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Clean cloud:  
Meeting the climate challenge  
in Australia & New Zealand

PRESENTED BY **Google Cloud**

Report 2022

**Deloitte**  
Access **Economics**



*“The climate crisis is the most important societal challenge of our time ... The greatest impact will come through the collective action of like-minded organisations, people, innovators and non-governmental organisations ...”*

Punit Renjen, CEO Deloitte Global

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# Executive summary

## Businesses across Australia and New Zealand have big plans to tackle climate change and reduce their emissions.

This research found 54% of businesses are reducing emissions today and 70% plan to in the next three years. However, only an additional 5% of businesses plan to reduce emissions indirectly in the next three years.

## Cloud and related technologies can be leveraged across industry to unlock environmental benefits, far beyond the initial benefit associated with transitioning from on-premises data centres.

This research identifies 12 sustainability use cases for cloud and related technology, including supply chain transparency, predictive maintenance, disaster response management, real-time inventory tracking, and financial asset risk analysis and can be used across many sectors in the Australian economy.

These applications can help Australian industry reduce their carbon emissions from energy use to help achieve the 28% reduction target by 2030. Australia's National Greenhouse Gas Inventory shows that business's share of electricity sector emissions fell by 9.9 million tonnes between 2005 to 2019, but will need to fall a further 43 million tonnes by 2030 to achieve a 28% reduction.

## Despite the opportunity, many businesses lack a coherent plan to take action on emissions.

Over a third of businesses (34%) have no climate strategy, and 44% of businesses without a strategy are not intending to develop one in the next three years.

With respect to sustainability, businesses operating in Australia and New Zealand are responding to different policy contexts. From 2023, New Zealand will introduce mandatory climate-related disclosures for large publicly listed companies, which is driving progress.

Currently, one-third of New Zealand businesses are taking action to reduce direct emissions, compared to just over one-quarter of Australian businesses. This is despite almost all businesses expecting a reduction in their emissions going forward.

While businesses intend to reduce emissions, the effectiveness of the climate strategies employed so far has been low: 60% of businesses with a standalone climate strategy have not seen emissions levels change much.

While businesses see benefits in reducing their emissions and improving environmental performance, many don't recognise the role of cloud in achieving environmental goals. Only one in five businesses saw 'improving sustainability' as a key benefit of adopting cloud systems. Within organisations, the decision to adopt cloud is undertaken after a narrow financial assessment of only costs.

## Transitioning to cloud presents a major opportunity for businesses to take climate action.

Businesses with a climate strategy and that use cloud are the most likely to be realising emissions reductions. While many have recognised the need to move to more technology-based solutions, only a small proportion of businesses (9%) are currently using the cloud to host all of their data. 91% of businesses in Australia and New Zealand, realise more of the benefits of cloud computing.

New Zealand businesses are moderately more likely to have made more progress towards adopting cloud technologies, with cloud spend as a slightly larger share of GDP, relative to Australia.

Cloud is five times more energy efficient than the on-premises data centres of companies and public sector organisations in APAC, on average. Annually, 4.5Mt CO2 emissions would be avoided if all businesses using on-premises servers switched their workloads to the cloud.



## To support businesses to further their environmental progress through cloud, this report proposes that firms:

- 01 Strengthen adoption of cloud applications through communities of practice
- 02 Coordinate the technology and sustainability teams
- 03 Quantify the environmental benefits of technology investment decisions
- 04 Ensure cloud spending is guided by a coherent, overarching climate strategy

## However, cloud applications can reduce business emissions even more, and will be key to achieving ambitious emissions reduction goals.

While shifting data and applications to cloud from on-premises servers will support direct emissions reduction, it is cloud-based applications that could provide the biggest dividend.

## There is an opportunity for businesses to reframe cloud as an environmental initiative, rather than only a technological one.

Businesses that have both a climate strategy and host their data mainly or entirely in cloud servers are the most likely to be realising emissions reductions.

Reflecting this opportunity, cloud is set for growth in the coming years. In Asia-Pacific, Australia is considered one of the most advanced public cloud markets. The International Data Corporation forecasts that it's expected to be valued at US\$10 billion in 2023, up from US\$4.7 billion in 2018.

## To unlock environmental benefits, it is critical to address the challenges which are stalling progress.

The most commonly-identified barrier to greater investment in cloud is a lack of knowledge about the ways that cloud can be used to achieve sustainability goals (39% of firms ranked in their top three).

A lack of integration between the technology and sustainability workforce was the second most

commonly-identified challenge (33%). Reflecting the challenges of knowledge sharing and collaboration between teams, the most commonly identified enablers to support greater action were improving the integration between technology and sustainability teams (47% of firms ranking this as key), followed by organisation-wide leadership to improve sustainability (37%).

## To support businesses to further their environmental progress through cloud, this report proposes that firms:

1. Strengthen the adoption of cloud applications through communities of practice
2. Coordinate the technology and sustainability teams
3. Quantify the environmental benefits of technology investment decisions
4. Ensure cloud spending is guided by a coherent, overarching climate strategy.

# Cloud-enabled sustainability initiatives

Complex cloud applications will enable businesses to realise substantial and ongoing emissions reduction. The potential of cloud to reduce business emissions is far greater than just the immediate benefits of transitioning from on-premises data centres.

This research identifies 12 sustainability use cases for cloud and related technologies:



### 1. Improving supply chain transparency

A traceable production process and supply chain is critical to ensuring compliance with ESG standards. Big data collection and real-time analysis can enable more responsible sourcing decisions.



### 4. Reducing resource consumption

Cloud-enabled deep learning and high-resolution imagery can provide compelling and personalised analysis of the benefits of adopting sustainable practices, and is used by some solar providers to encourage households to make the switch.



### 2. Quality checks and predictive maintenance

A machine learning drone-based surveillance system minimises the need for humans to undertake potentially hazardous inspections, and avoids the emissions associated with staff travelling large distances to investigate faults.



### 5. Improving agriculture productivity

Farmers can boost yield, avoid blights (spread of crop disease), and cultivate crops more efficiently with real-time data and imagery.



### 3. Managing natural disaster responses

A fleet of cloud-enabled drones are agile, unstaffed vehicles, that can be used to deliver humanitarian support, to monitor and assess damage following natural disasters, and to provide evacuation warnings.



### 6. Real-time inventory tracking

In the retail sector, cloud-enabled data collection allows for a richer set of insights about inventory, which can be used to predict waste of perishable items, allowing time for store managers to take action to minimise this waste.



### 7. Minimising retail waste

Virtual and augmented reality technology can save substantial emissions by making packaging and transportation redundant. It's a model already adopted by clothing and furniture retailers that offer a virtual try-on service, to minimise the waste and transport emissions associated with returns.



### 10. Climate risk analysis of financial assets

The complex data required to model climate risk is hosted on cloud servers. These data are critical to enable financiers to account for climate-related risks in asset pricing – a model which embeds climate awareness into decision making.



### 8. Transport decarbonisation

Cloud-enabled data collection and machine-learning models can enable more efficient fleet management, to support major emissions reductions.



### 11. Accelerated application development

Many of the preceding use cases for cloud involve developing bespoke software. Developing greater efficiency, minimising the time-to-market and ensuring sustainability benefits are realised promptly.



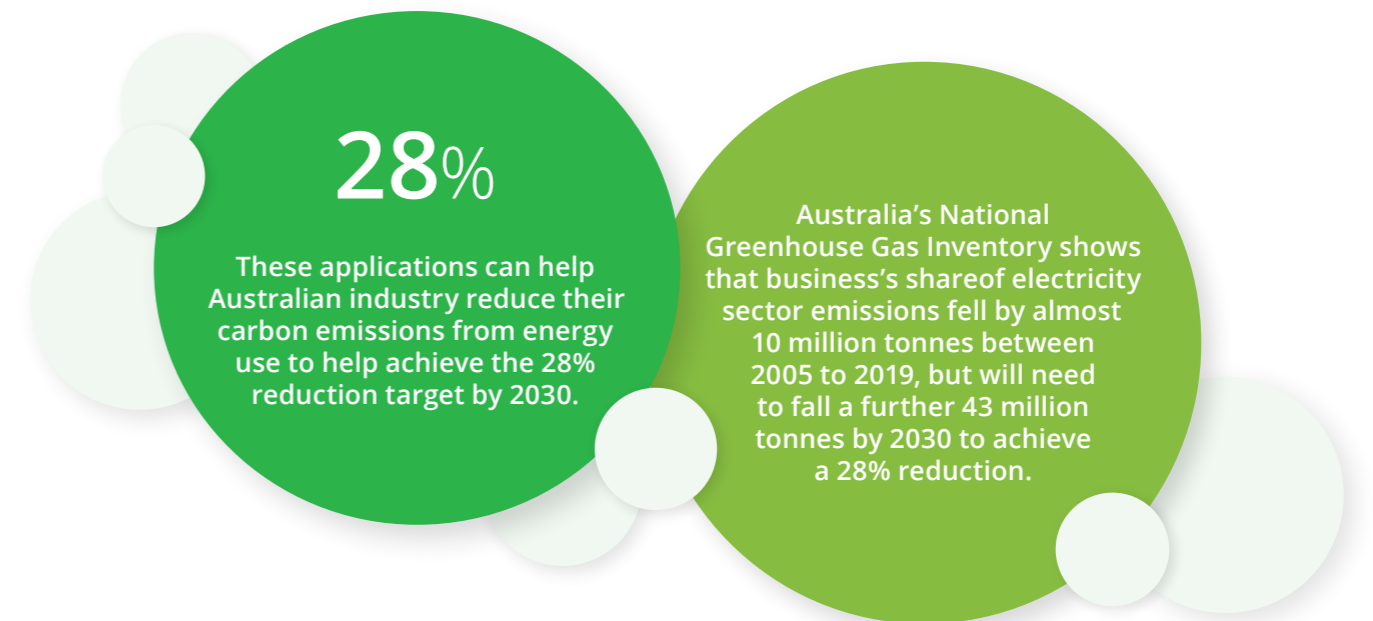
### 9. Responsive building management

Smart heating, cooling and ventilation systems use real-time energy consumption data and AI to respond to building capacity and weather conditions. This can minimise the CO2 footprint, by only heating or cooling a building when necessary.



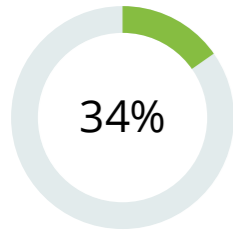
### 12. Transitioning to carbon-free energy

Cloud-enabled real-time data dashboards allow users to receive updates on the energy sources used to power their operations, to run analytics on sustainability performance and energy use, and to identify opportunities to switch to renewables.

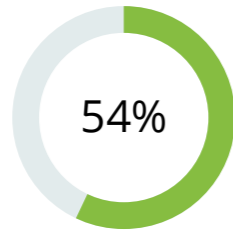


# 1. Big plans to tackle climate change

Australian and New Zealand businesses have big aspirations for carbon cuts – although the adoption and implementation of climate strategies varies.



34% of businesses still don't have a climate strategy and of those with a strategy, 60% of businesses have not seen emissions levels change much.



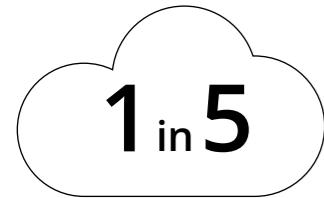
54% of businesses report that they are reducing emissions today – a share which will rise to 70% in three years – the lack of progress puts the effectiveness of existing climate strategies in question.



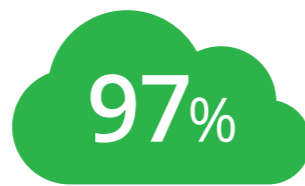
One-third of New Zealand businesses are taking action to reduce direct emissions, compared to just over one-quarter of Australian businesses, while Australian businesses are more likely to be investing in indirect emissions reduction.<sup>1</sup>

# 2. Cloud performance

Most businesses don't recognise the potential of cloud to achieve environmental goals, but those that do report a range of benefits.



businesses rank 'improving sustainability' as among the key benefits of transitioning to cloud technologies.



of businesses that use cloud technology report positive environmental impacts.

The environmental benefits associated with increased cloud use will rise, as internet traffic and data workloads rise exponentially. Cloud is five times more energy-efficient than the on-premises data centres of companies and public sector organisations in APAC, on average.

Few businesses host all data in the cloud. 7% of Australian businesses have fully transitioned to cloud, while 43% have made substantial progress in the transition. In comparison, 15% of New Zealand businesses host all data in the cloud, and 31% are making major progress in the transition.



# 3. Actions for the future



# Introduction

**The imperative for climate action has never been stronger, and technology will play a major role in navigating a cleaner future.**

Over the past 50 years, there has been a movement to recognise that companies have a duty to all stakeholders in their value chain, not just their shareholders. This has sparked a focus on environmental, social and governance (ESG) issues. ESG is a way of describing the broad concepts that must be addressed to create a truly sustainable company – a concept that promotes sustainability in the long term because a company has societal relevance and societal purpose.

The growing concern around climate change also means it is imperative for companies to improve their environmental performance now more than ever. Technology and the breadth of innovative technologies enabled by cloud computing can play a role in helping companies improve this performance. It is in this context that Google Cloud engaged Deloitte Access Economics to research how businesses in Australia and New Zealand can use cloud and cloud-enabled technologies to achieve their ESG goals.

## This report

Google Cloud Australia engaged Deloitte Access Economics to help it in researching the role of technology, particularly cloud services, in supporting businesses within Australia and New Zealand to improve their performance on measures of environmental impact.

## The survey

The report is informed by a survey of 493 businesses across Australia and New Zealand, operating in a range of industries, in November 2021. Around three-quarters were in Australia and one-quarter in New Zealand. While overall survey results suggest businesses' experiences are similar across Australia and New Zealand, variation in policy settings motivated a comparison of cloud and environmental benefits between the markets and revealed some differences, which are explored in this report.

About half of survey respondents were managers, and half were executives or directors in their businesses. 39% had responsibility for IT or digital areas, 11% had sustainability responsibilities and the remaining half had responsibilities for both. The survey had respondents from a variety of industries across primary industry, manufacturing, construction, services and public sector organisations.

Figures contained in the report relate to surveyed businesses, unless otherwise specified. As such, results may be representative of only the surveyed population.



## The role of cloud in reducing emissions.

Global internet traffic has grown exponentially in the last decade, as have the workloads of data centres. Thanks to clean cloud solutions, the energy use by cloud data centres has remained relatively constant.

**Cloud computing enables sustainability benefits through:**



01 \_\_\_\_\_

# Big plans to tackle climate change



# Australian and New Zealand businesses have big aspirations for carbon cuts: 70% of businesses intend to be reducing emissions within the next three years.

**54% of businesses are reducing emissions today, and 70% say they will be reducing emissions within the next three years.**

Businesses are recognising the importance of tackling climate change, with its significant environmental, social and businesses benefits. While only 54% of businesses are currently reducing emissions, a further 16% expect to reduce their emissions in the next three years.

Across emissions activities, direct emissions are where most businesses see their potential (i.e. minimising emissions from vehicles), followed by emissions from extraction, manufacturing and processing raw materials. In contrast, reducing indirect emissions (i.e. switching to more sustainable energy sources) is where businesses have made most progress today, but only another 5% of firms have plans to adopt similar initiatives in the next three years. These results may suggest that firms do not see technology as a means to reduce emissions.

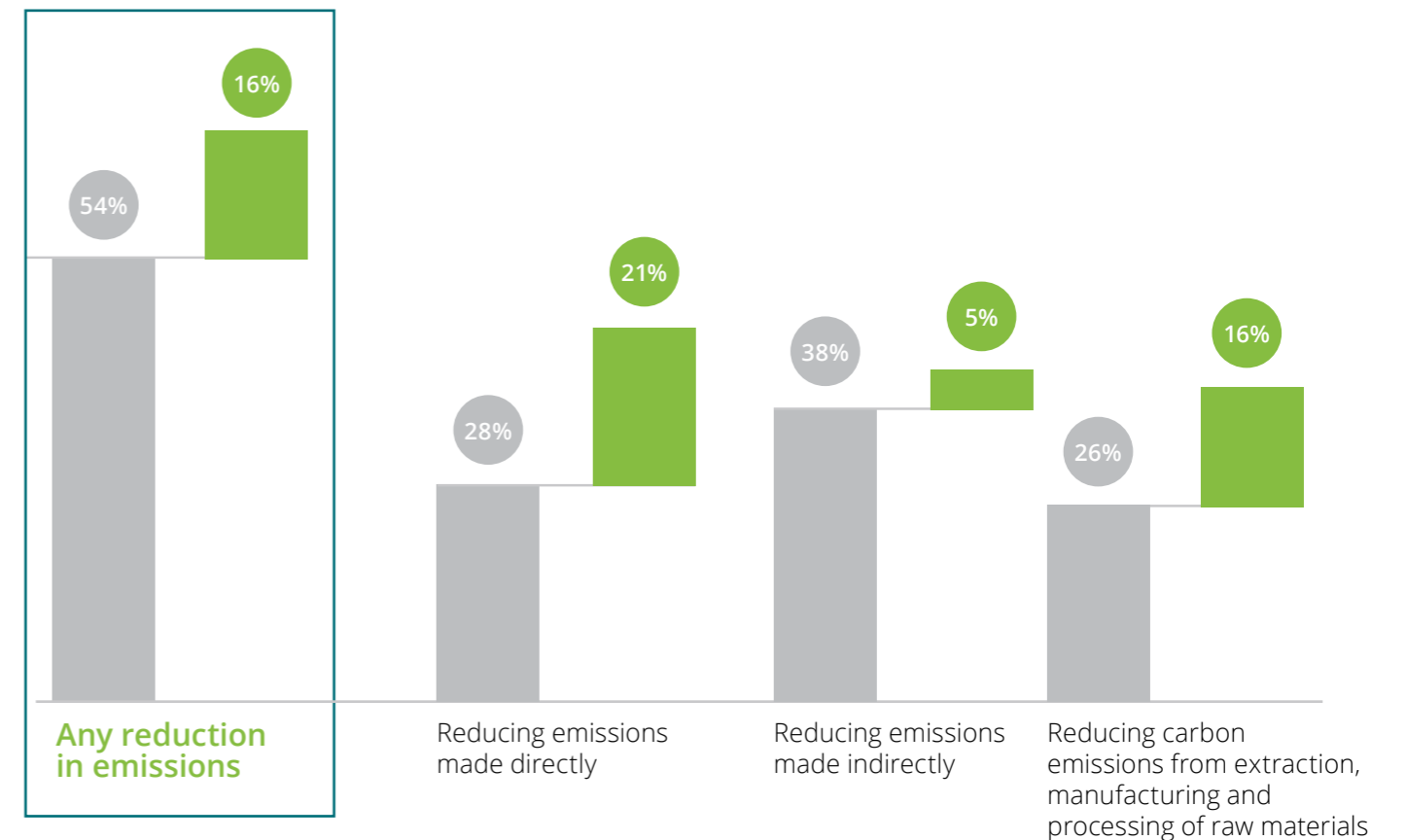
For 30% of businesses surveyed, progress has stalled on the transition to cloud as well. Currently, one-third (33%) of New Zealand businesses are taking action to reduce direct emissions, compared to just over one-quarter (27%) of Australian businesses. Conversely, Australian businesses are slightly ahead in terms of action to reduce indirect emissions (40%), relative to New Zealand (34%). This may reflect a different industry composition in these economies, where some approaches to emissions reduction are more relevant than others.

Amid COVID-19 disruption, ESG is increasingly important for business leaders across the C-suite. They recognise that investors, customers and staff all want action on ESG, and they are responding, although it's still a work in progress. In a survey of Australian CFOs, 11 ESG activities were listed. Only 13% (on average) of CFOs believe they have completed them or that the activities are in place, while 70% (on average) believe these activities are planned or in progress.



**Chart 1.1**  
**Progress on emissions reduction**  
Share of firms taking action

■ Currently taking action  
■ Planning to take action in next three years



**Source:** Deloitte Access Economics (2022).  
**Survey question:** What does your current emissions reduction activity look like now, and what do you expect it to look like in 3 years' time? (N = 493)  
**Note:** Reducing emissions via extraction, manufacturing and processing of raw materials is an action specific to Australia's industry composition.

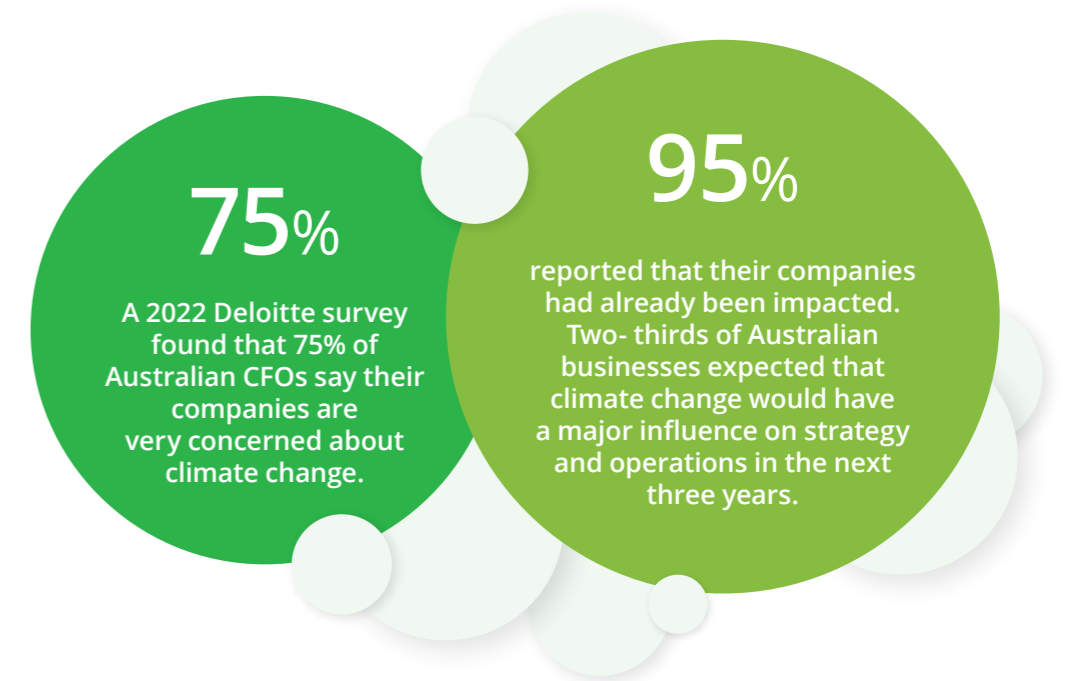


## Sustainability is now central to business, not just an afterthought: 40% of businesses identify sustainability as among their top three business priorities.

Freely emitting carbon has far-reaching environmental consequences, but also poses monetary costs to businesses in the form of poorer market engagement, reputational consequences, lower operational efficiency, higher energy costs, and reduced competitive advantage.<sup>1,2</sup> As businesses recognise the benefits of tackling climate change, they are prioritising sustainability in their operations. While among the top three priorities for several businesses, sustainability still falls behind other metrics such as customer needs, which was ranked by the most number of businesses as their top three priorities (66%), followed by financial performance (60%) and operational efficiency (58%). Only 13% of businesses state sustainability as their top priority. As the financial dividend of sustainability becomes larger and customers put more impetus on businesses to engage in sustainable practices, businesses are likely going to increase their focus on climate change. For now, businesses have a way to go in reducing emissions.

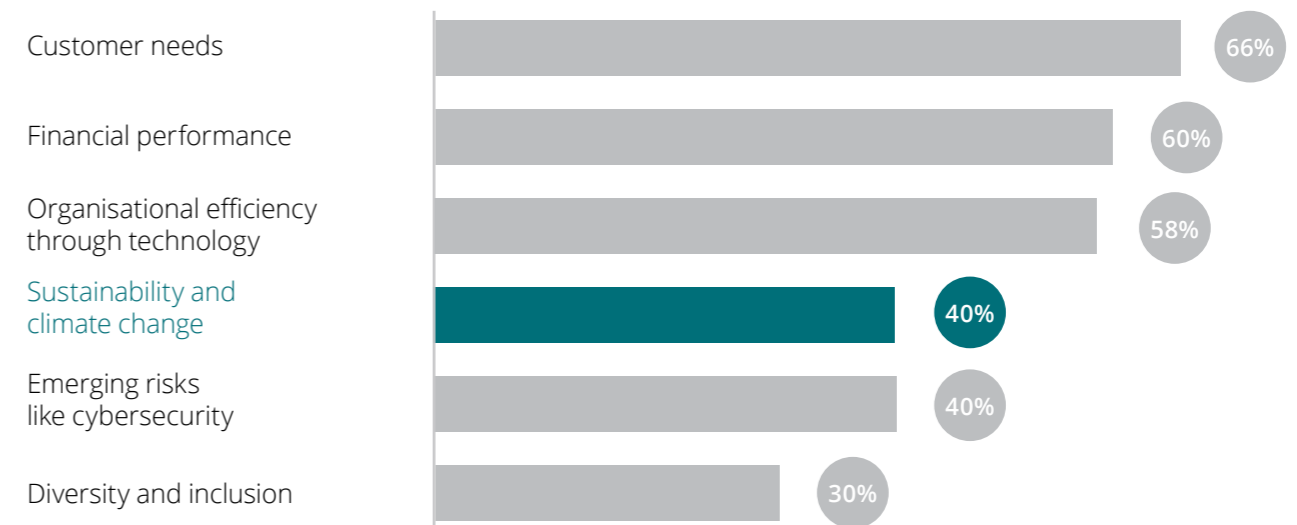
### Business motivations for climate action - Australia

Australian CFOs listed employee morale, brand recognition and reputation, and addressing climate change as the top three benefits of their climate efforts. The bottom three were all financial – relating to revenue from longstanding businesses, cost of investment, and operating margins – perhaps suggesting that the short-term costs of transitioning are a barrier to progress towards a low carbon future.



**Chart 1.2: Business priorities**

Share of firms ranking each issue in their top three



**Source:** Deloitte Access Economics (2022)

**Survey question:** What are some of your organisation's biggest priorities? Please rank, where 1 is the highest prioritisation. (N=493)

## A section of the economy is yet to engage with sustainability issues: 34% of businesses have no climate strategy.



Despite the imperative businesses face to tackle climate change, many do not have a strategy to do so.

Over a third of businesses have no climate strategy, and 44% of the businesses without a strategy are not intending to develop one in the next three years. These results are despite most businesses expecting a reduction in their emissions going forward.

Larger businesses (with more than 1,000 workers) were more likely to have established a strategy (83%) compared with smaller businesses (60%). Reflecting the correlation between having a strategy and making progress on emissions reduction, larger businesses were moderately more likely to have recorded emissions reduction (70%) than small businesses (51%).

Globally, one-third of the Fortune Global 500 (163 companies) have publicly committed to achieving a climate target as of October 2020.<sup>1</sup>

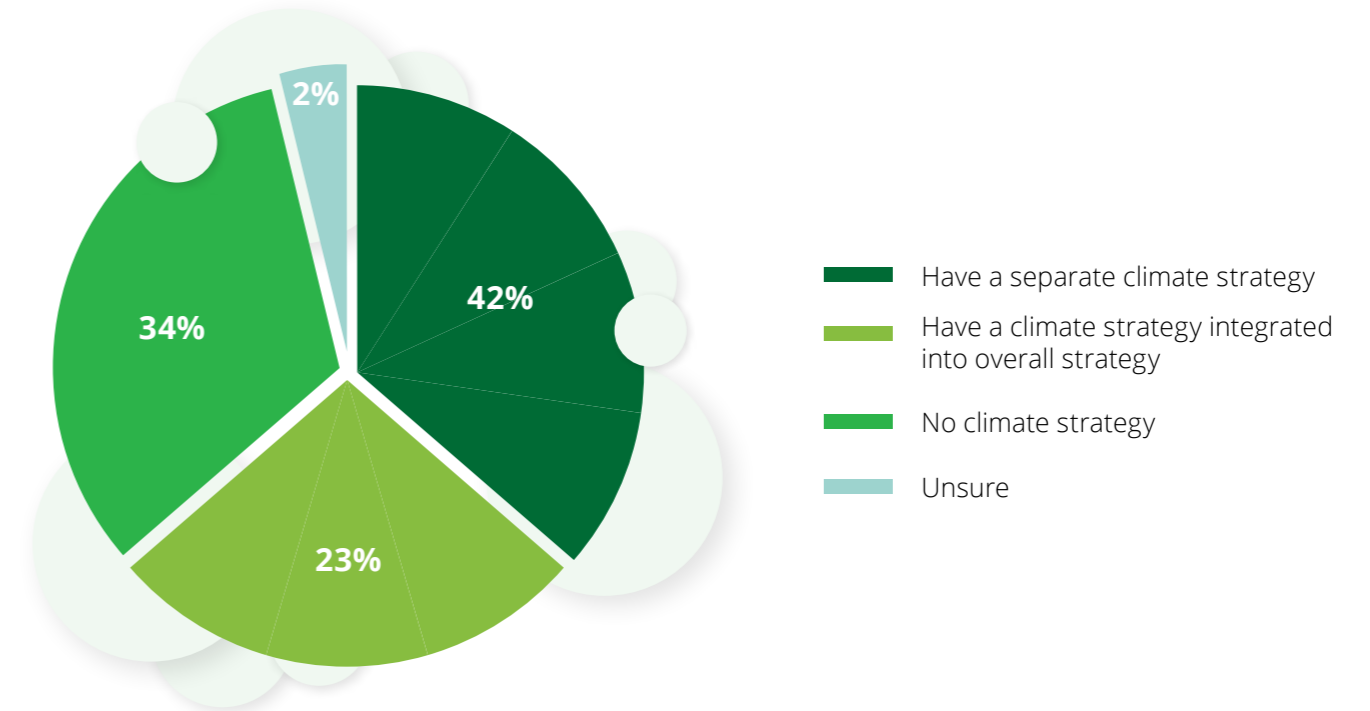
The most common target is to achieve carbon neutrality (91 companies), followed by emissions reductions in line with keeping global warming below 2 degrees Celsius (74 companies) and achieving 100% renewable energy for operations (56 companies).<sup>3</sup>

Relative to the proportion of businesses with a broader climate strategy, a greater proportion (81%) have a decarbonisation strategy, with the top feature of these strategies being a clear vision from leadership.

Other features characterising businesses' decarbonisation strategies include communication and training for employees about efforts to reduce emissions (30%), initiatives that will help reduce carbon emissions (32%), and targets for carbon reduction (30%).



Chart 1.3: Proportion of businesses with a climate strategy by type of strategy



### Business motivations for climate action - New Zealand

A 2021 Deloitte survey of New Zealand CFOs found that 73% had either planned, completed or were at various stages of developing their sustainability strategy and plan. While progress is incomplete for some of these businesses, it is evident that an overwhelming majority of businesses have begun to make progress.<sup>4</sup>

When asked about their rationale for investment in climate action, CFOs noted an intent to strengthen competitive advantage (54%), a sense that 'it is the right thing to do' (52%), and a need to respond to changing consumer preferences (41%). Further, a new regulation requiring publicly-listed businesses to make climate risk-related disclosures is expected to be driving progress.

# Australian businesses will need to lift their game to meet emissions targets. Overall emissions have decreased only modestly over time.



Australia's emissions for the year to June 2021 were an estimated 498.9 Mt Co2-e, a 2.1% reduction on the previous year. The reduction is primarily driven by emissions reductions in electricity (-4.5%), fugitive emissions (-8.7%) and transport and (-1.9%).<sup>4</sup> Australia's overall emissions have decreased only modestly over time, driven largely by Land Use, Land Use-Change and Forestry (LULUCF).

In the year to March 2021, Australia's emissions totalled 494.2 million tonnes: 5.3% or 27.8 million tonnes lower than in 2020, and 20.8% lower than in 2005 (the baseline year for the Paris Agreement). These trends partly reflect a reduction in transport emissions due to COVID-19 restrictions, as well as reduced fugitive emissions and ongoing reductions in electricity emissions.<sup>4</sup>

**The majority (59%) of Australian businesses with a standalone climate strategy state that they have not seen emissions levels change much.**

Nonetheless, environmental outcomes are a greater focus for the majority (82%) of businesses than are social and governance outcomes, and all surveyed businesses are expecting reductions in emissions levels in the next three years. However, it is unclear how businesses will achieve these reductions, given 44% of businesses have not yet made progress in developing a climate strategy over the next three years.



There is scope for more action, especially with respect to direct emissions. Australian business survey results reveal that:

# 27%

of businesses are reducing emissions directly.

# 40%

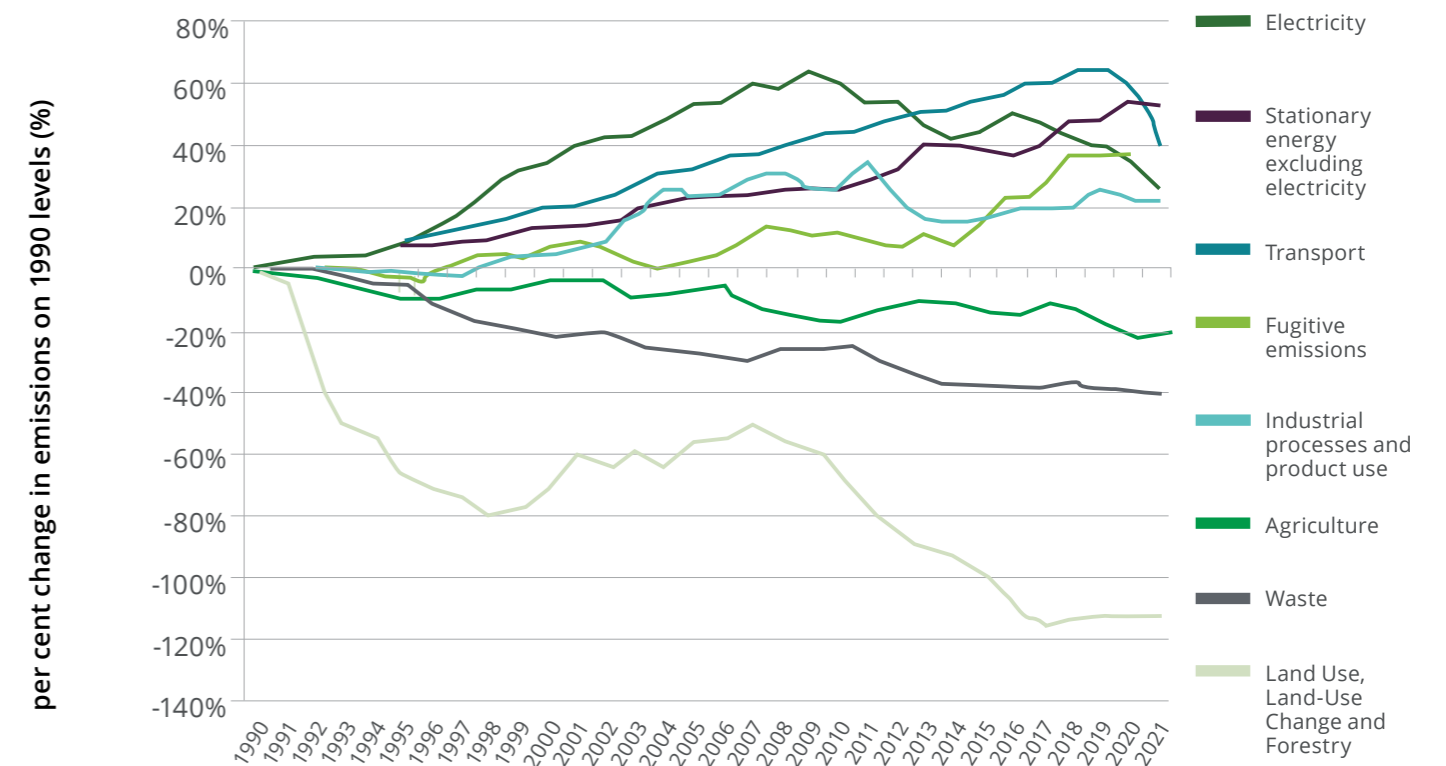
of businesses are reducing emissions indirectly by switching to more sustainable energy sources.

# 27%

of businesses are reducing emissions from better extraction, manufacturing and processing of raw materials.

While businesses are exerting efforts to reduce emissions through various methods, the effectiveness of strategies employed is low.

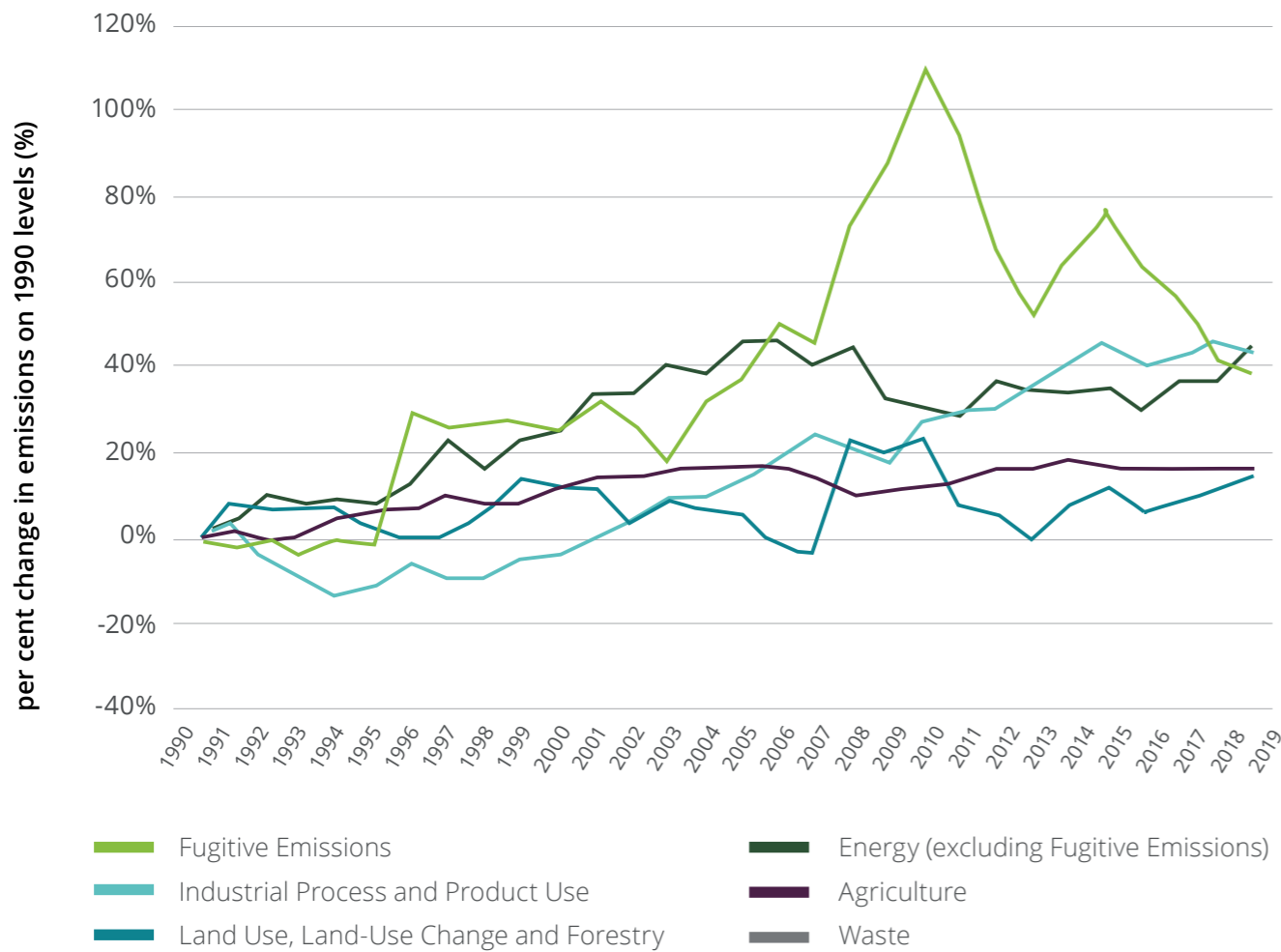
**Chart 1.4. Australia's emissions activity over time**  
% change indexed to 1990



**Source:** Department of the Environment and Energy (2021); Quarterly Update of Australia's National Greenhouse Gas Inventory: March 2021

# New Zealand's businesses must also take more action. An emissions reduction plan and new reporting requirements will drive momentum.

**Chart 1.5: New Zealand's emissions activity over time**  
% change indexed to 1990



Source: Ministry for the Environment (2021)  
New Zealand's Greenhouse Gas Inventory 1990-2019



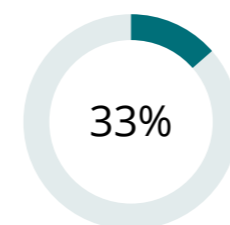
## New Zealand is at a critical juncture for emissions reduction.

New Zealand is one of the few countries to have a net zero emissions by 2050 goal enshrined in law, its Zero Carbon Act, and just over 80% of electricity is produced from renewable sources.<sup>5</sup> Nonetheless, there remains some potential for New Zealand businesses to further electrify or move to other sources of renewable energy.<sup>5</sup> Emissions from sources other than waste have remained above 1990 levels and are still trending upward (Chart 1.5).

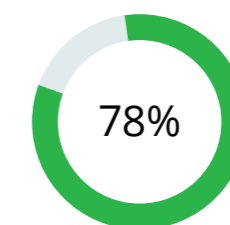
The inaugural Emissions Reduction Plan, which will set out policies and strategies for meeting emissions budgets, will be released by the government in coming months, and responds to a review undertaken by the newly-established Climate Change Commission.<sup>6</sup> The reduction plan will inform the settings of the national NZ Emissions Trading Scheme to 2025.

Alongside this, legislation passed in December 2021 sets out mandatory climate-related disclosures for large publicly listed companies, in order to ensure that the effects of climate change are routinely considered in business decision making.<sup>7</sup>

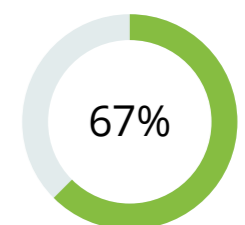
## Reflecting this momentum, New Zealand survey results reveal that one-third of businesses (33%) are reducing emissions directly and 78% intend to by 2025.



of businesses are reducing emissions indirectly by switching to more sustainable energy sources.



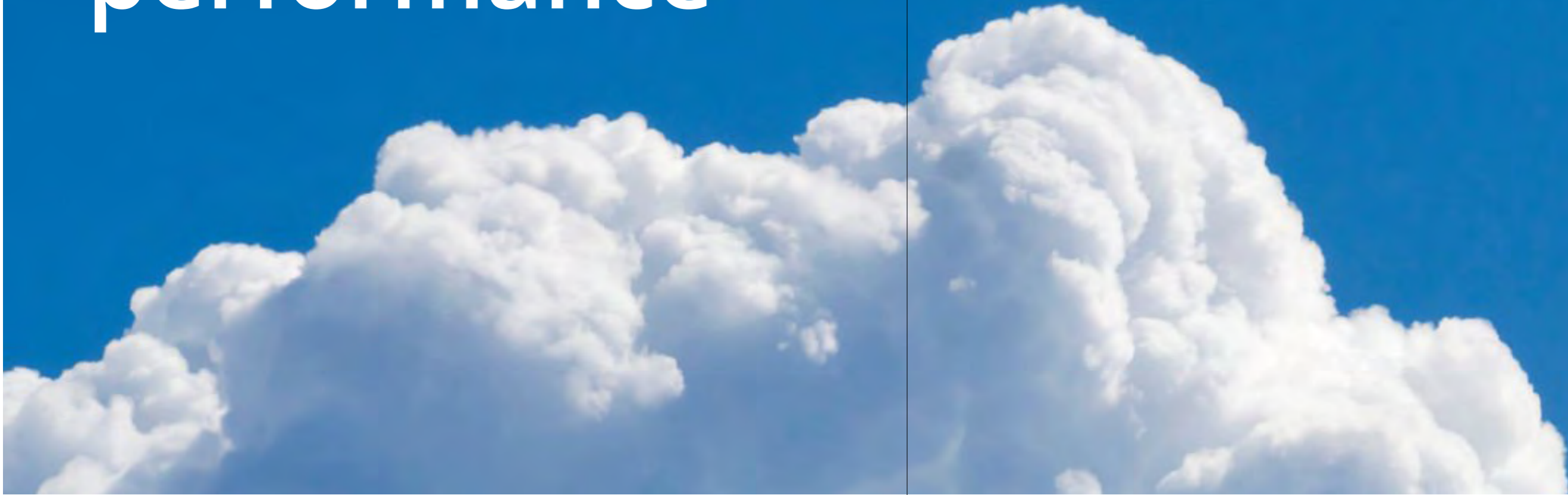
of businesses intend to be taking action to reduce emissions indirectly, by 2025.



of New Zealand businesses with a standalone climate strategy state that they have not seen emissions levels change much.

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# Cloud performance



# Most businesses don't recognise the role of cloud to achieve environmental goals: one in five businesses rank 'improving sustainability' as among the key benefits of transitioning to cloud technologies.

Within organisations, the decision to adopt cloud is undertaken after a narrow financial assessment of capital, operational and transition costs.

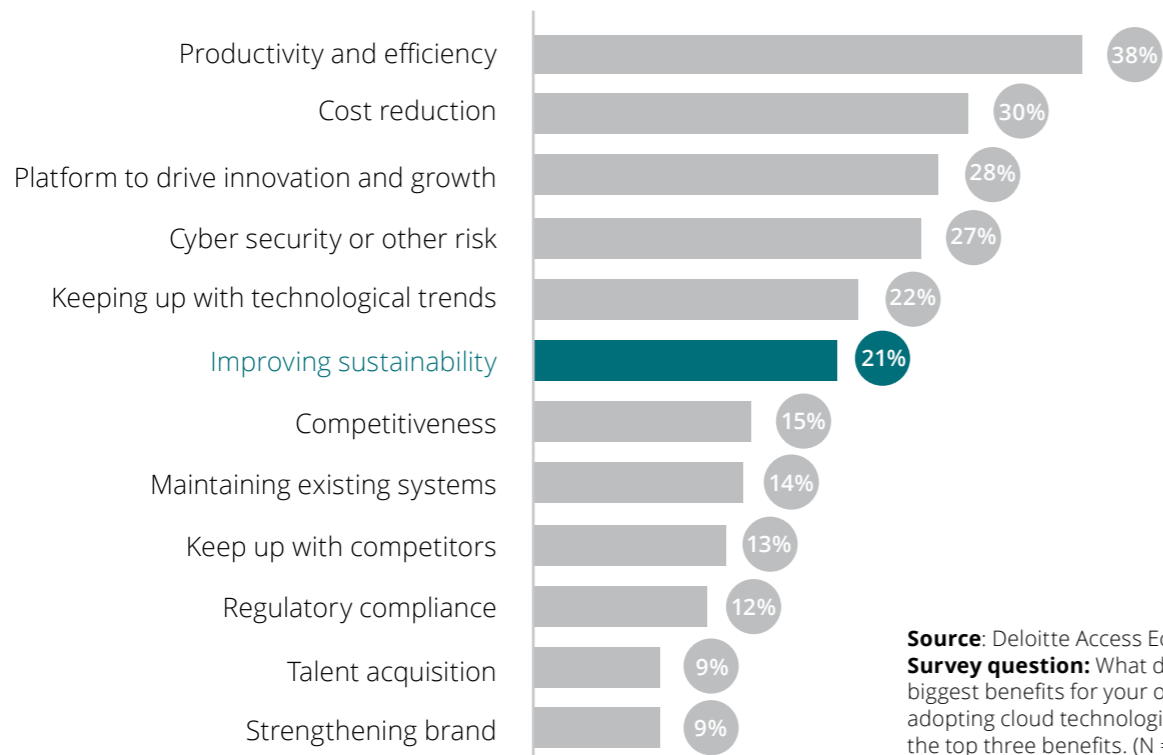
When asked about the top benefits of transitioning to cloud, the most commonly reported benefits related to productivity and efficiency, cost and risk reduction and improved cyber security. Meeting sustainability goals and improving sustainability within organisations were lower on the scale of benefits identified by businesses,

compared to these more traditional concerns around business and operational benefits.

Only one in five businesses saw 'improving sustainability' as a key benefit of adopting cloud systems – suggesting that the emissions reduction dividend from cloud is not being given the recognition it deserves. Australia and New Zealand could accelerate its cloud adoption by factoring in this environmental benefit.

## Reported benefits of cloud transition

Share of firms ranking each item within the top three benefits



Source: Deloitte Access Economics (2022)  
 Survey question: What do you see as the biggest benefits for your organisation if adopting cloud technologies? Please rank the top three benefits. (N = 493)



## Benefits of cloud adoption for the New Zealand public service

In late 2020 the New Zealand Government started building its Cloud Centre of Excellence initiative to accelerate the uptake of cloud and execute well-designed and governed cloud migrations across NZ's public sector.



This builds on the government's Cloud-First policy announced in 2016 and its more recently launched digital strategy in late 2019. The Strategy for a Digital Public Service sets a direction to develop a modern public service and the systems which will meet the needs of people in a modern, changing world, so it is easier for people to have seamless access to the government services.

Paul James, Government Chief Digital Officer, is overseeing support for the development of digital solutions for the public sector and recently said, "We have a lead role on behalf of government to support a more connected, responsive and consistent digital public service ... this reflects our purpose to work with and through agencies to drive and deliver customer-centred digital government."

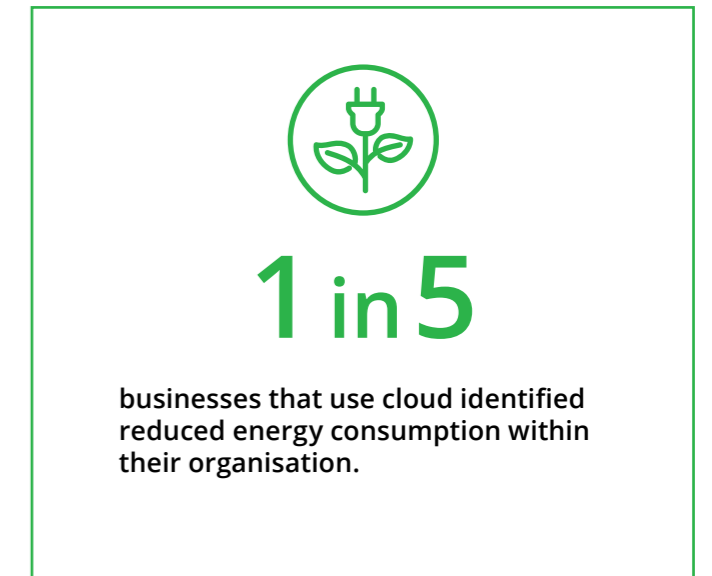
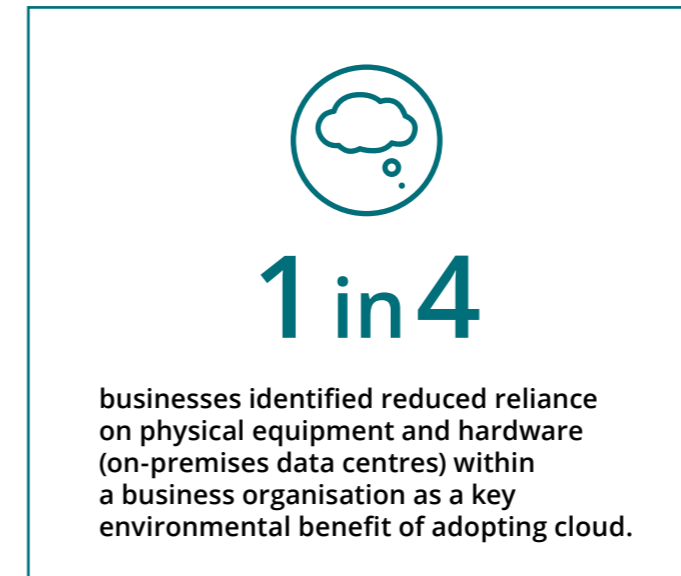
**But for those that do report a range of benefits, one in five businesses say Cloud leads to lower energy consumption within their organisation.**

Cloud technologies are delivering environmental benefits in a number of ways, such as reducing the reliance on physical equipment and lowering energy consumption within organisations. However, the emissions reductions associated with these outcomes are not well captured, with only 54% of businesses reducing emissions today despite 97% reporting positive environmental impacts.

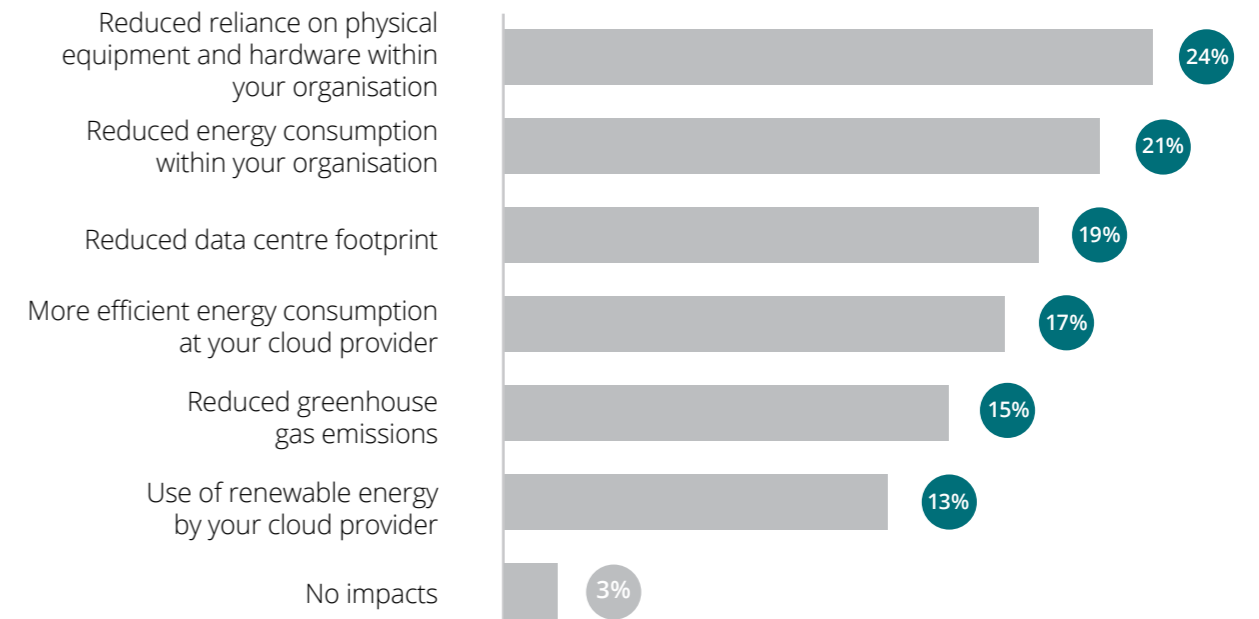
Notably, the impact of a climate strategy on emissions reduction is more significant than the impact of the cloud strategy. This may reflect a lack of awareness that cloud transition is a means of indirectly reducing emissions.

Only 15% of firms identified greenhouse gas emissions as among the top benefits of adopting cloud technologies suggesting the emissions dividend of cloud is not well understood.

**While climate strategies appear to drive emissions reductions more than cloud use does, firms do recognise the environmental benefits of their transition to cloud.**



**Biggest benefits of cloud technologies**



**Source:** Deloitte Access Economics (2022)

**Survey question:** What do you see as the biggest benefits for your organisation if adopting cloud technologies?

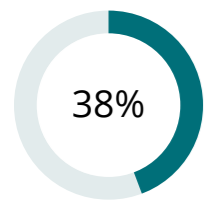
Please rank the top 3 benefits. (N = 493)

# The cloud efficiency benefit: Cloud use and traffic have risen exponentially but cloud energy consumption flatlined – reflecting the environmental benefits associated with increased cloud use.

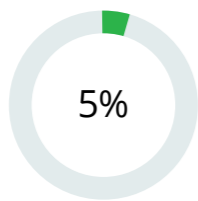
All surveyed businesses expect to reduce their environmental impact further in the next three years. This will mainly be achieved by reducing their 'direct' emissions (e.g. by minimising emissions from vehicles). Conversely, progress to minimise 'indirect emissions' (i.e. by switching to more sustainable energy sources) is stalling.

**Reframing cloud as an environmental initiative, rather than just a technological one, could enable more rapid progress.**

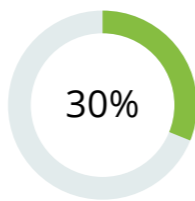
Public cloud services have experienced tremendous growth across Asia Pacific over the last five years, growing an average 40% each year between 2015 and 2020 to reach \$43 billion in total cloud spending.<sup>1</sup>



Only 38% of firms have begun to tackle their indirect emissions.



An additional 5% of firms have plans to take similar action in the next three years. These results suggest that firms may not see cloud technology as a means to enable emissions reduction.



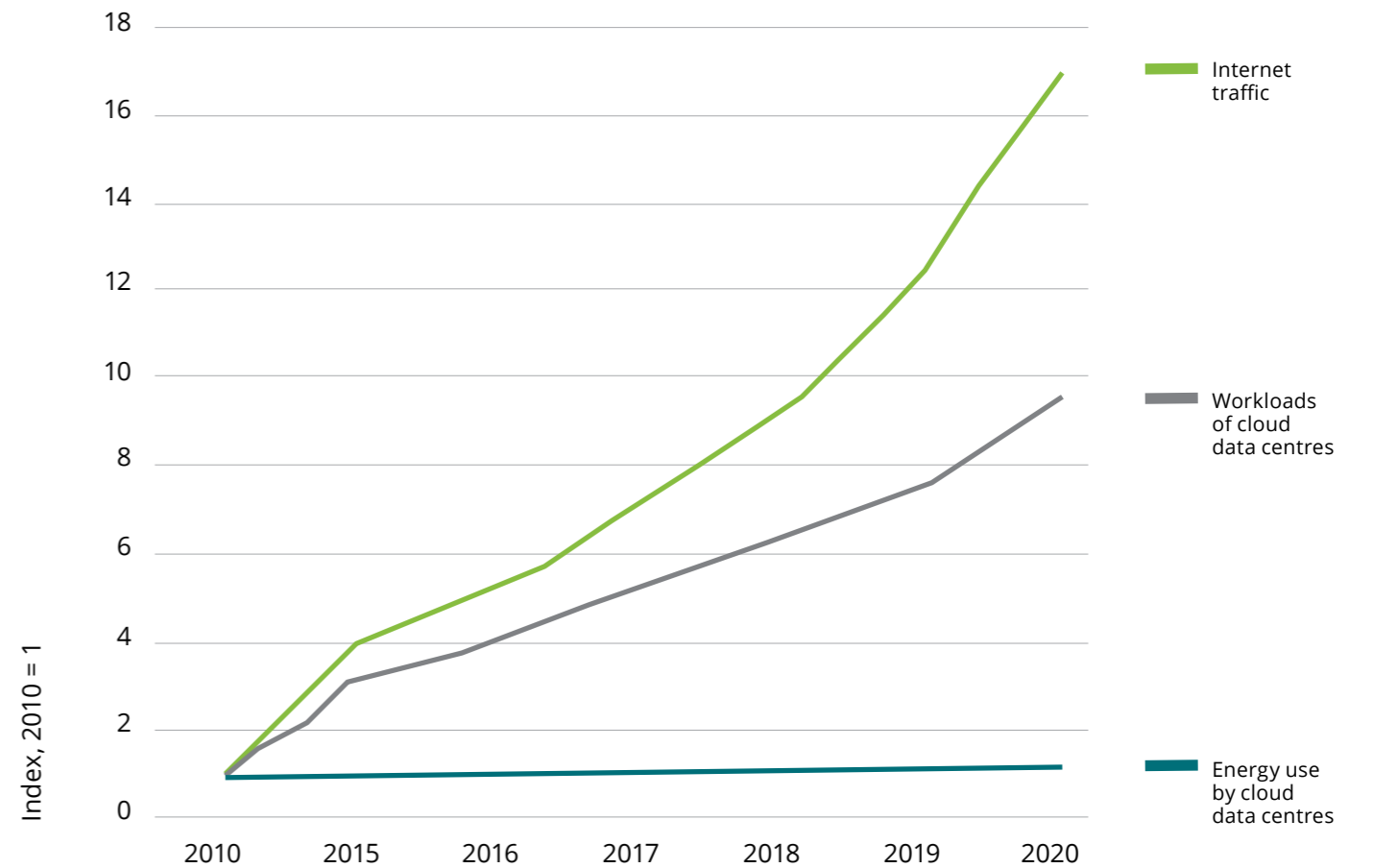
For 30% of businesses surveyed, progress has stalled in their transition to using the cloud.



As data workloads grow, the imperative to use cloud services to minimise the environmental impacts is stronger than ever. The volume of global internet traffic and cloud data centre workloads has risen exponentially (chart below). Across the same period, the level of energy use by centralised cloud data centres has been stable.

The International Energy Agency attributes this outcome to significant improvements in energy efficiency and a shift to larger scale data centres (which house cloud data), limiting energy demand growth from on-premises data centres and data transmission networks.<sup>2</sup> While a positive outcome, the IEA reiterates the need for strong government and industry efforts on energy efficiency, renewables procurement and R&D in order to reduce energy demand and emissions growth into the future.

**Global trends in internet traffic, data centres workloads and data centre energy use, 2010–2020**



Source: International Energy Agency (2022)



## The emissions reductions dividend: The potential of cloud applications to reduce business emissions is far greater than the immediate benefits of transitioning from data centres.

Transitioning to cloud storage is an opportunity for businesses to take climate action.



Deloitte's survey of businesses shows that only 9% of businesses have fully adopted cloud storage.

of businesses in Australia and New Zealand have an opportunity to realise more benefits from cloud computing.

Businesses can also reduce emissions by simply transitioning from on-premises servers to public cloud. Research on the benefits of cloud in the APAC region suggests that the cloud is five times more energy efficient than the on-premises data centres of companies and public sector organisations in APAC, on average.<sup>3</sup>

Transitioning from on-premises data centres to cloud can improve energy efficiency by 78% for typical enterprises and public sector organisations in APAC.<sup>3</sup> Another study found cloud solutions to be 93% more energy efficient and up to 98% more carbon efficient than on-premises solutions.<sup>4</sup>

**According to previous research, if all Australian organisations not currently using cloud storage transitioned, carbon emissions would fall by 4.5 million tonnes each year, reflecting \$1 billion a year in avoided energy costs.<sup>5</sup>**

Cloud providers can help businesses track these changes. For example, Google Cloud's Carbon Footprint reporting tool helps businesses measure, track and report on the carbon emissions linked to their use of the cloud.



Users can see the gross, location-based emissions linked to their use of Google Cloud. They can track their cloud projects' emissions profiles, allowing changes to be made to its carbon footprint. The calculation methodology is available and can be shared when users report on cloud-related carbon emissions.

# \$1 billion

a year in avoided energy costs

Given New Zealand's current lack of onshore cloud data centres to service the private sector, the environmental impacts of cloud use are high. Currently, when New Zealand businesses adopt cloud models, their workloads – and environmental

impacts – move offshore, mainly to Australia. Given that Australia has a far lower share of renewable energy, developing onshore cloud data centres in New Zealand will be in itself an environmental gain.

**While direct savings have a sizeable impact, there is a lot more that can be achieved through cloud applications. Leveraging cloud-enabled technologies will be key for industry to achieve ambitious emissions reduction goals.**

While shifting data and applications to the cloud from on-premises servers will support direct emissions reduction, it is cloud-based applications that could provide the biggest dividend.

These applications can help Australian industry reduce their carbon emissions from energy use to help achieve the 28% reduction target by 2030. Given that a reduction of 45 to 50% by the 2030 target is required under a 1.5C trajectory, it is critical that more Australian businesses develop climate strategies which leverage innovative technologies to realise progress.

Australia's National Greenhouse Gas Inventory shows that industry activity accounts for around 70% of stationary energy-related CO<sub>2</sub> emissions, with the remaining 30% driven by households. For businesses, a 28% reduction in emissions from energy use – via Electricity, Gas, Water and Waste Services – equates to a reduction target of 53 million tonnes of CO<sub>2</sub> by 2030. Progress made since 2005 has seen a reduction of 9.9 Mt CO<sub>2</sub> in annual business emissions, which will need to fall a further 43 million tonnes by 2030 to achieve a 28% reduction. Critical to making further progress towards these goals will be to consider how emerging technologies can embed more sustainable practices in business operations.

The use cases presented in this report specify these opportunities. These initiatives can also support businesses to reduce non-energy-related emissions. Indeed, the 53 Mt CO<sub>2</sub> in energy related emissions reduction is a component of a much larger goal. All together, Australia needs to avoid 4,596 Mt CO<sub>2</sub> in reductions from 2005 to 2030 to achieve its 28% reduction target.

**Further progress on emissions reduction in the future will rely primarily on technological advancements across business and industry, and cloud will underpin several emerging technologies.**

Under Australia's current climate plan, priority technologies will deliver 85% of the emissions reductions necessary to achieve net zero by 2050. Priority areas include carbon sequestration, for which a cloud-based simulator is being tested to help optimise rock-specific conditions for safe carbon storing.<sup>8</sup> The remaining 15% of the necessary emissions reduction will rely on new technologies, which the country is relying on to emerge over the next decade, for which cloud will likely also play an important role.

Cloud providers can help businesses identify opportunities. For example, Google has committed to helping more than 500 cities and local governments reduce annual carbon emissions significantly – aiming for an aggregated 1 gigaton reduction by 2030. It has released the Environmental Insights Explorer ("EIE"), a platform drawing on Google's mapping data and relevant greenhouse gas emission factors, to help decision-makers use the EIE to measure emission sources, run analyses, and identify ways to reduce emissions.<sup>9</sup>

# Google Cloud's actions to support environmental sustainability.

“Last year we set a moonshot goal to operate on 24/7 carbon-free energy by 2030 for all of our data centres and campuses. That means that by the end of the decade, we aim to deliver every search, every email, and every YouTube video without emitting carbon.”

Ruth Porat, Alphabet and Google CFO<sup>10</sup>

## Carbon neutrality

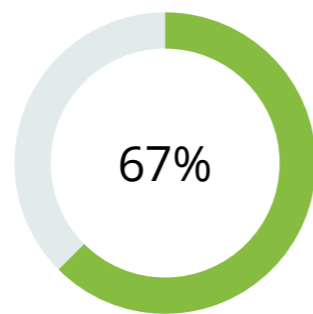
In 2007, Google announced it was committing to achieving carbon neutrality.<sup>6</sup> By September 2020, it had purchased high-quality carbon offsets to cover all the carbon emitted by the company since it began operations.<sup>11</sup>

The company signed up to the United Nations' Race to Zero, as well as the Exponential Roadmap Initiative, in June 2021. The alliance aims to halve emissions before 2030 and achieve net zero emissions by no later than 2050, throughout participants' value chains.<sup>12</sup>

Alongside these plans, Google uses machine learning tools to optimise energy use across data centres to local temperatures, minimising unnecessary energy use. An algorithm trained on historical weather data will tweak a data centre's cooling system to respond to external weather conditions, sampling local weather conditions every five minutes to ensure that – for example – if there is a sudden drop in temperature, the facility knows to devote less energy to cooling the servers.<sup>13</sup>

## Carbon-free energy for data centres

Some of Google's data centres are already using around 90% carbon-free energy. Globally, Google achieved 67% carbon-free energy (CFE) on an hourly basis across all of its data centres in 2020, an increase from 61% in 2019.<sup>11</sup>



Globally, Google achieved 67% carbon-free energy.



Technologies that Google is exploring to assist with achieving its 24/7 carbon-free energy goal include artificial intelligence and other software to, for example, allow non-urgent computing tasks to be performed when energy demand is lower, to predict wind power availability, or to allow tasks to be moved between data centres.<sup>13</sup>



Energy sources that Google is looking to use for the 24/7 carbon-free energy goal include geothermal, wind and solar pairing, nuclear, green hydrogen, long-duration storage, and carbon capture and storage. Storage battery capacity will also be a key component of reaching the goal, particularly in the near term while other technologies are still evolving.<sup>11</sup>



Google Cloud estimates the share of carbon-free energy used to run data centres in each region. This data allows users to consider carbon-free energy as part of their data location strategies.

Reflecting Australia's broader energy profile, the carbon intensity of data centres in Sydney and Melbourne is particularly high, with carbon-free energy being used only around 11% of the time in Sydney.

Given considerations around latency to end users and data residency requirements, which may limit the ability to shift some data offshore, there is an imperative for further progress to improve CFE performance in the Asia-Pacific region.

03

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# Case study



# Case study: At Schneider Electric the future is now when it comes to implementing digital solutions to achieve environmental and sustainability goals.

Schneider Electric is a global leader in energy management and automation with operations in more than 100 countries.

The company's philosophy is that access to energy and digital is a basic human right. The company works with customers to drive digital transformation by integrating world-leading processes and energy technologies to realise the efficiency and sustainability opportunities.

Schneider Electric works with customers to develop paths to sustainable outcomes and transform how energy is consumed. "Electrification is the future. Energy systems won't be large and centralised, they will be decentralised and there will be large data sets of complex operations. Digital solutions, in particular cloud technology, will be required to make systems sustainable." added Mr O'Reilly.

A significant proportion of emissions comes from infrastructure. According to Mr O'Reilly, "the materials that comprise buildings, such as steel

and aluminium, require the highest level of carbon manufacturing. In customers' transitions to net zero emissions by 2030, they will require a carbon measurement system to reduce their emissions and hit their ESG goals. To measure this, complex data sets of supply chains and interactions with the public will need to be understood and monitored. This will have to be done using cloud technology."

**In Australia, Schneider Electric sees the biggest barrier for companies achieving ESG goals as a lack of awareness.**

According to Mr O'Reilly, "In my experience, I have seen that there is a lack of awareness from our customers in how to achieve their ESG goals. Companies want to implement changes, they just don't know how." Further, Mr O'Reilly noted, "While businesses are implementing changes and can do more, a stronger policy framework would help drive sustainability."



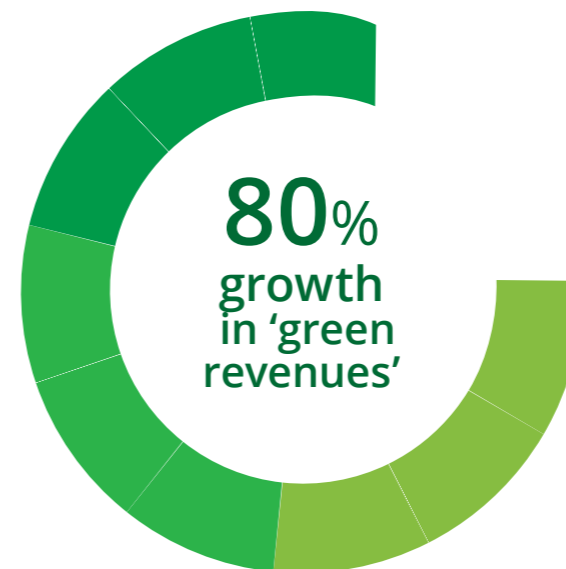
Schneider believes that the future is now when it comes to implementing digital solutions to achieve ESG goals. Mr O'Reilly said: "infrastructure lifecycles – be they 5, 10, or 50 years – mean that it is the decisions that businesses make now that will determine whether Australia can meet its climate ambitions for 2030 and 2050. The financial sector is already assessing companies and investment proposals on the basis of their sustainability. Just as we ask what the net present value of financial returns are, we must ask what are the carbon impacts of an asset."

Schneider has a cloud-first philosophy, housing its own data and applications in the cloud. It also designs and offers customer service applications in the cloud. It has commitments to, by 2025, have 80% growth in 'green revenues', to help its customers save or avoid 800 million tonnes of carbon emissions, and reduce top supplier emissions by 50%. Employee and executive remuneration is directly tied to environmental targets to increase accountability. Mr O'Reilly observes that businesses with a purpose tied to sustainability will find it easier to attract and retain the best talent for tomorrow.

**“ 15 years ago, ESG goals and outcomes weren't well known or they were absent completely from an organisation's strategy. Today, investors will often ask about ESG first and then move onto financial results. ”**

Gareth O'Reilly,  
Zone President and Managing Director,  
Pacific Zone

**By 2025**  
**800 million tonnes**  
of carbon emissions saved or avoided by Schneider customers



  
**Top supplier emissions reduced by 50%**

04 \_\_\_\_\_

# Cloud-enabled sustainability initiatives



## Sustainability use cases: From monitoring inventory to minimising waste, to reporting carbon emissions in real time, cloud-based initiatives can support a diverse set of sustainability objectives.

While some cloud applications offer industry-specific solutions to sustainability challenges, cloud-enabled big data, AI and machine learning technologies can support business across all sectors. We highlight 12 leading examples of cloud applications to enhance sustainability:

### 1. Improving supply chain transparency

A traceable production process and supply chain is critical to ensuring compliance with ESG standards. A cloud-based environmental data platform developed by Google and WWF Sweden enables greater supply chain visibility in the fashion industry, and is an example of the way that big data can enable more responsible sourcing decisions.

**35%**  
of surveyed ANZ businesses use this technology.

**+54%**

*Intend to use by 2025*

Available to +54% of businesses in manufacturing, construction, transport, utilities, mining, agriculture, wholesale, retail and IMT.

#### WWF Sweden fashion shows how data can drive transparency in supply chain

Google and WWF Sweden joined forces to help create an environmental data platform that will enable more responsible sourcing decisions in the fashion industry, an industry that today accounts for 20% of wastewater globally.

Partnering with WWF brings together Google Cloud's technical capacity, including big-data analysis and machine learning, Google Earth Engine satellite imagery data, and WWF's deep knowledge of assessing raw materials to make supply-chain data visible and accessible to decision makers, and drive more responsible and sustainable decisions.



### 2. Quality checks and predictive maintenance

Cloud-enabled machine learning tools have transformed approaches to inspecting infrastructure. Using a machine learning drone-based surveillance system minimises the need for employees to undertake potentially hazardous inspections, and avoids the emissions associated with staff travelling the often large distances to investigate faults. Energy corporation AES uses machine learning tools to automatically inspect wind farms, and to identify and triage defects.

**45%**

of surveyed ANZ businesses use this technology.

**+45%**

*Intend to use by 2025*

Available to businesses in retail, IMT, manufacturing, construction, transport, utilities, mining, agriculture and wholesale.

### 3. Managing natural disaster responses

Cloud-enabled drones are agile, unstaffed vehicles, which could be used to deliver humanitarian support, and to monitor and assess damage following natural disasters.<sup>2</sup> These innovations could play a major role in improving resilience to natural disasters, in supporting recovery, and to inform evacuation warnings.<sup>3</sup>

**35%**

of surveyed ANZ businesses use this technology.

**+44%**

*Intend to use by 2025*

Available to businesses in the public sector, finance, agriculture, construction, mining, utilities.

#### 4. Reducing resource consumption

Clear reporting of resource use and emissions can inform more responsible decision making by businesses and their consumers. Using Google Cloud's deep learning, and high-resolution imagery, SunPower created models that design and visualise solar power systems on residential roofs, allowing homeowners to estimate the amount of energy they could generate with solar.

**+54%**

*Intend to use by 2025*  
Available to businesses across all industries.

**34%**

of surveyed ANZ businesses use this technology.

#### 5. Improving agriculture productivity

Primary producers can boost yield, avoid blights (spread of crop disease), and cultivate crops more efficiently with real-time data. Swiss agritech startup Gamaya has developed a machine learning imaging solution which stitches together an aerial photograph of light reflections – from ultraviolet to infrared – which can be used to diagnose disease in crops, and to isolate disease before it spreads, minimising waste.<sup>4</sup>

**52%**

of surveyed ANZ businesses use this technology.

**+24%**

*Intend to use by 2025*  
Applicable to businesses in agriculture.



**40%**

of surveyed ANZ businesses use this technology.

**+50%**

*Intend to use by 2025*  
Available to businesses in retail, IMT, manufacturing, construction, transport, utilities, mining, agriculture and wholesale.

#### 6. Real-time inventory tracking

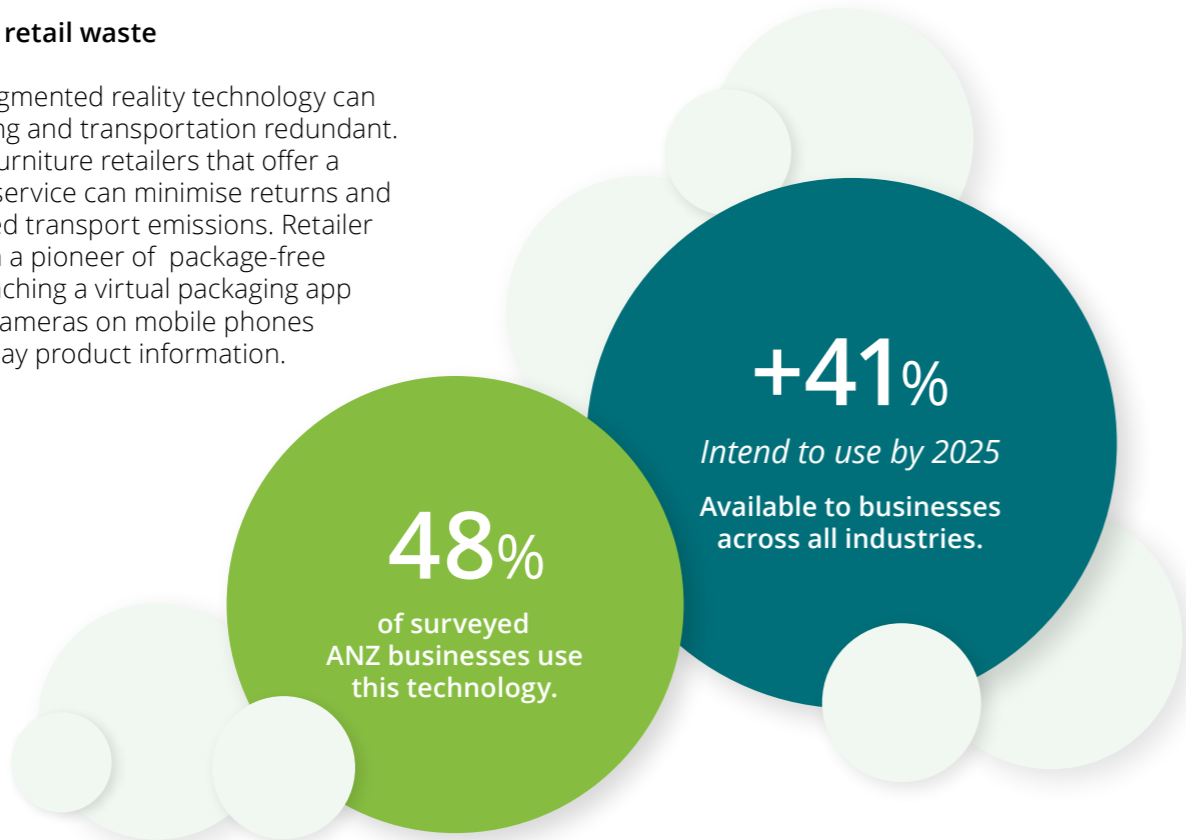
In the FMCG sector, cloud-enabled data collection allows for a richer set of insights about inventory, capturing real-time images of scanned products, and details such as expiry date or origin. This data can be used to predict waste of perishable items, and to alert store managers to take action to minimise this waste. The data can inform inventory personalisation and store layout decisions, to minimise waste – a tool used by major grocery retailer, Carrefour.<sup>1</sup>

**Carrefour, one of the largest grocery retailers in Europe, needed to ensure it had the right products, in front of the right shoppers, at the right store location.**

With Google Cloud, Carrefour developed an assortment recommendation tool that helped the chain support a more personalised selection at store level, giving store directors the autonomy to influence inventory needs. The tool also gives Carrefour headquarters visibility into the merchandising decisions by each of their franchise stores.

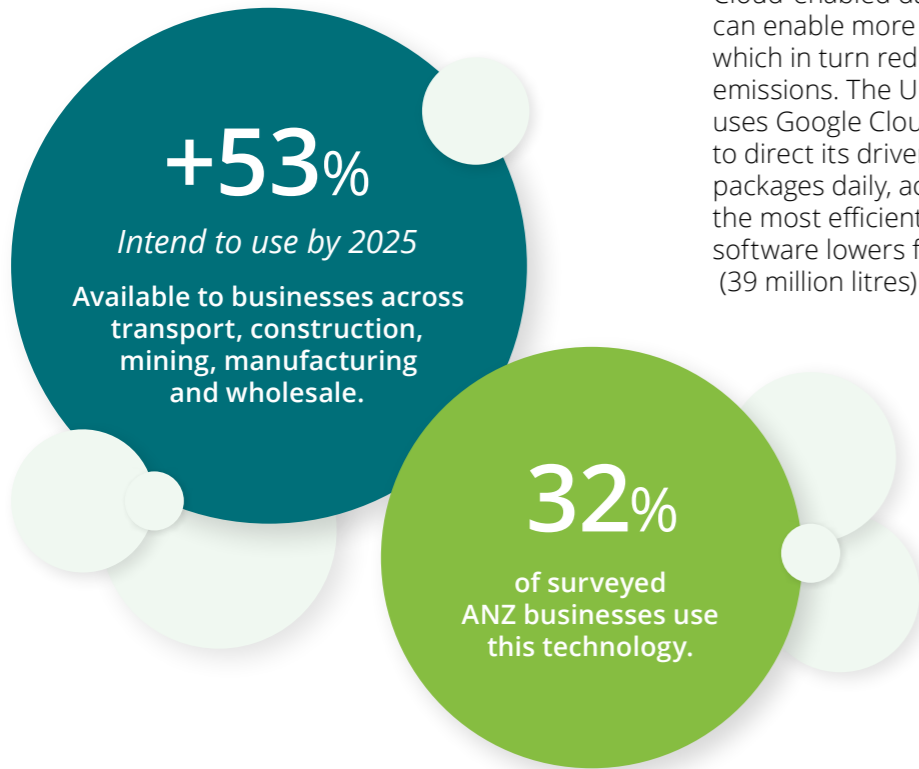
### 7. Minimising retail waste

Virtual and augmented reality technology can make packaging and transportation redundant. Clothing and furniture retailers that offer a virtual try-on service can minimise returns and their associated transport emissions. Retailer Lush has been a pioneer of package-free solutions, launching a virtual packaging app which allows cameras on mobile phones and AI to overlay product information.



### 8. Transport decarbonisation

Cloud-enabled data collection and reporting can enable more efficient fleet management, which in turn reduces transport-related emissions. The United Parcel Service (UPS) uses Google Cloud enabled routing software to direct its drivers, who deliver 21 million packages daily, across 220 countries. By identifying the most efficient route for drivers, the routing software lowers fuel use by 10 million gallons (39 million litres) a year.<sup>5</sup>



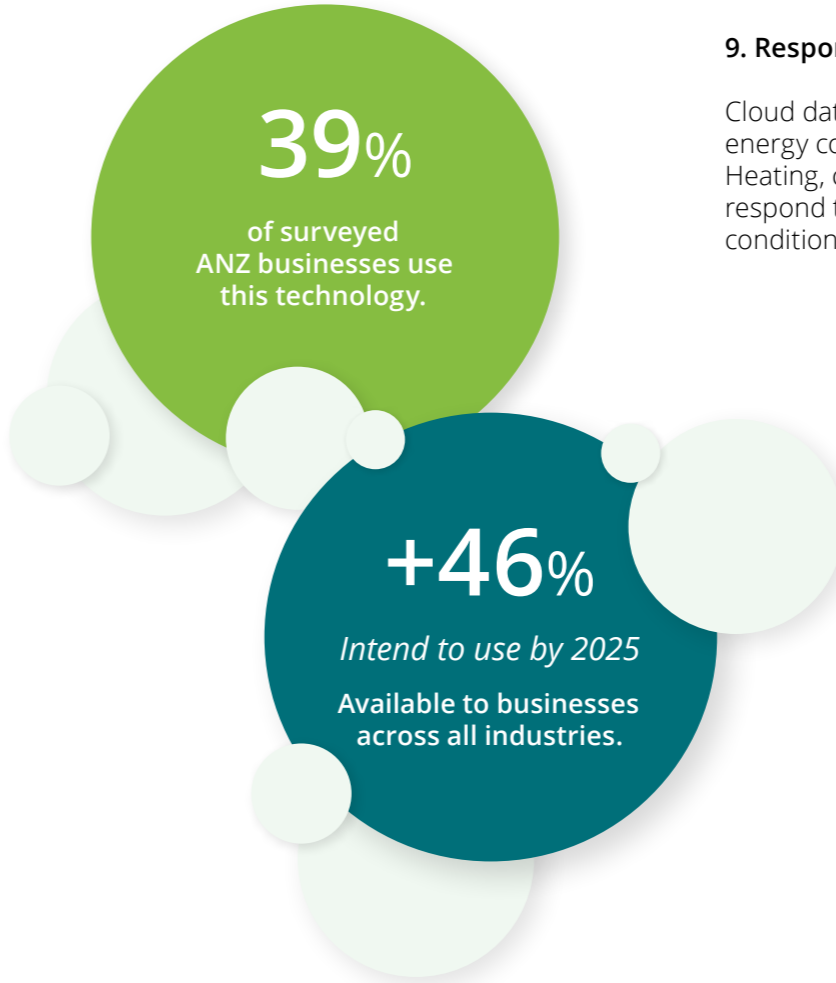
**UPS routing software leverages Google Cloud to reduce fuel consumption by 10 million gallons (39 million litres) a year.**

The drivers who make that possible perform 120 pick-up and drop-off stops daily. Sifting through more than one billion data points daily to select the most efficient and cost-effective route is too hard a challenge for traditional analytics solutions.

But using machine learning, UPS significantly reduced the time needed to pick the best routes, and made it possible to design software that tells the delivery driver exactly where to go, every step of the way. This routing software now saves the company up to \$400 million a year. And it reduces fuel consumption by 10 million gallons a year, significantly aiding UPS's journey towards more sustainable operations.

### 9. Responsive building management

Cloud data analytics can be used to offer real-time energy consumption data to energy managers. Heating, cooling and ventilation systems, which respond to building capacity and weather conditions, can minimise costs and CO2 footprint.





### 10. Climate risk analysis of financial assets

The complex global data required to model climate risk is hosted on cloud servers. The CIMP6 database, hosted by Google Cloud, allows users to better understand past, present and future climate changes.<sup>6</sup> These insights are critical to enable finance providers to model and account for climate-related risks, when pricing assets. Where climate risk determines access to finance, these impacts may become more embedded into decision making.

**+47%**

*Intend to use by 2025*  
Applicable to businesses in financial services.

**44%**

of surveyed ANZ businesses use this technology.

### 11. Accelerated application development

Many of the preceding use cases for cloud involve developing bespoke software. Developing apps on cloud platforms can enable greater efficiency and accelerate the development process, minimising the time-to-market and ensuring that sustainability benefits are realised promptly.

**37%**

of surveyed ANZ businesses use this technology.

**+50%**

*Intend to use by 2025*  
Available to businesses in information, media and telecommunications, and professional services.



### 12. Transitioning to carbon-free energy

Cloud storage provides the opportunity to accelerate the adoption of renewable energy. By enabling users to receive real-time data on the energy sources used to power their operations, and to run analytics on their sustainability performance and energy use, the technology identifies opportunities to use alternative energy sources.

**29%**

of surveyed ANZ businesses use this technology.

**+55%**

Available to +55% of businesses in mining, utilities, transport, agriculture and construction.

Most organisations (67%) globally are also committed to environmental sustainability targets.

Cloud adoption has become a strong pillar of digital strategy worldwide. Cloud is being used across industries to meet sustainability targets while also enhancing security of operations. According to a recent IDG survey of

2,000 IT leaders in 14 countries, 62% of leaders stated that IT infrastructure and data centres were the top area being assessed to help meet sustainability targets. With 90% indicating sustainability is a priority and/or a performance metric in their IT department, the sustainability dividend of cloud is now more significant than ever.

# 05 \_\_\_\_\_

## Actions for the future



# Organisations and their cloud strategies: Half of all businesses are running workloads mostly on-premises, with only a small proportion of businesses fully adopting cloud models.

Globally, cloud is being adopted rapidly, with a forecast by Gartner indicating that end-user spending on public cloud services will grow by 21.7% from US\$396 billion in 2021 to US\$482 billion in 2022. A combination of factors are responsible for this rapid change, including the ubiquity of cloud across environments, from mobile banking, to gaming to healthcare. Media and gaming companies, followed by retailers and financial services institutions have been major drivers of public cloud adoption.<sup>3</sup>

**While many businesses are moving to more technology-based solutions and many have recognised the need to adopt a more data-driven approach, only a small proportion of businesses are currently using the cloud to host all of their data.**

7% of Australian businesses host all data in the cloud, although 43% have made substantial progress in the transition. These results are relatively aligned to ABS data which reports that 55% of Australian businesses used some paid cloud computing in 2019-20. In the Asia-Pacific region, Australia is considered one of the most advanced public cloud markets. It's expected to be valued at US\$10.5 billion in 2023, up from US\$4.7 billion in 2018.

Among the New Zealand businesses, 15% host all data in the cloud, while 31% are making further progress in shifting away from on-premises storage. New Zealand business are moderately more likely to have made more progress towards adopting cloud technologies, with cloud spend as a slightly larger share of GDP, relative to Australia. In 2020, Australian business's spending on public cloud totalled US\$5157 million (0.4% of GDP) compared to New Zealand's public cloud spending of US\$1,115 million (0.5%).

### Australian business spending on public cloud totalled

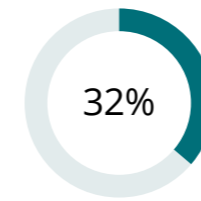
**US\$5,157**  
million (0.4% of GDP)

### New Zealand's public cloud spending

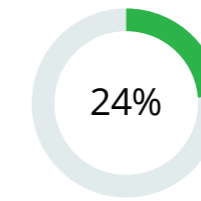
**US\$1,115**  
million (0.5% of GDP)



## Half of all businesses are still storing data mostly on-premises, and one-fifth of all businesses have no plans to shift to cloud.



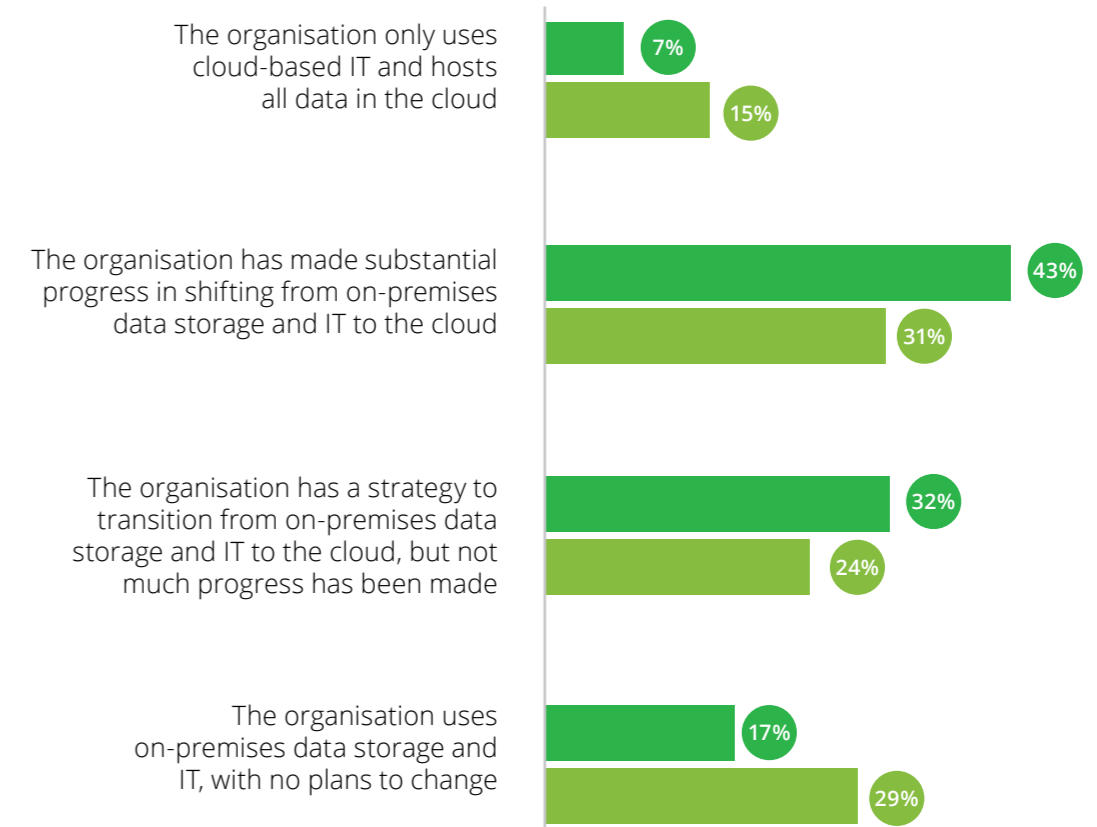
32% of Australian businesses have a strategy to transition from on-premises data storage and IT to the cloud.



24% of New Zealand businesses have a strategy to transition from on-premises data storage and IT to the cloud, but report little progress in the space.

### Cloud adoption in Australia and New Zealand

Share of surveyed businesses



■ Australia    ■ New Zealand

**Note:** 7 respondents (or 1%) were unsure, not captured in this graph. Results may not add up to 100% due to rounding.

## Challenges limiting cloud adoption: A lack of knowledge about the ability to improve sustainability outcomes using cloud, siloed teams and issues with firms' environmental strategies are key barriers.

**The most-commonly identified barrier to greater investment in cloud for sustainability purposes is a lack of knowledge about the ways that cloud can be used to achieve these goals.**

This knowledge gap was the barrier most ranked by 39% of firms as within the top three challenges, and was the top barrier reported by firms across several industries, including Hospitality (29%), Information, Media and Telecommunications (22%), Professional Services (21%) and Construction (18%).

Perhaps reflecting this lack of knowledge about the potential for cloud technology to support environmental outcomes, organisations said their technology and sustainability teams were not well integrated, with 33% ranking this lack of integration among their top three challenges. For firms in real estate services, utilities and manufacturing sectors, the largest reported barrier was an inability to integrate cloud technologies with existing sustainability approaches (16%). This may reflect that these industries are more focused on reducing direct emissions, given their reliance on physical capital.



Insufficient measurement of the impact of organisations' actions on suitability outcomes was also commonly identified as a barrier.

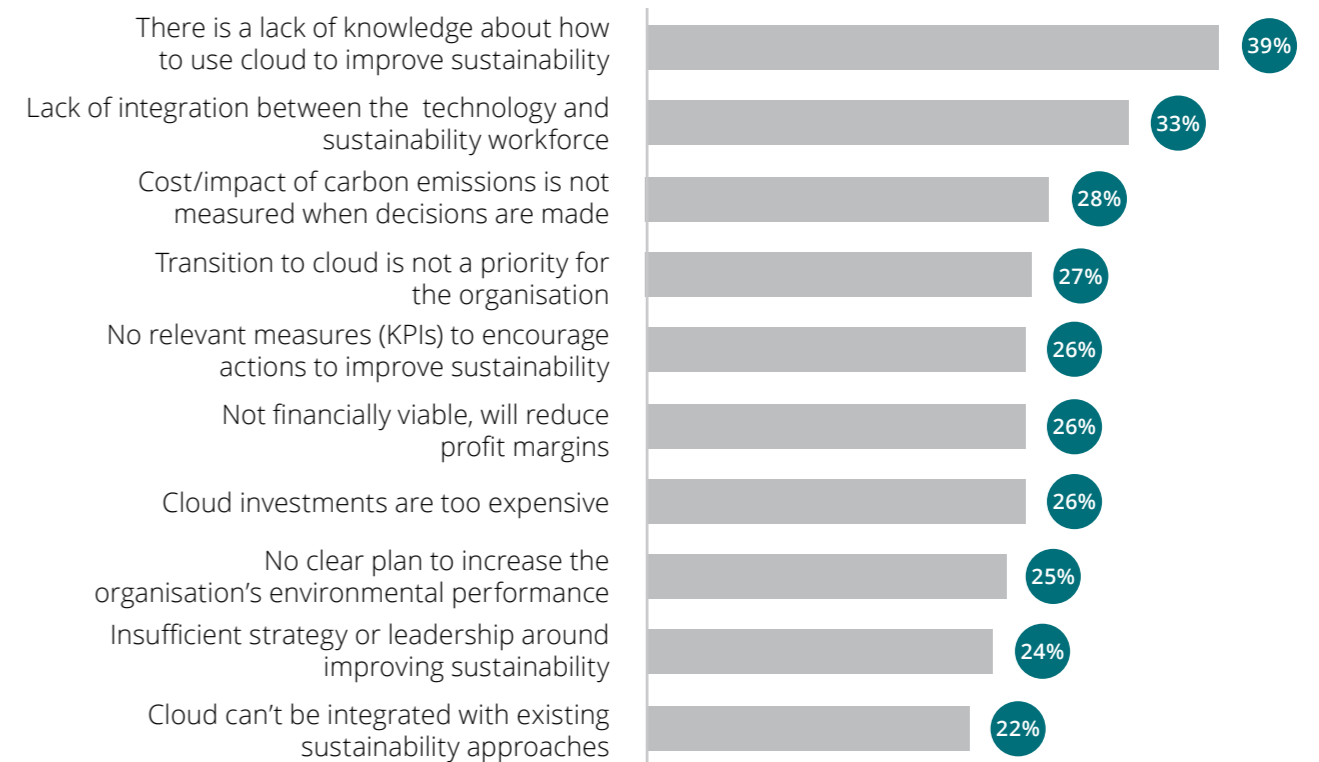


of firms identified that the cost of carbon emissions was not considered when decisions were made.



of firms noted a lack of financial or environmental performance indicators as constraining greater cloud adoption.

### Biggest barriers to adopting more cloud technology for sustainability purposes Proportion ranked within the top three



**Source:** Deloitte Access Economics (2022)

**Survey question:** What do you think are the biggest barriers for your organisation adopting more cloud technology? (N = 493)

**Note:** 8% of respondents were unsure, and 2% stated 'other'

## Enablers to improve cloud uptake: Integration between the technology and sustainability workforce can enable greater use of cloud technology to meet sustainability goals, and may reduce the knowledge gap.

**Organisations see improving the integration between technology and sustainability teams as the top enabler of cloud use for sustainability.**

Almost half (47%) of surveyed businesses identified that aligning these two workforces could enable greater cloud adoption for sustainability use – alongside organisation-wide leadership to improve sustainability (37%). Larger firms (employing more than 1,000 staff) were twice as likely to identify workforce integration as the top barrier (40%) than smaller firms (19%).

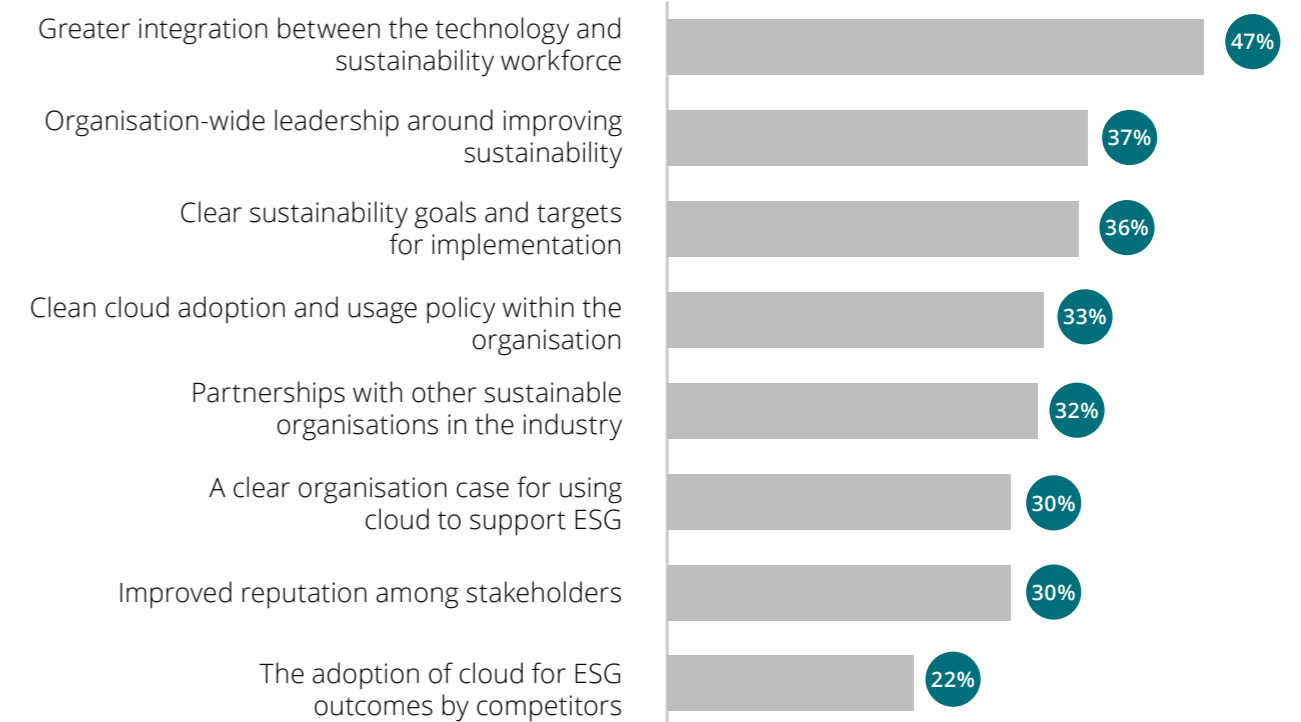
**Organisations with a sustainability strategy embedded in their corporate strategy and integrated throughout the organisation (40% of firms) were less likely to report barriers associated with a lack of prioritisation, than firms without an embedded strategy.**



For around a third of businesses, partnerships with other organisations were seen as an opportunity to enable greater use of cloud across their industry, perhaps reflecting the need for knowledge sharing around industry-specific use cases.



### Biggest enablers to adopting more cloud technology Proportion ranked within the top three



**Source:** Deloitte Access Economics (2022)

**Survey question:** What do you think are the biggest enablers for your organisation adopting more cloud technology? (N = 493)

**Note:** 11% of respondents were unsure, and 1% stated 'other'

## Actions to enable environmental progress through cloud technologies:

### Embedding environmental goals across the businesses – through policies and leaders – can enable greater alignment between sustainability goals and technology practice.



#### 1. Build capability through communities of practice

Despite a rich bank of use cases, 4 in 10 businesses identified 'lack of knowledge' as the key barrier to adopting cloud applications for environmental gain. To mitigate this, sharing proof-of-concepts for cloud use cases across the business, and industries, is key. Visible leadership, clear usage policies and coordinated teams can also enable innovative cloud applications to be developed, trialled, and put in place across the businesses.



#### 2. Coordinated technology and sustainability teams

One-third of firms identified that a lack of integration between the sustainability and technology teams was a challenge, and it was the most commonly identified enabler to support businesses to use cloud for environmental goals. Increasing collaboration between specialist teams as facilitated by the chief sustainability officer or COO can bridge the divide between technology and sustainability specialists, and ensure that climate impacts are treated as a whole-of-enterprise and supply chain consideration.



#### 3. Quantify the environmental benefits of technology investment decisions

Several measures are available to monetise the impact of carbon emission, to ensure that the social cost of carbon can be priced-in to decision making. 28% of surveyed firms said that one of the biggest barriers to adopting more cloud technology is that the cost of carbon emissions is not considered when decisions are made. Including emissions within the cost-benefit analysis for technology investments could support greater adoption.



#### 4. Ensure technology spending is guided by a coherent, overarching climate strategy

One-third (34%) of Australian and New Zealand businesses have no climate strategy, and 29% of businesses with a strategy are yet to make progress on emissions reduction. Clear, measurable goals, embedded in finance and environmentally-focused KPIs are a critical first step to ensure that efforts to minimise the organisation's carbon footprint are not a siloed effort by the CSR team.



Business have reported using cloud and cloud-enabled technologies for a diverse set of initiatives to support environmental outcomes. With 70% of businesses articulating an intention to begin, or continue to reduce emissions within the next three years, we propose four actions to ensure that this progress reflects the potential of cloud technology to achieve these goals:

# Endnotes \_\_\_\_\_



# Endnotes

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# Survey respondents

The results presented in this report represent a surveyed sample of 493 businesses across Australia and New Zealand of various sizes and ages, and operating across a diversity of industries. Individual respondents were required to be at Manager level or above, with responsibility for either IT or sustainability processes (or both).

## Business characteristics

Where is your organisation headquarters located?



Around how many people does your business employ?

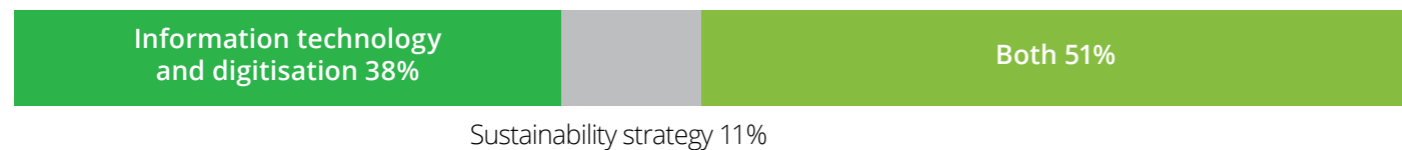


When was your organisation founded?



## Survey respondent profile

Do you have a role to play in any of the following aspects of your organisation's activities?

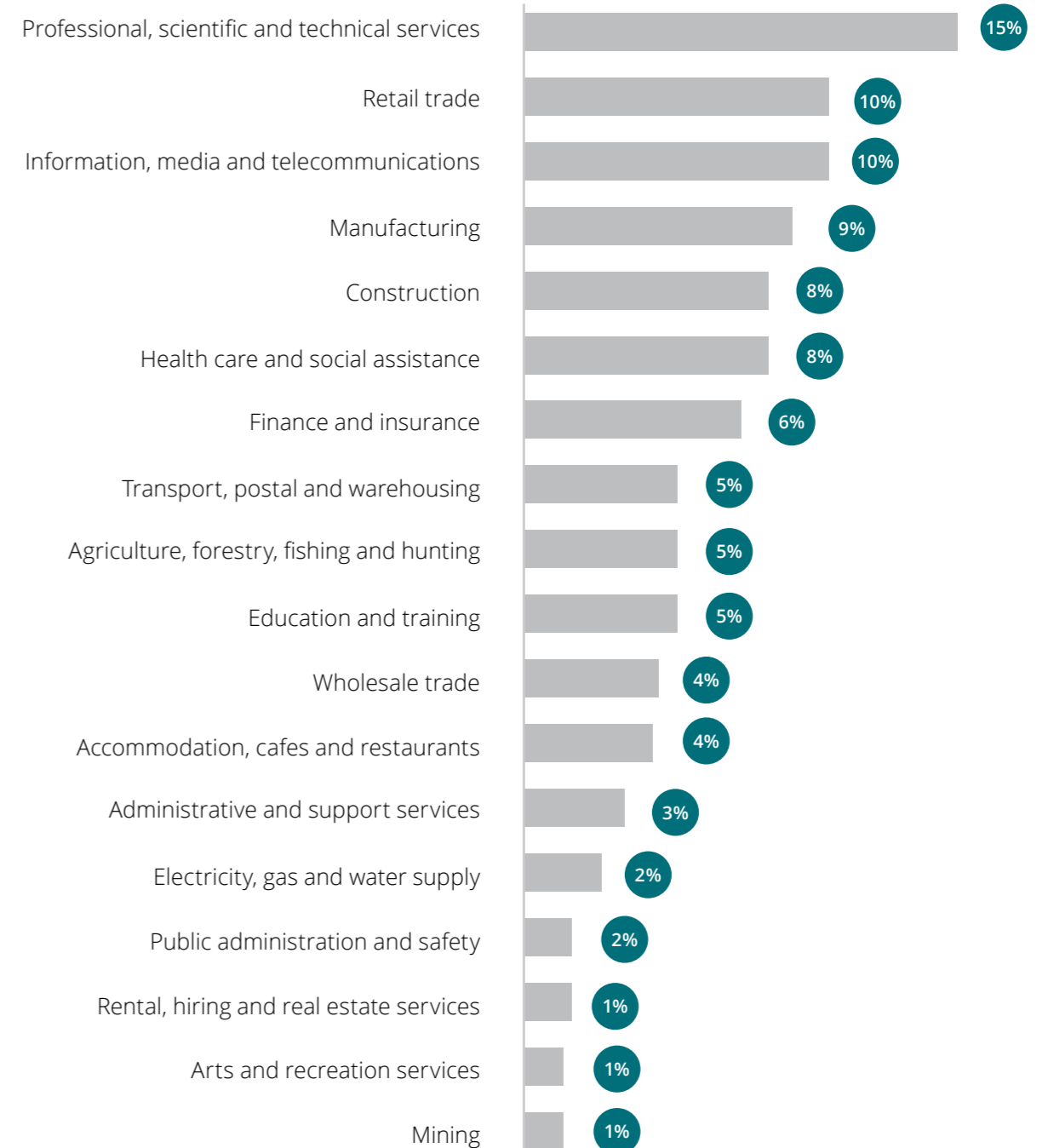


Which best describes your position in the organisation?



## Business characteristics

In which industry does your organisation operate?





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