Climate Bonds INITIATIVE

Green Infrastructure Investment Opportunities

AUSTRALIA & NEW ZEALAND

Sponsors

Green Infrastructure Investment Opportunities, Australia & New Zealand

Contents

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This report highlights green infrastructure investment opportunities in Australia and New Zealand. It has been prepared to help meet the growing demand for green investment opportunities – including green bonds - as well as to support the two countries' transition to a low-carbon economy. It aims to facilitate greater engagement on this topic between project owners and developers, and institutional investors.

Green finance instruments and trends are explored in the report, with sector-by-sector options presented. Green infrastructure investment opportunities are also explored sector-by-sector, with projects presented in reference case studies and a sample green pipeline of opportunities. The sample pipeline is not exhaustive – rather a snap shot of the different types of opportunities available in the short and medium-term future. A more comprehensive list of almost 400 green infrastructure investment opportunities is available on the Climate Bonds Initiative website.

The report is intended for a wide range of stakeholders in Australia and New Zealand, including domestic superannuation funds and asset managers and their global counterparts, potential issuers, infrastructure owners and developers, as well as relevant Government ministries (Finance, Planning, Energy, Transport, Environment). It is part of a research series which commenced with the *Green Infrastructure Investment Opportunities, Indonesia* report in May 2018 and will investigate green infrastructure investment opportunities around the world, initially focusing on the Asia-Pacific region.

In developing this report, the Climate Bonds Initiative consulted with key Government bodies, industry, the financial sector, peak bodies, NGOs and think tanks – in partnership with ANZ, Commonwealth Bank of Australia, Macquarie Group, NAB, Westpac, the Clean Energy Finance Corporation (CEFC), IFM Investors, the Investor Group on Climate Change, the Principles for Responsible Investment and RIAA. We would like to thank these partners along with the other organisations that contributed to the report: Australian Water Association, Green Building Council of Australia (GBCA), GRESB and New Zealand Green Building Council.

Climate Bonds Initiative

The Climate Bonds Initiative is an international investor-focused not-for-profit organisation working to mobilise the USD100tn bond market for climate change solutions.

It promotes investment in projects and assets needed for a rapid transition to a low-carbon and climate resilient economy. The mission focus is to help drive down the cost of capital for large-scale climate and infrastructure projects and to support governments seeking increased capital markets investment to meet climate goals.

The Climate Bonds Initiative carries out market analysis, policy research, market development; advises governments and regulators; and administers a global green bond standards and certification scheme.

Climate Bonds Initiative screens green finance instruments against its Climate Bonds Taxonomy to determine alignment and uses sector specific criteria for certification (see Annex 1).

Climate Bond Partners range from investors representing USD14tn of AUM and the world's leading investment banks to governments like Switzerland and France and include major Australian and New Zealand institutions such as ANZ, CBA, NAB, CEFC, GBCA, Investor Group on Climate Change and Westpac. The Climate Bonds Initiative is also the lead partner in the Green Infrastructure Investment Coalition.

Executive summary

Since the signing of the Paris Agreement there has been an increasing demand from institutional investors for investment opportunities that address environmental challenges and support sustainable development. Australia and New Zealand are both characterised by small populations, high GDP per capita and well-developed capital markets. Australia also benefits from access to a AUD2.6tn national savings pool.

Both nations face challenges in adapting to climate impacts and in meeting tightening international emissions targets. They also need to develop sustainable urbanisation models and to address congestion. There is a mounting urgency for government and industry to increase their emphasis on policies and provision of low-carbon, sustainable and climate resilient 'green' infrastructure. The brown to green transition from emissions intensive brown infrastructure to cleaner assets needs to attract broad-based support and considerable momentum in order to meet the Paris goals.

There is an infrastructure construction boom underway in Australia and New Zealand. Although both nations have traditionally relied heavily on high-emission, fossil fuel-powered transport – there is an increasing focus on (low carbon) public transport and freight rail. There is a boom in building small- to large-scale renewable energy capacity. Green building certifications have grown significantly, and 'resilient' buildings are becoming mainstream.

Almost half the projects included in Infrastructure Australia's Infrastructure Priority List 2018 meet international investor definitions of 'green', although they are not always labelled as such. Similarly, just over 40% of New Zealand projects in the *Australia and New Zealand Infrastructure Pipeline* (ANZIP) could be considered 'green'.

Green infrastructure development presents a range of attractive green investment opportunities. There is an increasing number of low-carbon transport, renewable energy, sustainable water infrastructure and green building projects in the pipeline.

"Our cities are the crucible of innovation, of enterprise – it's where so much of GDP is created and it's vital they have the right infrastructure."[4]

Former Australian Prime Minister **Malcolm Turnbull**

This report identifies nearly 400 projects and assets that could qualify for refinancing, additional financing, or new financing in the near - to long-term.

The Climate Bonds Taxonomy[1] was used to identify eligible green projects under four sectors. To narrow the scope and volume of projects the following filters were also applied:

Low carbon transport – mostly projects valued above AUD100m (Australia) and NZD100m (New Zealand)

Renewable energy - only renewable energy generation facilities above 50MW

Sustainable water management – mostly projects valued above AUD50m (Australia) and NZD50m (New Zealand)

Low-carbon buildings - Green Star certified projects - mostly 6-star rated projects

The report has been prepared to help meet the growing demand for 'green' and ESG investment opportunities – including green bonds - as well as to supportboth nations respective transitions to a low-carbon economy. It aims to identify green investment projects with investment potential and explore how investors can gain exposure to these using innovative green finance instruments.

Internationally, growing interest in green finance has resulted in the development and growth of dedicated green financial products including green bonds, green loans, social and sustainable bonds, green infrastructure investment trusts and green index products, which complement opportunities in public and private equity investments. Green bonds have become a popular debt instrument for exposure to green assets and projects.

A green bond market emerged in Australia in 2014 and more recently in New Zealand. Australia was the 2nd largest source of issuance within the Asia Pacific region for H1 2018 and 12th globally, outpacing green issuance from larger bond markets like Japan. Australia has emerged as a best practice model of early development with commitment from the major banks and asset managers, providing a sound base for expansion, despite the relatively minor supply of non-bank ASX 100 green issuance to date.

"Climate change is real. It's happening now. This is not about talking about what we do in the future, but the action that we have the potential to carry out as leaders in the business community and the international environment."[3]

New Zealand Prime Minister **Jacinda Ardern**

Most Australian and all New Zealand green bond issues to date have been Certified under the Climate Bonds Standard reflecting strong adherence to international best practice. The label of 'green' is, however, not widely applied to infrastructure. The 'green' standards that do exist are mostly voluntary and administered by non-government bodies.

There is an immediate and growing opportunity for institutional investors to become more active, to expand their participation in green infrastructure financing, building on the impressive foundation established so far. Investing in green infrastructure will ultimately help the governments to reach their climate targets, spur innovation, broaden the economic base, reduce urban congestion and promote more sustainable economic and social well-being.

The infrastructure pipeline found in this report is encouraging, but the scale of the challenge requires far greater ambition. The Asian Development Bank estimates the climate-adjusted infrastructure investment needs for Pacific region countries at 9.1% of their GDP between 2016 and 2030.[2] With Australia's and New Zealand's GDP totalling USD1.5tn, this translates to approximately USD1.5tn by 2030. There is no time to rest on laurels - the scale and timeframe is such that far more needs to happen and quickly.

Both nations have the potential and economic conditions to develop a well-planned sequential pipeline of green investment opportunities. Australia in particular is also uniquely placed with superannuation funds and managers having a global presence in infrastructure, debt financing and alternative assets. A robust green market would see Australia poised to become a significant source of capital flows and expertise into the region as ASEAN nations shift towards green finance to help meet their intertwined national-development, energy, emissions and climate goals.

Green infrastructure: an opportunity for growth

International context

Globally, the green economy is growing. Since the signing of the 2015 Paris Agreement there has been an increasing and publicly expressed awareness among institutional investors, particularly from OECD nations and China, of the long-term risks climate change poses to their ability to match assets with liabilities. This has led to growing demand for investment opportunities that address environmental challenges and support sustainable development, resulting in the development and growth of dedicated green financial products, including green bonds.

The global green bond market has seen exponential growth, exceeding USD161bn of issuance in 2017 up 85% from the year before. Milestones[5] have been set for annual issuance of USD1tn in green bonds and loans by 2020[6] and an Asian market of climate related infrastructure in the trillions during the following decade, according to the Asian Development Bank[7].

In Australia, despite a slow response by government, the financial sector is moving ahead[8]. Australia's major banks have led the way[9] by adopting and promoting best practice[10] in green bond issuance and supporting smaller issuers. The world's fourth-largest pool of retirement funds and other institutional investors have demonstrated an appetite for alternative assets and global presence in infrastructure[11]. This creates a solid foundation to significantly increase investments in green infrastructure and build a robust and supportive environment for green finance.

The same can be said for New Zealand. Green finance concepts[12] are taking hold and green debt[13] and bond issuance[14] is appearing[15].

Australia and New Zealand have the potential to be global leaders in green infrastructure delivery as both governments have the capacity and economic conditions to developing a well-planned sequential pipeline of green investment opportunities. The respective finance sectors are well positioned to develop and subsequently export green finance expertise.

Australia and New Zealand

Australia and New Zealand both face challenges in adapting to climate impacts and in meeting stricter international emissions targets. They also have challenges in building sustainable urbanisation models and addressing congestion. Both Australia and New Zealand have high urban based populations of about 90%[16].

A greater role by the financial sector and in particular private sector investment is considered crucial to the successful implementation of policy responses related to reducing carbon intensity, improving capital allocation, bridging investment gaps, accelerating infrastructure provision and embedding climate resilience.

Both countries have ambitious infrastructure and energy development plans. The emphasis is on improved connectivity, more reliable service delivery, and enhanced productivity growth. The Australian 2017-18 Federal Budget features an infrastructure spending program of AUD75bn from 2017-18 to 2026-27, including funding for critical airport, road, and rail infrastructure projects. Similarly, the Government of New Zealand will focus on road, rail and water infrastructure as well as regional development. It has allocated almost NZD1.5bn to these in the 2018 budget[17].

Although both nations have traditionally relied heavily on road and water transport – using high-emission, fossil fuel-powered vehicles and vessels – there is an increasing focus on public transport and freight rail. There is a boom in building small- to large-scale renewable energy capacity. Green building certifications have significantly increased, and resilient buildings are becoming mainstream. The number of green infrastructure projects has risen in both countries.

Almost half of the projects included in Infrastructure Australia's Infrastructure Priority List 2018[18] meet international investor definitions of 'green', although they are not always labelled as 'green'. Similarly, just over 40% of New Zealand projects in the *Australia and New Zealand Infrastructure Pipeline*[19] could be considered 'green'. However, the budget allocated to these seemingly 'green' projects, in each country, is much less than that for all other projects.

With an increasing urgency to respond to the challenges of climate change, governments, the financial sector and industry all need to increase their emphasis on policies and provision of low-carbon, sustainable and resilient green infrastructure. The transition from, polluting brown infrastructure to cleaner and greener assets needs to gain momentum with widespread support.

Traditional high-carbon infrastructure investments still dominate in Australia, with road, rail and ports being built to facilitate fossil-fuel industries. Australia's CO_2 emissions output on a per capita basis is one of the highest in the world[20].

Having ratified the 2015 Paris Agreement, Australia and New Zealand have committed to making finance flows consistent with a pathway towards low-carbon and climate resilient development. The Australian government has, however, been criticised[21] for not making stronger emissions reductions commitments. After the recent national elections, New Zealand has been pursuing more ambitious climate policies. It has pledged to reach carbon neutrality by 2050 and establish the mechanisms to phase out fossil fuels.

Despite their different public approaches, both governments have made infrastructure and sustainability commitments. They will require significant investment, both public and private, underpinned by innovative finance models. Green finance can play a significantly larger role in the future.

The last two decades have been about making assets work harder. The future will be about making 'green' upgrades to existing assets and harnessing the capital required for the delivery of new smart resilient infrastructure. Infrastructure needs to be fit for purpose over long operating cycles in a carbon-constrained, climate-impacted landscape.

Nationally Determined Contribution under the Paris Agreement in terms of reduction commitments for annual national greenhouse gas emissions:

Australia: 26–28% below 2005 levels by 2030 **New Zealand:** 30% below 2005 levels by 2030

Under the Paris Agreement, contributions must be updated regularly. The next update to Nationally Determined Contributions can be provided in 2020.

Macroeconomic outlook

Australia

Australia's real GDP growth is projected to continue at around 3% in 2018 and 2019[22]. Australia has experienced uninterrupted economic growth for 26 consecutive years. Continued growth will be aided by an improving global outlook, strong public infrastructure investment, and improved investor sentiment. Increased investment in housing is also anticipated to provide near-term support to the economy, helping with housing supply and pricing[23]. Publicly-funded infrastructure development and private sector spending on non-residential buildings will also be key drivers of investment activity and employment over the coming years[24].

The economy has adjusted to the recent decline in mining-related investment thanks to an accommodative monetary policy, a flexible labour market, stable rate of inflation, and a lower exchange. Furthermore, non-mining business investment has picked up and is projected to continue with increasing infrastructure development.

Public debt is expected to fall as a proportion of GDP, which should support a positive economic outlook. Government's goal is to reduce the annual deficit by around half of a percentage point of GDP per year over the four-year budget horizon[25].

New Zealand

New Zealand's real GDP growth is projected to continue at 3% in 2018 and 2019[26]. Growth will be aided by anticipated increases in interest rates, strong tax revenue and government spending, particularly on infrastructure. With government debt expected to decline as a share of GDP, additional spending should not affect fiscal sustainability.

Forecasts show surpluses in the operating balance before gains and losses, reaching NZD7.3bn in 2021-22 or 2.1% of GDP, which means that national net debt falls as a percentage of GDP to 19.1% in 2021-22. This would satisfy the government's net debt target of 20% by 2022[27]. It would also address some of the concerns raised by Fitch Ratings: while they affirmed New Zealand's rating, the credit rating agency cited high external debt burden and persistent current-account deficits as an issue[28].

All three ratings agencies found that New Zealand's ratings were supported by strong governance standards and prudent fiscal management. An example is the goal to keep future annual CPI inflation between 1-3% over the medium term and to avoid unnecessary volatility in output, employment, the exchange rate, and interest rates[29].

Australia Country Facts

Population: 25 million (2018)
Population growth rate: 1.35% (2017)
Urban population: 90%[30]
Rate of urbanisation: 1.37% annual rate of change (2015-20 est.)[31]

GDP: USD1,323bn (2017) – 13th largest economy in the world
Interest rate (cash rate): 1.5% (at end of 2017)
Inflation rate: 2.1% (Q2 2018)
Government 10Y, M: 2.65% (at July 1st, 2018)
Balance of trade: AUD1873m (June 2018)
Government debt to GDP: 41.9 % (2017)[32]

Moody's rating: Aaa (stable)
S&P rating: AAA (negative)
Fitch rating: AAA (stable)

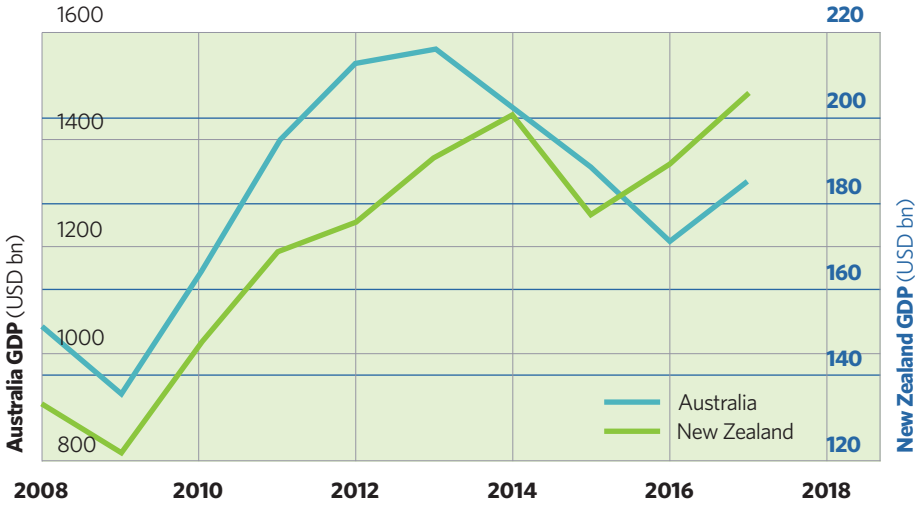
New Zealand Country Facts

Population: 4.8 million (as of July 2018)
Population growth rate: 0.97% (2017)
Urban population: 86%[33]
Rate of urbanisation: 0.98% annual rate of change (2015-20 est.)[34]

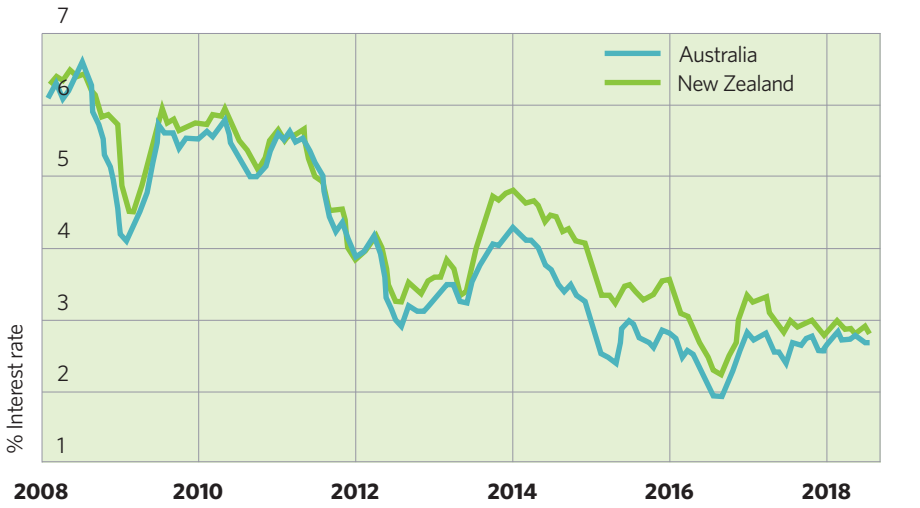
GDP: USD206bn (2017)
Interest rate (cash rate): 1.75% (at end of 2017)
Inflation rate: 1.5% (Q2 2018)
Government 10Y, M: 2.76% (at July 1st, 2018)
Balance of trade: -NZD113m (June 2018)
Government debt to GDP: 22.2 % (2017)[35]

Moody's rating: AA (stable)
S&P rating: AA (negative)
Fitch rating: Aaa (stable)

GDP for Australia and New Zealand (2008–2018)[36]



Australia and New Zealand Government Bond 10Y (2008-2018)[37]



Infrastructure financing

Globally, there is a high demonstrable need for infrastructure investments. Large tax cuts since the 1980s have led to considerable public-sector underinvestment in infrastructure. This has resulted in a significant gap between public sources of infrastructure finance available and the levels of infrastructure investment required by global economies to achieve their sustainable long-term economic growth potential[37].

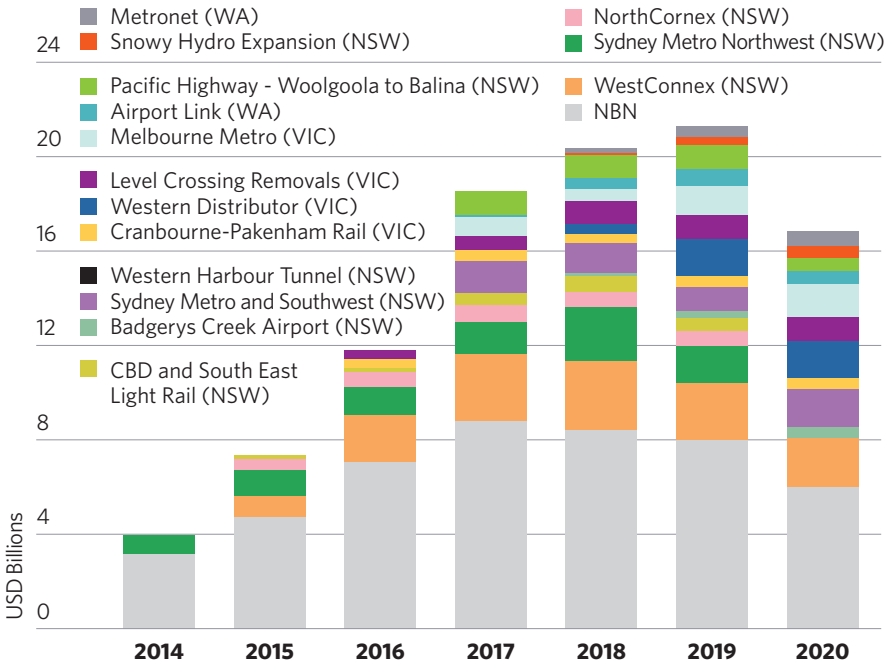
Currently about 1.5% (USD2tn) of annual global domestic product (GDP) is invested in infrastructure projects. However, an additional 1.0% (USD1.5tn) of global GDP needs to be invested annually to adequately meet infrastructure needs in transport, energy, building, land protection and water through 2030[38]. Unlike other asset classes, infrastructure investments present a unique risk-return profile. They tend to be less impacted by the business cycle and can provide a hedge to changes in interest rate. Infrastructure financing can provide long-duration exposures of over 20 years.

Financing infrastructure in Australia and New Zealand

The Australian and New Zealand governments have used multiple funding mechanisms to finance infrastructure development. These include asset sales, debt, project financing, Public-Private Partnerships (PPP), federal grants, value capture and concessional loans.

The green bond market has seen exponential growth. It surpassed USD161bn of issuance in 2017, up from USD87bn in 2016 and USD42bn in 2015. The expanding issuer base has been accompanied by ever greater diversification in issuer type, geography and projects. Bond investments meet the needs of institutional investors as they offer relatively stable and predictable returns. Long-dated bonds are best aligned with institutional investors' liabilities.

Major publicly-funded works spending trends, Australia, 2014-2020[59]



Australia

While publicly-funded infrastructure spending continues to increase in Australia, the government is seeking to attract further private investment in public sector infrastructure projects. The public sector alone cannot meet the increased demand for infrastructure over the next decade and fill the gaps in Australia's infrastructure capability. There is also the potential to increase competition and thus drive better value-for-money outcomes for government[39].

With guidance from the government's Infrastructure and Project Financing Agency (IPFA), an active investor approach to future infrastructure projects is planned. This will deliver a return on taxpayer investments and taps alternate funding[40]. It is anticipated that after 2019 public investment would decrease, and other types of financing will facilitate ongoing infrastructure development[41].

There are opportunities for domestic and international investors to finance, construct, own and refinance Australia's transport, utilities and social infrastructure. The Department of Infrastructure, Regional Development and Cities and the Australian Trade Commission (Austrade) is working to specifically attract foreign direct investment in Australian infrastructure, by functioning as a focal point for FDI inquiries and an information portal for market intelligence and investment opportunities[42].

Use of Public Private Partnerships

Australia has adopted long-term PPP infrastructure for the licensing of social ventures, which transfer risk to the private sector. However, there continues to be limited long-term debt-financing available since the global financial crisis. In New Zealand, the government continues to actively support a small, but innovative and growing PPP infrastructure market[60].

Examples PPPs – Australia

Project	Terms	Procuring government	Industry	Value (AUDm)	Consortium members included
Sydney Metro Northwest	20 years: operations, trains and systems	NSW	Transport	3,700	Northwest Rapid Transit consortium: MTR Corporation (Australia), John Holland, Leighton Contractors, UGL Rail Services, Plenary Group
Gold Coast Light Rail (Stage 1 and Stage 2)	15 years: design, build, finance, operate and maintain	QLD	Transport	Stage 1: 1,296 Stage 2: 420	GoldLinQ consortium: McDonnell Dowell Constructors, Bombardier Transportation, KDR Gold Coast Pty Ltd (Keolis and Downer EDI), Plenary Group

"Infrastructure is a key driver for growth, employment, and better quality of life in emerging markets and developing economies (EMDEs). But this comes at a cost. Approximately 70% of global greenhouse gas emissions come from infrastructure construction and operations such as power plants, buildings, and transport. The Overseas Development Institute estimates that over 720 million people could be pushed back into extreme poverty by 2050 as a result of climate impacts, while the World Health Organization projects that the number of deaths attributable to the harmful effects of emissions from key infrastructure industries will rise from the current 150,000 per year to 250,000 by 2030. [...] Crucially, in EMDEs with disproportionate exposure to climate change impacts, low-carbon infrastructure can help prevent a climate-related reversal of development gains."[61]

Deblina Saha, co-author of *Private Participation in Low-Carbon Infrastructure Investment*,[62] **The World Bank**

Infrastructure Partnerships Australia's *2017 Australian Infrastructure Investment Report* showed a strong appetite for infrastructure opportunities, from both local and international investors. An investor survey[43] showed that 70% of participating investors would be highly likely to invest in Australian infrastructure. The survey indicated that investors were attracted by the increased visibility of transactions and projects, specifically citing the *Australia & New Zealand Infrastructure Pipeline* (ANZIP) as a useful tool.

ANZIP is a joint initiative between the Australian and New Zealand governments and independent think tank Infrastructure Partnerships Australia. It provides a detailed list of likely and confirmed infrastructure investment or major development opportunities and is aimed at investors and contractors[44].

There are many infrastructure assets which are currently held by local and international funds. These range from regulated assets such as water and sewerage utilities to distribution pipelines and transmission wires. They include user-fee assets like toll roads, airports, ports and railways, as well as commercial operations like communications, power generation and energy providers[45].

The government has a number of funds for infrastructure. For example, the Urban Congestion Fund (AUD1bn) established by the Australian Federal Government to address urban congestion in cities by investing in projects that remove bottlenecks, improve traffic safety and increase network efficiency for both commuter and freight mobility[46].

Australia's superannuation funds are also active in infrastructure investment. For example, IFM Investors was established 28 years ago to manage infrastructure investments on behalf of Australian industry superannuation funds. It is owned by 27 major not-for-profit Australian pension funds and manages the retirement savings of over 11 million Australians[47]. IFM Investors currently manage AUD48bn in infrastructure in developed markets, with interests in 30 investments across Australia, North America and Europe[48].

As the interest of Australian superannuation funds in infrastructure is growing, so too are innovations for investment. In order to close the infrastructure gap, innovative finance products are required along with enhanced planning and regulatory development.

New Zealand

New Zealand has experienced an underinvestment in infrastructure and there is a great demand for brownfield and greenfield infrastructure development. The central and local governments in New Zealand own over NZD200bn of infrastructure assets and the forecast is that infrastructure spend will be over NZD110bn by 2025[49].

The government understands that traditional infrastructure funding and PPPs are no longer adequate and is seeking innovative means of funding infrastructure. The New Zealand Trade and Enterprise agency is working on behalf of the government to connect investors with opportunities, including infrastructure investment.

The government has previously set up funds that promote infrastructure development, such as the Future Investment Fund established in 2012. It has provided almost NZD5bn of new capital spending including NZD1bn for transport[50].

In 2018, the government will launch two further funds. The Provincial Growth Fund will have NZD3bn to invest over three years in regional economic development, including regional infrastructure[51].

The Green Investment Fund will focus more on promoting sustainable development, specifically aimed at supporting the new government-wide mission to transition towards a net-zero-emissions economy by 2050. This fund takes the new approach of co-investing alongside private capital. It aims to stimulate the inflow of additional private capital once it demonstrates the commercial benefits of investing in green projects[52]. This model recognises that there is both the need and demand for more low-carbon green infrastructure and less of the traditional, high-carbon infrastructure.

The need for green infrastructure is growing

About 70% of global greenhouse gas emissions come from infrastructure construction and operations such as power plants, buildings, and transport[53]. To overcome this global challenge and meet the goals of the Paris Agreement, the OECD believes about USD100tn in climate compatible infrastructure investment will be needed between 2016 and 2030[54].

In Australia, infrastructure-related emissions account for more than half of the country's total greenhouse gas emissions: 35% from the electricity sector and 18% from the transport sector[55]. In New Zealand, energy and transport contribute just over 30% of total greenhouse gas emissions[56]. To reduce these emissions, climate compatible, green infrastructure is required, including low-carbon and less polluting assets which are also climate resilient.

The *Australian Infrastructure Plan (2016)* emphasises that sustainability and resilience should not be seen as fringe concepts, but as good economic practice, and that sustainable and resilient infrastructure can support growth and a higher standard of living[57]. With the onset of climate change, the capacity of infrastructure to operate through minor disruptions, and recover quickly from major disruptions, will be critical to supporting people and businesses over the coming decades[58].

There is an immediate and growing opportunity for investors to participate in green infrastructure financing in Australia and New Zealand. At the same time, investing in green infrastructure will ultimately help the Australian and New Zealand governments to reach their climate targets, spur innovation, broaden the economic base, and promote more sustainable economic and social well-being.

"There is increasing focus in the infrastructure investment community on the opportunities that green investment brings. Across renewable energy, sustainable transport, green buildings and sustainable communities; financial investors, corporates and governments are all looking for ways to facilitate and participate in the transition to a low-carbon economy."

John Pickhaver, Co-Head of Macquarie Capital, Australia and New Zealand, Macquarie Group

Green finance

Demand for sustainable investments is increasing

Since the signing of the Paris Agreement demand has increased from institutional investors, particularly from OECD nations and China, for investment opportunities that address environmental challenges and support sustainable development. This has resulted in the development and growth of dedicated green financial products including green bonds, green loans, social and sustainable bonds, green infrastructure investment trusts and green index products (see Annex 1 and 2 for descriptions of debt and equity instruments).

Green bonds[63] are currently the most developed segment of thematic instruments, carrying a great recognition from the investor base. The 'green' label is a discovery mechanism that enables bond issuers, governments, investors and the financial markets to prioritise investments, which genuinely contribute to addressing climate change.

The demand for 'green' instruments continues to rise. For example, the green bond market has seen exponential growth - exceeding USD161bn of issuance in 2017, up from USD87bn in 2016. This demand for green instruments comes from:

- **Mainstream asset managers** (e.g. Aviva, BlackRock, State Street);
- **Specialist ESG and green bond fund managers** (e.g. Amundi, Natixis/Mirova);
- **Sovereign and municipal governments** (e.g. Chinese SOEs through their Belt and Road Initiative);
- **Supranationals**, i.e. multi-lateral banks (e.g. World Bank, ADB, Asian Infrastructure Investment Bank); and
- **Retail investors** (e.g. World Bank green bonds and US municipality bonds).

With investors increasingly looking for ways to address ESG and climate change in their investment processes, green bonds, along with other green financing tools, present a useful opportunity to meet environmental objectives and deliver on their fixed income mandates.

Green finance instruments in Australia and New Zealand

This increasing demand and innovation of the market has seen the creation of new, 'green' investment products designed to appeal to investors with different risk appetites. There are growing opportunities to mobilise private capital to support green infrastructure by investing in debt, funds, equity-linked products and listed companies.

Key global sustainable finance initiatives also illustrate the growing popularity of green finance and investment in sustainable development:

- **The Principles for Responsible Investment:** 2000 signatories from 67 countries, representing over 50%, or over USD80tn of global assets under management (AUM).
- **The Principles for Sustainable Insurance:** adopted by insurers representing over 20% of the global insurance market by premium volume and USD14tn in AUM.
- **The Principles for Responsible Banking:** 26 leading banks from 5 continents representing USD16tn in AUM[65].
- **The Equator Principles:** commitment from 94 financial institutions in 37 countries, covering the majority of international project finance in developed and emerging markets.
- **The Climate Bonds Initiative** partners represent USD13tn AUM and USD70trn AUM represented on its Standards Board.
- **The One Planet Sovereign Wealth Fund Working Group:** comprising six major sovereign wealth funds, including the New Zealand Superannuation Fund, who collectively manage over USD3tn in assets[66].
- **Climate Action 100+ initiative:** 289 investors with nearly USD30tn AUM have signed on, including Australian funds with more than AUD1tn under management[67 68].
- **The UN Environment Finance Initiative (UNEP FI):** 92% of the world's 25 largest banks are members - 120 leading banks across the world.
- **The Investor Group on Climate Change:** represents Australian and New Zealand institutional investors with total funds under management of over AUD2tn[69].

Innovative financial instruments have been developed in order to mobilise capital markets to fund green infrastructure projects. Green debt instruments include green bonds, securitisation and other structured finance, commercial paper, bank credit facilities, retail bonds, secured and unsecured notes. Institutional investors have invested in equity funds, REITs, syndicated loans, and co-investment vehicles. For investors with limited ability to manage their own green projects, a variety of corporate bonds, securitisation and syndicated loans are available.

"Our goal is to make a positive and lasting impact on the lives of our customers, people, shareholders, communities, and our environment – and our customers are telling us they want to participate in the transition to a low carbon economy. We're continually developing and offering innovative green finance tools that enable investors to back major renewable energy projects alongside NAB, and we find new ways to support companies that deliver green infrastructure projects around the world."

Mike Baird, NAB Chief Customer Officer, Corporate and Institutional Banking, NAB

In Australia and New Zealand, green bonds continue to be the primary means of gaining exposure to green finance. Financial institutions are increasingly entering the market to refinance pools of existing eligible assets. Green bond issuers – particularly large banks and State Governments – can also use green bonds as a signalling mechanism around 'green' policy.

Innovative structures have emerged in the local green bond market to provide a diversity of investment options. For example, National Australia Bank recently placed AUD200m of 10-year Low Carbon Portfolio Notes, which are backed by a portfolio of loans to Australian renewable energy developers. The structure mimics a loan portfolio syndication and provides investors with unique risk exposure to the Australian energy market. Westpac has also taken an innovative approach, by issuing an AUD117.3m climate bond in 2018 to Japanese retail investors, in the Uridashi bond market, to support the bank's funding for climate change solutions.

Macquarie Group green loan

In 2018, Macquarie Group issued a four-tranche GBP2bn loan facility that includes GBP500m green tranches: a 3-year revolving facility and a 5-year term tranche. The green tranches will be used to support renewable energy projects initially and energy efficiency, waste management, green buildings and clean transport projects in the future. The green loan facility is one of the first such facilities issued under the Green Loan Principles of the Asia Pacific Loan Market Association (APLMA), which seek to establish a set of best practice guidelines for green lending. The Macquarie Group Green Loan received considerable interest from Asian market investors.

NAB RMBS

In 2018, the NAB, through National RMBS Trust 2018-1, issued a AUD2bn RMBS in a multi-tranche issue that included a AUD300m green tranche, earmarked against AUD525m of prime residential mortgages. The underlying residential properties were assessed against the Residential Building Criteria of the Climate Bonds Standard. The tranche was priced at 0.85% over the one-month BBSW and was close to two times oversubscribed. Inclusion of the green tranche increased demand and investor diversity, attracting socially responsible funds as well as mainstream investors from Australia[70].

Clean Energy Finance Corporation (CEFC)

The CEFC, established by the Australian Government, is an independent entity investing in renewable energy, energy efficiency and low emissions technologies. It has access to AUD10bn in capital. At 30 June 2018, the CEFC's portfolio stood at AUD5.3bn.

The CEFC is required to target an average return of the five-year Australian Government bond rate +3 to +4 per cent per annum over the medium to long term (or +1 per cent per annum for investments made via the AUD200m Clean Energy Innovation Fund). The CEFC works to catalyse or 'crowd in' additional private sector investment in clean energy projects. Portfolio leverage at 30 June 2018 exceeded AUD1.80 from the private sector for each dollar committed by the CEFC.

The CEFC directly finances large-scale projects, particularly in renewable energy, and delivers finance for smaller-scale projects through aggregation programs with established co-financiers. The CEFC is also a substantial investor in Australia's emerging climate bonds market, and has invested in several large-scale equity funds targeting clean energy gains across infrastructure, property and agriculture. Through its Sustainable Cities Investment Program, the CEFC further encourages investment in renewable energy, energy efficiency and low emissions technologies across the built environment.

"Westpac recognises that climate change is an economic issue as well as an environmental issue, and banks have an important role to play in assisting the Australian and New Zealand economies, transition to net zero emissions. Increasing green bonds, green loans and green underwriting is a vital part of the mix, as is supporting new issuers to come to market."

Lyn Cobley, Chief Executive, Westpac Institutional Bank.

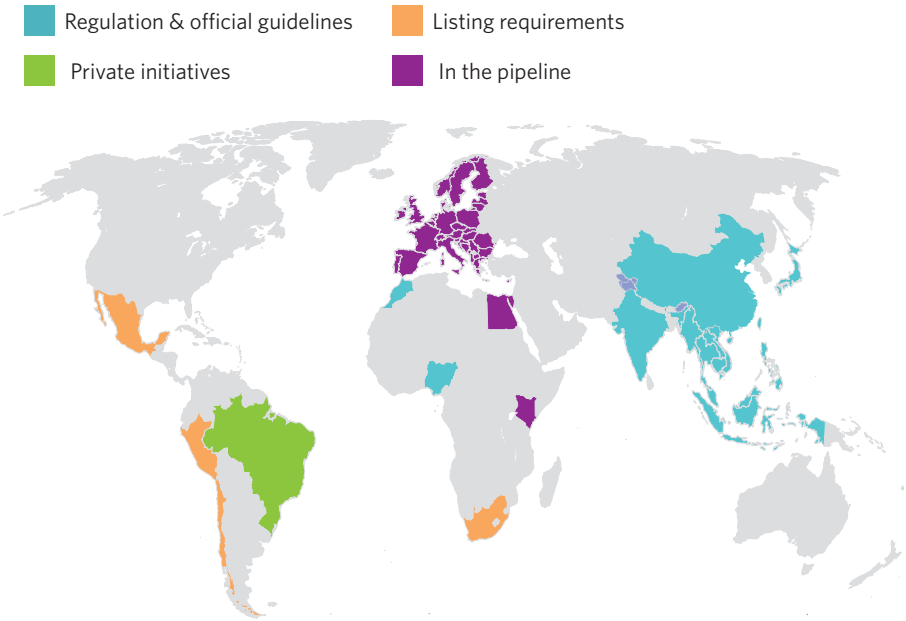
FlexiGroup, an Australian retail lender, issued its first loan receivables ABS with a green tranche in 2016. In 2018 it introduced a subordinated green tranche, in addition to the usual senior green tranche seen in previous deals.

Non-financial institutions are also innovating. For example, in 2017 Contact Energy, the New Zealand energy provider, had the majority of its outstanding debt instruments certified as 'green' when it created its Green Borrowing Programme. The unique feature is that the programme includes wholesale and retail bonds, private placements, credit facilities, an export credit line and CP programme. Contact Energy obtained programmatic certification under the Climate Bonds Standard. The certified debt facilities are backed by a pool of geothermal energy assets[64].

"As a core investor in Australia's green bond market, we are seeing growing interest from superannuation funds and managers who want to deepen their exposure to sustainable assets. This is essential if we are to achieve our national emissions reduction goals in the infrastructure sector and beyond. We are confident an increasing focus from underlying investors, along with improved sophistication and understanding of fund managers, and increased diversity of supply, can attract more investor support for this critical investment class."

Ian Learmonth, CEO, CEFC

National and regional green bond guidance is being adopted across the world to support market growth



International best practices and domestic guidelines for green instruments

The global green bond market is witnessing exponential growth, benefitting both issuers and investors. With the growth of the market, best practices have been developed at the international level to guide issuers, maintain investor confidence and avoid the risk of 'greenwashing'. At the international level, two main voluntary processes for green issuance have emerged:

- the Green Bond Principles (GBPs), coordinated by the International Climate Markets Association (ICMA), and the Green Loan Principles (GLPs), developed by the Loan Market Association (LMA), provide process guidance around transparency on the use of proceeds, project selection process, management of proceeds and reporting[72 73].
- the Climate Bonds Standard & Certification Scheme, managed by the Climate Bonds Initiative and developed by a network of technical experts, with input from industry players and investors, builds on the GBPs and adds green asset criteria which are aligned with achieving the goals of the Paris Agreement.

At a regional level, the Association of Southeast Asian Nations (ASEAN) Capital Markets Forum has provided green bond guidelines for adoption throughout the region while financial services regulators in China and India have their own green bond regulations. All are broadly consistent with international standards.

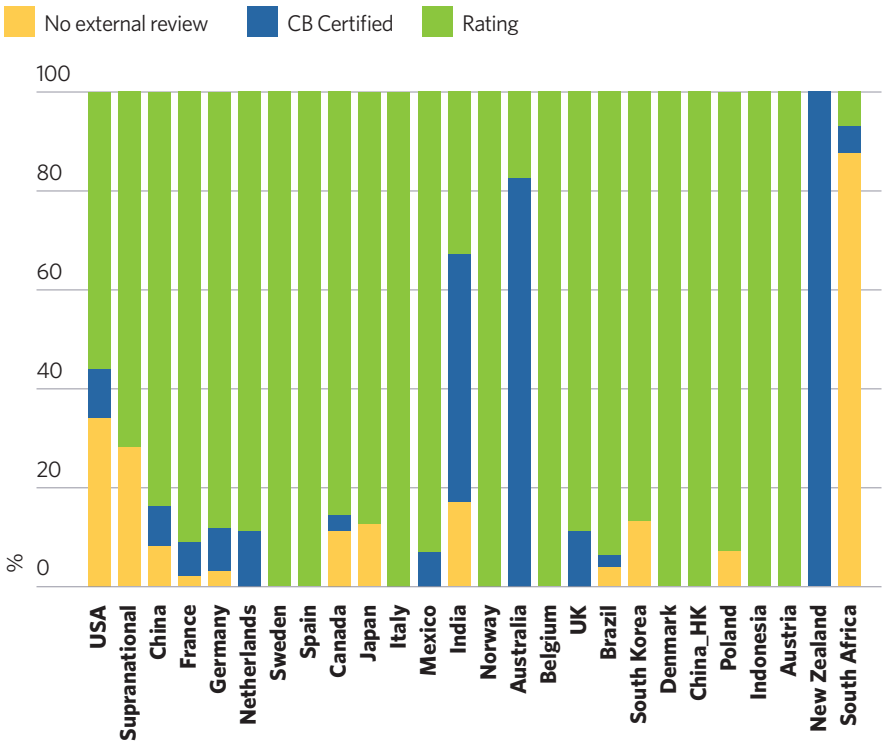
Governments, regulators and stock exchanges have started developing guidelines and regulations. These generally include guidance for issuance and disclosure in line with the GBPs and are mostly aligned with the Climate Bonds Taxonomy and Standard (see Annex 1).

Green bond issuance in Australia and New Zealand

Australian issuance features a diverse range of bonds, with multiple deals from the four biggest Australian banks, two state governments (so far), a commercial property fund, a leading university and several green ABS bonds. Most Australian and New Zealand green bond issues have been certified under the Climate Bonds Standard, starting with NAB in 2014 and followed by ANZ in 2015. This reflects strong leadership on best practice on the global stage.

Despite the lack of green bond policy by either the New Zealand Government or Australian Federal Government, a growing

Global certification



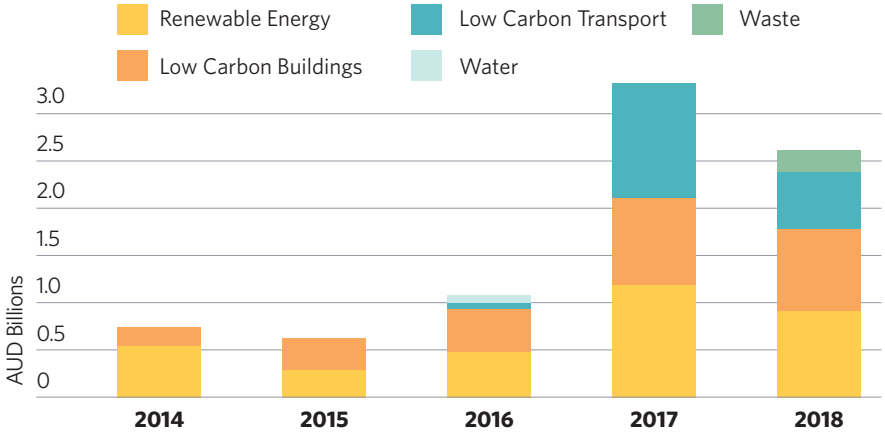
Australia and New Zealand are important green bond issuers

Cumulative issuance up to end H1 2018

commitment to ESG principles and sustainable investing as well as increased awareness of climate impacts has become one of the drivers behind the current demand for quality green debt issuance. The latest Responsible Investment Association of Australasia (RIAA) report notes that funds raised through green bonds are financing renewable energy assets, energy efficiency initiatives and low-carbon public transport.

The following are examples of different types of issuers, instruments and sectors of green bonds that have been issued in Australia and New Zealand. For more information, please see our report *Australia & New Zealand Green financing country briefing* (August 2018).

Australian use of proceeds



Australia

Instrument: Use of proceeds bond
Issuer: Westpac
Issuer type: Commercial bank
Amount: AUD500m
Date issued: May 2016
Maturity: 5 years
External review: CBI certified, verified by EY Asia Pacific
Use of proceeds: Wind, Low Carbon Buildings (Commercial)

Australia

Instrument: Green senior and subordinated tranches in a receivables ABS
Issuer: Flexi ABS Trust 2018-1
Issuer type: Non-bank lender
Amount: AUD81.3m (total for green tranches)
Date issued: May 2018
Maturity: Multiple
External review: CBI certified, verified by DNV GL
Use of proceeds: Rooftop Solar PV and Solar Hot Water Loans

Australia

Instrument: Use of proceeds bond
Issuer: Queensland Treasury Corporation
Issuer type: Government
Amount: AUD750m
Date issued: March 2017
Maturity: 7 years
External review: CBI certified, verified by DNV GL
Use of proceeds: Solar, Low Carbon Transport

Australia

Instrument: Use of proceeds bond
Issuer: Investa Commercial Property Fund
Issuer type: Property asset manager
Amount: AUD100m
Date issued: April 2017
Maturity: 10 years
External review: CBI certified, verified by EY Asia Pacific
Use of proceeds: Low Carbon Buildings (Commercial)

New Zealand

Instrument: Use of proceeds bond
Issuer: Auckland Council
Issuer type: Municipality
Amount: NZD200m
Date issued: June 2018
Maturity: 5 years
External review: CBI Certified, pre-issuance report by EY
Use of proceeds: To refinance existing debt used to buy electric trains and equipment as well as to help finance the purchase of more.

New Zealand

Instrument: Green borrowing programme
Issuer: Contact Energy Limited
Issuer type: Non-financial corporate
Amount: NZD1.88bn
Date certified: August 2017
Maturity: Multiple tenors
External review: CBI Certified, verified by EY Asia Pacific
Use of proceeds: The programme finances only geothermal assets. Eligible projects must have an emission intensity lower than 100gCO^2e/kWh to be in line with Climate Bonds Geothermal Criteria.

The future role of superannuation in Australia's infrastructure

Both the Australian and New Zealand governments are developing policy interventions to further support their green finance sectors including green investment banks, carbon markets, green certification mechanisms and renewable energy incentives[71].

Australia's employment-based compulsory superannuation contribution system has been an underlying driver of national savings. Coupled with strong banks that are prepared to be early movers and adhere to best practice in green bond issuance, Australia now has the foundations for green finance to expand into infrastructure projects. This patient retirement capital is willing and able to make large-scale investments and can be deployed to improve deal flow and scale up corporate green bond issuance.

The large industry superannuation funds have led on infrastructure and clean energy investment since the mid 1990s. This is partly a result of investment beliefs, a bias towards alternative investments and the ability to make direct equity-based investments. Over time, equity investments have increased through a mix of wholly owned specialist managers, JVs and other co-ownership models.

Achieving the Sustainable Development Goals

In September 2015, 193 nations came together to support the United Nations' Sustainable Development Goals (SDGs) - a collection of 17 global goals with 169 targets addressing social and economic development. Climate Bonds has identified six SDGs where increased green investment and green bonds provide direct benefits: SDG 6, 7, 9, 11, 13 and 15.[74]

For example, SDG 9 aims to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation[75]. Realising SDG 9 by 2030 will require significant resources, in both the developing and developed world context. It is estimated that the funding gap for achieving all 17 of the United Nations' SDGs is in the range of USD2tn to 3tn per year. The growth of the green bond market provides an excellent foundation to raise capital for bridging this gap[76].

In Australia, ANZ raised an EUR750m SDG Bond in the European market to fund loans related to 9 SDGs.[77] NAB's novel SDG Green Bond combines SDG goals and Climate Bonds certification criteria as eligibility requirements.[78] Green bonds and SDG bonds are not separate streams. They aim to finance many of the same assets, and deliver economically, socially and environmentally resilient societies.

"The Australian and New Zealand green bond markets are representative of global best practice. The markets are underpinned by a diversity of issuance and innovation in use of proceeds, a strong commitment towards transparency, with high levels of international certification. ANZ is working with investors to build confidence in market fundamentals and directions. The scale of green infrastructure investments expected to be made in Australia, coupled with strong investor demand, make the prospects for growth in green bonds bright."

Christina Tonkin, Managing Director, Loans & Specialised Finance, ANZ

Specialist funds

Key specialist funds in the infrastructure financing space include Australia's Clean Energy Innovation Fund and IFM's Australian Infrastructure Fund. In New Zealand, the Green Investment Fund will provide a boost to green infrastructure funding when it becomes operational at the end of 2018.

Clean Energy Innovation Fund

The CEFC operates the Clean Energy Innovation Fund, the largest dedicated Australian investor of its kind. It was created in 2016 as a specialist financier to invest AUD200m in early-stage clean energy companies. The Innovation Fund targets technologies and businesses that have passed beyond the research and development stage and which can benefit from early stage seed or growth capital to help them progress to the next stage of their development. It draws on CEFC finance to primarily provide equity finance to innovative clean energy projects and businesses which invest in renewable energy, energy efficiency and low emissions technologies. Innovation Fund investments are recognised as potentially carrying a higher risk profile, given the start-up nature of the investee companies and technologies.

IFM Australian Infrastructure Fund

Australia's largest infrastructure fund, the AUD12bn IFM Australian Infrastructure Fund is collaborating with CEFC to reduce carbon emissions. The CEFC is investing AUD150m into the fund, which will be used to target emissions reduction and energy efficiency initiatives across some of the nation's largest infrastructure assets, including ports, airports and electricity infrastructure[79]. This initiative supports IFM investors' commitment to work with asset management teams to deliver sustainable ESG outcomes that benefit both the communities they serve, the environment and superannuation member returns.

Green Investment Fund

As part of a wider suite being spearheaded by the new government, the Green Investment Fund will be established to make investments in New Zealand that reduce greenhouse gas emissions and provide a financial return. The fund will receive a NZD100m capital injection from the government and will operate independently, supporting the nation's transition towards a net-zero-emissions economy by 2050. It will work with businesses, infrastructure owners and investors to bring forward emissions reduction projects and draw in private investment for these projects. The fund will co-invest alongside private capital. It is anticipated that once it demonstrates investment and commercial success then other private investment will follow.

Green standards

A large segment of institutional investors has shown support to address climate change. However, when it comes to environmental criteria, investors currently have too few tools to ensure that their investments are making a significant impact. Having common definitions of 'green' across global markets, allows investors, potential issuers and policy makers to identify green assets and attract investment more easily.

In Australia and New Zealand there are a number of bodies that have developed definitions and standards for green assets and infrastructure projects:

- **The Infrastructure Sustainability Council of Australia's (ISCA's) Infrastructure Sustainability Rating Scheme** covers all infrastructure types in Australia and New Zealand[80].
- **The Green Star certification**, administered by the Australian Green Buildings Council and the New Zealand Green Buildings Council, and the National Australian Building Environmental Rating System (NABERS) and NABERS New Zealand cover buildings. New Zealand also has Homestar, an independent national rating tool that measures the health, warmth and efficiency of houses[81].
- **For renewable energy generation facilities**, guidance on development in Australia and New Zealand can be sought from local standards, regulation and industry associations.
- **The Climate Bonds Taxonomy** is used to identify green projects and assets which are aligned with achieving the goals of the Paris Agreement. This excludes fossil fuel power generation, ICE personal vehicles and new roads and infrastructure that facilitate their movement, and freight rail that is primarily used for fossil fuel transportation.

In 2017, a survey by the Investor Group on Climate Change of Australian and New Zealand investors - with funds representing over AUD328bn in AUM - found that for setting strategy and pursuing low-carbon investment, over half of all participants in the Australian survey indicated that they were using their own methodology for defining green investments, followed by the Low Carbon Investment (LCI) Registry (24%) standards and the Climate Bonds Initiative standard at 11%[82].

ISCA Infrastructure Sustainability Rating Scheme is a third-party rating system for evaluating sustainability across the planning, design, construction and operation of all phases of infrastructure programs, projects, networks and assets in Australia and New Zealand. covers all infrastructure types in Australia and New Zealand

The ISCA is a member-based, not-for-profit peak body. It administers a third-party rating program, provides training and knowledge sharing and creates a community of practice around sustainable infrastructure[83].

Green Star is an internationally-recognised rating system for the design, construction and operation of buildings, fit-out and communities. To rate a building or a fit-outs overall environmental impact, Green Star rating tools award points across nine categories: Energy, Water, Materials, Indoor Environment Quality (IEQ), Transport, Land Use & Ecology, Management, Emissions, and Innovation.

This helps to support stakeholders in the property and construction sectors to design, construct and operate projects in a more sustainable, efficient and productive way, and provides tenants with a trusted mark of independent verification to support decision making. It has benefits community-wide - helping to improve environmental sustainability, boosting productivity, creating jobs and improving the health and well-being of place for people, and results in money savings.

Green Star was launched by the Green Building Council of Australia in 2003 and remains Australia's only national and voluntary rating system for buildings and communities. New Zealand now has similar tools for design, construction and operation of buildings, fit-out and communities. These tools were adapted for New Zealand. In both countries, Green Star can be used as a proxy for Climate Bonds Certification[84].

NABERS is a national rating system that measures the environmental performance of buildings, tenancies and homes assessing energy efficiency, water usage, waste management and indoor environment quality of a building or tenancy and its impact on the environment. This is done by using measured and verified performance information, such as utility bills, and converting them into an easy to understand star rating scale from one to six stars. For example, a 6-star rating demonstrates market-leading performance, while a 1-star rating means the building or tenancy has considerable scope for improvement. Ideally it helps property owners, managers and tenants to improve their sustainability performance, reaping financial benefits and building their reputation.

In Australia it is run by a government authority. In New Zealand the Energy Efficiency Conservation Authority has the license for NABERSNZ in New Zealand. The NZGBC administer NABERSNZ, which in New Zealand is primarily focused on a building's energy performancee[85].

Climate Bonds Taxonomy and the Climate Bonds Standard & Certification Scheme

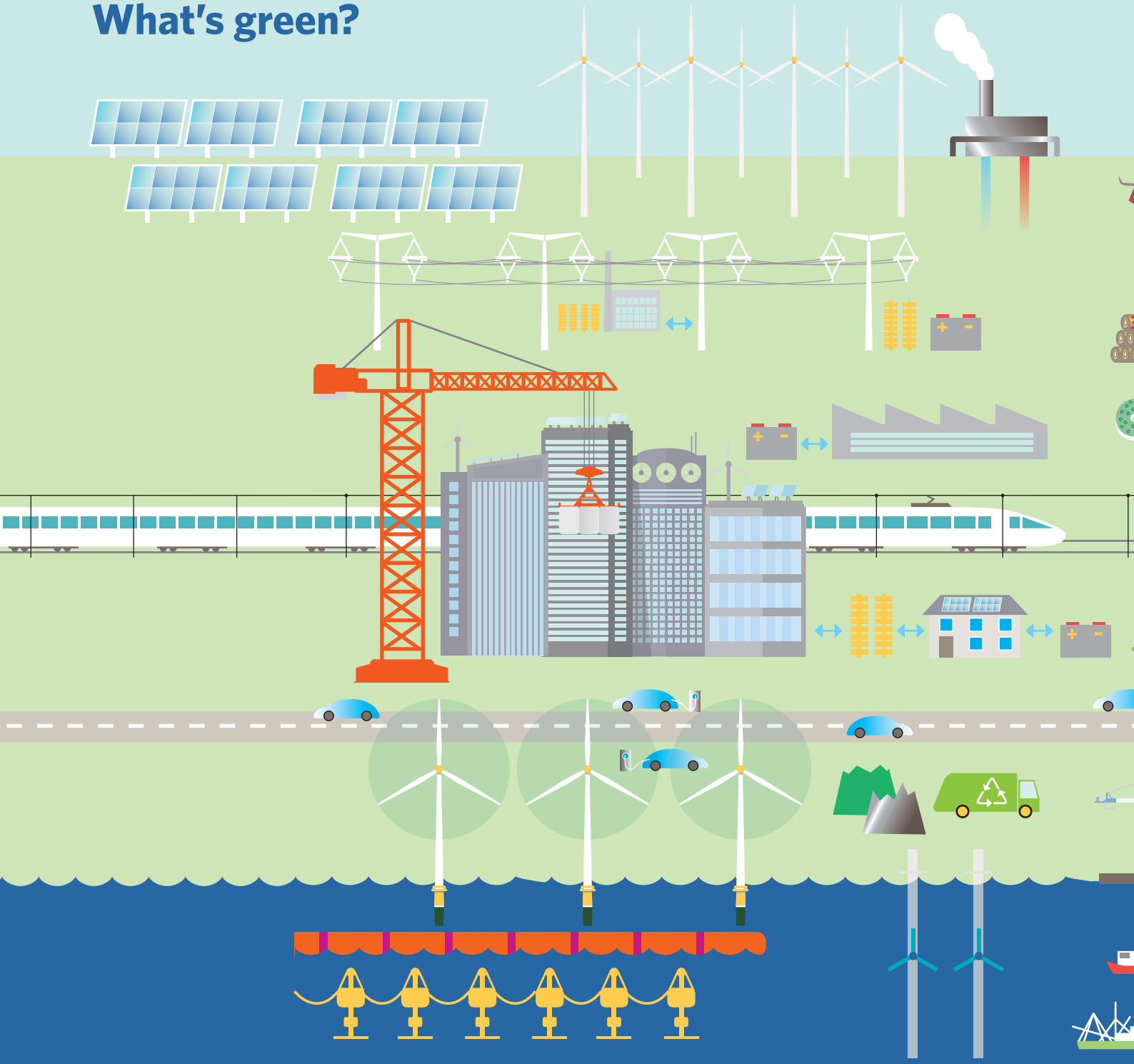
The Climate Bonds Taxonomy features eight climate-aligned sectors (see Annex 1). The purpose of the Taxonomy is to encourage common broad 'green' definitions across global markets in a way that supports the growth of a cohesive green bond market.

The Climate Bonds Standard & Certification Scheme is used to provide a Fairtrade-like labelling scheme for bonds and other debt instruments. Certification means that the deal:

- **Is fully aligned** with the Green Bond Principles or the Green Loan Principles.
- **Uses best practices** for internal controls, tracking, reporting and external review.
- **Finances assets** consistent with achieving the goals of the Paris Climate Agreement.

The certification of eligible projects and assets requires independent verification of the assets' climate credentials against the Climate Bonds Standard and relevant Sector Criteria. The Criteria provide eligibility conditions or thresholds which must be met for assets to be in line with a rapid trajectory towards a 2050 zero-carbon future. The criteria are developed based on climate science by technical expert groups with input from industry.

What's green?



Geothermal:

According to the Geothermal Energy Association, 39 countries could supply 100% of their electricity needs from geothermal energy, yet only 6% to 7% of the world's potential geothermal power has been tapped[86].

Drawdown Agenda

Solar:

The world installed a record number of new solar power projects in 2017, more than net additions of coal, gas and nuclear plants put together[87].

UNFCCC

Hydropower:

Hydropower is the largest source of renewable electricity in the world, producing around 17% of the world's electricity from over 1 200 GW of installed capacity, and is expected to remain the world's largest source of renewable electricity generation by 2022[88].

International Energy Agency

Transport (rail):

75% of the world's countries have established strategies and targets to improve the environmental performance of their transport sector within their Intended Nationally Determined Contributions (INDCs). One-fifth of the transport-related (I)NDCs include measures in the railway sector[89].

UNFCCC

Water:

The UN says the planet is facing a 40% shortfall in water supply by 2030, unless the world dramatically improves the management of this precious resource[90].

UNFCCC

Buildings:

Building-related emissions account for about one-third of global GHG emissions and could double by 2050, making building efficiency a critical part of the COP21 agenda[91].

GreenBiz

Green infrastructure investment opportunities

Methodology

The following section provides an exploration of green infrastructure investment opportunities in Australia and New Zealand in four key sectors: low-carbon transport, renewable energy, sustainable water management and green buildings. For each sector there is an overview, funding options and potential investment pathways, reference case studies, information on key trends as well as ideas for the future. At the end there is a sample pipeline of green infrastructure investment opportunities across Australia and New Zealand.

Sample pipeline and reference case studies

The sample pipeline at the end of this report is not exhaustive – rather a snapshot of the different types of opportunities available in the short- and medium-term future. A more comprehensive list of almost 400 green infrastructure investment opportunities is available on the Climate Bonds Initiative website.

The projects and assets in the sample pipeline have been drawn from government plans, consultation with key stakeholders and through extensive research of each sector. They were selected based on their green credentials as well as their investment potential – whereby an investor would most likely be able to gain exposure directly or indirectly to the project or asset.

The reference case studies were chosen from the sample pipeline and illustrate the different types of green infrastructure opportunities available in each sector in different locations in Australia and New Zealand.

Green credentials

The Climate Bonds Taxonomy was used to identify eligible green projects under the four sectors[92]. To narrow the scope and volume of projects the following filters were also applied:

- **For low-carbon transport** – mostly projects valued above AUD100m (Australia) and NZD100m (New Zealand)
- **For renewable energy** - only renewable energy generation facilities above 50MW
- **For sustainable water management** – mostly projects valued above AUD50m (Australia) and NZD50m (New Zealand)
- **For low-carbon buildings** - Green Star certified projects - mostly 6-star

Low-carbon transport

Transportation modes and ancillary infrastructure that produce low or zero direct carbon emissions. This can include national and urban passenger rail and freight rail networks; Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.

Renewable energy

Energy generation, transmission or storage technology that has low or zero carbon emissions. This can include solar energy, wind energy, bioenergy, hydropower, geothermal energy, marine energy or any other renewable energy source.

Sustainable water management

Assets that do not increase greenhouse gas emissions or aim at emission reductions over the operational lifetime of the asset, address adaptation, and increase the resilience of surrounding environments. This could include: water capture and collection, water storage, water treatment (with methane emissions treatment), flood defence, drought defence, stormwater management, and ecological restoration/ management. This covers built as well as nature-based water infrastructure.

Green buildings

Commercial and residential buildings, new or upgraded, operating with low-carbon emissions. The low-carbon credentials and emissions performance of the buildings are demonstrated through an accepted rating or 'green' assessment process, for example, Green Star certification.

Within each sector, further metrics were used to classify the green infrastructure investment opportunities by status:

- **Completed projects** - high profile, recently completed projects;
- **Projects under construction** – major projects from national, state and local government pipelines that are under construction;
- **Planned projects** - major projects from national, state and local government pipelines that had not yet begun construction and/or had been announced and had undergone business case planning and/or had been allocated budget;
- **Potential projects** – projects included in mid- to long-term plans or strategies as well as featured in media announcements or speculation.

Funding options and investment pathways

There are different types of funding options for 'green' labelled investments depending on the sector and the project timeframe. The sector determines the types of funding sources and risk profile, while the timeframe determines if there might be financing or refinancing opportunities, namely:

- **Complete projects** may offer refinancing opportunities depending on circumstances
- **Projects under construction** could offer equity and debt funding opportunities, and potentially refinancing (e.g. secured financing with a take-out option)
- **Planned projects** might have funding in place, but could also be seeking co-investment (e.g. private investment to complement public funding)
- **Potential projects** present an opportunity for investment in the future with the potential to define the funding structure.

There are various ways for an investor to gain exposure to a specific project, asset or portfolio. The possible investment pathways will vary depending on the asset ownership structure, the stage in the asset's financing lifecycle, and the investor's mandate. This can also vary between projects with public and private funding.

The 'green' credentials, funding options, timing, financial structures and possible investment pathways for each of the reference case studies are provided for the four sectors which follow: Low-carbon transport, renewable energy, sustainable water management, and green buildings.

Low-carbon transport

Public transport and freight rail networks are expected to see increased investment as governments aim to address population growth, increased urbanisation and worsening congestion in major cities as well as growing inter-city freight in both Australia and New Zealand. There is currently a rush by all states to meet the demands of growing cities, with upgrades of existing assets and development of new urban rail and bus projects.

Strong State and Federal Government support for these has been shown through policy commitments and increased funding for future transport infrastructure. This emphasis on transport can be seen in ANZIP's list of projects across Australia and New Zealand. Around 60% of the projects listed relate to transport, and almost half of these could be considered low-carbon transport projects.

Infrastructure and rolling stock upgrades for rail and busways will continue to be a priority. The transition to electric and other low- to zero-emission vehicles and the development of the necessary charging infrastructure will impact private vehicle transportation.

In New Zealand, the transition of public vehicles, like postal vans and garbage trucks, has already begun. In Queensland, Australia, the government has established an Electric Super Highway from Coolangatta to Cairns with recharging points for all electric vehicles at key tourism nodes along the nearly 1,800km route[93].

Funding options and investment pathways

In addition to public funding for transport infrastructure, the private sector has a strong pipeline of projects including PPPs, operating franchises and rolling stock leases[94]. Capital mobilisation for low-carbon transport continues to be targeted towards encouraging the use of energy-efficient transportation and the development of green infrastructure projects that reduce carbon emissions.

Government-backed concessional loans are a new structure which provides greater leverage against the revenue streams of transport (i.e. fares). Another innovative mechanism is 'value capture', which refers to the value that is generated for private landowners from infrastructure and surrounding business opearations. As private sector appetite increases, funding sources will continue to diversify, and investment will accelerate.

Investors seeking exposure to low-carbon transport projects and assets have a range of investment pathways to consider. Government-owned low-carbon transport assets are often identified in their green bond offerings, such as with the Certified Climate Bonds issued by the Victorian and Queensland governments and the Auckland Council. This pathway provides indirect exposure for investors to specific projects and assets and provides attractive credit and liquidity credentials for institutional investors.

"With record levels of transport infrastructure investment, it is often overlooked, the importance of the role this new infrastructure plays in reducing emissions and creating a more sustainable environment. Commonwealth Bank recognises this and is proud of its record in financing modern, future-proofed, transport infrastructure that promotes energy efficiency at its very core. Green bonds, working alongside traditional forms of finance, will ensure the continued funding of energy efficient infrastructure."

Andrew Hinchliff, Group Executive, Institutional Banking and Markets, Commonwealth Bank of Australia

More direct investment pathways include participation in consortium debt arrangements and/or equity stakes in individual projects via PPPs or other public-private ownership and financing structures.

Canberra Light Rail – Stage 1

Proponent: ACT Government

Location: Canberra, ACT

Status: Under construction

Classification: Public Passenger Transport, Rail, Infrastructure

Description: Stage 1 is a light rail line from the northern suburb of Gungahlin to the CBD. Canberra's light rail will have overhead wires along its full 12km length. Stage one will have 13 stops and enhancements to the Civic Plaza. Stage 2 will expand the network, connecting the City to Woden - connecting employment hubs, community services and commuters from south to north[95] . Further stages could see network extensions to the west, south and east of Stage 1 and 2 routes.

Output: Increased accessibility, sustainability and employment.

Cost: AUD707m (Stage 1 - infrastructure), this is included in the total PPP cost of AUD1.3bn (for design, construct, operate, finance and maintain over 20 years). The financing arrangements for Stage 2 and 3 are to be determined.

Financial structure: PPP + Federal Government funding

Potential investment pathways: Stage 1 is being completed as a PPP. The operating phase starts in 2018-2019. Stages 2 and 3 can also be PPPs to involve private partners and finance. Equity, mezzanine and subordinated debt are part of the financing structures available to the special purpose companies involved. The local government will be providing direct funding with an AUD67m annual contribution to Stage 1. Stages 2 and 3 will require increased funding and could be financed or refinanced via the capital markets.

Canberra Light Rail Stage 1 route map

Source: ACT Government, 2018

Melbourne Metro Rail Project

Proponent: VIC Government + Melbourne Metro Rail Authority

Location: Melbourne, VIC

Status: Under construction to be fully operational in 2026

Classification: Public Passenger Transport, Rail, Infrastructure

Description: The construction of CBD North and CBD South stations; twin 9km rail tunnels between South Kensington and South Yarra, the alignment of Swanston Street through Melbourne's CBD and links with existing train and tram lines. There will also be additional 33 high-capacity trains, which will accommodate approximately 1,100 passengers in the initial stages[96].

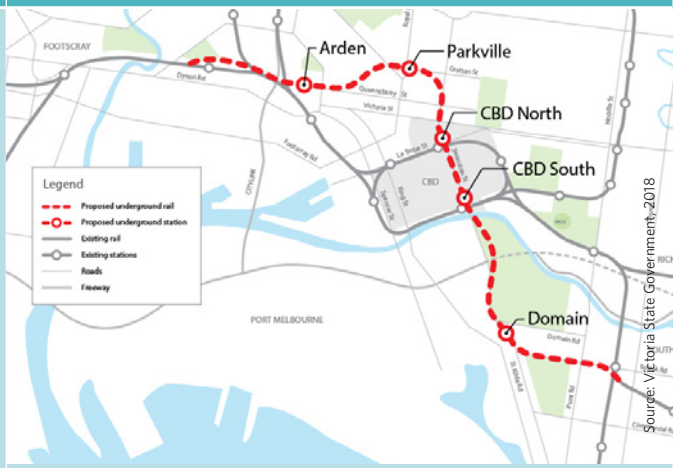
Output: Increase capacity (facilitating more trains to be operated on the Sunbury, Craigieburn, Williamstown, Werribee, Frankston, Upfield and Sandringham railway routes) supporting more than 20,000 passengers an hour; providing improved intermodal connectivity; less crowded and more reliable train network[97].

Cost: AUD10.9bn

Financial structure: Funding from the VIC Government plus PPP arrangements

Potential investment pathways: The Melbourne Metro Rail Project is being executed through a PPP model with 3 consortia. Two of the PPPs involve the Tunnel and Stations of the Metro Tunnel Project. The other PPP covers the new rolling stock. Mezzanine and subordinated debt as well as equity stakes can be used to finance the different PPPs. The initial investment funding is provided by the Victorian Government. The Treasury Corporation of Victoria is already a green bond issuer with 78% of its Certified Climate Bond allocated to low-carbon transport, including the Melbourne Metro Rail Project. Further issuance of green bonds by the Victorian government provide an excellent investment pathway for institutional investors.

Melbourne Metro Rail project map



Source: Victoria State Government, 2018

Auckland's electric trains

Proponent: Auckland Transport/Auckland Council

Location: Auckland, New Zealand

Status: Under construction

Classification: Public Passenger Transport, Rail, Rolling stock and Infrastructure

Description: The Auckland rail network has been undergoing a process of electrification since 2011, with more than 34,000 construction hours to install 3,500 foundations and masts, carrying 560km of overhead lines across 175km of railway tracks. In 2015, 57 three-car trains (carrying up to 232 seated passengers each) were added to the fleet and, in 2018, the Auckland Council committed to procuring a further 15 three-car electric trains, increasing Auckland's electric fleet to 72[98] [99].

Output: Faster, more frequent service, greater capacity per train and reduced emissions[100]

Cost: Est. NZD500m (infrastructure upgrades and electric train procurement) + NZD133m (new electric train fleet)

Financial structure: NZD500m via Auckland Council via Crown loan; NZD133m via Auckland Council and Crown grant

Auckland Electric Construcciones y Auxiliar de Ferrocarriles trains

Source: Auckland Transport, 2018

Potential investment pathways: The original funding and ownership package comprises NZD500m Crown (national government) loan to Auckland Council for infrastructure upgrades and electric train procurement and a NZD90m Crown grant to procure additional trains[101]. Auckland Council has since announced that new trains will cost NZD133m, ad that they will cover the additional NZD43m. Auckland Council released an inaugural green bond of NZD200m in 2018. The proceeds of the Certified Climate Bond are allocated to refinance existing debt used to buy electric trains and equipment and help finance the purchase of the new trains[102].

Brisbane Metro

Proponent: QLD Government/ Brisbane City Council

Location: Brisbane, QLD

Status: Planned – with metro services commencing in 2023

Classification: Public Passenger Transport, Bus, Infrastructure

Description: A high-frequency public transport system with two metro routes along 21km of existing busways that connect the north and south of Brisbane. The new fleet of 60 specialty vehicles, each with capacity for up to 150 people, will provide a turn-up-and-go service, with buses arriving every 3 minutes in peak periods, every 5 minutes at all other times and 24-hour service on weekends.

Output: Cut travel times, reduce Central Business District (CBD) bus congestion and improve services to the suburbs[103]

Cost: Est. AUD944m

Financial structure: Government funds committed (AUD300m Federal Government + AUD644m Local Government)

Potential investment pathways: The Queensland Government provides the Local Government funding component and the Queensland Treasury Corporation (QTC) is already a green bond issuer[104]. Its inaugural AUD750m Certified Climate Bond in 2017 has 85% of proceeds allocated to fund low-carbon transport projects and assets, including AUD324m to the Gold Coast Light Rail stage 1 & 2. The Queensland Government intends to issue more green bonds with allocations to low-carbon transport, such as the Brisbane Metro[105].

Brisbane Metro map

Inland Rail

Proponent: Australian Government, through the Australian Rail Track Corporation (ARTC)

Location: VIC to QLD

Status: Planned - the first train is expected to operate in 2024-25

Classification: Freight rail, Infrastructure

Description: A new 1,700km dedicated freight rail line running between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland. Double-stacked, 1,800m long trains with a 21-tonne axle load will be able to use the tracks at a maximum speed of 115km/h. Each train carrying the equivalent freight volume of 110 B-double trucks.

Output: Connect regional Australia to domestic and international markets; increase volume of freight per trip; reduce congestion on highways; transform national freight movements; provide supply chain benefits and substantial cost savings for producers; and improve economic development overall, with an estimated increase to Australia's GDP of AUD16bn during its construction and first 50 years of operation[106].

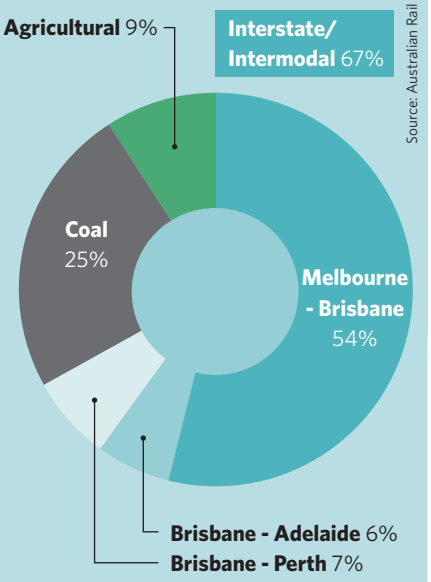
Cost: Est. AUD10.7bn over 10 years

Financial structure: Federal government AUD8.4bn of equity into ARTC on top of previously funded AUD900m.

Potential investment pathways: ARTC is owned by the Federal Government which is providing equity and direct grants. Through ARTC, the use of a PPP and green bond issuance could be relevant, whereby ARTC might want to get private partners involved in the project (complexity and risk sharing). ARTC is already a bond issuer although these have not been labelled green[107]. At the federal government level, it could be possible to restructure ARTC's debt and equity via green finance instruments in later stages of the project's financing life cycle.

Inland Rail – Net Tonne Kilometres by market - 2050[108]

Assuming completion of Inland Rail in 2024-2025



The LRT + BRT boom

Almost every major city in Australia either has, is developing or is planning to develop a light rail transit system (LRT) and/or bus rapid transit system (BRT). This is also a trend in New Zealand and around the world. This is because these systems provide many benefits: reduced congestion and the smoothing of traffic flows, improvement of travel speeds and reliability, greater mode shifting and reduced greenhouse gas (GHG) emissions. Their infrastructure development costs and times are also much less than developing an underground rail system. Overall, they are efficient and cost-effective mass-transit systems.

Ongoing developments in low-carbon transport investment opportunities

The upgrade of all bus and public vehicle fleets and all rail rolling stock to electric

Electric and plug-in hybrid vehicles are set to experience high growth over the next two decades in Australia, according to a report released by the Australian Renewable Energy Agency (ARENA) and CEFC[110]. There is also the potential for electric vehicles to provide support for the grid through smart charging, as a distributed network of batteries which can respond quickly.

Making ports and airports climate resilient

Australia and New Zealand are planning the development and upgrade of several ports and airports and there is the potential for these to include measures that mitigate against and adapt to the effects of climate change. For example, on-site electricity production, energy efficiency measures for indoor and outdoor lighting as well as integration with public transport and freight rail infrastructure. It is also important for ports and airports to protect themselves and the cities they support from the impacts of climate change by building adaptive features like reinforced sea-defences and improved drainage systems.

"The reality is that the transition to EVs is inevitable. We're already seeing vehicle makers confirm they will stop producing pure internal combustion engines over the coming years. At the same time, we're seeing dramatic improvements in vehicle charging networks, creating the essential infrastructure to support electric vehicles. These measures can deliver a material improvement on our greenhouse gas emissions, as well as take our vehicle fleet into the 21st century."[109]

Ian Learmonth, CEO, CEFC

LRT and BRT developments – Australia and New Zealand

Subsector	Project name	Location	Status
LRT: A public transportation system operating on exclusive, right-of-way rail lines that are generally above ground and sometimes on a shared roadway, with a frequent service of electrified trains or trams.	Sydney Light Rail	NSW	Under construction
	Parramatta Light Rail	NSW	Planned
	Newcastle Light Rail	NSW	Under construction
	Yarra Trams	VIC	Complete
	Gold Coast Light Rail - Stage 1 + Stage 2	QLD	Complete
	Gold Coast Light - Rail Stage 3 + 3A	QLD	Planned
	Sunshine Coast Light Rail	QLD	Planned
	Rockingham Light Rail	WA	Planned
	Adelaide Trams	SA	Complete
	Riverline (Hobart)	TAS	Planned
	ACT Light Rail	ACT	Under construction
	Auckland Light Rail	NZ	Planned

Subsector	Project name	Location	Status
BRT: A public transportation system using dedicated lanes and stations (separated from traffic) to allow for rapid and frequent operation by buses (that ideally have no direct emissions - such as hydrogen, biogas electric or electrified buses).	Sydney: B-Line, Liverpool-Parramatta T-way, Metrobus: North-West T-way and M2 bus corridor	NSW	Complete
	Smart bus	VIC	Complete
	South-East, Northern and Eastern Busways	QLD	Complete
	Brisbane Metro	QLD	Planned
	O-Bahn Busway - City Access Project	SA	Complete
	Canberra's Rapid Bus Network	ACT	Planned
	Auckland: Northern Busway, Central Connector	NZ	Complete
	AMETI (Auckland Manukau Eastern Transport Initiative)	NZ	Under construction

Renewable energy

Over 85% of New Zealand's energy is supplied by renewable energy resources. Australia is currently at 17% and growing[111]. In terms of the proportion of gross domestic product per capita investment in 'green' energy, both countries continue to lag relative to other OECD member countries[112]. This trend is set to change, with 2017 a milestone year for renewable energy investment and development.

Australia

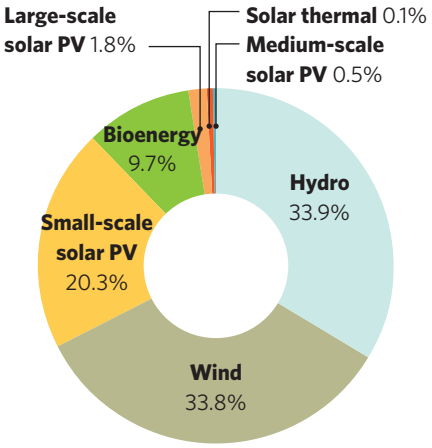
In 2017 approximately 700 MW of renewable energy projects were completed and began generation, with seven times that amount either under construction or with financial support[113]. This investment was dominated by large-scale wind and solar developments, which represented around AUD12bn.

In 2018 the Clean Energy Regulator announced that the volume of projects currently committed to could adequately meet the existing Large-scale Renewable Energy Target for 2020 and 2030[114]. Another outcome from this renewable energy boom is the anticipated decrease in residential electricity prices predicted by the Australian Electricity Market Commission, expected to fall by 6.2% on average over the next two years[115].

Looking forward, solar and wind energy generation continue to have the greatest potential for investment. There will also be an increase in battery storage and pumped hydro projects. In the last two years there has been a significant increase in the number of residential and large-scale battery storages facilities installed. In 2017, 12% of solar PV installations included a battery,

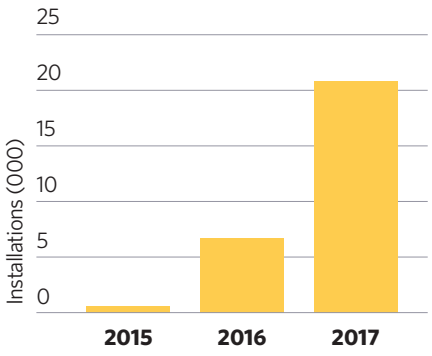
Renewables accounted for 17% of Australian electricity generation in 2017[119]

Renewable Generation by Technology Type



Australian energy storage 2017[121]

Residential energy storage system installations



bringing the total number of residential battery systems installed across Australia up to 28,000[116].

New Zealand

Currently New Zealand is powered by a range of renewable energy technologies including hydro, geothermal, wind and solar. Fossil fuel (gas) power generation represents a relatively small share of the power generation fleet.

New Zealand hopes to increase the share of renewable energy generation to at least 90% by 2025 with further expansion in geothermal generation; investment in generation from wind; and continued growth of the residential solar PV market[117].

Funding options and investment pathways

Renewable energy project developers and asset owners have access to a wide variety of funding options, including banks, project financiers, debt clubs, investment funds, direct investors and the capital markets.

Green bonds are best suited to large renewable energy projects or portfolios of assets and can be structured in a number of ways, including covered bonds, ABS, corporate use of proceeds bonds, and project bonds. Aggregation of smaller projects can be done through green securitisation or through banks originating green loans and refinancing in the green bond market.

Renewable energy funds are also being used to support greenfield renewable energy projects and stimulate innovation. In addition to publicly backed funds, like the Clean Energy Innovation Fund, there are private sector funds like the Powering Australian Renewables Fund, which is a AUD2-3bn fund created by AGL to develop and own approximately 1,000 MW of large-scale renewable generation projects[118].

Te Mihi Geothermal power plant

Proponent: Contact Energy

Location: New Zealand

Status: Complete

Classification: Geothermal, Generation facilities

Description: A two-unit 166-MW geothermal plant on the Wairakei geothermal steam field in Taupo; includes a bioreactor that reduces the amount of hydrogen sulphide entering the Waikato River; 2015 Energy Project of the Year in the Deloitte Energy Excellence Awards, recognising excellence in project planning and execution and in delivering community benefits[120].

Output: Safe and reliable low-carbon energy, powering more than 160,000 homes.

Cost: NZD623m

Financial structure: Private equity and green debt funding

Potential investment pathways: The geothermal plant was privately funded by Contact Energy. Contact Energy then issued a Climate Bonds Certified green bond to refinance some of its debt for geothermal assets. Through Contact Energy's Green Borrowing Programme, investors have the opportunity to invest in certified green debt instruments. The NZD1.8bn Green Borrowing Program includes all of Contact's wholesale bonds maturing after 2018 as well as various private placement and bank debt arrangements. All of these instruments have been certified, giving investors a number of pathways. Further funds raised via the Green Borrowing Programme will be certified as green debt instruments, providing primary market opportunities for potential investors.

Te Mihi Geothermal power plant aerial view


Source: Power Magazine, 2013

Kidston Solar Project

Proponent: Genex Power Limited

Location: Far-North Queensland, QLD

Status: Phase 1 complete, Phase 2 planned

Classification: Solar, Generation facilities

Description: The Kidston Solar Project involves the development of a 320 MW solar farm, in two phases, starting with 50 MW in Stage 1. It is located on the historical Kidston Gold Mine and is part of Genex's plans to build a AUD1bn renewable energy hub 400km west of Townsville. This will include a 250 MW pumped hydro project with 1500 MW hours storage capacity, the 270 MW Phase 2 solar project and a 150 MW wind farm.

Output: Phase 1 of the Solar Project is expected to generate 145GWh of renewable electricity per year, powering around 26,000 Australian homes and avoiding 120,000 tonnes of CO_2 emissions[122].

Cost: Phase 1 AUD126m, with Phase 2 estimated at AUD420m

Financial structure: Equity + green loans + Federal Government funding

Kidston Solar Project aerial photo

Source: Power Technology, 2018

Potential investment pathways: Genex is listed on the Australian Stock Exchange providing investors with direct equity in the parent company. Phase 1 funding included an ARENA Grant for AUD8.9m and debt finance of AUD54m from the CEFC[123]. The Northern Australia Infrastructure Facility has supported the development of the financing structure for the Stage 2 project through the provision of an indicative term sheet for a long-term concessional debt facility. Further funding will be sought via the banks.

Snowy 2.0

Proponent: Snowy Hydro Ltd + Australian Government

Location: Regional, NSW

Status: Planned

Classification: Hydropower, Generation facilities, Pumped Storage

Description: Snowy 2.0 is a proposed pumped-hydro expansion of the Snowy Mountains Scheme which will supercharge its existing hydro-electric generation and large-scale storage capabilities. It will link the two existing Snowy Scheme reservoirs of Tantangara and Talbingo through underground tunnels and an underground power station with pumping capabilities. Instead of releasing the water after energy has been generated, a pumped hydro scheme recycles or pumps water back to the upper reservoir to be used again[124].

Output: The expansion is expected to increase the capacity of the Snowy Hydro scheme by 50%.[125] It will provide reliable and stable low-carbon electricity.

Cost: Est. AUD3.8bn - AUD4.5bn (potentially an additional AUD2bn for transmission grid upgrades)

Financial structure: Equity from the Federal Government + other debt financing

Potential investment pathways: The original equity structure for the existing snowy hydro facility was 13% Federal Government and 87% NSW and VIC governments. The Federal Government bought the state government stakes in 2018, making it the sole owner of Snowy Hydro and the project. With this new equity structure, the federal government has the opportunity to fund the project with green finance products. Snowy Hydro has a BBB+ rating from S&P and could be a green bond issuer with allocation of proceeds to Snowy 2.0 Project. It could also use other green debt instruments to secure adequate finance as the project is constructed. The CEFC may also provide capital to Snowy 2.0.

Map of the Snowy Scheme

Source: Snowy Hydro, 2018

Dundonnell Wind Farm

Proponent: Tilt Renewables

Location: Regional, VIC

Status: Under construction

Classification: Wind, Generation facilities

Description: The wind farm will have up to 88 wind turbines, hosted by 12 host landholders over approximately 4500ha. The wind farm will be connected to the National Electricity Market (NEM) via a 38km 220kV transmission line to the Mortlake Gas Fired Power Station.[126]

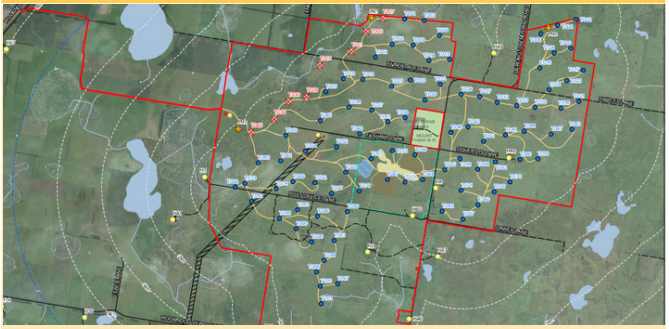
Output: Proposed maximum capacity of 350 MW.

Cost: Est. AUD600m

Financial structure: Equity plus debt from local and international banks

Potential investment pathways: The Dundonnell farm is fully owned by Tilt Renewables Ltd, which is listed on the Australian and New Zealand stock exchanges and was previously part of Trustpower. Exposure to this project and other parts of the growing Tilt portfolio is possible with equity, debt and potentially bonds for financing and refinancing. Tilt was recently in the market with an AUD300m equity raising linked to the Dundonnell project, with strong interest from institutional investors.

Dundonnell Wind Farm map



SA - NSW Interconnector

Proponent: ElectraNet

Location: SA to NSW

Status: Potential

Classification: Transmission Infrastructure

Description: A high-capacity 330 kV interconnector between SA and NSW, to be delivered by 2021-2022[127]

Output: More reliable and affordable power as well as improved electricity security to SA, and greater integration of renewables in the NEM

Cost: AUD1.5bn

Financial structure: AU200m state government + private and trustee ownership

Potential investment pathways: ElectraNet is owned 46% by State Grid Corporation of China, which is already a green bond issuer and will likely to continue issuing green bonds, 33% by YTL Power, which is listed on the Malaysian stock exchange, and 20% by a fund manager[128]. Gaining exposure to SA-NW connector would be possible via the fund manager, equity in YTL Power, or green bond issuance by State Grid.

Map of indicative SA – NSW Interconnector route

Ongoing developments in renewable energy investment opportunities

Recycling and waste-to-energy

In Australia, 23 million tonnes of urban waste go to landfill each year. This represents a significant opportunity for recycling or re-purposing waste, including via waste-to-energy generation facilities. Waste-to-energy electricity production is considered low-emissions technology when the waste used has been sorted and does not include plastics or metals. The CEFC estimates that there is a AUD2.2bn - AUD3.3bn market for waste-to-energy generation.[129]

Renewables to power heavy industry

According to ARENA, the mining sector accounts for roughly 10% of Australia's total energy use, with less than 5% of the mining sector's energy coming from renewable energy sources.[130] There is a huge opportunity for the share of renewable energy supply to increase, with the mining and metals industry already investing in large-scale integrated renewable energy and storage systems to reduce their energy costs. Co-generation is also an option for the metals industry – with the international giant GFG Alliance planning upgrades at the steelworks in Whyalla, SA, to capture and utilise heat output.[131]

Water management

In both Australia and New Zealand, water projects and assets can include dams, desalination plants and wastewater treatment plants, components of distribution networks, including pipes and pumping stations. They also include projects to harvest storm water and recycled water, mitigate floods and support local biodiversity. The ownership and regulation of these assets varies between the jurisdictions and so does the urgency to upgrade and replace aging infrastructure and respond to the needs of a growing population and the challenge of climate change.

In Australia and New Zealand, water infrastructure, climate change and economic performance are closely related. The Millennium drought in Australia and the water contamination incidents in New Zealand have highlighted the need for reliable and resilient water infrastructure to withstand stressors like drought and flooding conditions. Enhanced planning processes and increased upfront investment will be required for water infrastructure to meet the challenges of climate change and rapid urbanisation. Particularly as Australia's major cities are forecast to need 73% more than the current supply by 2050.[132]

Funding options and investment pathways

The majority of water-related infrastructure in Australia and New Zealand continues to be publicly owned. In Australia, the urban and rural water corporations are owned by the State Government and funded by the respective State treasuries. This is unlikely to change in the medium term.

In New Zealand, a recent focus on the resilience of the nation's water infrastructure has drawn attention to the potential for aggregation of water assets from council-by-council ownership into regional business models. This would assist with consolidating investment opportunities across New Zealand's water sector.

Similar to the investment pathways for low-carbon transport, the primary investment pathway for sustainable water infrastructure is through green bonds issued by State Governments (Australia) and Councils (New Zealand). Further investment pathways exist in the construction, ownership and refinancing of new types of infrastructure such as water desalination assets and commercial/industrial water infrastructure.

The Australian Water Association (AWA) has also undertaken research showing there are a range of alternative financing options available for water infrastructure projects from a variety of investment sources. In identifying the most appropriate arrangement, the various considerations include: the funding source, ownership, risks as well as the project type (greenfield or brownfield), size, age, capital profile, demand profile and operational control.

AWA alternative models for financing water infrastructure[133]

Type of arrangement	Investment Source		
	Government	Banks	Investors
RAB Model	✓	✓	✓
Green Bonds	✗	✗	✓
PPP	✓	✓	✓
Value Capture	✓	✓	✓
Conessional loans	✓	✗	✗
Grants	✓	✗	✗
Long Term Lease	✗	✓	✓
Direct Structured Lease	✗	✓	✗
Indirect Structured Financing	✗	✓	✗

Central Interceptor

Proponent: Government of New Zealand + Auckland Council

Location: Auckland, New Zealand

Status: Planned

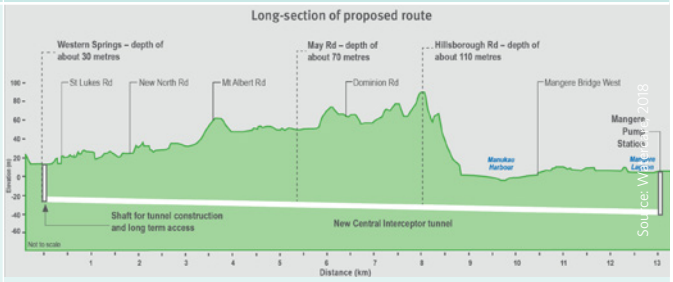
Classification: Water infrastructure, Water Storage, Distribution

Description: The construction of a new wastewater tunnel between Western Springs and the Mangere wastewater treatment plant in Auckland and I sewers conveying wastewater to the tunnel. The main tunnel will be approximately 13km long, situated between 15 and 110 metres below the surface.[134]

Output: Provides additional capacity to the network to accommodate population growth in Auckland and reduces overflows to the Waitemata and Manukau Harbours during wet weather.

Cost: NZD1.2bn

Long section of proposed central interceptor route



Financial structure: Local council funding

Potential investment pathways: Auckland Council will fund the interceptor. Auckland Council released an inaugural green bond in 2018. According to the council's green bond framework[135] proceeds from future green bonds could be used to finance assets and projects for sustainable water management, and investors could target new green bond issuance as their premier issuance was oversubscribed.

Shoalhaven Water's Reclaimed Water Management Scheme (REMS) – Stage 1b

Proponent: Shoalhaven City Council

Location: NSW

Status: Under construction

Classification: Water infrastructure, Water treatment, Water recycling system

Description: Stage 1A cost AUD34m, was commissioned in 2002 and has since irrigated over 500ha of land including 14 dairy farms, a golf course and sporting grounds, using over 20,000 ML through the REMS, and 70% of reclaimed water produced. Stage 1b will include reclaimed water from the Nowra and Bomaderry Wastewater treatment plants, both of which will be upgraded.[136]

Output: Reduced water use and increased water security

Cost: AUD130m[137]

Financial structure: Local council funding + State Government funding

Shoalhaven Water's REMS construction image

Potential investment pathways: The funding arrangement was signed in the early stage of phase 1 with NSW government and local council funding. The NSW Government confirmed AUD10.8m funding for REMS 1B. In 2018, the NSW Government[138] will, for the first time, issue sustainability bonds which according to announcements could include financing for sustainable water infrastructure. The local council is planning to absorb the project[139] in its budget with increasing CPI for future years and through bank lending. Exposure is possible through the NSW Government green bond, should the project meet their sustainable program requirements.

Wyaralong Water Treatment Plant

Proponent: QLD Government + SEQ Water

Location: QLD

Status: Planned

Classification: Water infrastructure, Water treatment

Description: A staged water treatment plant, located adjacent to the Cedar Grove Weir, with an initial capacity of 30 megalitres per day. Additional stages will increase the capacity of the plant to not less than 100 megalitres per day, with construction timeframes dependent on growth in demand.[140]

Output: Meet growing demand for potable water in Beaudesert and the South Logan area and reducing the draw from the Southern Regional Water Pipeline.

Cost: AUD50m

Financial structure: State government funding

SEQ Water – water treatment plant

Potential investment pathways: The Queensland Government provides the funding for SEQ Water and the Queensland Treasury Corporation (QTC)[141] is already a green bond issuer. Its inaugural AUD750m Certified Climate Bond in 2017 was a success and the Queensland Government intends to issue more green bonds with allocations to sustainable water and wastewater infrastructure.[142]

Ongoing developments in sustainable water investment opportunities

Improving alternative water sources

Alternative water sources can include recycled water, desalinated water, rainwater collection, storm-water harvesting or groundwater. They supplement traditional water supply sources, such as dams and reservoirs, which diversifies the supply and improves the sustainability and resilience of urban water supplies and increases water security.[143] This is particularly important in drought prone Australia. In New Zealand, this approach could allow for more isolated rural communities to have a stable and clean water supply. Desalination is the most adopted of these technologies in Australia, providing 484 to 674 GL/year of additional water. With the potential for major improvements to their efficiency and cost, desalination plants present a significant future investment opportunity.[144]

Promoting the water/ energy nexus

Government and industry are increasingly thinking of innovative ways to use water supply and energy generation together to result in efficiencies for both. The increased uptake of pumped-storage hydroelectricity shows how existing water sources can be used (without being depleted) to generate electricity. The NSW government is investigating the opportunity for private developers to make energy investments in existing state-owned water infrastructure and resources, including 38 dams across NSW – envisioning the potential for further pumped hydro, floating solar and other technologies, that can use WaterNSW assets.[145]

In a different example, desalination plants (normally high energy consumers) are using renewable energy to reduce their emissions whilst increasing water supply. In South Australia, a concentrated solar power tower plant has been developed to supply electricity, heat and desalinated seawater to grow 15 million kg of tomatoes per year in the Australian desert. The greenhouses at the Sundrop tomato farm will also produce over 450,000m^3 of freshwater per year and displace the use of about 2 million litres of diesel per year.[146]

Myalup-Wellington Water Project

Proponent: WA Government + Collie Water

Location: Regional, WA

Status: Planned

Classification: Water infrastructure, Water Storage, Distribution

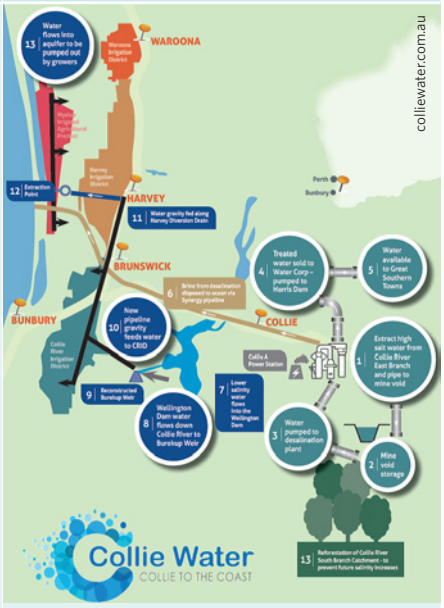
Description: The project comprises integrated above and below dam infrastructure components, aimed at reducing salinity in the Wellington Dam and surrounding area. The project is a response to the increased salinity and reduced reliability of groundwater that has reduced the yield of fruit and vegetable agricultural activity and abandonment of agricultural activity in the region.[149]

Output: By diverting high saline inflows upstream from Wellington Dam for desalination the quality of water stored in and released from the Wellington Dam for agriculture would improve and overall agricultural productively could increase.[150]

Cost: AUD349m

Financial structure: State Government + Federal Government + private funding Potential investment pathways: Collie Water, a private water company was established to manage the Myalup-Wellington Water Project. The Western Australian Government has allocated AUD37m. The Federal Government will provide AUD140m in funding as well as a concessional loan of up to AUD50m, and Collie Water will provide an estimated AUD169m to the project. Collie Water's contribution will be facilitated by the sale of at least 10GL per year of desalinated potable water to Water Corporation.[151] [152] Exposure to this project would be possible should the Western Australian Government join its east-coast State Government counterparts in issuing green bonds that include funding for sustainable water management projects.

Myalup-Wellington Water Project location



Victorian Desalination Plant

Proponent: Victorian Government + AquaSure

Location: Regional, VIC

Status: Complete

Classification: Water infrastructure, Water treatment, Desalination

Description: Located in Wonthaggi, the desalination plant includes reverse osmosis facilities, two underground tunnels and an 84km water transfer pipeline that provides desalinated water or catchment supplies to communities throughout Melbourne, South Gippsland and Westernport.[147] The facility has been designed to integrate into the landscape and reduce the amount of energy required to draw the seawater into the plant.

Output: Capable of supplying up to 150 billion litres of water a year to the greater Melbourne and Geelong area, and the capability to expand to 200 billion litres a year.

Cost: AUD4bn

Financial structure: PPP (fully funded by the private sector)

Potential investment pathways: The Project was built as a PPP through the AquaSure consortium, comprising Degrémont SA, Suez Environnement, Thiess Pty Ltd and Macquarie Group, in partnership with the Capital Projects Division of the Department of Sustainability and Environment, Victoria. Watersure is responsible for the operations and maintenance of the Victorian Desalination Project through September 2039 under contract to AquaSure. Watersure comprises SUEZ and Ventia (formerly Thiess Services). The bank group originally committed to seven-to ten-year funding, with the State Government acting as the lender of last resort for an initial bank syndication process. This was to enable AquaSure to seek additional long-term investors for AUD1.7bn of debt funding, which proved successful.[148] Degrémont is a specialised water treatment subsidiary of Suez, and Suez is a listed company that has also issued green bonds. Exposure to the project is possible via equities and through investment in green bond issuance.

Victorian Desalination Plant schematic

Green buildings

Globally, the building sector has the largest potential to significantly reduce greenhouse gas emissions compared to other major emitting sectors.[153] Green Star certified buildings in Australia have been shown to produce 62% less GHG emissions than average Australian buildings and consume 51% less potable water than if they had been built to meet minimum industry requirements.[154]

Green building certification programs are now institutionalised in mature real estate markets like Australia.[155] There are currently 1,986 as of 20 Aug. Green Star-rated projects in Australia and 153 Green Star-rated projects in New Zealand. 25,000 homes are going through Homestar, the certification for homes in New Zealand.

GRESB 2017 results showed that the Australian and New Zealand real estate sectors are leading the world in sustainability performance. The 2017 global average GRESB score was 63 points, with Australia and New Zealand achieving an average GRESB Score of 73.[156]

GRESB (Global Real Estate Sustainability Benchmark)

As the global ESG benchmark for real assets, GRESB assesses the sustainability performance of real estate and infrastructure portfolios and assets worldwide.[157] GRESB's annual Real Estate Assessment evaluates performance against seven sustainability aspects and indicators. In 2017, a record 850 property companies and real estate funds, representing 77,000 assets and over USD3.7tn in value, completed the Assessment. Participation increased again in 2018 with 903 companies and funds reporting their data to GRESB.[158]

"GRESB can help investors understand important non-financial metrics that are influencing the value of buildings across global markets. Leading companies understand this, which is why 20% more Australian companies are now reporting to GRESB than a year ago."

Romilly Madew, CEO, Green Building Council of Australia[159]

GRESB

"Around the world, we continue to see more and more investment in sustainable world-class assets. Established rating tools like Green Star provide investors with an independent verification of performance and helps us position our funds to meet the demands of leading investors."

Josh McHutchison, Managing Director, Investment Management, Lendlease[160]

Funding options and investment pathways

Low-carbon residential and low-carbon commercial buildings in Australia and New Zealand are attractive to private-sector investors. Consequently, the vast majority of the capital required for construction, ownership and refinancing of green buildings is provided by the private sector without additional government guarantees.

The private sector uses a wide variety of equity, debt and project finance structures for green building development, including funds, green loans and green bonds. Government-owned green buildings have also been financed with sub-sovereign green bonds.

New Horizons, Monash University

Proponent: University of Melbourne

Location: Melbourne, VIC

Status: Complete

Classification: Green Star – 6-star - Design & As Built

Description: New Horizons Building at Monash University, Clayton Campus, is a 6-star Green Star rated collaborative research centre, housing around 500 staff.[161] It was the second education building in Victoria to receive this rating and the first research laboratory building to do so.

Output: Reduced utility costs and reduced environmental impact

Cost: AUD175m

Financial structure: Green bond – Certified Climate Bond. The building was originally co-funded by the Australian Federal Government, through the Education Investment Fund, Monash University and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). In 2016 Monash University issued a Certified Climate Bond into the US private placement market which included allocation of proceeds to its portfolio of Green Star rated buildings.[162]

Potential investment pathways: Monash University has just announced its third green bond issuance.

New Horizons Building at Monash University, Clayton Campus

Source: Monash University, 2018

Darling Quarter - Commonwealth Bank Place

Proponent: Lendlease

Location: NSW

Status: Complete

Classification: Green Star – 6-star - Design & As Built

Description: Commonwealth Bank Place was awarded all four Green Star ratings: 6 star Green Star Design rating, 6 star Green Star As Built rating, 6 star Green Star Performance rating and a 6 star Green Star - Office Interiors rating and is the home to the Commonwealth Bank offices in Sydney.[163] It consists of two office towers located in Darling Quarter, which is a community precinct featuring office buildings, retail and green spaces, as well as eateries. The office building featured chilled beam air-conditioning technology including a single pass fresh air system and a 100kL rainwater harvesting tank.[164] The building is leased to the Commonwealth Bank. It was acquired by investors Australian Prime Property Fund Commercial (APPF Commercial) and First State Super (FSS).

Output: The building generates 50% less GHG emissions than an average commercial office building and consumes 80% less drinking water.[165]

Commonwealth Bank Place at Darling Quarter

Cost: AUD500m

Financial structure: The Darling Quarter precinct was delivered through a PPP and NSW Government funding.

Potential investment pathways: Exposure to Lendlease can be targeted as a possible green bond refinancing or investment in Lendlease's green building portfolio.

Developer profile: The building was developed by Lendlease, which is a listed company and a bond issuer. Lendlease have received 100 Green Star certifications on buildings they have developed.

1 William Street

Proponent: Cbus Property Pty Ltd

Location: QLD

Status: Complete

Classification: Green Star – 6-star - Design & As Built

Description: An office tower housing the Queensland Government and public service and comprising of a 43 story A-grade commercial building with premium services, providing approx. 75,000m^2 net lettable area, including 1,100m^2 of retail and 318 car spaces. It has achieved a 5 star Green Star - Office Design rating and a 6 star Green Star Office - As Built rating and a 5-star NABERS Energy rating. Some of its features include natural lighting, a sky garden and open, collaborative work space.[166]

Output: Reduction in energy costs to government occupants, freeing up CBD real estate by housing 500 public servants and reducing emissions

Cost: Est. AUD870m

Financial structure: The Treasury Commercial group managed the 1 William Street procurement process, securing 100% private funding for the project and providing oversight of project delivery. Cbus Property financed and developed the property, partnering with Brookfield Multiplex, and ISPT Super Property acquired 50% ownership of the development.[167]

1 William Street building

Potential investment pathways: Becoming a member of the fund, or potential refinancing.

Developer profile: Since achieving its first Green Star rating in 2008, Cbus Property[168] has developed 14 Green Star projects amounting to 400,000m^2 of commercial space – with several more projects registered for certification.[169] Cbus Property is the property development and investment arm of the Construction and Building Industry Superannuation Fund, which has 720,000 members and more than AUD32bn in funds under management.

Festival Plaza Commercial Development

Proponent: Walker Group Holdings Pty Ltd

Location: SA

Status: Under construction

Classification: Green Star - Registered

Description: A large-scale mixed-use commercial (office towers with 40,000m^2 aiming for a 6-sar Green Star rating) and retail development with public space[170]

Output: Reduced utility costs, reduced environmental impact and increased connectivity as well as providing a space in the city centre for culture and entertainment

Cost: Est. AUD1bn

Financial structure: State government (AUD180m), Private funding (AUD430m)

Potential investment pathways: Potential refinancing on completion

Developer profile: The Walker Corporation is Australia's largest private, diversified development company, with a commitment to achieving a minimum 5 star Green Star – As Built standard on all commercial and retail projects, if not the maximum 6 Green Star rating.[171] It has already benefited from two green bonds issuances by banks. In early 2015, the company's Tower 4D in Collins Square was part of ANZ's AUD600m green bond issuance, and, in 2016, Tower 4B Trust building in Collins Street was part of Westpac's AUD500m climate bond.

Festival Plaza Commercial Development rendering

Source: Walker Corporation, 2018.

Commercial Bay Tower

Proponent: Precinct Properties Downtown Ltd

Location: Auckland, New Zealand

Status: Under construction

Classification: Green Star - Registered (office space only)

Description: Retail and office space housing a working population of 10,000 people being built on the Auckland waterfront. Includes a 39-level office tower, the PwC Tower, opening in 2019. It is also a public transport hub with public spaces and hospitality environments.[172]

Output: Reduced utility costs, reduced environmental impact and increased connectivity

Cost: NZD850m

Financial structure: Bank loan and facilities + USPP and retail bond

Commercial Bay map with accessibility overlay

Potential investment pathways: This project appears to be solely funded with Precinct Properties debt. Exposure can be gained by investing in equity or the retail bond or private placement arrangements.

Property profile: Precinct Properties have received several Green Star as well as NABERSNZ certifications for their projects.

Ongoing developments in green buildings investment opportunities

Greening hospitals

Green hospital buildings deliver health outcomes for patients, staff and the environment. International studies collated by the World Green Building Council have confirmed that green healthcare facilities provide better patient care and reduce the length of stay required in hospital. Specifically, green design has been found to deliver 8.5% reduction in hospital stays, 15% faster recovery, 22% reduction in need for pain medication and 11% reduction in secondary infections.[173] Some of Australia's and New Zealand's health facilities are already Green Star certified or are registered for certification.

There is an opportunity for all new medical facilities to be designed and built, and for existing facilities to be retrofitted to be greener. Projects already planned by national and state governments in Australia and New Zealand that could be registered for certification under Green Star, include: Caboolture Hospital Expansion Stage 1 (QLD); Logan Hospital Expansion (QLD); Ipswich Hospital Redevelopment (QLD); Toowoomba Hospital Redevelopment (QLD); Princess Alexandra Hospital Rehabilitation Facility (QLD); Victorian Comprehensive Cancer Centre (VIC), New Royal Adelaide Hospital (SA); Canberra Hospital expansion – Spire (ACT); and, Nelson Hospital Redevelopment (NZ).

Greening public buildings

All government and public buildings should be green so as to ensure energy savings and promote the health of patrons and the environment. Libraries, courthouses, sporting facilities, museums, public housing, universities, and performing arts venues all present excellent opportunities for green buildings.

Projects already planned by national and state governments in Australia and New Zealand that could be registered for certification under Green Star, include: New Museum in Western Sydney (NSW), Social and Affordable Housing PPP project in New South Wales (Phases 1 & 2) (NSW), New Performing Arts Venue (QLD), Courts Precinct (SA), Riverbank Entertainment Precinct (SA), Hobart Science and Technology Precinct (TAS), University of Tasmania student accommodation (TAS), ACT Law Courts (ACT), Christchurch Multi-Use Arena (NZ).

Sample green pipeline

Sector	Project name	Proponent	Location	Status	Classification
Low-carbon transport 	Inland Rail	Australian Government/ ARTC	VIC to QLD	Planned	Freight rail, Infrastructure
	Sydney Light Rail	NSW Government	NSW	Under construction	Public Passenger Transport, Rail, Infrastructure
	Sydney Metro Northwest	NSW Government	NSW	Under construction	Public Passenger Transport, Rail, Infrastructure
	Melbourne Metro Rail	VIC Government/ Melbourne Metro Rail Authority	VIC	Under construction	Public Passenger Transport, Rail, Infrastructure
	Brisbane Metro	QLD Government/ Brisbane City Council	QLD	Planned	Public Passenger Transport, Bus, Infrastructure
	Gold Coast Light Rail - Stage Planned	City of Gold Coast	QLD	Complete	Public Passenger Transport, Rail, Infrastructure
	Central Eyre Iron Project (CEIP) infrastructure - rail	Iron Road Limited	SA	Planned	Freight rail, Infrastructure
	Canberra Light Rail – Stage 1	ACT Government	ACT	Under construction	Public Passenger Transport, Rail, Infrastructure
	Auckland Electric Trains	Auckland Transport / Auckland Council	New Zealand	Under construction	Public Passenger Transport, Rail, Rolling stock
	City Rail Link - Stations and Tunnels - Western Line at Mt Eden Station	Government of New Zealand	New Zealand	Under construction	Public Passenger Transport, Rail, Infrastructure
Renewable energy 	SA - NSW Interconnector	Electranet	SA to NSW	Potential	Transmission Infrastructure
	Snowy 2.0	Snowy Hydro Ltd	NSW	Planned	Hydropower, Generation facilities, Pumped Storage
	Dundonnell	Tilt Renewables	VIC	Under construction	Wind, Generation facilities
	Coopers Gap Wind Farm	PARF Company 10 Pty Ltd, trustee for Coopers Gap Project Trust	QLD	Under construction	Wind, Generation facilities
	Sun Metals solar farm	Sun Metals Corporation Pty Ltd	QLD	Complete	Solar, Generation facilities
	Kidston Solar Project – Phases 1 + 2	Genex Power Limited	QLD	Phase 1 Complete, Phase 2 Planned	Solar, Generation facilities
	Eastern Creek Energy from Waste Facility	Next Generation NSW	NSW	Planned	Bioenergy, Generation facilities
	North Qld Bio-Energy Plant	North Queensland Bio-Energy Corporation Limited	QLD	Planned/ Under construction	Bioenergy, Generation facilities
	Cape York Solar Storage	Lyon Solar	QLD	Planned	Storage, Large scale energy storage
	Te Mihi Geothermal power plant	Contact Energy	New Zealand	Complete	Geothermal, Generation facilities
	Te Ahi O Maui (Kawerau)	Eastland Group	New Zealand	Under construction	Geothermal, Generation facilities

Sector	Project name	Proponent	Location	Status	Classification
Sustainable Water Management	Shoalhaven Water's Reclaimed Water Management Scheme (REMS)	Shoalhaven City Council	NSW	Under construction	Water infrastructure, Water treatment, Water recycling system
	Hawkesbury-Nepean Valley flood management	NSW Government	NSW	Planned	Water infrastructure, Flood defences
	Victorian Desalination Plant	VIC Government	VIC	Complete	Water infrastructure, Water treatment, Desalination
	Wedderburn, Werribee and Bacchus Marsh irrigation upgrades	VIC Government	VIC	Planned	Water infrastructure, Water Storage, Distribution
	Wyaralong Water Treatment Plant	QLD Government + SEQ Water	QLD	Planned	Water infrastructure, Water treatment
	Perth Seawater Desalination Plant	Water Corporation of WA	WA	Complete	Water infrastructure, Water treatment, Desalination
	Myalup–Wellington Water Project	WA Government + Collie Water	WA	Planned	Water infrastructure, Water Storage, Distribution
	Alice Springs Flood Mitigation initiatives	NT Government	NT	Under construction	Water infrastructure, Flood defences
	Huia Water Treatment Plant Replacement	Government of New Zealand	New Zealand	Planned	Water infrastructure, Water treatment
	Central Interceptor	Government of New Zealand/ Auckland Council	New Zealand	Planned	Water infrastructure, Water Storage, Distribution
Green Buildings	Darling Quarter (formerly Darling Walk)	Lendlease	NSW	Complete	6-star Green Star - Design & As Built
	Australian Technology Park - Building 1 + 2	Mirvac	NSW	Planned/ under construction	Green Star - Registered
	Council House 2	City of Melbourne	VIC	Complete	6-star Green Star - Design & As Built
	New Horizons	Monash University	VIC	Complete	6-star Green Star - Design & As Built
	1 William Street	Cbus Property Pty Ltd	QLD	Complete	6-star Green Star - Design & As Built
	Brisbane Square Stage 2	Charter Hall Holdings Pty Ltd	QLD	Planned/ under construction	Green Star - Registered
	Festival Plaza Commercial Development	Walker Group Holdings Pty Ltd	SA	Under construction	Green Star - Registered
	The Hedberg + University of Tasmania, West Park Campus – Stage 2	University of Tasmania	TAS	Planned/ under construction	Green Star - Registered
	Christchurch Civic Building	Ngai Tahu Property	New Zealand	Complete	6-star Green Star - Office Design, Built & Interiors
	Commercial Bay Tower	Precinct Properties Downtown Limited	New Zealand	Under construction	Green Star - Registered

A more extensive list of the infrastructure project pipelines in Australia and New Zealand is available on the Climate Bonds Initiative website.

Green investment opportunities are growing

There is an infrastructure construction boom underway in Australia and New Zealand driven by ambitious infrastructure and energy development plans. Since the signing of the Paris Agreement, there has been an increasing demand from institutional investors for investment opportunities that address environmental challenges and support sustainable development.

Green infrastructure development in Australia and New Zealand presents a range of attractive green investment opportunities which provide unique risk-adjusted returns. In both countries, there is an increasing number of low-carbon transport, renewable energy, sustainable water infrastructure and green building projects in the pipeline. This report identifies nearly 400 projects and assets that could qualify for refinancing, additional financing, or new financing in the near- to long-term.

Existing funding allocations and traditional financing methods will not, however, adequately provide for this green pipeline. The Australian and New Zealand governments are developing policy interventions to attract further private investment to public sector infrastructure projects, but they must urgently increase their efforts.

There are growing opportunities to mobilise private capital to support green infrastructure by investing in debt, funds, equity-linked products and listed companies. Growing interest in green finance has resulted in the development and growth of dedicated green financial products including green bonds, green loans, social and sustainable bonds, green infrastructure investment trusts and 'green' index products.

Most Australian and New Zealand green bond issues have been certified under the Climate Bonds Standard, reflecting a strong leadership in setting international best practice. However, the 'green' label is not as widely applied to infrastructure as it could be.

With the increasing urgency to respond to the challenges of climate change, governments, the financial sector and industry need to increase their emphasis on policies and provision of low-emission, sustainable and resilient green infrastructure. The transition from polluting brown infrastructure to cleaner and greener assets needs to gain momentum with widespread support. This will ultimately help the Australian and New Zealand governments to reach their climate targets, spur innovation, broaden the economic base, and promote more sustainable economic and social well-being.

Sector	Definition	Context	Financing
Low-carbon transport	Low-carbon transport includes transportation modes and ancillary infrastructure that produce low or zero direct carbon emissions. For example, national and urban passenger rail and freight rail networks; Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.	Capital mobilisation for low-carbon transport continues to target the use of energy-efficient transportation and the development of low-carbon transport projects that reduce carbon emissions.	A variety of funding structures are available to encourage private sector involvement in the long-term financing required for such projects including green bonds, outright asset acquisitions, public-private partnerships and the securitisation of green assets.
Renewable energy	Renewable energy includes energy generation, transmission and storage technology that has low or zero carbon emissions. This can include solar energy, wind energy, bioenergy, hydropower, geothermal energy, marine energy or any other renewable energy source.	Both countries continue to lag behind other OECD member countries in GDP per capita investment in green energy. This trend is set to change, with 2017 a milestone year for renewable energy investment and development in both countries.	Renewable energy project developers and asset owners in Australia and New Zealand have access to a wide variety of funding options from banks, specialised project financiers, debt clubs, investment funds, direct investors and the capital markets.
Sustainable water management	Sustainable water management includes investments that reduce greenhouse gas emissions (water management is a major consumer of energy), address adaptation and increase the resilience of surrounding environments. This can include: water capture and collection, water storage, water treatment (with methane emissions treatment), flood defence, drought defence, stormwater management, and ecological restoration/management.	Climate change is leading to significant changes in rainfall distribution and water availability. Enhanced planning processes and increased upfront investment are required for water infrastructure in Australia and New Zealand to meet the challenges of climate change and rapid urbanisation.	Similar to the investment pathways for low-carbon transport, sustainable water infrastructure can be funded with green bonds issued by State Governments in Australia and Councils in New Zealand. Investment in the construction, ownership and refinancing of new types of infrastructure such as water desalination assets, commercial and industrial water infrastructure provide further options for investors.
Green buildings	To achieve global emission reductions under the Paris Agreement the built environment needs to see major reductions in emissions. Green buildings can be commercial or residential, new or upgraded. Low-carbon emissions performance is demonstrated through an accepted rating process, for example, Green Star certification.	The Australian and New Zealand property sectors are leading the world in sustainability performance. Green Star certified buildings in Australia have been shown to produce 62% less GHG emissions than average Australian buildings and consume 51% less potable water than if they had been built to meet minimum industry requirements.	Low-carbon residential and commercial buildings are an established asset class for private-sector investors. All types of financing instruments are used. Government owned green buildings have been financed with sub-sovereign green bonds. Funds have also been raised for energy efficiency upgrades.

Annex 1: Climate Bonds Taxonomy and Criteria

The Climate Bonds Taxonomy provides broad guidance for prospective green bond and climate bond issuers and investors. Guided by the Climate Science Advisory Panel, the aim of the Taxonomy is to encourage common definitions across global markets, in a way that supports the growth of a cohesive thematic bond market.

Climate Bond Certified

ENERGY	TRANSPORT	WATER	BUILDINGS	LAND USE & MARINE RESOURCES	INDUSTRY	WASTE	ICT
Solar	Private transport	Water monitoring	Residential	Agriculture	Cement production	Preparation	Broadband networks
Wind	Public passenger transport	Water storage	Commercial	Commercial Forestry	Steel, iron & aluminium production	Reuse	Telecommuting software and service
Geothermal	Freight rail	Water treatment	Products & systems for efficiency	Ecosystem conservation & restoration	Glass production	Recycling	Data hubs
Bioenergy	Aviation	Water distribution	Urban development	Fisheries & aquaculture	Chemical production	Biological treatment	Power management
Hydropower	Water-borne	Flood defence		Supply chain management	Fuel production	Waste to energy	
Marine Renewables		Nature-based solutions				Landfill	
Transmission & distribution						Radioactive waste management	
Storage							

Certification Criteria approved
Criteria under development
Due to commence

	Can be certified now	Criteria in development	TWGs launching soon
Energy	WIND, SOLAR, GEOTHERMAL, MARINE	HYDROPOWER, BIOENERGY	DISTRIBUTION & MANAGEMENT
Transport	RAIL, VEHICLES, BUS/RAPID TRANSIT		WATER TRANSPORT
Utilities	WATER	RECYCLING & REUSE, DISPOSAL	IT, COMMUNICATIONS
Buildings	RESIDENTIAL, COMMERCIAL		
Natural Resources		FORESTRY, AGRICULTURE, FISHERIES	
Industry			CEMENT, STEEL, MANUFACTURING & PROCESSING

Annex 2: Green debt instruments

Debt instruments	Use of proceeds	Rating	Australian and New Zealand example
Supra-nationals and sovereigns	Proceeds are allocated to nominated projects and assets.	Debt securities carry the credit rating of the issuing State. However, an independent rating may be assigned by ratings agencies.	No sovereign green bonds issued yet from Australia or New Zealand.
Green state treasury and municipal bonds (sub-sovereign green bonds)	Proceeds are allocated to nominated projects and assets within the sponsoring region.	Credit rating is based on that of the issuing municipality and the credit quality of the underlying assets.	Queensland Treasury Corporation issued a AUD750m 7-year green bond in 2017 to refinance solar energy, rail and cycle ways. Treasury Corporation of Victoria issued a AUD300m 5-year bond in 2016 for wind, solar, transport, buildings upgrades and water infrastructure. Auckland Council issued a NZD200m 5-year bond in 2018 to finance electrified railway infrastructure.
General obligation green bond	Proceeds are allocated on nominated projects and assets.	As the green bonds are backed by balance sheet assets, the bond will carry the credit rating of the issuing entity.	ANZ issued a AUD600m 5-year bond in 2015 to fund low carbon buildings, wind and solar.
Green revenue bond	Proceeds are allocated on nominated projects and assets.	As the green bonds are backed at least partially by the revenue stream, bonds carry the credit rating of the issuing entity.	No specific green revenue bonds have been issued yet but Auckland Council's NZD200m obligation bond is secured on expected rates revenue collection of the council.
Green securitisation or green tranches in ABS and MBS deals	Proceeds are allocated on nominated projects and assets.	Debt securities backed by a pool of underlying assets; an independent credit rating is issued by a rating agency.	FlexiGroup has done three ABS deals with green tranches, mostly senior (Class A) for the refinancing of solar rooftops but in its 2018 deal it placed a B note too. NAB provides an RMBS example. Global examples of green securitisations include Obvion's three Green Storm RMBS.
Green structured finance	Proceeds are allocated on nominated projects and assets.	Debt securities backed by a pool of underlying assets; an independent credit rating is issued by a rating agency.	National Australia Bank placed AUD200m of secured notes for the refinancing of wind and solar assets in June 2018. The structure is backed by loans to Australian renewable energy developers.
Green project bond	Proceeds are allocated on nominated projects and assets.	Credit rating is based on the quality of the backing green assets and the returns stream of the underlying project.	No green project bonds issued yet.
Green loans, syndicated loans and credit lines	Provides lending to encourage market development in climate-aligned sectors in line with the Climate Bonds Taxonomy and in compliance with the Green Loan Principles.	Interest rates are based on borrower credit scores or an ESG score assigned by an ESG rating agency.	Macquarie Group has issued a green revolver and a green green term loan. Contact Energy's green debt includes a variety of credit facilities. Syndication deals currently underway for wind and solar construction could be labelled green (currently not).
Mezzanine and subordinated debt	Proceeds are allocated on nominated projects and assets.	Hybrid capital investments, from development banks seeking to support private investment in the senior debt or from investors with a higher risk appetite.	Mezzanine finance facility of EUR245m provided by AMP Capital to Neoen a renewable-energy provider.

Annex 3: Green equity instruments

Equity instruments	Use of proceeds	Structure	Australian and New Zealand example
Private equity buyout, venture capital and unlisted equity funds	Fund allocations to innovative pilot-scale green projects including for qualified green infrastructure.	Aid project developers and entrepreneurs to secure a funding stream for green projects. PE often incorporates green indicators into process.	The Clean Energy Innovation Fund in April of 2017 invested AUD5m in Zen Ecosystems' series-B funding round.
Public equity	Allocations towards mature green technologies such as solar, wind energy and particularly infrastructure.	Primarily stock including green-bond linked products and pureplay investments. Additional capital in the form of government expenditure.	Last November, New Energy Solar raised in its initial public offering AUD200m.
YieldCos	Use of proceeds to fund a portfolio of off-balance sheet green certified energy projects.	Publicly traded vehicle consisting of pools of long-term cash-generating green assets, often with tax advantages.	Limited activity in Australia or New Zealand.
Mezzanine and preferred stock (Green B-shares)	Hybrid financing typically from development banks and international finance institutions supported by subordination of equity tranches.	Capital market investments in a hybrid debt-equity tranche.	AMP Capital's GBP37m mezzanine investment stake in a GBP247m refinancing of UK solar parks.[174] [175]
Senior equity tranches	Purchase of equity stakes in projects of strategic social and environmental importance.	Structured senior investment grade equity tranches geared towards risk-averse investors.	The CEFC committed AUD100m to an agricultural fund of Macquarie Infrastructure and Real Assets, targeting improved on-farm energy efficiency and reduced carbon emissions.
Junior equity tranches and equity guarantees (Green C-shares)	Junior subordinated equity tranche, from investors or grant agencies, often to serve as catalytic capital.	Fully subordinated first-loss capital or in the case of public companies, common stock.	The CEFC uses these instruments.

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Electronic version
The electronic version of this report and related information, including a list of infrastructure projects in Australia and New Zealand, can be retrieved from https://www.climatebonds.net/resources/reports/green-infrastructure-investment-opportunities-australia-and-new-zealand#

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Macquarie Group is a diversified financial group providing clients with asset management and finance, banking, advisory and risk and capital solutions across debt, equity, energy and commodities. Macquarie is committed to supporting the growth of the global green economy. As one of the world's largest investors in renewable energy, we have invested or arranged over AUD20bn of capital into renewable projects globally since 2010. Macquarie Capital is a leading equity investor, participant and sponsor in the development and construction of global renewable energy infrastructure assets. From battery storage in California and biomass-fuelled power in the UK, to solar in Japan, wind in Australia and waste-to-energy in Asia, we're delivering some of the largest and most innovative renewable projects globally. The ideas, capital and expertise of Macquarie and its Green Investment Group are powering green opportunities across Asia Pacific and around the world.

The **CEFC** is responsible for investing AUD10bn in clean energy projects on behalf of the Australian Government. Our goal is to help lower Australia's carbon emissions by investing in renewable energy, energy efficiency and low emissions technologies. We also support innovative start-up companies through the Clean Energy Innovation Fund. Across our portfolio, we deliver a positive return to taxpayers. The CEFC has been a major investor in climate bonds in Australia supporting the growth of the market. Climate bonds have enormous potential to unlock new finance to support increased investment across the clean energy sector. The CEFC is working with issuers to demonstrate the investment potential of Australia's emerging climate bond market.

At **Commonwealth Bank of Australia** we recognise our role in supporting long-term investment in low-carbon and renewable infrastructure and in accelerating the growth of climate bonds in Australia. In FY17 we arranged AUD 1.02 billion of climate bonds including Australia's first green asset-backed securitisation and the world's first climate bond from a tertiary education institution. We led more than AUD 2 billion of green and sustainability notes in FY18 for clients across the globe, one transaction being China Development Bank's inaugural offshore green bond. Our Energy Efficient Equipment Finance program continues to help businesses fund energy efficient vehicles, equipment and projects and in FY18 our lending exposure to the renewable energy sector grew to AUD 3.7 billion. In January 2018, the Global 100 Index named Commonwealth Bank the most sustainable business in Australia for the third consecutive year.

Established 160 years ago, **NAB** today serves 9 million customers in Australia, New Zealand, and around the world, including in our key trading and investment markets of Asia, UK and USA. We recognise that climate change is a significant risk and a major challenge for the global economy, and for society. As a global provider of financial products and services, we seek to play a key role in financing the transition to a low-carbon economy, and to innovate across all of our key sectors and markets to support low-carbon opportunities for our customers. NAB has been at the forefront of the green, social, and sustainability bond markets in Australia since 2011, recognised as both a 'Green Bond Pioneer' and 'Australian Sustainability Debt House of the Year'. In 2017, NAB committed to increasing environmental financing for customers from AUD18bn by 2022 to AUD55bn by 2025. Our goal is to make a positive and lasting impact on the lives of our customers, people, shareholders, communities, and our environment.

Westpac is Australia's first bank and oldest company, serving over 13 million customers. We have a long history of sustainability leadership, having been ranked as the world's most sustainable bank in the Dow Jones Sustainability Index ten times since the Index was first established in 1999. 2018 marks a decade since we released our first climate change position statement. Westpac has a long-term lending target of AUD25bn to climate change solutions by 2030 – a sign of our commitment to help businesses and individual customers respond to climate change. We have lent more than AUD8.5bn (total committed exposure) to climate change solutions, as at 1H18. Over the past two years, Westpac has provided committed funding supporting over AUD4.5bn of capital investment in Australian renewable energy projects with a total generation capacity in excess of 2.5GW which, when complete, will generate sufficient electricity to power over 1.4 million homes. Renewables now represent over 70% of our lending to the electricity generation sector. We have also played a prominent role in developing the AUD green bond market since facilitating its opening with World Bank's 2014 green issue.

Climate Bonds INITIATIVE

"Westpac recognises that climate change is an economic issue as well as an environmental issue, and banks have an important role to play in assisting the Australian and New Zealand economies' transition to net zero emissions. Increasing green bonds, green loans and green underwriting is a vital part of the mix, as is supporting new issuers to come to market."

Lyn Cobley, Chief Executive, Westpac Institutional Bank

"With record levels of transport infrastructure investment, it is often overlooked, the importance of the role this new infrastructure plays in reducing emissions and creating a more sustainable environment. Commonwealth Bank recognises this and is proud of its record in financing modern, future-proofed, transport infrastructure that promotes energy efficiency at its very core. Green bonds, working alongside traditional forms of finance, will ensure the continued funding of energy efficient infrastructure."

Andrew Hinchliff, Group Executive, Institutional Banking and Markets, Commonwealth Bank of Australia

"There is increasing focus in the infrastructure investment community on the opportunities that green investment brings. Across renewable energy, sustainable transport, green buildings and sustainable communities; financial investors, corporates and governments are all looking for ways to facilitate and participate in the transition to a low-carbon economy."

John Pickhaver, Co-Head of Macquarie Capital, Australia and New Zealand, Macquarie Group

"The Australian and New Zealand green bond markets are representative of global best practice. The markets are underpinned by a diversity of issuance and innovation in use of proceeds, a strong commitment towards transparency, with high levels of international certification. ANZ is working with investors to build confidence in market fundamentals and directions. The scale of green infrastructure investments expected to be made in Australia, coupled with strong investor demand, make the prospects for growth in green bonds bright."

Christina Tonkin, Managing Director, Loans & Specialised Finance, ANZ

"Our goal is to make a positive and lasting impact on the lives of our customers, people, shareholders, communities, and our environment – and our customers are telling us they want to participate in the transition to a low-carbon economy. We're continually developing and offering innovative green finance tools that enable investors to back major renewable energy projects alongside NAB, and we find new ways to support companies that deliver green infrastructure projects around the world."

Mike Baird , NAB Chief Customer Officer, Corporate and Institutional Banking, NAB

ANZ · CEFC Clean Energy Finance Corp · CommonwealthBank of Australia · Macquarie · nab · 200 years

Bank of New Zealand · GIIC Green Infrastructure Investment Coalition · ifm investors · Investor Group on Climate Change · PRI Principles for Responsible Investment · riaa Responsible Investment Association Australasia

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