Climate-related impacts

Artist impression of Suncorp headquarters being built using Boral's ENVISIA® and Aspire® lower carbon concretes. Photo courtesy of Mirvac.

SCOPE 1 AND 2

Absolute GHG emissions

2.2m

tonnes CO_2-e

↓ 8%

in FY2020

GHG emissions intensity

329

tonnes CO_2-e

↓ 6%

in FY2020

We are progressing strategies to leverage the opportunities of a lower carbon economy and to further mitigate our climate change risks.

We are committed to playing our role in addressing climate change. We support the 2015 Paris Agreement objective of limiting global warming to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further, to 1.5°C.

As a construction materials and building products company with a footprint in 17 countries, our greenhouse gas (GHG) emissions totalled 2.2 million tonnes CO_2-e in FY2020. On a divisional level, Boral Australia accounted for 78% of the Group's Scope 1 and 2 GHG emissions, with clinker manufacturing accounting for 45%, while Boral North America and USG Boral accounted for about 11% each.

Over the past 15 years, we have substantially reduced our carbon footprint. Our strategy has been to reduce our exposure to high-cost, capital- and energy-intensive manufacturing. This has included exiting bricks and sub-scale clinker production, in addition to improving operating and energy efficiency.

Since FY2005, we have reduced our Scope 1 and 2 emissions in Australia by around 44%. We achieved this largely by realigning our portfolio away from emissions-intensive businesses and reducing clinker manufacturing in Australia. Instead, we have been importing it from more efficient and larger scale operations in Asia.[1] Including Boral North America, our Scope 1 and 2 emissions decreased by 47% between FY2005 and FY2020.

1. Following the closure of Boral's clinker manufacturing plant at Waurn Ponds, Victoria in 2013, we have imported clinker from Asia. The emissions intensity of our Waurn Ponds clinker manufacturing operations in FY2013 was 0.98 tonnes CO_2-e per tonne of production. In FY2020, the emissions intensity of our imported clinker, included as Scope 3 emissions, is 0.96 tonnes CO_2-e per tonne of production, including shipping to the Port of Geelong (a 2% reduction in GHG emissions).

Committed to transparent engagement

During the year, we continued to constructively engage with investor representatives on climate change, including Climate Action 100+ and other stakeholders.

This engagement gives us valuable opportunities to understand the evolving expectations of our stakeholders, and to share our progress and response to the opportunities and challenges of climate change.

Strategy

Our approach to addressing climate change is focused on three interrelated priorities:

- **reduce the carbon footprint of our operations and value chain**
- **grow revenue from lower carbon construction materials and building products**
- **strengthen resilience by mitigating our climate change risks.**

In FY2018, we set three climate-related goals:

- reduce our GHG emissions intensity (tonnes GHG/$m revenue) by 10–20% by FY2023
- deliver annual growth in share of revenue from lower carbon, high-recycled-content products, and
- reduce CO_2-e in the supply chain by 1.1–1.5 million tonnes by increasing fly ash supply by FY2022.

Our performance against these targets is outlined on page 40.

In FY2020, we continued to strengthen our approach to managing and reporting on the risks associated with climate change. We:

- reduced our absolute Scope 1 and 2 GHG emissions by a further 8% to 2.2 million tonnes CO_2-e and GHG emissions intensity by 6%
- made further progress towards full alignment with the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). This includes strengthening the quality of our Scope 3 GHG emissions data and reporting, and commencing our physical climate-related risk scenario analysis, and
- broadened our reporting of GHG emissions and energy metrics to increase alignment with the Sustainability Accounting Standards Board (SASB) standard for the construction materials industry.

Review of carbon emission reduction targets

In FY2020, we undertook a review of longer term carbon emissions reduction targets consistent with the Science-based Target initiative (SBTi) methodology, including early development of possible emissions reduction pathways. In FY2021, we will conduct further analysis of possible pathways to strengthen our confidence in meeting science-based targets.

Importantly, in FY2021, we will complete the necessary work to adopt science-based targets and carbon emissions reduction pathways, taking into account the outcomes of the portfolio review that is currently underway and to ensure alignment with Boral's broader sustainability and business strategy.

We will also consider the ongoing appropriateness of our existing carbon emissions intensity and fly ash based supply chain targets in light of the reset business strategy.

Boral Cement carbon abatement initiatives

Boral Cement accounted for nearly 60% of Boral's Scope 1 and 2 emissions and about 36% of our 3.1 million tonnes of Scope 3 emissions in FY2020.

Accordingly, many of the significant opportunities for emissions abatement are within the Boral Cement business. In FY2019, we identified abatement projects that have the potential to reduce Boral Cement's Scope 1 and 2 emissions by about 20%, equivalent to about 300,000 tonnes CO_2-e – see 2019 Boral Review for further information.

Some of these projects, accounting for about 100,000 tonnes in carbon emissions abatement opportunities, were assessed as high priority, based on our initial assessment of their feasibility at nil carbon price.

Low-carbon fuels program

In FY2020, our solid waste-derived fuels (SWDFs) facility at Berrima reduced our coal-related emissions by 25,000 tonnes CO_2-e, compared to 30,000 tonnes in the prior year. SWDFs used include wood residues – such as untreated sawdust, pallets, bark chips and mill off-cuts – and refuse-derived fuels sourced from commercial waste such as paper, cardboard and packaging.

The carbon abatement in FY2020 was less than anticipated due to supply interruptions with SWDFs.

A further increase in the capacity of the low-carbon fuels facility will be achieved through investment in a chloride bypass. Following approval of a $4.6 million grant from the NSW Government, an important milestone in expanding the low-carbon program, preliminary design work on the chloride bypass has commenced.

Climate-related impacts (continued)

During the year, we continued to progress these projects. They include:

- increasing capacity of the Berrima low-carbon fuels program and investigating further low-carbon fuels programs
- investigating upgrading the Berrima facility to enable waste heat recovery
- implementing energy efficiency opportunities, including with projects related to process dust collector efficiencies, compressor optimisation and optimising cement grinding
- working towards maximising limestone mineral addition in cements, and
- reducing the clinker-to-cement ratio by replacing clinker with a greater proportion of supplementary cementitious materials.

We are working to access and secure higher volumes of usable fly ash and slag as a cementitious substitute material in Australia. We have commenced construction of a fly ash off-take facility at the Tarong Power Station in Queensland, with the aim of bringing it to market by 2022.

TCFD-based scenario analysis roadmap

We recognise that undertaking TCFD-based scenario analysis is a key step to obtaining greater insight into the potential future risks and opportunities of climate change. It enables us to adapt Boral's strategy to strengthen our resilience to climate-related risks and the transition to a low-carbon economy.

Based on the outcomes of a climate-related risks and opportunities review completed in 2019, we established a two-year roadmap to use comprehensive TCFD-based scenario analysis to further assess our most significant climate-related risks. This supplements the climate-related transition risk scenario analysis Boral Cement completed in FY2019 – we presented the outcome of this work in our 2019 Boral Review.

We planned to complete the scenario analysis of our physical climate-related risks in FY2020, and to commence work on the carbon pricing risk scenario analysis.

We completed the first stage of the physical scenario analysis work. However, the impacts and uncertainties of the COVID-19 pandemic meant management had to focus their efforts on crisis response, adapting to rapidly changing restrictions and business conditions, and taking decisive action.

With support from the Board HSE Committee, we suspended and delayed completion of the final stage of the physical climate-related scenario analysis and commencement of the carbon pricing risk scenario analysis by six months to FY2021.

This means that we have extended the timeline for completion of our scenario analysis roadmap to FY2022, rather than FY2021 – see table below.

The planned scenario analysis will enable us to assess key business risks identified under different climate-related and regulatory scenarios. The findings from this work will inform our business strategies and actions, and be incorporated into Group-level climate-related financial risk modelling.


Sourcing fly ash from a utility, Georgia, USA

Work done	✓ **Clinker** manufacturing transition risks ✓ Stage 1 of **climate-related physical risks** in key geographies	Findings integrated into strategic plans and Group-level climate-related financial risk modelling
FY2021–22 Work plan	• Stage 2 of **climate-related physical risks** in key geographies • **Carbon pricing risks** across Boral's supply chain • Availability and supply of **synthetic flue gas desulfurisation (FDG) gypsum** in USG Boral • Supply chain impacts on **Boral North America Fly Ash** from potential decline in coal-fired electricity generation	

Governance

Our approach to sustainability governance, including climate-related impacts, is outlined on page 27.

The Environmental Sustainability Governance Steering Group is responsible for coordinating and reviewing climate-related risks, strategy and reporting. The group, chaired by Boral's Group President HSE, Sustainability, Innovation & Operations Excellence comprises senior functional leaders, including from Group HSE, Group Risk and Investor Relations.

The group oversees the development of targets and implementation of Boral's climate-related scenario analysis roadmap. It also reviews and endorses recommendations to Boral's Executive Committee and the Board.

Climate-related information in this Sustainability Report, including performance against our targets and goals, is reviewed by this group, the CEO & Managing Director, the Board HSE Committee and the full Board.

Risk management

Climate change risks are incorporated into Boral's enterprise risk management (ERM) framework and processes. These processes include business-specific, bottom-up risk assessments, as well as top-down reviews. The Group Risk team works with business leaders and functional managers to ensure risks are adequately considered.

Group Risk reports quarterly to the Board Audit & Risk Committee on a range of risks, including specific risk reviews and divisional risk profiles. It also reports on Boral's organisation-wide risks at least once a year.

Climate change risks are incorporated as a standalone category of risk in our ERM framework. The severity of the risk is assessed using Boral's ERM risk scoring methodology, which assesses risks based on consequence and likelihood of occurrence. The consequence is rated according to a number of factors including potential financial impact.

Risks and opportunities

Physical risks

Across our global operations, flood and storm deluge are key physical risks.

More than 90% of our sites have been assessed for the risk of flooding. Over recent years, we have implemented further risk mitigation measures, including:

- installing additional pumping equipment at quarries as contingeny ahead of high rainfall events to improve our recovery response
- installing temporary backup power generators in case storms interrupt power supplies, and
- developing tailored flood emergency response plans.

The outcomes of the first stage of our climate physical risks scenario analysis outlined on pages 42–44 highlight the potential increased risk of heatwaves and drought in Australia and southern USA, and of heatwaves across Asia.

In Australia, the December 2019/ January 2020 bushfire crisis highlighted the increased risk of bushfires, accompanied by water scarcity and heatwaves. During 2019, eastern and southern Australia experienced average spring and summer temperatures 1.5°C higher than the long term average (1961–1990), accompanied by 40% lower rainfall.

Boral supporting NSW Rural Fire Service activities

Australian bushfire crisis

The Australian bushfire crisis in FY2020 devastated many communities, destroying more than 3,000 homes and razing close to 13 million hectares, causing extensive ecosystem losses. It also had a significant impact on our business.

Boral Australia reported 30% lower concrete volumes during January 2020 compared to the same period in the prior year, as severe smoke haze and evacuation orders across many regions hampered building and construction activity.

The ongoing drought that culminated in the bushfire crisis also had an impact on captured rainfall available for our quarries to use. We purchased about 110 megalitres of water between December 2019 and February 2020 to meet our operational needs, at an additional cost of $1.7 million.

Following a risk review of water stress in our Quarries business, we are investigating measures to mitigate the risk of future constrained water supply – see page 46.

Climate-related impacts (continued)

Physical risks – short term and ongoing

Potentially significant impacts/consequences	Key mitigation measures
Acute risks: Increased frequency and severity of extreme weather events, such as cyclones, precipitation causing floods or deluge, and bushfires	
Disrupted or reduced demand due to impacts on the prosperity of local economies and disruption to customer sites	• Geographically diverse operations and diverse end-markets
Disrupted logistics or supply chain may impact our ability to supply our customers and have raw materials delivered from impacted regions	• Geographically diverse operating network, which provides flexibility across a number of our businesses • Group Procurement considers supply risk and identifies alternative supply options for key raw materials
Property damage to key Boral operations may result in business interruption and require repairs to Boral operations. Property damage to key suppliers may result in temporary supply interruption for vital raw materials and/or significant cost increases	• Impact of physical damage to our buildings, plant, equipment and stock, and resulting lost profit, is mitigated through Boral's risk management, which includes working with our group insurers – this involves considering and implementing improvements such as business contingency plans • Raw material supply continuity plans in place at key sites
Environmental damage may result in fines, penalties and/or damage to Boral property and/or community, including waterways	• Environmental management system helps to identify and mitigate site-specific environmental risks via internal self-assessments and audits • Investment in stormwater infrastructure
Chronic risks: Shifts in climate including precipitation patterns, unseasonal weather variability, and rising mean temperatures and sea levels	
Constrained water supply due to prolonged drought may result in higher water costs and declining product demand from customers due to higher prices	• Establishing water targets and investigating measures to mitigate risk of constrained water supply – see page 46 • Continue to increase use of recycled water and on-site water harvesting and storage • Investigating alternative fugitive dust controls that reduce reliance on water
An increase in the number of rain-impacted days may significantly affect our customers' operations and, in turn, demand in Boral Australia's Concrete and Asphalt businesses, and our Fly Ash business in the USA, in particular increasing costs through operational inefficiencies	• Developing strategies to increase business resilience in the event of adverse weather
An increase in heatwaves and hot days could lead to migration, reduced product demand, decreased productivity and higher energy costs[1]	

Given that the typical expected life of our operations extends more than 20 years, we define short-, medium- and long-term climate-related risks as follows:

Short-term risks: 0–10 years

Medium-term risks: 10–20 years

Long-term risks: 20+ years

1. Boral works to comply with industry standards on ambient temperature for workers.

Transition risks – short term and ongoing

The following transition risks will be considered in our planned scenario analysis and/or have been considered in Boral Cement's clinker transition risk scenario analysis completed in FY2019.

Potentially significant impacts/consequences	Key mitigation measures
Carbon policy changes and potential introduction of regulatory pricing mechanisms and/or trading systems may impact cost of non-renewable energy and high-emission products	
Boral Cement: Demand may fall for clinker as costs rise due to exposure to a potential carbon price	• See pages 35–36 for progress on Boral Cement's decarbonisation initiatives
Boral North America: Supply of fly ash may fall and/or the cost may rise due to a decline in coal-fired power generation	• Target and comprehensive growth plans to expand supply
USG Boral: Supply of synthetic gypsum may decline and/or costs rise due to a decline in coal-fired power generation in Asia	• Investing in network flexibility; strengthening contracts with suppliers; and identifying network of alternative suppliers of raw materials, including natural gypsum
Energy policy changes may increase costs due to shifts in supplied energy mix (such as more renewables), driving up the cost of raw materials, either domestic or imported	• Investing in lower carbon fuels and energy efficiency initiatives • Actively monitoring policy and regulatory developments
Disruptive technology may affect our competitiveness, either through reduced demand or supply-side cost impacts	• Continue to invest in developing innovative lower carbon construction materials and building products – see pages 51–52
Building and construction industry standards changes may result in decreased demand for higher carbon products	• Boral Cement scenario analysis completed in FY2019 considered this risk • Continuing to invest in developing innovative lower carbon construction materials and building products

Opportunities

Increased building and construction rectification and remediation work

- More frequent extreme events may result in higher demand for rectification and remediation work. For example, Boral North America Roofing business benefited from increased re-roofing activity in Florida following Hurricane Irma in September 2017

Increasing demand for more resilient infrastructure and buildings

- In Australia, Boral's advanced lower carbon concrete range provides strength and long-term durability, outperforming conventional concretes
- In Boral North America, our concrete and clay tile roofing products offer greater resistance to extreme weather conditions than many other roofing materials

Capturing growth from changes in construction industry standards

- Building our capacity to develop and market more sustainable construction materials and building products – see pages 51–52
- Our Fly Ash business in the USA is well positioned to benefit from increasing substitution of cement in concrete production

Reduced energy costs

- Investment in low-carbon solid waste-derived fuels facility at Berrima is decreasing our energy costs and carbon footprint
- Continuing to explore opportunities to improve energy efficiency of operations, including investigating further low-carbon fuels programs in our cement business
- Boral Timber is progressing development of a project to convert timber sawmill residues into renewable diesel and bitumen

Climate-related impacts (continued)

Metrics and targets

Our targets

1. Reduce GHG **emissions intensity by 10–20% on FY2018 by FY2023**[1]

   ↓12% on FY2018

2. Deliver annual **growth in share of revenue from lower carbon, high-recycled-content products**[1]

   ↑2% to 15%

3. **Reduce CO_2-e in supply chain by 1.1–1.5 million tonnes** by increasing fly ash supply by FY2022[2]

   ↑ 0.2 million tonnes CO_2-e

In FY2020, Boral Group's Scope 1 and 2 emissions declined by 8% to 2.2 million tonnes CO_2-e compared to the prior year. This reflects the lower level of production overall across all three of our divisions. With demand uncertainty due to COVID-19, we curtailed production to avoid inventory build-up across most businesses. We also responded to government-mandated closures in Boral North America and USG Boral, as well as implementing temporary closures.

Boral Cement's carbon emissions were down 7% to 1.32 million tonnes. This reflected a three-week shut of the Berrima clinker kiln in June to manage inventory levels as sales were impacted by the COVID-19 pandemic, and unscheduled downtime earlier in the year.

Performance against targets

1 In FY2020, Boral Group's GHG emissions intensity reduced by 6% to 329 tonnes of CO_2-e per A$million of revenue compared to FY2019. This decline reflects overall lower levels of production and activity, with only a modest decline in underlying revenue.

Compared to FY2018, our GHG emissions intensity was down by 12%. Although this decrease is within our targeted FY2023 goal of a reduction in GHG emissions intensity of 10–20% on FY2018, we recognise that the reduction in FY2020 emissions significantly benefited from COVID-related impacts.

2 This year, we broadened our metric calculating share of lower carbon, high-recycled-content products (defined as having a minimum 40% recycled content) to consider our USG Boral division. In South Korea and China, USG Boral manufactures plasterboard using synthetic gypsum, a by-product of coal-fired power generation.

On this basis, our share of lower carbon and high-recycled-content products grew to 15% of underlying revenue, up from 13% in FY2019. See page 51 for a description of our lower carbon, high-recycled-content products.

3 GHG emissions avoided through the sale of fly ash in the USA were lower at 5.0 million tonnes[2], down from 5.2 million tonnes in FY2018. The supply of fly ash in FY2020 was impacted by unplanned intermittent power plant outages and permanent plant closures.

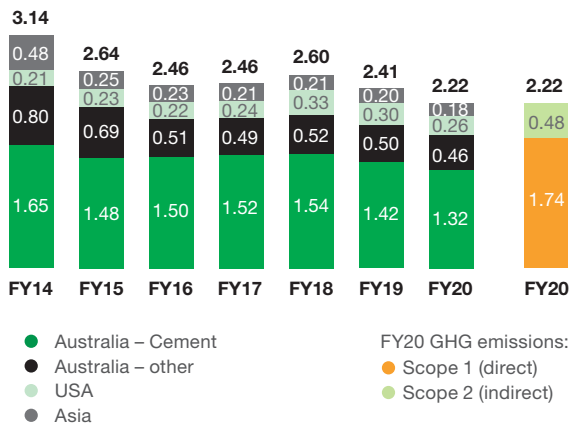
FY2020 GHG emissions[3]

tonnes CO_2-e

Scope 1 and 2	↓8% to 2.2m
Scope 3	3.1m

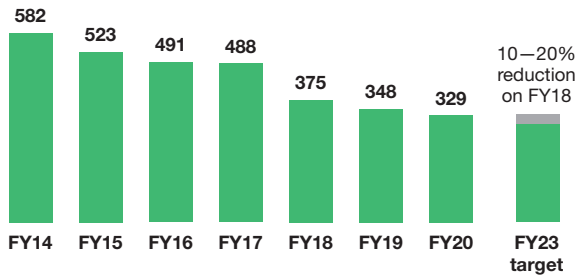
GHG emissions from operations[3,4]

(million tonnes CO_2-e)

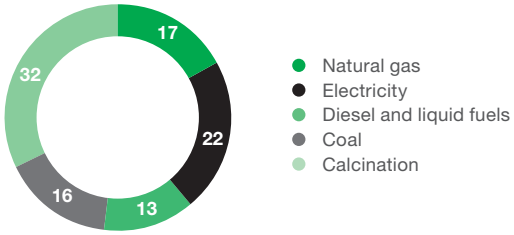


GHG emissions intensity from operations[1]

(tonnes CO_2-e per A$m revenue)



GHG emissions by fuel source[1] (%)



Scope 3

We consider each of the 15 categories of Scope 3 emissions as defined in the WRI Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (GHG Protocol). We focus our data capture efforts on those GHG emissions that are most material to Boral and that we have a greater ability to influence.

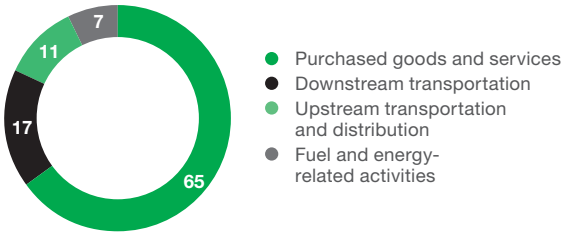
In FY2020, we continued to improve our data collection and refine our Scope 3 data methodologies. We worked with suppliers and other industry members to improve our assumptions and ensure our reporting is more aligned to the GHG Protocol.

Where more accurate data was available, we also restated our FY2019 Scope 3 emissions based on our more robust methodology. However, in some cases, insufficient data was available to facilitate this.

On this basis, our FY2020 Scope 3 GHG emissions were 3.1 million tonnes compared to 3.2 million tonnes CO_2-e in FY2019 (restated from 3.0 million tonnes).

In FY2020, approximately 65% or 2 million tonnes of Scope 3 emissions related to the purchase of raw materials – this includes clinker and cement in Boral Australia; cement, glass and plastic resin in Boral North America; and paper, metal and gypsum in USG Boral.

Scope 3 GHG emissions by category (%)



Energy

In FY2020, energy consumption across the Boral Group declined 7% on the prior year, reflecting lower levels of production, which were exacerbated by the impact of COVID-19.

At our low-carbon fuel facility at Berrima, the anticipated increased replacement of coal in FY2020 and higher contribution from biofuels wasn't achieved due to supply interruptions of SWDFs – see page 35.

Expenditure on energy and fuel was down 11% to A$315 million compared to the prior year, benefiting from lower energy consumption and lower unit cost of energy.

Energy consumption

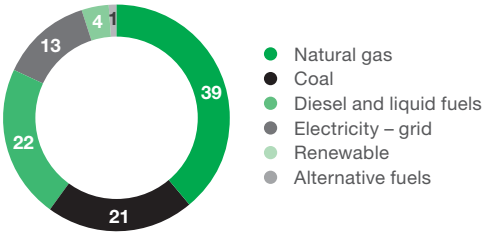
↓ 7%
to 19.2 PJ

Energy costs

↓ 11%
to A$315m

	Energy cost	Energy consumption (PJ)	
	FY2020	FY2020	FY2019
Boral Group	A$315m	19.2	20.6
Boral Australia	A$191m	11.6	12.1
Boral North America	US$41m	3.8	4.4
USG Boral	US$42m	3.8	4.1

Energy by fuel source (%)



See boral.com/sustainability for further data on Boral's energy and emissions.

WWW

1. Based on Group-reported revenue adjusted to include Boral's 50% share of underlying revenue from the USG Boral and Meridian Brick joint ventures, which are equity accounted.
2. We have used a conservative conversion factor to estimate CO_2-e emissions displaced as a result of fly ash substitution for cement in ready mix concrete, assuming that for every tonne of fly ash approximately 0.8 tonnes of CO_2-e is displaced. This conversion rate accounts for varying qualities of fly ash, and so assumes a substitution rate of 1.25 tonnes of fly ash per tonne of cement in ready mix concrete, and assumes 1 tonne of cement produced results in 1 tonne of carbon emissions.
3. GHG emissions from operations and energy consumption data excludes some joint ventures, which in aggregate are not deemed to have material emissions.
4. Data may not add due to rounding.

Climate-related impacts (continued)

Physical risk scenario analysis

We are undertaking our physical climate-related scenario analysis work in two stages.

The **first stage**, which was completed in FY2020, identified the geographic regions where Boral operates that are most vulnerable to the impacts of physical climate-related risks under various warming scenarios in the mid-century and end-of-century periods.

The **second stage**, which will be completed FY2021, will quantify the potential operational and financial impacts on Boral of an increase in climate hazards at a site and/or business level, considering existing mitigation measures and controls.

Boral undertook the first stage of the scenario analysis with the assistance of sustainability advisory business South Pole.[1]

This work involved:

- **a science-based assessment** of the expected change in climate hazards under two climate-warming scenarios for the regions where Boral has its most material operations: Australia, the US, South Korea, Thailand, Indonesia, China, Vietnam and India, and
- **a vulnerability screening** of our operations to assess the adverse macro-economic effects from the aggregated physical climate-related impacts in each of our countries of operation, under 2°C to 4°C warming scenarios.

Science-based assessment

The science-based assessment identified the change in severity and frequency of climate hazards from a baseline year or current conditions, to mid-century and end-of-century under two warming scenarios.

The two climate scenarios chosen are based on the Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5).

We considered the business as usual scenario (RCP 8.5), where global warming is likely to exceed 4°C by 2100, and the scenario where strong emissions mitigation actions are expected post 2040, and the global temperature increase is more likely to stay below 2°C by 2100 (RCP 4.5).

The **climate hazards** selected were based on the findings of the IPCC[2] and official governmental reports, and are:

- drought
- heatwaves
- bushfires
- heavy precipitation and rainfall triggered flooding
- tropical cyclones, and
- sea level rise and coastal flooding.

More than 60 recent scientific publications were reviewed to estimate expected changes in the relevant climate hazards across the eight countries assessed. The location of Boral's sites, such as proximity to the coast was taken into account.

Representative Concentration Pathways

IPCC AR5 outlines four Representative Concentration Pathways (RCPs) which describe different climate futures considered possible, depending on the volume of GHG emitted to 2100. The four pathways are RCP 8.5, RCP 6.0, RCP 4.5 and RCP 2.6, and are consistent with certain socio-economic assumptions.

	Mid-century (2046–2065) warming	End-of-century (2081–2100) warming	Assumes
RCP 8.5	2.0°C (1.4°C–2.6 °C)	3.7°C (2.6°C–4.8°C)	High global population and economic growth, absence of climate change policies, modest technological improvement in non-fossil fuel energy sources and minor improvements in energy efficiency, leading to global emissions nearly doubling today's levels by 2080.
RCP 4.5	1.4°C (0.9°C–2.0°C)	1.8°C (1.1°C–2.6°C)	Strong global mitigation actions, with significant technological and cost improvements in renewable energy sources, leading to global emissions that are half of today's levels by 2080.

1. South Pole is an international sustainability consultancy recognised for climate change and scenario analysis work.
2. IPCC, 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change*.
3. Based on Group reported revenue adjusted for Boral's 50% of underlying revenue from USG Boral and Meridian Brick joint ventures, which are not included in Group reported revenue.
4. Southeast – AL, FL, GA, KY, MS, NC, SC, TN, VA, WV; Southwest – AR, LA, OK, TX; West – AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY; Midwest – IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI; Northeast – CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VT.

For Australia and the US, climate hazards were further assessed on a regional basis.

Adopting a conservative approach, a **risk rating** was then applied to each hazard for each country/region, based on the change in *frequency, intensity and/or duration* of climate hazards under a business as usual scenario (RCP 8.5) for the mid-century and end-of-century periods.

The risk rating for each hazard was based on the strength of the climate change signal; that is, the degree of change from baseline or current conditions. The exact measure of the climate change signal depended on the hazard itself. For certain hazards, we determined the risk rating based on the relative change shown in the following table.

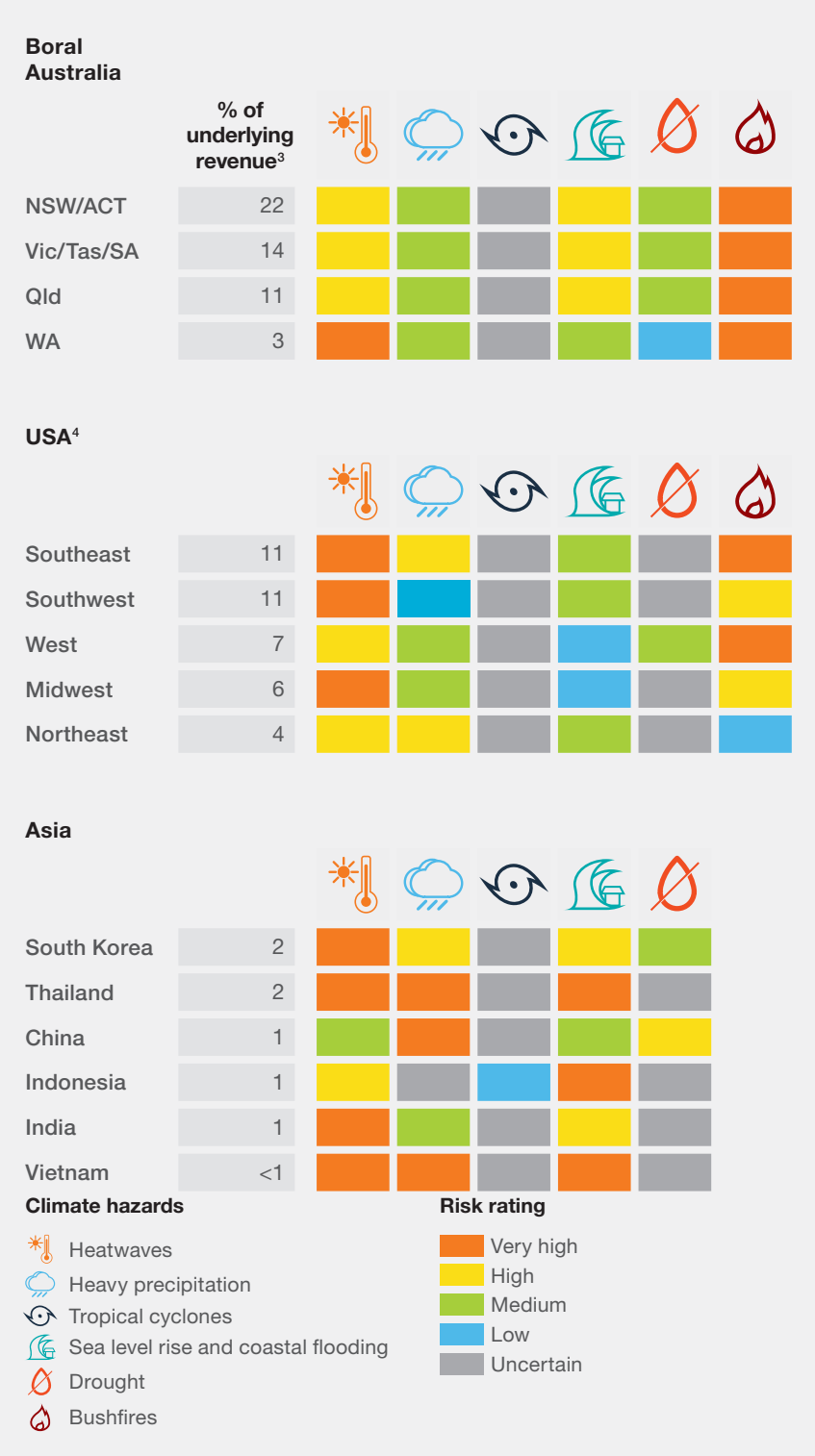
Low	below 10% change from baseline
Medium	10–20% change from baseline
High	20–30% change from baseline
Very high	above 30% change from baseline

Where there were contradictory research conclusions or insufficient data for a particular climate hazard, no risk rating was provided. In some cases, we evaluated the changes from a multi-hazard perspective, especially when assessing the risk of heavy precipitation and sea level rise.

Bushfire risk was not assessed for South East Asia, as it is not considered a significant risk and there is limited research on this climate hazard in that region.

The following graphic summarises the risk ratings for our countries/regions of operation over the mid-century period (2040–70) in a business as usual scenario (RCP 8.5).

Risk rating for 2040–70 horizon under RCP 8.5 warming scenario



Climate-related impacts (continued)

Wellcamp Quarry in Toowoomba, Queensland

Vulnerability screening

Boral largely supplies products and materials to local domestic building and construction markets in each country in which we operate. An increase in climate hazards and the resulting macroeconomic impact on that country is therefore expected to have an effect on our end-market demand.

The vulnerability screening aimed to assess the estimated adverse impact of increased climate hazards on the construction materials and building products sector in each country in which we operate, under 2–4°C warming scenarios. This considered:

- the adverse impact on each country's economic output, based on its vulnerability and readiness to adapt (referred as an ND-GAIN score[1]), and
- the most recent research on the potential physical impact of climate change on various sectors of each country's economy.

A risk rating (very low to very high) was attributed to our regional operations, based on the estimated adverse macroeconomic impact to the sector in each country/region.

Under a 2°C scenario, all of our operations were assessed as being at very low or low risk of adverse macroeconomic impacts.

However, under a 4°C scenario all developing countries in which we operate across South East Asia, as well as Mexico, were assessed as being at very high risk of adverse macroeconomic impacts.

This highlights the benefit – to the global economy and Boral's long-term position – of limiting warming to 2°C.

Next steps

In **stage two** of the physical climate-related scenario analysis, we will refine the country and regional heat maps to represent more granular geographic areas. We will also consider key individual operations and geographic clusters of sites to assess those with the highest vulnerability and highest likelihood of being affected by an increase in climate hazards. This analysis will include a baseline assessment, and will consider near-term and longer term risks out to mid-century for three warming scenarios: RCP 2.6[2], RCP 4.5 and RCP 8.5.

Stage two will include modelling the operational and financial impacts, considering aspects such as business interruption, property damage, environmental damage, water scarcity, decreased productivity, higher costs and end-market demand across the climate scenarios. This work will leverage historical operational and financial data showing how previous extreme weather events affected our business, and will assess current mitigation measures and controls.

We will use the results of this work to develop plans that further improve our resilience and our options for adapting to possible future climate change scenarios.

1. The score combines vulnerability and readiness to adapt to climate change into one number. Vulnerability is calculated using indicators on six topics: health, food, ecosystems, habitat, water and infrastructure. Readiness is calculated using three topics: social, economy and governance. University of Notre Dame Global Adaptation Index, Country Index. Technical Report, 2015.
2. RCP 2.6 represents a rapid transition scenario to a low emissions economy with global warming expected to be limited to below 2°C above pre-industrial levels by 2100.