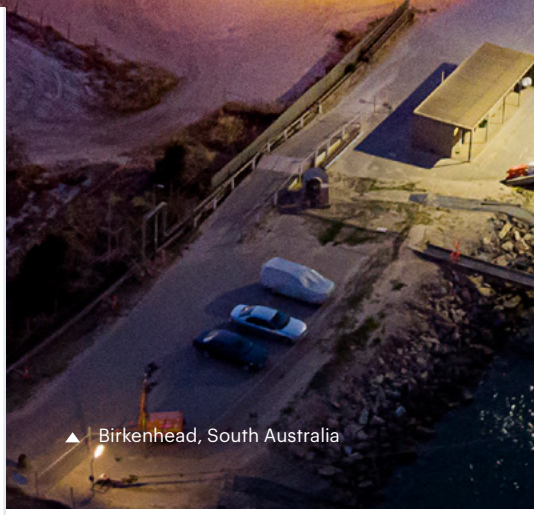
ADBRI
Building Australia since 1882

NET ZERO

Emissions Roadmap

NET ZERO

Adbri's goal to operate at net zero emissions by 2050 aligns with our purpose of *Building a Better Australia*.



▲ Birkenhead, South Australia

Acknowledgment of Country

We acknowledge the Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the lands and waters of Australia. We recognise their continuing custodianship of Country and culture and pay respect to their Elders past, present and emerging.

Disclaimer

This document has been prepared for the purpose of providing investors in Adbri Limited with information regarding the Company's long-term planning with respect to its climate change response. The Net Zero Emissions (NZE) Roadmap contains forward-looking statements and statements of opinion. These may include statements regarding climate change, transition scenarios, external enablers (including technology commercialisation, policy support, market support for lower carbon products, raw materials availability and energy availability), and actions of third parties. Such statements may be identified by the use of terminology including, but not limited to, `intend', `aim', `project', `see', `anticipate', `estimate', `plan', `objective', `believe', `expect', `commit', `may', `should', `need', `must', `will', `would', `continue', `forecast', `guidance', `trend' or similar words.

Any such statements speak only at the date of this Roadmap. Readers are cautioned not to place undue reliance on such statements, particularly in light of the long-time horizon which this Roadmap discusses and the inherent uncertainty in possible policy, market and technological developments in the future. No representation or warranty is made regarding the accuracy, completeness or reliability of the forward-looking statements or opinion, or the assumptions on which either is based. All such information is, by its nature, subject to significant uncertainties outside of the control of the Company, and actual results, circumstances and developments may differ materially from those expressed or implied in this Roadmap. There are also limitations with respect to scenario analysis, and it is difficult to predict which, if any, of the scenarios might eventuate. Scenario analysis is not an indication of probable outcomes and relies on assumptions that may or may not prove to be correct or eventuate. Except as required by applicable laws or regulations, the Company does not undertake to publicly update or review any forward-looking statements, whether as a result of new information or future events.

To the maximum extent permitted by law, the Company and its officers do not accept any liability for any loss arising from the use of the information contained in this Roadmap.

The information included in this Roadmap is not investment or financial product advice. Before making an investment decision, you should seek appropriate financial advice, which may take into account your particular investment needs, objectives and financial circumstances. Past performance is no guarantee of future performance.

Unless otherwise stated, the emissions data contained in the NZE Roadmap is reported as financial year (FY) 30 June, consistent with regulatory reporting requirements. Adbri's financial year is 31 December.

Introduction & overview

Our Net Zero Emissions Roadmap

Our short-term 2024 target

Scope 1 and 2 emissions

7% ↘

absolute reduction target by FY24 vs FY19

4% ↘

reduction achieved since FY19

32% ↘

reduction achieved since FY10

Our medium-term 2030 targets

Cement

20% ↘

reduction in cement emissions intensity kg CO_2e net/tonne of cement from a FY20 baseline of 557kg CO_2e net/tonne

Lime

10% ↘

reduction in lime emissions intensity kg CO_2e/tonne of lime from a FY20 baseline of 1,100kg CO_2e/tonne

Electricity

100% ↗

zero emissions electricity from a FY20 baseline of zero

Our actions

Reduce emissions

- Improve process and energy efficiency
- Increase use of alternative fuels
- Increase use of supplementary cementitious materials (SCMs)
- Grow expertise in breakthrough technologies

Create new products

- Develop new SCMs
- Innovate and develop lower carbon products
- Launch Environmental Product Declarations (EPDs) to inform choice
- Create product awareness to grow market demand

Collaborate with key partners

- Technology partners: innovation across our operations
- Customers: new product specifications
- Governments: policy settings
- Suppliers: inputs into our processes
- Joint venture partners: knowledge sharing and shared goals

Our long-term 2050 goal

Net zero emissions

A message from our leaders

"Achieving our goal of net zero emissions by 2050 is a priority for Adbri in delivering shareholder value. We are committed to taking decisive action on climate change in line with the expectations of our shareholders, customers and community."

Raymond Barro, Chairman

Adbri is a pioneering Australian manufacturing company. Since 1882, we have been *Building a Better Australia* by providing cement, lime, aggregates, concrete and masonry products to our customers and communities. Our success is tied to the sustainable growth of the Australian economy and the materials we produce are integral to supporting that growth.

Adbri's goal is to achieve net zero emissions by 2050, in line with the Paris Agreement. This is our first Net Zero Emissions (NZE) Roadmap and it sets out the targets and actions we will progress as we strive to decarbonise our business. The Roadmap builds on our strong performance to date – a 32% reduction in operational GHG emissions since FY10, with more than $50 million invested in projects delivering abatement outcomes over the past decade.

The NZE Roadmap has been guided by the scenario analysis disclosed in our Task Force on Climate-Related Financial Disclosures (TCFD) reporting in our *2020 Sustainability Report*. The analysis highlighted that the building, construction and materials sectors have a critical role to play supporting Australia's transition to a low carbon economy.

Adbri operates two emissions-intensive and hard-to-abate processes: the integrated manufacture of clinker and cement; and lime production that are critical to the economy. We believe that a strong Australian manufacturing sector is important for our country's future, especially following increased supply chain risks, and are committed to finding solutions to reduce our operational emissions from our manufacturing processes. Importing clinker would be an easy solution to reduce our Scope 1 emissions, however it would increase Scope 3 emissions and not reduce global emissions.

We have initially set medium-term targets for Scope 1 and Scope 2 emissions and intend to set a Scope 3 emissions target in the future. Our priority is to reduce emissions within our operations that meet our targets, rather than relying on offsets. Offsets may have a role to play if there are any residual emissions.

The *Australian Government's Low Emissions Technology Statement 2021* identified low emissions cement as one of its emerging technologies helping address Australia's key challenges, including decarbonising and expanding Australia's manufacturing base and supporting jobs.

We cannot advance climate change action alone. Government policy that creates the right framework for change is critical, coupled with real industry action and customer shifts. We are exploring options to expand our partnerships that accelerate the commercialisation of breakthrough technologies at scale needed for us to achieve our NZE goal.

We believe that success in implementing our NZE Roadmap can deliver value to shareholders, help us maintain the trust of our stakeholders, retain and attract employees while securing access to capital, resources and markets long into the future.

We will work diligently to implement our NZE Roadmap and will share our progress. We welcome all of our stakeholders to join us on this very important journey.

Nick Miller
Managing Director & CEO

Rebecca Irwin
Chief Sustainability & People Officer

Introduction & overview continued

Our business at a glance

An industry pioneer since 1882

Adbri produces and distributes cement, lime, concrete, aggregates, masonry products and industrial minerals that have helped build a better Australia for 140 years.

Today, Adbri is proudly one of this country's largest cement, lime, concrete and masonry producers.

Our business

1,500 people

200+ national locations[1]

63 quarries[1]

31 cement and lime facilities and depots[1]

108 concrete plants[1]

7 masonry facilities

Building a Better Australia

#1 Lime producer to the mineral processing sector

#2 Cement and clinker supplier to construction sector

#1 Concrete masonry products supplier

#4 Concrete and aggregates producer

Our strategic pillars

Safety

- We put safety first
- We care about each other's wellbeing
- We live by our Life Saving Rules
- Work Safe, Home Safe

Customer focus

- We deliver on our promises
- We are agile in meeting our customers' needs
- We build long-term partnerships that add value
- We act with integrity

Inclusivity

- We work together
- We embrace differences
- We respect and listen to each other
- We empower our people

Sustainable growth

- We create value for our investors and our communities
- We contribute to a sustainable future
- We learn and innovate
- We invest in our people

1. Includes joint ventures.

Our purpose

Building a Better Australia

Building a Better Australia is what we do at Adbri. It's how we contribute socially and economically as a company and as individuals.

Our promise

Always Ready

Key financials

Total revenue

$1.57b

Reported NPAT attributable to members

$116.7m

Total assets

$2.3b

The materials produced by Adbri are critical for Australia, today and tomorrow.

We envisage an Australian society in 2050 that will be smarter and more urbanised, connected and automated. This society will continue to demand cement, concrete and lime to meet its needs. Our manufacturing will continue to be essential to grow the Australian economy as we supply several key industries including construction, infrastructure, energy, mining, metallurgical processing and agriculture.

Cement and concrete remain essential in the transition to a low carbon economy, for example foundations of wind turbines; pumped hydro dams; tidal power installations; electricity transmission, distribution and sub-stations; mining, for example copper production; the built environment including hospitals, schools, and affordable housing; and new transport infrastructure, all rely on the standout qualities of cement and concrete.

We also expect lime to be essential in a low carbon world as it is used in construction activities, mineral processing, agriculture and environmental applications, including water treatment. There are no obvious products available today that can substitute for cement, concrete and lime in mainstream applications, at scale. A very high regulated carbon price may incentivise substitution in some markets, however we will seek to innovate to ensure that our products remain essential in the transition to a low carbon economy.

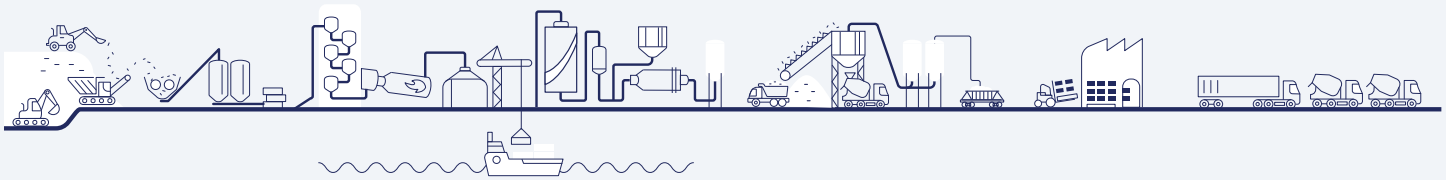
Introduction & overview continued

Our manufacturing processes

Our goal is net zero emissions by 2050. Understanding the source of emissions by activity and potential decarbonisation levers will assist us in achieving our goal.

Adbri's clinker, cement, concrete, aggregate and masonry processes

49% of our total operational emissions in FY20 (1,137 $ktCO_2e$).



Raw material extraction (incl. aggregate production)	Clinker production	Cement production	Concrete production	Masonry production	Transport & logistics
Share of emissions and source of emissions (%)					
3% – Onsite diesel – Electricity	**84%** – Process emissions (60%) – Kiln fuels (21%) – Electricity (3%) – Non-kiln fuels (<1%)	**8%** – Electricity	**<1%** – Electricity – Onsite diesel	**<1%** – Electricity – Onsite diesel	**3%** – Diesel for transport
Decarbonisation levers					
Process and energy efficiency improvements Zero emissions electricity Diesel reduction and replacement	Process and energy efficiency improvements Increase decarbonised raw feed Increase alternative fuels Zero emissions electricity Breakthrough technologies	Process and energy efficiency improvements Zero emissions electricity Increase use of SCMs Develop new SCMs	Process and energy efficiency improvements Zero emissions electricity Increase use of SCMs Develop new SCMs Diesel reduction and replacement	Process and energy efficiency improvements Zero emissions electricity Diesel reduction and replacement	Process and energy efficiency improvements Diesel reduction and replacement

Note: We have simplified our graphic illustrating our clinker, cement and concrete processes to activities that are accounted for within our operational boundary. Scope 3 emissions are not included and as such we have not shown clinker imports. One of our key actions for the near-term is to better understand our Scope 3 emissions and work with our partners and customers to set Scope 3 targets.

Adbri's lime manufacturing processes

51% of our total operational emissions in FY20 (1,196 $ktCO_2e$).

Raw material extraction
(incl. aggregate production)

Lime production

Share of emissions and source of emissions (%)

<1%
- Onsite diesel
- Electricity

60%
- Process emissions

35%
- Kiln fuels

<1%
- Non-kiln fuels

4%
- Electricity

Decarbonisation levers

Process and energy efficiency improvements

Zero emission electricity

Diesel reduction and replacement

Breakthrough technologies

Process and energy efficiency improvements

Explore options for alternative fuels

Fuel switching

Breakthrough technologies

Process and energy efficiency improvements

Diesel reduction and replacement

Process and energy efficiency improvements

Zero emissions electricity

Cement and concrete will continue to be essential for infrastructure such as hydro dams as we transition to a low carbon economy.

Net zero emissions goal

Our goal is to be net zero emissions by 2050.

It is a complex and challenging journey and we are striving towards a successful transition. Initially, the focus will be on our Scope 1 and Scope 2 emissions. This NZE Roadmap identifies the steps we aim to take towards reducing our Scope 1 and Scope 2 emissions to achieve our 2050 goal. As we build our engagement, capability, data systems and the necessary technology to measure, monitor and report Scope 3 emissions, we intend to develop a pathway to achieving net zero Scope 3 emissions in line with our 2050 goal.

Our short-term target is an absolute reduction target that was set as part of our Sustainability Framework, established in 2019 and covering the five-year period FY19–FY24. Our medium-term cement target is aligned to the 2021 Global Cement & Concrete Association (GCAA) members' commitment to reduce net cement emissions intensity by 20% by 2030 against a 2020 baseline. As our energy and GHG emissions data is reported to the Australian Government on a 30 June financial year, we have expressed our cement emissions target using FY20 as our baseline. Similarly, we have adopted FY20 for our medium-term targets for lime emissions intensity and electricity supply. Our long-term goal is an absolute reduction to achieve net zero emissions.

Taking action to reduce emissions means Adbri can better manage the risks of transitioning to a low carbon economy and take advantage of new opportunities. Our priority is emissions reductions from within our operations to meet our targets. We will assess whether offsets have a role to play to address residual emissions that can not be addressed through direct measures.

As customers transition to a low carbon economy, they are increasingly seeking options to use building construction materials with a lower carbon footprint. Ensuring Adbri is well placed to have products that meet these needs means we are positioned to deliver long-term shareholder value.

Targets		Scope 1	Scope 2	Scope 3
Short-term target FY24	7% absolute reduction in operational emissions by FY24 vs FY19 baseline	●	●	
Medium-term targets FY30	20% reduction in cement emissions intensity (kg CO_2e net/tonne) by FY30 vs FY20 baseline	●		
	10% reduction in lime emissions intensity (kg CO_2e/tonne) by FY30 vs FY20 baseline	●		
	100% zero emissions electricity[1] supply by FY30		●	
Long-term goal 2050[2]	Net zero emissions Scope 1 + Scope 2 + Scope 3	●	●	◌[3]

Scope 1

Emissions are greenhouse gas (GHG) emissions generated from the direct combustion of fuels, for example gas, diesel and coal and from process emissions within our sites where Adbri has operational control.

Scope 2

Emissions are indirect GHG emissions associated with the purchase of electricity for our sites where Adbri has operational control.

Scope 3

Emissions are all indirect GHG emissions across our value chain, excluding emissions from purchased electricity.

The targets are based on year end 30 June.

1. Zero emissions electricity includes electricity from renewable generation and emerging technologies such as power generation using hydrogen. In the event that firming capacity is required from non-renewable sources, we intend to offset the associated emissions.
2. Our long-term 2050 goal is heavily dependent on the commercialisation of breakthrough technologies to reduce Scope 1 emissions. While Adbri is committed to investing in the development of these essential breakthrough technologies, there may be impediments to their adoption in our operations that may affect our ability to meet our goal, such as retrofitting to our existing plants.
3. Our pathway to achieving net zero Scope 3 emissions remains under development.

Net zero emissions goal continued

Our indicative pathway to net zero emissions by 2050

Our pathway to NZE by 2050 is illustrated below for our Scope 1 and Scope 2 emissions. It highlights our historical success, our interim targets and pathway to 2050. The pathway is indicative only, as we know that the emissions reductions will not be linear due to the capital-intensive nature of our manufacturing. Year-on-year, we also expect variability in our absolute and intensity emissions performance due to production schedules, changing customer requirements and product mix, securing or losing contract volumes and the timing of abatement actions. There may be years where emissions increase as we work towards our 2050 goals.

In developing our NZE Roadmap, we drew on international and national experience from diverse organisations, such as the International Energy Agency (IEA), the International Panel on Climate Change (IPCC), Science Based Targets initiative (SBTi), Cement Industry Federation (CIF), Manufacturing Australia (MA) and the GCAA Transition Pathway Initiative (TPI).

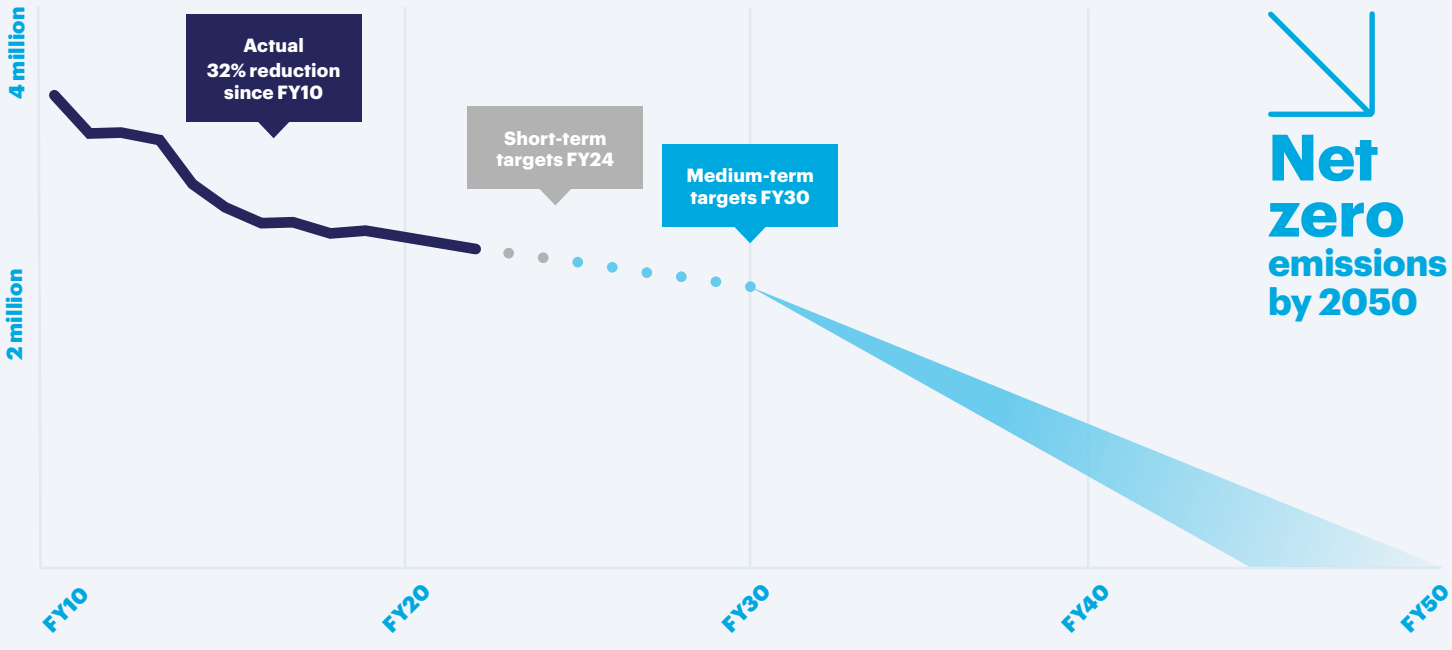
The SBTi has commenced work on a sectoral decarbonisation approach (SDA) for the cement sector and will be seeking industry views on the proposed approach. We are participating in the SBTi consultations. Once the new cement SDA is complete (expected in second half of 2022), we will review the methodology and assess how it may apply to our targets. At this stage, there is no SDA for the lime sector. There are limited industry-wide approaches to setting cement and lime emissions reduction targets.

Adbri is yet to set a target for Scope 3 emissions. As we progress our analysis of Scope 3 emissions, we plan to set an interim target which would be aligned with our long-term 2050 goal.

Since FY10, Adbri has reduced Scope 1 and Scope 2 GHG emissions by 32%.

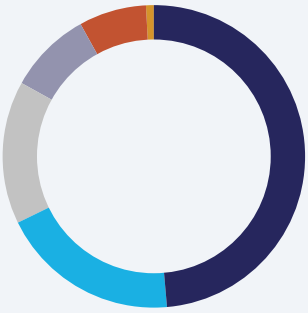
Adbri's indicative NZE pathway

Scope 1 and Scope 2 GHG emissions (tCO_2e)



Assumes:
Breakthrough technologies, such as carbon capture, storage (CCS), carbon capture, use and storage (CCUS), zero emissions process heat and zero emissions heavy vehicles, are commercialised and applicable to our operations post-2030.

Decarbonisation levers FY20–FY30[1]



49% Zero emissions electricity

19% Fuel switching

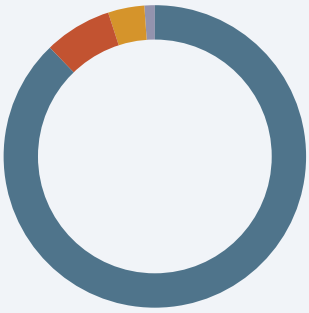
15% Increase alternative fuels

9% Process and energy efficiency improvements

7% Increase decarbonised raw feed

1% Diesel reduction and replacement

Decarbonisation levers FY30–FY50[1,2]



88% Breakthrough technologies

7% Increase decarbonised raw feed

4% Diesel reduction and replacement

<1% Process and energy efficiency improvements

1. The percentages represent the contribution of each lever to the estimated absolute emissions reduction in each timeframe.
2. Breakthrough technologies may include CCS/CCUS for the cement and lime sectors, zero emissions process heat, or other technologies that have yet to be identified.

Our NZE pathway is being approached in two stages. From 2020–2030, the priority is to deliver emissions reductions through conventional abatement approaches like process and energy efficiency, increasing the use of alternative fuels and a transition to zero emissions electricity. In parallel, we will also be building our capabilities in breakthrough technologies that will be required post-2030.

From 2030–2050, we will work to close the technology gap for our hard-to-abate clinker and lime manufacturing by supporting the development and de-risking of breakthrough technologies at scale, via partnerships in research and development (R&D) and potential pilot-scale demonstrations to accelerate commercial deployment. In this period, we will also look for further opportunities to substitute fossil fuels with zero emissions alternatives across our operations. Post 2030, zero-emission heavy vehicles are expected to become widely available.

The diagrams highlight the indicative, relative contributions of our actions to reduce our Scope 1 and Scope 2 emissions over the periods 2020–2030 and 2030–2050, based on our emissions profile in FY20.

▲ Hy-Tec concrete operations

Net zero emissions goal continued

Short-term 2024 targets

In 2019 we set out our Sustainability Framework, which includes a number of five-year targets.

On emissions reduction, our short-term target is a 7% absolute reduction in Scope 1 and Scope 2 emissions by FY24 vs FY19. Overall since FY19, we have achieved a 4% reduction. In FY21, we achieved a 2% reduction.

Our *2021 Sustainability Report* sets out in detail the targets in our Framework and our progress against them. In addition to our emissions reduction target, our Framework also includes targets for the use of alternative fuels in our South Australian kilns and targets for the use of supplementary cementitious materials (SCMs).

Our performance against these targets is summarised below.

Emissions reduction target

Targets for FY24 against FY19 base year	FY21	FY20	FY19
7% absolute reduction in Scope 1 + Scope 2 emissions (kt CO_2e)	2,289	2,333	2,387

Additional Sustainability Framework targets

Targets for FY24 against FY19 base year	FY21	FY20	FY19
50% kiln fuel to be sourced from alternative fuels in SA (%)[1]	25	25	23
Increase in supplementary cementitious material (SCM) (%) share of total cementitious sales to 24%[2]	20	21	21

1. Alternative fuels used at clinker production facilities are sourced from recovered materials that displace a portion of traditional virgin fossil fuels and reduce waste to landfill to support a circular economy.
2. The SCM target is based on 31 December calendar year performance.
3. The short-term target for alternative fuels is based on a financial year. Other data quoted is based on a calendar year.

Case study

Leader in alternative fuels

Adbri was the first company to utilise refuse derived fuel (RDF) for Australian cement manufacturing to reduce our reliance on traditional fossil fuels. RDF is processed waste material, primarily sourced from construction and demolition activities with smaller contributions from commercial and industrial activities, which provides an alternative fuel source. It has supported the creation of new businesses within the circular economy, reduced material to landfill and reduced the demand for fossil fuels.

We started using RDF at our Birkenhead plant in 2003. Since then, we have used 1.3 million tonnes of RDF, which has significantly reduced our use of gas and therefore our emissions and the cost per tonne to produce cement. Clinker kilns allow for a complete burn-out of waste-derived fuel with rapid combustion, long residence time and complete oxidisation of organic components.

The South Australian Environment Protection Authority (SA EPA) licence permits Adbri to use 25 tonnes of RDF per hour. We calculate that at this throughput, RDF could displace on average 40% of the total gas requirement at the Birkenhead plant across the calciner and the kiln. We increased our RDF substitution rate from about 28% in 2020 to about 35% in 2021[3].

In 2022 our target is up to 40%. We have a target of 50% by FY24, subject to consultation and regulatory approvals to achieve this increase.

Increasing our use of alternative fuels will allow Adbri to reduce the emissions intensity of our clinker production which will also have flow-on benefits in terms of reducing the emissions intensity of our cement and concrete products. As we continue to increase our use of alternative fuels, we will require policies that facilitate the circular economy, through the use of waste streams and by discouraging waste to be sent to landfill.

▲ RDF has been used at our Birkenhead plant since 2003

Lime is essential for a wide range of industries, including agriculture and environmental applications, as we transition to a low carbon economy.

Net zero emissions goal continued

Medium-term 2030 targets

Adbri has set three medium-term 2030 targets for cement, lime and electricity to reflect the main sources of our emissions. These individual targets provide greater transparency on the sources of our emissions and our actions to reduce them.

We have chosen an intensity target for cement to align with global industry practice that uses a FY20 baseline. Whilst the medium-term targets include intensity targets for cement and lime, our long-term 2050 goal is based on an absolute reduction in emissions.

Cement

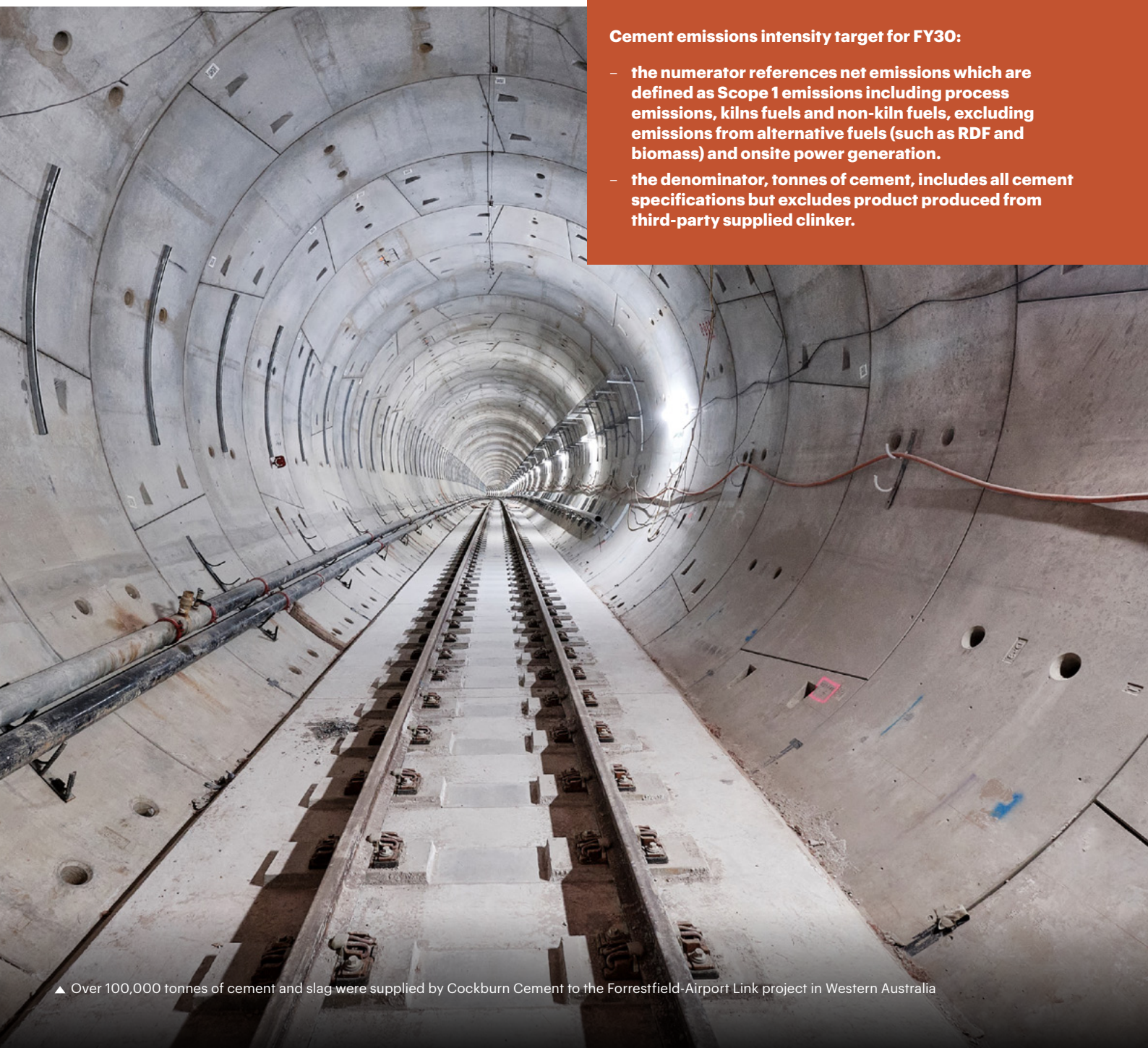
Adbri's cement manufacturing target based on net Scope 1 emissions is:

20% ↘

reduction in emissions intensity (kg CO_2e net) per tonne of cement by FY30 vs FY20 baseline

Cement emissions intensity target for FY30:

- **the numerator references net emissions which are defined as Scope 1 emissions including process emissions, kilns fuels and non-kiln fuels, excluding emissions from alternative fuels (such as RDF and biomass) and onsite power generation.**
- **the denominator, tonnes of cement, includes all cement specifications but excludes product produced from third-party supplied clinker.**



▲ Over 100,000 tonnes of cement and slag were supplied by Cockburn Cement to the Forrestfield-Airport Link project in Western Australia

Our target aligns with the GCCA commitments for its members[1] which provides a level of comparability for investors and other stakeholders. This is important as there are limited agreed benchmarks for the cement industry.

In the numerator, alternative fuels are excluded because the industry metric recognises the value of resource efficiency in the circular economy. By using alternative fuels, the demand for fossil fuels reduces. Onsite power generation is excluded for comparability across companies as some may purchase electricity from third parties or self-generate.

In the denominator, the tonnes of cement includes the production of cement from our Birkenhead and Angaston clinker, not from third-party supplied clinker. This is to ensure we are only reporting genuine long-term transformation of our Scope 1 emissions. Scope 2 emissions associated with clinker and cement manufacture are covered by the company-wide target for electricity procurement.

As shown below our historical performance demonstrates a positive trend over the past decade, reflecting our use of alternative fuels and our focus on continuous improvement in energy efficiency. In FY20, our cement emissions intensity was 557kg CO_2e net/tonne cement, 34% below our FY12 performance. Achieving our FY30 target of 446kg CO_2e net/tonne cement has the potential to deliver a 47% emissions reduction from FY12 to FY30. PwC has provided limited assurance for the baseline data (refer to p. 34).

We do not expect the future intensity trend line to FY30 will be linear. There will be yearly variability due to the mix of fuel sources used, including alternative fuels; the mix of cement products depending on specific customer demand; and the progress made on creating new lower carbon products with higher content of SCMs.

In FY21, the result was 568kg CO_2e net/tonne cement, a small increase in the cement emissions intensity compared to FY20 due to changes in the mix of cement products manufactured year-on-year.

The decarbonisation actions we will take to assist in meeting this target include:

- Increase decarbonated raw feed; for example, slag, to reduce process emissions in the integrated clinker/cement plants
- Increase use of alternative fuels in the integrated clinker/cement kilns
- Increase use of SCMs which will reduce the clinker inputs per tonne of cement.

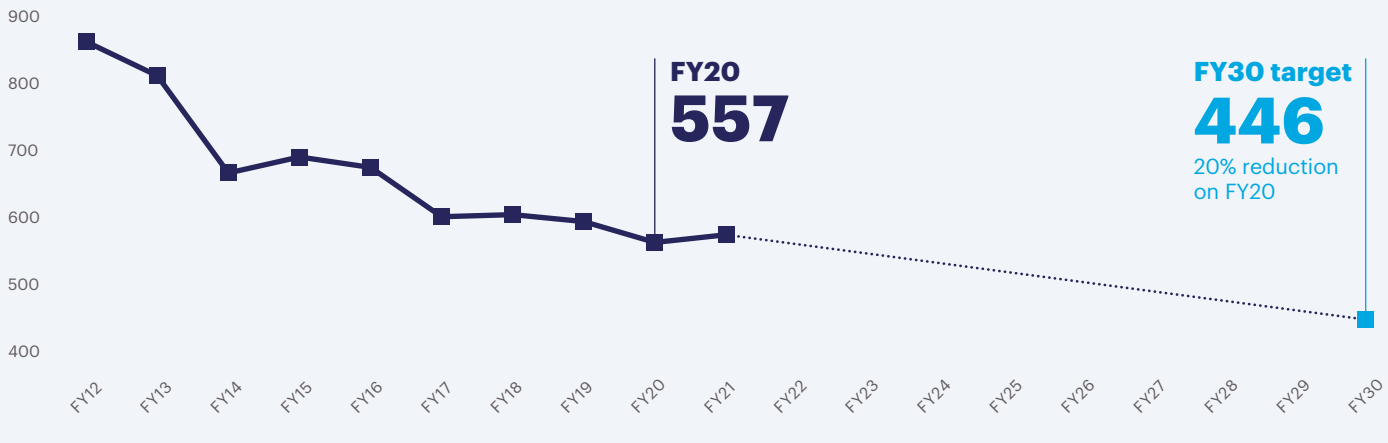
To support transparency and comparability we remain committed to reporting annually a range of indicators, in addition to our targets, including:

- Clinker to cement ratio (refer p. 24)
- Thermal efficiency of clinker production (GJ/tonne clinker) (refer p. 33)
- Electrical intensity of cement production (kWh/tonne cement) (refer p. 17)
- Net Scope 1 emissions intensity (kg CO_2e net)/tonne cementitious material.

Several international cement companies report against the emissions intensity metric per tonne cementitious material. As a point of reference, our intensity in FY20 was 549kg CO_2e net/tonne cementitious material.

1. Adbri is a member of the CIF, which is an affiliate of the GCCA. https://gccassociation.org/concretefuture/

Cement intensity emissions historical performance and target commitment (kg CO_2e net/tonne cement)



Net zero emissions goal continued

Lime

Adbri's lime business intensity target based on Scope 1 emissions:

10% ↘

reduction in emissions intensity (kg CO_2e) per tonne of lime by FY30 vs FY20 baseline

▲ The Munster plant converts naturally occurring shellsand to lime by heating it in the kilns

Based on Scope 1 emissions, Adbri has set a medium-term intensity target of a 10% reduction in emissions (kg CO_2e) per tonne of lime by FY30 vs FY20 baseline.

There are no international emissions intensity benchmarks for lime production. There are limited commercial actions that can be taken to significantly reduce the intensity of our lime manufacturing in the period to FY30. The 10% reduction is a stretch target for Adbri, based on currently available commercial decarbonisation actions for Scope 1 emissions. Scope 2 emissions associated with lime manufacture are covered by the company-wide target for electricity procurement. Given the capital-intensive nature of lime manufacturing and the impact of market demand on our intensity target, we do not expect a linear intensity trend line to FY30. There will be yearly variability due to changes in the kiln fuels and customer requirements for different lime product quality.

The graph below shows our historical performance against the intensity metric. The emissions intensity of lime manufacturing over the last decade has been relatively flat. Our FY20 base year intensity was 1,100kg CO_2e/tonne lime. Our 2030 target is 990kg CO_2e/tonne lime. In FY21, the lime emissions intensity was 1,083kg CO_2e/tonne lime. PwC has provided limited assurance for the baseline data (refer to p. 34).

The decarbonisation actions we will take to assist in meeting this target include the following:

- Reduce and phase out coal as a kiln fuel at Munster by the end of 2024
- Implement process and energy efficiency measures to reduce energy consumption
- Investigate opportunities for biomass materials to be used as alternative fuels in the lime kilns
- Assess design options for new lime plants, including as part of the definite feasibility study for the proposed Kalgoorlie kiln
- Conduct R&D and demonstration scale trials for new lime kiln designs with tech developers such as Calix (refer to p. 23).

We acknowledge that we have made a previous commitment to phase out coal at Munster by 2021, which we have not met. As part of our actions to reduce emissions from lime production, we will stop using coal by the end of calendar year 2024. Our usage of coal has declined year-on-year and in calendar year 2021 represented 50% of our fuel mix at Munster.

Lime emissions historical performance and target commitment (kg CO_2e/tonne)

Electricity

100%

zero emissions electricity supply by FY30

Electricity accounted for 9% of Adbri's total emissions in FY20. We have set an ambitious medium-term target to achieve 100% zero emissions supply by FY30 from a FY20 baseline of zero. Although around half of our electricity is sourced from renewable generation, currently none of our purchased electricity is accounted for as zero emissions electricity as we do not hold the large-scale generation certificates (LGCs).

In FY20, 74% of our Scope 2 emissions were dominated by purchased electricity for Cockburn Cement – Munster and Kwinana (lime and cement manufacturing) – and Birkenhead (clinker/cement manufacturing). Since FY12, our Scope 2 emissions have reduced by about 31%.

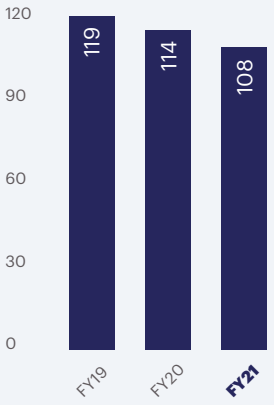
In cement production, electricity is used for raw material grinding, clinker production and cement grinding. In recent years, we have seen an improvement in the electrical efficiency of our integrated clinker/cement plants as shown in the graph.

By the end of 2021, we had made a cumulative investment of $942,000 in solar PV installations at six masonry and five concrete sites. The total installed capacity at the end of 2021 was 7.9MW. These investments reduce our Scope 2 emissions and have reduced our energy costs in the respective businesses.

As a first step to meeting this target, Adbri intends to review its electricity contracts and assess our options to purchase zero emissions electricity. In assessing electricity options, it will be important to match our electricity contracts with our operational requirements.

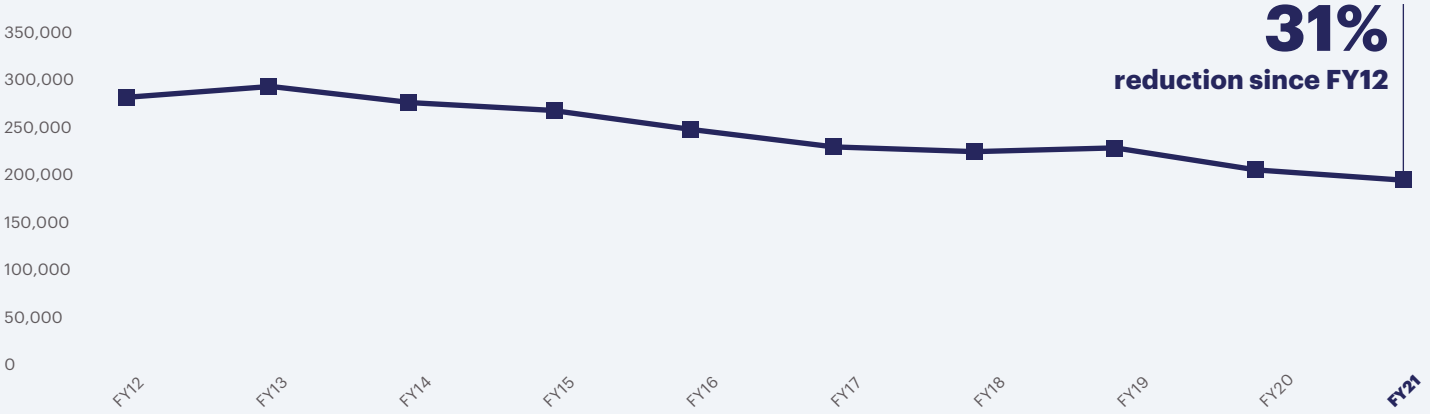
We expect that over the coming decade, zero emissions electricity will become more competitive across Australia, if the market is supported by appropriate government regulations, and investment is made to support infrastructure required to underpin new electricity generation. Our target is dependent on these external enablers delivering reliable, firmed and affordable decarbonised electricity across all markets in Australia, in a timely fashion.

Electrical intensity of cement manufacturing (kWh/t cement[1])



1. South Australian integrated clinker/cement plants only.

Scope 2 emissions historical performance (tCO_2e)



Net zero emissions goal continued

Long-term 2050 goal

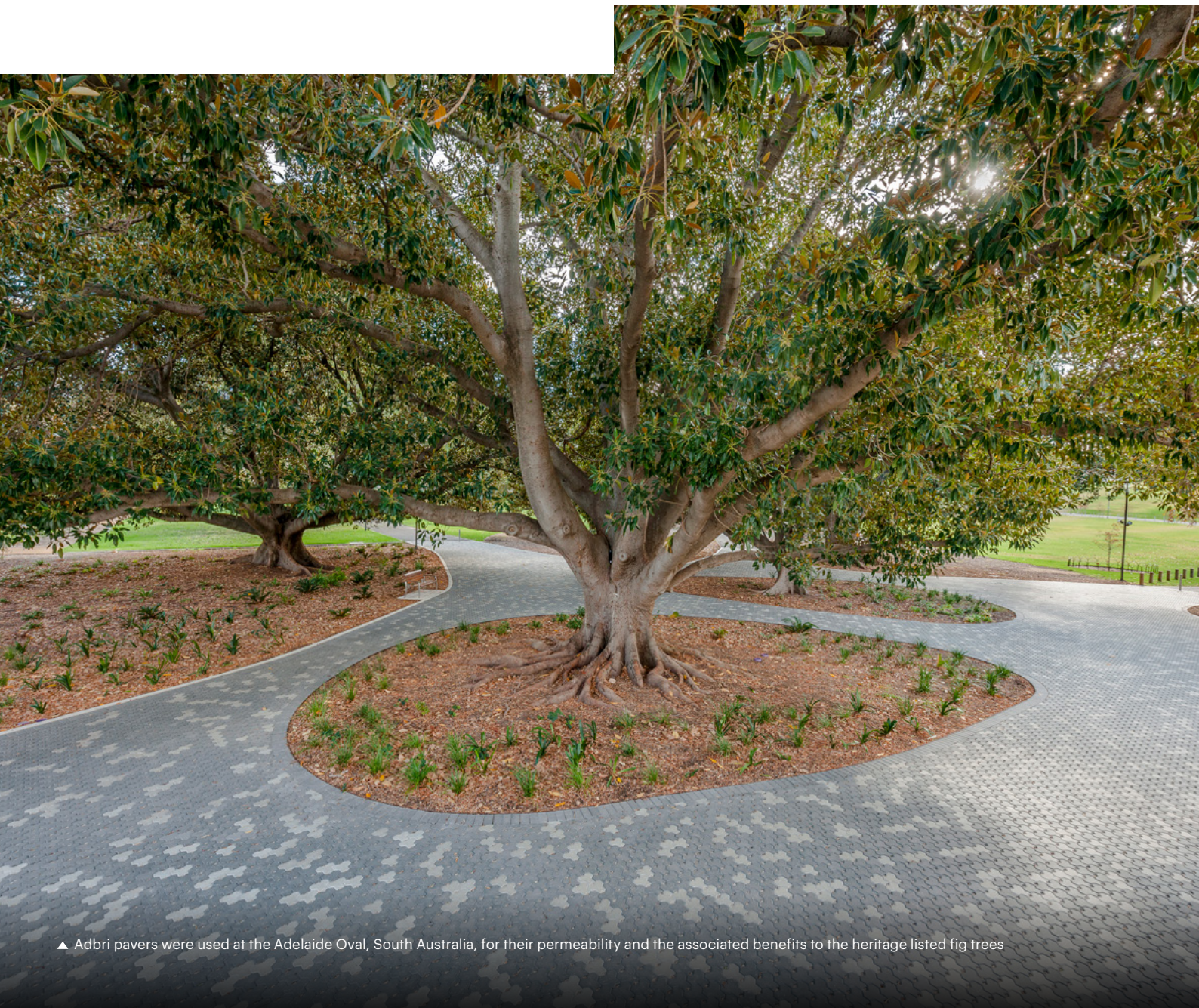
Adbri's long-term goal is to be net zero by 2050.

In the period from 2030–2050, we anticipate breakthrough technologies will play a key role in further reducing our emissions. We will continue to investigate a range of breakthrough technologies, including:

- CCS/CCUS for the cement and lime sectors
- Zero emissions process heat options, including electrification and hydrogen
- Zero emissions heavy vehicles for on-road and off-road use suitable for Adbri's operations
- Innovative use of new materials to reduce the emissions intensity of clinker manufacture, such as calcined clays.

Other potential technology options may emerge in coming years. We will partner with research organisations and technology developers to stay informed and assess technologies for application in our operations.

Our long-term goal is to be net zero emissions by 2050. Initially, the focus is on our Scope 1 and Scope 2 emissions, however, we intend to develop a pathway to achieving net zero Scope 3 emissions in line with our 2050 goal.



▲ Adbri pavers were used at the Adelaide Oval, South Australia, for their permeability and the associated benefits to the heritage listed fig trees

Action plan and decarbonisation levers

Our NZE Roadmap is focused on three key actions: reduce emissions, create new products, and collaborate.

Reduce emissions	**Cement**	Process and energy efficiency improvements
		Increase decarbonated raw feed
		Increase alternative fuels
		Increase the use of SCMs
		Diesel reduction and replacement
	Lime	Process and energy efficiency improvements
		Explore options for alternative fuels
		Fuel switching
	Electricity	Process and energy efficiency improvements
		Zero emissions electricity
	Breakthrough technologies	Breakthrough technologies
Create new products	**Lower carbon products**	– Develop new SCMs – Innovate and develop lower carbon products – Launch Environmental Product Declarations (EDPs) to inform choice – Create product awareness to grow market demand
	Building design and construction	– Support efficient and innovative building design and construction – Recycle concrete
Collaborate	**Key partners**	Work together across our processes to reduce emissions and create new products with customers, suppliers, joint venture partners, technology developers, research organisations, industry associations, governments, and standard setting authorities.

Action plan and decarbonisation levers continued

Reduce emissions

Cement

	Near term initiatives	Future opportunities

Process and energy efficiency improvements	– Progressing initiatives from our 2021 end-to-end process review at Birkenhead
	  – reduced air leakage
	  – running the kiln at its optimum level
	  – optimised milling operations
	– Delivery of the Kwinana Upgrade project, that will provide greater efficiencies in our Western Australian cement operations
		– Further process reviews, including at our Angaston manufacturing plant
		– Investigate digital automation and control technologies, including artificial intelligence (AI) to optimise manufacturing processes

Increase decarbonated raw feed	– Replacing natural minerals used for clinker manufacturing with alternative sources containing less, or no carbon, can lead to lower carbon dioxide emissions. Decarbonated raw materials have already been processed, so that they no longer release CO_2 at high temperatures – Ongoing pilot trials at Birkenhead using small quantities of slag as a decarbonated raw feed in clinker manufacture	– Identify suppliers of decarbonated raw feeds and negotiate supply arrangements to scale up pilot trials – Monitor international developments and research. The European Cement Association, CEMBUREAU, envisages up to a 3.5% reduction of process CO_2 emissions using decarbonated materials by 2030 and up to 8% reduction by 2050[1]. The ClimateWorks Foundation report, *Decarbonising Concrete*[2], suggests that at least 10% decarbonated raw materials can be targeted by 2050 as an important decarbonisation lever
Increase alternative fuels	– Birkenhead – continue to increase the RDF substitution rate in line with existing licence conditions and kiln design	– Birkenhead – consult and seek approval from the regulator to further increase the use of alternative fuels in our clinker manufacturing process, which may include investing capital required to facilitate the front-end firing of alternative fuels in our clinker kiln – Explore other alternative fuel sources, such as hydrogen. Experience in Europe suggests that injecting hydrogen into the clinker kiln fuel mix enables the use of alternative fuels at higher substitution levels – Work with the Heavy Industry Low-carbon Transition Co-operative Research Centre (HILT CRC) to investigate lower emission sources of process heat – Explore changes to kiln design to increase the use of alternative fuels – Monitor international experience and consider hydrogen projects with Australian gas suppliers and research partners. As the hydrogen industry grows in Australia, there is the potential for hydrogen to be blended with the traditional gas supply in the range of about 10% (volumetric basis)

1. https://lowcarboneconomy.cembureau.eu/carbon-neutrality/our-2050-roadmap-the-5c-approach-clinker/
2. https://www.climateworks.org/wp-content/uploads/2021/03/Decarbonizing_Concrete.pdf

	Near term initiatives	Future opportunities
Increase use of SCMs	– Increase use of SCMs in line with short-term SCM target of 24%, as a proportion of final cementitious product sales, by 2024 against our baseline of 21% in 2019 – Pilot trials with customers to test and demonstrate strength properties of lower carbon products using new and emerging SCM products – Contribute to development of industry standards for lower carbon products using higher levels of SCMs and lower carbon products using new SCMs	– Increase use of SCMs in line with our business strategy. Building on our 2024 target, we are planning for a 36% share of SCMs as a proportion of final cementitious product sales by 2030, against our baseline of 21% in 2020 – Explore new sources of SCM supply – Explore and monitor international research on novel SCMs, such as calcined clay and natural pozzolans

Diesel reduction and replacement	– Across our business, diesel use contributes about 3% of our total operational emissions, split about 50:50 between transport and other uses, for example onsite stationary diesel motors
	– Operational continuous improvement
	  – Further development of digital tools to deliver better utilisation of our vehicles and to provide quality data that can be used to optimise fleet operations and to support our decision-making in the choice of low carbon vehicles
	  – Maximise utilisation of vehicles, particularly in non-peak periods, for more efficient delivery runs
	  – Shift to trucks with larger payload capacities where viable
	  – Improve plant footprint to reduce average lead times
	  – Improve driver training/education for example, reducing fuel burn
	– Partnerships to develop battery electric technology particularly for concrete agitator trucks
	– Partnerships with Original Equipment Manufacturers (OEMs) to integrate fleet management systems for heavy quarrying machinery to improve efficiency and reduce load cycles
	– Investigation and trials of non-intrusive retrofitted hydrogen generation systems on trucks as fuel supplements
	– Supplement onsite generators with zero emissions energy sources
	– Assess options to develop diesel intensity emissions reduction targets
		– Work with OEMs of heavy quarrying/mining machinery to further develop hybrid and renewable mobile equipment options
		– Monitor and evaluate ongoing research for industrial-scale low carbon vehicles – both on and off-road – including vehicles using electricity with batteries; biodiesel; hydrogen fuel cells; and hybrid versions
		– Actively identify pilot trials globally and seek opportunities to collaborate in diesel fuel reduction initiatives

Action plan and decarbonisation levers continued

Lime

	Near term initiatives	Future opportunities
Process and energy efficiency improvements	– Undertaking an end-to-end review of manufacturing processes at Munster and Dongara	– Exploring optimal design for new kilns, in line with next stage of the lime strategy, for example the definitive feasibility study for the proposed Kalgoorlie plant
Explore options for alternative fuels	– Explore options for alternative fuels such as biomass	– Explore emerging alternative fuels, including hydrogen
Fuel switching	– At Munster, we will stop using coal by the end of calendar year 2024	

Electricity

	Near term initiatives	Future opportunities
Process and energy efficiency improvements	– Continue investing in projects that improve the electrical efficiency of our integrated clinker/cement plants, cement milling operations and lime manufacturing plants	
Zero emissions electricity	– Monitor energy policy developments, electricity prices and contracting approach in Australia – Assess further opportunities for investments in renewable generation within our sites and consider options for onsite energy storage	– Assess battery storage opportunities – Develop a negotiating strategy for renewable power purchase agreements ahead of the expiration of our major electricity contracts – Monitor and evaluate research internationally and in Australia to gain maximum benefits from our investments in renewable generation and energy storage

▲ Adbri's Campbellfield Masonry sites with a 2.1MW solar PV rooftop installation

Breakthrough technologies

Breakthrough technologies are critical to achieve our NZE goal, especially post 2030. These include new technologies in our transport fleet, our manufacturing processes and in energy for our kilns. Timeframes for developing technologies are difficult to predict, and some may emerge before 2030.

CCS/CCUS present potential options to address the process emissions from cement and lime manufacturing.

Strengthened climate goals and new investment incentives are delivering unprecedented momentum for CCS/CCUS, as these technologies are expected to play an important role in meeting global net zero emissions targets, including as one of few solutions to tackle emissions from heavy industries. In the IEAs 2021 World Energy Outlook a new scenario is outlined for NZE by 2050, aligned with a 1.5°C trajectory. In this NZE scenario, it is assumed that total CO_2 captured increases 40-fold from 2020 to 2030 and a further three-fold from 2030–2040.

The IPCCs 6th Assessment Report states that CCS will be essential for eliminating limestone process emissions, produced in the manufacture of clinker and lime.

Whilst there are elements of this technology available today, commercial scale and cost hurdles remain, and there may be other barriers to applying CCS/CCUS technology to Adbri's business. Internationally, a range of CCS/CCUS technologies are being used for large-scale demonstration projects in selected cement and lime plants. Most of these projects are heavily subsidised by international governments.

One example of a breakthrough technology is Calix's Low Emissions Intensity Lime and Cement (LEILAC) carbon capture technology, which allows pure CO_2 to be captured as it is released from heating limestone. Calix's technology uses external heating, so that process emissions are not mixed with combustion gases, which makes it simpler to capture CO_2, ready for compression and transport. There is the potential to combine the Calix technology in the calcination process with a zero emissions fuel source or renewable power to provide heat for the Calix reactor and, for cement, the clinkering kiln. This could present a technically viable pathway to zero emissions manufacturing for lime and cement.

Supported by the European Union, the LEILAC projects are demonstrating this new type of pre-calciner. In order to quickly and effectively apply this technology, the European-Australian collaboration includes consortia of some of the world's largest cement, and lime companies, as well as leading research and environmental institutions. The LEILAC2 project, commenced in 2020, will build a demonstration plant that aims to separate around 100,000 tonnes per year of CO_2, in a scalable module.

As carbon capture technologies emerge, there are both technical and economic constraints in retrofitting to existing lime and cement plants. We would need to fully assess how these technologies could be integrated across our manufacturing processes.

Even where carbon capture technology may be available, there remains the question of CO_2 storage or use, including transport costs to suitable storage sites. Industry storage hubs may present an option over the longer term, such as the potential of the South West Hub in Western Australia. We are working through the Kwinana Industries Council to monitor this development.

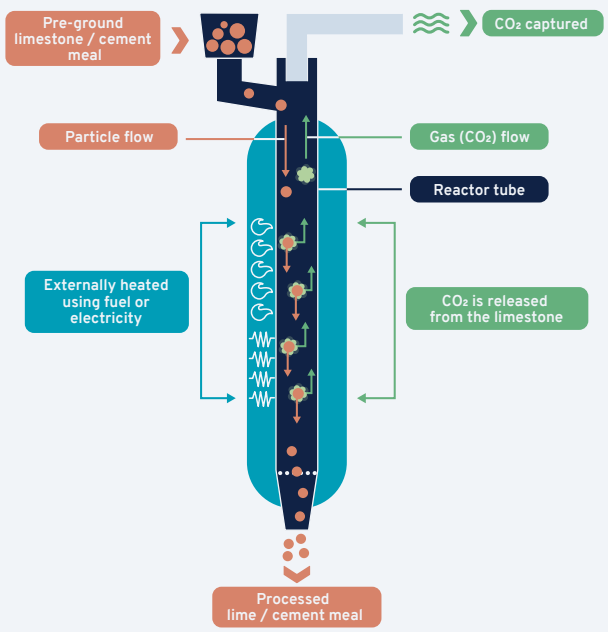
Breakthrough technologies are also a factor in the fuel sources available to heat clinker and lime kilns to the very high temperatures required for limestone calcination.

The increased number of large-scale demonstration projects in recent years where CCS/CCUS is being used in cement and lime plants is promising. Although there has been significant progress in CCS/CCUS technology to date, the technology is not commercial, at scale for industrial applications such as cement and lime manufacturing. To progress commercialisation, significant investment will be required in research, demonstration and pilot scale plants. Infrastructure investment for industry hubs to store CO_2 will also be important.

Partnerships and collaboration are a key way to progress breakthrough technologies. That is why Adbri is a core partner in the HILT CRC, established in June 2021.

Adbri has also partnered with Calix. In March 2021, we signed a Heads of Agreement covering the co-development of a Calix calciner for lime production with CO_2 capture. The project is framed around a five-year development and demonstration program. It would cover lime production of around 30KTPA, including demonstration of 20KTPA CO_2 capture.

We will continue to monitor and assess CCS/CCUS developments in Australia and internationally.



▲ New technology for CO_2 capture for clinker and lime manufacturing. Image courtesy of Calix

Action plan and decarbonisation levers continued

Create new products

Lower carbon products

Adbri is committed to manufacturing lower carbon products for our customers. One of our strategies is to increase the use of SCMs in our cement and concrete products.

Clinker is the most emissions-intensive product in the clinker-cement-concrete process. However, SCMs can partly replace clinker in cement (and therefore concrete). SCMs that are used most in Australia are ground granulated blast-furnace slag (GGBFS), fly ash from coal-fired power plants and limestone, all of which have much lower embodied carbon than clinker.

The clinker to cement ratio is an industry metric that reflects the utilisation of SCMs. By decreasing the amount of clinker and increasing the SCM content, the emissions intensity of cement can be reduced, while still producing a durable, resilient product that meets stringent standards.

Adbri's clinker to cement ratio at 77% was better than the Australian average of 84% in 2020.

The modelling in the *Decarbonisation Pathways for the Australian Cement and Concrete Sector*[1] suggested that the Australian cement industry should aim to achieve clinker to cement ratios of 70% by 2030 and 60% by 2050, to be aligned with the industry decarbonisation pathway. In FY20, our clinker/cement ratio was 77%. There was a marginal increase in FY21 to 78%.

At times the Australian market's clinker to cement ratio is higher than other developed nations. This is not, however, a marker of poor performance in the introduction of SCMs into the market – in fact Australia is well advanced compared to many other nations in this practice. It is instead a reflection of the point at which SCMs are introduced into the clinker-cement-concrete chain in Australia, comparative to other countries.

In many jurisdictions, SCMs are predominantly added into cement, and these 'blended cements' are then used to produce concrete. By contrast, in Australia the same SCMs are predominantly added directly at the concrete plant rather than being blended into cement. This actually provides a superior sustainability outcome in many instances, as the concrete producer can tailor their mix design to maximise SCM usage depending upon the end use of the concrete, compared to using a fixed ratio of SCMs contained within a blended cement.

As the Australian market demand for cement and concrete products grows over the period to 2030 and beyond, the total requirement for cementitious materials in our business will increase. SCMs can play a role in meeting this demand growth. We fully expect to maintain our domestic clinker/cement production profile over the period to 2030. If, in the future, there is reduced demand for clinker as a result of significantly higher use of SCMs, then this will allow us to reduce our imports of clinker, which is included in our Scope 3 emissions.

Building on our short-term SCM target, we are also setting a strategy to increase the SCM share of overall cementitious sales to 36% by 2030 against our 2020 baseline of 21%. This new measure will allow us to demonstrate our success in improving the substitution of clinker with lower carbon materials, irrespective of whether the SCMs are added through cement or directly at the concrete plant level.

Adbri has established an Innovation Council to prioritise, assess and recommend initiatives to develop lower carbon products across the business. We are working on EPDs to support the development of our lower carbon products and will also continue to pilot and trial innovative products across a range of end uses.

Institutional inertia, particularly with respect to Australian standards, presents one of the biggest hurdles to the widespread use of SCMs, including the use of higher limestone cements. We are engaging with organisations that are key in developing and updating product standards. We will continue to work with construction and infrastructure customers across the industry to accelerate the acceptance and adoption of these materials, many of which are proven in other countries.

1. http://cement.org.au/wp-content/uploads/2021/10/Decarbonisation_Pathways_Australian_Cement_and_Concrete_Sector.pdf

Adbri compared to the Australian industry roadmap clinker/cement ratio (%) decarbonisation pathway

Building design and construction

Adbri is focused on meeting customer needs, including customers who want to meet sustainable building requirements. Those requirements could include more innovative and efficient building design, which either uses less concrete or lower emissions concrete. We will continue to work with customers and specifiers to create product awareness. As new construction methods develop, there are likely to be further opportunities to develop products with a lower emissions footprint.

Recycling concrete is another longer-term action to reduce emissions and contribute to the circular economy.

In the near term, we will continue to work with authorities setting industry standards to support lower emissions building products.

CO_2 emissions are adsorbed during the lifetime of concrete structures, and after the end-of-life use, in a process called recarbonation. Opportunities to better understand the recarbonation process in the built environment are outlined in the *Decarbonisation Pathways for the Australian Cement and Concrete Sector.*

Collaborate with key partners

If novel technologies are to reach the required level of maturity to meet decarbonisation goals, collective action is needed in the near term.

To identify an optimal technology route for the decarbonisation of the cement and lime sectors, the interaction between different technologies and their technical and economic requirements should be assessed for the Australian context. We are exploring options to do this in partnership with others. Early planning can play an important part in preparing the sectors for a rapid and smooth rollout of technologies once they mature.

In 2021, we became a core partner of the new HILT CRC which is a leading collaboration to transform the heavy industry sector for a low carbon economy. In 2022, we are planning to participate in these projects through the HILT CRC:

- Alternative construction materials for the cement industry
- Carbon utilisation and recycling
- A CCUS Roadmap for the Australian cement and lime sector
- Carbon mapping of heavy industry
- Green heat for heavy industry.

We are also a partner of the SmartCrete CRC; a member of the Material and Embodied Carbon Leaders Alliance (MECLA) in NSW which brings together a wide range of industry, government, research and NGO representatives; and an Associate Member of VDZ, a German-based organisation which acts as an international knowledge hub for all aspects of the cement and concrete industry.

Our industry associations – Cement Concrete & Aggregate Australia (CCAA), CIF and MA – also provide opportunities to collaborate across industry and have all released NZE Roadmaps which align with our approach.

▲ Adbri's environmental permeable pavers featured at Brigidine College, St Ives, New South Wales

Our external environment

Climate change is both a strategic risk and an opportunity for our business. To mitigate this risk, we are adopting the actions outlined in this NZE Roadmap.

We recognise our success in transitioning to a low carbon economy requires external support and enablement. The uncertainty on the timing and scope of these external enablers will impact on our decisions along the pathway to NZE. We will work closely with the relevant external parties to influence outcomes and to prioritise actions which are anticipated to underpin our success.

We expect our actions to decarbonise our operations will lead to a range of opportunities, including resource efficiency and cost savings, development of new products, accessing new markets, and building resilience along our supply chain.

External enablers critical to Adbri's aspirations

External Enabler	Priorities
Technology commercialisation	– Collaboration across governments, investors, research organisations and communities to accelerate commercialisation of breakthrough technologies at scale – Additional Australian Government funding, R&D support and co-investment initiatives to drive investments to identify viable technology pathways to low emissions cement, concrete and lime products

Competitively priced energy	– Electricity: Continued access to affordable, reliable, firmed and decarbonised electricity requires:
	  – clear investment signals for zero emissions project developers
	  – availability of firming capacity to support intermittent generation
	  – transmission infrastructure to support the connection of zero emissions generation to electricity grids
	  – effective market planning for demand growth associated with electrification across sectors
	– Gas: Effective policies and market design are required to ensure competitively priced gas is available for our manufacturing operations, until alternative, viable fuel and technology options are available
	– Alternative fuels: Governments driving the circular economy by enabling legislation, streamlining waste policies and resetting landfill charges to incentivise the use of alternative fuels will enable Adbri to maximise the use of one of its key decarbonisation levers

Raw material availability	– Access to quality SCM raw materials in sufficient quantities is critical to Adbri's ability to meet lower carbon product designs – As novel SCMs are identified, regulations will be needed to support commercial supply

Market support for lower carbon products	– Governments have a role to play in stimulating demand for lower emissions products through:
	  – new national standards, codes, accreditations and work methods developed in partnership with the industry
	  – setting ambitious standards for energy performance of buildings that are demanding and sophisticated enough to take into account the benefits of properties such as thermal mass
	  – setting government procurement policies that provide market demand for lower emissions products, and over time demonstrate product performance and acceptance
	– Tier 1 construction companies partnering with suppliers of lower carbon products to create critical mass in the market
	– Retailers to promote lower carbon products and provide education to commercial and residential customers

Policy support	– Government policies have a vital role in enabling, de-risking and coordinating emissions reductions, including policies that:
	  – reduce transition risks
	  – support decarbonisation investment
	  – continue to recognise cement and lime manufacturing as emissions-intensive trade-exposed activities
	– If carbon pricing legislation is introduced in Australia:
	  – it is critical that the design of such a scheme does not disadvantage domestic manufacturing versus imported products
	  – a carbon border adjustment mechanism, or similar, would be required to ensure equitable treatment of imports and domestic manufactured products to avoid carbon leakage
	– Rigorous methodologies and transparent rules for registries are required to provide confidence in carbon credits from offset projects
	  – rules must be enforced to ensure no double counting of units
	  – linkages with international schemes should not reduce the quality of Australian carbon credit units (ACCUs)

Our investment and reporting

Investing in our action plan and decarbonisation levers

Over the past decade, Adbri has invested over $50 million in capital projects to deliver abatement outcomes. Adbri will continue to assess options to invest in emissions reduction actions.

As we work towards more detailed scoping on near term emissions reduction initiatives, projects will be assessed as part of our capital allocation process. We will build on our capability in the business to include carbon price sensitivity analysis in our investment decisions.

We are also in the process of upskilling our employees on climate change, energy and NZE issues. It is important all our people – from the Board to our operations teams – are given the right tools to allow them to understand the issues, commitments and challenges in order for them to help solve these complex business issues. We will need a diversity of skills, experience and thinking to explore and evaluate the best actions for Adbri to take over the short, medium and long term.

Executive remuneration has been linked to both financial and sustainability targets, including climate change key performance indicators (KPIs).

Adbri is committed to the challenges of reducing our emissions and to continue delivering long-term shareholder value.

Offsets

Our first priority in our NZE journey is emissions reductions within our operations to meet our short- and medium-term targets. As we progress emissions reduction initiatives, we will assess whether offsets have a role to play in addressing residual emissions that cannot be dealt with until late in our pathway. We will continue to monitor developments in the Australian and international carbon markets, which are changing rapidly in response to the increasing ambition of government and corporate commitments.

Reporting

Transparently sharing our progress against our Roadmap is important to Adbri. There are many factors that will have an impact on our ability to implement emissions reduction initiatives and our progress may not be linear. We will provide annual updates on our performance against our targets in our annual *Sustainability Report*.

▲ Birkenhead, South Australia

Our approach

Climate Change Position Statement

In 2022 Adbri released its Position on Climate Change. This statement outlines our acceptance of the climate change science, the role of lime, cement and concrete in the transition to a low carbon economy and our commitment to collaborative action.

Adbri's Position on Climate Change

Adbri accepts the Intergovernmental Panel on Climate Change's evidence that warming of the planet is unequivocal, that human influence is the main driver and physical impacts are unavoidable.

We believe

- The world must pursue the Paris Agreement goals with increased collective ambition to accelerate action to limit the impacts of climate change
- Business has a critical role to play in responding to scientific evidence and addressing the risks and uncertainties of climate change
- The challenge of significantly cutting global emissions will require transformations across the economy, including the built environment
- Cement, concrete and lime products have a critical role to play in the transition to a low carbon economy
- Lime and cement manufacturing are both hard-to-abate processes; however, there are energy-related abatement actions available in the short and medium term
- Technologies required for our net zero emissions goal are not yet commercial at scale, but we anticipate these can be developed through innovation, investment and cooperative partnerships
- Government policies will play a critical role in enabling action aligned to the Paris Agreement.

We are committed to

- Identifying and integrating commercial responses to climate change into our strategies as we plan for sustainable growth
- Reducing our operational greenhouse gas emissions in line with our public targets as we transition to a low carbon future
- Listening to our employees and communities and collaborating with our suppliers, JV partners and customers
- Producing lower carbon products for our customers to support their sustainability goals
- Adapting to the potential physical impacts of climate change by working with experts to build our knowledge and enhance the resilience of our assets
- Partnering with others to develop technologies and solutions to ensure our business remains profitable and market leading
- Building our capacity and resourcing across the business through training and skills development to support our journey to net zero emissions
- Engaging with governments to adopt appropriate policies to support sustainable manufacturing in Australia
- Transparently reporting our performance against our commitments using international frameworks, including the Task Force on Climate-Related Financial Disclosures.

Our Sustainability Framework

Adbri's Sustainability Framework identifies two primary goals:

- Engaged people and communities
- Sustainable and responsible business

The Sustainability Framework complements the NZE Roadmap as it is committed to addressing the impacts of climate change and developing lower carbon products. The Framework, adopted in 2019, includes Adbri's short-term emissions reduction target. More information about the Sustainability Framework can be found in Adbri's *2021 Sustainability Report*.

Task Force on Climate-Related Financial Disclosure (TCFD)

In 2019, Adbri committed to phase in reporting in accordance with the TCFD framework of Governance, Strategy, Risk Management and Metrics. Adbri has identified climate change as a strategic risk and an opportunity for our business. Our risk assessment is aligned with the TCFD approach and includes an analysis of transition and physical risks.

An important disclosure recommended by TCFD is to describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

Adbri disclosed its first climate change scenario analysis in the *2020 Sustainability Report*, including an assessment of three scenarios, drawing on work from the IPCC and the IEA.

Last year, the IEA published its World Energy Outlook (WEO-2021) which includes a new scenario for NZE by 2050. In this NZE scenario, CO_2 emissions are net zero in 2050 globally, and the rise in temperature reaches a maximum level of just over 1.5 °C around 2050 and by 2100 the rise in temperature falls to around 1.4ºC.

Key global signposts for Adbri taken from IEA's NZE scenario include:

- Investment in clean energy increases four-fold from 2020 to 2030
- Total CO_2 captured increases 40-fold from 2020 to 2030 and a further three-fold from 2030–2040
- The share of renewable energy more than doubles from 2020 to 2030 and reaches 88% by 2050
- The share of new buildings that are zero carbon ready increases from 5% in 2020 to 100% in 2030
- The share of electric, hydrogen and hybrid vehicles in total heavy vehicle sales increases from zero in 2020 to 30% in 2030; 84% in 2040; and 99% by 2050.

These signposts give Adbri confidence that our own priorities and our decarbonisation levers are closely aligned with a number of the global priorities for action in a 1.5°C NZE scenario. By partnering with others over the next decade, we can take advantage of investment and innovation trends to bring forward new technologies so that we are ready to scale up beyond 2030. This strategy positions Adbri to capture opportunities in the transition to a NZE future, aligned with a 1.5°C trajectory.

▲ We are committed to making a positive contribution to communities

	No Action	Stated Policies Scenario	Sustainable Development Scenario
Temperature target	4.0ºC	2.7ºC	1.7ºC
IPCC/IEA	IPCC RCP 8.5/IEA 6DS	IEA STEPS	IEA SDS
Summary	This scenario represents emissions trends in recent years. With no effort to stabilise emissions, the global temperature rises 4ºC this century leading to a high risk of extreme weather events, coastal flooding and lower crop yields. Fossil fuels are used unabated in this scenario	Represents scenario based on current stated policy ambitions. Achieving country net-zero targets is not automatically assumed	Limits impact of physical risk from climate change; however, requires a rapid and wholesale change in energy markets. Aligns with Paris Agreement goals

Our emissions

Clinker, cement, concrete and masonry

Adbri owns and operates two of the five cement plants in Australia that produce clinker and cement in an integrated process – Birkenhead and Angaston in South Australia. Almost 60% of the total cement manufactured in Australia is produced in such integrated manufacturing plants. The remaining 40% involves the use of clinker which is imported and manufactured into cement at grinding facilities located around Australia's coastline.

Cement is also directly imported into Australia, averaging around 5% to 10% of today's domestic cement demand.

Cement production consists of three main stages:

- Preparation of raw materials – limestone, clay and sand are mixed and milled into a homogenous powder (raw meal)
- The ground raw meal is heated in a pre-calciner, where the calcination process occurs, before it is fed into a rotating kiln at about 1450°C to produce clinker. The chemical process of calcination releases CO_2 (process emissions)
- The clinker is cooled and ground with other materials to produce cement.

Concrete is a mixture of cement, water, sand and aggregates, as well as SCMs as additions.

Clinker manufacturing is a hard-to-abate process due to the very high levels of process emissions, the need for high temperatures in the kiln, and the current high cost and technical risk associated with known abatement solutions. The clinker process emissions cannot be significantly reduced by any conventional approach. The only viable technology known today that may be able to fully decarbonise our clinker manufacturing is CCS/CCUS, which is not yet commercial at scale for industrial processes.

Achieving high temperatures in the clinker kiln has traditionally required fossil fuels. Although we have decreased our use of gas and increased our use of alternative fuels, we expect that some gas will be required for the foreseeable future to create the right environment within the kiln for clinker production. The high process emissions and the emissions from the kiln fuels are challenges that make the process hard-to-abate, but we are committed to working in partnership with key stakeholders to unlock solutions that will enable us to produce NZE cement and concrete products in future decades.

The presence of strong and sustainable local manufacturing of key materials such as cement and concrete is closely linked to the economic prosperity of Australia and its regional communities. Concrete is a localised business employing local communities and makes a positive contribution to local economies. Our challenge is to reduce the emissions from the manufacturing of these products to ensure that we can continue to offer innovative and sustainable solutions for society.

Lime

Adbri manufactures lime at a number of sites in Australia, including Munster and Dongara in Western Australia and Angaston in South Australia. The calcination process (similar to clinker production) generates lime and carbon dioxide from limestone. These process emissions are currently unavoidable and cannot be reduced cost-effectively today.

Fossil fuels have been used traditionally to achieve the high temperatures required for calcination. The Munster lime kiln uses both gas and coal; our other lime plants currently use only gas as the kiln fuel. Although lime manufacturing is hard-to-abate today, we believe that some of the promising technologies in pilot trials may provide the solutions to decarbonise our operations in the future, for example the Calix technology used in the LEILAC projects in Europe.[1]

GHG emissions[2]

Operational emissions (Scope 1 and Scope 2)

Adbri's operational emissions are split by process emissions (60%) and energy emissions (40%). In FY21, of the 60% process emissions, approximately 45% came from clinker manufacturing and 55% from lime manufacturing.

Our total emissions in FY21 were 2.29 million tonnes CO_2e. Figure 1 outlines our GHG emissions and the split by Scope 1 emissions and Scope 2 emissions. Figure 2 provides details of our operational emissions by product – cement; lime; and concrete, aggregates and masonry. In our base year for our 2030 targets, FY20, clinker, cement and concrete (including aggregates and masonry) contributed 1,137kt CO_2e (49%) and lime manufacturing contributed 1,196kt CO_2e (51%). A further breakdown of emissions by activity is provided on p. 6 and p. 7.

Adbri's emissions are dominated by contributions from process emissions, kiln fuels and electricity as shown in Figure 3.

1. https://www.calix.global/industries/industry-lime/
2. Adbri's emissions reporting is on a financial year basis (30 June) in line with the NGERS reporting obligation.

Scope 3 emissions

We disclosed our Scope 3 emissions for the first time in our *2021 Sustainability Report*. Our estimated Scope 3 emissions for FY21 were 1.01 million tonnes CO_2e. This estimate included our material sources of emissions, but not all Scope 3 categories. To date we have included the embedded carbon in our imported clinker and cement; sea freight of imported clinker, cement and slag; and upstream emissions associated with production and supply of energy (e.g. production and transportation of gas to our sites), as shown in Figure 4.

Although our disclosure includes a substantial component of Scope 3 emissions, we will continue to complete assessment of emissions from: purchased goods – sourced within Australia; capital items; joint ventures (JV) contributions; and downstream transportation and distribution associated with contractors who deliver products to our customers. Engagement with our suppliers, customers and JV partners will help us to better understand the options to reduce their emissions and their expected transition pathways.

Given we do not have operational control of any of our JVs, we have not reported their emissions in our operational emissions. We will report emissions from our JVs on an equity accounting basis in our Scope 3 emissions in the future.

As we refine our understanding of Scope 3 emissions, we will look to set an interim Scope 3 emissions target. We intend to include Scope 3 emissions in our 2050 goal.

Clinker manufacturing is the most emissions-intensive part of the process to make cement. Adbri both manufacturers clinker in Australia, and imports clinker from overseas. Emissions from imported clinker are counted in Adbri's Scope 3 emissions.

Shifting to a model where all of Australia's clinker is imported would lead to a substantial reduction in Australia's national emissions, but this model would also result in a significant loss of domestic manufacturing capability in Australia, with flow on losses to jobs and economic growth. Simply 'offshoring' emissions will not address the global challenge of reducing emissions, nor support more innovative ways to manufacture clinker, cement and concrete.

The difference between cement and concrete made from Australian manufactured clinker and that made from imported clinker is important for a number of reasons:

- **Comparability across the industry**: It is important to be transparent about the embedded emissions in the clinker used to make cement, in order to compare emissions performance across the industry.
- **Competitiveness**: Different ways of accounting for emissions may make domestic products appear less attractive and competitive from an emissions perspective.
- **Policy**: As national governments adopt policy settings on carbon pricing and emissions reduction, policy impacts should drive a level playing field, so that imported products are not at an advantage compared to domestic products. If imports are advantaged, it would result in longer supply chains and a negative impact on local manufacturing capacity, jobs and economic activity.

Historical performance

Adbri is proud of our historical performance to reduce GHG emissions. Since FY10, we have reduced our Scope 1 and Scope 2 emissions by 32%. As shown in Figure 5, our main sources of emissions are from the use of natural gas, coal and RDF in our clinker and lime kilns, electricity and liquid fuels, such as diesel. As shown in Figure 6, our emissions have been reducing in recent years, aligned with our short-term target.

Factors contributing to emissions reduction include:

- Switching from domestic clinker production to importing clinker at the Cockburn Cement plant in Western Australia. This plant faced a number of challenges due to the aging, inefficient clinker manufacturing assets, rising energy and maintenance costs and limitations on raw feed
- Use of alternative fuels – such as RDF at Birkenhead – means we have been able to use less gas. RDF is a lower emissions energy source than gas
- Reduced reliance on coal for the Munster lime kiln
- Continuous improvements to modernise our plants
- Process improvements in our end-to-end cement manufacturing processes
- Improvements in thermal efficiency (Figure 8) and electrical intensity (p. 17).

Over the past decade, we have invested over $50 million in projects to deliver energy savings and abatement outcomes.

Adbri's clinker/cement manufacturing plants are leaders in the Australian industry on a number of key metrics and are internationally competitive in terms of clinker emissions intensity as shown in Figure 9 and Figure 10.

▲ In FY21 our Tinda Creek quarry in NSW trialled a hybrid electric excavator

Our emissions continued

Figure 1 – GHG emissions

	FY21	FY20	FY19
Total operational GHG emissions (Scope 1 and 2) tCO_2e[1]	**2,289,449**	2,332,553	2,387,020
Scope 1 GHG emissions tCO_2e[1]	**2,092,331**	2,125,121	2,156,481
Scope 2 GHG emissions tCO_2e[1]	**197,118**	207,432	230,539
Scope 3 GHG emissions tCO_2e	**1,012,808**	N/A	N/A

1. GHG emissions are measured and reported in line with the *Australian National Greenhouse and Energy Reporting Act 2007.*

Figure 2 – GHG emissions by product
Scope 1 + Scope 2 kt CO_2e

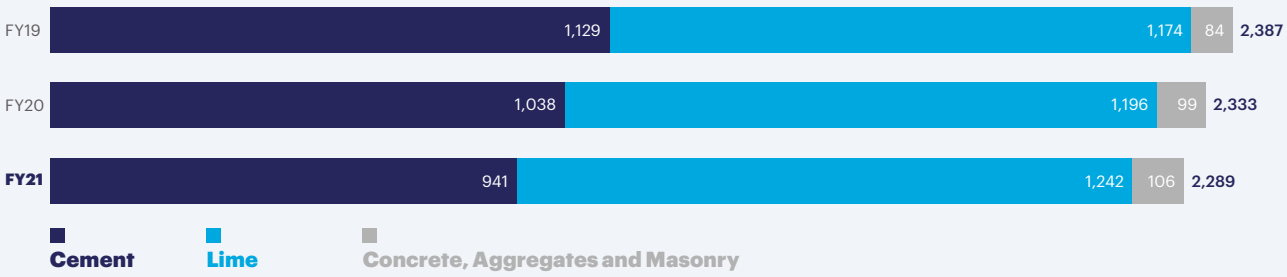
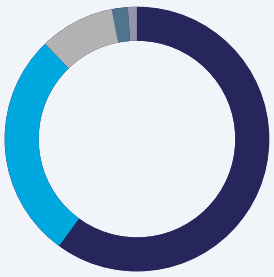


Figure 3 – FY21 Operational GHG emissions (Scope 1 + Scope 2) by source



Process emissions (lime and clinker) **60%**

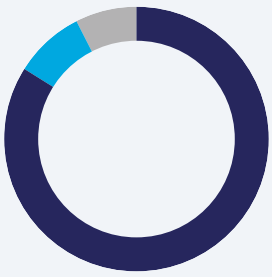
Kiln fuels **28%**

Electricity **9%**

Non-kiln onsite fuels **2%**

Transport fuels **1%**

Figure 4 – FY21 Scope 3 emissions

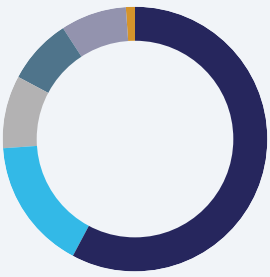


Purchased goods **84%**

Upstream fuel & energy-related activities **9%**

Upstream transportation & distribution **7%**

Figure 5 – FY21 Energy consumption by source (TJ)



Natural gas **58%**

Coal **16%**

Electricity **9%**

Refuse derived fuel **8%**

Liquid fuels **8%**

Recovered waste oil **1%**

Figure 6 – Scope 1 and Scope 2 operational GHG emissions vs clinker and lime production

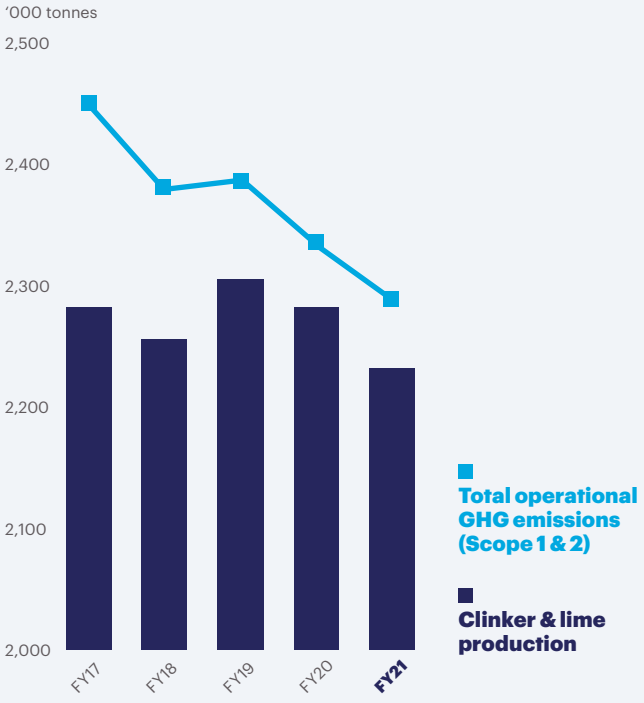


Figure 7 – Reduced energy consumption FY19–FY21 (GJ)

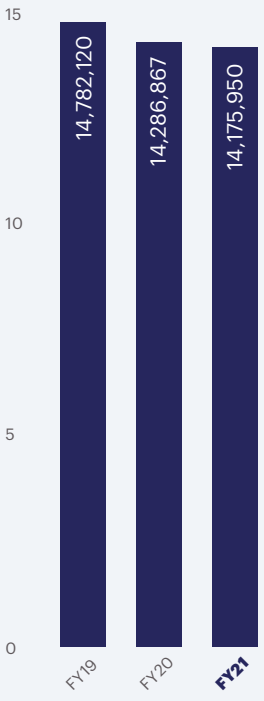
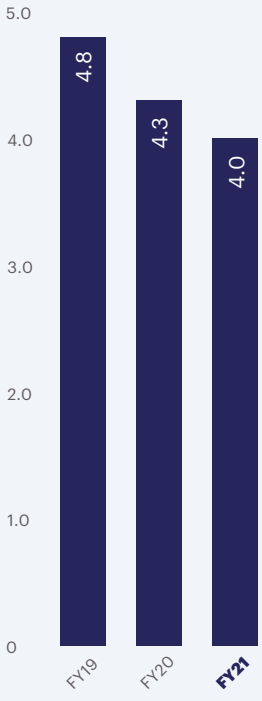


Figure 8 – Thermal efficiency of our clinker manufacturing (GJ/t clinker[1])



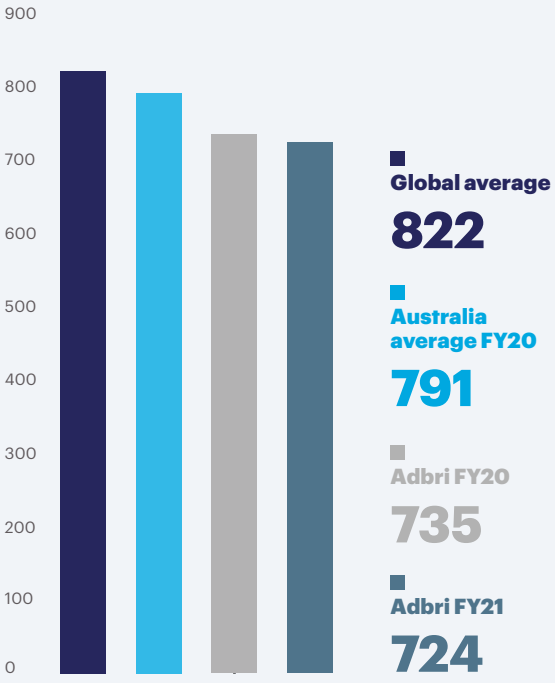
1. South Australian integrated clinker/cement plants only.

Figure 9 – Comparing Adbri's clinker performance against the Australian industry average performance

Metric	Australian industry average 2020[2]	Adbri FY20	Adbri's relative performance
Thermal substitution rate (%) (alternative fuels)	18	25	●
Clinker/ cement ratio (%)	84	77	●
Clinker Scope 1 emissions intensity (kg CO_2e/tonne clinker)	791	735	●

2 *Decarbonisation Pathways for the Australian Cement and Concrete Sector* 2021 by VDZ on behalf of The Cement Industry Federation; Cement Concrete and Aggregates Australia; SmartCrete CRC; RACE for 2030 CRC http://cement.org.au/wp-content/uploads/2021/10/Decarbonisation_Pathways_Australian_Cement_and_Concrete_Sector.pdf

Figure 10 – Clinker emissions intensity – Scope 1 emissions ($kgCO_2e$/tonne clinker)[2]



Assurance

Independent Assurance Report to the Board of Directors of Adbri Limited

What we found

Based on the work described below, nothing has come to our attention that causes us to believe that the $kgCO_2$-e (net) per tonne of cement and $kgCO_2$-e per tonne of lime produced for the 12 months to 30 June 2020 has not been prepared, in all material respects, in accordance with the Basis of Preparation.

What we did

Adbri Limited engaged us to perform a limited assurance engagement on the preparation of $kgCO_2$-e (net) per tonne of cement and $kgCO_2$-e per tonne of lime produced in accordance with the Basis of Preparation for the 12 months ended 30 June 2020.

Subject matter

The Subject Matter included within the scope of our engagement (disclosed in Adbri's Net Zero Emissions Roadmap) comprised the following:

- Cement emissions intensity of 557 kgCO2-e (net) per tonne of cement produced for the 12 months to 30 June 2020; and
- Lime emissions intensity of 1,100 $kgCO_2$-e per tonne of lime produced for the 12 months to 30 June 2020.

Reporting criteria

The Subject Matter needs to be read and understood together with Adbri's Basis of Preparation which Adbri is solely responsible for selecting and applying. The Basis of Preparation, included in Appendix 1, describes the key methods, assumptions, estimates and calculations Adbri Limited has applied in preparing the Subject Matter.

Our Independence and Quality Control

We have complied with relevant ethical requirements related to assurance engagements, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

The firm applies Auditing Standard ASQC 1 Quality Control for Firms that Perform Audits and Reviews of Financial Reports and Other Financial Information, Other Assurance Engagements and Related Services Engagements and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Inherent limitations

Inherent limitations exist in all assurance engagements due to the selective testing of the information being examined. Therefore fraud, error or non-compliance may occur and not be detected. Additionally, non-financial data may be subject to more inherent limitations than financial data, given both its nature and the methods used for determining, calculating and estimating such data.

Limited assurance

This engagement is aimed at obtaining limited assurance for our conclusions. As a limited assurance engagement is restricted primarily to enquiries and analytical procedures and the work is substantially less detailed than that undertaken for a reasonable assurance engagement, the level of assurance is lower than would be obtained in a reasonable assurance engagement.

Professional standards require us to use negative wording in the conclusion of a limited assurance report.

Restriction on use

This report including our conclusions, has been prepared solely for the Board of Directors of Adbri Limited in accordance with the agreement between us, to assist the Directors in reporting on the selected subject matter. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Board of Directors and Adbri for our work or this report except where terms are expressly agreed between us in writing.

We permit this report to be disclosed in Adbri's Net Zero Emissions Roadmap Report to assist the Directors in responding to their governance responsibilities by obtaining an independent assurance report in connection with the selected subject matter.

Responsibilities

PwC

Our responsibility is to express a conclusion based on the work we performed.

Responsible party

Adbri Limited management is responsible for the preparation and presentation of the subject matter in accordance with the Reporting Criteria.

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What our work involved

We conducted our work in accordance with the Australian Standard on Assurance Engagements (ASAE) 3000 *Assurance Engagements Other than Audits or Reviews of Historical Financial Information* and ASAE 3410 *Assurance Engagements on Greenhouse Gas Statements*. This Standard requires that we comply with independence and ethical requirements and plan the engagement so that it will be performed effectively.

Main procedures performed

The procedures we performed were based on our professional judgement and included:

- evaluating the Basis of Preparation;
- undertaking enquiries with management regarding the processes and controls for capturing, collating and reporting the Subject Matter;
- on a sample basis, agreeing underlying records to evidence supporting the Subject Matter;
- undertaking analytical review procedures over data and obtaining explanations from management regarding unusual or unexpected amounts; and
- assessing the reasonableness of any material estimates made in preparing the Subject Matter.

We believe that the information we have obtained is sufficient and appropriate to provide a basis for our conclusion.

John Tomac
Partner
30 March 2022

PricewaterhouseCoopers
Sydney

Appendix 1 – Basis of Preparation

Cement Emissions Intensity Measurement - Scope & Methodology

This document outlines the basis on which the Cement Emissions Intensity Metric (CIM) has been calculated.

The CIM FY20 baseline is 557 kg CO2e net/tonne of cement.

Greenhouse gas is abbreviated to GHG. National Greenhouse Emissions Reporting scheme is abbreviated to NGER.

Methodology

A breakdown of the calculations used is summarised below:

Cement Emissions Intensity Metric (kg CO_2-e net/tonne cement) =

[(Total GHG emissions from clinker and cement production - total GHG emissions from cement production using third party clinker) - Scope 2 electricity - alternative fuels GHG emissions] / tonnes cement produced using clinker from Adbri operations.

Scope

Included:

- The baseline assessment incorporates inputs from Birkenhead and Angaston operations, which are the only two operations where Adbri produces clinker in Australia.
- The cement emissions intensity metric focuses only on the direct emissions (Scope 1) generated in the production of cement from our own clinker.

Excluded:

- The CIM excludes Scope 2 emissions, which aligns with the Global Cement and Concrete Association (GCCA) members' commitment. Scope 2 emissions are captured in a separate target 'zero emissions electricity by 2030'.
- The cement emissions intensity metric is a 'net' calculation which excludes emissions generated from:
  - Any on-site power generation.
  - Alternative fuels including items such as refuse-derived fuel (RDF) including wood and plastics; waste oil; and biomass fuels.
  - Cement produced from third party clinker.
  - Scope 2 emissions.

Consistent with the GCCA members' commitment, alternative fuels are netted out of the emissions calculation to reflect their circular economy value.

Reporting period

In alignment to Adbri's published GHG emissions targets, the Cement Emissions Intensity Metric has been reported on a financial reporting period ending 30 June 2020 (FY20).

Financial year reporting aligns with NGERs reporting commitments.

Data collection

The CIM calculation is based on NGER data for FY20 and production data for the same period.

Lime Emissions Intensity Measurement - Scope & Methodology

This document outlines the basis on which the Lime Emissions Intensity Metric (LIM) has been calculated.

The FY20 baseline is 1,100 kg CO2e/tonne of lime.

Greenhouse gas is abbreviated to GHG.

Methodology

A breakdown of the calculations used is summarised below:

Lime Emissions Intensity Metric (kg CO_2-e net/tonne lime) =

[Total lime GHG emissions - Scope 2 emissions]/ tonnes of lime production

Scope

Included:

- The Baseline Assessment incorporates inputs from Munster, Dongara, Mataranka and Angaston operations, which were active lime producers in FY20 within the Adbri Group.
- The lime intensity metric focuses only on the direct emissions (Scope 1) generated by the lime processes.
- The Scope 1 emissions are gross (rather than net, as used in the Cement Emissions Intensity metric).

Excluded:

- The lime emissions intensity metric excludes Scope 2 emissions which is consistent with our cement intensity measurement.

Reporting period

In alignment to Adbri's published Greenhouse Gas (GHG) emissions targets, the Lime Emissions Intensity Metric has been reported on a financial reporting period ending 30 June 2020 (FY20).

Financial year reporting aligns with NGERs reporting commitments.

Data collection

The LIM calculation is based on National Greenhouse Emissions Reporting scheme (NGER) data for FY20 and production data for the same period.

140 years strong

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