SMARTer2030: THE AUSTRALIAN OPPORTUNITY FOR ICT ENABLED EMISSION REDUCTIONS

FUJITSU

FOREWORD FROM TELSTRA

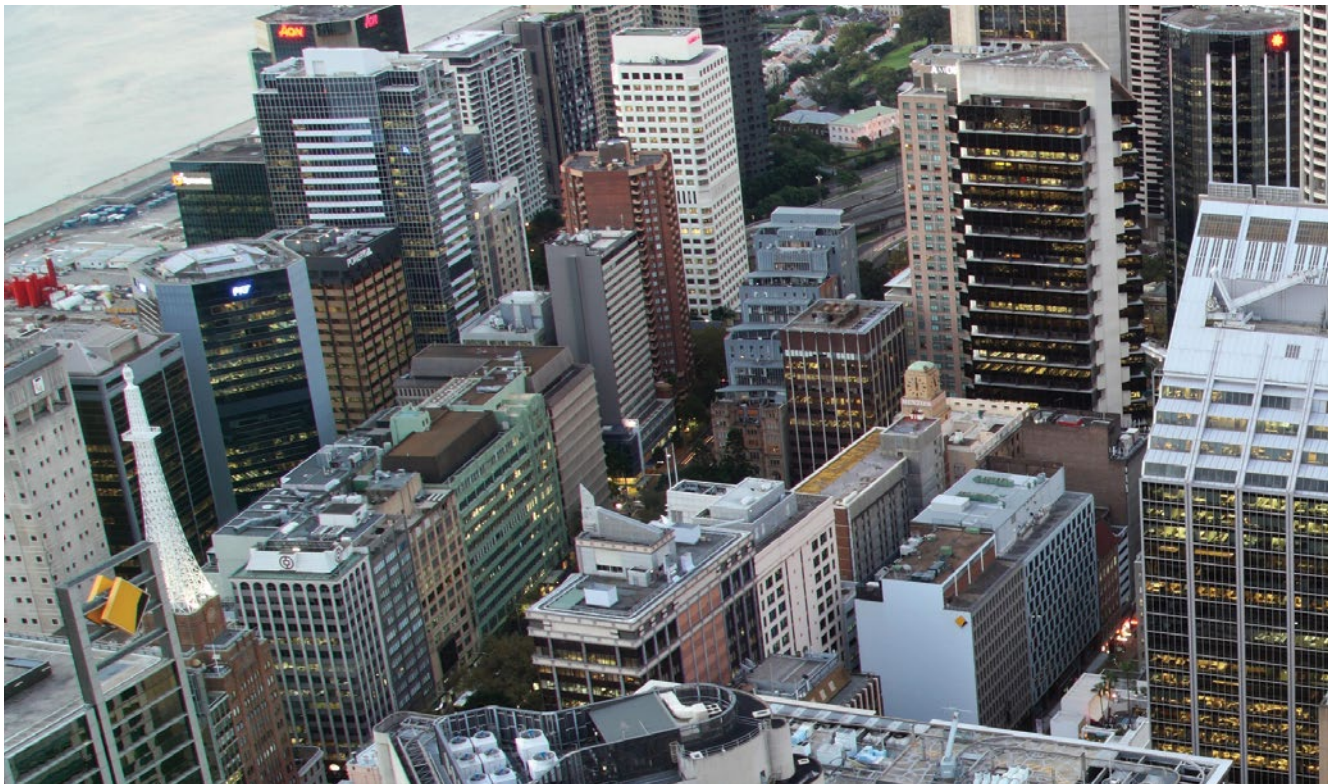
Today, technology and technological innovation offers us many attractive opportunities to realise economic and social improvement while also reducing carbon emissions. In fact, the rapid evolution of information and communications technology continues to reveal new systems, infrastructure and software that can deliver faster and better solutions to many carbon-intensive day-to-day activities.

At Telstra we are working to innovate and leverage technology to help our customers and the communities we operate in respond to climate change. Our significant investments developing and deploying new infrastructure and products means we are in a strong position to help Australians connect with the future low-carbon growth world.

Telstra together with government, business and consumers also has a role to play in changing mind sets. The SMARTer2030 report is a significant contribution to our on-going learning about how technology can assist with addressing climate change and, what we all must do to achieve our climate goals. It will help develop ideas and knowledge, by providing evidence and insights into a wide range of innovative opportunities.

As Telstra strives 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 a changing climate. SMARTer2030 helps Telstra and all Australians understand the ways and means to achieve a low-carbon future with economic and social benefits.

Martijn Blanken
Group Managing Director & Chief Customer Officer – Global Enterprise and Services, Telstra Corporation



FOREWORD FROM FUJITSU

Fujitsu is committed to innovation and working with customers and partners to shape a world where everyone, everywhere is empowered with and by digital technology. At Fujitsu we call this Human Centric Innovation.

Our long-standing support for environmental improvement goes hand-in-hand with a commitment to economic and social progress. As an information and communications technology company, we naturally believe that technology can and will play a significant role in solving some of society's biggest problems. The evidence that this is now happening is clear.

The digital transformation of the Australian and global economies continues at a rapid pace. It is the greatest current global force offering genuine innovation in the way people work and live.

As more people become more connected, we are witnessing technology as an enabler of low-carbon growth. It is reducing travel, energy consumption and resource use while, for individuals, opening up easier access to a range of products and services and, for businesses, creating new revenue opportunities, reducing operating costs and creating market differentiation.

Supporting SMARTer2030 is one way Fujitsu is informing people of the power of ICT.

SMARTer2030 clearly articulates that Australia and the world have much to gain from implementing smarter and more efficient technology. As businesses apply a serious technology and innovation lens across their environmental impacts and opportunities, they will increasingly find an ICT solution that delivers not only for the environment, but also for the bottom line, customers and the community.

Mike Foster
Chief Executive Officer, Fujitsu Australia

EXECUTIVE SUMMARY

Background

Information and communications technology (ICT) is a powerful tool driving environmental, economic and social benefits. ICT enables people and organisations to be more connected and to reduce energy and resource consumption.

The digital transformation of the Australian and global economies opens up significant innovation opportunities. It will play a fundamental role to not only reduce greenhouse gas emissions and limit global warming, but generate new revenue streams and improve access to essential services.

The latest report by the Global e-Sustainability Initiative (GeSI), SMARTer2030 ICT Solutions for 21st Century Challenges,[1] details how the world can use ICT to address a range of sustainability issues, particularly improving energy efficiency and transitioning to low-carbon growth.

SMARTer2030 examines eight industry sectors[2] and how existing ICT solutions impact each sector.

SMARTer2030 finds that as ICT becomes faster and more accessible, it generates more economic, environmental and social benefits. By enabling people to work and live in cleaner and healthier ways, ICT presents attractive opportunities that enable economic growth with a lower carbon footprint.

For example, it looks at health services and how E-Health uses technologies such as wearable devices to enable remote diagnostics and communication, and therefore offer environmental, economic and social benefits. It also examines food production and agriculture, and how Smart Agriculture devices such as field based sensors and machine to machine communications can reduce energy, water and fertilizer use while increasing productivity.

[1] *http://smarter2030.gesi.org/*

[2] *Health, Education, Manufacturing, Energy, Agriculture, Transport, Buildings, Work and Business*

[3] *Gartner, November 2015. http://www.gartner.com/newsroom/id/3165317*

[4] *Defined as online shopping through secure, cashless, gateways*

[5] *Or 'telework' involves the use of cloud-based platforms, connections and smart devices to facilitate office work between employees in different locations*

[6] *All currency conversion in this report are at $USD 1 = $AUD 1.32*

[7] *Use of technology to facilitate and speed up information across different stakeholders*

20% REDUCTION ON GLOBAL CARBON EMISSIONS BY 2030

12 BILLION TONNES OF CARBON REDUCTION BETWEEN 2015-2030 GLOBALLY

188 MILLION TONNES OF CARBON EMISSION REDUCTION IN AUSTRALIA IN 2030

250 MILLION LITRES OF TRANSPORT FUEL SAVED

Global key findings

SMARTer2030 finds that the carbon emissions avoided through the use of ICT are nearly ten times greater than the carbon emissions generated by deploying it. The report findings are based on a range of modelled year on year activities whereby applying ICT solutions can reduce carbon emissions, while also generating other economic or social benefits. The findings are then expressed as the benefits that these activities have the potential to achieve in the year 2030.

If the scenarios modelled are achieved, ICT can enable a 20% reduction in global carbon emissions by 2030. That is a reduction in global carbon emissions of 12 billion tonnes between 2015 and 2030. That is more carbon emissions saved than the 10.5 billion tonnes emitted by China for the whole of the year 2015.

It is estimated that in 2016 there are more than 4 billion consumer devices connected globally, and about 2.2 billion business devices – that is a 30% increase from 2015 and almost one device for every one of the 7.4 billion people in the world in 2016.

It is estimated that in another five years there will be 13.5 billion connected consumer devices as consumers and organisations realise the benefits of the Internet of Things (IoT) where sensors and machine to machine communication (M2M) learning improve efficiencies of operations and everyday life.[3]

As the rapid uptake of technology and IoT continues, access and opportunities will be more affordable, amplifying the sustainability benefits.

In Australia, SMARTer2030 finds that ICT has the potential to reduce carbon emissions by 188 million tonnes a year in 2030. Australia's total emissions in 2015 were 549 million tonnes and under a 'business as usual' scenario would be 683 million tonnes at 2030. If ICT can reduce Australia's emissions by 190 million tonnes a year by 2030 it has the potential to reduce Australia's emissions by 27% at that time.

SMARTer2030 also finds that in Australia:

- E-Commerce[4] can save 250 million litres of transport fuel from avoided shopping trips;
- E-work[5] can free up $USD 9 billion ($AUD 11.8 billion)[6] in capital expenditure through the reduced need for infrastructure;
- E-Health[7] can support 7 million people a year to engage with health practitioners remotely, in real time and on-demand; and
- Smart energy and grid solutions could avoid the deployment of over 13,000 km of grid infrastructure.

The way forward

Governments, businesses and consumers all have roles to play in accelerating adoption of ICT that can reduce emissions. Those ICT solutions can at the same time generate economic and social benefits.

SMARTer2030 calls on governments across the globe to be holistic in setting policy and simplifying regulation. It calls on businesses to be bold, show leadership, collaborate and encourage others. It calls on consumers to be aware of the benefits ICT enables, leverage their purchasing power to choose more e-services and be open to the opportunities ICT can provide.

ICT-enabled solutions present a compelling value proposition for consumers and businesses alike, offering governments evidenced based options for a wide range of further policy development and action.

Opportunities abound, but will only be realised if decision makers are aware of, and can unlock the potential of ICT.

"The more we connect the more we empower, the more we empower people through ICT, the more we break down the linkage between economic growth and energy consumption."

Luis Neves
Global e-Sustainability Initiative, Chairman,
(from presentation to the Carbon Market Institute, Melbourne, May 2016)

1 INTRODUCTION AND GLOBAL FINDINGS

For global climate change policy and action, the 21st Conference of the Parties (COP21) in Paris was a historic event. On 12 December 2015, 195 countries announced they would take collective action to limit global warming to well below 2°C, culminating in the Paris Agreement.

Before and during COP21, countries submitted individual Intended Nationally Determined Contributions (INDCs) which are country-specific action plans outlining how they will contribute to climate change mitigation and adaptation. As part of its INDC, the Australian Government took to Paris a commitment to reduce carbon emissions by 26-28% by 2030 from a 2005 baseline.

Following the events in Paris, attention must now turn to how we can achieve this reduction. A significant opportunity is through increased use of Information and Communications Technology (ICT).

Since 2008, the Global e-Sustainability Initiative (GeSI) has been investigating the positive link between technology and low-carbon growth. In 2015, GeSI released its third study on this topic, *SMARTer2030: ICT Solutions for 21st Century Challenges*. This research:

- Quantifies the carbon emissions reduction potential for 12 ICT use cases across 8 industry sectors;
- Estimates economic benefits from ICT-enabled cost savings and ICT revenue opportunities;
- Identifies additional environmental, social and economic benefits; and
- Makes recommendations for business, policy makers and consumers to fast track implementation of ICT solutions.

This report contains the Australian highlights of this research. In this report, opportunities are outlined which are available to governments, business and consumers to increase the use of ICT to help reach Australia's carbon emissions reduction target.

Fujitsu and Telstra are members of GeSI and participated in the development of the SMARTer2030 report. As members of the ICT sector, both organisaitons are passionate about the role of technology in enabling low carbon growth and working to foster ongoing discussion and dialogue about the ideas presented in this report.

"Australia faces a range of sustainability challenges – climate change, water scarcity, resource depletion, biodiversity protection. Take just one example that connects every Australian with all of these issues – food. Smart agriculture can help prevent or repair environmental damage, reduce inputs and still increase productivity. The work of SMARTer2030 can contribute to a more sustainable food supply as well as provide business opportunities for Australian ICT innovators."

Dermot O'Gorman
WWF Australia, Chief Executive Officer

About SMARTer2030: ICT Solutions for 21st Century Challenges

The Global e-Sustainability Initiative (GeSI) is a global partnership of ICT companies and organisations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability.

The SMARTer2030 study is the third instalment in the GeSI 'SMART' series. Previous reports – SMART 2020 in 2008 and SMARTer2020 in 2012 – focused solely on the carbon abatement potential of ICT. As estimation techniques have advanced and methodologies been refined, the scope of the study has broadened to consider further environmental, economic and social benefits.

The key global findings of SMARTer2030 are that across the world:

- ICT can enable a 20% reduction of global carbon emissions by 2030, essentially holding global carbon emissions at 2015 levels.
- ICT can enable a low carbon growth future – it can ensure environmental improvement, enable economic development and deliver social benefits.
- The emissions avoided through the use of ICT are nearly 10 times greater than the emissions generated by deploying it.
- Due to improvements in energy efficiency, the ICT sector's footprint is expected to decrease to 1.97% of global emissions, compared to 2.3% in 2020, as was estimated in the SMARTer2020 Report.
- ICT provides other significant environmental benefits such as increasing agricultural crop yields while reducing water and petrol use.
- For the eight sectors studied, ICT could generate over $USD 11 trillion ($AUD 14.5 trillion) in economic benefits per year by 2030. This is the equivalent of China's annual GDP in 2015.
- ICT will connect 2.5 billion extra people to the 'knowledge economy' by 2030, giving 1.6 billion more people access to healthcare and half a billion more people access to e-learning tools.
- Worldwide growth of the digital economy continues to accelerate, providing the scale necessary to drive greater connectivity and new, disruptive business models.

The full report can be found at smarter2030.gesi.org

2 THE PARIS AGREEMENT AND IMPLICATIONS FOR AUSTRALIA

First negotiated in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty which aims to stabilise greenhouse gas concentrations at a level that will prevent dangerous interference with the climate system. The UNFCCC is the main vehicle for progressing international cooperation to mitigate and adapt to climate change.

COP21 was the 21st gathering of nations to discuss and update the UNFCCC. The resultant Paris Agreement is significant in that it is adopted by 191 countries and is the first global, legally-binding agreement for tackling climate change.

The Paris Agreement commits signatory countries to:

- A global goal to hold average temperature increase to well below 2°C, and pursue efforts to keep warming below 1.5°C, above pre-industrial levels;
- Set national carbon emission reduction targets from 2020 and review targets every 5 U-party 2016 years to ensure they are sufficiently ambitious;
- Acknowledge the need for co-operation to increase understanding, action and support in areas such as early warning systems, emergency preparedness and risk insurance; and
- Financial, technological and capacity building support to help developing countries meet their commitments and adapt to a changing climate.

The agreement became legally binding in November 2016, after more than 55 countries accounting for at least 55% of total global greenhouse gas emissions deposited their ratification and acceptance to the United Nations.

Australia took to Paris the INDC commitment to keep carbon emissions 26-28% below 2005[8] levels by 2030. For Australia to meet this commitment, carbon emissions will need to be reduced by 160 million – 172 million tonnes a year by 2030.

A number of State and Territory Governments have also announced a range of actions to be implemented to reduce carbon emissions. Many have publicly committed to carbon reduction targets in their jurisdictions, over time frames from 2020 to 2050.

In the 2015 financial year ending 30 June, Australia's reported emissions were 549 million tonnes of carbon emissions (CO_2e)[9]. As shown in figure 1 on the right, the majority of Australia's emissions come from electricity generation, direct combustion of fuels, agriculture and transport. Combined they are responsible for more than 80% of Australia's total emissions.

[8] In 2005, Australia emitted 614 million tonnes of CO_2e.

[9] Estimated at June 30, 2015

[10] https://www.environment.gov.au/system/files/resources/7c0b18b4-f230-444a-8ccd-162c8545daa6/files/nggi-quarterly-update-dec-2015.pdf

[11] Source: DoE 2015a; DoE estimates

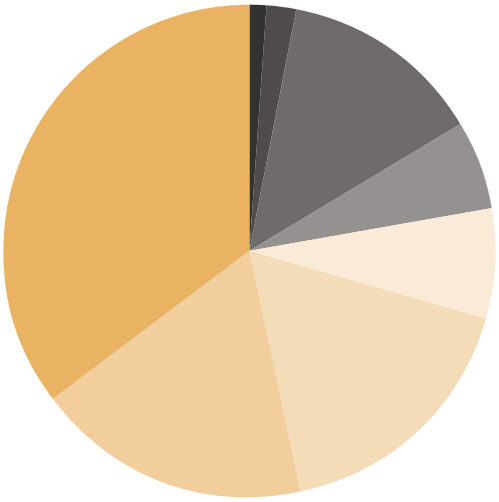
[12] As calculated for this report by Equilibrium OMG Pty Ltd.

"The Carbon Market Institute is dedicated to building a world where business rises to the challenges and opportunities of climate change – there is no doubt Information and Communications Technology is an enabler that business can use to manage energy use, lower emissions and reduce costs. Innovative technology solutions offer a real and present opportunity to enable a low carbon growth future."

Peter Castellas
Carbon Market Institute, Chief Executive Officer

Figure 1

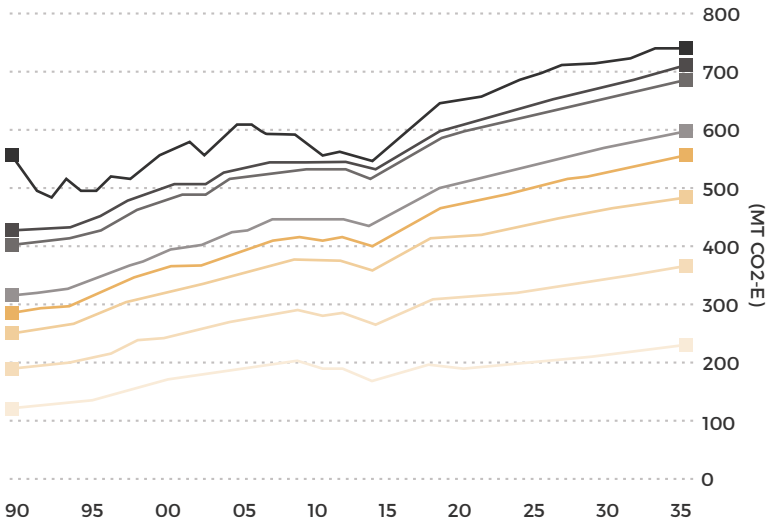
December 2015 Accounts[10] – breakdown of carbon emissions by sector (numbers are rounded)



- ENERGY-ELECTRICITY
- ENERGY-STATIONARY ENERGY EXCLUDING ELECTRICITY
- ENERGY-TRANSPORT
- ENERGY-FUGITIVE EMISSIONS
- INDUSTRIAL PROCESS AND PRODUCT USE
- AGRICULTURE
- WASTE
- LULCF

Figure 2[11]

Australian Carbon emissions trajectory through to 2035



- LULUCF
- WASTE
- AGRICULTURE
- INDUSTRIAL PROCESS AND PRODUCT USE
- FUGITIVES
- TRANSPORT
- DIRECT COMBUSTION
- ELECTRICITY

Without any action taken, if Australia's carbon emissions continue to grow on their current 'business as usual trajectory', it is currently forecast that emissions at 2030 will be 683 million tonnes (see figure 2).

According to SMARTer2030, ICT has the potential to reduce carbon emissions in Australia by 188 million tonnes a year at 2030. This means that – with full adoption of ICT across the eight industry sectors and if the technologies modelled were fully adopted – ICT can potentially support the Australian Government to surpass its target[12]. Therefore, there is a strong case for increased use of ICT to help deliver Australia's INDC commitment.

3 THE ROLE OF ICT IN CARBON EMISSIONS REDUCTION IN AUSTRALIA

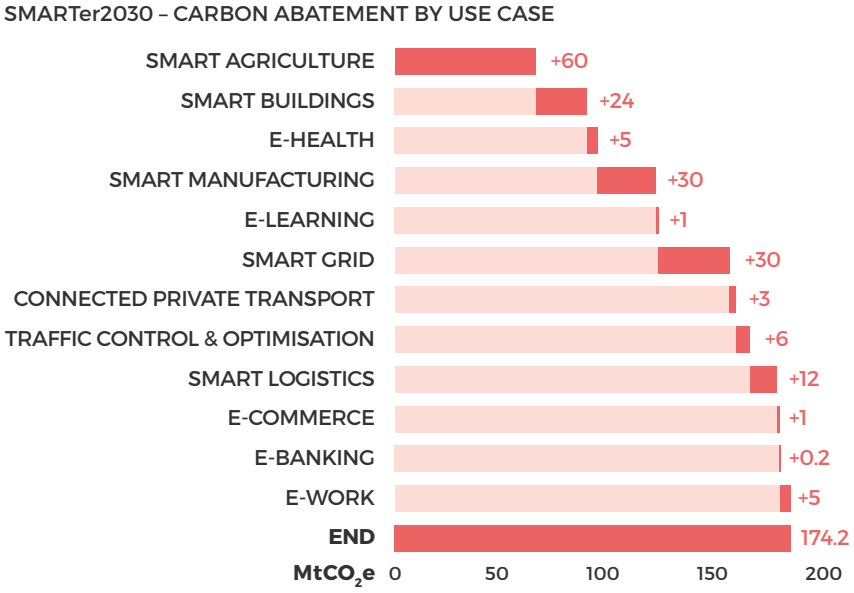
SMARTer2030 investigates the carbon reduction potential for 12 ICT use cases across eight industry sectors. These are:

- Smart Agriculture – use of ICT to improve efficiency of food production by increasing crop yield, reducing waste and increasing access to markets;
- Smart Manufacturing – application of ICT to conventional manufacturing processes, increasing flexibility, efficiency and responsiveness;
- Smart Energy – using ICT to match energy demand to supply, integrate renewable energy into grid systems and enhance energy efficiency;
- Smart Buildings – using software, sensors and controls to create intelligent homes and workspaces;
- E-Health – using technology to deliver information across different stakeholders (i.e. doctors, patients) regardless of location to improve health outcomes;
- E-Learning – education delivered through smart devices and broadband internet;
- Work and Business, comprising:
  - E-Work – teleworking
  - E-Commerce – online shopping;
  - E-Banking – electronic banking products and services; and
- Smart Mobility, comprising:
  - Traffic Control and Optimisation (TCO) – increasing efficiency of traffic, driving and parking through connected sensors, location-based apps and intelligent infrastructure;
  - Connected Private Transportation – car-sharing and car-pooling apps;
  - Smart Logistics – optimising routes and loads whilst reducing waste in the system.

As shown in figure 3, regardless of industry sector, ICT provides significant opportunities for carbon emissions reduction.

Figure 3

Australian Carbon Abatement potential by sector



Smart Logistics solutions such as fleet management and route optimisation systems are important tools to help transport companies plan and optimise fleets. Through improving efficiencies such as reducing empty runs and redundancies, it is estimated that if the scenarios are delivered as modelled, Smart Logistics has the potential to deliver carbon emissions reductions of 12 million tonnes a year by 2030 in Australia.

ICT has the potential to transform manufacturing in Australia, creating a truly low-emissions 'Smart' sector. When technologies such as smart devices, Internet of Things (IoT), data analytics, 3-D printing and augmented reality devices are applied to manufacturing, it creates significant opportunities for changing the way in which factories operate, how sites are managed and how goods are produced. SMARTer2030 estimates that ICT can reduce carbon emissions in the Australian manufacturing sector by 30 million tonnes of CO_2e by 2030.

Although ICT enables carbon reduction across all of the sectors, some ICT-enabled solutions present particularly significant benefits to Australia with Smart Agriculture, Smart Energy and Smart Manufacturing solutions offering about 75% of total savings.

E-HEALTH

E-Health offers a range of options that can reduce travel, increase access, enhance service provision and ultimately improve outcomes for patients, carers and health professionals.

Fujitsu partnered with ADTEC to develop and install a system enabling parents to securely and remotely monitor their children at Canberra Hospital Neonatal Unit. The system provides greater flexibility for parents to check their child's progress, leading to less stress and less travel. The solution also enhanced outreach training and information transfer between health practitioners to improve the care and treatment of new born babies. https://www.youtube.com/watch?v=r8PDME6gFnk

NT Telehealth is a Telstra supported service offering high definition video conferencing capabilities to interface with existing NT care services, video conferencing to enable clinicians to support existing business processes and to allow patients to connect up with loved ones who may be out of their communities for medical treatment.

The Northern Territory Government reports that the initial roll out resulted in greater access to health care services while saving $AUD 1.1 million in travel costs. E-Health consultations increased from 200 to 1000 in a year and the rate that patients did not attend appointments was reduced.

3

QANTAS

Qantas, Fujitsu and Telstra collaborated to find an ICT solution to avoid the need to print 18,000 pages of paper every day for flight operations; and for pilots to carry 20kg of flight manuals on each flight.

The solution led to tablet devices being provided to all Qantas domestic and international pilots and all necessary operations data and manuals being electronically available.

Qantas calculates that the reduced weight and ensuing improved fuel efficiency on all flights that has been enabled by ICT is now saving $AUD 1.5 million annually in jet fuel.

"Qantas has embraced information technology as a means to reduce environmental impacts, reduce costs and open up commercial opportunities. We calculate that the weight reduction achieved when our pilots changed to using tablet devices instead of carrying 20kg of flight manuals is saving $AUD 1.5 million in fuel annually."

Ian Milne
Qantas, Head of Group Fuel and Environment

The following table provides a breakdown of the emissions reduction and sustainability benefits that ICT technologies enable across Australia.

Australian ICT enabled activities and benefits			
Use case	**ICT enabling technologies**	**Carbon emission reduction potential at 2030**	**ICT enabled sustainability benefits**
E-Learning	Computerised devices in educational and learning environments, interactive lessons	1 Mt CO2e through reduced travel and resource use	415,000 e-learning degrees
Smart Agriculture	Precision agriculture, automation and Internet of Things (IoT) technologies to allow farmers to increase resource efficiency, productivity and resilience whilst reducing food waste along the supply chain.	60 Mt CO2e	650 billion litres of water saved per year, yield per hectare increased by 700 kilograms of produce per year, additional revenue of $USD 1.8 billion
E-Health	Enabling patients to manage their own health	5 Mt CO2e through reduced transport and decreased hospital space required	An additional 7 million people using E-health by 2030 and $USD 1.5 billion saved in reduced travel and resource use
Smart Buildings	Building software and remote controls for better energy management in homes and workplaces	24 Mt CO2e saved through energy efficiency measures	650 million litres of fresh water saved from households
Smart Grid	Energy supply and current demand connected for more efficient networks	30 Mt CO2e due to energy efficiency improvements	More than 13,000 kms of infrastructure avoided and $USD 20.7 billion saved in reduced costs
Smart Logistics	Optimised distribution activity	12 Mt CO2e	More than 1 million square metres of space released for other purposes
Traffic control and optimisation	Intelligent sensors and connected cars enabling traffic and parking to be managed more efficiently.	6 Mt CO2e from increased vehicle efficiency and increased public transport	Reduced congestion, lower travel times
Connected Private Transportation	Connected vehicles stimulating car sharing and route sharing.	3 Mt CO2e through decreased travel and car production	Reduced need to purchase cars, lower fuel consumption
E-Work	Cloud platforms, connectivity and devices enabling office work between people in different locations	6 Mt CO2e due to less commuting and decrease in business travel	Reduced travel, better work-life balance and $USD 9 billion saved from reduced infrastructure need
E-Commerce	Platforms and connections enabling on-line commerce and trading	1 Mt CO2e through reduced travel and fuel consumption	250 million litres of fuel saved
E Banking	Provision of banking products and services through electronic delivery channels, such as internet or mobile banking	0.2 Mt CO2e from fewer consumer trips required to the bank and reduction in employees employed by bank	$USD 36 million ($AUD 47.5 million) in costs savings through reduced fuel, energy and resource use

4 ICT PROVIDES ADDITIONAL SUSTAINABILITY BENEFITS FOR AUSTRALIA

Beyond the impacts of climate change and the need to meet Australia's 2030 carbon emissions reduction target, Australia faces a range of other sustainability challenges.

As a country prone to drought, Australia faces challenges securing reliable food supplies. As a large country, there are challenges to ensure equality of access to essential services such as education. Australia's ageing population is creating growing budgetary pressures to deliver health services to all Australians.

Beyond carbon emissions reduction, ICT can help Australia address some of these broader sustainability challenges.

Australia has an ageing population and the number of Australians in 2030 aged 65 or over is expected to increase by 84% from 2015 numbers. This will have significant ramifications for budgets and the provision of healthcare services. By 2047, government health costs could comprise 10% of GDP, compared to 6% today[13]. Technologies such as wearables, smart devices and remote diagnostics can transform the healthcare sector, providing on-demand, remote and personalised treatment and savings time and resources.

The SMARTer2030 analysis suggests that in Australia, by 2030, more than 415,000 E-Learning degrees could be delivered each year. This not only increases access to education for Australians in regional and remote parts of the country but by 2030 if the technologies considered are adopted it could save education departments and universities upwards of $USD 9 billion ($AUD 11.8 billion) each year at 2030 in efficiencies and cost savings.

In this section, we outline some of the broader environmental, economic and social benefits ICT can deliver to Australia.

4a. Environmental benefits of ICT in Australia

Beyond climate change mitigation, ICT enables wider environmental benefits and can be instrumental in solving broader environmental challenges, such as:

- Increasing efficiency and reducing consumption of resources, such as water and fuel;
- Taking cars off the road through more effective mobility solutions; and
- Increasing crop yields through Smart Agriculture solutions.

For example, Agriculture is one of Australia's most important industries. There are more than 300,000 people working in the sector who together represent an $AUD 53 billion[14] industry that grows enough food to feed 80 million people each year.

Smart Agriculture solutions – such as sensor-based field equipment, data analytics, big data and traceability and tracking systems – can increase yields, decrease resource inputs and reduce waste, protecting the sector against droughts and natural disasters. SMARTer2030 estimates that by 2030, ICT could increase crop yields by over 700kg per hectare per year as well as decrease water consumption by 650 billion litres.

[13] *Australian Government Productivity Commission Research Paper (2013), http://www.pc.gov.au/research/completed/ageingaustralia/ageing-australia.pdf*

[14] *http://www.abs.gov.au/ausstats/abs@.nsf/mf/7503.0*

SMART AGRICULTURE

Smart Agriculture uses ICT to gather and communicate information in order to make farming and agriculture more efficient and productive. Australia in particular is well situated to benefit greatly from Smart Agriculture as it can significantly boost land productivity, save water and reduce fertiliser use.

Telstra assisted the Sheep Co-Operative Research Centre to develop and launch an app giving sheep farmers across Australia easy access to up to date information to support breeding decisions and improve stock productivity.

ICT-enabled solutions can significantly contribute to developing farmers' climate change resilience by allowing for timely response to changes in climate and weather conditions.

Fujitsu has worked with farmers to provide technology for glasshouse horticulture. Information on temperature, humidity, CO_2, sunlight, rain, and wind is gathered in real time by sensors and used to automatically control facilities in order to maximise productivity and the nutritional and market value of the products. This innovation has enabled farmers to develop new products such as low potassium lettuce which is sold to people with kidney disease who cannot process the mineral properly.

4

4b. Economic benefits of ICT in Australia

ICT is transforming all aspects of the global economy and will continue to do so, creating disruptive business models, driving efficiencies and transforming how we work and do business.

ICT has the potential to generate direct economic benefits for the Australian economy both through ICT-enabled cost savings and additional revenue opportunities. The savings and revenue estimates are based on a range of modelled year on year activities building to estimated benefits at the year 2030. Some of the ways in which SMARTer2030 estimates that ICT could deliver substantial cost savings across Australia by 2030 include:

- $USD 4.13 billion ($AUD 5.4 billion) from reduced electricity and water consumption in Smart Buildings;
- $USD 3.85 billion ($AUD 5 billion) from increased flexibility and efficiency of road, air, train and marine freight due to Smart Logistics solutions; and
- Smart Energy solutions delivering $USD 20.71 billion ($AUD 27.3 billion) in savings if the scenarios on improved energy efficiency in grids and streamlined operations are delivered and result in fewer losses during transmission, storage and distribution.

Smart Agriculture in particular can achieve significant costs savings. Those savings are achieved as ICT such as smart sensors and machine to machine communication improves resource efficiency, reduces waste and automates and optimises processes.

With respect to new revenue opportunities, ICT has the potential to generate an additional $USD 65 billion in new sales and revenue by 2030. Those revenue opportunities arise as ICT enables the development of new products and services as well as through increasing the productivity of human resources and plant and equipment.

Some examples of ICT driving new revenue across Australia by 2030 include:

- $USD 4.49 billion ($AUD 5.9 billion) from Smart Home technology installation and connectivity;
- $USD 32 million ($AUD 42.2 million) to the ICT sector from the sale of Smart Manufacturing technologies and sensors;
- $USD 1.1 billion ($AUD 1.4 billion) from sale of wearable devices to support E-Health services.

As figure 5 shows, revenue opportunities are spread across all of the use cases and have the potential to drive growth in each of the eight sectors.

Figure 4

ICT-Enabled Cost Savings in Australia

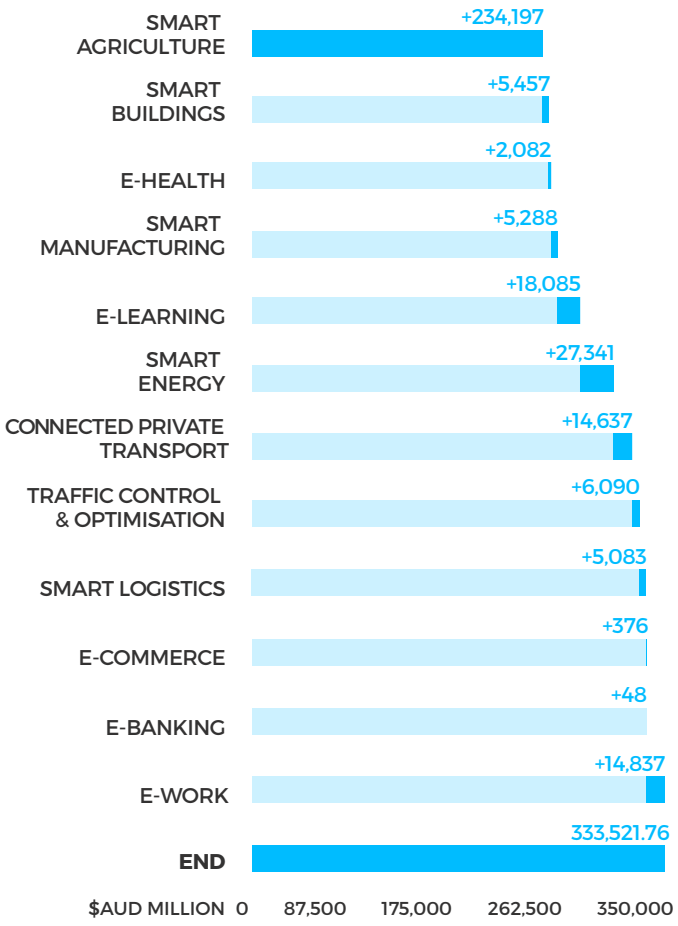
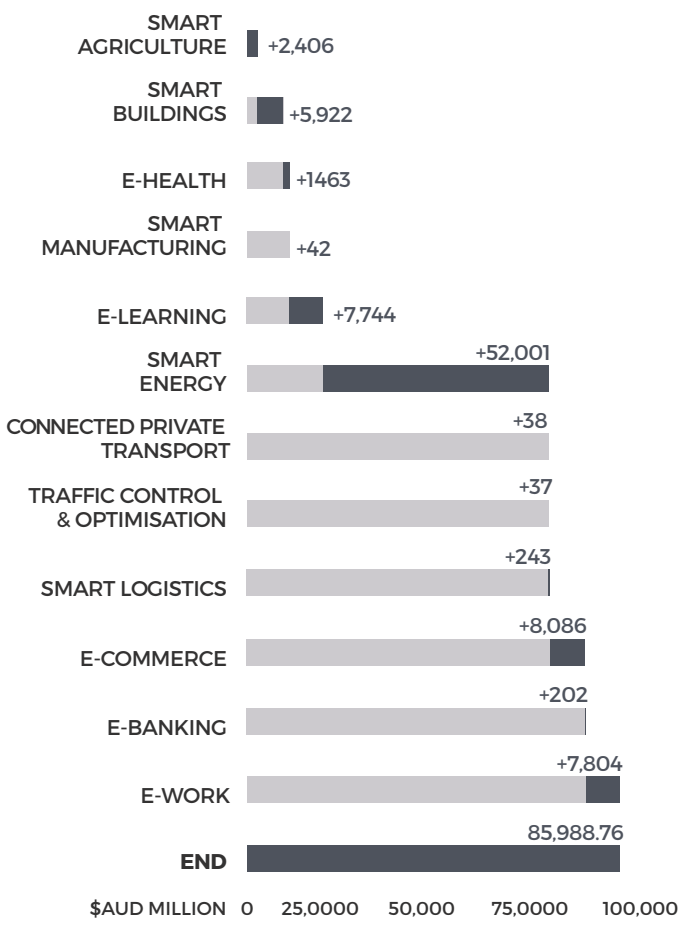


Figure 5

ICT-enabled revenue opportunities in Australia



In the area of Smart Energy, there are opportunities for new and greater revenue of $USD 20.7 billion ($AUD 27.3 billion) for Smart Grid operators through the supply of new systems and services. For E-Learning SMARTer2030 estimated more than $USD 5.8 billion ($AUD 7.6 billion) in extra revenue can be generated as more courses are made accessible to more people.

4

FUJITSU SMART BUILDINGS WITH LEND LEASE

An innovative cloud-based platform assists Lend Lease in delivering an industry best practice 4 Star "Green Star" Multi-Unit Residential development.

Fujitsu and Switch Automation developed an innovative, state-of-the art and sustainable solution that addressed the limitations of existing traditional building network and home automation systems. The solution was designed primarily to benefit residents by providing transparent, real time usage of water and power that enables residents to easily manage and reduce their own energy usage and costs. This single user-interface also integrates video intercom and lighting control via the one platform and interface.

Fujitsu designed and implemented a fibre based network infrastructure that delivered not only ultra-high speed Internet and TV services, but also provided a single converged IP building backbone capable of supporting all of the services.

Switch Automation delivered a highly integrated, cloud based platform called 'Switch Smart Hub' that met all Green Star requirements and provided residents with an intuitive, easy to use home automation experience.

Ultimately, as Lend Lease collects and analyses this sustainability data, the company can translate this information into improving future designs and creating a competitive advantage.

4c. ICT creates social benefits in Australia

From a social perspective, ICT can generate benefits by improving access to essential services such as banking, education and healthcare; and also by driving opportunities for increased income. SMARTer2030 finds that ICT enables;

- Easier access to services and increased convenience that improves participation and experience.
- Access to information and services that enable people to reduce their expenditure on a good or service.
- Access to learning and productivity improvements that can lead to increased income for both organisations and individuals.

As ICT becomes less expensive and more accessible, an extra 2.5 billion people around the world can become connected, improving their income potential and wellbeing.

Globally ICT can provide 1.6 billion people with access to E-Health services and 450 million with access to E-Learning.

In Australia, where mobile phone and smart phone penetration rates are 135% and 90% respectively[15], there is significant opportunity for ICT to deliver substantial social benefits, equalising access to services and allowing full participation in society, regardless of location.

For example, technologies that enable people to E-Work offer significant social benefits. Technologies that support employees to work remotely can improve quality of life and support better work-life balance, through eliminating the work commute. They can also support increased employment opportunities for employees with a disability and employees with strong family obligations that require them to work remotely.

[15] *Australia - Mobile Communications - Statistics and Forecasts - See more at: http://www.budde.com.au/Research/Australia-Mobile-Communications-Statistics-and-Forecasts.html#execsummary*

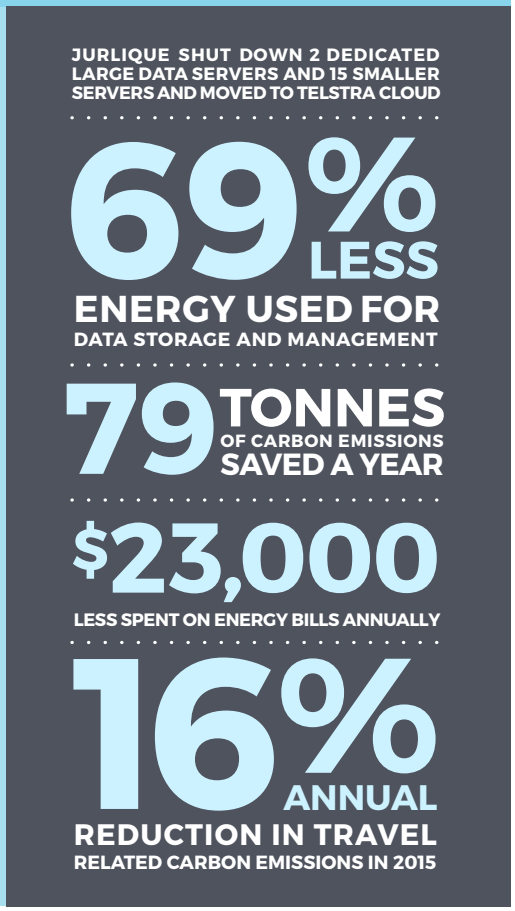
TELSTRA E-WORK AND JURLIQUE

With environmental stewardship a core brand value, global skincare leader Jurlique aimed to reduce carbon emissions by 20% 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 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.

Qingtech benchmarked Jurlique's move to the cloud to quantify sustainability gains. It found that Telstra's carbon emissions for powering Jurlique's services total 51 tonnes annually, a reduction of 61%. In all, Jurlique is saving 130 tonnes of carbon emissions a year and $AUD 23,000 annually from reduced energy costs. The net saving each year is 79 tonnes of carbon emissions.

Jurlique is also making indirect sustainability gains. Cloud video conferencing on desktops now powers global collaboration, increasing speed to market and reducing travel costs related carbon emissions by approximately 16%.



5 THE WAY FORWARD

ICT presents compelling opportunities for governments, businesses and consumers to be more innovative and connected as a means to ensure low-carbon growth and reduce carbon emissions.

Opportunities abound, but will only be realised if decision makers unlock the potential of ICT. There are actions that governments, businesses and consumers can take to realise a low-carbon growth future.

Government

For government and policy makers across the globe, the opportunity is to create an environment that will empower citizens, drive economic growth and transform public services. Government and policy makers can make decisions to ensure that ICT is deployed in a manner that meets underlying needs and improves quality of life, drives economies and addresses sustainability challenges. SMARTer2030 asks governments to be holistic and consider key calls to action.

Setting clear emissions targets based on levels of economic growth will provide an incentive to reduce carbon intensity and decouple economic growth from carbon emissions. Emissions limits and sector or technology specific targets will help decarbonise energy and transport in particular.

Creating incentives to invest in broadband infrastructure will expand broadband connectivity and widen access to affordable ICT which will increase penetration and participation.

Business

For business, the challenge is to take concrete steps that will show leadership and inspire others towards similar action. Business needs to understand its current footprint and operational requirements and consider how technology can help them be smarter, faster and more efficient.

Setting emissions targets at industry or business level – where an industry or business decides to set and communicate its own target and performance - will bring greater commitment and transparency to carbon impacts and opportunities.

Companies can invest in ICT to increase energy efficiency and staff productivity and be innovative by developing low-carbon partners to speed up deployment of breakthrough technologies and procure low-carbon electricity.

It is essential for business to be open to exploring the opportunities that ICT can provide and to utilise ICT to deliver better environmental and economic outcomes.

Consumers

When consumers choose to use a particular technology they can influence future products and services. People do not have to be passive recipients of what ICT can offer, but can be active change agents. SMARTer2030 finds that consumers using technology for sustainable outcomes and demanding complete solutions will fast track new and innovative products and services.

Consumers can influence governments and other authorities to ensure secure access to broadband infrastructure enabling use of E-Services saving money and improving living standards.

Informed consumers will drive change. Consumers choosing the E Service brands and platforms that provide the best value and maximise time and money savings will drive innovation in low-carbon products and services.

Leveraging ICT for low-carbon growth requires all parties to take action, but also requires shared responsibility and collective action. As key stakeholders act within their sphere of responsibility, opportunities to partner, inform and work with others will be a key to unlocking ICT-enabled low-carbon growth.

Conclusion

While SMARTer2030 reveals the significant upside of technology and carbon emissions, we recognise that the ICT sector itself faces challenges. The sector's most material environmental impact is the emissions associated with the energy it consumes to power its networks.

As the demand for data continues to increase so does the need for energy to support the increased demand for connectivity and networks.

Through GeSI and SMARTer2030 the ICT sector is showing that it is willing to tackle its challenges and play a leadership role; it is not good enough for us to point out the opportunities, we have to actively help people achieve a low carbon future.

SMARTer2030 presents compelling data at the industry and sector level to demonstrate that business in Australia can leverage ICT to achieve significant environmental and economic outcomes.

Regardless of sector, technology opportunities exist.

This report, and the full SMARTer2030 report, present a view into what is possible and how Australia can transition to a low carbon economy while still enjoying economic growth and social benefits. The challenge is that industry and government must be made aware of the opportunities, have the capacity to understand what is possible, and ensure take up of ICT solutions. This report is a step in that direction.

The practical role that ICT can play in reducing carbon emissions is increasingly understood by the ICT sector – and as SMARTer2030 shows – the potential benefits will continue to grow.

Fujitsu and Telstra are committed to continue communicating the enabling role of ICT so that when businesses, governments and consumers consider technology, they see the full range of economic and environmental opportunities and benefits that can help them engage in, and assist in delivering a low-carbon future.

5 SMART LOGISTICS

ICT enables greater insight and control leading to logistics with lower travel distances, optimised load carrying and reduced fuel consumption.

Probe-generated traffic information provisioning services are contributing to solving traffic congestion, promoting the use of toll roads, and reducing CO_2 emissions from congested traffic.

Fujitsu is providing a cloud service that utilises location information and collects probe data such as vehicle location, time and speed, and generates and accumulates traffic information, such as congestion conditions and their duration. Information can be collected for use in instructing drivers on when roads are congested, when there are accidents, and when a disaster occurs.

The internet of Things (IoT) is transforming the transport network and Telstra is a proactive partner in the eco system by providing innovative solutions to both the transport network operators, in the form of platforms to data management platforms, the data and vehicle based technology, in the form of connected vehicles. The actionable insights that the collection of data can provide informs organisations and consumers and has endless possibilities. These include, but are not limited to:

- Informing customers on more effective routes to improve journey times and reduce congestion of our roads
- Parking solutions to direct customers to vacant spots to reduce them driving and looking for empty car park spaces
- Fleet management platforms to provide real time tracking of dashboards of vehicles within an organisation to improve vehicle performance and ultimately deliver more efficient transport and reduce environmental impacts

"A significant reduction in carbon emissions is needed in the next five years. Robust and innovative research like SMARTer2030 presents practical opportunities for individuals, organisations and businesses to consider how technology can drive them, and Australia, to a low carbon future."

Anna Skarbeck
ClimateWorks, Chief Executive Officer,

About Fujitsu – Human-centric innovation

Fujitsu believes that digital technology can empower everyone, wherever they are.

Our approach is to bring together people, information and things. With this approach we can transform traditional classrooms into collaborative, dynamic and interactive learning environments. We can turn companies into digitized businesses, enabling creativity from their people, insight generation and large gains in efficiency through cloud computing, big data and mobility solutions - at Fujitsu we call this Human Centric Innovation.

Fujitsu is a global information and communications technology (ICT) company, offering a full range of technology products, solutions and services. We are the largest IT service provider in Japan and in 2014 was rated the number five provider in the world. We use our experience and the power of ICT to shape the future of society with our customers. 159,000 Fujitsu people support customers in more than 100 countries.

Fujitsu Australia and New Zealand is a leading service provider of business, information technology and communications solutions. As one of the largest ICT companies in the Australian and New Zealand marketplace, we partner with our customers to consult, design, build, operate and support business solutions. From strategic consulting to application and infrastructure solutions and services, Fujitsu Australia and New Zealand has earned a reputation as the single supplier of choice for leading corporate and government organisations. Fujitsu Australia Limited and Fujitsu New Zealand Limited are wholly owned subsidiaries of Fujitsu Limited.

In all our actions, we seek to protect the environment and contribute to society.

Our contribution to the creation of a sustainable environment includes making environmental protection a top management priority. With clear environmental goals set for all our business areas, we conduct our business activities in a well-planned and sustainable manner.

We are committed to implementing Green Procurement throughout our supply chain, which includes our business partners. From the earliest stage of development our products incorporate energy conservation concepts in design and material selection.

We are committed to helping our customers in their efforts to protect the environment. We supply specialised consulting combined with environmental solutions incorporating the know-how and innovative technology we have developed so we can work together in protecting the global environment.

As a global corporation, we have developed deep roots in communities around the world and engage in social activities in harmony with local and global communities. This includes the promotion of cultural events, sporting activities, youth educational programs, regenerating our own rainforest in Borneo and other global initiatives.

5 About Telstra – role in supporting low-carbon growth

Telstra believes business has an important role to play in addressing global warming. We need to work in partnership with governments and the wider community to minimise the environmental, economic and social impacts of climate change.

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.

We are working to innovate and leverage technology to help our customers and our communities respond to climate change. Technology and technological innovation is an essential enabler of low-carbon economic growth.

Telstra's response to climate change is focused in three areas: minimizing our emissions, building resilience and helping to enable low-carbon economic growth.

We will continue to publicly report our climate change activity and performance annually to ensure transparency.

The infrastructure we operate to deliver our products and services is long-lived, so a robust and risk-based approach is important when it comes to managing the physical impacts of climate change.

Increased frequency and severity of extreme weather can damage and disrupt our infrastructure and operations. This, in turn, can affect customer service and have wider financial, health and safety implications. We are committed to better understanding the risks posed by climate change to our infrastructure and people, and identifying action to strengthen the climate change resilience within our business.

We also strive to deliver products and services that help our customers adapt to the changing climate. By facilitating early warning systems, assisting with climate modelling and prediction, and supporting natural disaster response and recovery, we can help customers minimise and respond to the risk of extreme weather events.

Telstra accepts there is more work to do to build our knowledge of, and response to climate change. Through innovation and world class technology, we continue to look for new ways to help our customers become more productive, efficient and resilient.

ABOUT THE REPORT

About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of Information and Communications Technology (ICT) companies and organisations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability. Formed in 2001, GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' activities to improve their sustainability performance, and promotes innovative technologies for sustainable development. GeSI's membership includes over 30 of the world's leading ICT companies; the organization also collaborates with a range of international stakeholders committed to ICT sustainability objectives. These partnerships include the United Nations Environment Program (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the International Telecommunications Union (ITU), and the World Business Council for Sustainable Development (WBCSD). Such collaborations help shape GeSI's global vision on evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org

Project team

This Australian SMARTer2030 report was produced by the following team.

Pauline Gregg. General Manager, Environment, Telstra.

Pauline is responsible for Telstra's over-arching environmental strategy and is a senior sustainability practitioner with more than 20 years' experience in the private and public sectors. Pauline has been the architect and manager of leading-edge sustainability programs in a number of organisations bringing a focus on driving organisational and environmental benefits. Pauline is also a Board Member of the Environment Institute at the University of Adelaide.

Lee Stewart. Head of Sustainability, Oceania, Fujitsu Australia Limited.

Lee Stewart is the Head of Sustainability for Fujitsu Oceania where he is responsible for the execution of the Fujitsu regional sustainability strategy, targets and goals. He is a member the global sustainability leadership team and is the global lead for sustainability consulting across the Fujitsu Group. His role includes looking at where innovation and technology can help in reducing the environmental impact of Fujitsu, their customers and wider society. He has led the implementation of NABERS energy efficiency ratings for Data Centres, is the current Chair of the Australian Information Industry Association (AIIA) Environmental Group and an accomplished Climate Reality Speaker who was trained by Al Gore in 2011.

Nick Harford. Managing Director, Equilibrium.

Nick is from Melbourne-based sustainability consulting and management company Equilibrium that services a range of private companies and governments. Nick's work covers a range of environmental aspects, from technical energy, waste and greenhouse work to strategic communications and engagement. Prior to Equilibrium Nick was group general manager of environment at packaging and recycling company Visy and has a background in corporate affairs, government and the media.

Fujitsu and Telstra are committed to on-going dialogue and engagement to advance take-up of ICT solutions to reduce carbon emissions. If you wish to contact us to discuss this report and the sustainability opportunities that ICT offers, please email: sustainability@au.fujitsu.com and/or environment@team.telstra.com

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