21 Amazon (2025) *Amazon investing AU$20 billion to expand data center infrastructure in Australia and strengthen the nation's AI future.*
22 Vena Group (2024) *Amazon Solar Project Australia – Wandoan.*
23 Amazon (2025) *Operations begin at wind farm in Hawkesdale, Victoria, backed by Amazon.*
24 The Energy (2025) *Energy matching: making Data centres even greater, again.*

Data centres procure 1 TWh of LGCs, which certifies their consumption is matched by renewable energy generation. LGCs provide an additional revenue stream for renewable projects (above the revenue they receive for supplying energy to the grid) and help support their returns. As the LGC market operates as a free market, data centre demand for LGCs create a price signal that encourages and supports renewable energy buildout.[25]

Data centres' on-site solar installations currently produce around 11 gigawatt hours (GWh) of electricity annually, providing direct renewable energy for their operations. This is equivalent to the energy required to power nearly 2,000 homes. Overall, 70 per cent of data centres' current annual energy consumption comes from renewable energy sources (see Exhibit 11).

CASE STUDY

NEXTDC is supporting data centre performance with rooftop solar

NEXTDC drives industry-leading practices in sustainable infrastructure, with significant investment in large-scale rooftop solar systems across its national data centre footprint. This strategy reinforces NEXTDC's commitment to renewable energy leadership and delivers cleaner, more efficient infrastructure for customers.

At M1 Melbourne, NEXTDC operates one of Australia's largest data centre rooftop solar arrays. Commissioned in October 2013, the $1.2 million photovoltaic system was the largest of its kind at the time. It generates approximately 550 MWh of electricity each year, helping to offset more than 670 tonnes of CO_2 annually. This environmental benefit is equivalent to removing 200 petrol vehicles from Australian roads each year.[26]

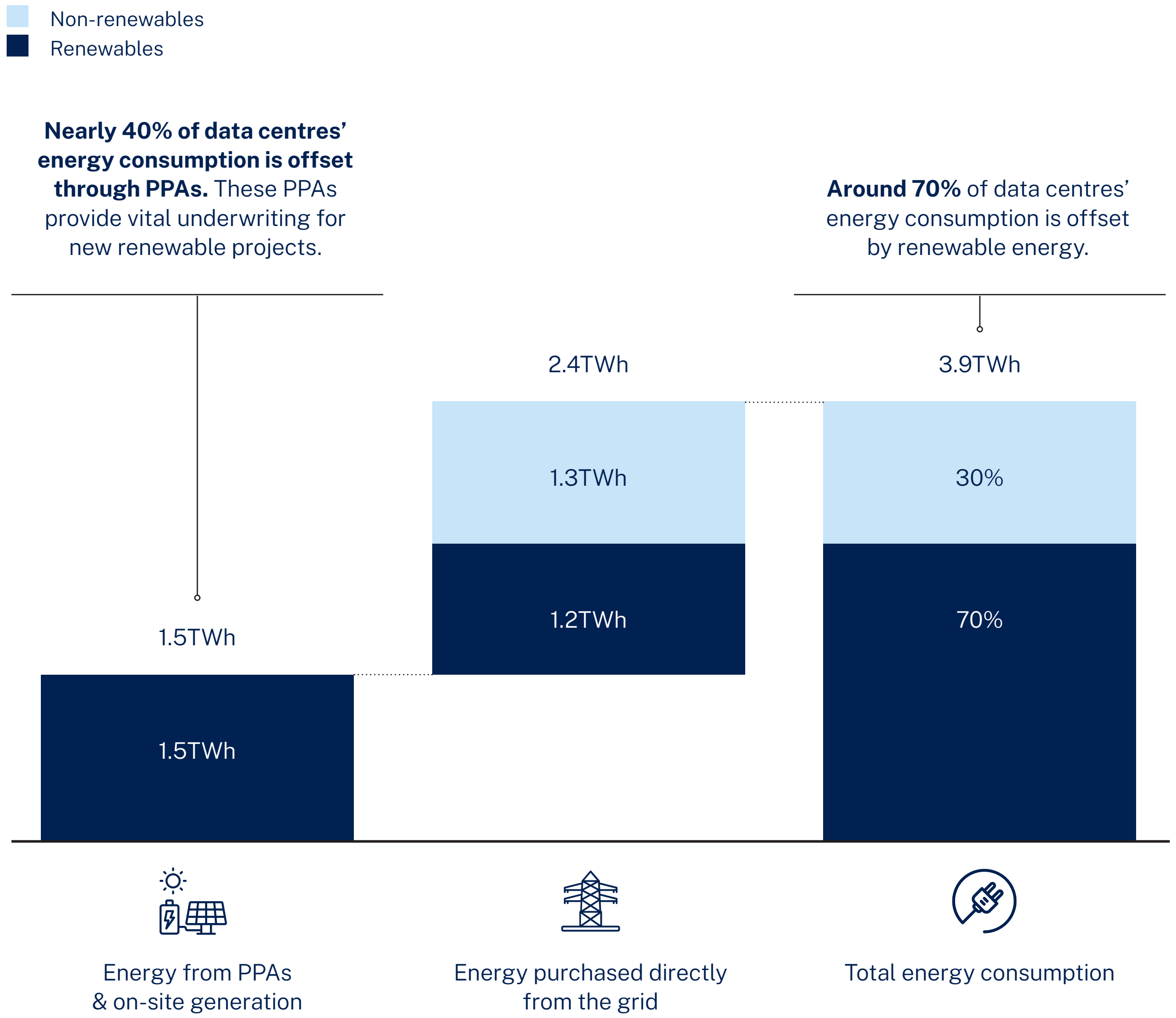
NEXTDC has expanded its rooftop solar program to additional facilities, including its Sydney data centre in Macquarie Park. This deployment is expected to generate around 120,000 KWh per year, further strengthening the company's commitment to a more sustainable future, and high-efficiency operations that support customers' goals.

25 Data centres' energy consumption from the grid represents a further 0.3 TWh of renewable energy consumption.
26 NEXTDC (2015) *The solar-powered cloud.*

EXHIBIT 11

Data centres source around 70% of their energy from renewables through direct purchases, offsets, and on-site generation

Data centre electricity consumption by source, TWh, 2025



Source: Data from select data centre operators; Expert interviews; Mandala analysis.

2.3

Data centres are making significant investments in the grid and are forecast to invest an additional $7.2 billion by 2030

Like other industrial users of energy, data centres are required to fund their own electricity grid connection. This includes investing in transmission and distribution infrastructure where existing capacity is insufficient to meet their needs.[27] This occurs where data centres are establishing themselves in greenfield sites that are not serviced by grid infrastructure, or where their demand is greater than can be provided by existing infrastructure.

Data centre funded grid infrastructure is owned and operated by government-owned or highly regulated private utilities companies.

Most data centres invested $3.1 billion in grid infrastructure between 2020 and 2025. As data centres increasingly establish themselves in greenfield sites that require new transmission and distribution infrastructure, these investments are expected to reach $7.2 billion by 2030 (see Exhibit 12). By comparison, the Australian Government has committed $10.3 billion of funding for vital grid electricity infrastructure to 2030.[28]

Data centres often invest in grid capacity above their immediate operational requirements. This is due to several factors including speeding up grid connection, minimum connection capacity requirements set by grid operators, the need for future expansion capacity, regulatory standards for redundancy and resilience, and the economics of grid connection investments which often favour larger capacity allocations.[29]

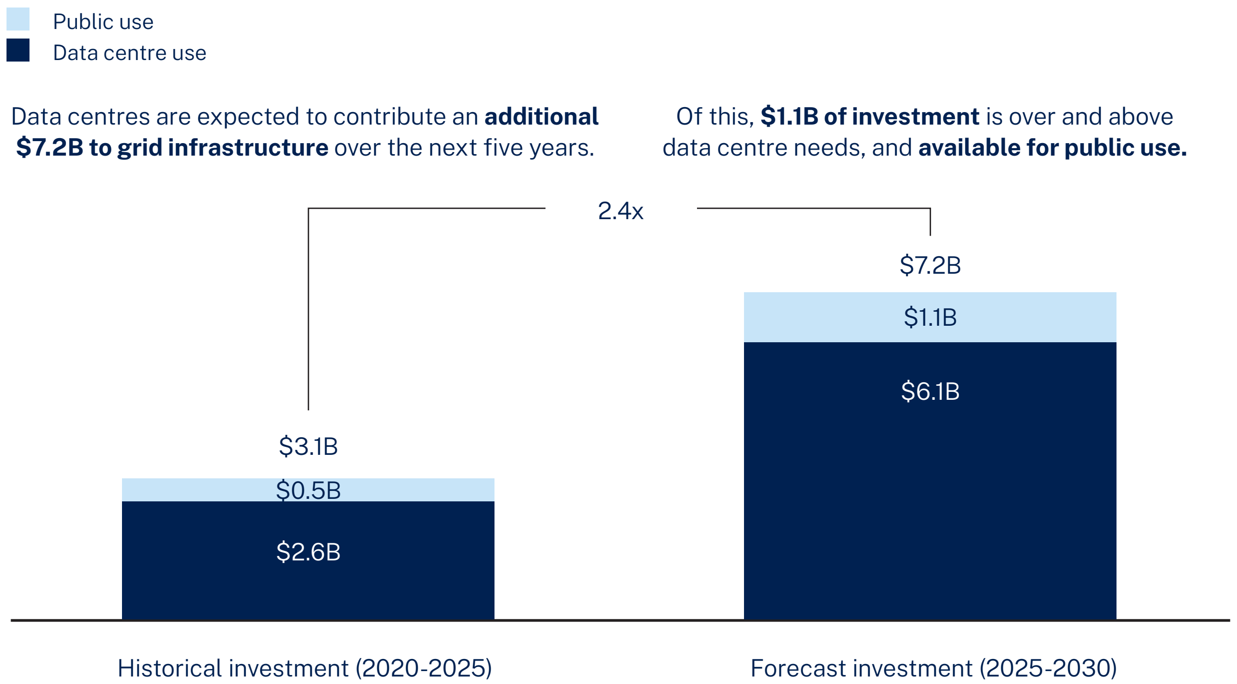
Between 2020 and 2025, $500 million (or 15 per cent of total investment) represented excess capacity. This is expected to reach $1.1 billion by 2030. This additional investment benefits communities and other businesses by adding grid resilience during times of high demand or grid events, such as during heatwaves or blackouts and creating opportunities for other industries and housing developments to connect at a lower cost.[30]

The contributions data centres make to the grid enable them to scale their operations without compromising grid stability and resilience, while providing excess capacity that benefits broader system and community needs.

EXHIBIT 12

Data centres will contribute $7.2 billion in grid infrastructure investment over the next five years

Data centre contributions to public and private grid infrastructure, 2020-2025 and 2025-2030F



Source: Data from select data centre operators; Expert interviews; Mandala analysis.

27 AEMC (2025) *AEMC modernises grid connection rules to accelerate energy transition, manage AI boom.*
28 Department of Climate Change Energy the Environment and Water (2025) *Rewiring the Nation.*
29 King & Wood Mallesons (2025) *Energising Innovation: Data centres and the Future of Australia's electricity Network*; Expert interviews.
30 Expert interviews; Mandala analysis.

2.4

Meeting Australia's growing digital needs with on-premise servers could require 7x more electricity

Data centres have become significantly more efficient over the last two decades. This is typically measured by power usage effectiveness (PUE). PUE is calculated by dividing the total power used by a data centre (including IT and infrastructure loads) by the power consumed solely by the IT load. PUE values are always above one, with lower values indicating higher efficiency.

Globally, data centres have an average PUE of 1.56, which is a 38 per cent improvement from 2007. In Australia today, data centres are even more efficient, with a median PUE of 1.30 (see Exhibit 13).

EXHIBIT 13

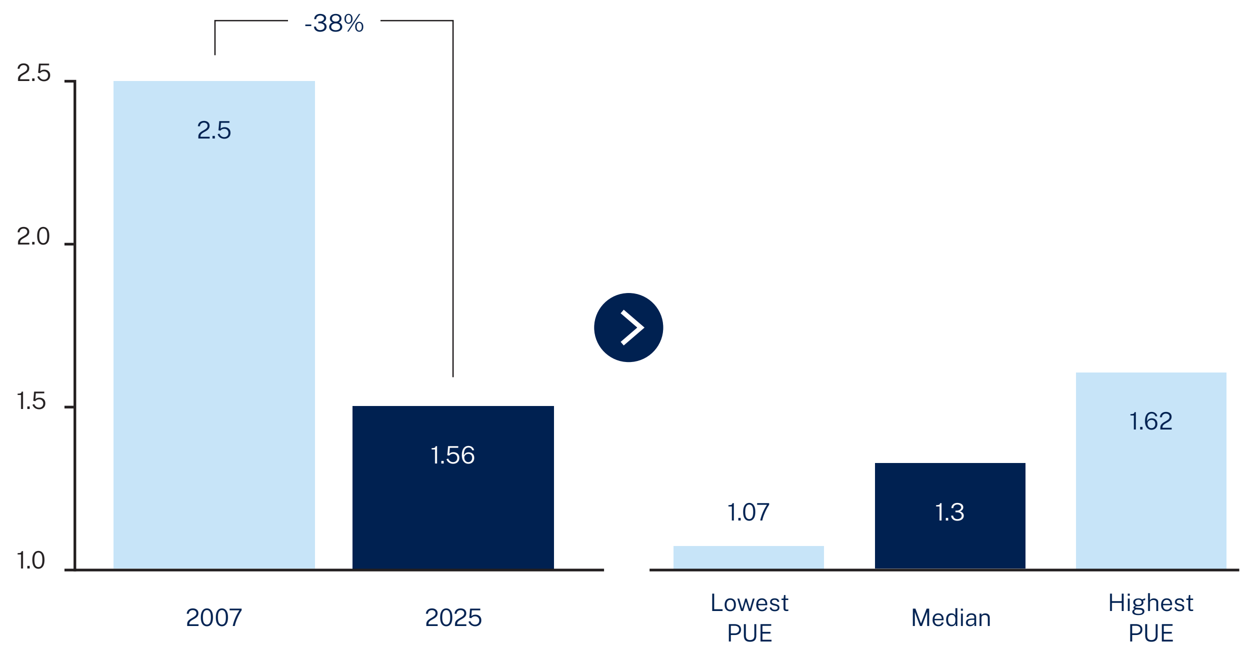
Data centres are becoming more efficient, requiring less electricity to power the same IT loads

Global average power efficiency of data centres over time

Power usage effectiveness (PUE), 2007-2024

Australian power efficiency of data centres

Power usage effectiveness (PUE), 2025



Data centres globally have improved efficiency by 38% since 2007, with an average **PUE of 1.56.**

Data centres in Australia are even more efficient, with PUEs as low as 1.07 and a median **PUE of 1.30.**

Source: Uptime Institute (2024) *Global Survey of IT and Data Centre Managers*; DataCenterMap; Mandala analysis.

Improvements in data centre PUE have been largely customer- and market-driven, reflecting advances in hyperscale and colocation facility design. This includes reducing mechanical energy use, optimising power distribution, adopting more efficient chips, and deploying higher-performance servers.

Colocation and hyperscale data centres centralise computing, storage, and cooling systems, eliminating the need for duplicate systems across multiple smaller facilities. Without data centres, businesses would need to house their own servers. On-premise servers typically operate much less efficiently than data centres.

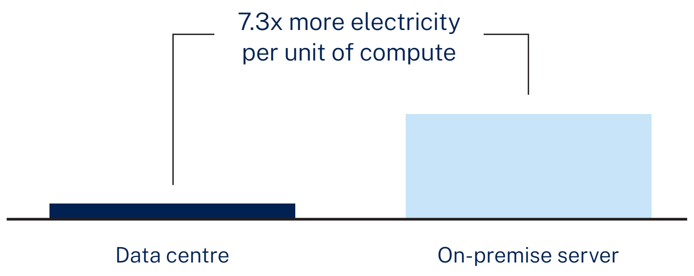
In Australia today, on-premise servers require more than seven times the electricity required by data centres to perform the same computation (see Exhibit 14). Unlike data centres where there is transparent information on the energy and water usage of compute, on-premise workloads are largely invisible. Moving Australia's existing on-premise workloads to data centres will displace energy usage from businesses to data centres' total energy usage, resulting in significant energy savings for Australia. As new technologies improve colocation and hyperscale data centres' efficiency, savings will be compounded while our lives become increasingly digital.

EXHIBIT 14

On-premise servers consume more than seven times more electricity per unit of compute than data centres

Data centre electricity usage per unit of compute, 2025

On-premise servers are significantly less efficient than data centres, using **7.3x more electricity on average.**



Source: AEMO (n.d.) *Loss factors and regional boundaries*; AWS (2024) *How moving onto the AWS cloud reduces carbon emissions*; Mandala Partners (2024) *Empowering Australia's Digital Future*; Oxford Economics (2025) *Data centre energy demand*; Mandala analysis.

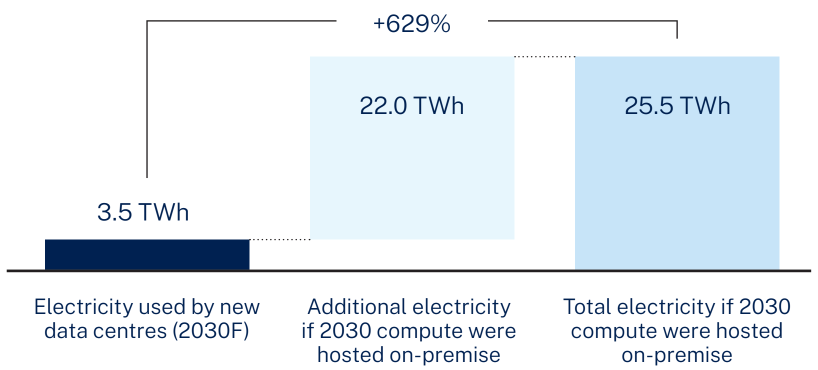
Data centres represent a major opportunity to meet Australia's growing digital demands more efficiently and sustainably. Data centres built between now and 2030 are expected to consume 3.5 TWh of additional electricity, based on AEMO forecasts. Not all of this energy demand is additive to the energy system in net terms, but rather displaces energy that would otherwise be consumed by on-premise computing. If the compute supported by these new data centres instead remained on-premise, total energy demand would increase by 22 TWh to 25.5 TWh a year by 2030 (see Exhibit 15).

EXHIBIT 15

Data centres save electricity due to their efficiencies and role in aggregating processing capacity

Electricity consumption comparison: on-premise servers vs data centres, TWh, 2030F

If 2030 projected compute requirements were met using on-premise servers instead of data centres, electricity use would be around **629%** higher.



Source: Oxford Economics (2025) *Data centre energy demand*; Mandala analysis.

3 Data centres in Australia are poised to become leaders in water stewardship

3.1

Data centres contribute to the water system and can help enable recycled water infrastructure

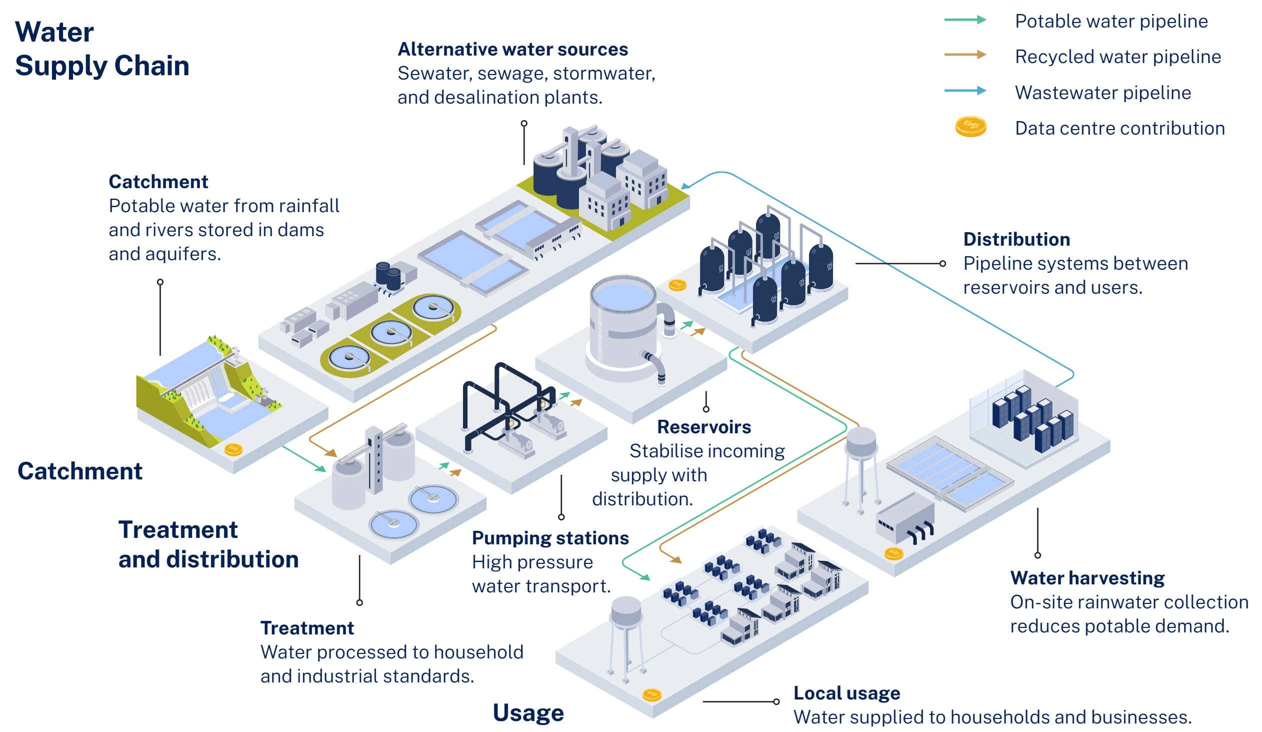
Data centres use water to manage the heat generated by servers. Cooling methods vary between data centres (see Exhibit 5). Some data centres use closed-loop designs which recirculate the same water through the system, reducing water consumption.

Data centres in Australia currently consume around 5.5 GL of water annually, just 0.04 per cent of Australia's total water use. In major data centre locations in Sydney and Melbourne, data centres use 0.7 and 0.2 per cent of local water use respectively.

As data centre capacity grows, so too will their overall water use (to around 17 GL by 2030).[31] Data centres are expected to play a more significant role as investors in treatment and distribution networks and in expanding Australia's currently limited recycled water infrastructure (see Exhibit 16).

EXHIBIT 16

Data centres have a role to play across Australia's water supply chain



Source: Sydney Water (2018) *Drinking Water Management Manual*; DEECA (2023) *Victoria's water grid*; Bureau of Meteorology (2021) *Sydney*; Expert interviews; Mandala analysis.

31 Mandala analysis. See appendix for details.

EXHIBIT 17

Data centres contribute to water infrastructure, improve their water efficiency, and can help enable recycled water infrastructure

Contribute to water system infrastructure	Implement innovative water usage technologies	Plan to make investments in recycled water
▪ Funded **$40 million** in pipeline upgrades around Australia. ▪ Includes **2 GL** in excess capacity available to local areas, equivalent to the use of **10,000 homes.**	▪ Invest in innovative water **technologies** such as direct-to-chip liquid cooling and closed-loop liquid cooling systems. ▪ Invest in on-site rainwater harvesting, saving **0.3 GL** of water, equivalent to the annual usage of **1,500 homes.**	▪ Expected to invest between **$500 million and $1.1 billion** by 2030 in building recycled water pipelines and upgrading treatment facilities. ▪ Could replace up to **50%** of water consumption with recycled water, equivalent to the annual consumption of **50,000 homes.**

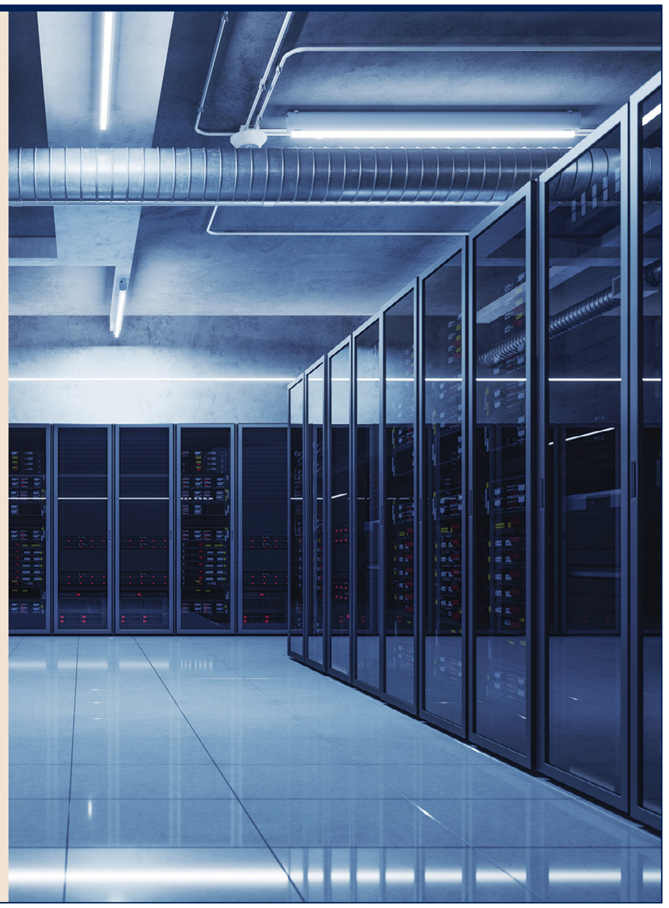
CASE STUDY

AirTrunk achieves energy efficiency with liquid cooling systems

AirTrunk has invested in the research and development of liquid cooling technologies since 2019 to meet the growing demands of AI and high-performance computing. The AirTrunk has deployed over 20 MW of direct-to-chip liquid cooling capacity at its JHB1 facility in Malaysia.[32]

Direct-to-chip cooling uses liquid-filled cold plates attached directly to CPUs and GPUs to remove heat more efficiently. AirTrunk's direct-to-chip cooling capabilities supports the expanding AI sector by enabling higher-density GPU deployments that traditional air cooling cannot handle. The technology allows data centres to accommodate high density servers while maintaining optimal performance and energy efficiency.

AirTrunk facilities have PUE ratios that average 1.32. Its liquid cooling systems deliver significant energy savings of 10 to 20 per cent, compared to other designs.



32 AirTrunk (2024) *Accelerating a liquid-cooled future for data centres.*

DATA CENTRES AS ENABLING INFRASTRUCTURE

3.2 Data centres continue to pursue innovations in cooling technologies that minimise water usage

Data centres have made significant advances in cooling technologies that minimise both water and electricity usage while underpinning the development of AI models and cloud computing.

Water efficiency in data centres is measured by water usage effectiveness (WUE), which calculates the total water consumed by a facility divided by the energy consumed by IT equipment. A lower WUE indicates more efficient water use.[33] Australia's most water efficient data centres achieve WUEs as low as 0.01 through innovative cooling systems, such as free-air cooling which uses the outside air to cool the data centre, or closed-loop systems which recirculate water rather than consuming it through evaporation.

Generally, there is a trade-off between energy and water efficiency and operators have to make decisions about balancing these two inputs.

Beyond operational efficiency, some data centres are investing in on-site water harvesting to reduce their impact on the water network. To date, investments in water harvesting have reduced data centres' potable water consumption by 0.3 GL per year, equivalent to the annual usage of approximately 1,500 households.[34]

Data centres also support broader collaboration on water sustainability. For example, Amazon is a joint founding leader of the Water-AI Nexus Center of Excellence, a global initiative to address water sustainability in AI development by bringing together water utilities, technology companies, and researchers.[35] The initiative pursues a dual mission: ensuring AI infrastructure uses water efficiently while leveraging AI capabilities to address water management challenges.

CASE STUDY

CDC's LiquidCore™ closed-loop liquid cooling system reduces water use in data centre operations

Founded in 2007 when Australia was experiencing the Millennium Drought, CDC implemented LiquidCore™. This is an advanced liquid cooling system designed to deliver resilience and support customer equipment without relying on ongoing water consumption, evaporation, or waste.

This approach reduces CDC's reliance on municipal water supplies, lowers operational costs, and improves resilience in regions with limited or unpredictable water access. This enables CDC to achieve a WUE of 0.01 litres per kWh of IT load. CDC's LiquidCore supports both air and direct-to-chip cooling as required by customers.

Across its Australian and New Zealand operations, CDC estimates the system saves around 9 GL of potable water annually (equivalent to 3,600 Olympic-sized swimming pools).[36]

33 WUE was developed in 2011 by The Green Grid, a global consortium of companies, government agencies, and educational institutions dedicated to advancing energy efficiency in data centres and business computing ecosystems.
34 ABS (2023) *Water Account, Australia.*
35 Water Environment Federation (2025) *Water-AI Nexus.*
36 CDC (n.d.) *Saving water on an epic scale.*

3.3

Data centres are funding $40 million in pipelines that provide the equivalent water use of 10,000 households

In addition to investing in technologies to reduce water use, data centres help fund water treatment and distribution networks to support their water needs. Where this involves upgrading infrastructure above their direct requirements, excess capacity can provide spillover benefits to local communities.

In recent years, data centres have been providing mandatory contributions to water utilities of around $40 million to upgrade potable pipelines, in addition to financially contributing to upgrading assets such as reservoirs and pumping stations. These upgrades include increasing the width of pipelines to an industrial size. Mandated contributions, which apply to all industrial users of water, are proportional to demand. As data centre demand increases, so too will their financial contributions.

The potable pipelines that data centres invest in are sized to handle more than their typical water demand, with peak demand occurring rarely, only on extremely hot days, generally once every several years. Data centre funded pipelines are owned and operated by water utility companies which can use excess capacity in non-peak periods to supply local areas. Since data centres rarely use the full capacity of these pipelines, local areas could have an estimated 2 GL in additional water supply available for general use, equivalent to the use of 10,000 households (see Exhibit 18).[37]

Some data centres are also making voluntary investments in water catchments. For example, AWS has funded biodiversity restoration in the Great Eastern Ranges, which supports the natural replenishment of the region's water catchment.[38]

As data centres scale rapidly to meet demand for their services, enhanced coordination between operators and water utilities will be essential. Water regulators, accustomed to managing gradual shifts in residential demand, will need to work closely with industry to anticipate and plan for the concentrated infrastructure requirements of large-scale data centre developments.

EXHIBIT 18

Data centre investments in potable water infrastructure create excess capacity for local communities

Data centre investment in potable water infrastructure and excess capacity, current and planned to date

Investment in water pipeline infrastructure	**$40 million** Current and planned investment to date by data centres to upgrade potable water pipelines for their peak water use, in addition to reservoirs, pumping stations, and other assets.
Typical additional water availability	**2 gigalitres** Of additional water is made available to local areas annually, as data centre investments create excess capacity that benefits other users on typical days.

Source: Queensland Water Regional Alliance Program (2019) *Infrastructure Cliff? Queensland's ageing water and sewerage assets. Research Report 5.2*; Oxford Economics (2025) *Data centre energy demand*; DataCenterMap; Expert interviews; Mandala analysis.

37 ABS (2023) *Water Account, Australia.*
38 The Great Eastern Ranges (2024) *Amazon Web Services and Great Eastern Ranges collaborate to boost catchment health and biodiversity in Greater Sydney.*

3.4

Data centres could play a significant role in upgrading Australia's recycled water infrastructure

While data centres are currently reliant on potable water from the existing water network, recycled water presents a key opportunity for data centres to reduce their reliance on potable water and support the build out of new recycled water infrastructure. Recycled water is a largely climate independent and currently underutilised resource in Australia, with most treated effluent from our communities discharged to our rivers and oceans.[39]

Increasing the availability of recycled water would help provide an alternative to potable water. The benefit of water recycling in reducing demand for potable drinking water and improving long-term water security is acknowledged by Infrastructure Australia and the Productivity Commission, and is a feature of both NSW and Victoria's State Infrastructure Strategies.[40, 41, 42, 43]

Recycled water use in major metropolitan systems remains quite modest. For example, Sydney Water saved about 13 GL of drinking water via recycled use in 2023–24, equivalent to around 2 per cent of total demand. However, recycled water use is part of the Greater Sydney Water Strategy, with targets to double the volume of recycled water available between 2025 and 2030.[44]

Wastewater volumes and water supply requirements are growing with the population, meaning our capital cities are already proposing multi-billion dollar investments in water supply and wastewater infrastructure.[45] Investing in recycled water infrastructure reduces wastewater discharge and provides an alternative supply to potable water,[46] helping to provide a solution that would otherwise require new investments.

Recycled water for data centres has the potential to provide a fit-for-purpose and sustainable source of cooling water, reducing demand for potable water while also benefiting communities through potential savings in wastewater infrastructure. The use of recycled water for cooling is aligned with the water neutral or water positive goals of many data centre operators.

Data centres are expected to invest between $500 million and $1.1 billion in building recycled water pipelines and upgrading treatment facilities to provide high-quality water over the next five years to 2030. As a result, they could directly replace up to 50 per cent of their potable water consumption with recycled water, equivalent to eight GL, or the annual water consumption of 50,000 Australian households (see Exhibit 19).[47] These investments exceed the $70 million that would be required to replace eight GL based on the levelised cost of previous projects, because data centre investments will support larger-scale infrastructure developments rather than the previous incremental upgrades.[48]

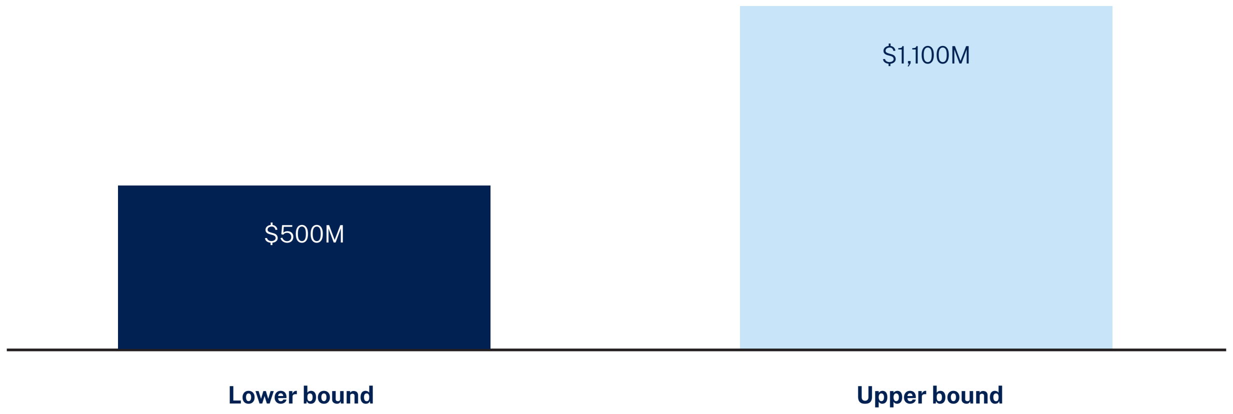
Data centres could support investment in recycled water infrastructure through multiple models. They could contribute to funding direct recycled water connections to the data centre site, either through water utilities or private sector initiatives. Data centres could also offset drinking water consumption at another location, such as through recycled water certificates.[49] Recycled water producers, such as coNEXA (see coNEXA case study), are actively engaging with the data centre industry to leverage existing and create new recycled water infrastructure. Industry collaboration and government facilitation is required to deliver the quality and quantity of recycled water the data centre industry needs, at a speed that supports investment decisions.

39 Water Quality Australia (2025) *Effluent Management Guidelines.*
40 Infrastructure Australia (2021) *2021 Australian Infrastructure Plan: Reforms to meet Australia's future infrastructure needs.*
41 Productivity Commission (2024) *National Water Reform 2024: Inquiry Report.*
42 Infrastructure NSW (2022) *Staying Ahead: State Infrastructure Strategy 2022-2042.*
43 Infrastructure Victoria (2025) *Victoria's draft 30-year infrastructure strategy.*
44 Sydney Water (2024) *Water conservation.*
45 The Guardian (2025) *Pumping sewage into the sea has long been a Sydney thing – and even $32bn won't change that*; Melbourne Water *(2024) Melbourne Water injects millions into Western Treatment Plant upgrade.*
46 NSW Productivity Commission (2021) *Productivity Commission White Paper 2021: Rebooting the economy.*
47 ABS (2023) *Water Account, Australia.*
48 Water Services Association of Australia (2020) *All options on the table: urban water supply options for Australia.* Note: Estimate of $100 million required to enable 12 gigalitres of recycled water is from a levelised cost of $6.9 per kilolitre for purified recycled water for drinking in FY20, adjusted for inflation. A levelised cost approach includes both capital costs and future operational costs.
49 For example, the Sustainable Water Investment Market (SWIM) and Sustainable Water Investment Certificate (SWIC) initiative.

EXHIBIT 19

Data centres could invest up to $1.1 billion in recycled water infrastructure, easing pressure on Australia's potable system

Potential investment for data centres to enable recycled water infrastructure, 2030F



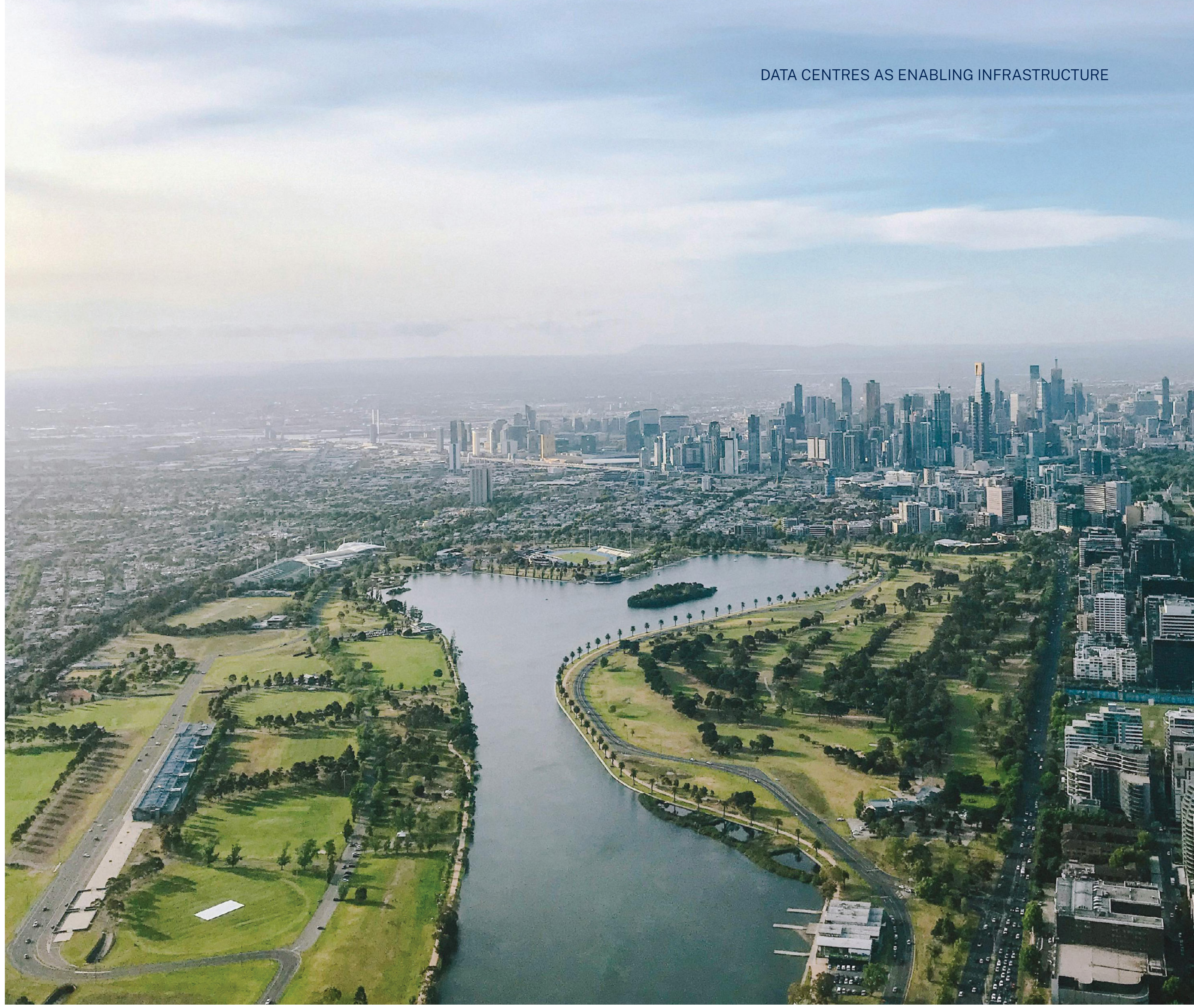
$500 million to replace 25% of all data centre potable water consumption with recycled water

$1.1 billion to replace 50% of all data centre potable water consumption with recycled water

Data centres could invest **$500 million to $1.1 billion** to replace 25% to 50% of their potable water consumption with recycled water by 2030.

Note: Estimated investments for large data centres to enable a percentage of water consumed by all data centres to come from recycled sources.
Source: Water Services Association of Australia (2020) *All options on the table: urban water supply options for Australia*; Expert interviews; Mandala analysis.

DATA CENTRES AS ENABLING INFRASTRUCTURE



4 Coordinated policy action is needed to harness sustainable data centre growth

Accelerating approvals, promoting industry-informed standards, and facilitating private investment will help Australia to position itself as a leading destination for sustainable data centre investment. These policy priorities will help to facilitate the opportunities that data centre growth will support in renewable energy deployment and innovative water sustainability solutions in Australia. Effective policy settings can harness data centre growth in a way that accelerates Australia's clean energy transition while ensuring sustainable energy and water practices.

EXHIBIT 20

Coordinated policy action can support sustainable data centre development

Accelerate critical infrastructure approvals	Promote industry-informed standards and coordination	Facilitate private investment and ensure supply chain resilience
▪ Prioritise and fast-track electricity network upgrades. ▪ Accelerate approval processes for water infrastructure. ▪ Support flexible and predictable processes to streamline data centre approvals, allowing approval stages to proceed concurrently with design finalisation.	▪ Industry is best placed to drive efficiency improvements. Any standards that emerge should be based on industry best practice, ensuring they remain flexible and internationally compatible. ▪ Recognise and facilitate coordination between data centre developers and utilities for infrastructure planning and investment.	▪ Remove regulatory barriers to private investment in electricity grid and water infrastructure. ▪ Support industry-led infrastructure solutions such as recycled water networks. ▪ Consider mechanisms to ensure the supply of energy grid components to reduce project delays and enhance grid resilience.

DATA CENTRES AS ENABLING INFRASTRUCTURE

4.1 Accelerate critical infrastructure approvals

Efficient and predictable approval processes are important to support sustainable data centre growth, alongside timely deployment of grid and water infrastructure. Current processes are often complex and fragmented across jurisdictions and authorities, contributing to delays and cost increases.[50]

Reforms need to focus on speed, flexibility, and accountability. This requires government to:

- Prioritise and fast-track **electricity network upgrades,** including transmission and distribution infrastructure, to support energy integration and data centre connections. This is essential to unlocking capacity for both Australia's digital economy and the broader energy transition, reducing connection delays and improving grid reliability.
- Accelerate **approvals for water infrastructure,** including pipelines and treatment facilities. Faster delivery of critical water assets will improve the resilience of our water systems and ensure reliable access for both data centres and surrounding communities.
- Establish **flexible and predictable processes** to streamline data centre approvals. This should include allowing approval stages to proceed concurrently with design finalisation. Likewise, where design modifications are needed, this should not force a return to the start of the process but rather a pause of the relevant component only. Such flexibility reflects the fast pace of technological change in data centre development.

CASE STUDY

The Productivity Commission has recently recommended speeding up approvals for new energy infrastructure

The Productivity Commission's 2025 interim report identifies critical bottlenecks in Australia's renewable energy approval processes and proposes solutions to accelerate infrastructure development. These include setting statutory deadlines for priority projects, reforming national environment laws to create clear standards, and establishing a specialist strike team within government to fast-track priority projects. It also proposes an independent Clean Energy Coordinator-General to monitor progress and resolve delays.[51]

Similar reforms have been introduced in New Zealand to reduce regulatory barriers and streamline renewable energy projects. This includes introducing mandatory one-year processing timeframes and longer consent durations, demonstrating how faster, clearer approvals can support private investment and accelerate decarbonisation.

"Our sluggish and uncertain approval processes are not up to the task...Getting to a yes or no quicker on priority projects would meaningfully speed up the clean energy transition."

—Martin Stokie, Commissioner, Productivity Commission

4.2 Promote industry-informed standards and coordination

Data centre operators are driven by market forces and customer expectations to continuously improve their sustainability performance. They already assess, track, and benchmark their ESG outcomes against globally recognised standards and frameworks, enabling them to demonstrate leadership in sustainable infrastructure and maintain competitiveness in global markets.[52]

Government should recognise the role of industry expertise in shaping sustainable operational practices, supporting industry-informed standards and coordination:

- Industry is best placed to drive efficiency improvements. **Any standards that emerge should be based on industry best practice,** ensuring they remain flexible and internationally compatible.
- Government should facilitate **coordination between data centre developers, utilities, and network operators** to improve long-term visibility of demand and support collaborative infrastructure planning and investment.

50 King & Wood Mallesons (2025) *Data centres – APAC Regulatory Guide.*
51 Productivity Commission (2025) *Investing in cheaper, cleaner energy and the net zero transformation*; Dentons (2025) *Recent amendments to the RMA.*
52 GRESB (2025) *Sustainable infrastructure: data centers.*

CASE STUDY

Early and ongoing coordination between data centres and utilities is supporting the infrastructure needs for the growing demands of Australia's digital economy

Data centres and utility companies are forming strategic partnerships to deliver the power infrastructure that Australia's growing digital economy demands. These collaborations unlock mutual value by ensuring utility providers can strengthen local grid stability, while data centre operators secure reliable and scalable power to meet customer demands.

An example of these partnerships is NEXTDC and Jemena's collaboration to upgrade NEXTDC's M2 Melbourne facility. This included coordination to forecast long-term load requirements, and synchronise network design and approvals.[53] This enabled the M2 facility to become a Tier IV data centre,[54] doubling the site's capacity from 50 megavolt-amperes (MVA) to 100 MVA.

Another example is CDC's partnership with Jemena to support power network upgrades for its Brooklyn campus in Melbourne. This collaboration ensured the development of scalable and resilient power networks through critical early engagement and joint planning, which provided CDC with the power it needed for its campus while strengthening the stability of the local grid.

53 Jemena (2024) *Powering up Data centres in Melbourne's north-west*; NEXTDC (2025) *M2 Melbourne Data Centre.*
54 NEXTDC (2024) *Understanding Data Centre Tiers: Building Reliable Infrastructure.*

DATA CENTRES AS ENABLING INFRASTRUCTURE

4.3 Facilitate private investment and ensure supply chain resilience

Private capital will play a central role in financing the electricity and water infrastructure required to support Australia's growing digital economy. Investors stand ready to make investments in Australia's water and energy systems.[55] Policy frameworks should remove unnecessary barriers to investment and strengthen supply chain resilience to ensure timely project delivery. Government should:

- Facilitate **private investment in electricity and water infrastructure** needed to support data centre growth. Clearer pathways and approval frameworks are required to accelerate delivery of critical assets without relying on additional public funding.
- **Support industry-led infrastructure solutions.** Private sector initiatives addressing energy and water challenges should be welcomed as part of Australia's infrastructure mix, with clearer pathways to network integration and scale. The sector is continually innovating, for example developing recycled water networks to reduce industrial demand for potable water (see coNEXA case study).
- Consider mechanisms to **ensure the supply of energy grid components** to reduce project delays and enhance grid resilience, in line with the federal government's ongoing work to strengthen our supply chains.[56]

CASE STUDY

Each year coNEXA recycles over 10 GL of water for industrial, agricultural, and residential customers

coNEXA is a long-term partner in private water infrastructure, covering the full infrastructure lifecycle, including development, approval, delivery, operation, and maintenance. Its key recycled water businesses include Willunga Basin Water in McLaren Vale, AquaNet in Western Sydney, and the Kooragang Industrial Water Scheme (KIWS) in the Hunter Region.

KIWS and AquaNet both source secondary effluent from public utilities, which would otherwise be discharged to the environment, and convert this into high quality recycled water suitable for industrial reuse. Using advanced treatment incorporating ultrafiltration, reverse osmosis and chlorination, the recycled water is low salt, fully disinfected, and perfectly suited for use in cooling towers.

These existing recycled water schemes provide a precedent for how private recycled water producers, such as coNEXA, could deliver adaptive, timely, and flexible water infrastructure that minimises the drinking water consumption of the emerging data centre sector.[57]

Picture: coNEXA's AquaNet Recycled Water Facility in Fairfield, NSW

55 Alvarez & Marsal (2025) *Bridging the Gap: Clear Investment Conditions Crucial to Powering Australia's Energy Transition.*
56 Australian Government (2025) *National Freight and Supply Chain Strategy 2025.*
57 coNEXA (2025) *Our Businesses*; Expert consultation.

5 Appendices

5.1 Appendix A: Methodology

Exhibit A1: Data centre energy consumption

Approach

This report uses forecasts developed by Oxford Economics on behalf of AEMO. The forecasts are based on a blended approach combining two independently constructed methodologies.

- The Project Approach uses project-level data from AEMO, Network Service Providers (NSPs), and industry to estimate electricity consumption of known existing and prospective data centre developments.
- The Economic Approach models the underlying demand for data centre services by sector, linking economic activity, technological adoption, and energy use.

Oxford Economics uses a midpoint of these two approaches in its forecasts.

Key inputs

Input	Value	Source
Data centre energy consumption FY25	3.9TWh	Oxford Economics (2025) *Data Centre Energy Demand*
Data centre energy consumption FY30	12TWh	Oxford Economics (2025) *Data Centre Energy Demand*

Exhibit A2: Data centre energy consumption relative to on-premise energy consumption

Approach

We estimated the energy consumption from on-premise servers by comparing their efficiency to data centres across a range of areas, with the following steps:

- Take the difference in computer chip efficiency (measured by performance per watt) between the average data centre and average on-premise server
- Add the difference in the average PUE between data centres and on-premise servers
- Apply energy lost through distribution to on-premise servers energy demand
- Apply these differences to energy demand from new data centres.

Key inputs

Input	Value	Source
Ratio of data centre to on-premise server chip efficiency	4.1	AWS (2024) *How moving onto the AWS cloud reduces carbon emissions*
Data centre average PUE	1.3	Mandala Partners (2024) *Empowering Australia's Digital Future*
On-premise average PUE	2.1	Mandala Partners (2024) *Empowering Australia's Digital Future*
Energy lost through distribution	10%	AEMO (n.d.) *Loss factors and regional boundaries*

Exhibit A3: Source of data centre energy

Approach

We used a bottom-up approach to aggregate data from multiple sources to model sector-wide energy consumption. These sources included:

- Proprietary data shared by data centre providers
- Public information available on data centres' projects and initiatives

Key inputs

Input	Value	Source
Commercial solar capacity factor	20%	AEMO (2025) *Quarterly Energy Dynamics Q1 2025;* AEMO (2024) *Technical Assessment Report Review of GenCost 2023-24*
Commercial on-shore wind capacity factor	30%	Asia Wind Energy Association (2025) *Australia*
Rooftop solar capacity factor	11%	CSIRO (2024) *Small-scale solar PV and battery projections 2024*

Exhibit A4: Data centre energy grid investment

Approach

We used a bottom-up approach to aggregate data from multiple sources to model sector-wide investment in the energy grid from 2020-2025 and 2025-2030. These sources included:

- Proprietary data shared by data centre providers
- Public information available on data centres' projects and initiatives
- Consultations and interviews with experts

Key assumptions

- As data centres increasingly establish themselves in greenfield sites, they will be obligated to establish new connection infrastructure.
- Investment in transmission and distribution infrastructure is only driven by hyperscale and colocation data centres (noted in expert interviews).
- Investment in transmission and distribution infrastructure will increase and proceed as planned by hyperscale and colocation data centres (noted in expert interviews).

APPENDICES

Exhibit A5: Data centre current and forecast water demand

Approach

We estimated data centre water consumption to be 5.5 GL for 2025 using publicly available datapoints from Sydney Water, extrapolating out to Australia using the following steps:

- Data centres consume 3.7 GL of water annually in Sydney, assuming a consumption rate of 10 megalitres a day.
- Data centre water consumption in Australia is determined based on Sydney water consumption. We estimate that 67 per cent of current data centre water consumption occurs in Sydney, proportional to 67 per cent of current Australian data centre electricity consumption occurring in Sydney.

We estimated data centre water consumption to be 17 GL by 2030 informed by the forecasted uplift in data centre electricity consumption from Oxford Economics and AEMO using the following steps:

- Current 2025 electricity consumption for IT load is estimated to be 3 TWh with 3.9 TWh in total electricity consumption divided by 1.3 median PUE for Australian data centres.
- Current Australian data centre WUE is estimated to be 1.8 based on 5.5 GL of water consumption in 2025 divided by an estimated 3 TWh of electricity consumption for IT load.
- Forecast 2030 electricity consumption for IT load is expected to be 9.2 TWh, based on 12 TWh of total electricity consumption divided by a PUE of 1.3.
- Forecast 2030 water consumption of 17 GL is determined by multiplying a WUE of 1.8 by an estimated 9.2 TWh of electricity consumption for IT load.

Key inputs

Input	Value	Source
2025 Sydney data centre water consumption	3.65 GL annually or 10 ML a day	Sphere Infrastructure (2025) *AI, Data centres and water: Australia's next infrastructure test*
2025 data centre electricity consumption in Sydney as a percentage of Australia	67 per cent (2.6 TWh out of 3.9 TWh annually)	Oxford Economics (2025) *Data Centre Energy Demand*
2030 Australian data centre total electricity consumption	12.0 TWh annually in Australia	Oxford Economics (2025) *Data Centre Energy Demand*

Exhibit A6: Data centre current water consumption in Sydney and Melbourne

Approach

Australian 2025 data centre water consumption: We estimated data centre water consumption to be 5.5 GL annually in Australia, or 0.04 per cent of Australia's overall water use. Australia's water use in 2025 is assumed to be the same as in 2021-22 (latest available data) at 14,691 GL (excluding water used by electricity, gas, water, and waste services).

Sydney and Melbourne 2025 data centre water consumption: We estimated data centre annual water consumption in 2025 to be 3.7 GL in Sydney and 1.1 GL in Melbourne, based on the electricity consumption by data centres in both locations. We use the following steps to estimate Melbourne data centre water consumption:

- Data centres are estimated to consume 3.7 GL annually in Sydney and 5.5 GL in Australia.
- We estimate that 21 per cent of current data centre water consumption occurs in Melbourne, proportional to 21 per cent of current data centre electricity.

Sydney and Melbourne 2025 data centre water consumption as a percentage of total water used: We estimated data centre water consumption to be 0.7 per cent of 546 GL consumed annually in Sydney during 2024-25, and 0.2 per cent of 472 GL consumed annually in Melbourne during 2023-24 (latest available data).

Sydney and Melbourne 2030 data centre water consumption: In 2030, we estimated data centre water consumption to be 16.8 GL annually in Australia, including 10.5 GL in Sydney and 5.1 GL in Melbourne. We use the following steps to estimate Sydney and Melbourne data centre water consumption:

- Data centres are estimated to consume 30 per cent of their total 2030 Australian water consumption in Melbourne, proportional to 30 per cent of 2030 Australian data centre electricity consumption expected to be in Melbourne.
- Data centres are estimated to consume 62 per cent of their total 2030 Australian water consumption in Sydney, proportional to 62 per cent of 2030 Australian data centre electricity consumption expected to be in Sydney. We have determined this by estimating data centres will consume 7.5 TWh within Sydney out of 12 TWh in Australia in 2030.

Sydney and Melbourne 2030 data centre water consumption as a percentage of total water used: We estimated data centre water consumption to be 1.9 per cent of 559 GL forecasted to be consumed annually in Sydney in 2030, and 0.9 per cent of 557 GL forecasted to be consumed annually in Melbourne in 2030.

Key inputs

Input	Value	Source
2025 Sydney data centre water consumption	3.65 GL annually or 10 ML a day	Sphere Infrastructure (2025) *AI, Data centres and water: Australia's next infrastructure test*
2021-22 Australian total water use minus electricity, gas, water and waste services	14,691 GL in 2021-22	ABS (2023) *Water Account, Australia, Table 1.1*
2025 data centre electricity consumption in Melbourne as a percentage of Australia	21 per cent (0.8 TWh out of 3.9 TWh)	Oxford Economics (2025) *Data Centre Energy Demand*
2024-25 Sydney total water consumption	546 GL in 2024-25	Sydney Water (2024) *Price Proposal 2025–30*
2023-24 Melbourne total water consumption	472 GL in 2023-24	Greater Western Water, Melbourne Water, South East Water and Yarra Valley Water (2024) *Melbourne's Annual Water Outlook 2025*

Table continues

Input	Value	Source
2030 data centre electricity consumption in Sydney as a percentage of NSW grid-supplied electricity	11 per cent	Oxford Economics (2025) *Data Centre Energy Demand*
2030 data centre electricity consumption in Sydney	7.5 TWh, estimated as 11 percent of 68 TWh in NSW grid-supplied electricity during 2029-30	AEMO (2025) *NEM Electricity Statement of Opportunities (ESOO)*
2030 data centre electricity consumption in Melbourne as a percentage of Australia	30 per cent	Oxford Economics (2025) *Data Centre Energy Demand*
2030 Sydney total water consumption	559 GL in 2029-30	Sydney Water (2024) *Price Proposal 2025–30*
2030 data centre electricity consumption in Sydney as a percentage of NSW grid-supplied electricity	11 per cent	Oxford Economics (2025) *Data Centre Energy Demand*
2030 Melbourne total water consumption	557 GL, estimate as an additional 85 GL to 472 GL in 2023-24	Greater Western Water, Melbourne Water, South East Water and Yarra Valley Water (2024) *Greater Melbourne Urban Water and System Strategy: Water for Life*

Exhibit A7: Data centre contribution to the water system

Approach

Water usage: We estimated data centres are saving 0.3 GL of potable water consumption due to rainwater harvesting

Key assumptions

- Data centres are assumed to be consuming 5 per cent of their water needs from on-site rainwater harvesting (noted in expert interviews). 0.3 GL of water sourced from rainwater harvesting is determined through 5 per cent of 5.5 GL.
- 0.3 GL of water consumption is assumed to be equivalent to the usage of 1,500 homes, based on an average consumption of 0.1753 ML/Household.
- 2 GL of typical excess capacity is assumed to be equivalent to the usage 10,000 homes, based on an average consumption of 0.1753 ML/Household.
- 8 GL of recycled water consumption is assumed to be equivalent to usage of 50,000 homes, based on an average consumption of 0.1753 ML/Household.

Key inputs

Input	Value	Source
Average household water use	0.1753 ML/ Household in 2021-22	ABS (2023) *Water Account, Australia.*

Exhibit A8: Data centre investment in potable water pipelies

Potable pipeline investments

Approach

We used a bottom-up approach to aggregate data to model sector-wide current and planned potable pipeline investment. These sources included:

- Proprietary data shared by select data centre providers
- Estimated market shares of data centre providers
- Consultations and interviews with experts

Key assumptions

- As data centres establish new industrial-sized water pipeline connections, they are obligated to contribute to the upgrade of the infrastructure.
- Investment in potable pipeline infrastructure is driven by larger hyperscale and colocation data centres (noted in expert interviews).

Potable pipeline impact on water supplied

Approach

We estimate that the water brought to local areas in excess of the typical data centre water consumption through potable pipelines contributed to by data centres.

Key assumptions

- Data centres are estimated to use less water on a typical day than on a peak or maximum day (noted in expert interviews).
- Contributions to potable pipelines are assumed to be made by larger hyperscale and colocation data centres. Typical additional water brought to local areas through these pipelines has been estimated only for the data centres assumed to be making investments.
- Potable pipelines are assumed to be sized to enable 1.5 times more water supply than data centres would need on a typical day.

Exhibit A9: Data centre recycled water investment

Approach

We used a bottom-up approach to aggregate data from to model sector-wide potential recycled water infrastructure investment. These sources included:

- Proprietary data shared by select data centre providers
- Estimated market shares of data centre providers
- Consultations and interviews with experts

Key assumptions

- Data centres are increasingly looking to invest in the recycled water network to provide alternative water sources as a substitute for potable water.
- Investment in recycled water infrastructure is likely to be driven by larger hyperscale and colocation data centres (noted in expert interviews). These data centres investing in recycled water are assumed to have a particular proportion of 2030 water consumption from recycled. Other data centres not making these investments are assumed to not consume recycled water.

5.2

Appendix B: Reference List

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