

Impacts of AI on the Property Industry

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Macroplan

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macroplan



Introduction to AI

- What is AI?
- What tools will AI produce for the property sector?
- Implications of AI on the broader property sector
 - What is the projected demand for AI
 - How will AI be delivered - data centres
 - Constraints: Energy, Capital, Labour, and Time
 - What are the spatial (economic geography) implications
 - What are the real estate opportunities

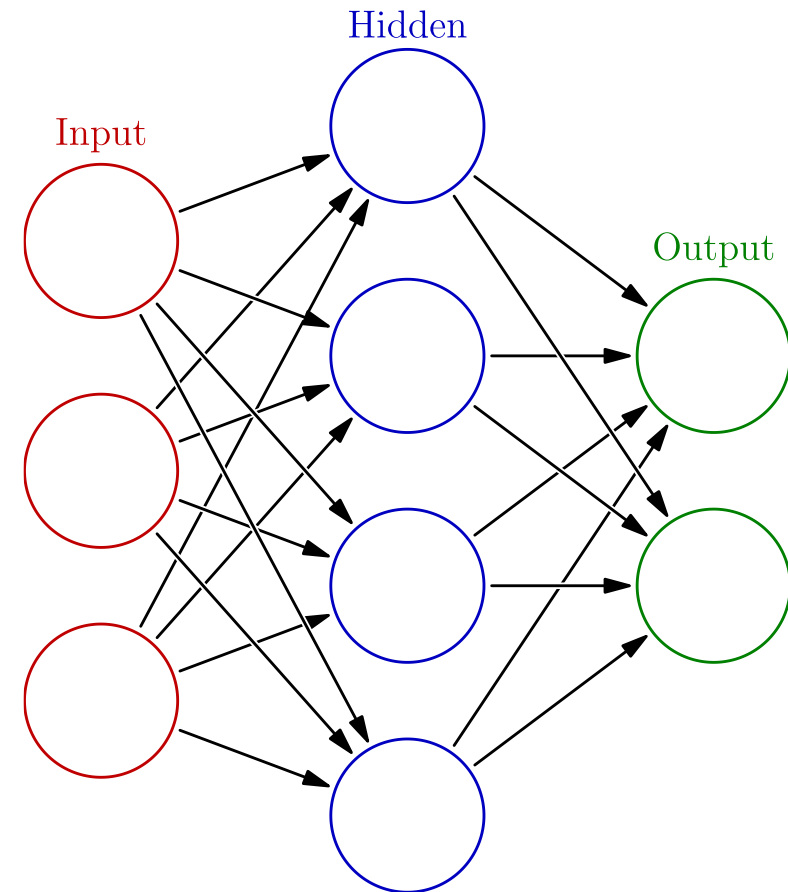
What is AI?

AI, at a fundamental level, is a machine learning from a large amount of information to produce some form of output.

The process is based on neural networks, which are inspired by the neural networks found in brains.

Neural networks work by detecting patterns in the input data which are used to determine the output. For example, a clearly defined rectangle shape could be part of a pattern that is recognized as an image of a book.

For a more practical example, in agriculture, this can be used to identify weeds, diseased plants, or ripe fruit and the appropriate actions that should be taken.





What is AI?

Machine learning was kickstarted with AlexNet, an image recognition AI trained on 1.2 million images that relied on heavy GPU (graphics processing unit) use to greatly reduce the error rate.

It was the first published framework available for GPU-based neural network training and inference, and became commonly used in neural network research.











What is AI?

Since then, forms of AI have been influencing our lives. These include:

- Algorithms
 - Search engines and product recommendations on websites
- Machine Learning
 - Enhanced algorithm-based processes
 - Voice assistants (e.g. Siri, Alexa)
 - Fraud detection
 - Stock market prediction
 - Route optimisation (e.g. Google Maps)
 - Generative AI (e.g. ChatGPT, AI image creation)
 - Agriculture

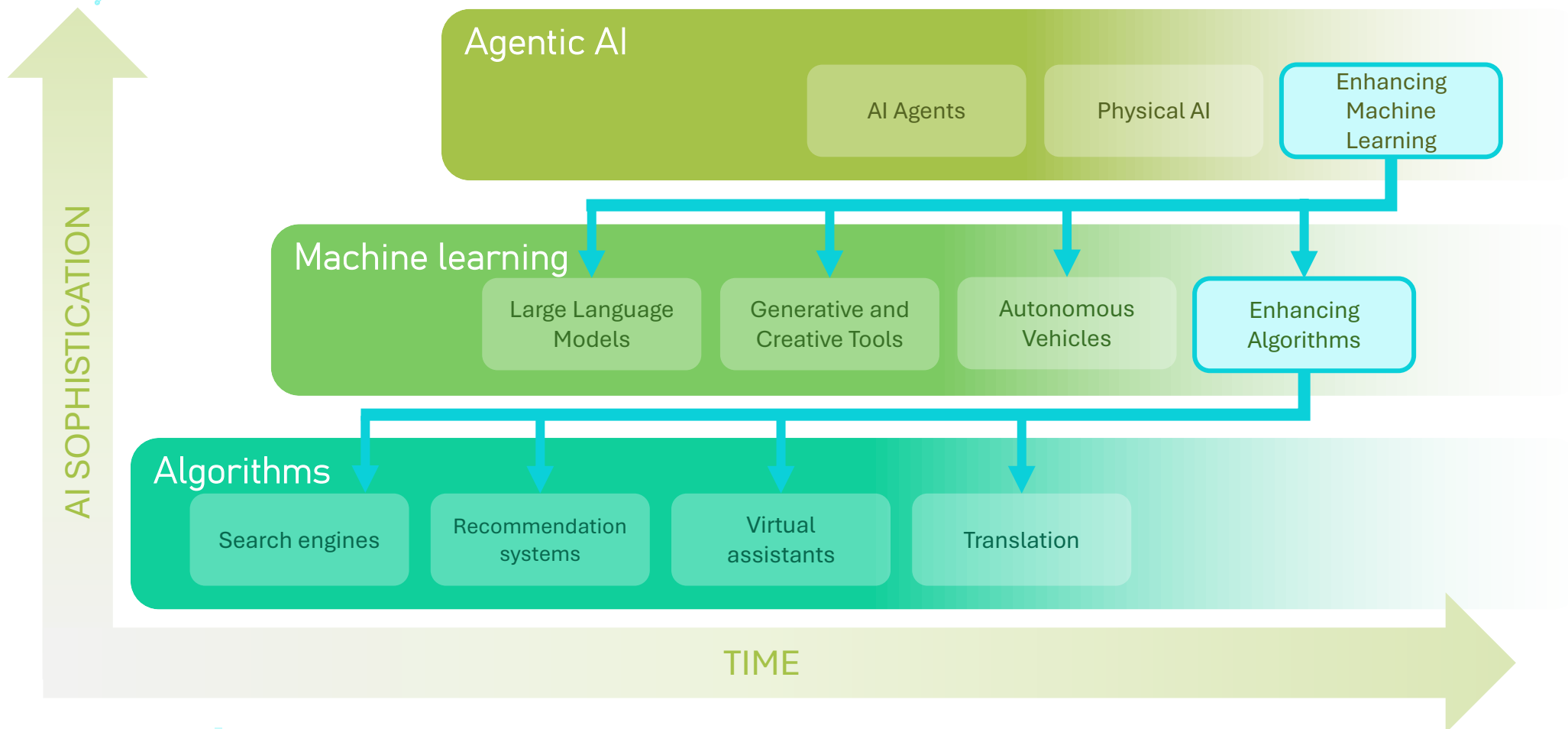
Generative AI

Generative AI are AI systems capable of creating new content, such as text, images, audio, and video. They do this using learning patterns developed from a pre-existing data base.

Text	Images	Music	Video
 Copilot 	 DALL-E  Midjourney	 Suno 	 runway 

Large Language Models (LLM) are a sub-type of generative AI focuses on learning from and writing text.

The Progress of AI





Agentic AI

AI agents

AI agents are AI models that can perform complex tasks and make decisions. They will like use multiple AI sub-models and data bases for training and problem-solving.

Examples: AI software for research, employee support, or factory operations

Physical AI

Machines that use agentic AI to operate in the real world based on input from receptors and a digital twin of the real-world environment.

Examples: Humanoid robots that work in factories, truly autonomous vehicles

What else can AI produce?

Nvidia CEO Jensen Huang sees three areas for future AI developments:

Agent robots



Curator Customizer Evaluator Guardrails RAG Retriever



Self-driving vehicles



Humanoid robots for factories



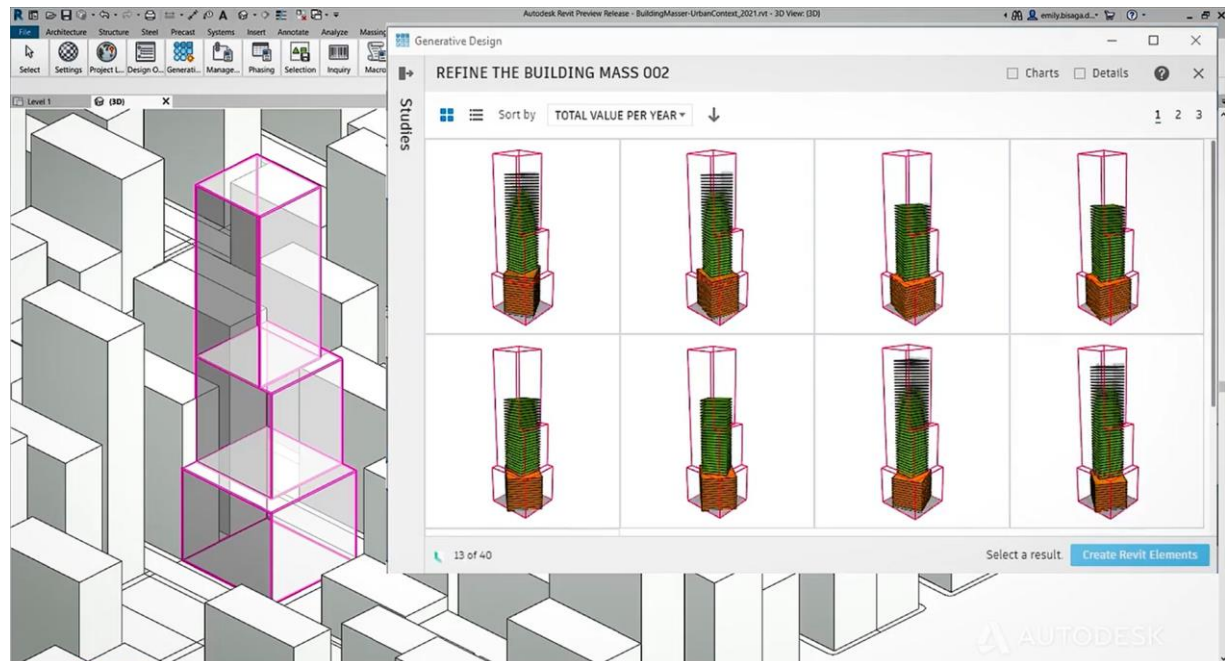


What tools will AI produce
for the property sector?

AI in Computer Assisted Design (CAD)

Computer-aided design (CAD) software is used for creating, modifying and analysing designs, including construction designs.

Autodesk Revit is building information modeling software that includes a **generative design tool**, which produces multiple design options based on your goals, such as minimising total cost, volume outside, zoning, etc.





AI and Planning Applications

City Futures Research Centre is developing an AI that collects and classifies planning applications across 383 LGAs.

It's at proof of concept stage and has already classified data from over 200,000 planning applications. For NSW, it has 82–85% accuracy.

Planning applications can be mapped to show trends (where more of certain types of projects are occurring, for example).



AI's Potential in Urban Planning

AI has the potential to streamline a number of processes that rely on the analysis of large amounts of data – both quantitative and qualitative.

AI models could be developed to aid in:

- » **Traffic management**

- » Real time traffic flow data could be used to optimize traffic signals and to highlight areas where issues are occurring.

- » **Land use planning**

- » AI could identify the land that is best suited to certain types of developments, or the best uses for specific parcels of land.

- » **Public engagement and decision-making**

- » AI could perform sentiment analysis, process requests and provide information to the public that is tailored to their specific situation.



AI in Property Sales

AI could also be harnessed to enhance property sales. For example:

» Property valuation and market analysis

- » Past sales data, information on the property, level of interest in the property (e.g., clicks on websites) and other sources of information could be combined and analysed by an AI model to provide property valuations.
- » Areas with higher potential in specific market segments could also be identified based on past and current trends.

» Personalised property recommendations

- » Recommendations could be made to potential purchasers based on their stated preferences, their browsing habits, financial capacity, and the behaviour of others with similar profiles.



AI and Property Acquisition – A Warning

The U.S. real estate investment Zillow used an AI model to select properties for investment, including the price they were willing to pay.

They lost \$881 million (at least, those are the known losses in 2021) and have since shut the project down.

Their AI model wasn't suited to a rapidly changing market (which was adjusting to their actions and facing unexpected supply chain issues) and could not account for unrecorded reasons for lower property values (e.g. noise, quality of construction, disruptive neighbours, etc.).

Implications of AI on the broader property sector

Over the past 30 years in housing construction labour productivity has declined.

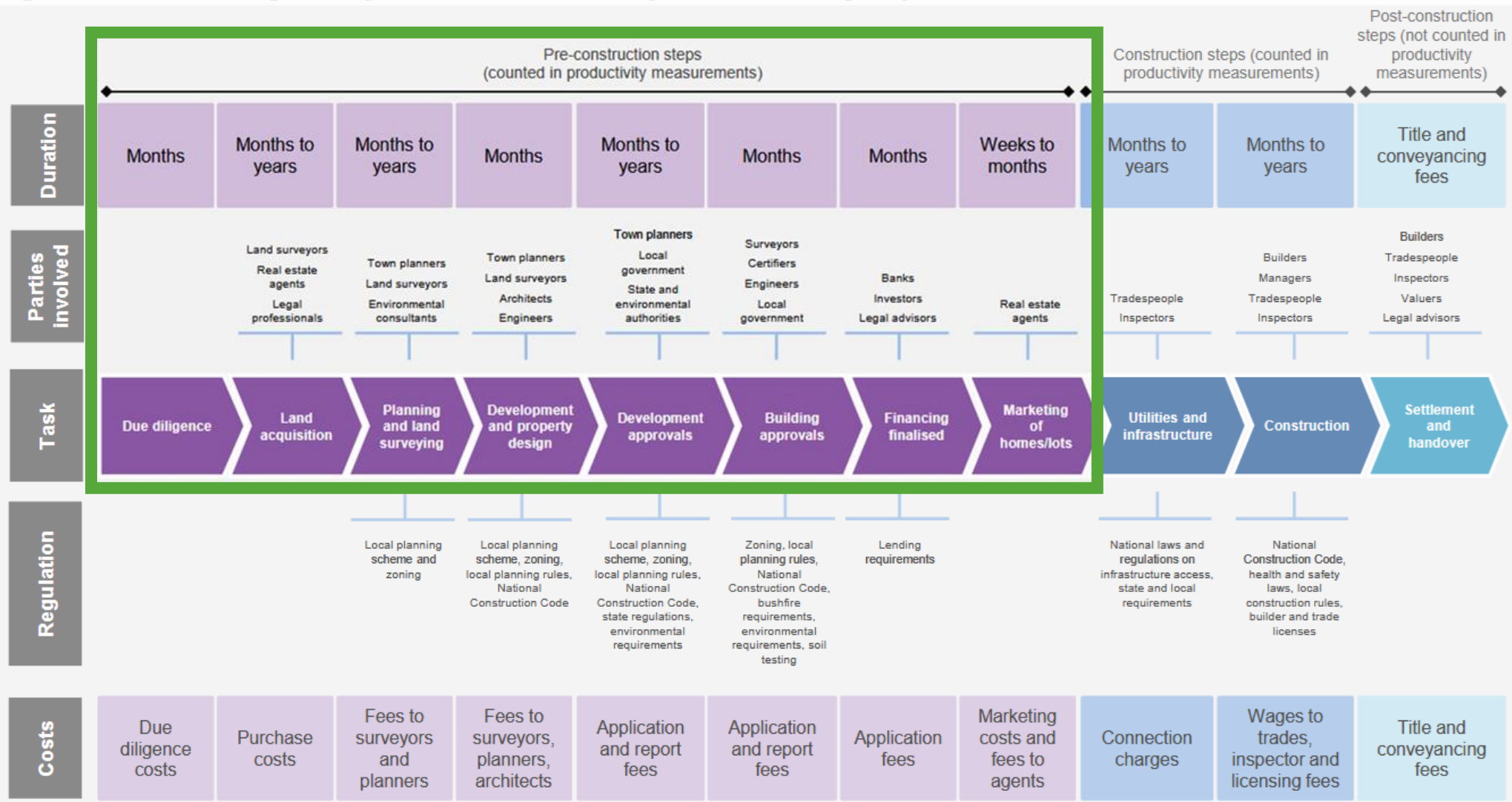
The gross value added per hour worked has declined by 12%.

One of the key factors contributing to this are complex, slow approvals.

AI has the potential to streamline decision-making and planning processes, greatly reducing the time and cost of development.



Figure 3.1 – The housing development and construction process has many steps^a



a. While much of the housing development and construction process is sequential, some steps can overlap. For example, a developer may begin arranging financing or setting up supporting utilities and infrastructure much earlier in the process for them to be ready in time for construction to commence.

Source: Beachwood Homes (2024); Infrastructure Victoria (2019); Loftly Building Group (2021); O'Brien et al (2000, pp. 75–76); Urban (2014); discussions with project participants.

A decorative graphic consisting of teal circles and lines, resembling a circuit or data flow, is positioned at the top and bottom of the slide.

Implications of AI on the broader property sector

Australia's AI Industry

650

(approx.)

AI companies are
headquartered in
Australia

AI and automation
are projected to
generate up to

**\$600
billion**
in total to
Australia's
GDP by 2030

Australian AI technologies received
\$7 billion
from foreign investors between
2018-2023.

Australian AI applications received
\$2 billion
in venture capital in 2023.



Data Centres – Property Market Implications

The data storage services industry generated revenue of
\$5.2 billion
for the 2023 financial year.

It has seen an average annual growth of
5.6%
over the previous five years.

It is forecast to grow by
8.2% per annum
over the next five years.

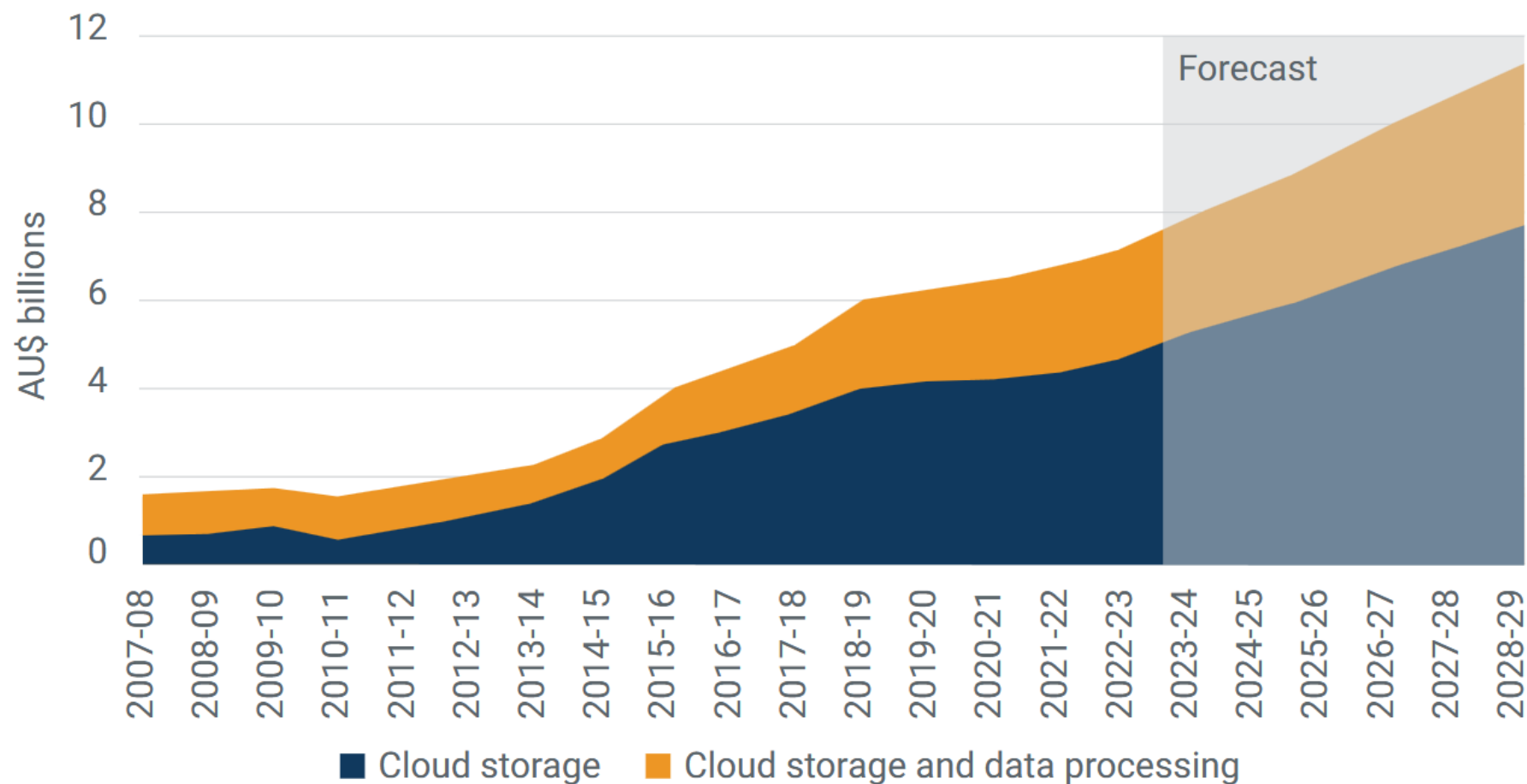
Big Money in Data Centres

Blackstone acquired Data Centre operator AirTrunk for A\$24 billion.

It was the **largest-ever data centre deal globally** and the largest transaction in Australia in 2024.



Cloud Industry Revenues in Australia



Projected Global Data Centre Demand

Global data centre demand due to AI use (GW)

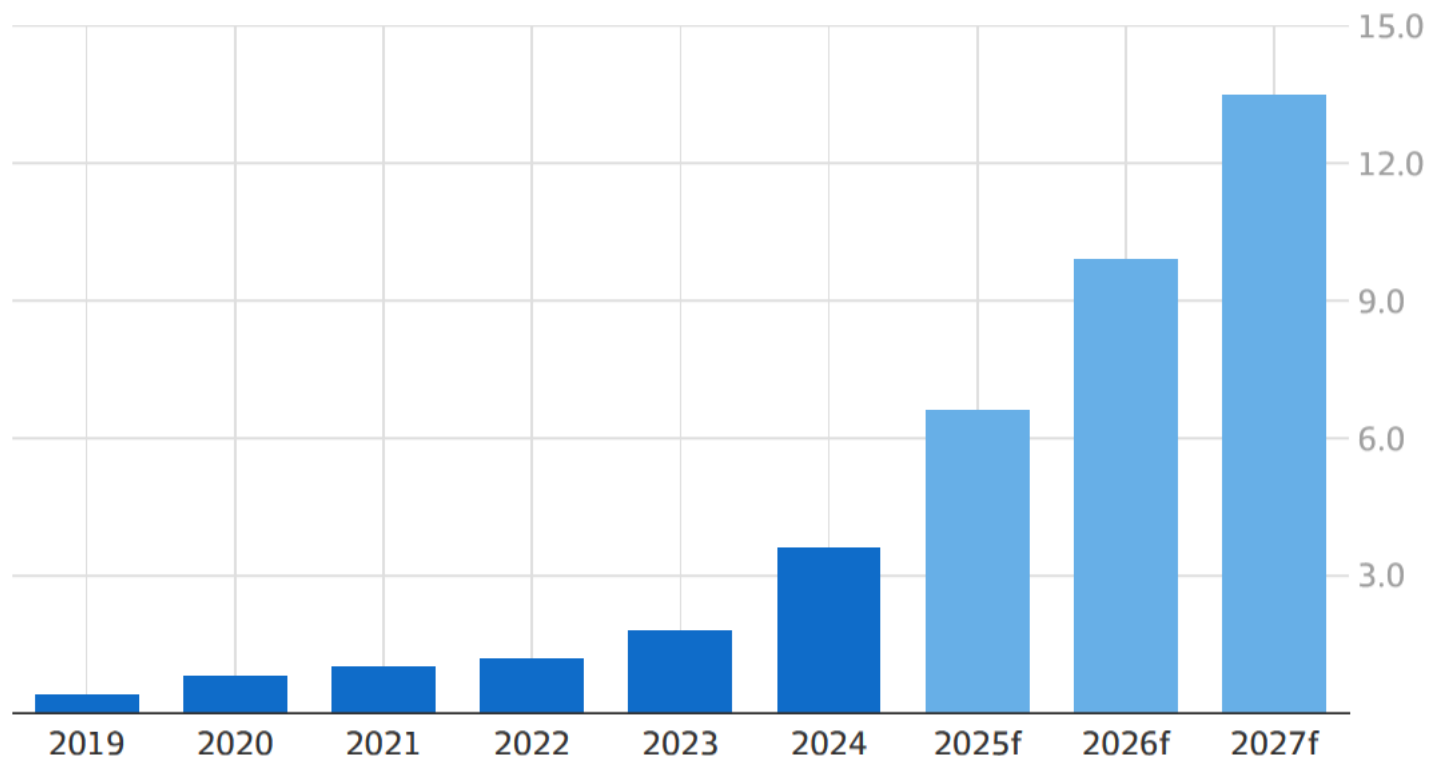


Chart: Financial Review • Source: HMC Capital



How will AI be delivered – data centres

- What are data centres
 - Types (basic, hyperscale, new energy parks/AI parks)
 - GW requirements for basic and hyperscale
 - Classification – colocation, etc.
- Most of the easy sites are already utilized
- Next group of hyperscale centers will most likely be on the urban fringes
- \$26 B by 2030 (Mandela) compare to current building industry \$269 billion
 - ~10% of building capacity

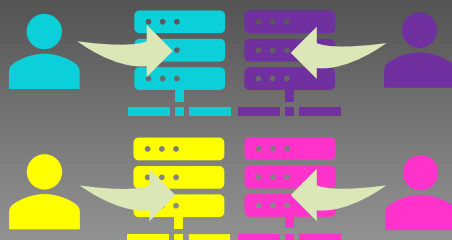
Types of Data Centre Storage

Cloud storage



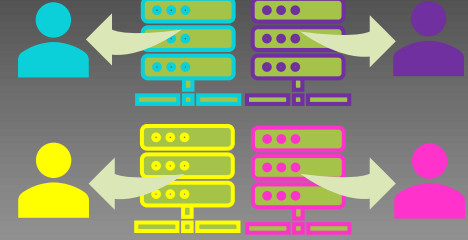
- » Digital data on multiple servers
- » Operator is responsible for ensuring clients' data

Co-location storage



- » Provides physical storage space for a client's own server
- » Facility provides the power, cooling and physical security

Managed storage



- » Enables clients to lease an entire server and an industry operator for their use
- » Client selects their own operating system and hardware

Types of Co-location Data Centres

Hyperscale Co-location Data Centres

>2 MW

- » Have large power requirements of multiple megawatts (at least 2MW)
- » Leased to cloud providers of large technology companies with high demands

Wholesale Co-location Data Centres

500KW-2MG

- » Have power requirements between 500 kilowatts and 2 megawatts
- » Leased to clients with lower demands than a hyperscale facility

Retail Co-location Data Centres

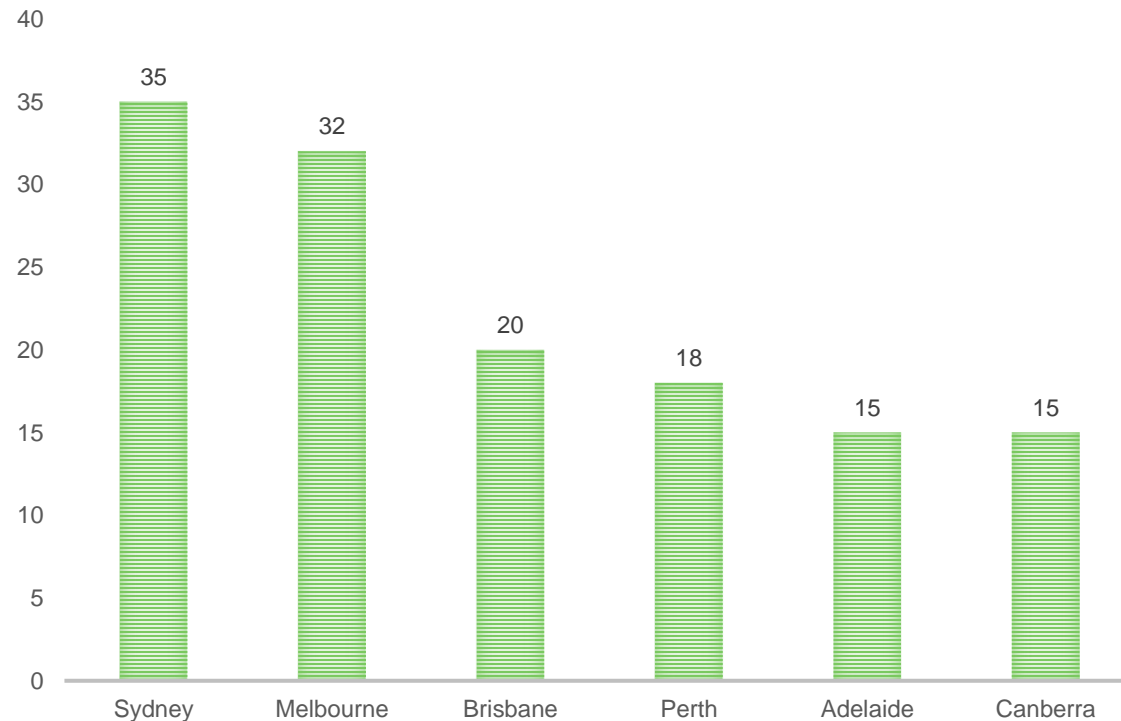
<500KW

- » lower power demands of less than 500 kilowatts
- » leased to clients with lower requirements than a Wholesale or Hyperscale facility and with less customisation privileges

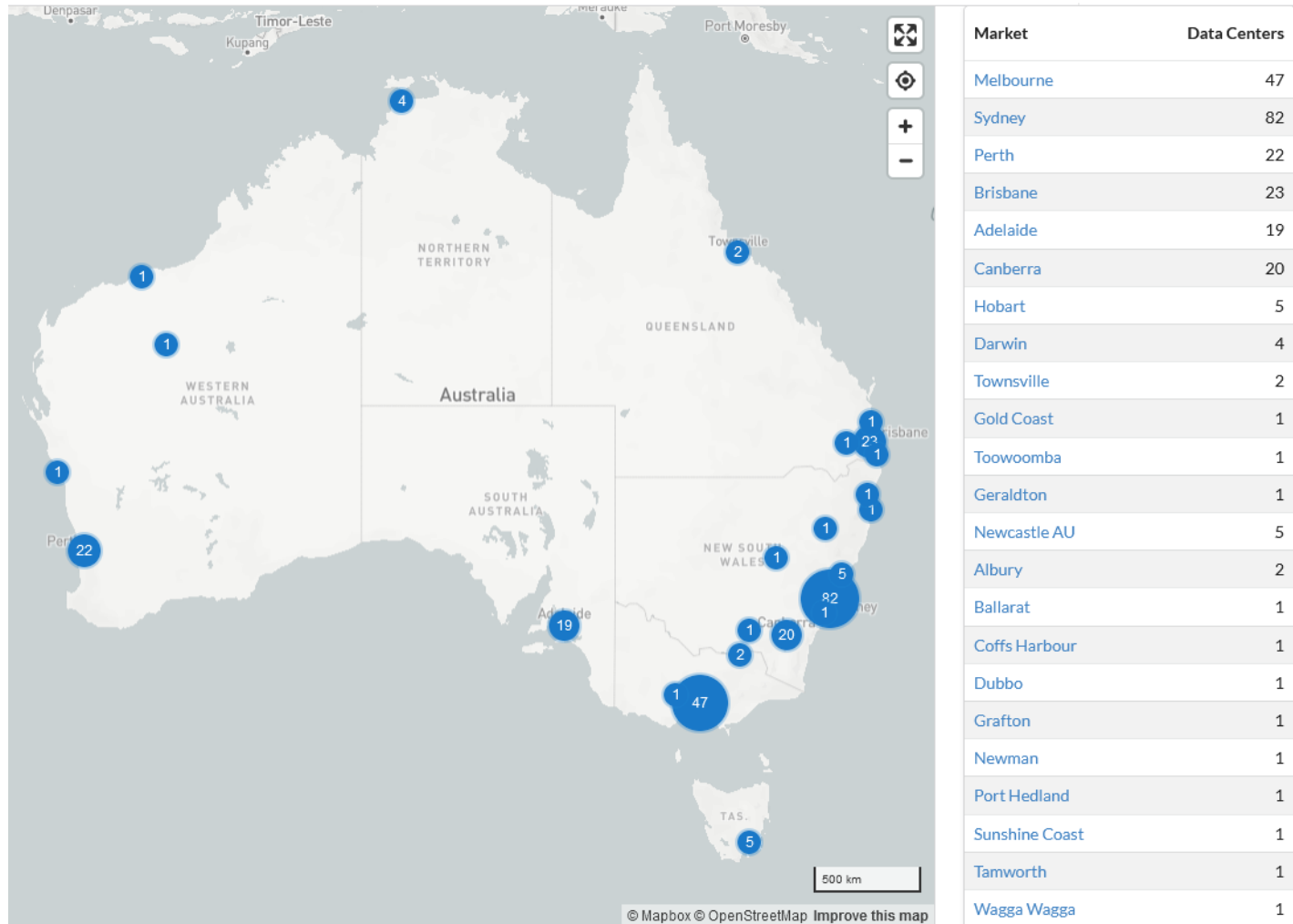
Number of data centres

There are approximately **135** co-location data centres operating in Australia

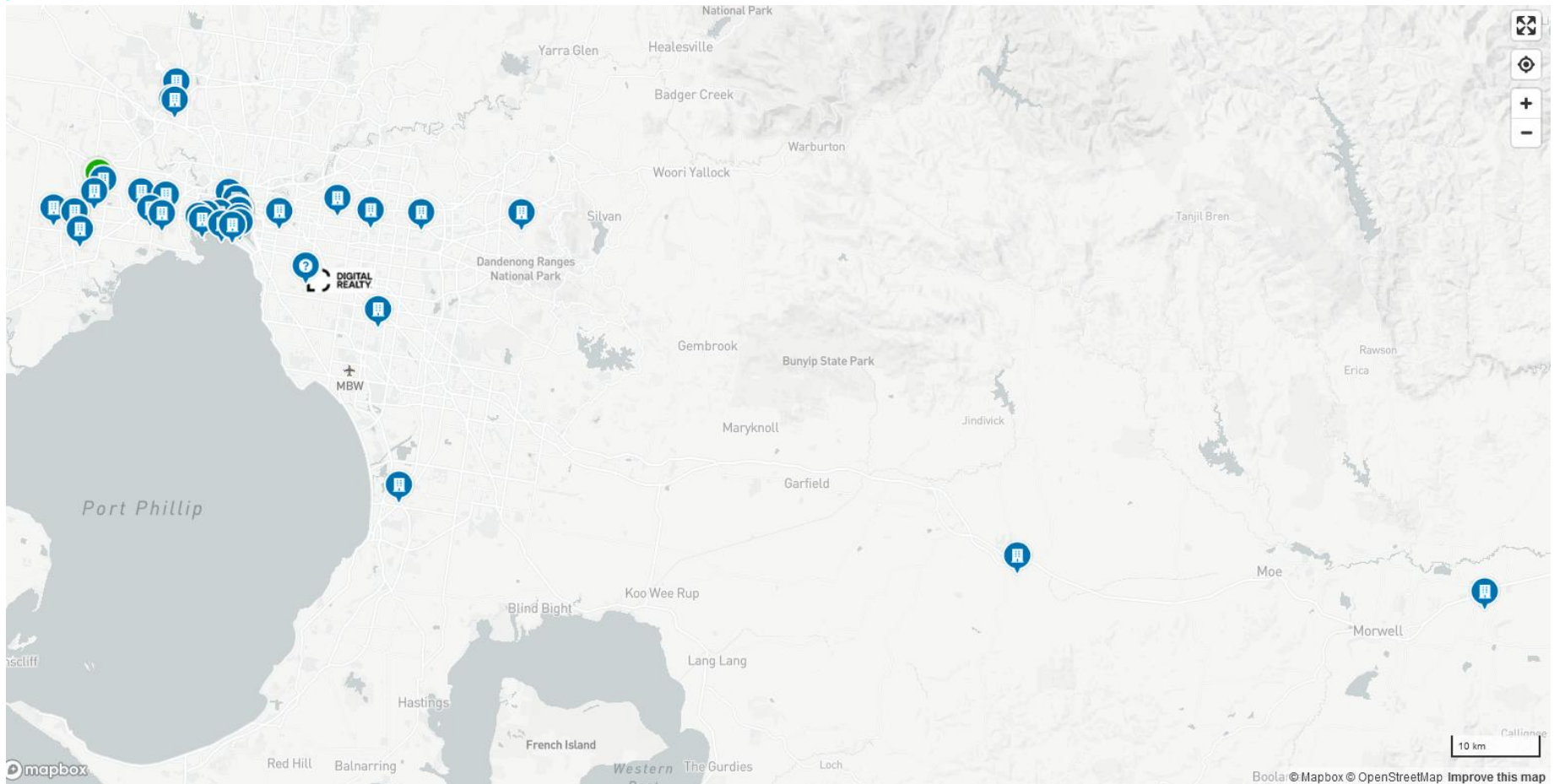
COUNT OF OPERATIONAL DATA CENTRES IN AUSTRALIA



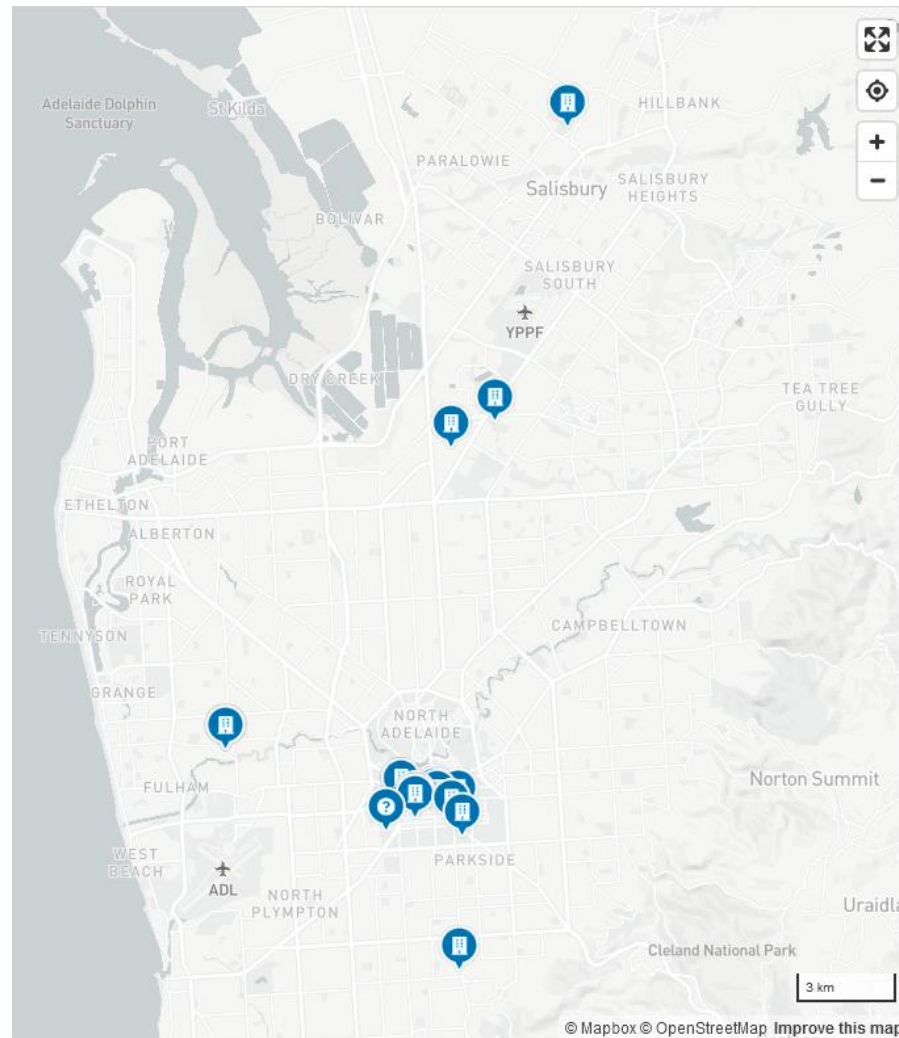
Current Data Centre Locations - Australia



Current Data Centre Locations – Melbourne



Current Data Centre Locations – Adelaide



Data Centre Locations

Data centres in Australia are concentrated in proximity to cities to meet consumer demand

Deployable capacity by location, 2024

● Hyperscale¹³ ● Non-hyperscale ● 100 MW (size of bubble = deployable capacity)





Future Data Centre Construction

An estimated

183,000 sqm is currently under construction

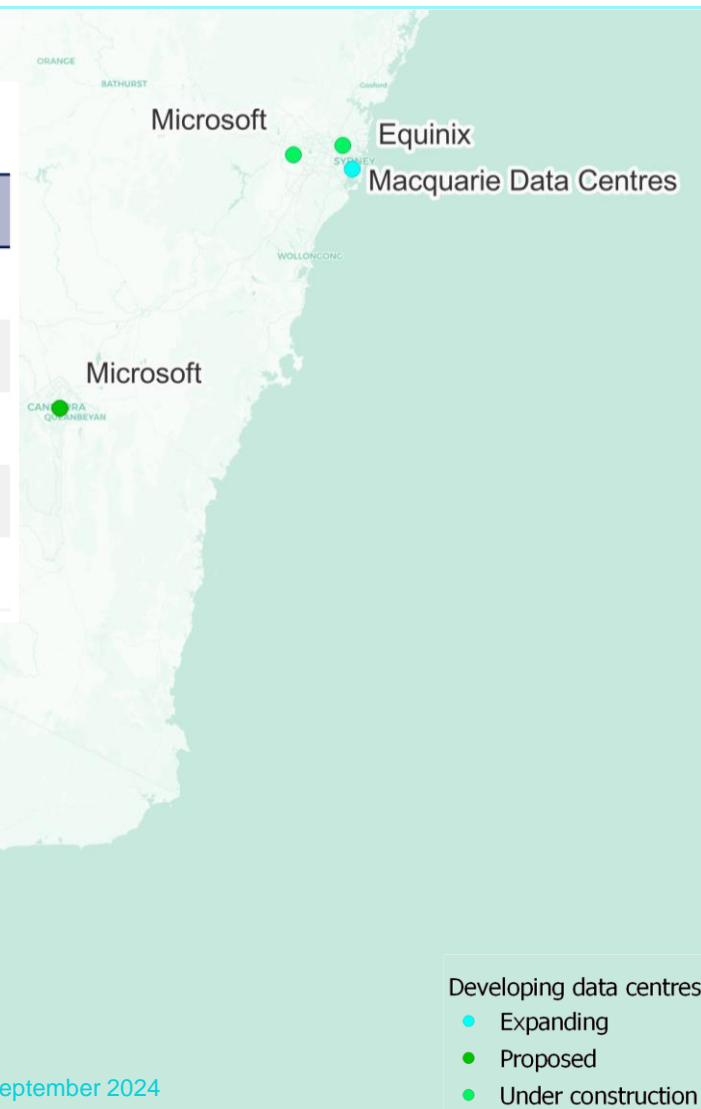
for data centres, with almost three quarters of it in Melbourne.

If all planned and proposed data centres are built by 2029,
**1.7 Gigawatts of power capacity will be added to
Australia.**

Future Data Centre Construction

DATA CENTRES UNDER CONSTRUCTION

Centre	Location	Owner	Centre Type	Tier	Area (sqm)	Power (mw)
Kemps Creek Data Centre	Kemps Creek, Sydney	Microsoft	Hyperscale Co-location	N/A	95,355	190 MW
IC3 Super West	Macquarie Park, Sydney	Macquarie Data Centres	Hyperscale Co-location	Tier III	11,700	45 MW
WAI1	Belmont, Perth	GreenSquareDC	Hyperscale Co-location	Tier III	40,000	96 MW
Woods Road Data Centre	Truganina, Melbourne	Microsoft	Hyperscale Co-location	N/A	N/A	N/A
Garden Drive Data Centre	Tullamarine, Melbourne	Microsoft	Hyperscale Co-location	N/A	N/A	N/A





Future Data Centre Construction

Currently, city and city fringe locations are popular for Hyperscale Co-location centres.

Soon, they will be locating in outer metro areas or regional areas.

This will be due to:

- » Availability of power
- » Lack of industrial land in the most desirable areas
- » Land costs
- » De-centralization (for risk mitigation)

Investment in Data Centres

Amazon, Google, Meta and Microsoft are projected to spend more than

\$180 billion USD

on data center expansions and related infrastructure costs.



Microsoft will spend **\$80 billion USD** (\$128 billion AUD) to build data centers, with a portion of that being spent in Australia.



The Stargate Project

The Stargate Project is a new company which intends to invest \$500 billion over the next four years, starting with \$100 billion and 10 data centres already under construction in Texas.

Stargate is lead by SoftBank and OpenAI, with additional funding by Oracle, and MGX.

Arm, Microsoft, NVIDIA, Oracle, and OpenAI are the key initial technology partners.



The United Kingdom's AI Growth Zones

The UK is planning to invest heavily in AI infrastructure and is creating

AI Growth Zones

areas where **planning proposals will be sped up** and **energy connections will be available** to power data centres.

The first will be in **Culham, Oxford** which already hosts the United Kingdom Atomic Energy Authority – a UK government research organisation responsible for the development of fusion energy.



The United Kingdom's AI Growth Zones

£14 billion in investment has already been committed to the UK's AI infrastructure by three major tech companies:

» Vantage Data Centres

- » Will invest over £12 billion in data centres across the UK
- » Will build one of Europe's largest data centre campuses in Wales

» Nscale

- » Will invest \$2.5 billion to support the UK's data centre infrastructure over the next three years
- » Will build the largest UK sovereign AI data centre in Loughton, Essex by 2026

» Kyndryl

- » Will build a new tech hub in Liverpool in the next three years, generating 1,000 AI-related jobs

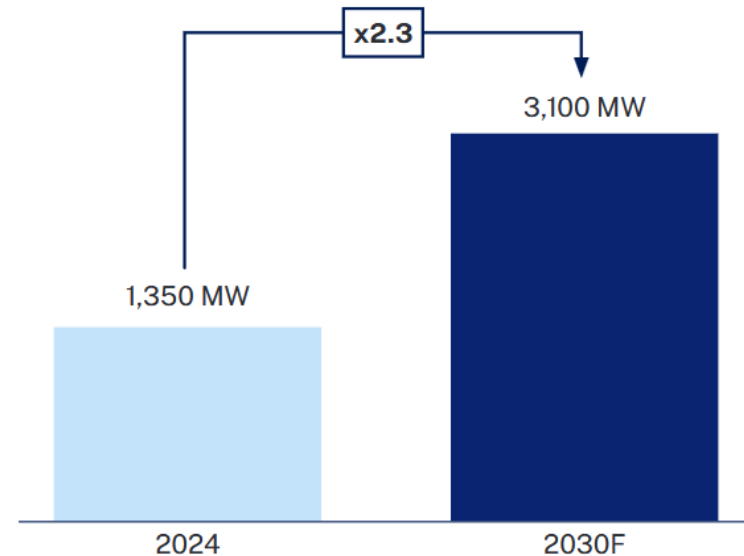
Investment in Data Centres

Data centre deployable capacity in Australia is projected to more than double from 1,350 megawatts (MW) in 2024 to **3,100 MW by 2030**

Additional investment in Australia's data centre capacity is forecast to top **\$26 billion by 2030**

Data centre deployable capacity in Australia⁶

Megawatt (MW), 2024 – 2030F



Infrastructure investment


+AU\$26 billion

Investment of \$26 billion is required to construct the additional data centre capacity by 2030

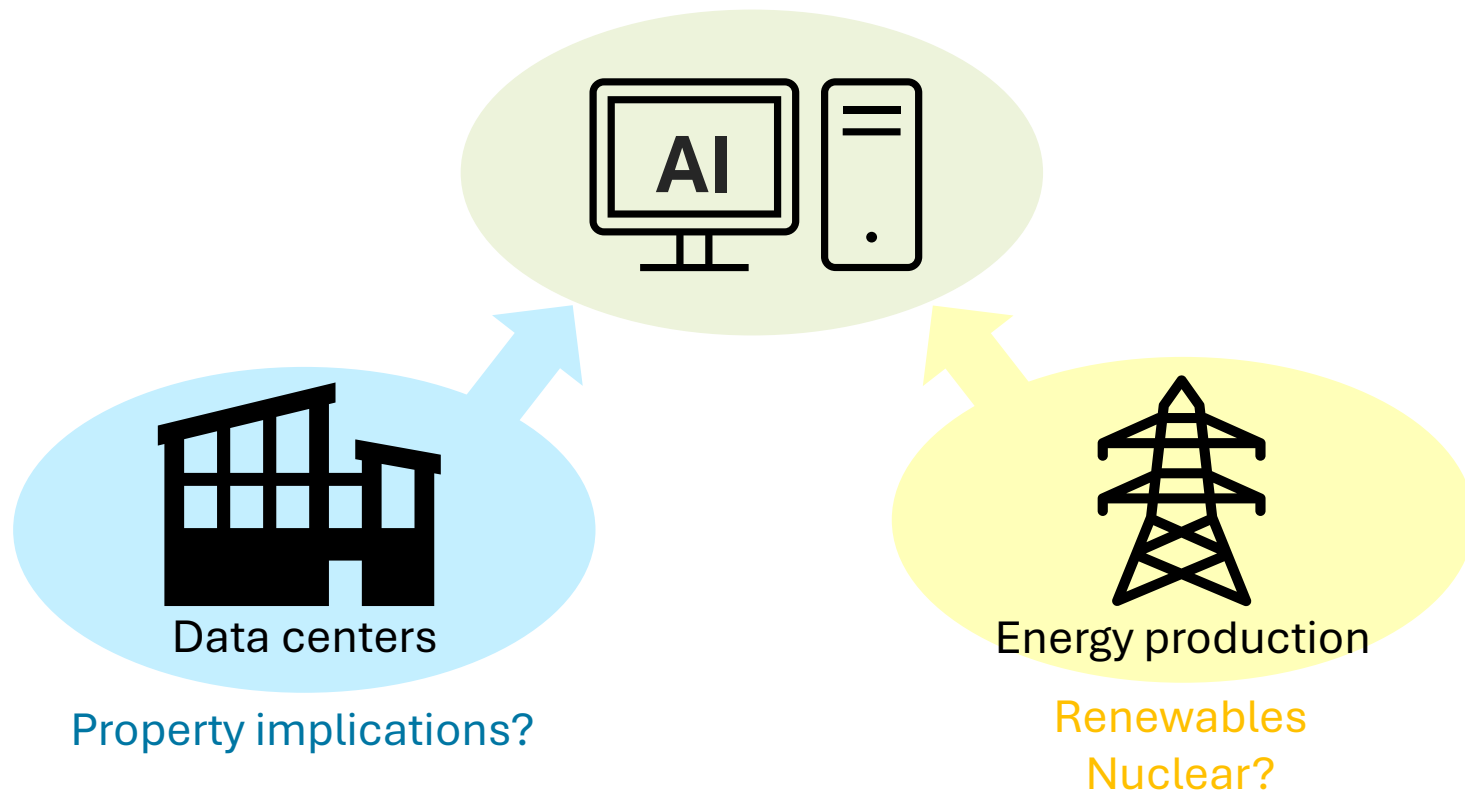


Energy: Property Implications

- » There will be constraints in many areas on supply and new requirements
- » Australia has upcoming new capacity (AEMO)
 - » New renewable capacity
 - » Off shore component
 - » On shore wind farms, solar

How to Build AI

A ChatGPT request uses **10 times as much energy** as a Google search.



AI Requires A Lot of Energy

AI uses a lot more energy to answer users' questions than a traditional Google search.



Traditional
Google search

0.3Wh



ChatGPT text
query

2.9Wh



AI-Powered
Google search

6.9-8.9Wh

Forecast Energy Consumption

Data centres make up nearly 3 TWh of current load across the business mass market (BMM) and large industrial loads (LIL) sectors.

The Central scenario forecasts around

5 TWh of data centre load by 2033-34

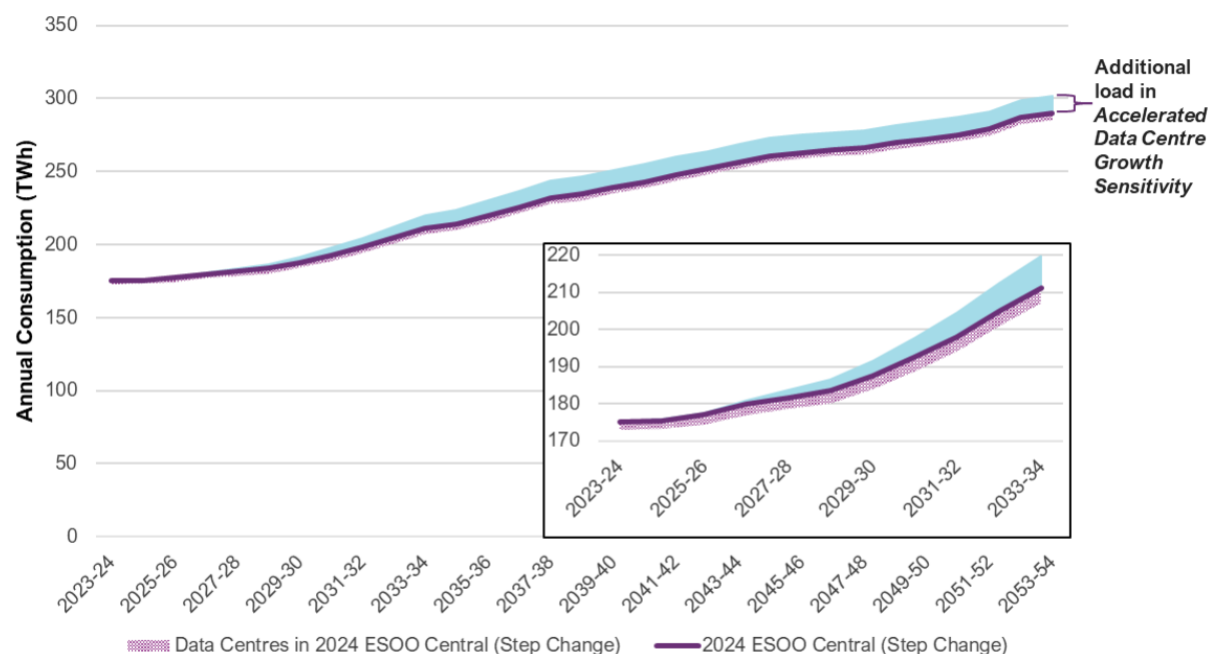
from existing and committed LIL projects.

The sensitivity forecasts nearly

10 TWh of additional load per year by 2033-34

from all developments classified as 'existing', 'in commissioning', 'committed', and 'anticipated'.

Figure 11 Operational consumption for ESOO Central scenario and Accelerated Data Centre Growth sensitivity, 2023-24 to 2053-54 (TWh)



Note: This figure captures loads that are sufficiently large to be considered an LIL. Smaller data centre loads may be present in the BMM forecast. Additional loads presented are not committed and subject to change.
















Adding Renewable Energy to Australia

Major data centre operators are supporting renewable energy projects in Australia as a part of their commitment to be powered by 100% renewable energy by 2023.

= Demand for agricultural land

They mainly do this through power purchase agreements (PPAs).

Data centre operators in Australia are using various mechanisms, including PPAs, to accelerate the addition of renewable energy to Australia's grid

Select initiatives by data centre operators	Location	Power capacity of initiative	Power capacity equivalent for households ²⁸
 Microsoft entered a 15-year PPA with Fotowatio Renewable Ventures (FRV) Australia for the Walla Walla Solar Farm in 2022.	 Walla Walla, NSW	 300 MW	83,000 households
 AWS and Vena Energy announced the Solar Project Australia-Wandoan in 2024, which is set to generate 125 MW of renewable energy through a PPA .	 Woleebee, QLD	 125 MW	60,000 ²⁹ households
 Google , AirTrunk , and OX2 have entered a long-term PPA , which is projected to add 25 MW of renewable energy capacity to Australia's energy grid by 2025.	 Riverina, NSW	 25 MW	7,000 households
 CDC offers its customers across Australia 100% net zero carbon electricity by retiring large generating certificates (LGCs) , driving investment into renewable energy generation. ²⁷	 Australia	 300 MW	90,000 households
 NEXTDC has been a Principal Partner in the Melbourne Renewable Energy Project (MREP) , collaborating in a consortium to support Pacific Blue's (formerly Pacific Hydro) construction of the Crowlands Wind Farm through a PPA , which started generating power in 2019.	 Glenlofty, VIC	 80 MW	35,000 households

Source: AirTrunk (2023) Google, AirTrunk and OX2 to add renewable energy capacity in Australia; Equinix (2024) Equinix signs its first renewable energy PPA in Australia with TagEnergy; CEFC (2022) Powering Microsoft data centres with Walla Walla sunshine; NEXTDC (2022) FY22 ESG Report; Vena Energy (2024) Amazon and Vena Energy announce 125 MW solar project in Queensland; Mandala analysis.

Data Centres Need Consistent Energy Supplies

Technologies to support ongoing clean energy requirements of data centres³⁴

Battery Energy Storage Systems



Energy storage systems, such as lithium or flow (commonly vanadium) batteries, provide the capabilities to deploy renewable energy during periods of low generation.

Pumped hydro



Pumped hydro can provide electricity during periods of low demand for a continuous period of up to 12 hours. This is done by pumping water from a lower reservoir to a higher reservoir.

Compressed air energy storage



Pressurises and stores atmospheric air in underground caverns, which is then released and expanded through a turbine generator to produce energy for up to 12 hours.

Thermal energy storage



Utilises the ability of different materials to hold heat as a means of storing energy. The heat is later used to generate electricity for up to 24 hours.

The Nuclear Option

Data centres, used to run AI among other things, require huge amounts of power. Big Tech is turning to nuclear power to fulfil this need.



Microsoft

will restart Three Mile Island and purchase the plant's entire electricity generating capacity over the next 20 years.

amazon

purchased a data centre site next to the Susquehanna nuclear power plant (Pennsylvania), including a 10-year PPA.



will purchase energy from small modular reactors to be developed by Kairos Power, with the first planned to come online by 2030.

Meta

is currently seeking proposals from nuclear power developers.

Sources: <https://www.technologyreview.com/2024/09/26/1104516/three-mile-island-microsoft/>

<https://www.bbc.com/news/articles/cx25v2d7zexo>

<https://heatmap.news/technology/amazon-nuclear-talen-energy>

<https://blog.google/outreach-initiatives/sustainability/google-kairos-power-nuclear-energy-agreement/>

<https://www.theguardian.com/technology/2024/oct/15/google-buy-nuclear-power-ai-datacentres-kairos-power>

<https://www.reuters.com/business/energy/meta-seeks-nuclear-power-developers-reactors-start-early-2030s-2024-12-03/>

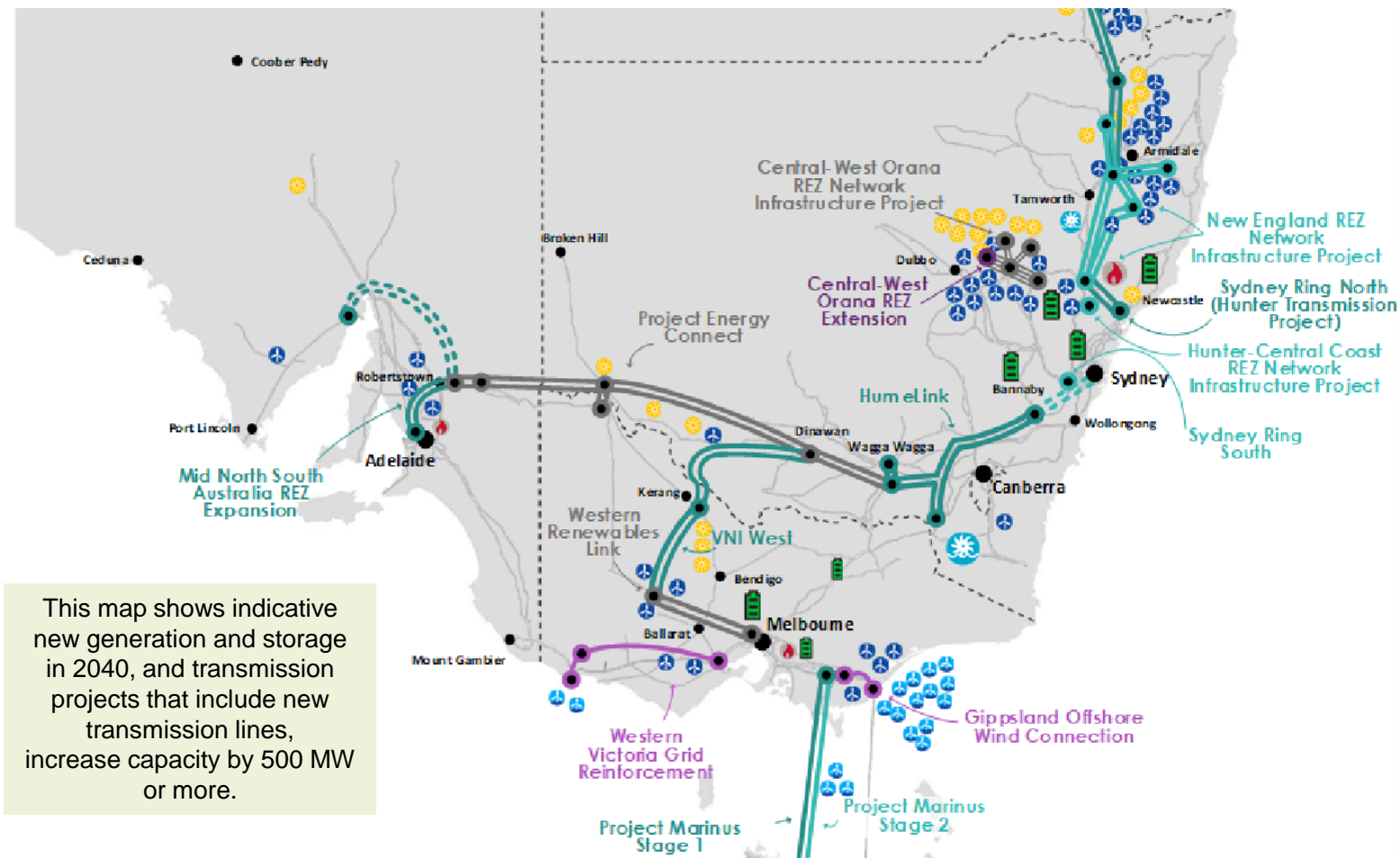
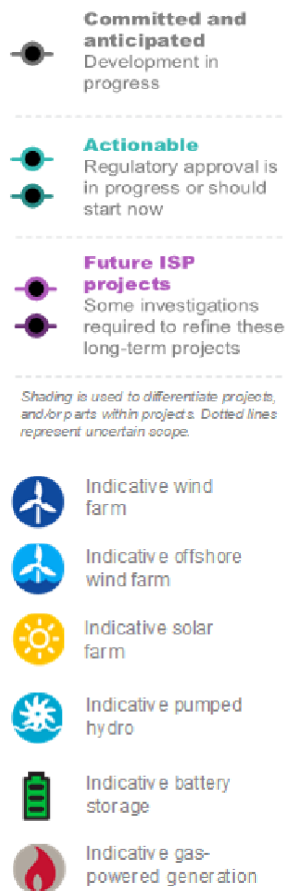


Challenges to development

Development of new data centres come with a number of key challenges:

- » finding suitable land
- » access to adequate and steady power supply
- » increasing construction costs

Future Renewable Projects



This map shows indicative new generation and storage in 2040, and transmission projects that include new transmission lines, increase capacity by 500 MW or more.



Data Centres Can Change Where People Live

Data centres that are built further away from urban centres bring a lot of money to the towns that they are built in, but they can also make housing unaffordable as a flood of jobs come to the area during construction.

This could change the demographic makeup of the towns affected – either through migration or (with the right investments) increased amenity and access to higher paying jobs.



AI Could Reshape a City's Population

College/university graduates will likely be the ones most affected by large-scale uptake of AI. Some will benefit, but others will be competing for jobs with people without a degree as AI makes some fields more accessible.

Graduates negatively affected by AI are likely to move to areas that work with their qualifications and preferred lifestyle. These will be places with:

- » Reasonably large populations
- » A higher proportion of graduates
- » Lower cost of living (especially housing)
- » Industries with lower exposure to AI

Newcastle's Clean Energy Precinct

The Clean Energy Precinct will consist of 220 hectares of land in Newcastle for hydrogen and clean energy projects, including production, export, and storage.

It will offer common user, open access, shared infrastructure across clean energy storage, transport, and export facilities.

It will reach 1.6 GW of production in five years, with an ultimate goal of 3 GW.



Opportunities: SUBCO's Submarine Cable System

SUBCO is building a transcontinental submarine cable system connecting Sydney, Melbourne (Torquay), Adelaide and Perth (SMAP).

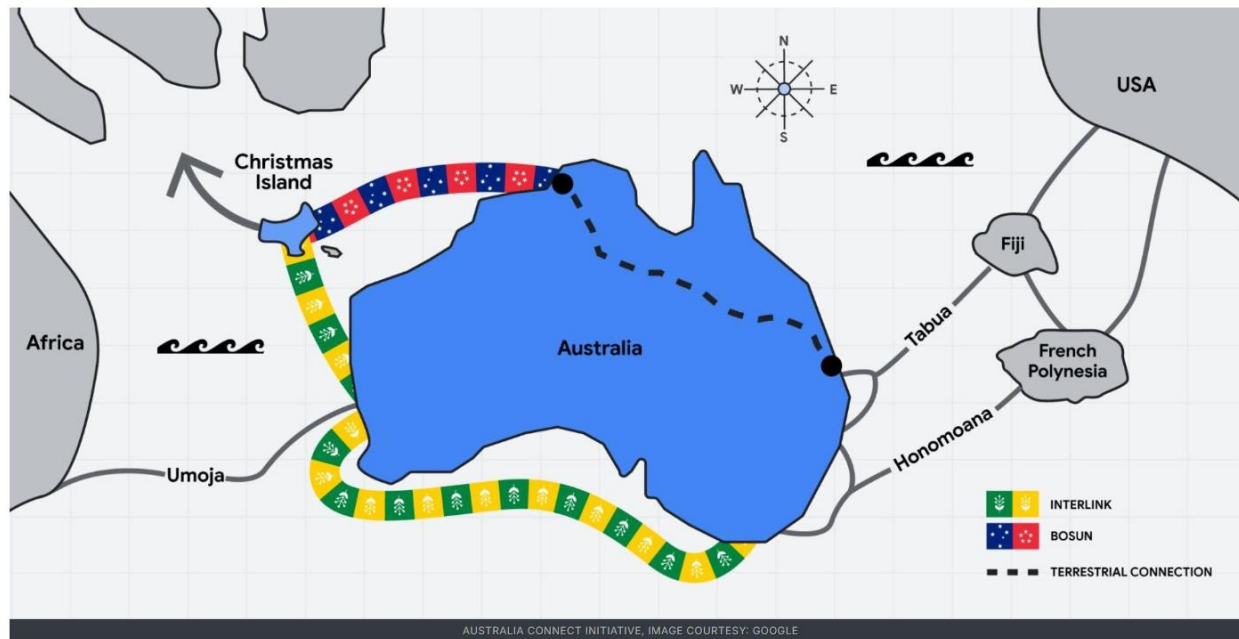
Torquay, Victoria and Maroubra, NSW will get coordinated cable landing infrastructure and new infrastructure that connects these locations back to the respective parties' cable landing stations.



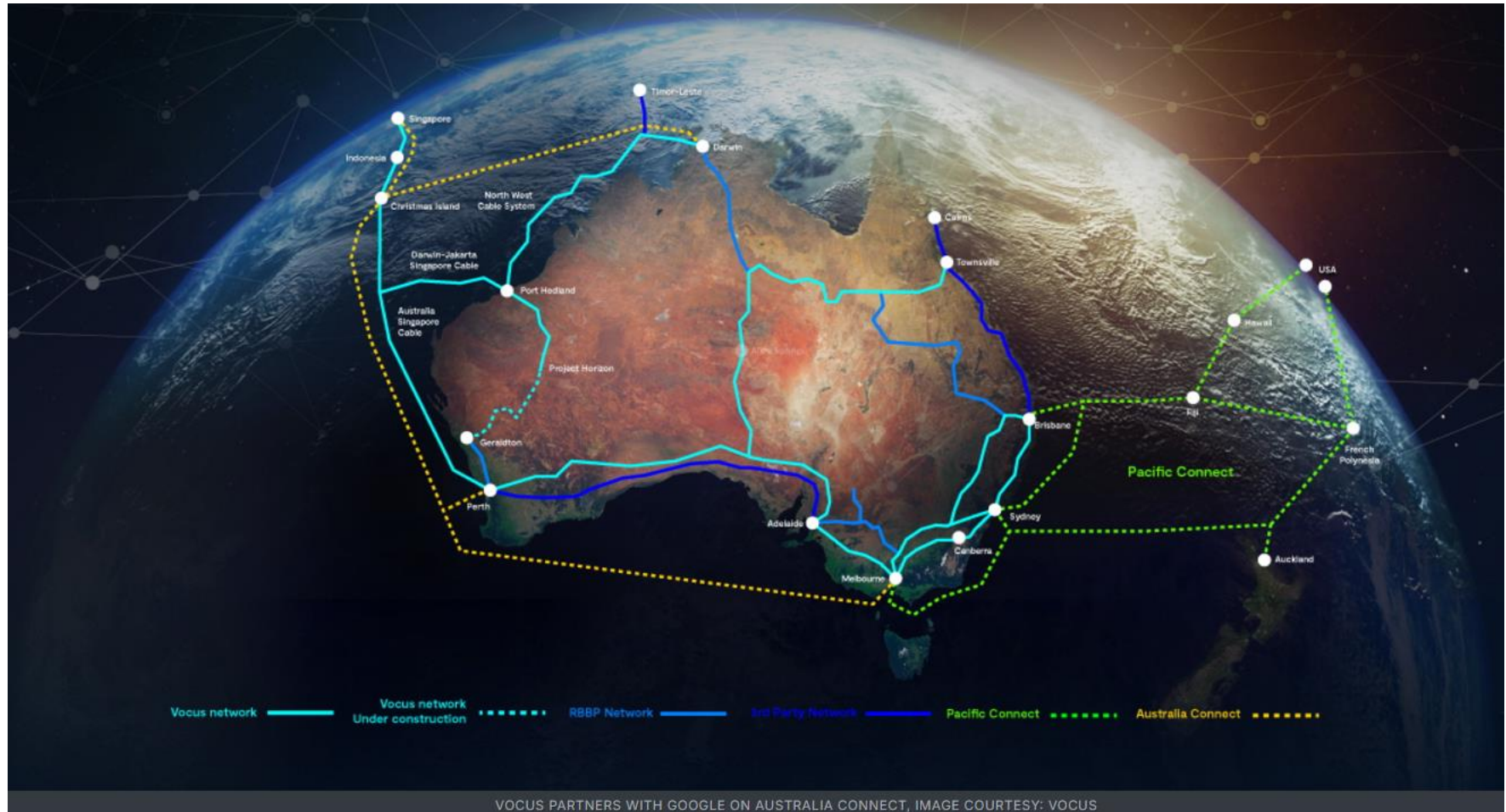
Google's Pacific Connect Initiative

Google will build three transpacific cable systems

- Tabua
 - Will connect the US and Australia to Fiji
- Honomoana
 - Will connect the US and Australia to French Polynesia
- Bosun
 - Will connect Darwin, Australia to Christmas Island, which has onward connectivity to Singapore



Australia Connect (Terrestrial and Subsea)



Adelaide

Adelaide is an emerging market for data centres, with only 15 centres currently located there.

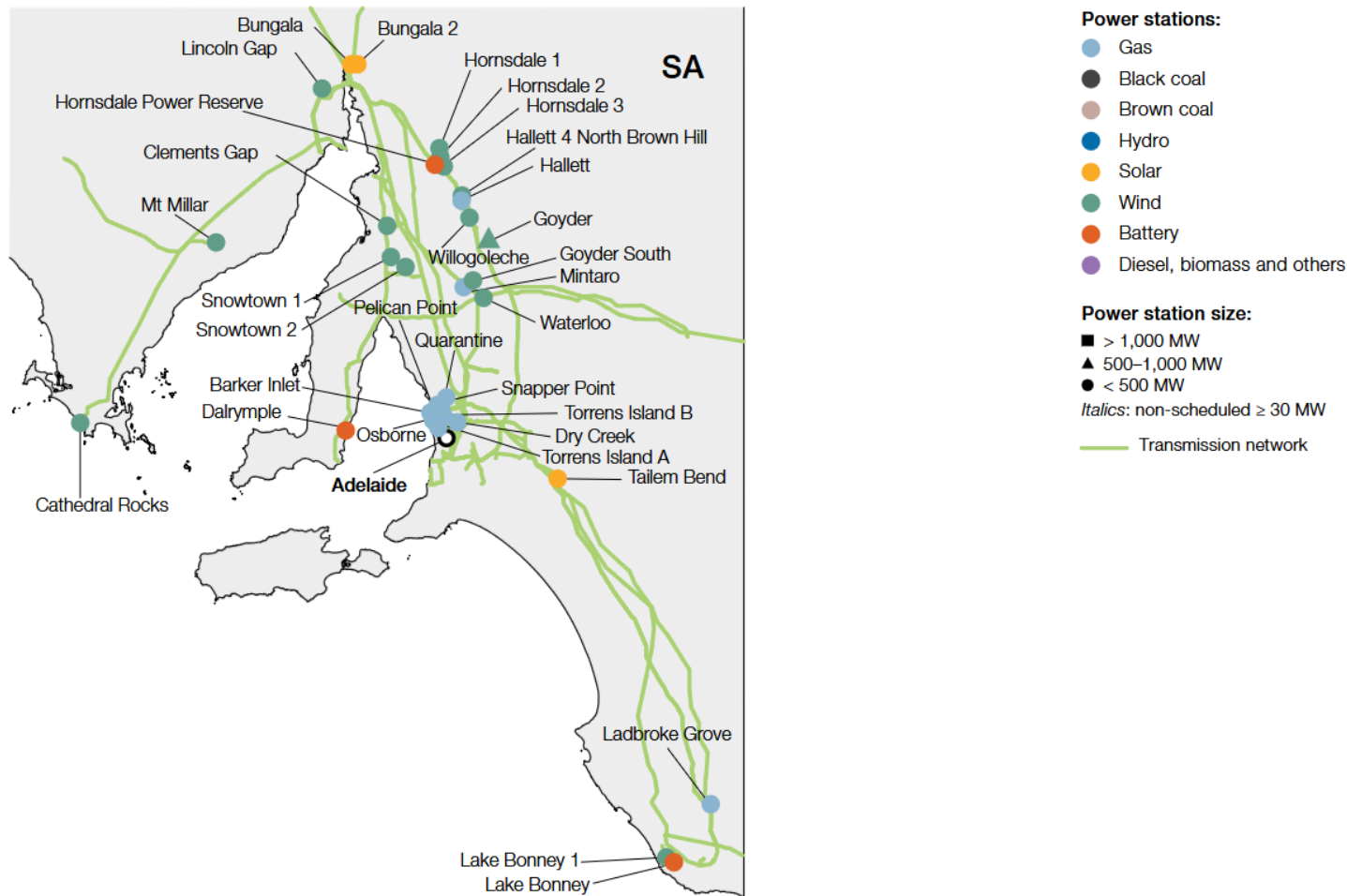
However, it will soon be connected to SUBCO's submarine data cable network, making it more valuable to overseas data clients.

South Australia is also looking to invest in hydrogen generation for energy production, including a Green Hydrogen Electrolyser and Power Station.

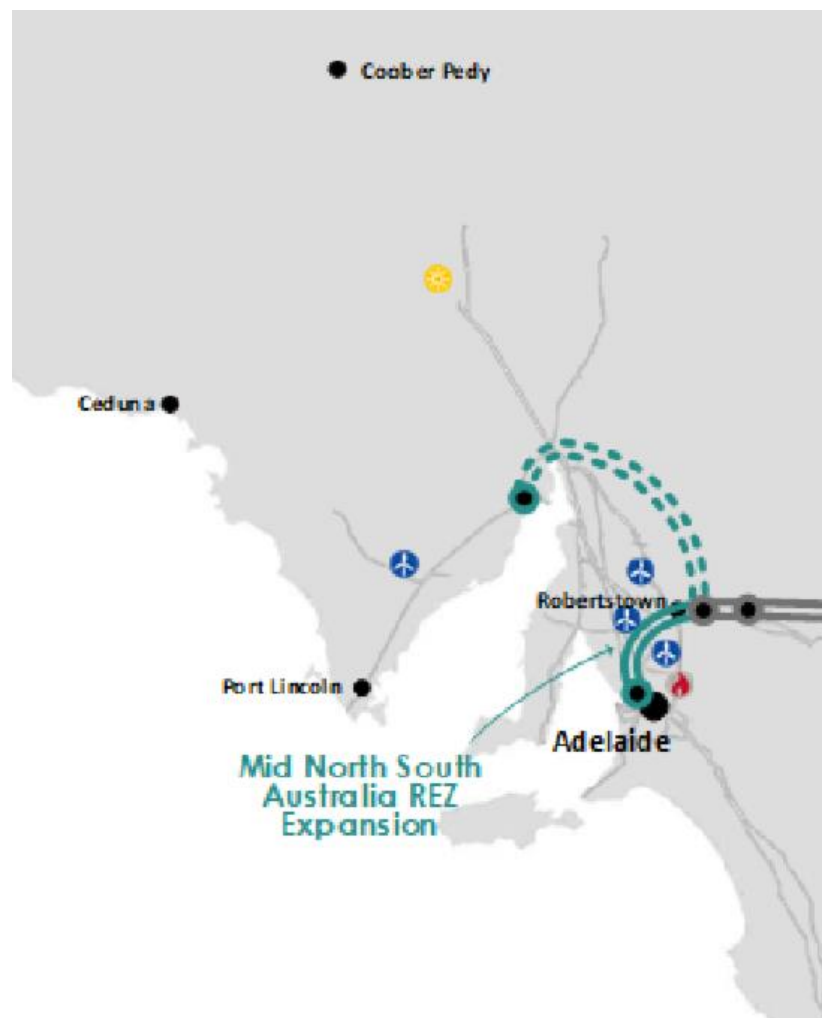
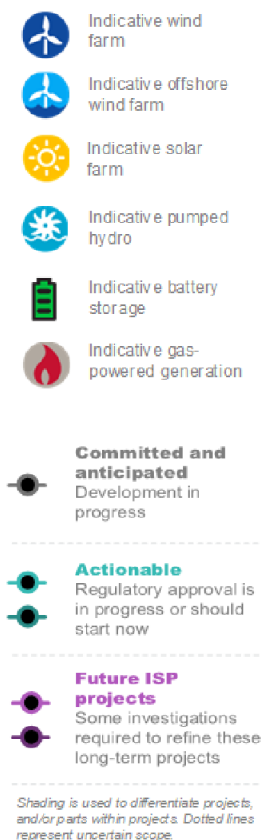


“The state government has committed funding of more than half a billion dollars to build a world-first grid-scale green hydrogen facility by 2025. The facility will include 250 megawatts of electrolyzers, 200 megawatts of power generation, and hydrogen storage infrastructure.”

Generators in the NEM – South Australia



Renewable Energy Projects in Adelaide



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