Final report for NZTE

Market potential study on green data centres in New Zealand

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Analysys Mason has been engaged to perform a market potential study on green data centres in New Zealand to support NZTE

Background

- The New Zealand Government is keen to enable the country to be a thriving digital nation and New Zealand Trade and Enterprise ("NZTE") under the Ministry of Business, Innovation and Employment is spearheading the process.
- New Zealand's South Island is currently not as well developed in the digital economy as the North Island. However, there is potential for the South Island to become a green data centre hub by serving data centre demand from the region. The South Island is suitable for this role given, its high share of renewable energy, its low climate and the planned submarine cable connecting South Island to other countries in the region.
- South Island becoming a green data centre hub would boost the digital economy of the Island and would support the Government's digital nation aspirations.
- Analysys Mason has been engaged to support NZTE by conducting an independent market potential study on green data centres in New Zealand.

Scope

- This is the draft report from our study, covering the following:
  - global data centre market trends and the implications of each trend on the New Zealand market
  - data centre demand forecasts for New Zealand taking into consideration the potential of South Island to become a green data centre hub for the region
  - an overview of the competitive landscape and future supply outlook for both New Zealand and Australia

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The NZ colocation DC market is currently positioned to only serve local demand; this report explores the potential for NZ to become a hub serving international demand

New Zealand's colocation demand forecast considerations

Demand type	Local demand	International demand	
Countries of demand origin	 New Zealand	 Australia	  Singapore / LATAM
Key triggers for New Zealand DC market to capture growth	• Launch of CSPs in New Zealand which could result in enterprises currently with data residing in Australia, to repatriate the data to NZ • CSPs deciding to lease as opposed to self-build which will drive growth in colocation demand	• Improving international connectivity between Australia and New Zealand's South Island via the Hawaiki NUI cable from 2025 • Increasing sustainability objectives of hyperscalers and enterprises can be achieved by locating their DCs offshore in in NZ's South Island (due to favorable green DC characteristics) • Computing requirements of enterprises and education/research institutions are increasing – some workloads can be offshored due to relaxed latency requirements	• Improving international connectivity - the Hawaiki Nui cable is confirmed and will provide connectivity to Singapore, the Humboldt cable is still being considered and will potentially connect New Zealand to Chile • DEPA regulation may encourage increased digital trade and data flows between Singapore/LATAM and NZ • Increasing sustainability objectives from enterprises in other nations • Increasing computing requirements from HPC applications (with relaxed latency requirements)
	Decreasing potential / demand that can be served by New Zealand		
Inclusion in New Zealand colocation market size	✓ Demand generated locally and will be served locally, especially now CSPs are starting to enter New Zealand	✓ There is potential for a share of colo demand to be served by regional offshore DCs e.g. Tasmania or New Zealand once the Hawaiki NUI cable is operational	✗ Our view is that this should be considered as an upside only, due to uncertainties pertaining to other potential hubs, uncertainty with international connectivity and individual country ambitions

Strategic / political ambitions would be needed to help Invercargill / Southland become a more attractive hub

Note: DEPA stands for Digital Economy Partnership Agreement, HPC stands for high performance computing

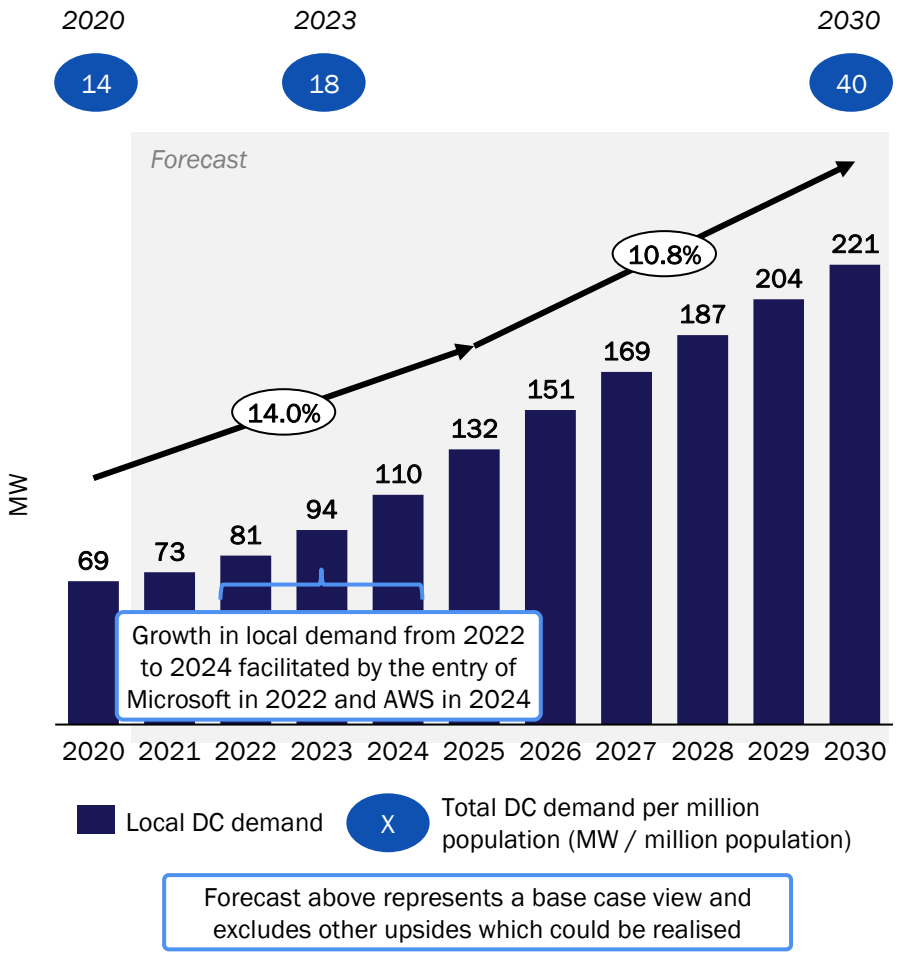
Source: Analysys Mason analysis, news reports

Local DC demand in NZ is expected to grow driven by strong growth in the internet economy, continued migration to the cloud and rising awareness of data localisation

Drivers of local demand for data centres in New Zealand

Driver	Details
Growth in the internet economy	• New Zealand demonstrates high internet penetration (#11 globally) and high social media penetration (#11 globally) • Notably, New Zealander's demonstrate higher use of 'content streaming services', 'banking and financial services apps' and 'general time spent on social media' compared to peers in Australia • Strong local demand for data will drive the internet economy going forward
Increasing cloud adoption	• The NZ Government has a Cloud First policy which requires "organisations to adopt public cloud services in preference to traditional IT systems" • Global CSPs are starting to enter New Zealand to capture growing local demand – from both existing cloud users which may migrate data from other regions back to New Zealand and new enterprises which are just starting the cloud journey • If CSPs partner with DC operators (as opposed to self-build) this could boost local colocation demand
Potential increase in data localisation	• There are no overarching data localisation requirements in New Zealand meaning that most enterprises/the government have been able to rely on DCs and cloud providers in Australia • Incidents of data repatriation have been observed and rising awareness of data privacy could spur more data to be localised

Total local data centre demand forecast in New Zealand[1]



[1] Includes self-build and colocation data centres

Source: Analysys Mason analysis, Structure Research, Digital Government New Zealand, expert interviews, https://www.statista.com/study/85973/key-online-and-social-data-worldwide-2021/

Growth in local DC demand is expected to be a key trigger for global CSPs starting to enter New Zealand – which will continue to fuel the digital economy

Overview of CSPs' presence in Australia and New Zealand

Cloud provider	New Zealand	Australia
Google Cloud	Not yet present	Currently present with regions in Sydney and Melbourne
Amazon Web Services	Building a new region with ready-for-service date (RFS) in 2024	Currently present (Sydney) and launching 2nd region in Melbourne in 2022
Microsoft Azure	Building a new region with estimated RFS by end 2022	Currently present with regions in Sydney, Melbourne and Canberra
Alibaba Cloud	Not yet present	Currently present (Sydney)
Tencent Cloud	Not yet present	Currently present (Sydney)
Oracle Cloud	Not yet present	Currently present with regions in Sydney and Melbourne
IBM Cloud	Not yet present but has a data centre in the country to serve local CSPs	Currently present (Sydney)

We have seen in markets globally that hyperscalers generally enter in succession of one another – as a result more hyperscalers are expected to enter New Zealand in the coming years

- To capture growing demand for cloud services, CSPs have started setting up operations in New Zealand
  - Microsoft became the first CSP to enter New Zealand when it announced plans in 2020 to launch a new region
  - AWS soon followed suit with its own plans for a new region, which is scheduled to enter into service in 2024
- Once local cloud regions are operational, it is likely that local enterprises and New Zealand Government agencies will localise their data workloads to take advantage of lower latencies and address data sovereignty concerns
- Neither AWS nor Microsoft has publicly announced plans to partner with DC operators, though should they elect to do so this could boost local colocation demand
  - while Microsoft has bought land directly from the New Zealand Government, observers have speculated that it may be working with CDC to lease the latter's upcoming DCs
  - as part of AWS' cloud investments in New Zealand, it is understood to have budgeted for hardware and utility costs

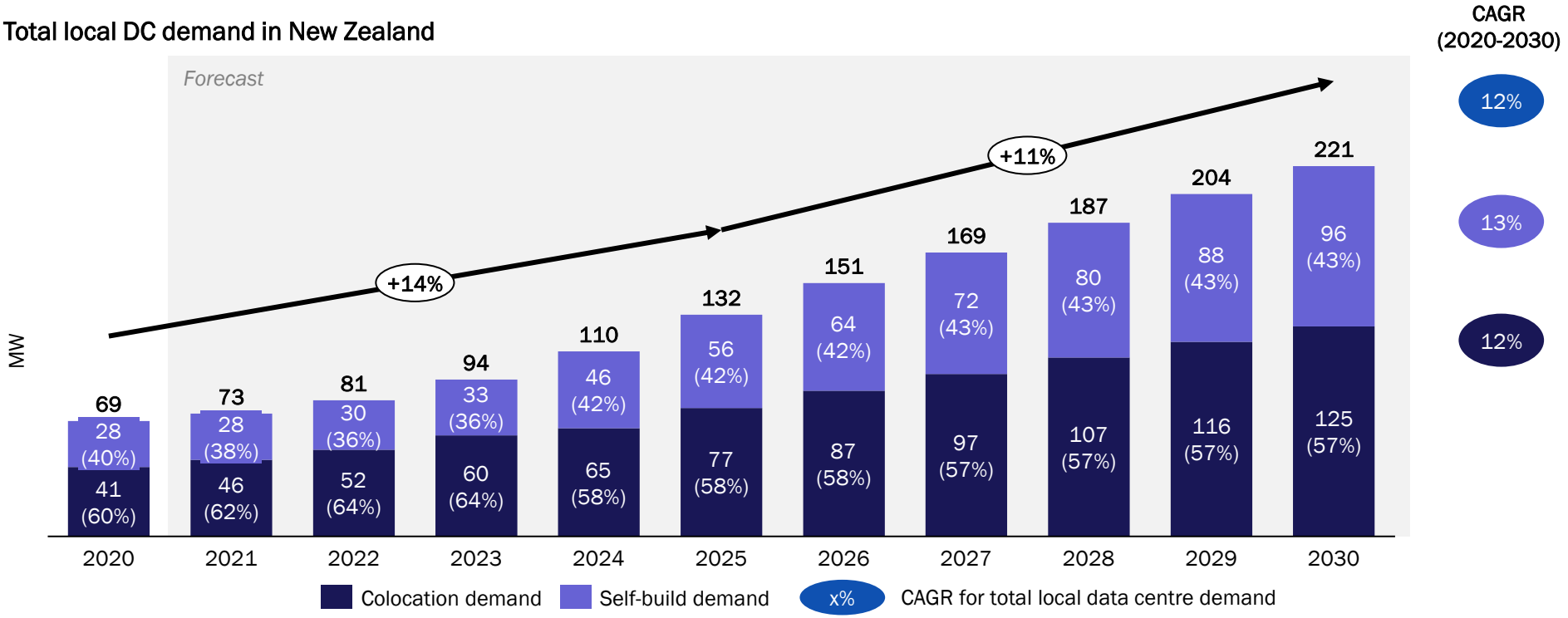
"The local server farms [in New Zealand] would serve local customers like TVNZ ANZ, Vector and Education Perfect even faster and address concerns for those with data sovereignty issues who needed data stored locally."

Tim Dacombe-Bird, AWS New Zealand Head

 Source: News articles, company press releases

We expect CSPs to adopt a hybrid approach between self-building facilities and using colocation facilities; as such, demand for both types of facilities will grow

Total local DC demand in New Zealand



- Currently the majority of total data centre market demand is estimated to be serviced by colocation facilities with the remaining demand residing in self-build facilities which likely come from enterprises storing their data in their own localised data centres
- Going forward, Microsoft and AWS will be entering the NZ market; we have assumed that AWS will self-build and Microsoft will adopt a hybrid approach based on their respective preferences globally and partial indications in the public domain[1]
  - other players (aside from Microsoft and AWS) are expected to have a smaller share of the market and typically have a lower propensity to self-build
- Other colocation providers such as Datagrid NZ, Lake Parime, CDC, Spark and DCI have also announced their intentions to build colocation facilities across the country, including on the South Island

[1] There have been no firm indications in the public domain regarding if AWS and Microsoft will self-build vs. lease

 Source: Analysys Mason Analysis, Structure Research, news reports, expert interviews

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In the future, New Zealand has the potential to attract colocation demand from overseas; improvements in international connectivity will facilitate the hub concept

Key drivers for New Zealand being able to address international demand

Driver	Current situation	Implication
Improving international connectivity 	▪ New Zealand's North Island currently has direct international connectivity via multiple submarine cables to Australia and the USA ▪ Two additional submarine cables have been announced (Hawaiki NUI and Southern Cross Next) with other projects yet to be confirmed ▪ The Hawaiki NUI cable which is expected to be operational in 2025 would provide direct international connectivity between New Zealand's South Island and Australia; the cable will also connect to Indonesia, Singapore and USA	▪ From 2025 the Hawaiki NUI cable will enable future DCs on South Island to address international demand ▪ Further demand could become addressable if additional submarine cable projects are confirmed (eg. Humboldt cable, Antarctica Cable)
Favourable regulatory and policy landscape 	▪ Australia does not currently have overarching data localisation requirements meaning there is no specific need for CSPs or enterprises to use local data centres ▪ New Zealand has two trade agreements in place which enable the cross-border flow of data[1]; a further two trade agreements are being negotiated ▪ The Five Eyes Alliance and Migration Five agreements in place enable the sharing of intelligence information and identity data	▪ The regulatory landscape in Australia allows CSPs / enterprises to transfer data to colocation facilities in New Zealand ▪ Other agreements in place could break down data sovereignty barriers and enable New Zealand to address international demand (eg. DEPA)
Favourable climate and renewable energy generation 	▪ 81% of the electricity generated in New Zealand is renewable, with the share of renewables in South Island expected to be higher than the North Island; the share of renewables is also much higher than in Australia (23%) ▪ The temperature in New Zealand is lower than in other countries in the region, with an average max temperature of 14 degrees Celsius in Invercargill; the temperatures are much lower than in Australia (23 degrees Celsius)	▪ The low climate and high share of renewable energy positions New Zealand's South Island as a favorable location for green DCs ▪ South Island could potentially become a green DC hub for Australia like the Nordics are becoming the green DC hub of Europe
Increasing propensity for sustainability 	▪ Technology titans and CSPs are becoming increasingly concerned about sustainability, with several companies announcing net zero targets ▪ Large enterprises with High Performance Computing (HPC) / large storage requirements are seeking more sustainable compute solutions to meet their Environmental, Social, and Governance (ESG) goals	▪ Companies may look to green DCs in New Zealand to store / process their data as this will enable the enterprises to work towards fulfilling sustainability goals

[1] The scope of data which can be transferred differs between the two agreements. Source: Analysys Mason, IEA, New Zealand Foreign Affairs and Trade, Ministry of Trade and Industry Singapore, news articles, Climate Data

There is strong potential for Australia to offshore demand to green DC hubs which creates an opportunity for New Zealand's South Island to become a green DC hub

In Europe, we have observed extreme cases of technology titans storing up to 100% of data in the Nordics

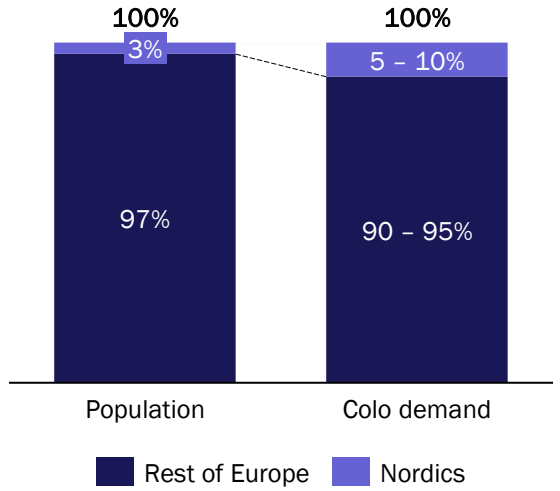
Technology titan's data centres in Europe

	Meta	Apple
DCs in the Nordics	*~70% of Meta's data centre capacity is located in the Nordics*  Luleå, Sweden  Odense, Denmark	*Apple currently only has one DC in Europe located in the Nordics*  Viborg, Denmark
DCs in rest of Europe	 Clonee, Ireland	*Does not have any DCs in the rest of Europe*

- Meta and Apple are non-CSP hyperscalers (i.e tech titans) which have less need for low latency
- This allows them to have DCs further away from population centres as seen from where they have chosen to locate their DCs in Europe

The Nordics are increasingly becoming the green DC hub of Europe accounting for an estimated 5-10% of European demand

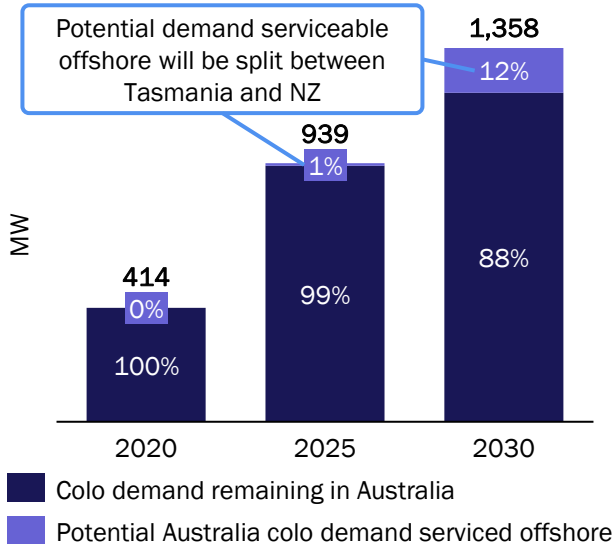
Estimated split of population and data centre colo demand between the Nordics and the rest of Europe in 2020



- The Nordics, have a low population representation as a percentage of Europe
- However, they have a significantly higher representation of total colocation DC demand; indicating they are serving as a hub for demand from Europe

A share of the demand from Australia can potentially be serviced offshore in green DC hubs (e.g. South Island or Tasmania); this can enable NZ to become a hub

Australia's colocation demand and potential % serviceable offshore in green DC hubs



- There is demand for colocation capacity in sustainable locations (e.g. South Island)
- Verticals which are mostly likely to look for offshore solutions include education/research institutions, social media and complex manufacturing

 Source: Company materials, Government statistics, Structure Research, Analysys Mason analysis, expert interviews

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Customers in Australia willing to use offshore green DCs are likely willing to use DCs in Tasmania and South Island NZ to the same extent (assuming sufficient supply)

Competitive positioning of a green DC in South Island vs. Tasmania

Invercargill used as an example given that it is the closest area in South Island (from Australia) where the Hawaiki NUI cable will be connected to

Metric[1]	South Island New Zealand (Invercargill)		Tasmania	
Electricity generated from renewable sources in 2020 (%)	◕	• Electricity generated from renewable sources in Invercargill is expected to higher than the NZ average which is already high at 81%	●	• By end 2020, Tasmania generated 100% of its energy from renewable sources
Temperatures in the region	●	• The South Island, specifically Invercargill has an average max temperature of ~14°C • Its average temperature throughout the year is ~10°C	◕	• Tasmania, specifically Hobart has an average max temperature of ~16°C • Average temperature throughout the year is ~11°C
Electricity prices[2] (USD/kWh)	◑	• Electricity prices in Invercargill are lower compared to the NZ average • Spot prices in Invercargill average USD12.5 cents/kWh (key challenge is for NZ spot pricing to at least be competitive to Tasmania)	●	• Electricity prices in Tasmania are significantly lower compared to Australia's average • Spot prices in Tasmania average USD2.9 cents/kWh
Connectivity to Australia	◕	• The Hawaiki NUI (deployed in 2025) cable is expected to provide direct connectivity between Invercargill and landing stations in Sydney and Melbourne, Brisbane and Darwin • It is expected to have 240Tbit/s of capacity • Latency to Australia likely higher than Tasmania	◔	• Two existing cables (Bass Strait 1 and 2) connecting Tasmania to mainland Australia have limited capacity of ~1Tbit/s each; while a third cable (Basslink) has had multiple reliability issues • The cables are also not connected directly to landing stations in Sydney and Melbourne
Regulations	●	• There are currently no overarching data localisation requirements in Australia which would indicate little to no barrier to data flows	●	• Tasmania is a part of Australia hence data is expected to freely flow between both parts of the country
Overall score	◕	A green DC in South Island would have a strong value proposition; the main weakness would be the high electricity pricing, however this could potentially be mitigated by DC providers negotiating with energy suppliers	◕	Green DCs in Tasmania have a strong value proposition aside from limited bandwidth on submarine connectivity routes to Australia

○ *Unfavourable* — ● *Favourable*

[1] Key metrics considered when picking a green DC location. There are other factors which will be considered when choosing a DC hub more generally which could include but are not limited to: land prices and availability; closeness to customers; workforce competence et cetera; [2] Based on TTM (Q3 2021) average spot pricing data; Source: IEA, Climate Data, TeleGeography, news reports, AER, EMI

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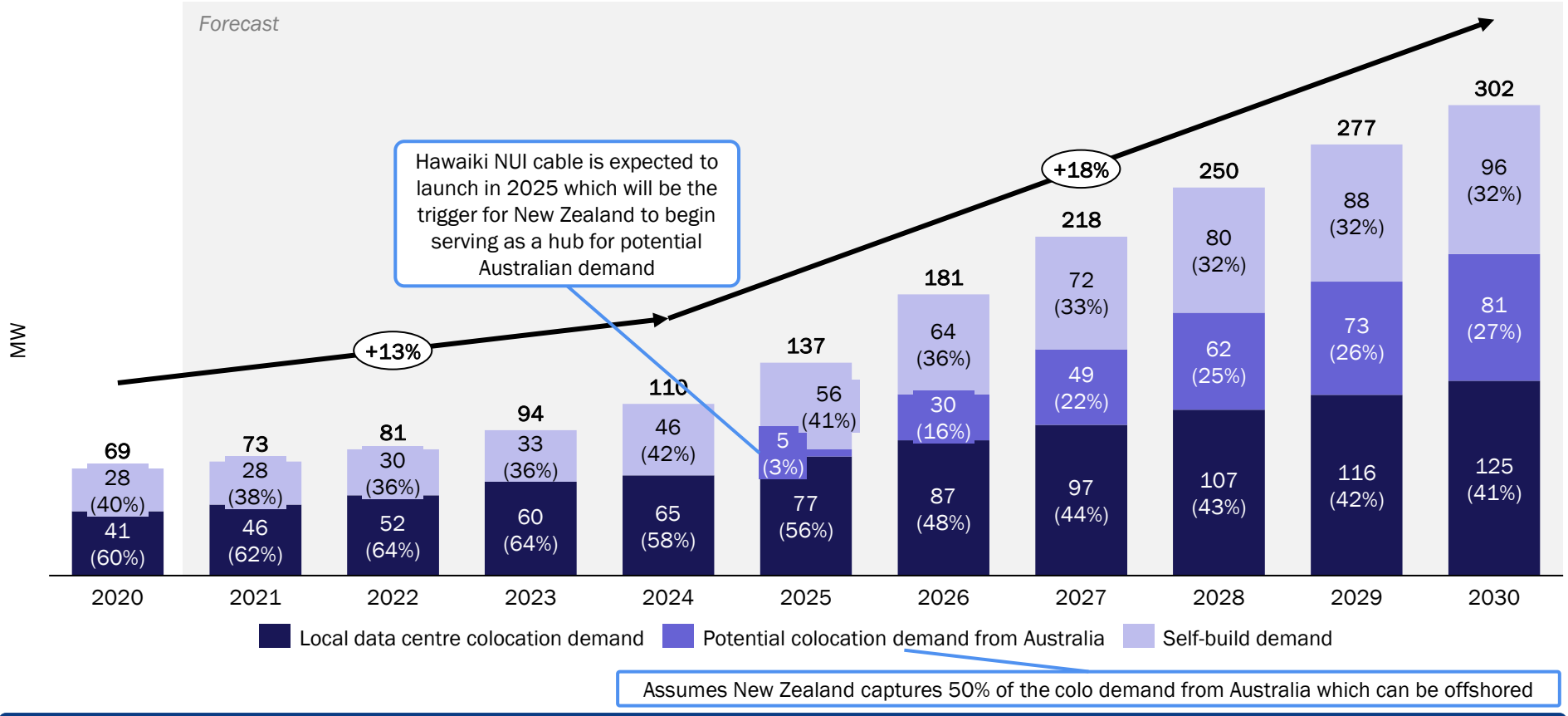
Considering local and potential international demand from Australia, the size of the DC market in New Zealand has the potential to increase by over 4x by 2030

DC demand in New Zealand (local + international)



There is a possibility that overall data centre colocation demand in New Zealand could be higher due to potential demand from Singapore and LATAM – which should be viewed as a potential upside to the overall forecast

 Source: Analysys Mason analysis, Structure Research, Expert interviews

NZ will attract both large and small hyperscale customers; as such, NZ is expected to have slightly higher hyperscale colocation pricing compared to Australia

Typical customers[1] with hyperscale demand expected in New Zealand

Type of customer	Cloud Service Providers (CSPs)	Technology titans	Education/research institutions	Enterprises using HPC
Examples of companies	Google Cloud Microsoft Azure Amazon Web Services	Meta Apple	Research institutes (e.g. biosciences, Geosciences) Universities	Vehicle manufacturers Oil and gas companies Financial industry (back-end / fraud detection)
Expected preferred DC location in NZ	 Auckland – to be close to the end user	 Nationwide including South Island	 Nationwide including South Island	 Nationwide including South Island
Rationale	• Microsoft / AWS have announced DCs in Auckland • In other countries, cloud providers typically are in urban centres	• In the Nordics, technology titans have displayed strong willingness to deploy in remote areas away from population centres	• Education/research institutes do not have a need for low latency and do not need to be located near population centres	• A large portion of compute requirements do not require low latency (e.g. running simulations and big data analytics)
Demand and pricing	Large demand per customer resulting in lower pricing due to economies of scale		Demand may be of smaller magnitude (e.g. 3MW) which would classify them as smaller hyperscalers, resulting in higher pricing	
	The mix of larger and smaller hyperscale demand from companies means that we expect hyperscale colocation pricing in New Zealand to be at a slightly higher price point vs. Australia			

[1] Crypto-currency mining is another industry which has a high demand for processing and does not have any low latency requirements, furthermore the general consensus is that miners are attempting to create more sustainable operations

 Source: Analysys Mason, news reports

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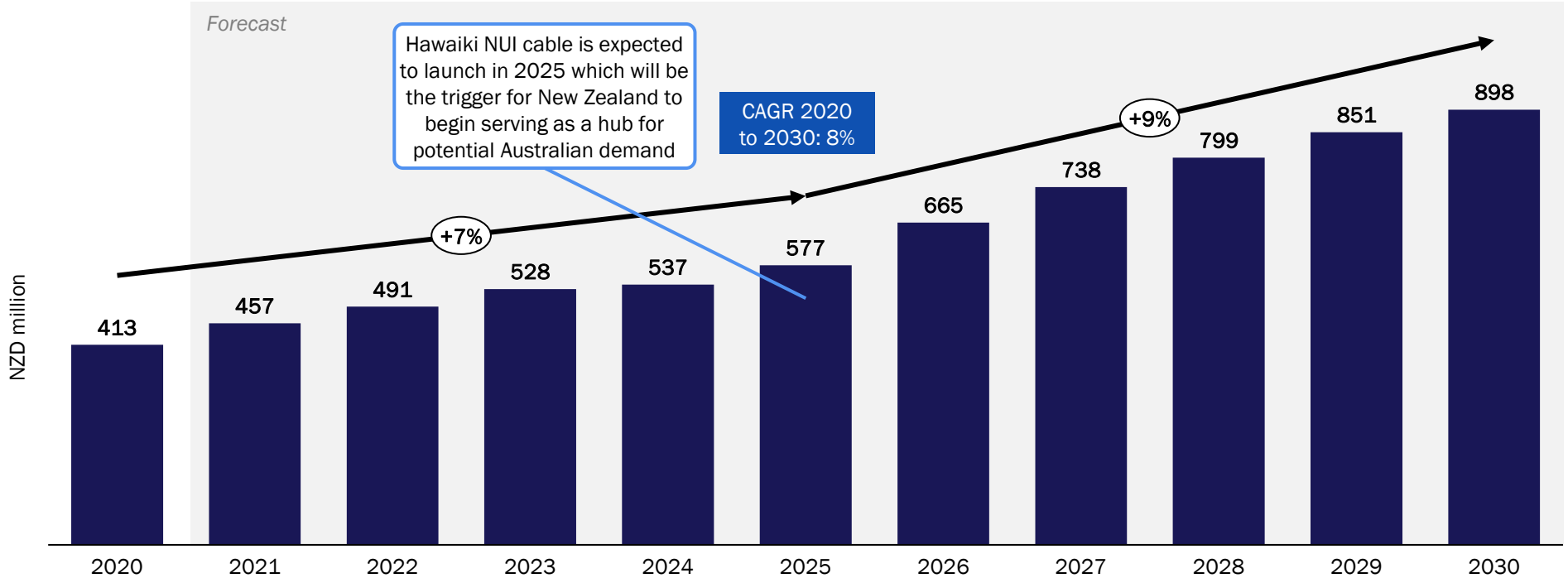
The revenue market size for New Zealand's colocation market is expected to grow at a reasonable CAGR of ~8%; driven by both local and international demand

DC colocation revenue in New Zealand



The basis for calculating revenue from Australian colocation demand is based on New Zealand having comparable hyperscale pricing to Australia – this is vital in order to remain competitive against colocation facilities in Australia

 Source: Analysys Mason analysis, Structure Research, expert interviews

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We have identified several key trends in the global data centre market which have strong implications for the development of New Zealand's data centre market

Global trend	Description	Implications for New Zealand
1 Strong growth in the internet economy and data traffic is driving data centre demand globally	▪ Growing internet penetration globally is increasing access to the internet economy, including e-commerce and online content (social media/ gaming /videos) ▪ Increased use of these applications has spurred growth in data usage, which is driving data storage needs and in turn data centre demand	▪ New Zealand has high internet penetration thanks to strong investments in underlying network infrastructure and is also witnessing strong growth in data usage ▪ This is driving demand for data storage, thus increasing demand for data centres in New Zealand
2 Digital transformation initiatives among enterprises are gaining traction and driving demand for cloud services	▪ Globally, cloud adoption is expected to grow from its relatively nascent state to a more mature state as businesses undergo digital transformation and migrate IT workloads to the cloud ▪ This is reflected in the expected increase in business spend on cloud services	▪ Cloud adoption in New Zealand is likewise forecast to grow rapidly in the coming years as businesses store their data and applications in the cloud ▪ AWS and Microsoft have announced plans to launch dedicated cloud regions in NZ to capture the growing cloud demand, with others likely to follow
3 Data centre demand is becoming dominated by hyperscalers as leading cloud providers expand their geographic reach and technology titans gain scale	▪ Globally, data centre count, especially hyperscale data centres, has increased to meet growing storage and computing needs; key hyperscalers include cloud service providers (CSPs) and technology titans[1] ▪ Hyperscale DC demand can be served by either self-build or colocation; in practice most hyperscalers employ a hybrid strategy	▪ As CSPs start to launch cloud regions in New Zealand, they are expected to adopt a hybrid strategy of self-build and leasing of colocation data centres ▪ This will translate into hyperscale colocation demand which will create an opportunity for data centre providers in New Zealand with hyperscale facilities
4 Data centre customers and governments increasingly care about sustainability which is driving demand for green DCs and the emergence of green DC hubs	▪ Globally, DC customers increasingly care about sustainability; lower power usage effectiveness (PUE)[2] reduces power usage and carbon emissions, better supporting sustainability aims ▪ Net-zero ambitions of hyperscalers and governments globally will drive demand for green DCs including the emergence of green DC hubs which are perhaps further away from the end user but leverage favorable climates and renewable energy sources	▪ New Zealand is a favorable location to build green DCs as the low climate can cut the power requirements needed for cooling and the abundance of renewable energy means DCs can be run by renewable energy as opposed to fossil fuels ▪ In addition, New Zealand is well positioned to become a green DC hub as international connectivity between New Zealand and other countries continues to improve

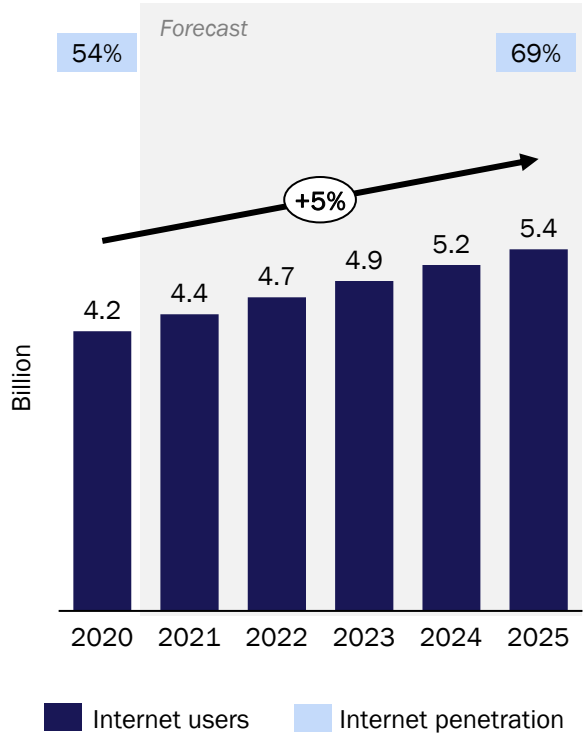
[1] Key CSPs include AWS and Microsoft, key technology titans include Apple and Meta (Facebook) [2] PUE is the ratio between the data centre and IT equipment energy measurement values, and is calculated by dividing the sum of energy usage by the data centre by the sum of energy usage by its IT equipment

Source: Analysys Mason analysis, Schneider Electric

1 Increasing internet penetration, e-commerce activity and the consumption of high-quality content will continue driving the demand for data centre storage globally

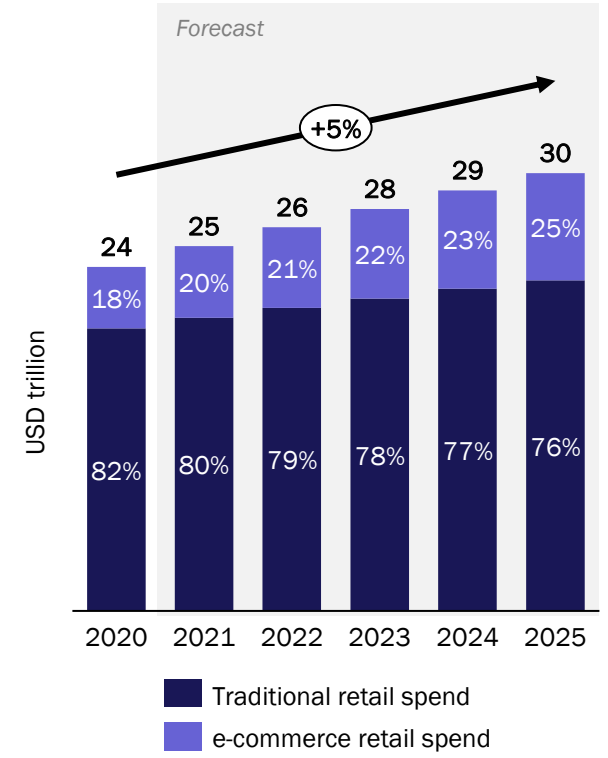
Globally, the volume of internet users is expected to grow driven partially by the continued expansion of mobile and fixed networks

Global internet users and internet penetration



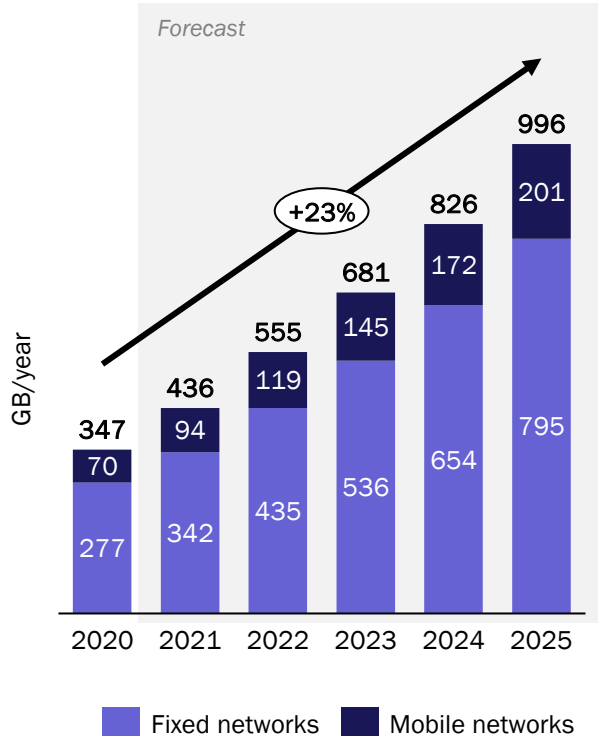
Increasing internet penetration is expected to drive e-commerce spend globally; e-commerce is expected to represent a quarter of total retail spend by 2025

Global e-commerce retail spend and share by traditional vs. e-commerce



Increased use of e-commerce and the consumption of online content (social media / gaming / videos) will continue to spur growth in data usage

Data usage per connection on fixed and mobile networks – global average



 Source: Government statistics, Analysys Mason Research, eMarketer

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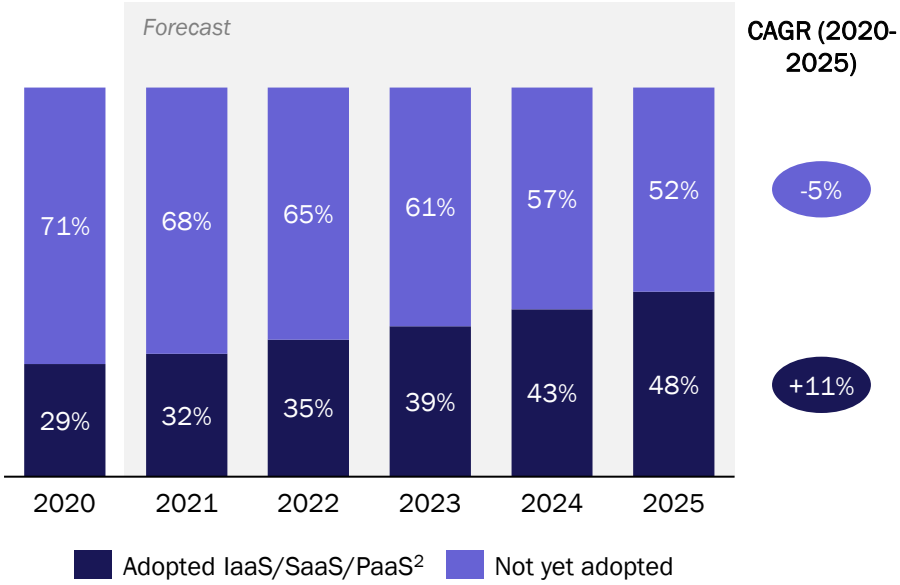
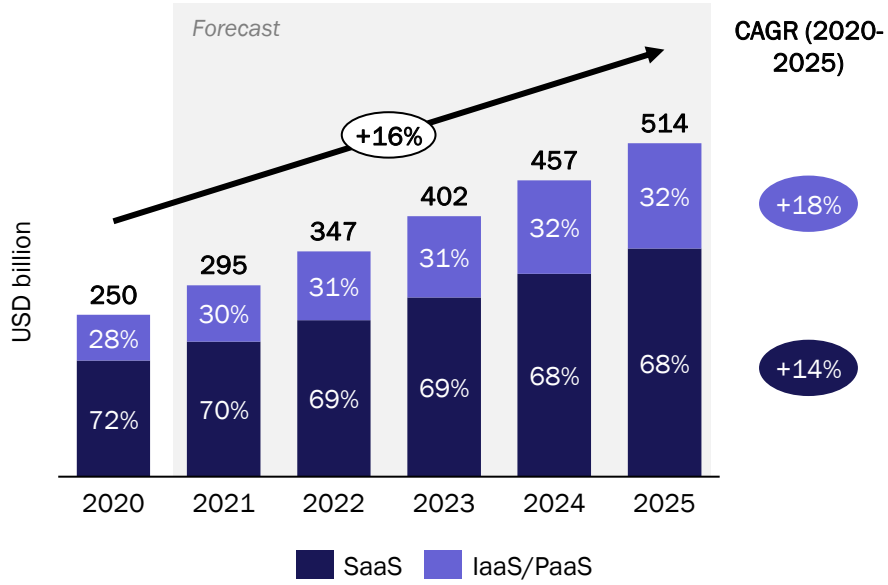
2 Digital transformation initiatives among enterprises globally are gaining traction and driving demand for cloud services; further cloud adoption is expected in NZ as well

Share of businesses[1] adopting cloud globally



Cloud adoption in New Zealand is likewise gaining traction and is forecast to increase from 32% in 2020 to 47% in 2025

Business cloud spend globally



Business spend on cloud services in New Zealand is likewise forecast to grow robustly at a CAGR of 12% from 2020 to 2025

- Globally and in New Zealand, cloud adoption is expected to grow from its relatively nascent state currently to a more mature state as businesses undergo digital transformation and migrate their IT workloads to the cloud
- This is reflected in the expected increase in business spend on cloud services; In New Zealand, two cloud service providers (CSPs) AWS and Microsoft have decided to launch dedicated cloud regions to capture the growing cloud demand, with others likely to follow (possible examples include: Google, Meta, Alibaba, Tencent Cloud, Huawei Cloud, Baidu AI Cloud)

[1] Share of businesses with more than 10 employees that adopt cloud services in their business operations; [2] Infrastructure-as-a-service (IaaS), Software-as-a-service (SaaS) and Platform-as-a-service (PaaS) are sub-segments of cloud services

 Source: AMI Partners SMB Technology Forecaster, news articles

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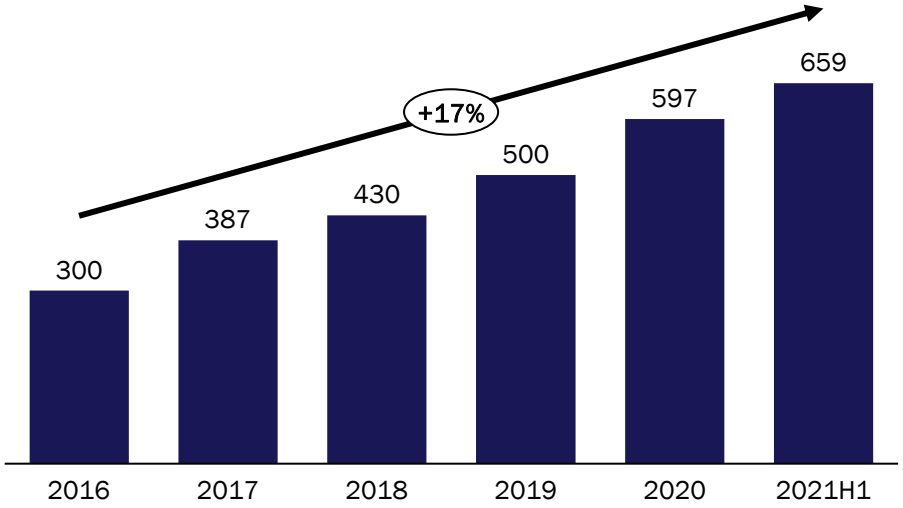
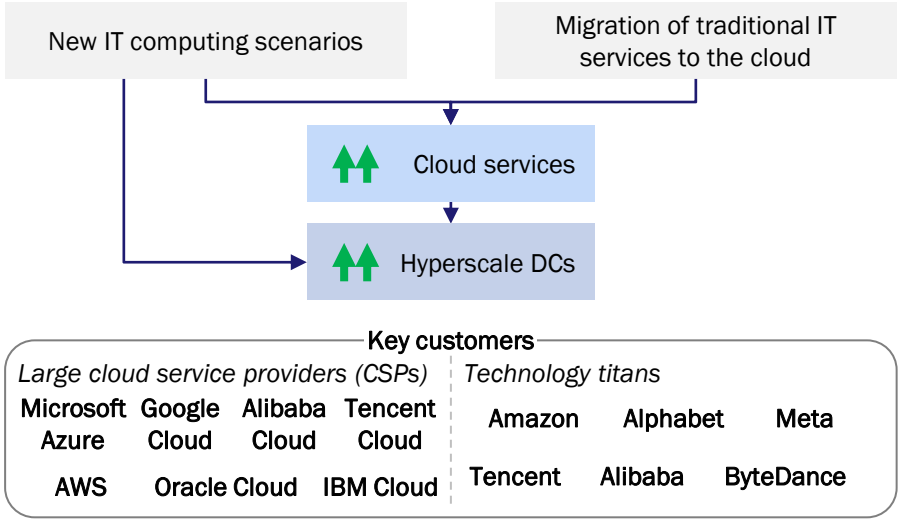
Globally, the volume of hyperscale data centres has increased to meet growing storage and computing needs; key hyperscalers include CSPs and technology titans

Number of hyperscale DCs globally (captive and colocated)



- Around the world, there has been a general increase in the number of data centres, with facilities used to: store the increasing volume of data generated, host cloud-based software (e.g. customer relationship management software) and, provide computing capability to applications (e.g. artificial intelligence)
- As data centre demand has increased, the industry has gradually shifted to large scale facilities known as hyperscale data centres[1] to achieve higher operating efficiencies, economies of scale and greater reliability

Drivers of hyperscale DCs



- Hyperscale DCs serve two main functions that traditional DCs do not thanks to their scale
  - **support cloud services:** data and applications are increasingly hosted online rather than on-premise for on-demand access, thus requiring large storage capacity
  - **facilitate new IT computing scenarios:** businesses are incorporating new applications like artificial intelligence which require large computing power
- Key hyperscalers include CSPs and technology titans

[1] According to Structure Research, hyperscale is used to describe large wholesale colocation deals that range from 3MW and can go up to in excess of 20MW in terms of total contracted IT power

 Source: Analysys Mason, Structure Research

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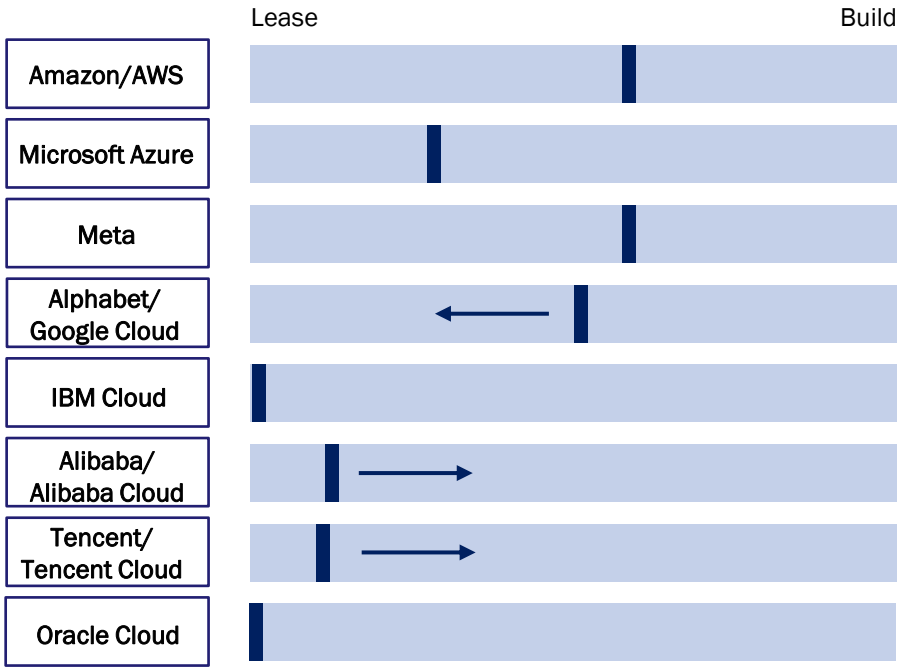
Hyperscale DC demand can be served by either self-build or colocation; in practice most hyperscalers employ a hybrid strategy

Lease vs. build mix for top hyperscalers globally



Hyperscalers adopting hybrid strategy of leasing and self-building in Asia-Pacific – *non-exhaustive list of examples*

Hyperscaler	Approach	Country	Details
AWS	Lease	Singapore	Third availability zone is hosted at a colocation facility
	Self-build	India	Procured 150 acres of land in state of Telangana to build DCs
Microsoft Azure	Lease	Australia	Announced two new Azure cloud regions in Canberra in 2018, hosted in CDC's facilities
	Self-build	Taiwan	Secured land in 2021 to build first data centre
Tencent Cloud	Lease	Malaysia	Selected Green Packet as partner to build hyperscale DC
	Self-build	China	Launched its self-built facility in Qingyuan, Guangdong in 2020

- In general, hyperscale DC demand can be served by either self-build or colocation
  - some hyperscalers (e.g. AWS) have a slight preference to self-build hyperscale data centres to control build quality and costs
  - others (e.g. Alibaba) are known to prefer leasing from dedicated third-party hyperscale DC operators to achieve faster time-to-market
- In practice, most hyperscalers employ a hybrid strategy – they build DC hubs where land / power are cheap and lease DCs elsewhere from high-quality providers with a strong track record; ~70% of all hyperscale DCs are estimated to be leased

 Source: Structure Research, Analysys Mason, news articles, company press release

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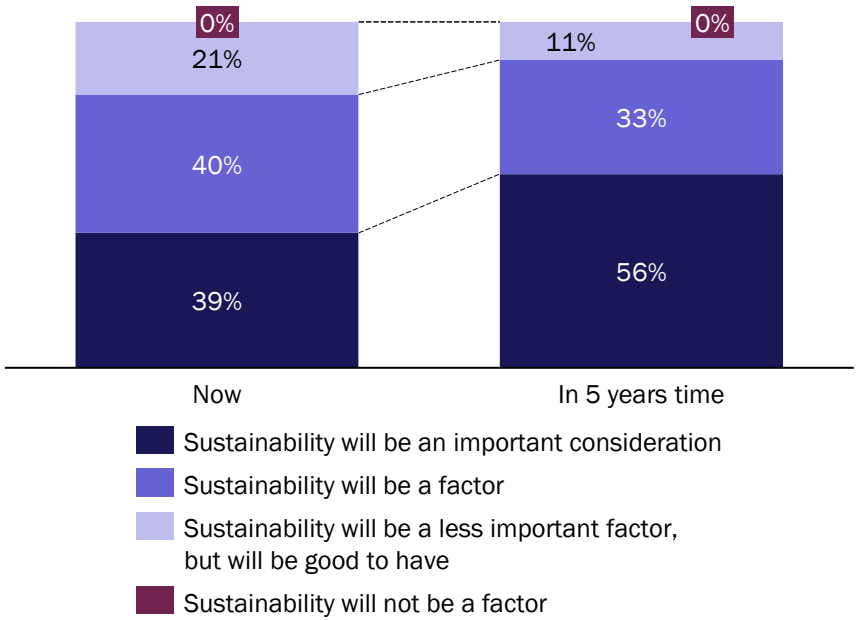
4 Globally, DC customers increasingly care about sustainability; lower PUE reduces power usage and carbon emissions, better supporting sustainability aims

Data centre customers increasingly care about sustainability when choosing providers

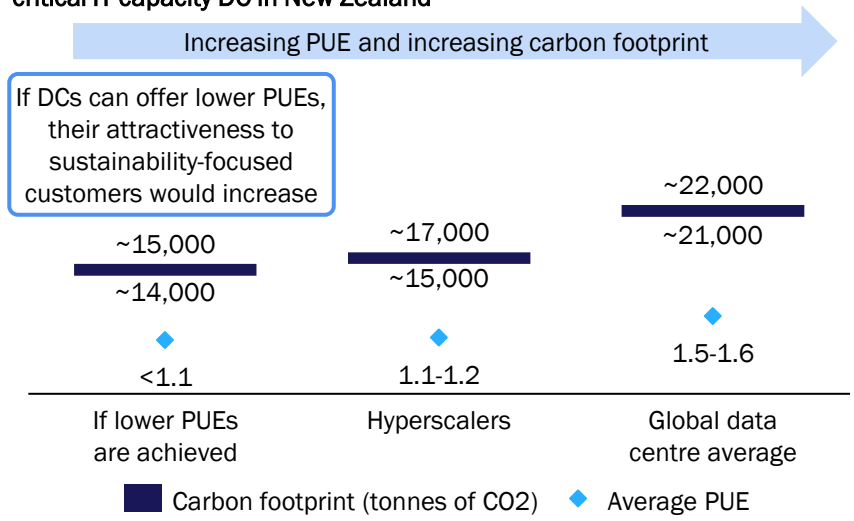
How much of a priority would sustainability be in choosing a third-party data centre?



Note: The survey involved 208 respondents in Indonesia, Malaysia, and Singapore from industries including services, construction, engineering, architecture and real estate

Lower PUEs reduce power usage which can thus lower carbon footprint; DC operators that can attain lower PUEs are thus better positioned to meet customers' sustainability aims

Annual carbon footprint by Power Usage Effectiveness (PUE)[1] for a 10MW critical IT capacity DC in New Zealand[2]



- Data centres typically need electricity to power both core IT computing/storage equipment as well as ancillary equipment (e.g. air-conditioning for cooling)
- Facilities with lower PUE expend less power on ancillary equipment – this lowers their carbon footprint and impact on the environment

[1] PUE is the ratio between the data centre and IT equipment energy measurement values, and is calculated by dividing the sum of energy usage by the data centre by the sum of energy usage by its IT equipment; [2] As estimated by Schneider Electric's data centre carbon footprint calculator

Source: Schneider Electric, https://www.digitalcentre.technology/wp-content/uploads/2020/11/The-Future-of-Data-Centres-in-the-Face-of-Climate-Change-Report.pdf

4 Net-zero ambitions of hyperscalers and governments globally will drive demand for green DCs, which will be enabled by new technologies, energy sources and locations

Net zero commitments and targets set by hyperscalers and governments will drive the demand for green data centres

Net-zero commitments from hyperscalers

Google	Intends to run their data centres on 24/7 carbon-free energy and be water-positive by 2030 across all their data centres
Meta	Committed to reach net-zero greenhouse gas emissions by 2030 through using 100% renewable energy at its offices and data centres
AWS	Committing to reach net-zero carbon emissions across their data centres by 2040 and increase use of efficient energy and water DC cooling methods
Microsoft	Committed to be carbon negative by 2030 and remove all historical carbon emissions by 2050

Net zero initiatives implement by governments

European Union	54 individual data centre operators and 22 data centre and cloud industry trade associations have signed the Climate Neutral Data Centre Pact (CNDCP) to make data centres climate neutral by 2030
China	Both local and central governments have introduced measures requiring minimum PUEs for new builds and for new DCs to increase share of energy from renewable sources (e.g. 100% by 2030 as imposed by Beijing City Government)

New technologies, energy sources and locations are increasingly being used to develop green data centres

New technologies deployed for green data centres

Immersion cooling	Indirect evaporative cooling	Direct-to-chip cooling
(e.g. Alibaba and Tencent in China)	(e.g. Meta in Singapore)	*(e.g. Google in the USA)*

New energy sources deployed for green data centres

Solar power	Wind power	Hydropower
(e.g. NextDC in Australia)	*(e.g. Google in the Netherlands)*	*(e.g. Apple in the USA)*

New locations deployed for green data centres

Floating	Underwater	Caves
(e.g. Keppel Data Centres in Singapore)	*(e.g. Microsoft in Scotland)*	*(e.g. Cavern Technologies in the USA)*

To build in certain locations or utilise certain energy sources, the DC may need to be built away from population centres, which would necessitate a trade-off between network latency, facility PUE and renewable energy usage

Source: Company website and documentation, European Parliament, The People's Government of Beijing Municipality, news articles

4 Increasing demand for green DCs creates an opportunity for certain markets to become green DC hubs by addressing international data centre demand

Markets with DC demand to offshore to green DC hubs typically have...

- Enterprises with sustainability ambitions
- Enterprise verticals with relaxed latency requirements
- Favourable regulation (e.g. no over-arching data localisation requirements)

Markets with potential to be green DC hubs typically have...

- Low temperatures
- High share of energy from renewable sources
- Reasonable international connectivity
- Reasonable power costs

Markets which exhibit the potential to become green DC hubs have a significant opportunity to grow their data centre markets, assuming there is sufficient international demand[1]

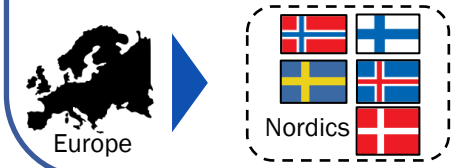
Becoming a green DC hub will increase the size of the country's data centre market

which can in turn bring economic benefits such as...

- Increasing employment
- Improving infrastructure
- Attracting investments and enterprises
- Growing the digital economy

Examples of green DC hubs

The Nordics have become a green DC hub and serve international demand



New Zealand

There is strong potential for NZ to become a green DC hub; resulting in the DC market serving both local and international demand

[1] Geographical proximity of the International demand to the green DC hub also plays a role

 Source: Analysys Mason, Tasmanian Government

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4 We have seen in Europe, that Nordic markets are starting to be positioned as green DC hubs for colocation demand due to favourable supply and demand dynamics

Overview of the dynamics which position the Nordics[1] as green DC hubs for Europe

	Dynamic	Overview	Examples / comparisons
Demand	**Sustainability ambitions of DC customers**	• Several CSPs and technology titans have announced net zero ambitions; these players are increasingly focused on serving demand by using green data centres	**Meta** **Google Cloud** **AWS** **Microsoft** **Apple**
Demand	**Rise in demand from verticals with relaxed latency requirements**	• Enterprises with High Performance Computing (HPC) needs, and relaxed latency requirements are increasingly using colocation providers in the Nordics for sustainability • Crypto currency miners have chosen the Nordics due to cheap and renewable power	**Hewlett Packard Enterprise** **BMW** **Daimler** **Volkswagen**
Supply	**Low temperatures**	• The lower temperature witnessed across the Nordics (especially Iceland) compared to DC hubs[2] in Europe provide a greater ability to use free cooling which in turn reduces energy use	Average max temperature of **~17°C** in Nordics vs **~19°C** in established European hubs[2]
Supply	**High share of energy from renewable sources**	• The Nordics have an abundance of natural resources which allows them to generate large amounts of renewable power	**~80%** of electricity in the Nordics generated from renewables vs **~37%** in Europe
Supply	**Improving International connectivity**	• Countries generally have direct connectivity to elsewhere within and outside of Europe • Planned submarine cables will further improve connectivity and increase the addressable market for DCs in the Nordics	Examples of connected countries Russia, The USA, UK, Germany
Supply	**Reasonable power costs**	• Countries in the Nordics generally have ~10 to 40% lower electricity costs compared to European average – which allows DC customers to lower their total cost	Europe: **~USD7 cents/kWh** vs. Nordics: **~USD5 cents/kWh**
Regulation	**Incentives**	• Majority of the Nordic countries have introduced financial incentives in recent years to encourage operators to build DCs	Norway, Finland, Iceland, Sweden
Regulation	**Constraints from policies in Europe**	• Some countries in Europe have imposed restrictions (e.g. moratoriums, power/PUE restrictions) on DC builds citing sustainability and resource concerns • Restrictions in existing DC hubs could improve the prospects for Nordic DCs	Netherlands, Germany

[1] Countries considered in the Nordics include Denmark, Finland, Iceland, Norway and Sweden; [2] Hubs in Europe considered are London, Paris, Amsterdam and Frankfurt

Source: Company websites, Climate Data, IEA, TeleGeography, news reports

4 The Nordics are attracting demand from hyperscalers with a propensity for Green DCs or from enterprise verticals with relaxed latency requirements

Hyperscalers with data centres in the Nordics [1]

Apple	Apple decided to build its Viborg data centre in Denmark due to its ability to leverage sustainable **green power to meet its net-zero carbon emission targets**
Microsoft	"Microsoft has selected Sweden as the site for one of its most advanced, sustainable datacenter regions, due to the country's **strong commitments to sustainability** and innovation"
Meta	Facebook (now Meta) chose its location in Sweden to due to "**the cool, dry climate** [which…allows them] to continue [their] practice of using outside air to cool [their] data centers."

Use cases in the Nordics which do not require low latency

Use cases	Details
Technology titans requiring storage	• Large technology titans such as Meta and Apple do not require low latency links to data storage • For example, Apple only has one data centre in Europe which is in the Nordics (Denmark) while ~two-thirds of Meta's European data centre capacity is located in Nordic countries (Denmark and Sweden)
Enterprises with HPC requirements	• Enterprises with HPC requirements such as financial institutions, manufacturers and education/research institutions require the storing and processing of vast amounts of data but have relaxed latency requirements • For example, Daimler (one of the largest automotive manufacturers globally) is transferring its HPC workloads to Lefdal Mine Datacenter in Norway in a bid to becoming carbon neutral by 2039 • BMW and Volkswagen use Verne Global's data centres in Iceland to power their HPC processing (e.g. computer-aided design and aerodynamic calculations); Volkswagen also uses Green Mountain's DCs in Norway for its HPC workloads • HPE uses Digiplex's DCs in Sweden to run HPC and AI workloads citing the abundance of cheap and sustainable energy
Crypto currency mining	• Crypto currency miners have viewed the Nordics as a 'green haven' to conduct operations due to the abundance of green energy and low energy prices • Examples of miners with operations in the Nordics include Hive Blockchain, Genesis Mining and Bitfury

[1] Iceland has been excluded from map as no hyperscalers currently have facilities in Iceland, however there is a presence of hyperscale facilities

 Source: Company websites, news reports

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Contents

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Colocation DCs in NZ are currently positioned to serve local data centre demand however, there is strong potential for them to also serve international DC demand

New Zealand's colocation demand forecast considerations

We will explore the market size and demand drivers of both demand types (highlighted by the navigator in the top right-hand corner) in subsequent slides

Demand type	Local demand	International demand	
Countries of demand origin	 New Zealand	 Australia	  Singapore / LATAM
Key triggers for New Zealand DC market to capture growth	• Launch of CSPs in New Zealand which could result in enterprises currently with data residing in Australia, to repatriate the data to NZ • CSPs deciding to lease as opposed to self-build which will drive growth in colocation demand	• Improving international connectivity between Australia and New Zealand's South Island via the Hawaiki NUI cable from 2025 • Increasing sustainability objectives of hyperscalers and enterprises can be achieved by locating their DCs offshore in in NZ's South Island (due to favorable green DC characteristics) • Computing requirements of enterprises and education/research institutions are increasing – some workloads can be offshored due to relaxed latency requirements	• Improving international connectivity - the Hawaiki Nui cable is confirmed and will provide connectivity to Singapore, the Humboldt cable is still being considered and will potentially connect New Zealand to Chile • DEPA regulation may encourage increased digital trade and data flows between Singapore/LATAM and NZ • Increasing sustainability objectives from enterprises in other nations • Increasing computing requirements from HPC applications (with relaxed latency requirements)
	Decreasing potential / demand that can be served by New Zealand		
Inclusion in New Zealand colocation market size	✓ Demand generated locally and will be served locally, especially now CSPs are starting to enter New Zealand	✓ There is potential for a share of colo demand to be served by regional offshore DCs e.g. Tasmania or New Zealand once the Hawaiki NUI cable is operational	✗ Our view is that this should be considered as an upside only, due to uncertainties pertaining to other potential hubs, uncertainty with international connectivity and individual country ambitions

Strategic / political ambitions would be needed to help Invercargill / Southland become a more attractive hub

Note: DEPA stands for Digital Economy Partnership Agreement, HPC stands for high performance computing

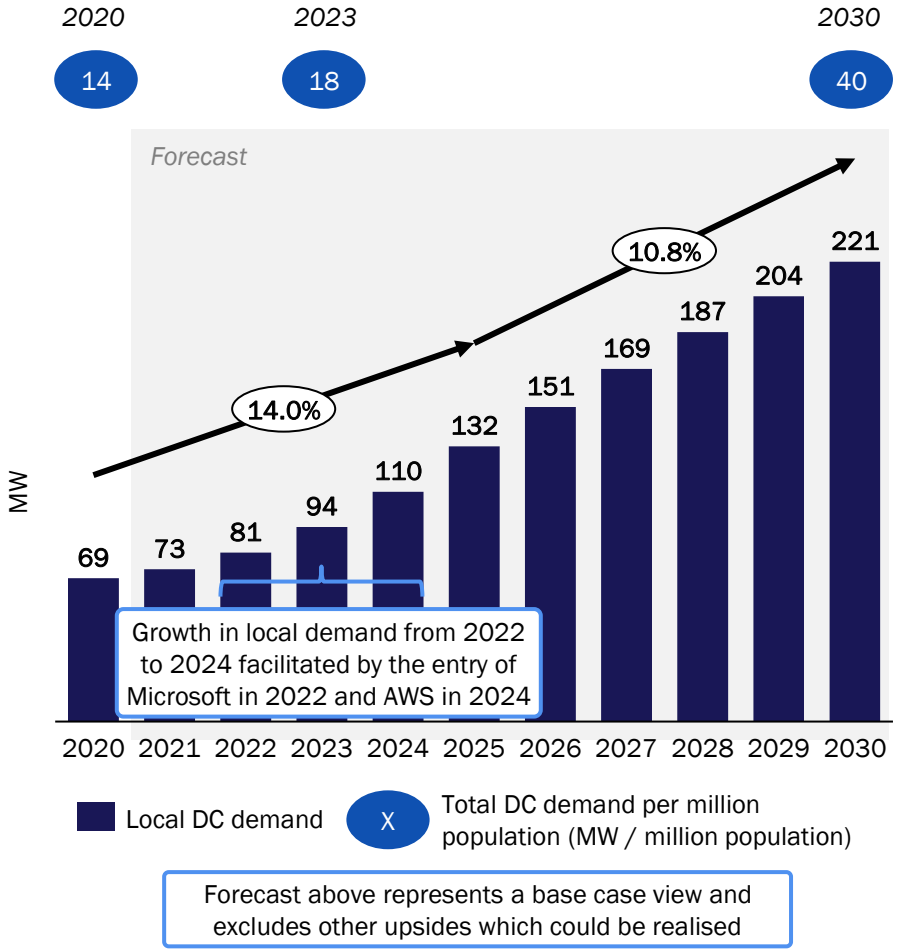
Source: Analysys Mason, news reports

Local DC demand in NZ is expected to grow driven by strong growth in the internet economy, continued migration to the cloud and rising awareness of data localisation

Drivers of local demand for data centres in New Zealand

Driver	Details
Growth in the internet economy	• New Zealand demonstrates high internet penetration (#11 globally) and high social media penetration (#11 globally) • Notably, New Zealander's demonstrate higher use of 'content streaming services', 'banking and financial services apps' and 'general time spent on social media' compared to peers in Australia • Strong local demand for data will drive the internet economy going forward
Increasing cloud adoption	• The NZ Government has a Cloud First policy which requires "organisations to adopt public cloud services in preference to traditional IT systems" • Global CSPs are starting to enter New Zealand to capture growing local demand – from both existing cloud users which may migrate data from other regions back to New Zealand and new enterprises which are just starting the cloud journey • If CSPs partner with DC operators (as opposed to self-build) this could boost local colocation demand
Potential increase in data localisation	• There are no overarching data localisation requirements in New Zealand meaning that most enterprises/the government have been able to rely on DCs and cloud providers in Australia • Incidents of data repatriation have been observed and rising awareness of data privacy could spur more data to be localised

Total local DC demand forecast in New Zealand[1]



[1] Includes self-build and colocation data centres

Source: Analysys Mason analysis, Structure Research, Digital Government New Zealand, expert interviews, https://www.statista.com/study/85973/key-online-and-social-data-worldwide-2021/

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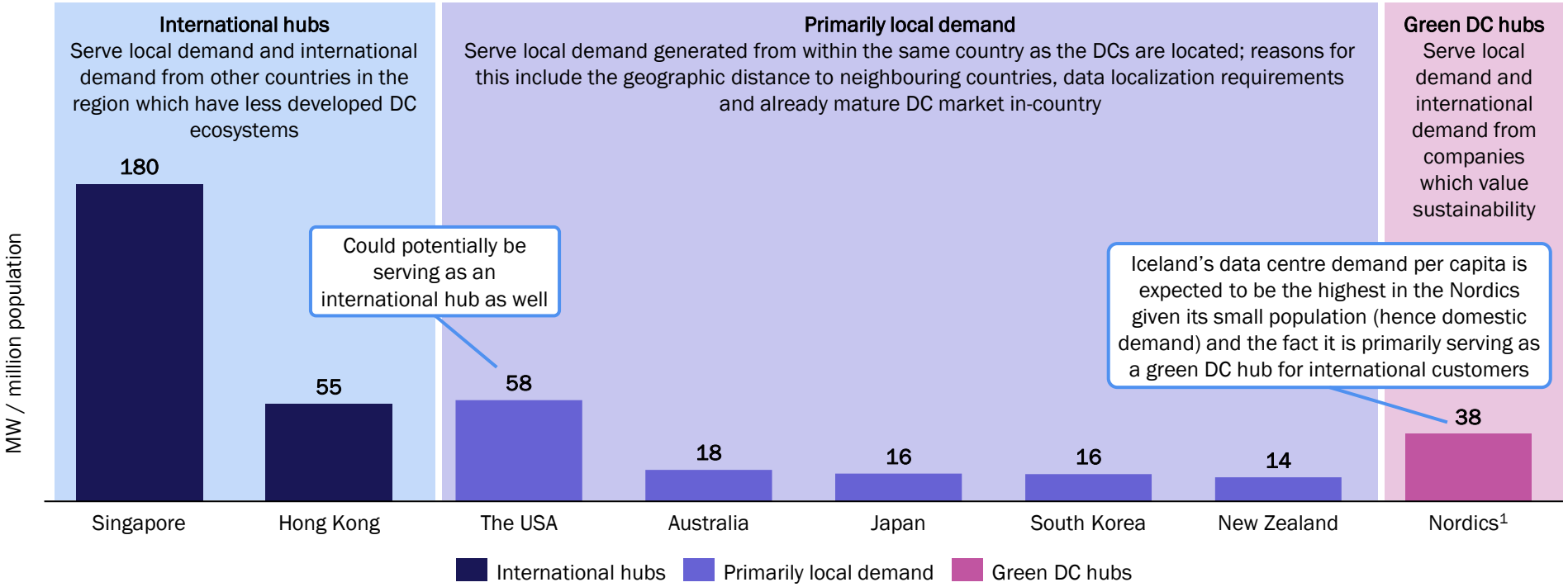
Data centre demand per capita in New Zealand is currently low compared to benchmarks indicating the market has strong growth potential in the next few years

Data centre demand per million population – *2020 estimates*



- **Data centre demand** is the total amount of capacity used from all types of data centres in a country, types of data centres include: self-built facilities by hyperscalers; on-premise data centres housed in organisations for their own use; and colocation data centres
- Demand forecast for New Zealand consider a progressive increase in data centre demand per million population, from 14 in 2020 to 40 in 2030 – additional upside can be realised due to the arrival Hawaki NUI which could enable New Zealand to attract demand from Australia which in turn would bring the data centre demand per million population to ~55 by 2030

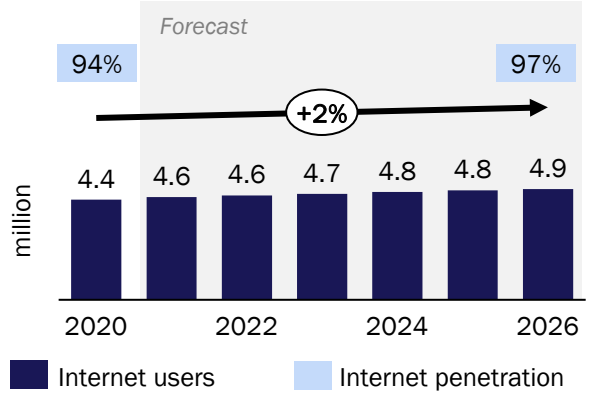
[1] Countries considered in the Nordics include Denmark, Finland, Iceland, Norway and Sweden

 Source: Analysys Mason analysis, Government statistics, expert interviews

High internet penetration, increasing e-commerce activity and consumption of high-quality content will drive demand for data centre storage in New Zealand

Internet penetration is high in New Zealand and is forecast to continue growing, facilitated by strong investments in underlying network infrastructure

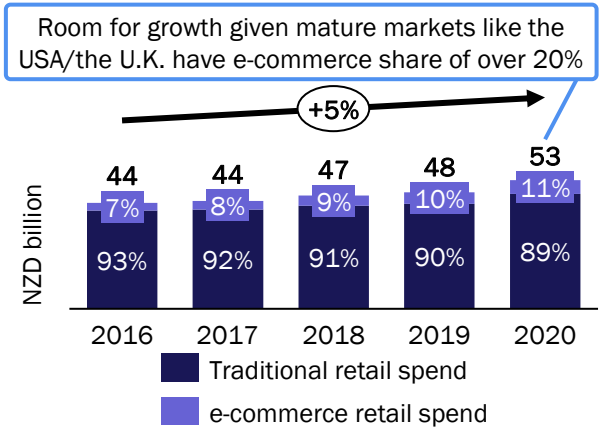
New Zealand total internet users and internet penetration



- Internet services can be accessed by either mobile or fixed networks
- New Zealand's high internet penetration rate has been facilitated by:
  - high mobile network coverage of ~98% of the population
  - strong investments in fixed network infrastructure – the Ultra-Fast Broadband government initiative has boosted home fibre penetration to 85% since 2008

Increased access to the internet has spurred growth in New Zealand's e-commerce market; further growth is also expected

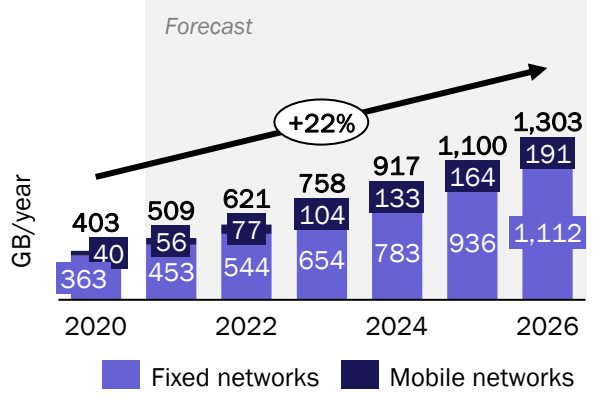
New Zealand e-commerce retail spend and share by traditional vs. e-commerce



- Increased access to the internet has fueled the rise of New Zealand's e-commerce industry, which grew at a compound annual growth rate (CAGR) of 16% from 2016 to 2020
- Going forward, New Zealand's e-commerce market is likely to continue growing with evolving consumer preference towards digital means of purchasing

Increased use of e-commerce and the consumption of online content (social media / gaming / videos) has spurred growth in data usage

Data usage per connection on fixed and mobile networks in New Zealand



- Increased use of e-commerce and the consumption of data-intensive online content (social media/gaming/videos) has spurred growth in data usage
- In 2020, 82% of New Zealand's population were active social media users (#11 globally), spending an average of 1 hour 55 minutes on social media daily

Source: Government statistics, operator websites, Ministry of Business, Innovation and Employment, NZ Post, Analysys Mason Research, https://www.statista.com/study/85973/key-online-and-social-data-worldwide-2021/

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Growth in local DC demand is expected to be a key trigger for global CSPs starting to enter New Zealand – which will continue to fuel the digital economy

Overview of CSPs' presence in Australia and New Zealand

Cloud provider	New Zealand	Australia
Google Cloud	Not yet present	Currently present with regions in Sydney and Melbourne
Amazon Web Services	Building a new region with ready-for-service date (RFS) in 2024	Currently present (Sydney) and launching 2nd region in Melbourne in 2022
Microsoft Azure	Building a new region with estimated RFS by end 2022	Currently present with regions in Sydney, Melbourne and Canberra
Alibaba Cloud	Not yet present	Currently present (Sydney)
Tencent Cloud	Not yet present	Currently present (Sydney)
Oracle Cloud	Not yet present	Currently present with regions in Sydney and Melbourne
IBM Cloud	Not yet present but has a data centre in the country to serve local CSPs	Currently present (Sydney)

We have seen in markets globally that hyperscalers generally enter in succession of one another – as a result more hyperscalers are expected to enter New Zealand in the coming years

- To capture growing demand for cloud services, CSPs have started setting up operations in New Zealand
  - Microsoft became the first CSP to enter New Zealand when it announced plans in 2020 to launch a new region
  - AWS soon followed suit with its own plans for a new region, which is scheduled to enter into service in 2024
- Once local cloud regions are operational, it is likely that local enterprises and New Zealand Government agencies will localise their data workloads to take advantage of lower latencies and address data sovereignty concerns
- Neither AWS nor Microsoft has publicly announced plans to partner with DC operators, though should they elect to do so this could boost local colocation demand
  - while Microsoft has bought land directly from the New Zealand Government, observers have speculated that it may be working with CDC to lease the latter's upcoming DCs
  - as part of AWS' cloud investments in New Zealand, it is understood to have budgeted for hardware and utility costs

"The local server farms [in New Zealand] would serve local customers like TVNZ ANZ, Vector and Education Perfect even faster and address concerns for those with data sovereignty issues who needed data stored locally."

Tim Dacombe-Bird, AWS New Zealand Head

 Source: News articles, company press releases

New Zealand does not have overarching data localisation requirements; enterprises and government agencies have been able to rely on cloud regions in Australia

Key legislation / laws on data localisation requirements

- Currently, there is no overarching data localisation requirement governing data residency in New Zealand, although some data localisation regulations by government agencies may apply
  - government agencies are prohibited from storing confidential information overseas
  - the Inland Revenue requires businesses to store business records in DCs physically located in New Zealand
- Privacy in New Zealand is regulated based on the Privacy Act 2020, which requires entities transferring data overseas to seek approval of the individual concerned or to take reasonable steps to ensure the overseas recipient will handle personal data in accordance with the Privacy Act
- Under the Privacy Act, the Privacy Commissioner has discretion to prohibit personal information transfer from New Zealand to another country if two conditions are met:
  - the information concerned is received in New Zealand from another country and is likely to be transferred to a third country where it will not be subject to comparable safeguards to those in the Privacy Act
  - the transfer would likely breach basic principles of the OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data

Implications and outlook for in-country data storage requirements

- Under current legislation with an absence of overarching data localisation requirement, there is generally no specific need for public cloud service providers (CSPs), enterprises or government agencies to use local data centres[1]
- Enterprises and government agencies may, in theory, lease colo capacity from overseas DC facilities or overseas cloud services which would reduce local data centre demand in New Zealand
  - enterprises and government agencies are currently leveraging cloud regions in neighbouring Australia to meet their IT infrastructure needs; these cloud regions typically rely on data centres in Australia
- Going forward, this reliance on Australian DCs/cloud regions has the potential to reduce due to emerging trends in New Zealand
  - as New Zealand's DC market develops and adds more capacity, we expect enterprises and governments to be able to realise benefits (more sustainable operations, reduced latency) by using local facilities and as such, favour doing so
  - as CSPs start to develop a presence in New Zealand, we expect enterprises to favour using the local region of the cloud provider, notwithstanding one time costs involved with data migration

New Zealand has relatively open data storage requirements in contrast to other developed economies like the USA which make in-country storage of data a strong requirement for all cloud providers (i.e. US Cloud Act) – it is unclear if NZ will adopt such a policy in the future

[1] Except for storage of business records for enterprises and storage of national security information for government agencies

Source: New Zealand Legislation, Office of the Privacy Commissioner, Future of Privacy Forum, Inland Revenue New Zealand, Analysys Mason analysis

Regulation from the Inland Revenue requires certain data to be stored locally; data repatriation could also become more prominent with rising data privacy concerns

Overview of New Zealand Inland Revenue' s Revenue Alert RA 10/02 (2010)

Applicability	▪ A person/business who carries on any business or any other activity for the purpose of deriving assessable income in New Zealand
Selected scope relevant to data centres/cloud services	▪ Individuals/companies need to store business records in DCs physically located in New Zealand to comply with the record keeping obligations ▪ Those using a cloud computing service will need to be satisfied that all business records will be stored in data centres located in New Zealand ▪ It is allowed to use cloud computing to back up business records provided the primary business records are stored in New Zealand

- Starting from 2010, the Inland Revenue requires businesses to store business records in DCs physically located in New Zealand
- As more businesses undergo digital transformation and digitise their business records, there will likely be growing demand for data storage locally, both through colocation and hosting on public clouds with local DCs

Data repatriation of New Zealand data hosted overseas

Case study: Department of Conservation (DoC)'s repatriation of data back to New Zealand

Department of Conservation Te Papa Atawhai + Te Rūnanga o NGĀI TAHU

- In 2019, the DoC repatriated genome information of the kākāpō, a species of rare native bird in New Zealand, back to a locally-based database from AWS' cloud-based service hosted in Sydney
- This came four years after the initial decision to migrate kākāpō's genome information to AWS Australia following the closure of the data centre DoC was colocating in

- In 2019, the DoC repatriated data on overseas cloud services; in 2021 the New Zealand Government was petitioned to repatriate vaccine certificates from overseas-owned clouds due to privacy concerns
- While incidents of data repatriation have largely been isolated events, more petitions for local data storage could occur due to rising awareness and concerns around data privacy

Data localisation regulations from the Inland Revenue and instances of data repatriation are both expected to be drivers for local data centre demand in New Zealand

 Source: New Zealand Inland Revenue, news article

NZ Government's Cloud First policy has led to some workload hosted overseas (e.g. Australia); this is expected to change as CSPs set up cloud regions in New Zealand

Overview of New Zealand Government's cloud policy and initiatives

a Government Cloud Programme

DIGITAL.GOVT.NZ

- To advance New Zealand's digital agenda and digital economy, the NZ Government set up the Government Cloud Programme to promote the use of cloud services by the public service
- This includes working actively with agencies to assist with their cloud adoption planning and common cloud-related challenges
- Target of the policy includes New Zealand's public and non-public service departments, the 20 district health boards, and 7 Crown entities

b New Zealand Government's Cloud First Policy (2015)

Data type	Brief description	Allowed on public cloud?	Data localisation?
Confidential, Secret, Top Secret	National security information whose compromise would damage national interests	No	Yes
Restricted	National security information whose compromise would be harmful to New Zealand	Yes	No
Sensitive	Policy and privacy information whose compromise would damage the interests of New Zealand or endanger the safety of its citizens	Yes	No
In-confidence	Policy and privacy information whose compromise would prejudice the maintenance of law and order	Yes	No
Unclassified	All information published to the government web domain that is not protected by access controls	Yes	No

Significant portion of NZ Government's data

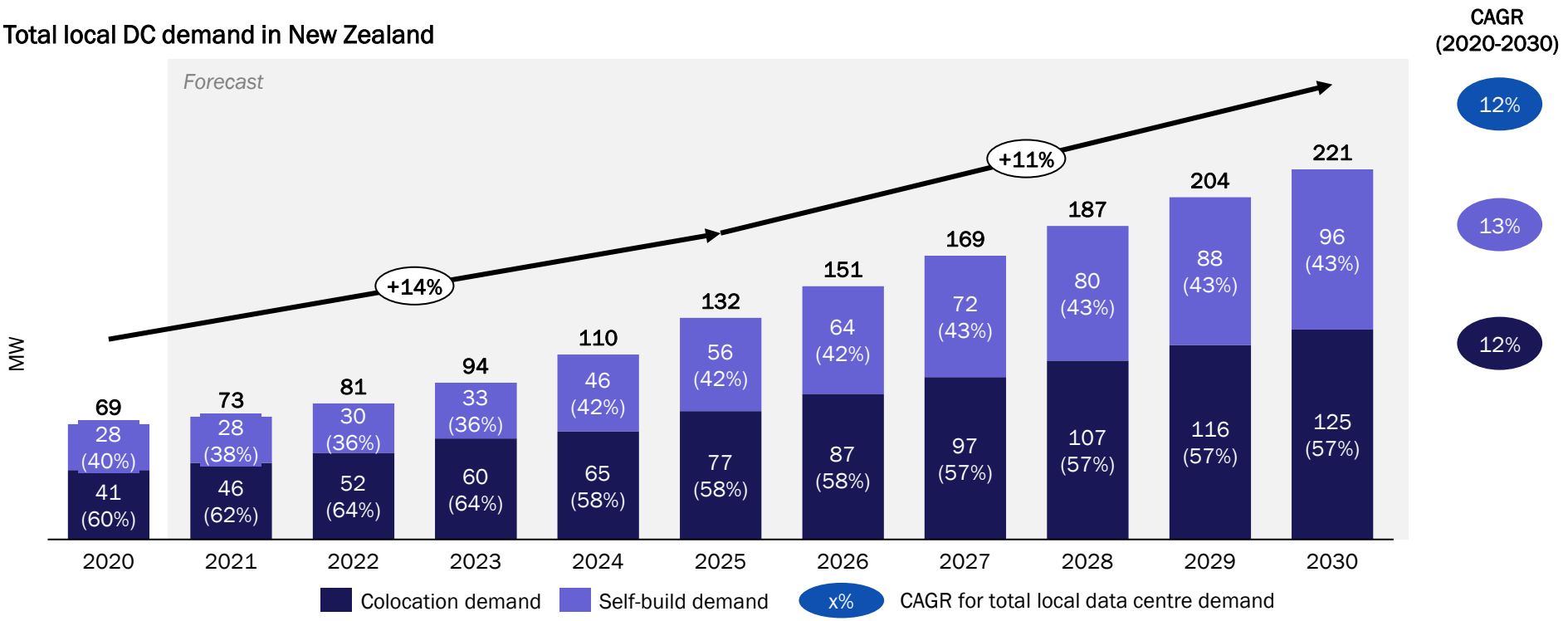
- The Cloud First policy requires government agencies to **adopt public cloud services in preference to traditional IT systems** (incl. third-party colocation), following risk assessments

- Under the Cloud First Policy, a significant portion of NZ Government's data likely does not have data localisation restrictions; this has enabled some government workload to be hosted overseas in locations where CSPs have DCs (e.g. Australia)[1] however, this is likely to change as CSPs set up cloud regions within New Zealand
- That said, some government agencies have expressed a preference to choose cloud providers with data centres physically located in New Zealand – for example, Ministry of Health and Statistics New Zealand are both using cloud services from local CSP Cloud Catalyst; another notable group with this preference is the NZ Māori which places its data sovereignty in high regard

[1] It should be noted that the progress of NZ Government's cloud migration (and thus the volume of government data currently hosted overseas) is unknown

Source: Digital Government New Zealand, company websites

Local data centre demand in New Zealand will be served by a combination of colocation and self-build; both types of facilities are expected to show strong growth



- Currently the majority of total data centre market demand is estimated to be serviced by colocation facilities with the remaining demand residing in self-build facilities which likely come from enterprises storing their data in their own localised data centres
- Going forward, Microsoft and AWS will be entering the NZ market; we have assumed that AWS will self-build and Microsoft will adopt a hybrid approach based on their respective preferences globally and partial indications in the public domain[1]
  - other players (aside from Microsoft and AWS) are expected to have a smaller share of the market and typically have a lower propensity to self-build
- Other colocation providers such as Datagrid NZ, Lake Parime, CDC, Spark and DCI have also announced their intentions to build colocation facilities across the country, including on the South Island

[1] There have bene no firm indications in the public domain regarding if AWS and Microsoft will self-build vs. lease

 Source: Analysys Mason Analysis, Structure Research, news reports, expert interviews

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In the future, New Zealand has the potential to attract colocation demand from overseas; improvements in international connectivity will facilitate the hub concept

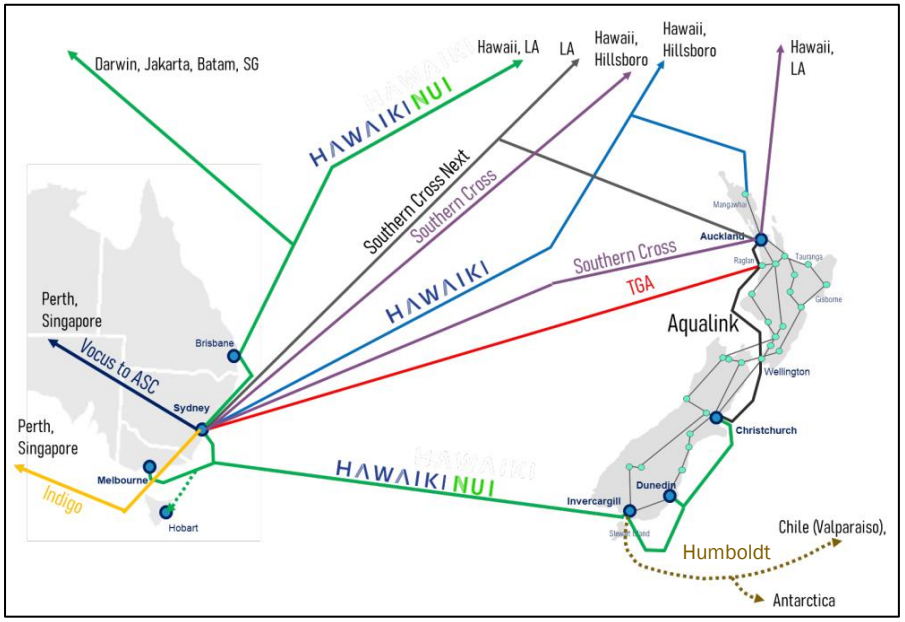
Key drivers for New Zealand being able to address international demand

Driver	Current situation	Implication
Improving international connectivity 	▪ New Zealand's North Island currently has direct international connectivity via multiple submarine cables to Australia and the USA ▪ Two additional submarine cables have been announced (Hawaiki NUI and Southern Cross Next) with other projects yet to be confirmed ▪ The Hawaiki NUI cable which is expected to be operational in 2025 would provide direct international connectivity between New Zealand's South Island and Australia; the cable will also connect to Indonesia, Singapore and USA	▪ From 2025 the Hawaiki NUI cable will enable future DCs on South Island to address international demand ▪ Further demand could become addressable if additional submarine cable projects are confirmed (eg. Humboldt cable, Antarctica Cable)
Favourable regulatory and policy landscape 	▪ Australia does not currently have overarching data localisation requirements meaning there is no specific need for CSPs or enterprises to use local data centres ▪ New Zealand has two trade agreements in place which enable the cross-border flow of data[1]; a further two trade agreements are being negotiated ▪ The Five Eyes Alliance and Migration Five agreements in place enable the sharing of intelligence information and identity data	▪ The regulatory landscape in Australia allows CSPs / enterprises to transfer data to colocation facilities in New Zealand ▪ Other agreements in place could break down data sovereignty barriers and enable New Zealand to address international demand (eg. DEPA)
Favourable climate and renewable energy generation 	▪ 81% of the electricity generated in New Zealand is renewable, with the share of renewables in South Island expected to be higher than the North Island; the share of renewables is also much higher than in Australia (23%) ▪ The temperature in New Zealand is lower than in other countries in the region, with an average max temperature of 14 degrees Celsius in Invercargill; the temperatures are much lower than in Australia (23 degrees Celsius)	▪ The low climate and high share of renewable energy positions New Zealand's South Island as a favorable location for green DCs ▪ South Island could potentially become a green DC hub for Australia like the Nordics are becoming the green DC hub of Europe
Increasing propensity for sustainability 	▪ Technology titans and CSPs are becoming increasingly concerned about sustainability, with several companies announcing net zero targets ▪ Large enterprises with High Performance Computing (HPC) / large storage requirements are seeking more sustainable compute solutions to meet their Environmental, Social, and Governance (ESG) goals	▪ Companies may look to green DCs in New Zealand to store / process their data as this will enable the enterprises to work towards fulfilling sustainability goals

[1] The scope of data which can be transferred differs between the two agreements. Source: Analysys Mason, IEA, New Zealand Foreign Affairs and Trade, Ministry of Trade and Industry Singapore, news articles, Climate Data

New Zealand's North Island has direct international connectivity via multiple submarine cables to Australia / the USA; future cables have been announced

Submarine cable connectivity in New Zealand - existing and planned



Aqualink cable allows for domestic submarine connectivity between the North and South Islands and is owned by Vodafone

Note: Hawaiki NUI and Southern Cross Next cables are planned cables and are not currently in service while the Humboldt cable is not confirmed

Existing international submarine cables connecting New Zealand

Cable	Ready for service (RFS)	Design capacity
Hawaiki	July 2018	67Tbit/s
Tasman Global Access	March 2017	20Tbit/s
Southern Cross Cable Network	November 2000	22Tbit/s
Total design capacity		**109Tbit/s**

Confirmed planned submarine cables connecting New Zealand

Cable	Expected RFS	Design capacity
Hawaiki NUI	2025	240Tbit/s
Southern Cross Next	Mid-2022	72Tbit/s
Total design capacity		**312Tbit/s**

International connectivity provided by the Hawaiki NUI cable is essential for the South Island to address demand from Australia (and possibly other countries)

 Source: Submarine cable providers

Australia does not currently have data localisation laws; while it has been self-sufficient for colo needs, the rise of New Zealand's DC market offers an alternative

Key legislation / laws on data localisation requirements

- Like New Zealand, there is currently no overarching data localisation requirements in Australia – this is largely a result of the Government's policy of facilitating cross border flow of data and information while protecting individual privacy
- Privacy in Australia is regulated based on the Australian Privacy Principles (APP), which requires entities transferring data overseas to take reasonable steps to ensure the overseas recipient will handle personal data in accordance with the APP
- Certain categories of sensitive personal information have additional rules that may restrict their transfer overseas:
  - electronic health records that contain personal identifying information cannot be held, transferred or processed outside the country
  - sensitive personal information[1] disclosed overseas require more rigorous steps to ensure the compliance to the APP
  - selected information held in the Australian credit-reporting system has restrictions on transferring overseas

Implications and outlook for in-country data storage requirements

- Under current legislation with an absence of data localisation requirements, there is no specific need for CSPs or enterprises to use local data centres
- Enterprises may, in theory, lease colo capacity from overseas data centre facilities and reduce local data centre demand in Australia
  - the impact of this to date has been limited as there is no data centre hubs nearby that Australian businesses and organisations can rely on
- However, this may change with the build-out of hyperscale DCs in neighbouring New Zealand and improved international connectivity between Australia and New Zealand
  - New Zealand may become a viable alternative for Australian businesses and organisations to procure colocation services
  - New Zealand businesses and government agencies may repatriate some of their workloads back onshore to take advantage of lower latencies and address any data sovereignty concerns once the local cloud regions are operational

[1] Such information refers to racial, political, religious etc. related personal information as defined in the Privacy Act

 Source: Analysys Mason analysis

Trade agreements between New Zealand and other countries facilitate the cross-border transfer of data which could create an upside for colo demand in NZ

Overview of New Zealand's data exchange-related agreements with other countries/jurisdictions [1/2]

	Name of treaty/ agreement	Countries involved	Brief overview	Impact on colo demand in New Zealand
Trade agreements	Digital Economy Partnership Agreement	New Zealand, Chile, Singapore China filed for admission to the agreement in Nov 2021	▪ Facilitate end-to-end digital trade by mutually recognising digital identities and adopting e-invoicing, amongst other measures ▪ **Enable trusted data flows by enabling cross-border data flow** and adopting open government data, amongst other measures ▪ Build trust in digital systems, facilitate digital economy growth by offering online consumer protection, amongst other measures	✓ Potential to capture some spill-over colo demand from Singapore due to Singapore's ongoing moratorium on DC build ✓ However, New Zealand may face competition from Chile, itself an emerging DC hub with ~50% of its electricity generated from renewable sources ✓ China unlikely to be a competitor amidst uncertain likelihood of admission and data privacy/sovereignty concerns
	Regional Comprehensive Economic Partnership *(signed in Nov 2021, to take effect from 2022)*	New Zealand, Australia, China, Japan, South Korea, countries in the ASEAN[1] region	▪ Comprehensive free trade agreement encompassing goods market access, cross-border trade in services, e-commerce and other topics ▪ The agreement seeks to allow for transfer of data between countries to support business needs **for e-commerce** while ensuring privacy and other public policy priorities can be regulated for	? Potential to capture some colo/cloud demand from ASEAN countries where data centre markets are more nascent ? However, it is unclear if businesses would use NZ's colo/cloud resources over those in neighbouring countries (e.g. Indonesia)
	(**Under negotiations**) New Zealand-Pacific Alliance free trade agreement	New Zealand, Chile, Colombia, Mexico, Peru		? Potential to capture some colo/cloud demand from Colombia and Peru where data centre markets are more nascent ? However, it is unclear if businesses would use NZ's colo/cloud resources over those in neighbouring countries (e.g. Chile/Mexico)
	(**Under negotiations**) European Union-New Zealand free trade agreement	New Zealand, countries in the European Union		× Minimal impact on colo demand as there are multiple alternate DC hubs (including green DC hubs) in the EU

[1] Refers to the Association of South-East Asian Nations, which includes: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam

Source: New Zealand Foreign Affairs and Trade, Ministry of Trade and Industry Singapore, news articles

New Zealand's Five Eyes and Migration Five agreements could be creating additional demand for colo in New Zealand given, the cross-border data flow

Overview of New Zealand's data exchange-related agreements with other countries/jurisdictions [2/2]

	Name of treaty/ agreement	Countries involved	Brief overview	Impact on colo demand in New Zealand
Other agreements	UKUSA Agreement *(also known as Five Eyes Alliance)*	New Zealand, Australia, Canada, United Kingdom, the USA	▪ Sharing of all **intelligence information** obtained with other countries in the pact by default	✓ Possible driver for local colo demand as the data received from other countries needs to be securely stored (potential for volume of data to be large) ✓ Given the sensitive nature of such data, the NZ Government is unlikely to rely on overseas data centres/cloud regions for storage purposes, thus driving local colo demand
	Secure Real Time Platform (*also known as Migration Five*)		▪ Sharing of **identity data**, including biometrics, with other countries in the pact for immigration control only upon request	× Minimal impact on colo demand as volume of identity data received likely to be small

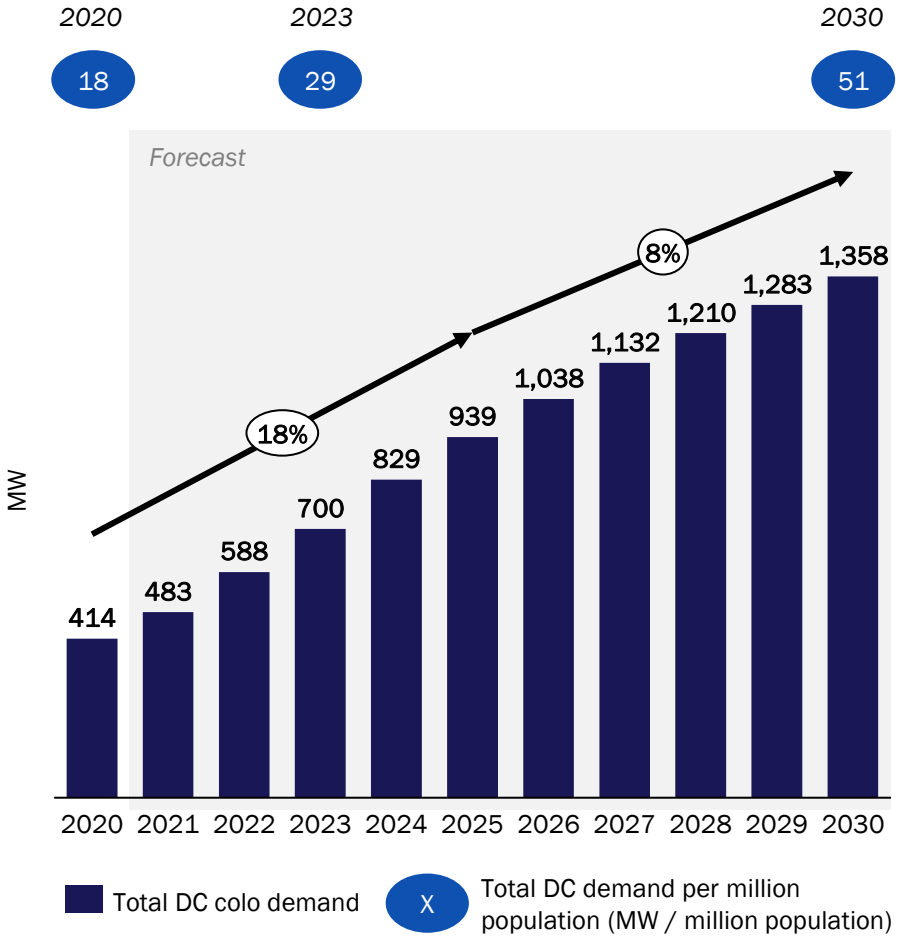
 Source: New Zealand Foreign Affairs and Trade, news articles

Demand for data centres in Australia is expected to grow strongly driven by the growing internet economy, increasing cloud adoption and good startup ecosystem

Drivers of data centre demand in Australia

Driver	Details
Growth in the internet economy	• Australia demonstrates relatively high internet penetration (#21 globally) and relatively high social media penetration (#15 globally) • Australians have demonstrated strong growth in e-commerce spending (~20% annual growth between 2017 to 2020) • Strong local demand for data will continue to drive the internet economy going forward
Increasing cloud adoption	• Australia has one of the highest cloud adoption rates among enterprises in APAC at ~60% of businesses in 2020, driven by the advanced digital maturity of its economy vs. less developed countries in the region • Cloud adoption amongst enterprises is expected to increase to ~66% by 2025 as more enterprises pursue digital transformation • The government is leading the way for public cloud migration based on its own cloud-first policy that requires government agencies to adopt the cloud where it is "fit for purpose, provides adequate protection of data and delivers value for money"
Good startup ecosystem	• Australia has a good start-up ecosystem – having produced several unicorns: e.g. Canva, Afterpay, and Atlassian • The government is also looking to further boost the digital economy – having developed a national digital economy strategy to drive continued innovation and development

Colocation DC demand in Australia



Source: Australian Government Digital Transformation Agency, cloud providers' websites, AMI Partners SMB Technology Forecaster, Analysys Mason analysis, ABS, https://www.statista.com/study/85973/key-online-and-social-data-worldwide-2021/

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NZ can be attractive from a sustainability perspective for Australian demand; similar to how the Nordics are attractive from a sustainability perspective for Europe

Invercargill used as an example given that it is the closest area in South Island (from Australia) where the Hawaiki NUI cable will be connected to

Sustainability / pricing metrics[1] to be considered when choosing DC location

Metrics	Europe	Denmark	Finland	Iceland	Norway	Sweden	Australia	New Zealand	New Zealand (Invercargill)
Electricity generated from renewable sources in 2020 (%)	37%[2]	84%	52%	100%	99%	69%	23%	81%	>81%
Climate in main DC hub (average max temperature[3])	18.9°C	17.9°C	18.3°C	11.6°C	17.4°C	18.0°C	22.8°C	20.0°C	14.2°C
Electricity prices[4] (USD cents/kWh)	6.6	7.7	5.9	4.8	4.3	4.2	5.3	13.4	12.5

Electricity generated from renewable sources in Invercargill is expected to higher than the NZ average

Temperatures in Invercargill are considered to favourable even when compared to most Nordic countries

Spot pricing presented however, DC operators will likely be able to negotiate lower prices

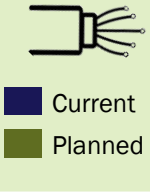
New Zealand's South Island has a high degree of renewable energy generation and low temperatures (which reduces energy required for cooling DCs) which makes the island a suitable location for green DCs – even fairing better compared to some Nordic countries

[1] List of metrics considered is not exhaustive; [2] Data for Europe is as of 2019; [3] Average max temperature has been used instead of average temperature as it gives a better indication to what extent 'free cooling' can be used throughout the year; [4] Based on trailing twelve months (TTM) (Q3 2021) average spot pricing data for NZ and AUS; for Europe, data is for H1 2021 using pricing of largest consumption band available. Source: IEA, Climate Data, Eurostat, AER, EMI

Furthermore, connectivity to the South Island is set to improve due to the upcoming Hawaiki NUI cable which will improve the Island's ability to become a green DC hub

Invercargill used as an example given that it is the closest area in South Island (from Australia) where the Hawaiki NUI cable will be connected to

Connectivity overview across the Nordics, Australia and New Zealand

Metrics	Denmark	Finland	Iceland	Norway	Sweden	Australia	New Zealand (North Island)	New Zealand (Invercargill)
Number of submarine cables[1]								None currently but one confirmed cable (Hawaiki NUI) currently in the works and one potential (Humboldt)
Key countries connected via submarine cables[1,2]	• Sweden • Germany • The USA	• Sweden • Russia • Germany	• United Kingdom • Denmark • Greenland (connected to Canada)	• Denmark • The USA • United Kingdom	• Denmark • Finland • Latvia	• The USA • New Zealand • Singapore	• Australia • The USA	Planned • Australia • The USA • Singapore • Indonesia • Chile

The South Island is currently only connected via submarine cable to the North Island of New Zealand and is not connected to any international nations. However, the planned Hawaiki NUI cable will provide connectivity between Invercargill on the South Island and other countries in the region; this in turn, will unlock the South Island's prospects of becoming a green DC hub for Australia and potentially APAC

[1] Data from TeleGeography extracted on 9th December 2021; [2] Countries selected based on two criteria. Firstly the presence of a direct submarine cable to a specific country. Secondly, based on the specific countries which have the highest international bandwidth to the selected country.

 Source: TeleGeography, news reports

There is strong potential for Australia to offshore colocation demand enabling, New Zealand South Island to become a green DC hub; similar to Europe vs. Nordics case

In Europe, we have observed extreme cases of technology titans storing up to 100% of data in the Nordics

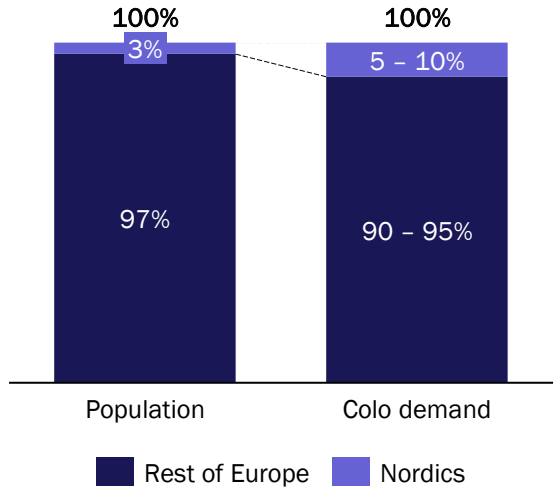
Technology titan's data centres in Europe

	Meta	Apple
DCs in the Nordics	*~70% of Meta's data centre capacity is located in the Nordics*  Luleå, Sweden  Odense, Denmark	*Apple currently only has one DC in Europe located in the Nordics*  Viborg, Denmark
DCs in rest of Europe	 Clonee, Ireland	*Does not have any DCs in the rest of Europe*

- Meta and Apple are non-CSP hyperscalers (i.e tech titans) which have less need for low latency
- This allows them to have DCs further away from population centres as seen from where they have chosen to locate their DCs in Europe

The Nordics are increasingly becoming the green DC hub of Europe accounting for an estimated 5-10% of European demand

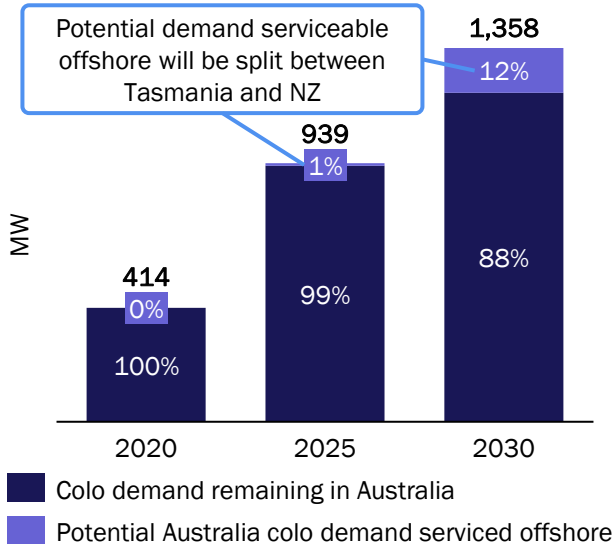
Estimated split of population and data centre colo demand between the Nordics and the rest of Europe in 2020



- The Nordics, have a low population representation as a percentage of Europe
- However, they have a significantly higher representation of total colocation DC demand; indicating they are serving as a hub for demand from Europe

A share of the demand from Australia can potentially be serviced offshore in green DC hubs (e.g. South Island or Tasmania); this can enable NZ to become a hub

Australia's colocation demand and potential % serviceable offshore in green DC hubs



- There is demand for colocation capacity in sustainable locations (e.g. South Island)
- Verticals which are mostly likely to look for offshore solutions include education/research institutions, social media and complex manufacturing

 Source: Company materials, Government statistics, Structure Research, Analysys Mason analysis, expert interviews

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Customers in Australia willing to use offshore green DCs are likely willing to use DCs in Tasmania and South Island NZ to the same extent (assuming sufficient supply)

Competitive positioning of a green DC in South Island vs. Tasmania

Invercargill used as an example given that it is the closest area in South Island (from Australia) where the Hawaiki NUI cable will be connected to

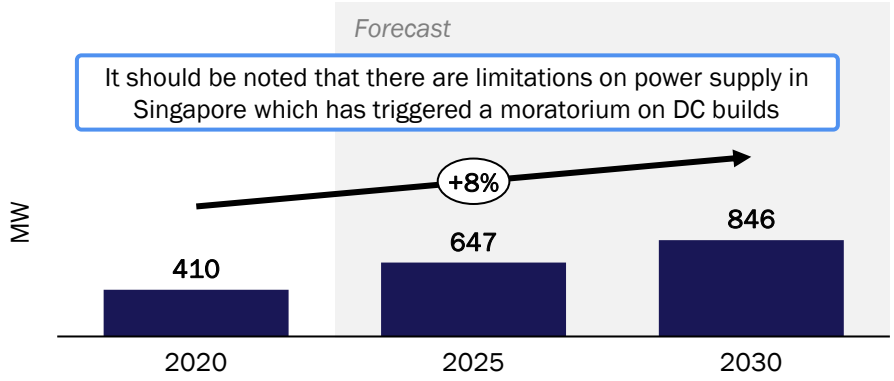
Metric[1]	South Island New Zealand (Invercargill)		Tasmania	
Electricity generated from renewable sources in 2020 (%)	◕	• Electricity generated from renewable sources in Invercargill is expected to higher than the NZ average which is already high at 81%	●	• By end 2020, Tasmania generated 100% of its energy from renewable sources
Temperatures in the region	●	• The South Island, specifically Invercargill has an average max temperature of ~14°C • Its average temperature throughout the year is ~10°C	◕	• Tasmania, specifically Hobart has an average max temperature of ~16°C • Average temperature throughout the year is ~11°C
Electricity prices[2] (USD/kWh)	◑	• Electricity prices in Invercargill are lower compared to the NZ average • Spot prices in Invercargill average USD12.5 cents/kWh (key challenge is for NZ spot pricing to at least be competitive to Tasmania)	●	• Electricity prices in Tasmania are significantly lower compared to Australia's average • Spot prices in Tasmania average USD2.9 cents/kWh
Connectivity to Australia	◕	• The Hawaiki NUI (deployed in 2025) cable is expected to provide direct connectivity between Invercargill and landing stations in Sydney and Melbourne, Brisbane and Darwin • It is expected to have 240Tbit/s of capacity • Latency to Australia likely higher than Tasmania	◔	• Two existing cables (Bass Strait 1 and 2) connecting Tasmania to mainland Australia have limited capacity of ~1Tbit/s each; while a third cable (Basslink) has had multiple reliability issues • The cables are also not connected directly to landing stations in Sydney and Melbourne
Regulations	●	• There are currently no overarching data localisation requirements in Australia which would indicate little to no barrier to data flows	●	• Tasmania is a part of Australia hence data is expected to freely flow between both parts of the country
Overall score	◕	A green DC in South Island would have a strong value proposition; the main weakness would be the high electricity pricing, however this could potentially be mitigated by DC providers negotiating with energy suppliers	◕	Green DCs in Tasmania have a strong value proposition aside from limited bandwidth on submarine connectivity routes to Australia

○ *Unfavourable* — ● *Favourable*

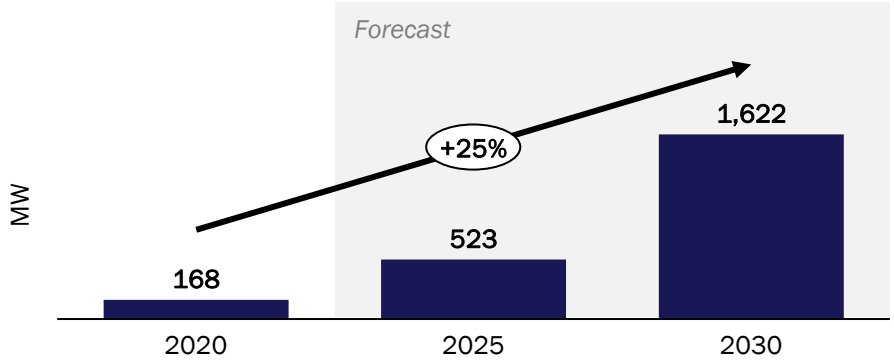
[1] Key metrics considered when picking a green DC location. There are other factors which will be considered when choosing a DC hub more generally which could include but are not limited to: land prices and availability; closeness to customers; workforce competence et cetera; [2] Based on TTM (Q3 2021) average spot pricing data; Source: IEA, Climate Data, TeleGeography, news reports

A further upside would be for New Zealand to serve as a green DC hub for demand from Singapore and LATAM given, the cross-border data flows enabled by DEPA

Colocation DC demand in Singapore



Colocation DC demand in LATAM[1]



New Zealand could potentially capture some DC colocation demand from Singapore and LATAM due to DEPA and Singapore's current moratorium on DC builds though this upside could be limited by several factors

✓ Digital Economy Partnership Agreement (DEPA) is an agreement between Singapore, New Zealand and Chile to...

✓ Singapore currently has a moratorium (since 2019) on new DC builds in the country – which could limit the new supply of DCs coming online

✓ New Zealand is geographically located between both Singapore and LATAM which positions it to serve demand from both countries

✗ There may be hubs closer to both Singapore and Chile which could limit the upside potential

✗ Chile will be reliant on the Humbolt cable which has yet to be confirmed and is the only potential link between it and NZ

✗ Chile has plans to become its own green DC hub which could potentially limit the need for NZ to service its demand[2]

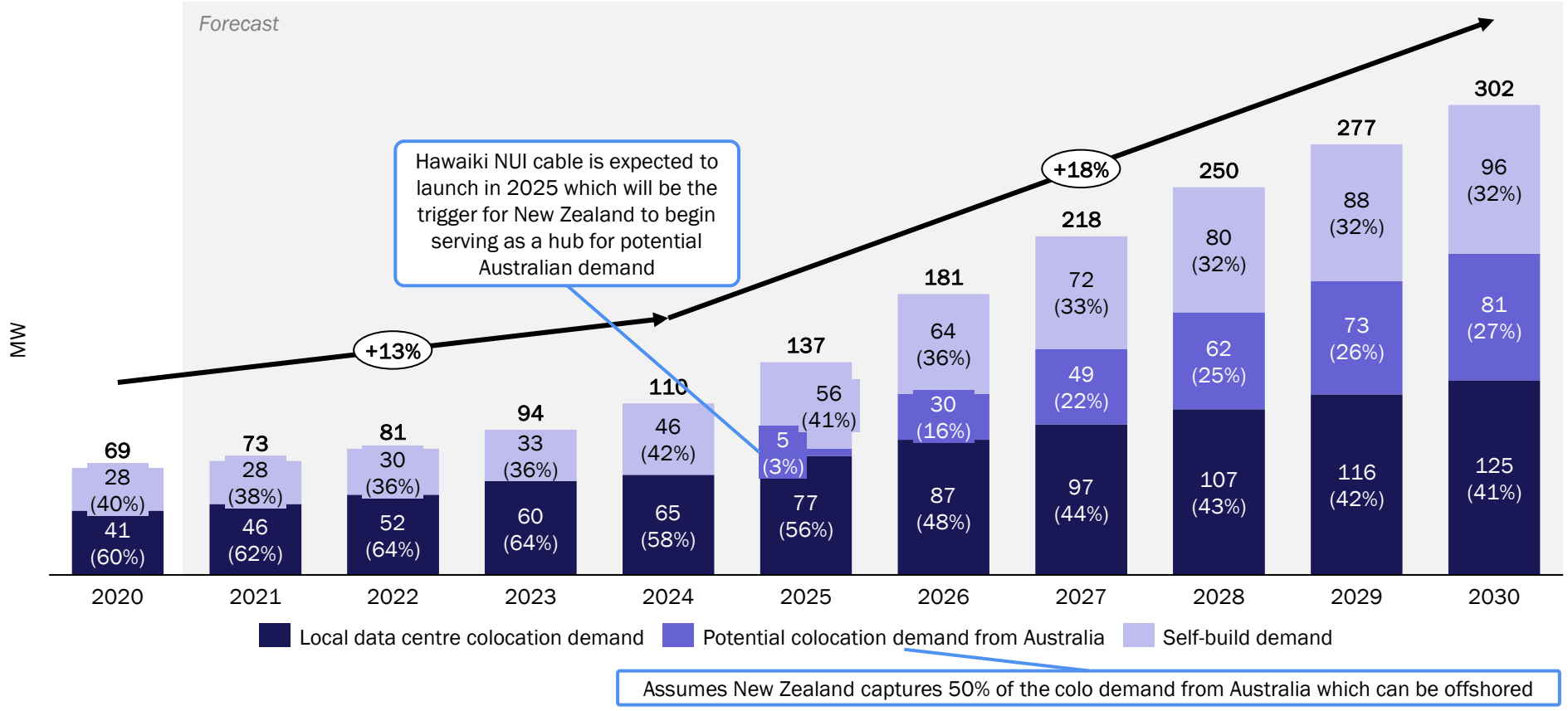
New Zealand's South Island serving as a hub for demand from APAC (excl. Australia) and LATAM should be considered as an upside case only; as such, we have not quantified this in our forecast of total potential colocation demand served by New Zealand

[1] LATAM stands for Latin America [2] Chile has already attracted hyperscale investment e.g. Google launched a DC in 2015

 Source: Structure Research, Analysys Mason analysis, Ministry of Trade and Industry, news reports

Considering local and potential international demand from Australia, the size of the DC market in New Zealand has the potential to increase by over 4x by 2030

DC demand in New Zealand (local + international)



There is a possibility that overall data centre colocation demand in New Zealand could be higher due to potential demand from Singapore and LATAM – which should be viewed as a potential upside to the overall forecast

 Source: Analysys Mason analysis, Structure Research, Expert interviews

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The colo DC industry in New Zealand is expected to become more geographically balanced as DCs on the South Island take a notable share of net absorption

Illustrative colo DC demand shift across New Zealand

	Current state of play	Future state of play
Local demand	• Demand is predominately located in DCs on the North Island even though only an estimated ~2/3 of traffic is generated on the North Island 	• More equal distribution based on traffic generated • Potentially at least ~1/3 of net absorption to be on the South Island with possible migration of some workloads from North to South 
Demand from Australia	• There is currently little to no demand from Australia being stored in New Zealand's DCs 	• Demand expected to be primarily served in the South island driven by direct connectivity to Australian hubs through the new Hawaiki NUI cable • Presence of new upcoming hyperscale DC builds in South Island • Significantly lower temperatures in the South Island which would attract sustainability focused customers 
Overall impact	• Overall, the data centre demand is highly concentrated in North Island 	• Overall, data centre demand is expected to be spread more uniformly across the whole of New Zealand • With the South Island mainly benefiting from the colocation demand from Australia 

Shading on maps provide an illustrative view on the spread of demand across NZ

Increasing concentration of demand

 Source: Analysys Mason analysis

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NZ will attract both large and small hyperscale customers; as such, NZ is expected to have slightly higher hyperscale colocation pricing compared to Australia

Typical customers[1] with hyperscale demand expected in New Zealand

Type of customer	Cloud Service Providers (CSPs)	Technology titans	Education/research institutions	Enterprises using HPC
Examples of companies	Google Cloud; Microsoft Azure; Amazon Web Services	Meta; Apple	Research institutes (e.g. biosciences, Geosciences); Universities	Vehicle manufacturers; Oil and gas companies; Financial industry (back-end / fraud detection)
Expected preferred DC location in NZ	 Auckland – to be close to the end user	 Nationwide including South Island	 Nationwide including South Island	 Nationwide including South Island
Rationale	• Microsoft / AWS have announced DCs in Auckland • In other countries, cloud providers typically are in urban centres	• In the Nordics, technology titans have displayed strong willingness to deploy in remote areas away from population centres	• Education/research institutes do not have a need for low latency and do not need to be located near population centres	• A large portion of compute requirements do not require low latency (e.g. running simulations and big data analytics)
Demand and pricing	Large demand per customer resulting in lower pricing due to economies of scale		Demand may be of smaller magnitude (e.g. 3MW) which would classify them as smaller hyperscalers, resulting in higher pricing	
	The mix of larger and smaller hyperscale demand from companies means that we expect hyperscale colocation pricing in New Zealand to be at a slightly higher price point vs. Australia			

[1] Crypto-currency mining is another industry which has a high demand for processing and does not have any low latency requirements, furthermore the general consensus is that miners are attempting to create more sustainable operations

 Source: Analysys Mason, news reports

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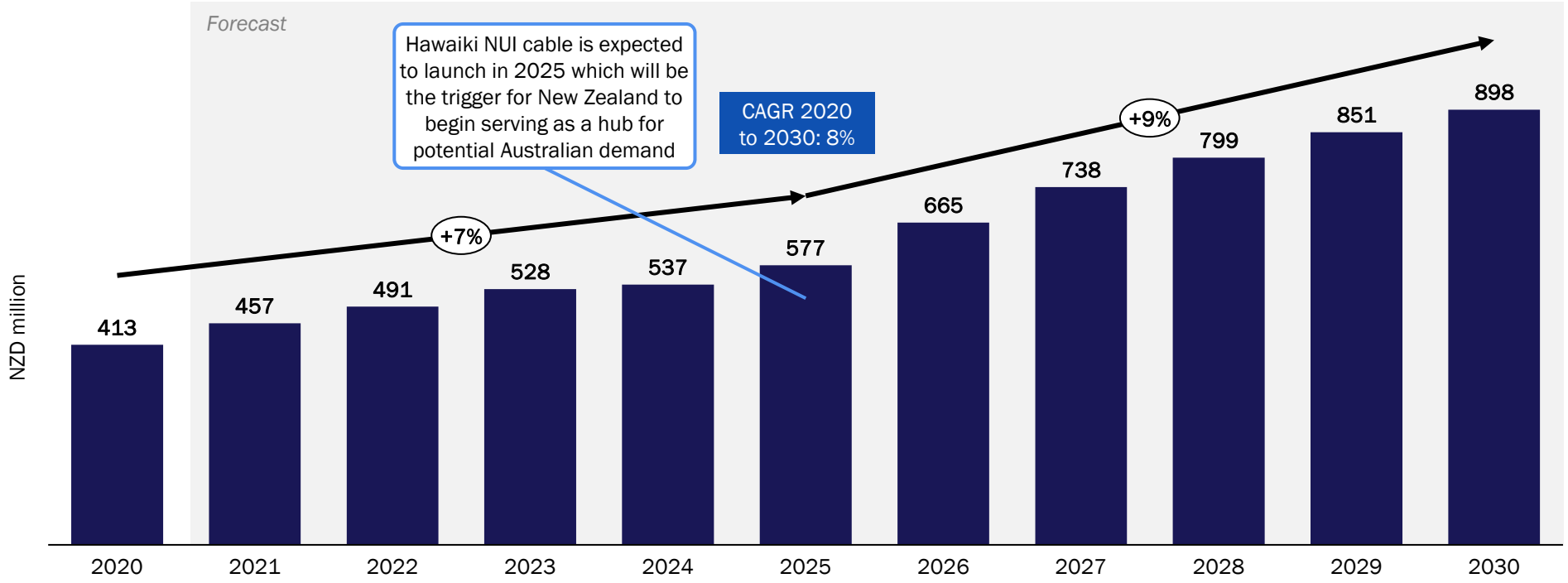
The revenue market size for New Zealand's colocation market is expected to grow at a reasonable CAGR of ~8%; driven by both local and international demand

DC colocation revenue in New Zealand



The basis for calculating revenue from Australian colocation demand is based on New Zealand having comparable hyperscale pricing to Australia – this is vital in order to remain competitive against colocation facilities in Australia

 Source: Analysys Mason analysis, Structure Research, expert interviews

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Contents

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New Zealand and Australia's DC markets are at different stages of maturity – the former is nascent and while the latter is relatively mature

Overview of New Zealand and Australia's data centre markets

	New Zealand	Australia
Status of DC market	▪ Nascent data centre market with ~41MW of IT demand ▪ CSPs like AWS and Microsoft are beginning to launch cloud regions in the country, with other players expected to follow suit	▪ Mature data centre market with ~414MW of IT demand ▪ All key CSPs have cloud regions in Sydney; some players have regions in other locations e.g. Melbourne (Google Cloud, Microsoft, Oracle Cloud) and Canberra (Microsoft)
Key hubs	Auckland	Sydney Melbourne
Key players	**Large players:** Spark, Datacom **Smaller players:** Vocus, IBM, PlanB, DataVault Two large local players dominate the market, with several smaller players each with less than 3MW; no hyperscale DCs	**Local players:** NextDC, AirTrunk, CDC Data centres, Macquarie Data Centres, *and others...* **Global players:** Equinix, Fujitsu, Digital Realty, Global Switch, *and others...* Several players have hyperscale DCs exceeding 30MW – e.g. AirTrunk's two DC campuses each exceed 100MW
Future supply	**180MW** *...of potential shell capacity in upcoming two years* Hyperscale facilities are starting to launch (e.g. Datagrid NZ), other new entrants could emerge if CSPs do not self build DCs	**380MW** *...of potential shell capacity in upcoming two years* DC players are investing heavily to build more large DCs – AirTrunk, NextDC and Digital Realty all have campuses with 100MW+ of power

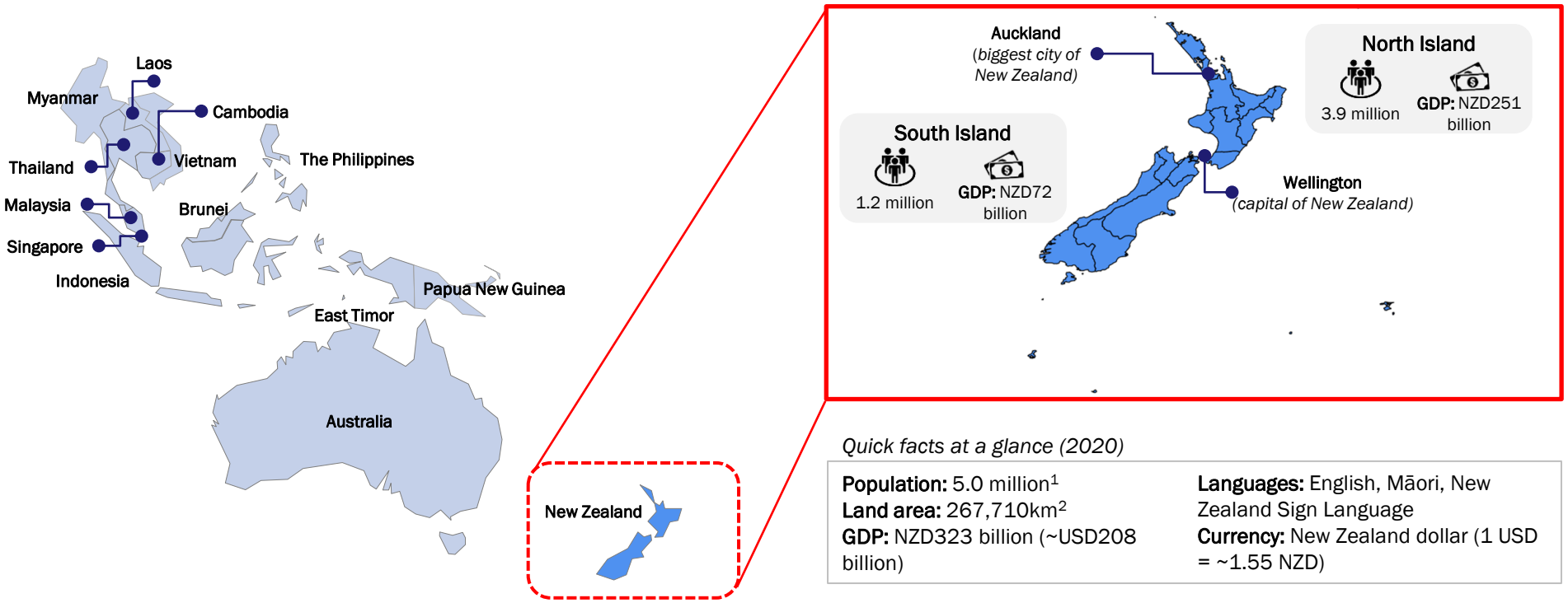
[1] New Zealand does not have hyperscale DCs yet, hence there is no hyperscale pricing reference available [2] Excludes power

Source: Expert interviews, Structure Research, Analysys Mason

New Zealand

New Zealand is a country of 5 million consisting of two main land masses, with the North Island accounting for bulk of the country's population and economic activity

Geography of New Zealand



Quick facts at a glance (2020)

Population: 5.0 million[1]
Land area: 267,710km^2
GDP: NZD323 billion (~USD208 billion)
Languages: English, Māori, New Zealand Sign Language
Currency: New Zealand dollar (1 USD = ~1.55 NZD)

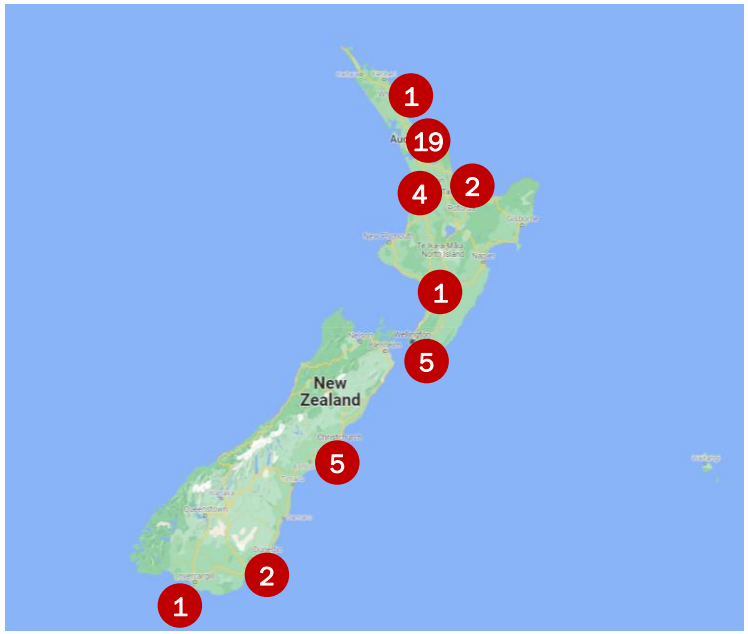
- New Zealand is a country of approximately 5 million located in the south of the Asia-Pacific region and to the east of Australia
- Geographically, the country consists of two main land masses, the North and South Islands
  - despite having a smaller land mass, the North Island accounts for bulk of the country's population and economic activity
  - meanwhile, the South Island is rich in renewable energy resources like hydropower and wind power, and exports a portion of surplus energy production to the North Island

[1] Does not sum up to total populations of North and South Islands due to rounding

 Source: Analysys Mason Research, Stats NZ, World Bank, Ministry of Business, Innovation and Employment

North Island's economic importance means most of the data centres in the country are located on the North Island; enabling close proximity to key customers

Geographical distribution of data centres in New Zealand



New Zealand has a total of 40 data centres[1], with 32 facilities located on the North Island

Ranking of data centre clusters by no. of businesses and employees

Island	Region	# of businesses[2,3]	# of employees[2]	# of data centres
North Island	Auckland	208 869	801 700	19
South Island	Canterbury	74 010	304 700	5
North Island	Wellington	59 187	272 000	5
North Island	Waikatao	59 100	206 800	4
North Island	Bay of Plenty	39 318	138 800	2
South Island	Otago	30 813	116 000	2
North Island	Manawatū-Whanganui	26 040	108 600	1
North Island	Northland	21 831	64 900	1
South Island	Southland	14 160	50 100	1
	Total	**533 328**	**2 063 600**	**40**

Key: North Island

There are no data centres currently in three of North Island's regions (Gisborne, Hawke's Bay, Taranaki) and in four of South Island's regions (Tasman, Nelson, Marlborough, West Coast)

- The North Island accounts for four of New Zealand's top five regions in terms of number of businesses and employees, underscoring its economic importance compared to the South Island
- Regions with more business activity tend to have more data centres; almost 50% of New Zealand's DCs are located in Auckland in close proximity to key customers

[1] Based on desktop research, data centre count may not be exhaustive; [2] As of February 2021; [3] Includes businesses of all scale, including sole proprietorship

Source: Operator websites, Stats NZ, Analysys Mason analysis

The DC market in New Zealand is nascent and dominated by two large players; Datacom is the largest player, Spark is the second largest and is telco-linked

Key colo data centre players in New Zealand

Company name	Ownership	No. of DCs (upcoming)	MW capacity (upcoming)	Locations	Energy source	Other details
Spark	BlackRock (7%), Vanguard Group (4%), Guardians of New Zealand Superannuation (3%), other public investors (86%)	18 (incl. 2 large facilities)	~20[1] (10[2])	Auckland, Wellington, Christchurch, Hamilton, Tauranga, Dunedin, Invercargill	Relies on the national electricity grid with energy from variety of sources	▪ Incumbent telco with largest market shares in mobile and fixed network ▪ Network of facilities is a mix of dedicated data centre facilities and converted exchange buildings
Datacom	Evander Management (51%), New Zealand Superannuation Fund (39%), other investors (10%)	4	Up to 29[3]	Auckland, Wellington, Christchurch, Hamilton	*Undisclosed*	▪ Last known expansion plans in 2019 when Datacom upgraded its Orbit, Gloucester and Kapua facilities
Vocus	Wholly owned by Voyage Australia[4]	3	~2	Auckland, Christchurch	Claims to use 100% renewable power	▪ No known expansion plans (last DC in 2013) ▪ Acquired by Voyage Australia in June 2021 as part of Vocus Group's sale
IBM	Vanguard Group (8%), BlackRock (7%), other investors (85%)	2	~2	Auckland, Christchurch	*Undisclosed*	▪ Opened its Auckland data centre in 2011 ▪ Understood to serve local enterprises like Air New Zealand out of its facility
Plan B	Privately held	5	~1	Auckland, Wellington, Christchurch	*Undisclosed*	▪ Network of small facilities across NZ ▪ Mainly serves financial institutions clients
DataVault	Privately held	2	~1	Auckland, Hamilton	Partially uses solar power	▪ Small local retail DC provider

Note: There are 6 other data centres held by smaller players

[1] Estimated based on expert interviews; [2] Expansion of existing Takanini data centre; [3] As listed on official website, it is unclear from public information if Datacom has fully fitted out the IT capacity because other data sources suggest smaller capacity figures; [4] Consortium comprising of Macquarie Infrastructure and Real Assets and Australian superannuation fund Aware Super. Source: Operator websites

Spark is New Zealand's incumbent telecom operator; its data centre offering is primarily retail-focused, boasting strong location and connectivity advantages

Company	No. of DCs (upcoming)	MW capacity (upcoming)	DC market focus
Spark	18 (incl. 2 large facilities)	~20[1] (10[2])	Mostly retail with some wholesale
Key information			
Ownership	BlackRock (7%), Vanguard Group (4%), Guardians of New Zealand Superannuation (3%), other public investors (86%)		
Customers	Government departments (e.g. Stats NZ), enterprises (e.g. Genesis Energy), financial institutions (e.g. Fidelity Life)		
Product offerings			
Data centre	Colocation, backup and disaster recovery		
Interconnection *(via own fibre)*	Cross connect, dedicated internet access, private network solutions (metro ethernet), international private connectivity		
Other ICT services	Mobile and fixed services, cloud services, cybersecurity, IT outsourcing		
Competitive assessment			
1 Location ● Present nationwide via a series of DCs and converted exchange buildings		2 Pricing ◔ Likely more expensive than Datacom for colo; may be charging markup for power	
3 Connectivity ● Strong connectivity offering to and between its data centres		4 Specifications ◔ DCs are older (generally older DCs have lower specifications[3]), though flagship DC has PUE of 1.25	

- Formerly known as Telecom New Zealand, Spark is New Zealand's incumbent telecom operator, having been separated from its infrastructure arm (Chorus) in 2011 as a condition for the latter winning contracts for the New Zealand Government's Ultra-Fast Broadband initiative
- Spark's data centres have excellent connectivity thanks to its fibre infrastructure and network of internet exchanges nationwide
  - Spark has its own fibre infrastructure that provides connectivity to and between its DCs
  - its exchange-converted DC facilities have strong peering (more than 10 peering partners each)
  - its most-connected DC in Auckland has 37 peering partners, including with most local internet service providers and overseas content distribution network operators like Facebook and Akamai
- Spark is understood to be a mainly retail-focused data centre operator – its DC and cloud service subsidiary CCL serves more than 1000 customers nationwide

Overall competitiveness ◔

[1] Estimated based on expert interviews; [2] Expansion of existing Takanini data centre; [3] In terms of rack density and overall PUE

Source: Company website and documentation, news articles, PeeringDB, Analysys Mason, expert interviews

Datacom is a local integrated ICT services provider whose data centre offering is characterised by newer facilities with stronger specifications

Company	No. of DCs (upcoming)	MW capacity (upcoming)	DC market focus
Datacom	4	Up to 29[1]	Retail and wholesale
Key information			
Ownership	Evander Management (51%), New Zealand Superannuation Fund (39%), other investors (10%)		
Customers	International cloud and telecoms providers, enterprises (e.g. Fonterra), major banks and financial organisations (e.g. IAG New Zealand), IT service providers and government departments as customers		
Product offerings			
Data centre	Colocation, backup and disaster recovery		
Interconnection	Cross connect		
Other ICT services	Cloud services, cybersecurity, contact centre services, system integration and application outsourcing		
Competitive assessment			
1 Location ◕ Present in all key hubs of Auckland, Wellington and Christchurch		2 Pricing ◕ Estimated to be slightly cheaper than Spark for colo	
3 Connectivity ◕ No connectivity offering but DCs generally well-connected by third-party providers		4 Specifications ◕ Facilities are relatively new (upgraded in 2019), PUE of 1.4-1.5	

- Datacom is New Zealand's biggest technology company, offering a range of information and communications technology (ICT) services including system integration and data centre colocation
- In 2018, Datacom partnered with AirTrunk to lease capacity from AirTrunk's SYD1 and MEL1 hyperscale facilities in Australia, providing its customers access to hyperscale-grade capacity, which was not yet available in New Zealand
- While Datacom does not offer its own internet connectivity and relies on third-party connectivity providers, its DCs are generally well-connected
  - its largest DC Orbit has more than 40 different providers offering varying connectivity options
  - all four of its DCs are interconnected with one another and with AirTrunk's facilities in Australia
- In addition to offering its customers cloud access to AWS, Microsoft Azure, Google Cloud and Alibaba Cloud, Datacom also operates its own cloud services based on its data centre resource and system integration capabilities

Overall competitiveness ◕

[1] As listed on official website, it is unclear from public information if Datacom has fully fitted out the IT capacity because other data sources suggest smaller capacity figures.

Source: Company website and documentation, news articles, PeeringDB, Analysys Mason analysis

New Zealand has witnessed commitments for data centre builds by new entrants that will add significant supply to the colo market in New Zealand

Recent developments/activities

- **Q3 2021:** AWS announced plans to launch AWS Asia-Pacific (Auckland) Region by 2024, which will consist of three availability zones
- **Q2 2021:** Voyage Australia, a consortium comprising of Macquarie Infrastructure and Real Assets and Australian superannuation fund Aware Super, acquired Vocus New Zealand as part of the Vocus Group acquisition for ~AUD3.5 billion (~NZD3.7 billion)
- **Q3 2020:** Plan B Limited acquired Vodafone New Zealand's Auckland data centre for an undisclosed sum
- **Q2 2020:** Microsoft announced plans to establish its first data centre region in New Zealand, offering services like Microsoft Azure and Microsoft 365 to clients; region expected to be ready for service by end of 2022
- **Q2 2019:** Datacom invested NZD52 million to upgrade and extend its data centres in New Zealand, increasing total capacity across its four facilities by ~40%

Announced supply of new data centres

Expected launch	Company	DC capacity and other details
2022	Lake Parime	▪ Plans to build a DC consisting of eight containers with a total capacity of ~10MW in Central Otago, South Island ▪ Facility to be intermittently operational when there is surplus renewable power; the power will be used for HPC applications
2022 onwards	CDC	▪ Silverdale DC and Hobsonville DC (10MW each), both of which are in Auckland ▪ Strong demand with 80% of capacity already contracted/reserved/subjected to a first right of refusal[1]
2023	Datagrid NZ	▪ Partner with Meridian Energy to build a green hyperscale DC in Invercargill, South Island ▪ Site has capacity starting at 10MW and with potential of up to 150MW
Unknown	Spark New Zealand	▪ Announced plans to expand existing Takanini data centre in Auckland by 10MW in August 2021
Unknown	DCI Data Centres	▪ Secured consent for land purchase in Auckland to build cloud data centre

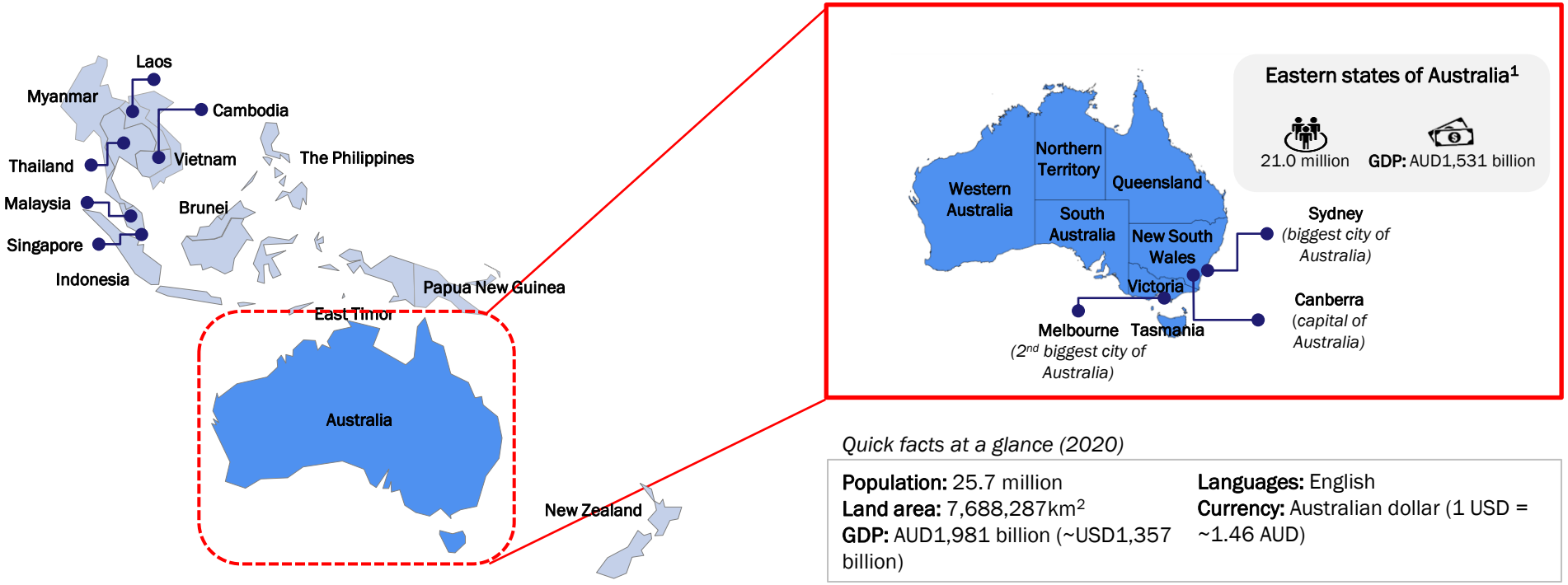
The New Zealand data centre market has witnessed commitments for data centre builds by new entrants in the past year, both in Auckland as well as on South Island. In the upcoming two years, DC providers have announced up to 180MW of potential shell capacity, which will add significant supply to the colocation market in New Zealand.

[1] CDC currently leases colo capacity to Microsoft in Australia, although the two companies have not publicly disclosed any partnership in New Zealand

Source: Operator websites, news articles

Australia is a country of 26 million; the eastern states of Australia account for bulk of the country's population and economic activity

Geography of Australia



Quick facts at a glance (2020)

Population: 25.7 million
Land area: 7,688,287km^2
GDP: AUD1,981 billion (~USD1,357 billion)
Languages: English
Currency: Australian dollar (1 USD = ~1.46 AUD)

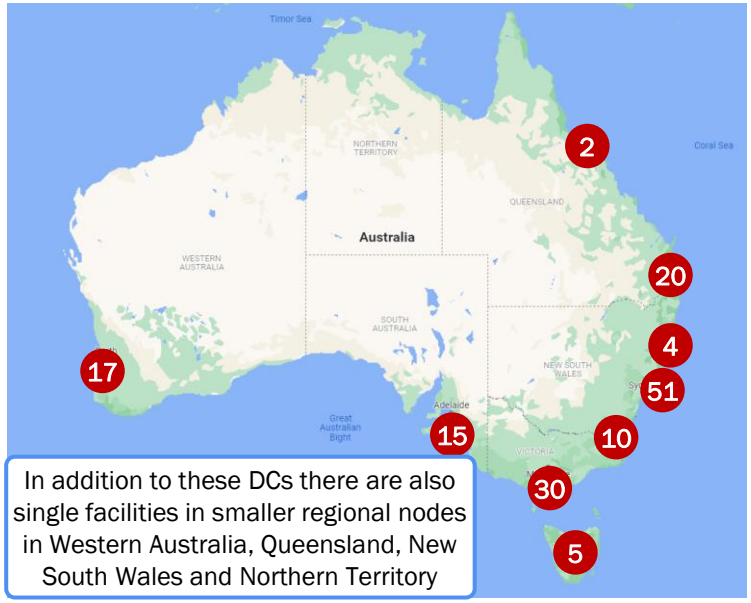
- Australia is a country of approximately 26 million located in the south of the Asia-Pacific region, neighbouring South-East Asian nations Indonesia and East Timor as well as Oceania nations incl. New Zealand and Papua New Guinea
- Geographically, the country consists of six states, three internal territories and seven external territories (outlying Islands)
  - the eastern states of Australia account for bulk of the country's population (~82% of total) and economic activity (~77% of total GDP)
  - Western Australia is the largest state in the country by land mass (32.9%)

[1] Eastern states of Australia include the states of Victoria, New South Wales, Queensland and Tasmania as well as the Australian Capital Territory and Jervis Bay Territory

Source: Analysys Mason Research, Australian Bureau of Statistics, Geoscience Australia

The economic dominance of the eastern states of Australia has led to bulk of the country's DCs clustered along the east coast, especially in Sydney and Melbourne

Geographical distribution of data centres in Australia



In addition to these DCs there are also single facilities in smaller regional nodes in Western Australia, Queensland, New South Wales and Northern Territory

Australia has a total of 160 data centres[1], with 126 facilities located in the eastern states of Australia

Ranking of data centre clusters by no. of businesses and employees

State	# of businesses[2,3]	# of employees[2]	# of data centres
New South Wales	817 648	4 154 800	57
Victoria	655 395	3 444 500	30
Queensland	460 669	2 661 300	24
Western Australia	230 220	1 404 400	18
South Australia	149 404	866 600	15
Tasmania	40 718	262 200	5
Australian Capital Territory	31 499	232 300	10
Northern Territory	14 947	133 600	1
Total	**2 400 480**	**13 159 700**	**160**

Key: Eastern states of Australia

- Eastern Australia accounts for Australia's top three states by number of businesses and employees, underscoring its economic dominance compared to Western and South Australia; as such 79% of Australia's DCs are clustered in urban nodes along the east coast
  - Sydney is the primary DC hub – its status as a key economic hub coupled with its strong connectivity to both international and domestic networks have been key drivers for growth
  - Melbourne is the second largest data centre hub and is expected to see growing demand as cloud providers expand with additional cloud regions

[1] Based on desktop research, data centre count may not be exhaustive; [2] As of June 2021; [3] Includes businesses of all scale, including sole proprietorship

Source: Structure Research, Australian Bureau of Statistics, Analysys Mason analysis

Australia's DC market is competitive with a mix of both global and local providers and includes players such as AirTrunk that target hyperscale demand [1/2]

Key colo data centre players in Australia

	Company name	Ownership	No. of DCs (upcoming)	MW capacity (upcoming)	Locations	Energy source	Other details
	AirTrunk	Macquarie Infrastructure and Real Assets (88%), AirTrunk CEO – Robin Khuda (12%)	3 (1)	370 (320)	Sydney, Melbourne	1% renewable power for SYD1 and MEL1 facilities	▪ Biggest DC operator in Australia by IT capacity, operates hyperscale campuses ▪ Announced in Nov 2021 plans to build a third facility in Sydney across nine phases
Local providers	**NextDC**	UniSuper (5%), Ellerston Capital (5%), other investors (90%)	9 (4)	167 (530)	Sydney, Melbourne, Canberra, Brisbane, Perth	Solar power for S1 and M1 facilities	▪ Hosts several cloud providers in Australia ▪ Has the strongest pipeline of upcoming facilities of all operators in Australia
	CDC Data Centres	Infratil (48%), Australian Future Fund (24%), Australian Commonwealth Superannuation Fund (24%), founders (4%)	9 (2)	133 (107)	Sydney, Canberra	Its Canberra facilities use 100% renewable power	▪ Focus on Government segment with its secure, sovereign DC ecosystem ▪ Still has land bank with potential capacity of 240+MW in Sydney, and Canberra
	Macquarie Data Centres	Macquarie Telecom Group (100%)	5	24 (33[1])	Sydney, Canberra	Solar power for IC5 facility	▪ IC2 and IC3 are owned by Keppel DC and developed by Macquarie who is the master lessee
	DCI Data Centers	Brookfield Asset Management (100%)	2 (4)	~12 (58)	Sydney, Adelaide	Using renewable power for new Darwin facility	▪ Acquired by Brookfield Asset Management in 2019
	DXN	DC Alliance (9%), SG Hiscock (6%), other investors (85%)	3	~10	Sydney, Tasmania, Darwin	100% renewable power for Tasmanian facility	▪ Received investment from Singapore DC firm DC Alliance, established strategic alliance to cross-sell each others DC colo capacity

[1] Expansion of existing IC3 campus

Source: Operator websites, news articles

Australia's DC market is competitive with a mix of both global and local providers and includes players such as AirTrunk that target hyperscale demand [2/2]

Key colo data centre players in Australia

	Company name	Ownership	No. of DCs (upcoming)	MW capacity (upcoming)	Locations	Energy source	Other details
Global providers	**Equinix**	Vanguard Group (13%), Blackrock (8%), Capital Group (6%), State Street (5%), other investors (68%)	18	N/A	Sydney, Melbourne, Canberra, Brisbane, Perth, Adelaide	Won right for joint purchase of solar and wind energy directly from sellers in August 2021	▪ Acquired Metronode in 2018, adding ~215,000 sq/ ft of colocation space
	Digital Realty	Vanguard Group (16%), Capital Group (12%), Blackrock (9%), State Street (6%), other investors (57%)	5 (2)	50 (250)	Sydney, Melbourne	*Undisclosed*	▪ Recently acquired additional land plots in Sydney to support future expansion
	Fujitsu	Fujitsu Limited (100%)	6	78	Sydney, Melbourne, Brisbane, Perth	Partially using solar power for Brisbane facility	▪ Recently completed expansion of Western Sydney facility
	Global Switch	Jiangsu Shagang Group (52%), other investors (48%)	2	64	Sydney	*Undisclosed*	▪ Presence only in Sydney ▪ Multiple government agencies have been moving to other DCs after Global Switch came under Chinese ownership ▪ Owners reported to be evaluating a sale
	Keppel Data Centres	Keppel T&T[1] (70%), Keppel Land[1] (30%)	1[1] (1)	5 (14)	Sydney	*Undisclosed*	▪ Sister company Keppel DC REIT also owns Macquarie Data Centres' Intellicentre 2 and 3 facilities

Note: There are 97 other data centres held by smaller players

[1] Its Gore Hill DC is owned by Keppel DC REIT (sponsored by Keppel Telecommunications & Transportation (Keppel T&T)); [2] Both Keppel T&T and Keppel Land are subsidiaries of Keppel Corporation, a Singapore-based MNC which is listed on the Singapore Stock Exchange, whose majority shareholder is Temasek Holdings (Singapore's sovereign wealth fund)

Source: Operator websites, news articles

Australia has a strong pipeline of announced hyperscale builds that will see significant colocation capacity being added in the upcoming three years

Recent developments/activities

- **Q2 2021:** Fujitsu completes Western Sydney Data Centre with a total capacity of 30MW in Phase 1 and potential to increase by 62MW
- **Q1 2021:** AirTrunk completes the construction of its second data centre in North Sydney with a total capacity of 110MW and a PUE of 1.15
- **Q3 2020:** Telstra sells its ~13MW data centre in Melbourne to Centuria REIT for AUD417 million (~USD320 million) with a minimum 30-year lease-back arrangement
- **Q2 2020:** NextDC completed a capital raising process that raised AUD672 million from North American investors and some sovereign wealth funds in exchange for 20% equity stake in the company
- **Q2 2020:** Macquarie Infrastructure and Real Assets (MIRA) acquired 88% stake in AirTrunk with an implied valuation of ~AUD3 billion (~USD 2.3 billion)
- **Q1 2020**: Sovereign wealth fund, Australia's Future Fund, acquired a 24% stake in Canberra DCs for an undisclosed amount. Sources have estimated the stake to be worth at least AUD250 million

Announced supply of new data centres (non-exhaustive)

Expected launch	Company	DC capacity and other details
2022	Keppel DC	▪ Keppel DC Sydney 1 to provide 13.5MW of capacity when completed
2022	CDC	▪ EC4 (37MW) and H5 (20MW) expected to come online in 2022
2022	DCI Data Centres	▪ ADL2 DC to provide 4MW when ready
Q2 2022	NextDC	▪ S3 Sydney DC to provide 12MW initial IT load and 80MW when complete
Q4 2022	DCI Data Centres	▪ Eastern Creek, Sydney DC to provide 36MW for hyperscale purposes
Early 2023	Vantage Data Centres	▪ First phase of Melbourne DC campus will provide 8MW
H1 2023	NextDC	▪ M3 Melbourne DC to provide 150MW of capacity when fully completed
H2 2023	Macquarie Telecom	▪ IC3 Super West will provide 33MW of capacity when completed

Note: This list does not include announced facilities that do not have a specified expected launch date

The Australia data centre market has welcomed new funding and developments in the past year, with many large data centre providers expanding their footprint through new hyperscale builds, mainly in Sydney. In the upcoming two years, DC providers have announced up to 380MW of potential shell capacity, which will add significant supply to the colocation market in Australia

 Source: Operator websites, news articles

Legal notice

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