Risk report

As Australia's largest financial institution, the Board and management of the Bank understand that effective risk management is important to the financial wellbeing of our customers and the broader economy.

Risk management is about understanding the uncertainties facing our organisation, and developing strategies to benefit from them, or minimise their impact on the achievement of our purpose and strategy. With factors such as the advancement of new emerging technologies, shifting societal expectations, elevated regulatory oversight, uncertain macroeconomic conditions, changing environment and competitive landscape, banks are increasingly exposed to greater levels of uncertainty and therefore require innovative and robust risk management practices.

The financial risks of the Group have traditionally been well managed. We proactively manage the credit quality of our portfolios and maintain a strong liquidity and capital position to deliver strong and sustainable returns for our shareholders.

However, in recent years a succession of conduct and compliance issues, followed by the findings of the APRA Prudential Inquiry in 2018, exposed a lack of maturity in the Group's non-financial risk management practices. The Financial Services Royal Commission further highlighted the impact of these weaknesses on the lives of individual Australians. As a result, the Board and management have committed to:

- enhancing our governance over non-financial risk and investing in new capabilities to strengthen our management of operational risk and compliance
- a change in the mindsets and behaviours of staff at all levels to earn the trust of our stakeholders
- a sustained improvement in our risk management practices.

To achieve these objectives we have identified and made good progress during the year on the following priority areas:

Enhancing our risk governance

Over the past year, the Board has been setting clearer expectations of the business so that it receives better quality information on risks to enable it to act quickly and decisively on that information.

Management has taken steps to improve the rigour of governance over non-financial risks by establishing a Non-Financial Risk Committee (NFRC) which is elevating the importance of non-financial risk and making it a top priority for the Executive Leadership Team. Our focus on identifying and understanding emerging risks, trends and issues across all of the Group's material risk types is also providing better insights to inform decision making.

Overview of our Risk Management Framework

The diagram on page 51 outlines the key components of the Risk Management Framework for managing the Group's Material Risk types; including the governance that enables Executive and Board oversight of these risks. This framework incorporates the requirements of the APRA prudential standard for risk management (CPS 220). Integral to our approach to managing risk is:

- the **Group Risk Appetite Statement** which articulates the type and degree of risk the Board is prepared to accept and the maximum level of risk that the institution must operate within; and
- the **Group Strategy** which articulates the Group's approach to the implementation of its strategic objectives.

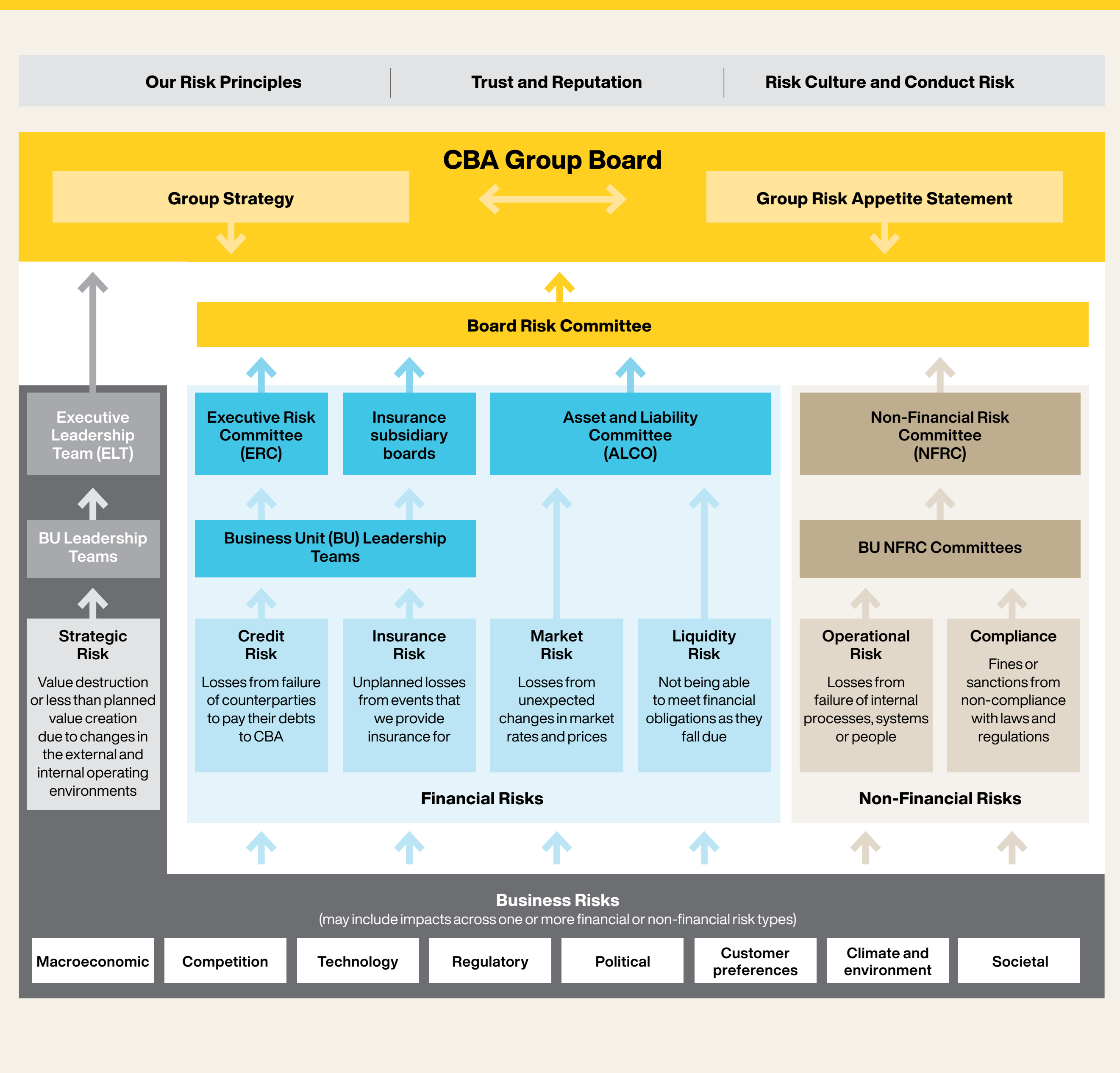
The framework is delivered by governance and reporting processes, risk policies and procedures, and our risk infrastructure (people, systems and processes).

The *Operating context* on page 8 outlines the material trends in our current external operating context which, together with their associated impacts on the Group's material risks, are receiving focus by the Executive and Board.

Our current internal operating context is characterised by the significant program of change across the Group to deliver on our strategic imperative of making the Bank simpler and better. The Group is managing this strategic program of change through strong governance structures over significant transformational initiatives, setting clear priorities for business areas and regularly monitoring the progress against our strategy. Failure to effectively manage this program of change could impact delivery of our strategy and result in increased regulatory oversight.

> "As Australia's largest financial institution, the Board and management of the Bank understand that effective risk management is important to the financial wellbeing of our customers and the broader economy."

Risk Management Framework



Refer to Note 9 in the *Financial report* on page 201 for further detail on the current risk exposures and the approach the Group takes to the management of its material risk types.

Risk report (continued)

Driving risk culture change across the Group

The Board and the Executive Leadership Team recognise their crucial role in setting the cultural tone of the Group. This includes leading a strong risk culture which the Group defines as being those beliefs, values and practices within the organisation that determine how our people identify, measure, govern and act upon risks.

A key priority of the Board and management is to ensure our risk culture is one of accountability, empowerment, constructive challenge, reflection and striving for best practice risk management. This will drive decisions that are lawful, ethical and lead to better customer and risk outcomes. We know that community confidence in us depends on this.

Over the last year the Board and the Executive Leadership Team have taken the time to better understand the drivers of our risk culture and have developed a methodology to formally and consistently assess this across the Group. This has allowed us to identify areas of development and establish a number of priority initiatives aimed at cascading the right tone from the top, connecting better with our customers and reinforcing our purpose and values. Supporting initiatives have also been targeted at lifting leadership capability, elevating risk experience and inspiring our people around the change required.

Reinforcing business ownership of risk outcomes

The Group believes that every employee needs to be a risk manager, and that the front line business is accountable for understanding and managing the risks of their business, to ensure conscious risk versus return decisions. To support business owners in taking greater accountability for the risks that they originate we have increased our risk resourcing and capability and focused on clarifying the differing risk accountabilities of business owners and risk specialists. We are also improving the processes used to manage risk across the Group. This includes improving risk controls and building capability to analyse the root causes of issues and incidents that have a negative impact on customers.

> "We are investing in risk systems and innovation to allow better risk identification, reporting and analytics capability to more deeply understand issues and complaints."

Elevating the status of the Risk Management function within the organisation

A strong and independent Risk function is a key enabler of robust business decisions. In support of this, a recent change agreed by the Board and Executive Leadership Team is that the Risk function will have a shared accountability with the business for risk decisions. In practice this is being achieved by extending Risk's mandate from 'reviewing and challenging' to 'approving' that decisions made by the business have consciously and robustly assessed the risks. This change in mandate strengthens the 'voice of risk', an issue that was highlighted in the APRA Prudential Inquiry report, and is currently being embedded into risk frameworks Group-wide. In addition, the following key initiatives are in progress to increase both the capabilities of the Risk function and those of the business owners:

- Investing in risk systems and innovation to allow better risk identification, reporting and analytics capability to more deeply understand issues and complaints.
- Implementing a number of data quality initiatives to improve the structure and quality of data to support reporting and risk decision making.
- Enhancing risk skills and capabilities to correct areas of under-investment in the management of non-financial risk.
- Simplifying risk policies, processes and tools and developing a common risk management language.

Strengthening our Conduct Risk framework

As part of our commitment to better customer and risk outcomes, we have developed a Code of Conduct to ensure all staff have a clear understanding of what acceptable conduct means. A core principle contained in our new Code of Conduct is to ensure we do the right thing by our customers by asking 'Should We?' when making decisions. This Code has become mandatory training for all CBA staff and the 'Should We?' test is being embedded in key processes across the Group, such as product development and review processes. This will make conduct an essential and embedded part of the disciplined control environment supporting our business decisions. Other focus areas have been improving the way customer complaints are reported, identifying systemic issues and fixing them and delivering consequences to employees whose actions lead to poor outcomes for customers.

We are confident that the continued focus on these priority areas over the next two years will result in a sustained improvement in the maturity of the Group's risk management practices and lead to better customer and risk outcomes.

Our material risks

We continuously develop and improve the Group's Risk Management Framework to ensure that it is robust and fit-for-purpose given the nature of the Group's business and that it supports our strategy of delivering balanced and sustainable outcomes for stakeholders. This means responding to evolving better risk management practices and the Group's operating context, including heightened global regulatory change and additional scrutiny which are trends that are likely to continue into the foreseeable future. The key actions we are taking for each of the Group's material risk types are described below.

Note 9 in the *Financial report* on page 201 provides a detailed definition of each material risk type, the applicable governing policies and key management committees, and the key limits, standard and measurement approaches for each risk type.

Risk type	Context	Key actions we are taking
Strategic Risk	• The external operating environment is changing at a rate and in ways not previously experienced (see the *Operating context* on page 8). In particular, the unprecedented changes in the competitor landscape, emerging technologies, societal expectations and required workforce capabilities expose the Group to Strategic Risk. • It is therefore increasingly important that, when developing and monitoring execution of strategic plans, we appropriately and consistently assess the aggregate impacts of the changing operating context across all of our material risk types.	• We have formalised the existing strategic risk practices through a Board approved strategic risk policy and associated procedures for identifying, monitoring, managing and reporting on strategic risk. • We have developed a more structured approach to the identification, management and oversight of emerging risks through the Non-Financial Risk Committee. • These stronger disciplines are being embedded into strategic and business planning and monitoring processes.
Credit Risk and Insurance Risk	• Macroeconomic uncertainty is leading to slow credit growth and low consumer confidence, which in turn is impacting discretionary spending. These factors, combined with historically low interest rates, elevates the need for robust credit policies, procedures and tools to support credit decisions in this new environment. • Economic factors impacting the housing market are particularly important given the Group's proportion of earnings from home lending. • As climate-related events, external policy decisions and community expectations around climate action become heightened, the potential long-term impacts of climate change on the credit and insurance portfolios needs to be factored into current origination and portfolio management decisions. • The Group is divesting its life insurance businesses and therefore will only retain general insurance risk into the future.	• The Group regularly reviews and adjusts credit limits and settings in response to changing economic conditions to ensure alignment with Group risk appetite. • Significant investment is underway to enhance the systems and data necessary for aggregation of exposures and for reporting and portfolio management, particularly in the non-retail parts of our business. • We are progressively performing climate change scenario analyses on our credit and insurance portfolios to understand potential impacts and how these can be factored into business decisions.
Liquidity Risk and Market Risk	• The Group has well designed and embedded frameworks in place to manage its liquidity and market risks. However, we recognise the need for ongoing vigilance to ensure the Bank is well positioned in the event of stressed liquidity or market conditions. • Macroeconomic uncertainties which could cause volatility in global markets, are heightened by the current environment of: – global trade disputes leading to geo-political instability and lower business confidence – interest rates remaining at historically low levels, with further falls expected.	• The Bank performs regular stress tests and scenario analyses covering adverse and severe operating conditions. This allows a better understanding of our liquidity and market risks to enable proactive risk based decisions. • In addition, the Bank maintains a diverse yet stable pool of potential funding sources across different currencies, geographies, entities and products. • We limit the amount of short-term wholesale funding sourced from offshore and the Bank maintains sufficient liquidity buffers and short-term funding capacity to withstand periods of disruption in long-term wholesale funding markets.

Risk report (continued)

Risk type	Context	Key actions we are taking
Operational Risk	• The 2018 APRA Prudential Inquiry exposed a lack of maturity in the Group's non-financial risk management practices. A comprehensive three-year Remedial Action Plan is in progress to strengthen the Group's operational risk framework. • Information security risks for the Group have increased in recent years due to: the evolution and development of new technologies; the Group's increasing use of digital channels; and the increased sophistication and broadened activities of cyber criminals. • The Group has a significant program of change to deliver a simpler, better bank. The complexity of current operations creates the risk of poor or slow execution which could impact the ability to execute our strategy effectively.	• Good progress has been made on enhancing our risk governance, driving risk culture change across the Group, reinforcing business ownership of risk outcomes and elevating the status of the Risk Management function within the organisation. This progress will continue over the next two years to ensure a sustained improvement in the maturity of the Group's risk management practices. • We continue to invest in our operational risk capabilities (in particular cybersecurity, data management and supplier management) to ensure they evolve in response to the Group's changing operating environment. We have a program in place to identify the Group's most critical data elements in order to drive appropriate quality and lineage, using our Data Management framework. • The significant program of change to deliver a simpler, better bank is being managed through strong governance and oversight over these transformational initiatives.
Compliance	• There is an increased risk of regulatory action (including enforcement action) or policy change which may negatively impact the Group's financial position or reputation. • Significant regulatory reforms are under development, across a number of jurisdictions that will strengthen the industry and improve customer outcomes. These could impact the Group's operations and financial performance. Examples include: – Open Banking to give consumers access to and control over their data – APRA and RBNZ's proposals to revise the capital framework for banks – conduct-related reforms such as product design and distribution obligations and greater prescription on responsible lending requirements – regulation arising from the Financial Services Royal Commission's recommendations.	• Progress continues through the Remedial Action Plan to strengthen the Compliance Management Framework, including resources and policies and procedures, and to ensure they are well embedded within business units. • A Code of Conduct has been developed and is being embedded across the Group. Conduct controls are also being strengthened across the business to address the increased expectations. • We have developed a new Regulatory Engagement Standard that drives engagement with regulators in an open and transparent way. • A financial crime compliance program is improving the quality of customer data and embedding financial crime policies and procedures into business practices.

Our approach to addressing climate change

As a provider of financial services – including lending, insurance and wealth management – the physical and transition impacts of climate change are strategically important to our business. We are taking a phased approach to identifying and managing both the risks and the opportunities.

We aim to disclose our progress, performance and plans in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

We are focusing on having the right policies in place, undertaking detailed analysis to better understand the risks and opportunities, developing and implementing strategic responses, building internal understanding and customer capabilities, and contributing to economy-wide initiatives.

Addressing climate change (continued)

	Phase 1-2 **Policy, due diligence, governance, analysis of portfolio risks and opportunities**	**Phase 3** **Extending scenario analysis, strategic responses, capability building**	**Phase 4** **Embedding climate considerations into strategy, business and risk management processes**
	Pre-FY19	**FY19**	**FY20-21**
Governance	• Climate Policy Position Statement[1] • Group Environment Policy[1] • Equator Principles III Report[1] • ESG Lending Commitments[1] • Responsible Investing Framework[1] • The Board governs climate risks and opportunities through the Risk Management Framework[2]	• Developed a Group Environmental and Social Policy with updated climate commitments, including: – continuing to reduce our exposures to thermal coal mining and coal fired power generation, with a view to exiting the sectors by 2030, subject to Australia having a secure energy platform – supporting the development of existing and emerging technologies that enable an accelerated transition to a low carbon future	• Review the Group Environmental and Social Policy to ensure alignment with the rapidly evolving nature of environmental and social issues • Review the Group Risk Appetite Statement • Review of climate-related roles and responsibilities
Strategy	• Commitment to support the objectives of the Paris Agreement • Climate scenario analysis: – Business lending: transition risks – FirstChoice Australian Share Fund: transition risks – Retail (home lending) and insurance: physical risks • Portfolio-level strategic responses	• Climate scenario analysis: – Agribusiness lending: physical risks • Portfolio-level strategic responses • Client engagement	• Climate scenario analysis: – Business lending: physical risks for other key portfolios – Retail (home lending) and insurance: transition risks – Investment portfolios: transition and physical risks • Further develop strategic responses • Client and customer engagement
Risk management	• Elevated climate as a strategic risk and a long-term driver of both financial and non-financial risks • Introduced an ESG Risk Assessment Tool, including climate and energy considerations, for business lending • Training on ESG risks, including climate, for business lenders • Established Energy Value Chain analysis	• Physical climate risk added to the ESG Risk Assessment Tool process for business lending • Reviewed clients within carbon sensitive sectors, based on FY18 scenario analysis, to better understand their management of climate risk • Updated Energy Value Chain Analysis	• Continue to update the ESG Risk Assessment Tool and build capabilities as stakeholder expectations and global developments evolve • Work with clients as they progress their transition strategies
Metrics and targets	• Emissions reduction target (Scope 1 and 2) • Assessed emissions in business lending portfolio • Low carbon project funding target of $15 billion by 2025	• Joined the global RE100 initiative and committed to sourcing 100% of our electricity needs from renewable energy by 2030 • Assessed emissions in business lending portfolio[3] • Progress on low carbon project funding target	• Continue to make progress on our RE100 commitment • Science-based emissions reduction target (Scope 1 and 2) • Assess emissions in business and retail lending and investment portfolios • Emissions reduction target (Scope 3) • Progress on low carbon project funding target

1 All policies are found at commbank.com.au/policies.
2 Further information on the Group's Risk Management Framework is provided on page 201.
3 Our assessed emissions reporting is available at commbank.com.au/CRreporting.

Climate governance

The Board directly oversees the management of the Bank's climate-related risks, opportunities and strategies.

Specifically, in the 2019 financial year the Board:

- reviewed and endorsed the Group's Environmental and Social Policy (E&S Policy), which outlines our approach to climate-related risks and opportunities
- monitored performance against our climate-related goals and targets
- reviewed and approved our climate-related strategy and disclosures.

The Executive Leadership Team (ELT) continues to be responsible for:

- directing the development and implementation of ESG policies, including climate
- overseeing progress, performance and reporting on climate
- leading external engagement and advocacy and helping customers and clients on climate-related matters.

Under our E&S Policy, business and support units across the Group are responsible for addressing specific climate-related impacts, risks and opportunities. Internal procedure documents provide clear guardrails and guidance on issue management and client activity.

An example of how this works in practice is our commitment to reducing our exposures to thermal coal mining and coal fired power generation. This applies to our Institutional Banking & Markets (IB&M) business which has accountability for adherence to, and implementation of, this part of the E&S Policy.

Climate strategy

To better understand potential climate change impacts, risks and opportunities for the Bank, and to build the resilience of our business and our customers, we are taking a phased approach to scenario analysis. We prioritise analysis of areas that are material to the Bank and to our customers. The results of our scenario analysis help inform our business and strategy planning.

The scenario analysis we undertook in 2018 has helped inform our strategic responses as follows:

	Physical risk		Transition risk	
FY18 focus	**Building insurance policies**	**Home loan portfolio**	**Business lending portfolio**	**FirstChoice Australian Share Fund**
Risks	Flooding, storms, extreme heat and drought, bushfires, sea level rise		Market, regulatory, legal, reputation, technology	
Progress during FY19	• We continue to focus on supporting sector-wide initiatives that enhance climate resilience and reduce disaster risk, including through our membership of the Climate Change Action Committee within the Insurance Council of Australia.	• We are developing a green mortgage initiative that rewards and encourages energy efficiency, by giving cashbacks to customers who use solar panels and make their homes more energy efficient. • We are building our capabilities to develop and implement business solutions that protect customers and the Bank from climate risk.	• We have incorporated physical climate risk into our ESG Risk Assessment Tool and ESG risk e-learning. • We have made a commitment to reducing our exposure to thermal coal mining and coal fired power generation, with a view to exiting the sectors by 2030, subject to Australia having a secure energy platform. • We are conducting deeper analysis on our lending to carbon sensitive sectors to understand how clients manage their carbon risk.	• We are investigating tools to display carbon risk within portfolios for use as an asset allocation tool. • We are working with an external specialist vendor to utilise its latest climate scenario model and receive reporting on climate-related risks within our portfolios.

Addressing climate change (continued)

Wealth management focus on climate

We continue to build capabilities across our wealth management businesses to manage climate and broader ESG risks on our customers' behalf, and to offer new investment solutions:

- Colonial First State (CFS) Investments measures and reports carbon emissions intensity (see page 61 for details).
- CommSec Pocket now enables investment in ETHI, an Exchange Traded Fund that invests in 100 large global stocks that are climate change leaders.
- Colonial First State Global Asset Management and Commonwealth Bank Group Super both report their climate governance, strategy, risk management and metrics in line with the TCFD[1].

FY19 climate scenario analysis – risks and opportunities in Australian agriculture

This year we conducted scenario analysis on the physical risks of climate change on our agribusiness lending portfolio. This reflects the important role Australia's farmers play in the nation's economy and for our business, and the sensitivity of the sector to changes in climate.

Farming under challenging climate conditions is not new to Australian farmers. Climate change however has the potential to increase the frequency of acute climate events such as floods and droughts, and to alter longer-term climate conditions which can impact farm productivity.

As a major lender to Australia's farmers[2] we have undertaken detailed scenario analysis to understand how climate change affects agriculture through acute and chronic shifts in temperature, humidity and rainfall. Our analysis enables us to understand the risks, identify ways to support our customers into the future, and contribute to building resilience in the sector.

What we did

We undertook a forward-looking assessment of climate-related factors that could impact the grains[3], livestock[4] and dairy[5] sectors which represent approximately 65% of our Australian agribusiness portfolio across Commonwealth Bank and Bankwest.

We worked with climate consultancy Energetics to simulate agricultural productivity against a range of potential climate conditions up to 2060, using models derived from peer reviewed scientific literature and industry research.

Impacts were assessed on both a 'do nothing' and 'adapt' basis to understand the extent to which the impacts of climate change could be mitigated. The analysis also incorporated economical viability, recognising that adaptation requires both investment and a willingness to change established practice.

A detailed outline of the methodology is provided on page 60. It remains important to note that scenario analysis considers the outcomes of a range of possible future pathways, based on assumptions, and is not a forecast or prediction.

1 Available at cfsgam.com.au and oursuperfund.com.au/annual-reports.
2 We conducted our analysis on the most recent client insights available. Group agriculture exposure was $22.4 billion at 31 December 2018 of which $11.2 billion was loans to Australian farmers.
3 Grains include cereals (e.g. wheat and sorghum), oilseeds (e.g. canola) and pulses (e.g. lupins and chickpeas).
4 Livestock includes beef cattle and sheep for wool and lamb.
5 Dairy includes dairy cattle only.

What we found

Grains

Current grain growing regions face the risk of potential farmer profitability declines by 2060, due to falls in productivity in many areas of up to 50% below the 2018 baseline levels, primarily due to changes in predicted rainfall (Figure 01). Adaptive measures can preserve current productivity levels in most regions, and even improve profitability up to 65% above the baseline in some regions (Figure 02). However, the trend of declining rainfall could result in some regions becoming significantly less viable for crop production in the long term.

Adaptive measures including breeding for improved tolerance to drought and heat could improve crop yields by up to 20% by 2060 for certain crops. Genetic modification can markedly increase crops' climate resilience, with the potential to improve the yield of some crops by up to 40% over the next 40 years. However, the use of genetically modified organisms (GMOs) is a controversial solution and is currently banned in parts of Australia.

Further developments in crop monitoring and management technology to maximise water efficiency and optimise activities are expected to boost productivity. Farmers can also shift the sowing window to optimise the growing season, and there is potential for further improvements.

Livestock

Livestock regions face significant farmer profitability declines by 2060, with falls of up to 40% due to a deterioration in pasture growth and quality (Figure 03). However, adaptive measures can significantly improve livestock production, with most regions able to convert an absolute decline in profitability to an improvement above the baseline by 2060. There is a cost to these adaptive measures, which may outweigh the benefits for some regions (Figure 04).

Potential adaptive measures include breeding for increased tolerance to heat and humidity, improving pasture quality in harsher conditions and cooling livestock by providing shade and water sprays. Developments in monitoring and management technology can maximise resource efficiency. An example is rotational grazing using virtual fencing technology. This maintains soil and pasture quality by reducing overgrazing. Genetic modification of pasture species has most potential in the south where pastures are typically not native.

Dairy

Dairy regions also face the risk of farmer profitability declines by 2060, with falls in most regions of up to 40% from baseline levels (Figure 05). A key risk for declining dairy profitability is the incidence of consecutive days of significant heat stress, measured using the Temperature Humidity Index (THI). After five such days in a row dairy cows can stop lactating, ceasing production.

Adaptive measures can significantly improve the situation for dairy production, with most regions projected to at least maintain baseline levels of profitability. As Figure 06 shows, in some regions a farmer profitability decline could be converted to an improvement of up to 40% above the baseline.

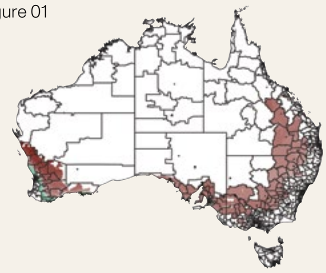
Breeding in *Bos indicus* genetics could increase tolerance to heat and humidity but may also lower milk yield, so uptake of this measure is likely to be delayed. Improved monitoring technology has the potential to maximise output, by optimising supplemental feed and the cooling of cows using shade and water sprays. Genetic modification of pasture or supplemental feed species can also potentially increase yield.

Climate simulation: impact on farm profitability by 2060

Grains

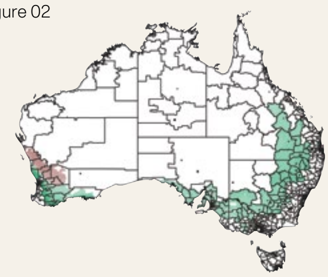
Worst case without adaptation

Figure 01



Worst case with adaptation (ex GMOs)

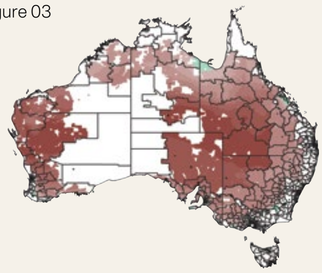
Figure 02



Livestock

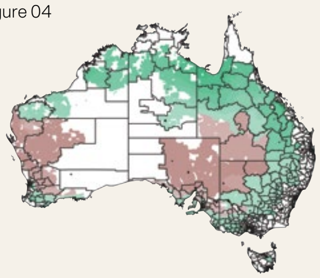
Worst case without adaptation

Figure 03



Worst case with adaptation (ex GMOs)

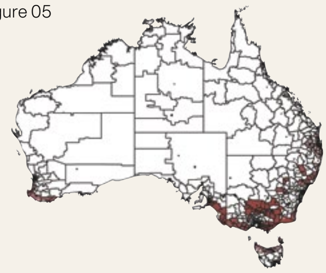
Figure 04



Dairy

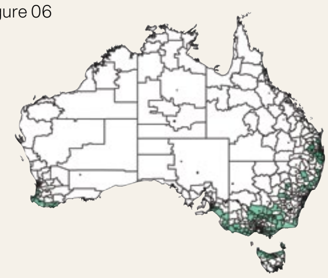
Worst case without adaptation

Figure 05



Worst case with adaptation (ex GMOs)

Figure 06



% change in farm profitability -50% +110%

Addressing climate change (continued)

How we are responding

We have estimated the impacts of the above potential changes on the credit quality of our portfolio. We found that while many customers are likely to be impacted by potential productivity falls due to climate change, in aggregate the impacts are not significant for our portfolio. Through our credit assessment, we have observed that our farmers are largely able to manage climate events within their financials, due to the buffers present in their current and future interest coverage ratios. With the right adaptive measures, and the right timing of their uptake, these impacts can be successfully mitigated by adaptation improving yields for farmers.

As a Group, we are using the findings of our analysis to inform the future management of our agriculture portfolio, including building better tools to manage and monitor our risks. We will focus on supporting our customers operating in those areas of Australia that, according to our modelling, will be significantly impacted by climate change. We are also engaging and upskilling our agribusiness teams through training, policies and toolkits, so that they are able to incorporate considerations of climate resilience and adaptation into conversations with our farming customers.

Methodology for agriculture portfolio physical risk scenario analysis

Climate change scenarios

Climate change impacts to each agriculture sector were assessed in response to multiple emissions pathways, climate scenarios and adaptation responses to capture a wide range of potential impacts. The Intergovernmental Panel on Climate Change's (IPCC) low (Representative Concentration Pathway 4.5) and high (RCP 8.5) global emissions pathways were considered as well as two climate models to provide a range of potential outcomes. Outcomes were then considered with and without the uptake of cost-effective adaptive measures. Altogether, 12 scenarios were considered, book-ended by a best case (low emissions pathway, climate model showing least change, full adaptation uptake, inclusive of GMO developments) and worst case (high emissions pathway, climate model showing most change and no adaptation uptake).

Impact models

Climate impact models were sourced for grains, dairy cattle and livestock based on a survey of Australian literature. The impact models are:

- Grains: a statistical relationship between productivity, seasonal rainfall and seasonal temperature was applied to historical and future climate data on a five kilometre grid.
- Livestock: a statistical relationship between productivity, seasonal rainfall and seasonal temperature was applied to historical and future climate data on a five kilometre grid.
- Dairy: a statistical relationship between productivity and seasonal rainfall, temperature and the Temperature-Humidity Index modelled at three sites by Dairy Australia was applied to the other five dairy regions.

Climate variables

The climate variables are:

- seasonal rainfall and temperature
- daily average temperature and humidity.

Additional climate variables and related environmental stressors are known to affect production but were assessed more broadly due to data and evidence limitations. These parameters include fire, cyclones, sea level rise, pests and diseases. As a result, our modelling of physical climate risk may understate the potential impact of climate change.

Outputs

Bounds were placed on the results of the statistical models to ensure that outputs were plausible. Results were filtered, using Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) land use data, to remove unused land such as deserts and waterways. The effects of climate change were expressed as percentage changes in productivity from a 2018 adjusted baseline to ensure relevance to the current day. Commodity prices were assumed to remain steady. In adaptation scenarios the change in profitability is the change in output post adaptation less the cost of adaptive measures.

Adaptation

Potential adaptive measures were researched for each agricultural sector. These include measures already taken up by some farmers but with potential for increased uptake, as well as measures not yet implemented but well researched. Additionally, an allowance was included for future technology not yet developed, projected to be available from around 2035. Adaptation uptake curves were developed for each representative commodity type based on the selected measures, their expected crop yield improvements, and costs to implement and uptake rates.

Credit risk

Using the profitability and productivity impacts, we were able to estimate how climate change could effect the credit risk metrics of our existing agribusiness customers. Using a driver based approach and our existing credit risk models we were able to assess the impact on the portfolio's probability of default. A number of simplifying assumptions were made for example, land values and commodity prices were held constant. As a consequence, the actual impacts may be greater or less than those calculated.

Data sources

Farm location information was obtained from the Australian Bureau of Statistics (ABS) Agricultural Census 2015-16. Other geographical information was obtained from the ABS, ABARES and other Australian Government agencies. Climate impact models were drawn from research by CSIRO, ABARES and Dairy Australia.

Limitations and uncertainties

This analysis is based on best available information. However, it is unable to overcome some important limitations and uncertainties. For example, climate change simulations currently have minimal ability to model extreme weather events. Similarly, agricultural impact models need to be further developed to test the bounds at which statistical relationships change.

Climate risk management

Climate-related, and wider environmental risk, is an important element of strategic risk which we identify, assess and manage via our risk management framework and ESG business practices.

Policy and processes

Our approach to climate risk management cascades down from our Group level policies via the frameworks for each material risk type, which are documented in the Group's Risk Management Framework (see page 201).

The requirements of these policies and frameworks are translated into sector/ portfolio controls and specific transaction and client level processes that support appropriate consideration of ESG risks in business decisions.

In particular, climate change is included as an area of special focus in our Group Environmental and Social Policy, which is underpinned by comprehensive procedure documents that govern and guide implementation across the Group.

Climate risk has the potential to create both financial and non-financial impacts for the Group, as its physical and transition impacts have the potential to affect our customers' ability to service and repay their loans, as well as the value of collateral the Bank holds to secure loans. These impacts include long-term changes in climatic conditions, extreme weather events, and the action taken by government, regulators or society more generally to transition to a low carbon economy. For more please refer to *Climate-related risk* in Note 9.2 of the *Financial report* on page 206.

Climate in our ESG risk assessment process

The Bank is a major provider of business loans. A key step in our credit risk due diligence for business lending is the assessment of potential transactions for ESG risks, including climate risk, through our ESG Risk Assessment Tool.

All Institutional Bank loans and large loans in other business units are subject to a compulsory ESG risk assessment. This must take place before a loan can be priced. The process includes an initial ESG risk assessment based on country of operations and more than 500 industry sectors. The overall ESG risk levels are aligned with the Equator Principles' risk categories A, B and C. Additional ESG due diligence is required for transactions which have medium or high ESG risks identified in the initial assessment.

Along with climate and energy as focus areas, we now include physical climate risk in our ESG risk assessment process. This means loans are reviewed to understand how clients are managing their carbon impacts and climate resilience.

There is compulsory training on ESG Fundamentals and the ESG Risk Assessment Tool for all our Institutional Banking and Business Banking client facing roles, plus the credit risk teams.

Assessing the emissions in our investments and business lending

To understand the concentration of our carbon-related exposures we measure the carbon intensity of equity investments, our exposure to companies in the energy value chain, and the overall emissions we finance through our business lending portfolio.

Carbon emissions of equity investments in FirstChoice investment options

In line with our commitment to reduce our own emissions we measure the climate – related risks of our investments. For our equity investments in the MySuper products[1], from June 2016, we see a continued downward trend in carbon emissions per $100,000 invested.

In the largest cohort of our FirstChoice Employer Super offer, (FirstChoice Employer 1970-74), emissions have gone from 32.2 tCO_2-e at 30 June 2018 to 30.6 tCO_2-e at 30 June 2019[2]. This is equivalent to a reduction from 6.8 cars driven daily for a year to 6.5 cars[3].

For our multi manager equity portfolios, our FirstChoice Australian Share emissions stood at 18.9 tCO_2-e per $100,000 invested and FirstChoice Global Share was a lower 14.2 tCO_2-e (4 cars compared to 3 cars) at 30 June 2019.

Another measure of carbon is carbon intensity. This measures carbon emissions normalised by sales revenue to allow for comparison between companies of different sizes. From June 2018 to June 2019 the carbon intensity of First Choice Employer 1970-74 has changed from 360.4 tCO_2-e/$ revenue to 325.7 tCO_2-e/$ revenue.

At June 2018, FirstChoice Australian Share had a carbon intensity of 326.5 tCO_2-e/$ revenue compared to 230.4 tCO_2-e/$ revenue at June 2019. FirstChoice Global Share also reduced its carbon intensity, from 209.0 tCO_2-e/$ revenue in June 2018 to 148.4 tCO_2-e/$ revenue in June 2019.

1 On 16 March 2019 we updated the Commonwealth Essential Super age based investment option, known as the 'Lifestage option', to be more tailored to the member's age. This means the asset allocation is in line with that of the Lifestage option in FirstChoice Employer Super. Both MySuper products will therefore have the same emissions per $100,000 going forward and will not be reported separately.

2 The equivalent number of cars data is sourced from the *United States Environmental Protection Agency Greenhouse Gas Equivalencies Calculator.*

3 Carbon emissions data is provided and calculated by MSCI Inc. MSCI collects reported Scope 1 and Scope 2 emissions from each company. Only 60% of companies in the global equities universe report their greenhouse gas emissions, so MSCI estimates the remaining 40%.

Addressing climate change (continued)

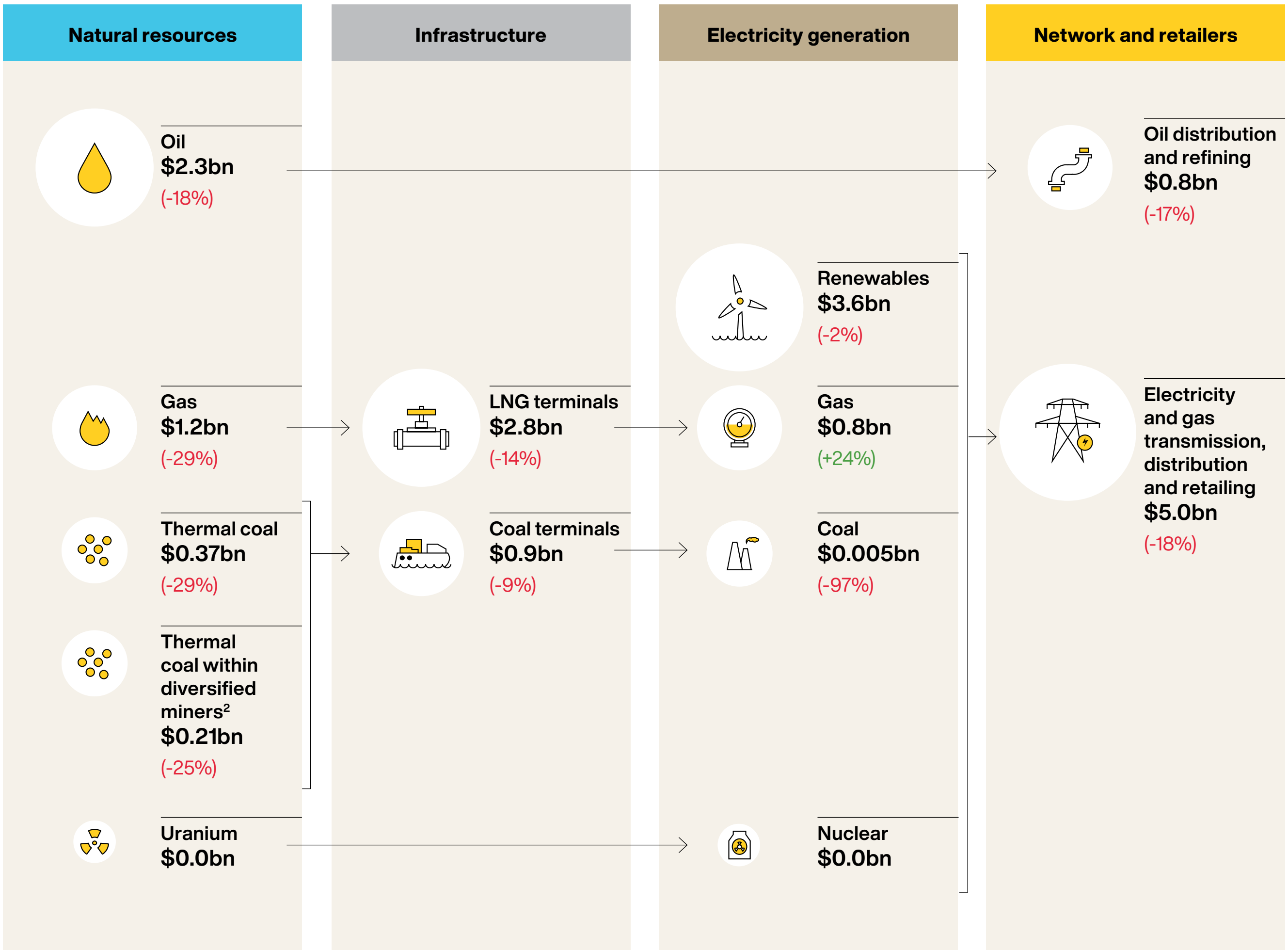
Energy value chain

For increased transparency, we have disclosed our exposure to thermal and metallurgical coal mining separately and we have detailed our exposure to thermal and metallurgical coal within diversified miners.

As part of our review of the diversified miners, we have classified exposures to coal subsidiaries of diversified miners to thermal and metallurgical coal directly.

Our exposure to metallurgical coal mining is $7 million and our exposure to diversified miners allocated to metallurgical coal mining is $82 million (not included below).

Exposures as at 30 June 2019[1]



Key: (+%) (-%)
Change since FY18

1 All figures are Total Committed Exposures (TCE) as at 30 June 2019. Figures represented have been specifically derived based on material client exposures. Not included are 'Other energy-related' exposures ($0.8 billion) which comprise smaller loans and exposure to energy trading entities.

2 Thermal coal exposure within each diversified miner is calculated as the Group's exposure to the miner, excluding exposure to coal subsidiaries, multiplied by the percentage EBITDA contribution of thermal coal in its latest annual financial statements. Exposure to coal subsidiaries of diversified miners are allocated to thermal coal.

Assessed emissions in our business lending portfolio

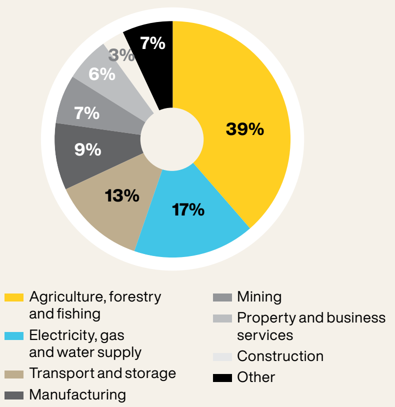
As a major provider of lending services, we play a crucial role in supporting economic and social development. We also recognise the role we play in addressing the challenge of climate change and in supporting the transition to a low carbon economy. As a result, we continue to assess the emissions arising from our business lending across Commonwealth Bank, ASB and Bankwest.

The emissions intensity of our overall business lending portfolio has continued to trend downwards, and has decreased in FY18 by 7.4% to 0.26 $kgCO_2$-e/$ of expenditure. Most sectors have shown a decrease in emissions intensity in FY18.

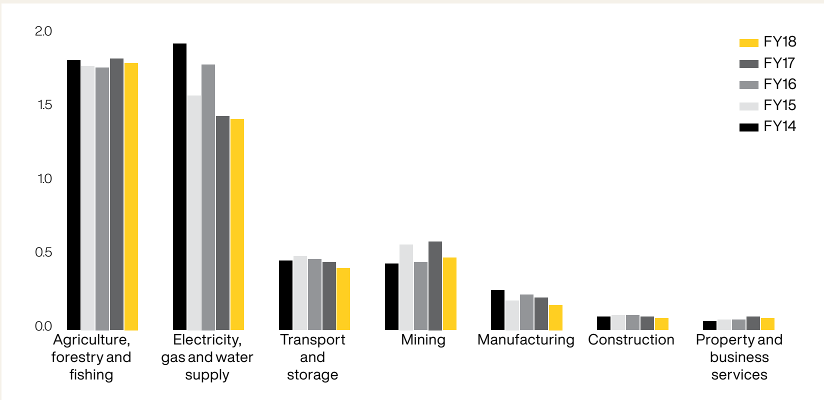
The Agriculture, Forestry and Fishing sectors represent the most emissions intensive part of our business lending portfolio.

The Electricity, Gas and Water Supply sectors show a general downward trend. The discontinuation of a number of high emissions intensive exposures contributed to this result in FY18. Our exposure to renewables increased 33% to $3.7 billion in FY18. A portion of the exposure included projects under construction which are typically initially more emissions intensive than operational renewable electricity assets.

CBA Group business lending
% of emissions by sector



Emissions intensity of expenditure ($kgCO_2$-e/$): key sectors



The full assessed emissions analysis including the detailed methodology is available at commbank.com.au/CRreporting

Climate metrics and targets

We report regularly on key metrics to measure our progress and to provide transparency to our stakeholders.

During the year we signed up, as the first Australian corporate, to RE100. This commits us to source 100% of our electricity consumption from renewable sources by 2030. As a first step in that process, as of June 2019 we are sourcing 65% of our national needs from the Sapphire Wind Farm in New South Wales. The table below shows the latest progress against our climate-related targets.

Metric	Target	FY19 progress
Low carbon target	$15 billion by 2025	$5.1 billion committed exposure as at 30 June 2019[2]
Sourcing renewable energy for our power needs	100% by 2030	65%
Emissions per FTE (Australia)	2.0 tCO_2-e by 2020	2.1 tCO_2-e
Solar panels on branches[1]	1,250 kW by 2020	1,105 kW
Assessed emissions in our business lending portfolio	An average emissions intensity decrease of our business lending portfolio consistent with our commitment to a net zero emissions economy by 2050	0.26 $kgCO_2$-e/$ of expenditure (2018 financial year)

For a full set of our *Environmental, customer, social and governance metrics* (including PwC's external assurance statement) see page 297.

1 A real time portal which displays data on how our network of solar equipped branches is performing can be accessed at cbasolarpower.com.au.
2 Reported exposure in the FY18 Annual Report (page 57) was $7.3 billion. A review found this was overstated and the correct FY18 figure for low carbon project funding was $4.6 billion.