Connecting with the cloud

A low-carbon future is ahead

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Executive Summary

Connecting to a low-carbon future

Technology is fundamental to achieving low carbon economic growth. It unlocks smarter and more efficient ways of working and living. It also helps reduce carbon emissions and energy-related costs.

Through Telstra's membership with the Global e-Sustainability Initiative (GeSI), we continue to engage with our global peers to conduct research into the role ICT can play in enabling low-carbon growth.

It's all part of our approach to responding to climate change. **Read more[1] >**

Telstra is ideally positioned to enable Australia's governments, businesses and consumers to transition to a low carbon economy. The rapid evolution in technology, combined with Telstra's significant investments in our network is enabling a range of financial and environmental benefits across the whole economy.

In 2014, we released the report Connecting with a Low-Carbon Future, which examined how ICT can help unlock financial and environmental benefits of a low-carbon economy. The report found that seven ICT opportunities[2] could potentially help Australia substantially cut emissions by 27.5 million tonnes per year and achieve annual energy savings of $8.1 billion. Cloud services were identified as an emergent technology which can drive further business and environmental efficiencies.

Since the 2014 report was released, the United Nations Framework Convention on Climate Change (UNFCCC) has been renegotiated in the form of the Paris Agreement. It is the first global, legally-binding agreement for tackling climate change. Australia took to Paris a commitment to keep carbon emissions 26-28% below 2005 levels by 2030. We believe there continues to be a strong case for increased use of ICT to help deliver on Australia's international commitment.

In this follow-up report, we look more closely at the possibilities of the cloud to drive energy-related cost savings and environmental efficiencies, while helping businesses quantify the benefits for their organisation. We hope you find it useful and welcome your questions and feedback.

1. https://www.telstra.com.au/content/dam/tcom/about-us/community-environment/pdf-e/Telstra-Climate-Change-Position-Statement.pdf
2. The seven technologies analysed were: Remote Appliance Power Management (RAPM), Context-Aware Power Management, Decentralised working, Personalised public transport, Real-time fleet management, Increased renewable energy, and high-definition video conferencing.

Quantifying the cloud

The cloud is transforming ICT. Simple to procure and manage, it's helping businesses realise the cost and efficiency gains that come from moving their data and workloads fully off-their own premises. Cloud also offers businesses the ability to innovate and move fast for competitive advantage, right source applications and manage security. However, when planning a move to the cloud, businesses often struggle to quantify the benefits.

Telstra is keen to stimulate further discussion about how we can use technology to create a low-carbon future. We recognise that providing quantifiable benefits is of enormous help to businesses when making decisions. So we've decided to lend a hand by offering some hard data on the benefits of cloud, backed by real-world case studies and an interactive calculator that can be used to help build a business case.

About this report

Telstra commissioned independent research company Qingtech to review our Australian cloud services and determine the energy and carbon emissions footprint. By comparing this information to the average onsite self-hosted server landscape, it was possible to estimate the potential direct savings in energy, cost and carbon emissions that organisations can expect to make by moving to the cloud. To help you see these savings in the context of real-world deployments, we have also assessed three Australian companies to quantify what sustainability gains they made by moving to the cloud.

How were savings estimated?

We first quantified the environmental impacts of Telstra's three major nationwide Australian data centres. In conducting this assessment we were able to develop a 'per server' and 'per service' view of the energy and carbon emissions within Telstra's data centres. Using estimates of onsite servers for small, medium and large Australian organisations, we then calculated the energy savings resulting from switching to Telstra's dedicated and shared cloud infrastructure services.

For the case studies presented in this report, we modelled a specific 'before' and 'after' profile for three Australian companies that switched from using onsite servers to Telstra's cloud services. We then assessed changes in energy consumption, energy cost and carbon emissions for each company to estimate the real savings they made.

We used academic methodologies coupled with Australian Bureau of Statistics (ABS) and International Data Corporation (IDC) research data to determine how many organisations in Australia now use cloud computing and to analyse the effect on Australia's emissions profile of others making the switch.

3. www.telstra.com/cloudfootprint

Quantify your cloud project

To explore what your organisation could save in energy use, energy-related costs and carbon emissions by moving to the cloud. **Try our online calculator[3] >**

What can the cloud do for your carbon footprint?

Creating opportunities that were unthinkable just 10 years ago, the cloud is opening pathways to low-carbon growth.

1 Data explosion

Drones, artificial intelligence, and virtual reality – what was once science fiction is now part of everyday life. And while the cloud has opened the floodgates to data, it has also given businesses more efficient ways to manage it.

2 The power of the cloud

In this new business universe, every business is under pressure to keep digital information flowing across wider networks and more diverse user groups. Previously, most businesses managed data computing and storage needs onsite with stand-alone servers housed in server rooms. The cloud offers a compelling alternative, allowing services to be run and data to be stored remotely, and accessed almost anywhere where there's a network connection.

3 Efficiency gains

By enabling organisations to size their ICT to their needs and adjust it more dynamically, the cloud holds huge potential to help organisations optimise their IT – reducing cost and boosting efficiency across their operations.

With ICT available as a utility, it's straightforward to remove unused or underperforming infrastructure and take advantage of more energy-efficient alternatives – with a corresponding benefit on environmental sustainability.

Just how much can you save by moving to the cloud?

Telstra's independent analysis reveals: quite a lot.

Untapped potential

There's enormous potential to realise low-carbon growth, financial opportunities and reduce Australia's carbon emissions as more organisations make the switch to the cloud. As a starting point, our research shows that if all Australian organisations not currently using the cloud[4] adopted Telstra cloud services, this would reduce energy costs nationwide by approximately $1 billion a year, while avoiding carbon emissions of 4.5 million tonnes a year. That's a large contribution to facilitating low-carbon economic growth in Australia. This is the equivalent of the annual carbon emissions from over 2.2 million cars, and energy saved from almost 250,000 households.

Every business can benefit

It turns out you don't have to be a large organisation to benefit from the financial and environmental savings offered by Telstra's wide range of cloud services. Any size organisation can reduce its carbon footprint and operational costs. This is because centralised cloud solutions, such as Telstra's, offer economies of scale that make them more energy efficient compared to individual in-house or stand-alone servers and data management systems.

Efficient infrastructure

Telstra data centres are purpose built for secure data management and storage. They also take advantage of energy-saving technologies such as free-air cooling systems. They offer a far more efficient option for many organisations than prolonging the life of ageing in-house and on-premises infrastructure.

Who benefits most?

Our research estimates that Australian small and medium sized businesses can save between $4,100 and $10,300 per year per server in energy costs by shifting to cloud services. Those with over-engineered, old or inefficient data management systems can expect the greatest savings.

Larger organisations with more efficient infrastructure management can also achieve sustainability gains by consolidating their own infrastructure and moving to more flexible models that allow them to size capacity up and down as needed, reducing the cost of keeping their own infrastructure.

What's the most energy-efficient model?

Public cloud services deliver greater energy reduction and environmental improvement than other cloud computing models as it allows multiple organisations to share servers in the same data centre. This allows the servers to operate optimally and with minimal redundancy – this makes them more energy efficient per byte of data managed.

4. Based on Australian Bureau of Statistics data on cloud uptake in Australia

If all Australian organisations moved to the cloud*

Energy costs

↓ **$1 billion** a year (approximately)

Carbon emissions

↓ **4.5 million tonnes** a year

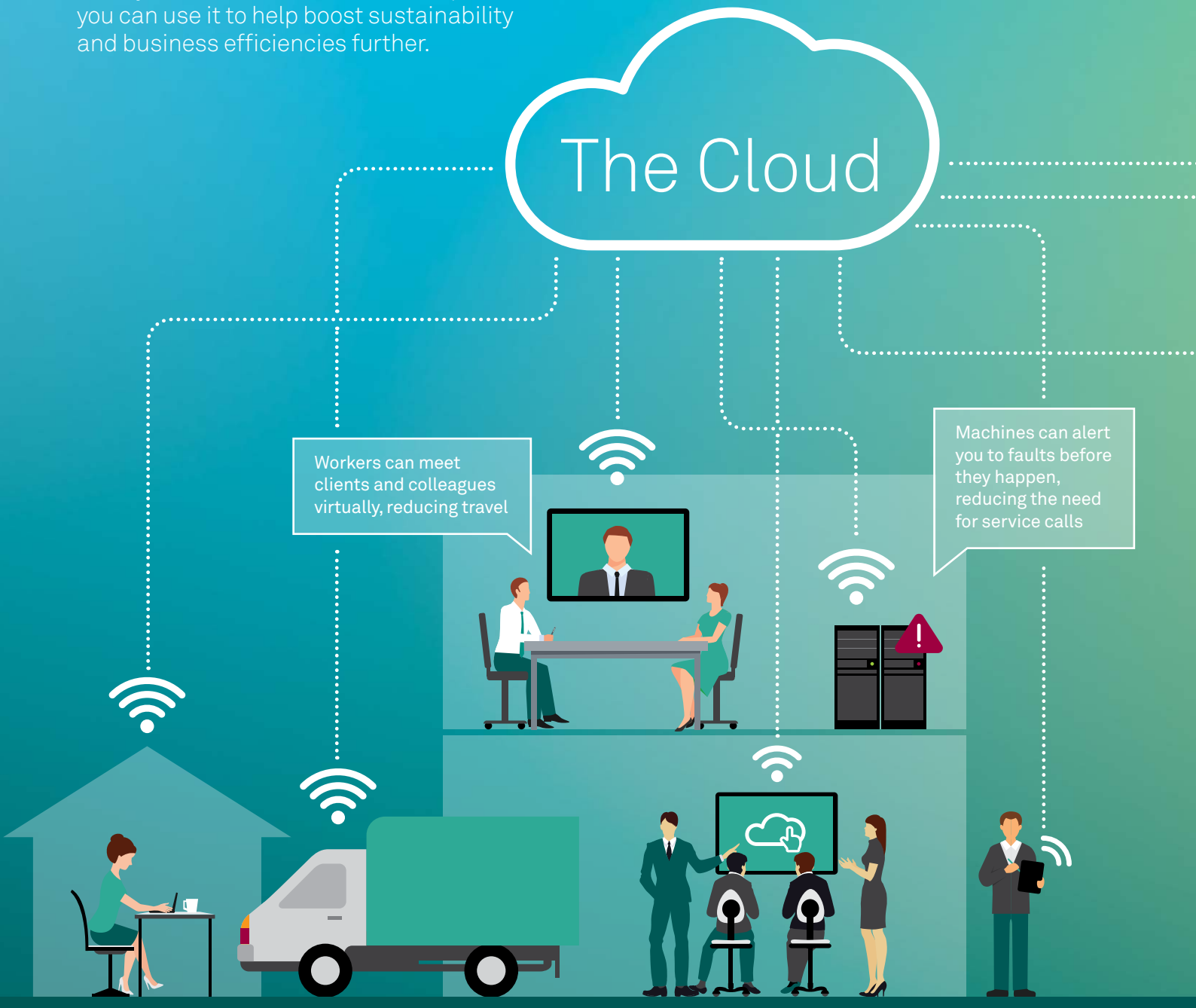
How much could your organisation save with the cloud?#

Organisation size (by full-time employees)	Annual reduction in carbon emissions^		Estimated total annual carbon emissions saved (tCO_2e)^		Estimated total annual energy cost saved (AUD)^^	
	Dedicated cloud computing	Utility / shared cloud computing	Dedicated	Shared	Dedicated	Shared
1–19	49%	78%	32	22	$ 6,500	$4,100
20–500	63%	84%	58	33	$10,300	$6,000
Over 500	5-52%	60-80%	3-90	22-59	$4,700 to $17,700	$4,400 to $10,900

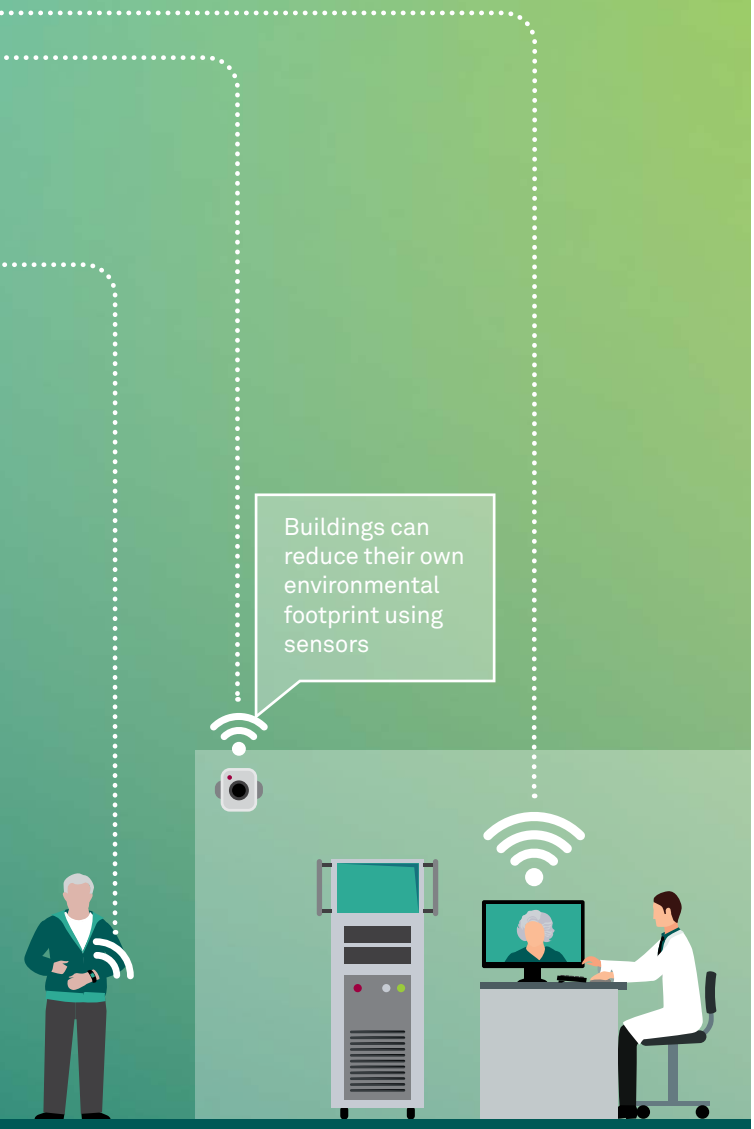
* Based on Australian Bureau of Statistics data on cloud adoption in Australia
\# To arrive at these estimates, Qingtech estimated benefits per server for small, medium and large organisations using dedicated and utility cloud computing services
^ These CO_2e savings take into account Telstra's emissions
^^ These cost savings are energy saved by turning off customer servers and doesn't include cost of service

And that's just the start...

Once your cloud infrastructure is in place, you can use it to help boost sustainability and business efficiencies further.



For many businesses, cloud services enable smarter ways of working and serving customers. For example, cloud collaboration technology can be used to enable flexible working environments empowering employees to connect with their choice of device and location. This also translates into energy-related cost savings and smaller carbon footprints. As more IT workloads are moved to the cloud, the benefits and savings multiply.



Indirect benefits of moving to the cloud

More productive

More than ten million Australians commute daily[5]. Travel times average 4.4 hours a week – 10 percent of workers spend 10 hours or more[6]. Cloud-based communication and collaboration can help reduce this productivity drain by enabling workers to be just as effective remotely as in the office. There's opportunity to boost productivity on a national scale by improving workplace flexibility, with research estimating that increasing female workforce participation by 4 percent would increase Australia's GDP by $25 billion[7].

More efficient

Cloud-based systems allow mobile workers to get the job done in more places and with potentially less effort, dramatically boosting productivity and your bottom line. Workers can check orders and upload information on the go, enabling them to respond to customer requests more efficiently and improving service. The data on your systems can be updated from the field, giving everyone data access across your business and the full picture to answer customer enquiries, forecast and plan.

More automated

Machines that "talk" to each other and to your systems via the cloud can help make your operations safer, improving uptime and efficiency. Connected vehicles, freight or assets can alert you when they require service or replenishment or enter a specific location. You can also take advantage of smart buildings to reduce your carbon footprint with sensors conserving resources by switching off heating, cooling and watering systems when they aren't needed and offering more efficient surveillance.

More insightful

Big data and analytics intersect with the boom in mobile devices, social media and apps to create powerful tools to help you deliver innovative services that customers want. Cloud-based apps can help you profile customers so you can understand their needs and develop products and services to suit them. And cloud computing provides powerful platforms for analysing big data for the game changing insights that will redefine your industry in future – or enable dramatic cost savings through delivering services in new ways.

In April 2017, the latest RightScale 2017 State of the Cloud Survey for Australia/New Zealand (ANZ) was released. This Telstra sponsored research provides data on how organisations in ANZ are adopting and benefiting from cloud services. **Read more[8] >**

5. McCrindle Research, February 2014, Getting to Work Social Analysis based on 2011 census; and Australian Bureau of Statistics, 2012, 4602.0.55.002 - Environmental Issues: Waste Management, Transport and Motor Vehicle Usage, Mar 2012.
6. AMP.Natsem Income and Wealth Report, 2011, incorporating from Waves 1-6 and Wave 9 of the HILDA survey, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, Melbourne.
7. 2015 Intergenerational Report, Australia in 2055, Australian Government, 2015, page 20-21, URL: http://www.treasury.gov.au/PublicationsAndMedia/Publications/2015/2015-Intergenerational-Report, accessed 22 May 2017.
8. https://insight.telstra.com.au/stateofthecloudanz

Case studies

Australian companies are already using the cloud to assist in boosting sustainability and realise financial savings. To help businesses get a sense of the potential benefits, we analysed two real-life deployments to quantify the business and sustainability gains delivered by the Telstra cloud.

How were the gains quantified?

The organisations featured provided their old onsite data centre or IT room server landscape so we could model their energy costs and carbon emissions before migrating to a Telstra cloud service. We also identified if old hardware was decommissioned which resulted in a 'before' and 'after' energy and carbon emissions profile.

The two organisations have now switched to a Telstra cloud service and we identified the exact servers and data centres that each organisation is utilising. Using this data and associated energy and carbon emissions profiles, we modelled the difference between previous onsite premises profiles and current cloud hosted platforms to determine actual differences in energy and carbon emissions.

Real savings

Each of the companies studied made considerable cost savings and carbon emission reductions by moving to the cloud. Of course, the bigger the organisation, the bigger the potential savings.

Case study 1

KinCare

KinCare

In-home care provider KinCare is keeping pace with a fast-growing customer base using Telstra cloud services. After a merger, the company swapped disparate IT infrastructure for dedicated and utility hosting in Telstra data centres. Telstra now hosts and manages 23 virtual servers and managed data network links to 11 sites.

The cloud move unlocked direct sustainability and business gains, including $300,000 in capital expenditure, and $3,000 in energy-related costs a year. Our analysis reveals KinCare used 52 percent less energy for data storage and management – a reduction in carbon emissions estimated at 10.8 tonnes a year.

KinCare amplified the impact by putting a cloud-based Customer Relationship Management (CRM) application on team smartphones. This reduced customer processing times from two weeks to 30 seconds, helping to make workers more productive.

Quantified sustainability gains

Disparate infrastructure with 4 different IT systems nationally

TELSTRA CLOUD hosts

23 virtual servers

Managed data network links to

11 sites

- ✓ **52% LESS ENERGY** used for data storage and management
- ✓ **10.8 TONNES SAVED** in carbon emissions a year
- ✓ **$3,000 SAVED** in energy related costs a year

2 week turnaround → 30 seconds with mobile CRM in the cloud

> We were able to provide access to [our] systems to all our offices and staff around the country very, very quickly. We can run multiple offices off the cloud."

Jerome Barrientos CIO, Kincare

Case study 2

Jurlique

With environmental stewardship a core brand value, global skincare leader Jurlique aimed to reduce carbon emissions by 20 percent over five years. In 2011, it moved closer to this goal by moving core IT operations to Telstra's cloud services and reaping a large reduction in its carbon footprint.

Making the switch allowed Jurlique to shut down two dedicated large data servers and 15 smaller servers, sidestepping the cost of upgrading and operating its ageing infrastructure. The company now uses Telstra's dedicated cloud service for data storage, processing and disaster recovery.

Telstra benchmarked Jurlique's move to the cloud to quantify the financial and sustainability gains. We found that by moving to the cloud, Jurlique is using 69% less energy than hosting historical on premises site-based IT infrastructure. In all, Jurlique is saving 79 tonnes of carbon emissions a year and $23,000 annually from reduced energy-related costs.[9]

Jurlique is also making indirect sustainability gains. Cloud video conferencing on desktops now powers global collaboration, increasing speed to market and reducing travel costs by approximately 20 percent.

Quantified sustainability gains

Jurlique shut down

2 dedicated large data servers

+

15 smaller servers

Telstra cloud

=

- ✓ **69% LESS ENERGY** used for data storage and management
- ✓ **79 TONNES SAVED** in carbon emissions a year
- ✓ **$23,000 SAVED** in energy related costs a year

> The more we use [video conferencing] the more value we get out of it. It enables us to save approximately 20% for travelling."

Director Global IT, Jurlique
Watch Jurlique's video case study **here**[10] >

9. Assessment of energy-related cost savings includes energy used to power equipment and associated heating and cooling costs
10. www.youtube.com/watch?v=WRe-CmvcKzA&feature=youtu.be

Telstra is committed to sustainable ICT

We're working hard to bring you more sustainable ICT by reducing our own emissions.

Our strategy

At Telstra, as we strive to be a world class technology company, we accept our responsibility to help facilitate low-carbon growth, to minimise our emissions and to improve community resilience to changing climate.

The delivery of our services – including cloud services – consumes energy and resources and has an environmental impact. We're working to lighten our footprint and continually striving to reduce energy and emissions for every byte of data we manage.

In FY16 we reduced our carbon emissions intensity by 56 percent from our FY14 baseline year, surpassing our 55 percent reduction target one year early.

Our commitment

We're committed to bringing you cloud services that offer you a more energy-efficient environment than on-premises computing infrastructure. Many of our customers have already secured significant business and environmental efficiencies by moving to Telstra's wide range of cloud services and we don't take this lightly. We understand that as your supplier you expect us to take responsibility for the energy and carbon emissions associated with your cloud services and work to reduce them.

Continuous improvement

To help us reduce our own environmental impacts and those of our customers, we're continuously improving the environmental performance of all our existing data centres. We're also embedding best practice environmental efficiency in new data centres that we're planning and building now.

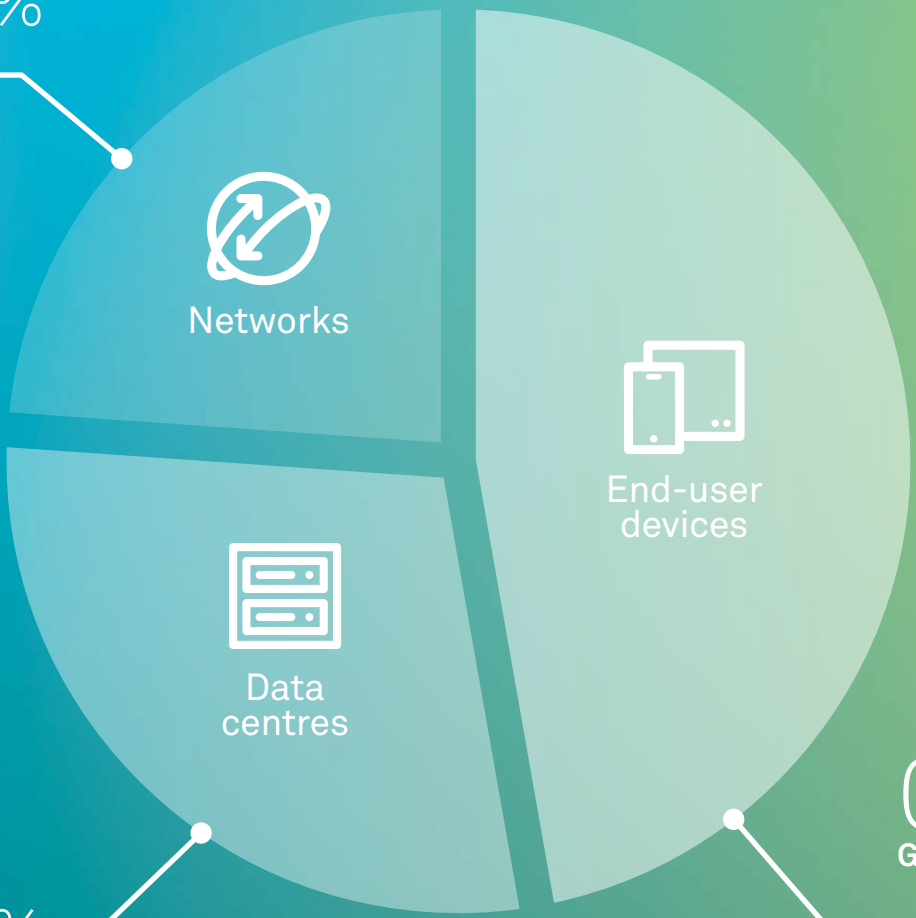
Greening the data centre

Upgrading existing data centres	Energy-efficient new data centres
At existing sites we are working to continuously improve the environmental efficiency with the following initiatives:	Our newest state-of-the-art data centre is located in Clayton, Victoria. It features:
• Computer room air conditioner units replaced with more energy efficient units • $30 million upgrade of chiller units and pumps to more efficient models • Temperature set points of chillers increased from 5°C to 7°C, reducing energy used for cooling • Variable speed drivers installed in cooling towers so they only pump the amount of air needed	• Economisers using outside ambient air temperatures to reduce the need for manufactured cool air • Raised flooring to increase air circulation • Vertical stacks to facilitate shortened cable runs • Air corridor containment for hot or cold air • Thermal heat from external extremes used in air temperature • Using DC-powered equipment to minimise loss from AC conversion

Where do ICT emissions come from?

According to the Global e-Sustainability Initiative, the ICT sector will be responsible for 1.97 percent of global carbon emissions by 2030[11]. As shown here, 28.8 percent of this comes from data centres. With global internet traffic expected to grow 3-fold from 2015 to 2.3 Zettabytes per annum in 2020[12], more data is required to be stored in the cloud. Telstra recognises that it's vital to find ways to power this demand more efficiently.

Source: Global e-Sustainability Initiative



0.30
$GtCO_2e$

24.0%

- Wireless
- Home
- Enterprise
- Data Transport

0.36
$GtCO_2e$

28.8%

- Servers
- Data
- Computing Units

0.59
$GtCO_2e$

47.2%

- Smart Phones
- Tablets
- PCs
- 3D printers
- Others

11. #SMARTer2030, ICT Solutions for 21St Century Challenges. Global e-Sustainability Initiative and Accenture Strategy, 2015, page 8.I. Calculations include direct, indirect and all other emissions where feasible with baseline fixed at 63.5 GtCO2eq
12. CISCO, 2016 VNI Global Fixed and Mobile Internet Traffic Forecasts. One Zettabyte is 10^{21} bytes.

Ready, set, go.

Telstra can help you to connect to the cloud.

We've found our customers want an end-to-end solution that lets them manage and scale their infrastructure and network to meet the security and performance requirements of the services and applications they use. While there's no one-size-fits-all cloud service, we've come up with a great way to offer our customers the flexibility they need.

1 Your ideal cloud

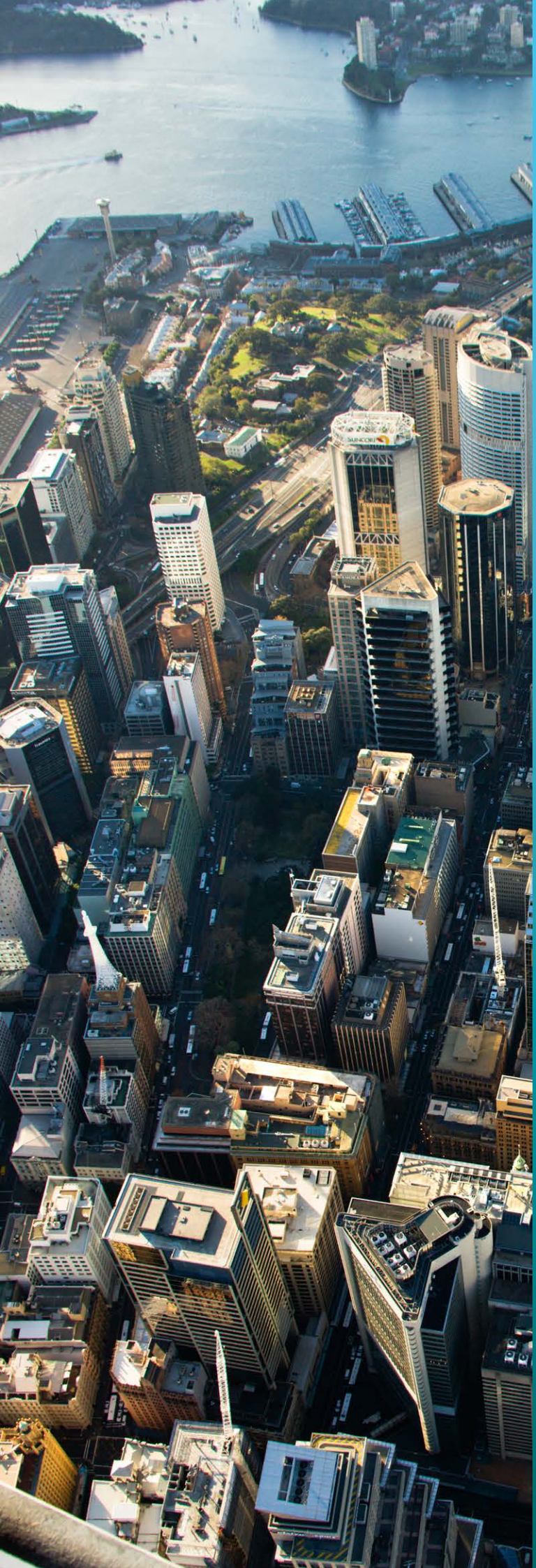
Our vision is to make it easy for organisations to have the ideal fit of cloud services by offering a choice of solutions from leading technology providers. Delivered over our secure and cloud-ready networks.

2 Smart and simple

Until now, the only way to customise your cloud to this degree was to work with different providers, creating a complex cloud environment that's hard to manage, integrate and control. Now you can procure some of the best cloud solutions from leading technology vendors – through one single provider.

3 Expert help to get going

Telstra can help you design, transition, optimise and run your ideal IT environment – just talk to our experts. We take care of integration and support performance end-to-end, helping to give you complete control and confidence.



Control and confidence in the Telstra cloud

Choice
Align software, servers, storage and communications solutions to your needs

Simplicity
Work with one provider to rightsource and procure your cloud services

Flexibility
Respond to changing business priorities by scaling your cloud up or down on a pay-as-you-go basis and moving workloads to the cloud

Scalability
Deliver services across Australia and overseas

Security
Meet compliance requirements on a tailored basis by varying workloads to meet differing security requirements

Performance
Deliver a great user end-to-end experience with Telstra's powerful networks and state-of-the-art data centres behind your cloud

About Telstra

At Telstra, our purpose is to create a brilliant connected future for everyone. We seek to identify ways we can use our technology, expertise, skills and scale to operate more responsibly, better serve vulnerable customers and help safeguard the environment to create long term value for us and the community.

Today 200 of the world's top 500 companies depend on our leading edge networks backed by billion-dollar investments – not only to do business but to make their operations more sustainable. Telstra is committed to improving our own environmental sustainability and we report annually on our progress at

telstra.com.au/aboutus/community-environment/reports

About Qingtech

To support our research we commissioned Qingtech to review our Australian cloud services and determine the energy and carbon emissions footprint. Qingtech helps organisations quantify, understand and manage the environmental impacts of their own technology, services and data by pushing traditional boundaries and instigating new approaches.

Qingtech work with some of the world's largest technology companies, uniquely supporting them to grow and succeed at both their core business and sustainability goals. The team have and continue to create and refine rigorous scientific methodologies for calculating ICTs impact that have been accepted and used globally.

qingtech.co.uk

Ready for the cloud?

Find out more

telstra.com.au/business-enterprise/solutions/cloud-services

Contact us

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